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Ministry of Transport

21 December 2016

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Transaction Advisory Services for the Development of Boankra Inland Port and Eastern Railway Line Project on PPP Basis

Final Feasibility Report

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List of Abbreviations and Meanings

Abbreviation	Full meaning
AA	Approval Authority
ADMD	Aid and Debt Management Division
ADT	Average Daily Traffic
AfDB	African Development Bank
BIP	Boankra Inland Port
BOT	Build Operate Transfer
BOO	Build Own Operate
BOST	Bulk Oil Storage and Transport
BoQ	Bill of Quantities
CAPEX	Capital Expenditure
CENELEC	European Committee for Electro-technical Standardization
CFS	Container Freight Station
CP	Conditions Precedent
CRRM	Credit for Released Materials
CWR	Continuous Welded Rails
C&F	Carrying and Forwarding
DBFOM	Design-Build-Finance-Operate-Maintain
DC	Direct Current
DEM	Digital Elevation Model
DEMU	Diesel Electrical Multiple Unit
DFI	Development Finance Institutions
DMU	Diesel Multiple Units
DPs	Development Partners
DSCR	Debt Service Coverage Ratio
DTM	Digital Terrain Model
EBITDA	Earnings Before Interest Tax Depreciation and Amortization
ECHs	Empty Container Handlers
EI	Executive Instrument
EIRR	Economic Internal Rate of Return
EMC	Electromagnetic Compatibility
EoI	Expression of Interest

Abbreviation	Full meaning
EPABX	Electronic Private Automatic Branch Exchange
EPC	Electronic and Plant Consultation
EPC	Engineering Procurement Construction
ERL	Eastern Railway Line
ESIA	Environmental and Social Impact Assessment
EXIM	Export Import
FDI	Foreign Direct Investment
FEED	Front-End Engineering Design
FEU	Forty Foot Equivalent
FIRR	Financial Internal Rate of Return
HDM	Highway Development Management
HFL	Highest Flood Levels
PFI	Private Finance Initiative
GACL	Ghana Airport Company Limited
GC	Clayey Gravel
GCI	Global Competitiveness Index
GDP	Gross Domestic Product
GDRA	Ghana Railway Development Authority
GHA	Ghana Highway Authority
GHATOA	Ghana Haulage Transport Owners Association
GHTDU	Ghana Haulage Transport Drivers Union
GIS	Geographic Information System
GM	Silty Gravel
GoG	Government of Ghana
GP	Poorly graded Gravel
GPHA	Ghana Ports and Harbours Authority
GPRTU	Ghana Private Road Transport Union
GRCL	Ghana Railway Company Ltd
GRDA	Ghana Railway Development Authority
GRHA	Ghana Road Haulage Association
GSA	Ghana Shippers Authority
GSC	Ghana Shippers Council
GW	Well graded Gravel
HR	Human Resource
IDC	Interest During Construction

Abbreviation	Full meaning
IMF	International Monetary Fund
IRR	Internal Rate of Return
ITLC	Integrated Transport and Logistics Corridor
JAPTU	Joint Association of Port Transport Union
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
KPIs	Key Performance Indicators
LED	Light-Emitting Diode
LLCR	Loan Life Coverage Ratio
LWR	Long Welded Rails
MI	Silt of medium plasticity
ML	Silt with low plasticity
ML – CL	Silty Clay of low plasticity
MMDA	Metropolitan, Municipal and District Assemblies
MoF	Ministry of Finance
MoF-PID	Ministry of Finance - Public Investment Division
MoT	Ministry of Transport
MoUs	Memorandum of Understanding
MS	MicroSoft
MT	Motorised Traffic
NPV	Net Present Value
OCCO	Operational Command Centre
ODA	Overseas Development Assistance
OECD	Organisation for Economic Cooperation and Development
O&M	Operations and Maintenance
OPEX	Operational Expenditure
PAM	Pan African Minerals Limited
PAP	Project Affected Persons
PAU	PPP Advisory Unit
PFA	Project and Financial Analysis
PFI	Private Finance Initiative
PID	Public Investment Division
PIT	Project Implementation Team
PPP	Public Private Partnership

Abbreviation	Full meaning
PSC	Public Sector Comparator
PSP	Private Sector Participation
PwC	PricewaterhouseCoopers
PV	Present Value
PVC	Polyvinyl Chloride
RAP	Resettlement Action Plan
RCC	Reinforced Concrete
RFP	Request for Proposal
RFQ	Request for Qualification
RMG	Rail Mounted Gantry
ROB	Road Over Bridge
ROW	Right of Way
RTG	Rubber Tyre Gantry
SC	Clayey Sand
SCR	Sequence Control Register
SDH	Secure Digital Host
SDH	Synchronous Digital Hierarchy
SEW	Structural Engineering Works
SG	Standard Gauge
SIL	Safety Integrity Levels
SM	Silty Sand
SM - SC	Clayey Silty Sand
SP	Poorly graded Sand
SPV	Special Purpose Vehicle
STC	State Transport Company
SW	Well graded Sand
TEU	Twenty-Foot Equivalent Unit
TMC	Terminal Management Company
TOR	Tema Oil Refinery
TTC	Travel Time Cost
UIC	International Union of Railways
USD	United States Dollars
UPS	Uninterruptable Power Supplies
VIPs	Vertical Intersection Points

Abbreviation	Full meaning
VOC	Vehicle Operating Costs
VOT	Values Of Time
VDS	Valuation and Development Services
VfM	Value for Money Assessment

Hon. Minister for Transport

Ministry of Transport
Accra, Ghana

Attention: Mr T.A Selby

18 October 2016

Dear Hon Minister

Subject:Transaction Advisory Services for the Development of Boankra Inland Port and Eastern Railway Line Project on a PPP Basis –Final Feasibility Report

In accordance with our contract with you dated 10 July 2014, we are pleased to enclose herewith our Final Feasibility Report for the development of Boankra Inland Port and Eastern Railway Line on a PPP basis. The report outlines:

- Our understanding of the assignment;
- Analysis of existing site conditions;
- Analysis of the various project options;
- Traffic Demand and Revenue Projections;
- Conceptual Engineering Design and cost estimates of the project;
- Legal and regulatory requirements of the project;
- Analysis of financial parameters of the project;
- Value for Money Assessment;
- Economic Assessments of the project.
- Transaction structuring of the project;
- Risks associated with the project;
- Market Sounding Activities
- Key Environmental and social impacts of the project; and
- Our proposed next steps.

Our Final Feasibility Report builds on our Draft Feasibility Report of 21 March 2016 and the feedback received from the various stakeholders.

We emphasise that the issues presented in this Final Feasibility Report are not exhaustive by any means, but highlight the key issues that have come to our attention to date.

We would like to take this opportunity to thank the Ministry of Transport and all other stakeholders for their contribution to our work to date.

We very much look forward to receiving your feedback on this report.

Yours sincerely
for: PricewaterhouseCoopers (Ghana) Limited

Vish Ashiagbor
Director

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Executive Summary

Executive Summary

Introduction

The Government of Ghana ("GoG") has re-emphasised the need to involve the private sector in the development of public infrastructure by promoting a robust PPP agenda.

In this regard, GoG, through the Ministry of Transport ("MoT") and its Agencies namely Ghana Shippers Authority ("GSA"), Ghana Ports and Harbours Authority ("GPHA") and the Ghana Railway Development Authority ("GRDA"), intends to pursue a PPP arrangement for the development of the Boankra Inland Port ("the Inland Port"), together with the reconstruction of the Eastern Railway Line, which will connect to the Inland Port. The development of the combined projects on a PPP basis, if ultimately approved by GoG, will be guided by the National PPP Policy dated June 2011.

A team led by PricewaterhouseCoopers Ghana Ltd has been appointed by MoT to provide transaction advisory services for the above mentioned project.

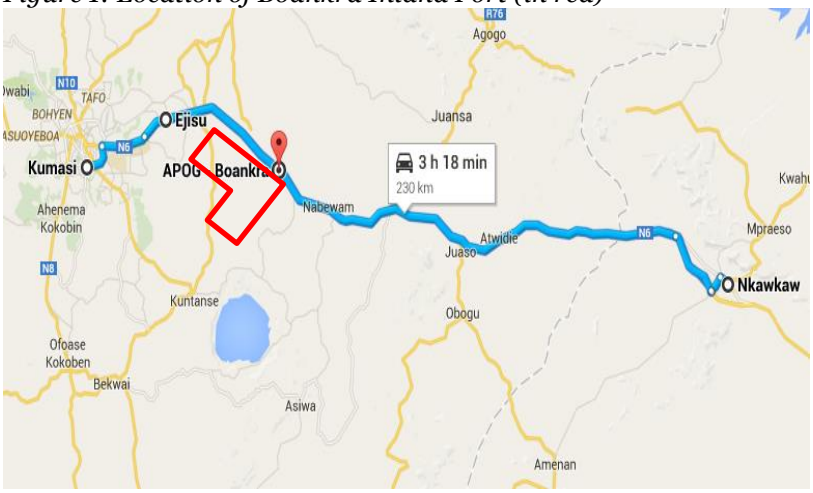
This report presents our Feasibility Assessment for the development of the Boankra Inland Port and Eastern Railway Line on a Public Private Partnership ("PPP") basis.

Project Concept and Requirements

Boankra Inland Port Project

The Boankra Inland Port, strategically located near Kumasi, was initiated in 1990 by GPHA and GSA in order to create an inland extension to the Tema Port. Currently, the Boankra Inland Port has been partially developed with an administration block, access roads and utility connections. Other plans for the further development of the Inland Port include an Inland Container Depot ("ICD"), port administration, shippers and freight forwarders offices, warehouses and commercial buildings. The Inland Port will also require the development of customs coordination protocols, customs clearance procedures and controls. Figure 1 below shows the location of the Inland Port.

Figure 1: Location of Boankra Inland Port (in red)



Source: Google Maps

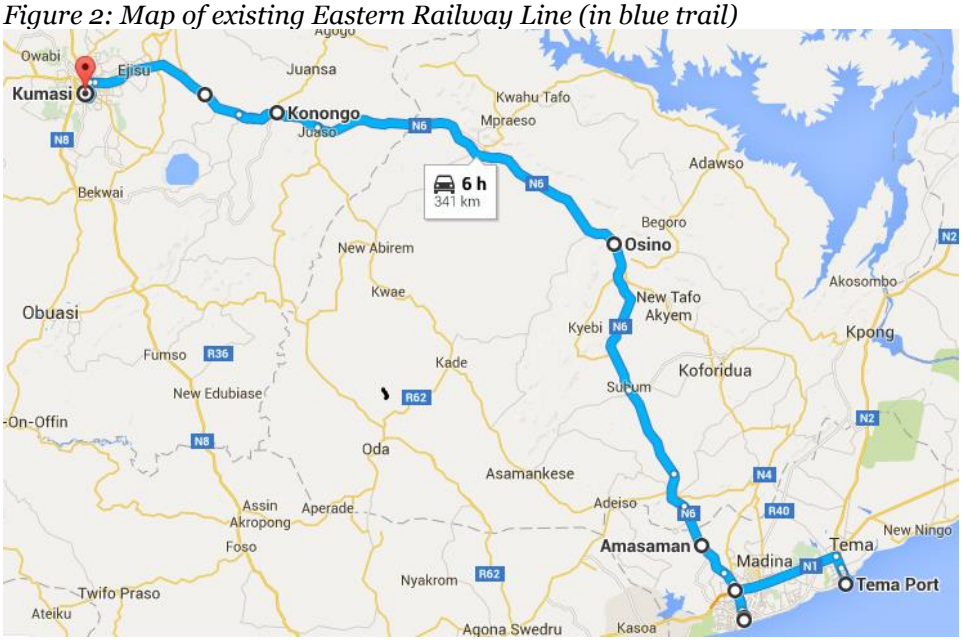
The concept is to attract private businesses to the area and develop it as an Industrial/Commercial Estate to serve the maritime business community. The Concessionaire would be responsible for estate management, marketing and development of the main roads and utilities. The individual lots would be developed by the Concessionaire.

The Eastern Railway Line Project

The Eastern Railway Line links Accra to Kumasi with a branch line from Achimota to Tema Port. The total track length is 330 km, and the gauge is 1,067 mm. Apart from the stretch from Accra to Nsawam and Accra to Tema which are being used for passenger traffic, the line is currently not operational due to its poor state.

The map below shows the existing Eastern Railway Line from Tema to Kumasi and a branch line to Accra.

Figure 2: Map of existing Eastern Railway Line (in blue trail)



Source: Google Maps

The reconstruction of the Eastern Railway line will include development, financing and operation of the 330km line and will include the provision of rolling stock, station upgrades, signalling and communication equipment.

The concept is to develop the Eastern Railway Line to modern standards, in order to provide an alternative, faster, safer and more efficient mode for transportation of freight from Tema Port to Northern Ghana and the landlocked countries to the north of Ghana.

Current State of the Boankra Inland Port

The Inland Port is being developed on a 400 acre parcel of land located at Boankra, 27 km away from Kumasi. The site is currently accessible by road.

At the Inland Port site, the Eastern Railway Line runs parallel to the N6 (Accra – Kumasi Highway). The site area is L-shaped with a fairly flat terrain and a stream running through the site. Some major works including land preparation, fencing and office buildings have been completed. We have however considered the Inland Port a Greenfield since it is currently not in operation.

Current State of the Eastern Railway Line

The existing Eastern Railway Line is virtually non-operational. The condition of the track is bad where it exists. Wooden sleepers are rotten and the ballast cushion is very thin. The tracks have mostly been removed or stolen beyond Nsawam.

The existing alignment has very sharp curves in some sections of the corridor such as from Tema to Achimota, from Accra to Achimota and Kumasi City areas, which would not be practicable to straighten due to constraints such as permanent structures i.e. lack of land beyond what the current Right of Way ("RoW") provides for.

The activities of illegal mining ("galamsey") along the banks of River Birim at Ankaase and other areas, particularly between Osino and Anyinam have completely destroyed substantial sections of the rail. In these affected areas the land is so badly disturbed that it may take some geotechnical engineering to stabilise the formation (route soil) in order to give it the requisite capacity to hold new tracks and the expected axle loading if the existing alignment is to be maintained. The only track showing in this area is the Anyinam level crossing.

The RoW has been encroached by human activities including commercial and resettlement activities. Human resettlement and commercial activities close to the rail are a major threat to the safe and efficient rail operation on the line. Several permanent and temporary structures have been built within the RoW. This will present social challenges to the development of the line around Tema, Achimota, Amasaman, Koforidua and other areas.

Signals and signal control structures have been vandalised and left in a deplorable state. Crossing protection signals in the section currently in operation are not only obsolete, but require crossing keeper personnel to manually operate them.

Some bridges and culverts are showing signs of fatigue and collapse. The bridges were designed to support 13.5 ton axle loads and would need to be strengthened or reconstructed to support from 22 to 25 ton axle loads.

Rolling stock and locomotive maintenance depots at Tema and Kumasi will also require rehabilitation and expansion.

Based on the Railway Master Plan, which sets out the minimum standards and design specifications for the railway, it was proposed by MoT/GRDA that the Eastern Railway Line be modernised to a standard gauge using 60kg rails and pre-stressed concrete sleepers.

Current State of the Accra-Kumasi Road

The Accra-Kumasi road forms the first section of the National Road N6, and is predominantly a single carriageway. The road connects two main economic metropolises, i.e. Accra-Tema business area in the Greater Accra Region and Kumasi area in the Ashanti Region. It also provides primary access from the southern parts of the country to the northern parts and vice versa.

The road is also an international transit route between Ghana and her landlocked neighbouring countries including Burkina Faso, Mali and Niger.

The road is currently characterised by:

- 3 toll booths on the road at Bunso, Ofankor and Kubease;
- An average speed of 55km/hr whereas the design speed is 100 km/h;
- Long travel times as a result of delays and congestion on the road; and
- Poor safety record along the highway.

Our observations also revealed other problems along the corridors which include:

- The lack of safe pedestrian crossing facilities and proper separation of pedestrians and vehicles was evident in the villages through which the road passes;
- Most safety barriers have been damaged by accidents;
- Broken down vehicles were left on the carriageway which represent a major hazard, particularly at night;
- Overtaking on bends was frequent and speed restrictions are poor;
- There were few facilities/rest stops provided for travellers along the corridor;
- The existing carriageways, whether dual or single, generally appeared to be in good condition except the section between Nsawam and Suhum that is being constructed;
- There were two toll points on the route, at Pokuase and Konongo collecting the nationally set toll rates; and
- The Pokuase toll point, despite its closeness to Accra and the obviously higher traffic levels, has only one booth per lane, and so causes queuing, resulting in a significant delay.

Options Analysis

As part of our considerations for finding the most viable option for the development of the Boankra Inland Port and Eastern Railway Line, we assessed the four identified project options against the primary objectives set out for the project's development and implementation. The options as determined for the development of the project included:

- Option 1 – Standalone Boankra Inland Port using a road connection only;
- Option2 – Standalone Eastern Railway Line carrying freight only;
- Option 3 - A combination of Boankra Inland Port and Eastern Railway Line for freight traffic only; and
- Option 4 - A combination of Boankra Inland Port and Eastern Railway Line for both freight and passenger traffic.

The identified objectives by which we assessed the project options were as follows:

- Decongestion of Tema Port and enhance its operational efficiency;
- Efficient and safer mode of transporting freight and passengers;
- Enhance Ghana's role as a transit corridor to landlocked countries;
- Feed traffic from other modes of transport to the Inland port;
- Enhance socio-economic/commercial development in the Ashanti Region and Eastern Corridor; and
- Provide value-added services and reduce cost.

Additionally, in finding the most suitable transaction option as required for the development of the Boankra Inland Port and the Eastern Railway Line, we assessed the projects based on key criteria that are required for PPP projects. They include:

- Strength and Capacity of the Market to Deliver the Project;
- Efficiency in Operation;
- Transfer of Risk to the Private Sector;

- Minimisation of Public Sector Risk;
- Viability and Bankability;
- Absence of Fiscal Commitment from Government;
- Health and Safety Improvements;
- Accordance with MDAs Strategic Plan;
- Absence of Legal Issues;
- Environmental and Social Soundness; and
- Affordability/Ability to Pay.

Based on the outcomes from our assessments, it was evident that combining the operations of the Boankra Inland Port and the Eastern Railway Line projects best meets the objectives of the project. This is mainly due to the advantages that integrating both the Inland Port and Railway Line operations provide in terms of the efficient import/export of freight as well as offering a faster, cheaper and safer means of transportation.

However, the combined Boankra Inland Port and Eastern Railway Line project will require a substantial capital investment to develop and may be challenging to fund by an investor. Moreover, it would be difficult to find a private investor with the capacity and experience in running both the Inland Port and Railway Line business together, as the two require very different skills and competencies.

Based on these considerations, we recommend that the combined Boankra Inland Port and Eastern Railway Line projects are implemented as two separate PPP transactions.

Traffic Demand Forecast Assessment

From our demand study, we have identified the sources of traffic for the Boankra Inland Port and the Eastern Railway line to be as follows:

- Containers;
- Petroleum Products;
- Cement;
- Cocoa;
- Other Cargo; and
- Passengers.

We used data from the Ghana Highway Authority (GHA) Axle Load Station at Boankra, traffic counts and O-D data including information collected from interviews of freight owners and shippers to determine the volume of traffic for the various freight types along the road corridor using 2015 as the base year. This is shown in the table below.

Table 1: Annual Volumes of Container and Cargo Traffic along Accra-Kumasi Road

Freight Items	Direction	Year 2015	Growth Rate (%)
Container within Ghana (TEUs/year)	Northbound & Southbound	46,136	5.07
Transit Container to landlocked countries (TEUs/year)	Northbound & Southbound	50,347	5.07
Petroleum (metric tonnes/year)	Northbound & Southbound	416,000	4.00
Cement (metric tonnes/year)	Northbound	143,578	6.90
Cocoa	Southbound	175,030	4.00
Other Cargo (metric tonnes/year)	Northbound & Southbound	676,447	5.07

Traffic Demand Forecast for the Standalone Boankra Inland Port using road connection only

In arriving at our traffic estimates for the Boankra Inland Port using road connection only, we have assumed that the volume of freight that is currently using Accra-Kumasi road will be the same for the standalone Inland Port with road connection on the following basis:

- Freight will be bonded and tracked to Boankra Inland Port;
- Customs and other shipping line services will be provided at the Inland Port;
- Trucking licenses/agreements will be awarded on a competitive basis to qualified and credible companies who can meet the customs bonding/transportation requirements;
- The transportation cost of freight using the road connection to the Inland Port will be the same or less than the current road transport cost;
- Tracking and insurance cost from Tema to Boankra will be subsidised by Government;
- The unimodal terminal (road-road) to Boankra will be a temporary alternative until the period where the railway line is constructed and operational;
- The Northbound traffic and transit cargo/container will be transported straight to the Boankra Inland Port by road as soon as it is offloaded from vessels at the Tema Port;
- Southbound traffic from the Northern parts of Ghana and landlocked countries will be sent directly to the Inland Port for processing and customs documentation before it is authorised to be transported by road to the Tema Port; and
- All containers or cargo will be processed by customs and the necessary documentation approved before the freight is allowed to be transported to its final destination.

The traffic estimates for the Standalone Boankra Inland Port using road connection only are shown in Table 2.

Table 2: Estimated Traffic Demand for the Standalone Boankra Inland Port using road connection only

Freight Items	Direction	2015	2018	2020	2025	2030	2035	2040	2045	2048
Container (TEUs) within Ghana										
Volume of container traffic to be transported by rail	Northbound-Southbound	46,136	53,517	59,082	75,660	96,891	124,079	158,895	203,482	236,027
Transit Containers (TEUs) to landlocked countries										
Volume of container transit traffic to be transported by rail	Northbound-Southbound	50,347	58,400	64,472	82,559	105,720	135,379	173,359	221,993	257,499
Cocoa (Metric Tonnes)										
Volume of cocoa to be transported by rail	Southbound	175,030	196,885	212,951	259,087	315,219	383,512	466,601	567,692	638,576
Other Cargo (Metric Tonnes)										
Volume of other cargo to be transported by rail	Northbound-Southbound	676,447	784,662	866,260	1,109,335	1,420,617	1,819,245	2,329,730	2,983,458	3,460,638
Total Container Traffic (TEUs)		**96,483**	**111,917**	**123,554**	**158,219**	**202,611**	**259,458**	**332,254**	**425,475**	**493,526**
Total Cargo Metric Tonnes		**851,477**	**981,547**	**1,079,211**	**1,368,422**	**1,735,836**	**2,202,757**	**2,796,331**	**3,551,150**	**4,099,214**

Note: *1) Other Cargo traffic consists of dry bulk, general cargo, bagged cargo and liquid bulk which are not containerised*

Traffic Demand Forecast for the Standalone Eastern Railway Line carrying freight only

We assumed that the volume of freight that is currently using Accra-Kumasi road (i.e. as at 2015) will almost be the same for the Eastern Railway Line. This was based on the following:

- Most of the respondents surveyed said they will shift to use rail if the current transportation cost of freight by road is reduced by 30% (i.e. a 30% discount);
- A reliable, safety and efficient service is provided;
- A policy is in place to ensure that most freight use the railway line;
- The Northbound traffic and transit cargo/container will be transported straight to Kumasi by rail after customs duty paid at the Tema Port;
- Southbound traffic from the Northern parts of Ghana and landlocked countries will be sent directly to the Kumasi Terminal for onward transportation on rail to Tema Port.

The traffic estimates for the Standalone Eastern Railway Line carrying freight only are shown in Table 3 below.

Table 3: Estimated Traffic Demand for the Standalone Eastern Railway Line carrying freight only

Freight Items	Direction	2015	2018	2020	2025	2030	2035	2040	2045	2048
Container (TEUs) within Ghana										
Volume of container traffic to be transported by rail	Northbound-Southbound	46,136	53,517	59,082	75,660	96,891	124,079	158,895	203,482	236,027
Transit Containers (TEUs) to landlocked countries										
Volume of container transit traffic to be transported by rail	Northbound-Southbound	50,347	58,400	64,472	82,559	105,720	135,379	173,359	221,993	257,499
Petroleum Products (Metric Tonnes)										
Volume of petroleum products to be transported rail	Northbound	416,000	467,943	506,128	615,782	749,192	911,507	1,108,988	1,349,253	1,517,726
Cement (Metric Tonnes)										
Volume of cement to be transported by rail	Northbound	143,578	175,396	200,436	279,810	390,618	545,306	761,253	1,062,717	1,298,227
Cocoa (Metric Tonnes)										
Volume of cocoa to be transported by rail	Southbound	175,030	196,885	212,951	259,087	315,219	383,512	466,601	567,692	638,576
Other Cargo (Metric Tonnes)										
Volume of other cargo to be transported by rail	Northbound-Southbound	676,447	784,662	866,260	1,109,335	1,420,617	1,819,245	2,329,730	2,983,458	3,460,638
Total Container Traffic (TEUs)		**96,483**	**111,917**	**123,554**	**158,219**	**202,611**	**259,458**	**332,254**	**425,475**	**493,526**
Total Cargo (Metric Tonnes)		**1,411,055**	**1,624,886**	**1,785,775**	**2,264,014**	**2,875,646**	**3,659,570**	**4,666,572**	**5,963,120**	**6,915,167**
Note: *1) Other Cargo traffic consists of dry bulk, general cargo, bagged cargo and frozen cargo*										

Passenger Traffic Demand Forecast for the Eastern Railway Line

The table below shows the projected rail passenger traffic based on the growth rate of 2.5% per annum.

Table 4: Forecasted Rail Passenger Traffic

2015	2018	2020	2025	2030	2040	2045	2048
819,338	882,337	927,006	1,048,822	1,186,646	1,519,007	1,718,617	1,850,762

Current Tariff Regime for Port and Rail Operations

We have highlighted the regulations that govern and prescribe port and rail tariffs in Ghana. We have also provided an overview of the tariffs which are currently charged at the Inland Port and Eastern Railway Line.

Tariff Regime for Inland Port Operations

As per PNDCL 160 under GPHA Act (1986), GPHA within the limits fixed by the Minister can prescribe rates, charges and dues for services provided by the Authority or specify the persons liable to pay the rates, charges and dues prescribed under section 75. Therefore, GPHA currently sets tariffs at ports in Ghana and would be responsible for setting the tariffs at the Inland Port.

The tariffs currently charged at the ports in Ghana are highlighted in Chapter 7 of this report.

Tariff Regime for Railway Line Operations

Railway operation in Ghana is governed by the Railways Act, 2008 (Act 779). The Act established the Ghana Railway Development Authority (GDRA) as the statutory body with responsibility to regulate and approve tariffs of railway companies.

The existing road and rail freight tariffs and the willingness to pay tariffs are shown in the table below.

Table 5: Existing Tariffs for Road and Rail

Commodity	Current Rate by Road (US$ per ton.km)	Current Rate by Rail (US$ per ton.km)	Willingness to Pay Tariff (US$) - 70% of Current Rate
Cocoa	0.25	-	0.18
Cement	0.06	-	0.04
Petroleum	0.21	-	0.15
Bulk Cargo	0.15	-	0.11
Other Cargo	0.12	-	0.08
20 ft Container	2.26	0.02	1.75
40 ft Container	-	-	-

80% of freight companies interviewed from our demand survey expressed willingness to shift to rail transport given a 30% reduction compared to current road fares.

The existing rail tariff is not high enough to cover passenger railway service costs and would require a subsidy from GoG or cross-subsidy between freight and passengers.

Conceptual Design Options and Cost Estimates – Boankra Inland Port

Given the forecasted traffic volumes, we do not believe that there will be an immediate need to develop all the facilities at the Inland Port upfront and that the development can be phased to meet demand as it builds up. This will also have the benefit of minimising the upfront investment required. Therefore, the Inland Port will be developed in two phases.

Based on the forecasted traffic demand, the total area that we have estimated for the first phase is approximately 64 acres for the Standalone Inland Port feeding traffic from road traffic only.

Proposed Layout

The proposed key development features for Phase 1 are:

- Road Network consisting of the main access road, a primary road that branches off from the Main Access Road to the Commercial and Port Administration Zone;
- Buildings i.e. Container Service Yard, Warehouses, Commercial Complex and Administration Complex and Fuel Station ;
- Equipment Storage Area;
- Customs Bonded Area;
- Services such as electric power lines, water lines, sewage and drainage systems; and
- Parking areas for trucks.

Area Requirements

The area required for each facility below was based on the traffic forecast, dwell time of containers/cargo, and the amount of space for equipment to maneuverer. The estimated area required for each facility is shown in Table 6 below.

Table 6: Area Assessment for the Boankra Inland Port

Facility	Area (Acres)
Container Yard Area	12
Empty Yard Area	4.5
CFS Area	10
Warehouse Area	13.5
Truck Parking Area	9
Commercial Complex	5.2
Utility Zone	4
Equipment Storage Zone	2
Fuel Station	1
Other Services(Post Office, Telecom, Security office and Fire Station)	0.5
Container Services Yard (Cleaning, Repair, Disinfection)	1.6
Truckers' facilities	1
Total (Acres)	**64.3**

Estimated Capital Expenditure for Boankra Inland Port

The estimated capital expenditure for the Boankra Inland Port is summarised below in Table 7.

Table 7: Estimated Capital Expenditure for Boankra Inland Port

Particulars	Amount (US$ Million)
Building Costs	77.5
Equipment Costs	16.4
Core Infrastructure(Power, road, IT, water, sewage)	10.0
Sub Total (EPC)	103.9
Contingency 15% of EPC*	15.6
Total Project Cost	**119.5**

*Contingency @ 15% EPC -This is to cover any extra work by the contractor

Conceptual Design Options and Cost Estimates – Eastern Railway Line

In order to minimise the project cost, we considered the following guidelines in reviewing and selecting an alignment for the Eastern Railway Line:

- Avoid geologically unstable formations, mineral parcels, national parks, archeologically sensitive areas to the extent possible;
- Avoid long tunnels and viaducts to the extent possible;
- Avoid infringement of built-up areas to the extent possible;
- Avoid infringement of religious sites, graveyards etc.;
- Provide yards and stations at locations for easy access by users;
- Provide adequate clearance from Highest Flood Levels (HFL);
- Provide drainage works as required;
- Provide crossings for animals at suitable locations;
- Balance cut and fills (i.e. earthworks) so that suitable cut would be used for adjacent fills;
- Minimise environmental pollution;
- Provide curvature and gradient suitable for the design speed; and
- Follow sound engineering practice.

Based on the above guidelines, we have considered and assessed three alignments for the Eastern Railway Line (see Chapter 8). These alignments are as follows:

1. Option 1/Minimum – This alignment considers the minimum specifications. The design speed we adopted was 80km/hour for freight /container and a horizontal curve up to 360m
2. Option 2/Desirable – This option meets the desirable specifications. The design speed for container was 100km/hour and for other freight is 80km/hour and has a horizontal curve up to 680m
3. Option 3/Ideal – This option meets the ideal design specifications. The design speed we adopted for freight / container is 120km/hour and has a horizontal curve up to 1,200m

Using the best-value least-cost approach from our assessment, we recommended Option 2 as the preferred alignment option to be taken forward at the detailed design stage.

Proposed Specifications for the Eastern Railway Line

One of the goals of the Economic Community of West Africa States ("ECOWAS") is the development of an integrated rail network between member countries. ECOWAS aims include the extension of railways in member countries, the interconnection of previously isolated railways and the standardisation of gauge, brakes, couplings, and other parameters.

Based on the above plan, GoG/MoT/GRDA have adopted the Railway Master Plan of December 2013 ("Railway Master Plan") prepared by TEAM Engineering Ltd on behalf of GRDA. The Railway Master Plan has certain specifications and requirements for designing, the formation, alignment, structures, stations and tracks for a standard gauge line.

The key standards that we have used for the concept design of the Eastern Railway Line are shown in Table 8 below.

Table 8: Design Standards Adopted

Description	Technical Features
Gauge:	• Standard Gauge 1,435 mm (4 ft 8 ½ in)
Design Speed	• Passenger nominal speed Velocity = 120km/h • Freight Speed: Velocity = 80km/h • Special Container flats: Velocity = 100km/h
Minimum Horizontal Curve Radius	• Min. without any constraint of RoW = 680m • Min. in populated with line within available RoW = 460m • 3 or 4 obligatory points through Koforidua with limited radius = 350 m
Minimum rising and falling gradient/Ruling Gradient	• Ruling gradient proposed is 1 in 100 compensated, so as to ensure that even on continuous rising gradients, reasonable speeds are maintained without the need for a pusher engine
Axle Load	• Considering mixed traffic on the proposed line, an axle load of 22.0 tonnes has been proposed.
Minimum length of Vertical Elements	• Minimum distance between adjacent Vertical Intersection Points (VIPs) has been restricted to Vmax/2.5 or 100m, whichever is more in the design
Vertical Curves	• We have proposed a circular curve with a minimum radius of 2500metres
Yard Gradient	• The gradient in the yards has been kept as flat as possible, however, for line passing through hills, sharper limiting gradient of 1:400 has been adopted
Rail Pads	• We have proposed to use rail pads of high stiffness having a thickness of 10mm
Points and Crossings	• Points and crossings will be 1 in 12 on main running lines and 1 in 9 for loops and service tracks
Rails	• UIC 60 (with weight of 60 kg/m) rail section as per UIC 860 specification has been proposed with Pre-Stressed concrete (PSC) sleepers

Description	Technical Features
	• Continuously Welded Rails (CWR) on the main line track and Long Welded Rails (LWR) on loop lines
Sleepers	• Mono-block Pre Stressed Concrete ("PSC") Sleepers with nominal length of 2.52m and nominal depth of 200mm have been proposed
Fastenings	• Pandrol Fastening System is proposed for the Eastern Railway Line
Ballast	• We have proposed a minimum of 300mm deep cushion of crushed stone of 65mm nominal size

Cost Estimates

The cost estimates for the proposed design option were derived based on the conceptual design created. Table 9 to 12 show the breakdown of the estimated costs we have considered for the construction of the railway line.

The cost rates we used for our estimates were based on ongoing works on the Western Railway Line.

Table 9: Construction Cost Breakdown for the Railway Line

Civil Works					
Sections	Length	Cost of Earth Works (US$ Million)	Structural Engineering Works Bridges, Retaining Wall and Tunnels (US$ Million)	Cost of Track work/ Permanent Way (US$ Million)	Sub Total (US$ Million)
Accra- Achimota	7.2	0.3	0.1	4.1	**4.5**
Tema- Achimota	23	0	0.9	13.3	**14.2**
Achimota-Kotoku	22.9	7.8	21.3	13.2	**42.3**
Kotoku-Nsawam	9.7	2.7	0.5	5.62	**8.82**
Nsawam-Koforidua	40.2	35.1	68.2	23.2	**126.5**
Koforidua Bypass	13.6	2.5	0.9	5.88	**9.28**
Koforidua – Nkawkaw	89.2	59.5	19.8	51.6	**130.9**
Nkawkaw- Ejisu	104.7	63.7	111.2	60.6	**235.5**
Ejisu-Kumasi	20.5	20.2	37.2	11.8	**69.2**
Total	**331**	**191.8**	**260.1**	**189.3**	**641.2**

We have estimated the resettlement and land acquisition cost for land being acquired at certain locations along the corridor. The table below shows the breakdown of the cost:

Table 10: Land Acquisition and Resettlement

Sections	Estimated Cost for Compensation (US$ million)
Accra- Achimota	1.0
Achimota- Kotoku	6.6
Kotoku-Nsawam	3.3
Nsawam –Koforidua	49.3

Sections	Estimated Cost for Compensation (US$ million)
Koforidua-Nkawkaw	27.6
Nkawkaw- Ejisu	17.8
Ejisu- Kumasi	45.8
Total Cost (US$ Million)	**151.3**

The estimated cost for rolling stock as per international standards is indicated in the table below:

Table 11: Rolling Stock for Freight Service

Equipment-Rolling Stock	Capacity	Specification	US$ million per Unit	Total Number of Units Estimated	Total Cost- (US$ million)
Locomotives					
Locomotives	3000 horse power	UIC Class (i.e. Co-Co)	3.20	12	**38.4**
Wagons					
Flat Wagons	90 TEU's	UIC Class R	0.09	260	23.4
Tank Wagons	2000 tons	Class Z/ UIC-type 7	0.12	120	14.4
Covered Wagons	3000 tons	Class G/ UIC 571-2	0.115	125	14.4
Sub-total (Wagons)				505	**52.2**

We have also separately estimated the cost of the infrastructure facilities that would be required during the operation stage of this Project and this is shown in the Table 12 below.

Table 12: Total Cost of Additional Facilities for Freight Rail Only

Description	Design Cost Estimate (US$ million)
Terminal Facilities at Tema	30
Terminal Facilities at Kumasi	30
Siding to Petroleum at Kaase (6km)	25
Siding and Rail Infrastructure within Boankra Inland Port	35.6
Maintenance Facilities	45
Operations Control Centre/ Other Support Buildings	25
Signalling and Telecommunication equipment	111.9
O&M Vehicles, Plant and Equipment	44.5
Electrical Works	7.4
Sub Total	**354.4**

The summary of the total project costs for capital expenditure of the Eastern Railway Line is seen in the table below:

Table 13: Summary of Total Project Cost

Description	Total Cost (US$ Million)
Rail Infrastructure (i.e. Earthworks, Bridges & Track work)	641.2
Relocation, Resettlement and Land Acquisition	151.3
Rolling Stock for freight	52.2
Other Freight Facilities (Terminals, Signalling & Telecommunications, Sidings, Maintenance Facilities, Other)	354.4
15% Contingency	179.8
Total	**1378.9**

*Contingency @ 15% on EPC Cost is to cover any extra work from earthwork contractor, track work contractor, bridgework contractor and signaling contractor.

Further details for the conceptual design and cost estimates for the Railway Line are discussed in chapter 8 of this report.

Economic Assessment

We have carried out an economic assessment of the proposed development of the Boankra Inland Port and the Eastern Railway Line. The objective of this assessment is to identify the costs and benefits of the project and their impact on GoG, transport users and the wider economy. The assessment measures the impact of the project on Travel Time, Vehicle Operating Costs (VOC), Road Maintenance Savings and Accidents using economic indicators such as the Net Present Value (NPV) and the Economic Internal Rate of Return (EIRR) to justify the economic viability of the project.

Our economic analysis of the Boankra Inland Port and Eastern Railway Line was carried out using the Highway Development and Management ("HDM-4") analysis tool and MS Excel spreadsheet calculations. The HDM-4 analysis tool is a software used for planning, programming, and operations and managing of a road network to optimise the overall performance of the network.

The key assumptions we used in our analysis include:

- A 12% discount rate, a benchmark commonly used at the World Bank to demonstrate economic value of investments was used (Ref: World Bank's Handbook on Economic Analysis of Investment Operations[1]);
- The rehabilitation of the Eastern Railway Line is estimated to cost about US$ 1,378.9 million with a construction period of five (5) years;
- The estimated cost of the Boankra Inland Port is US$ 119.2 million;
- Overall general maintenance cost for both the Inland Port and Railway Line is assumed to be 1% of capital cost annually. Periodic maintenance cost is assumed to be 5% of capital cost occurring 10 and 20 years following project implementation;
- A depreciation rate of 1.5% per annum is assumed for all project assets based on similar rates adopted for real estate and landed properties in Ghana;
- In view of assumption above, a salvage or residual value of 55% of the investment cost is assumed in the last year of project life and no maintenance cost is foreseen in the first and last years of operation;
- Environmental management cost and other socially related costs are assumed to be part of the overall project cost;
- All other costs input into the model are consistent with those used in the Financial Model; and
- All traffic flows used are consistent with the Demand Model.

[1] Operational Core Services Network Learning and Leadership Center, (1998), Handbook on Economic Analysis of Investment Operations, Washington, DC: The World Bank

The following economic indicators were used to justify the viability of the project options. These economic indicators include:

- Net Present Value (NPV);
- Economic Internal Rate of Return (EIRR %); and
- Road User Cost Savings

The table below summarises the results of our economic analysis:

Table 14: Summary of Economic Results

Alternative	Net Present Value (NPV) US$ Million	Economic Internal Rate of Return (EIRR) Percentage (%)
Option 1 - Boankra Inland Port (Standalone)	**567**	**18.8%**
Option 2 – Eastern Railway Line (Standalone)	**9,949**	**21.6%**
Option 3 – Boankra Inland Port and Eastern Railway Line (Freight Only)	**9,227**	**17.9%**
Option 4 – Boankra Inland Port and Eastern Railway Line (Freight and Passenger)	**9,704**	**18.7%**

The results of the economic assessment indicates that the all the 4 project options are economically viable and would benefit the wider economy if implemented**.**

Risk Assessment

Risks are an inherent part of PPP projects, particularly, a project of this size and complexity. In this report, we have identified the risks associated with the various aspects of this project. These risks have been quantified and allocated to the party that is best placed to manage them in a cost effective way. Appropriate mitigation measures have also been identified to avoid the occurrence or minimise the impacts of these risks, should they materialise.

We evaluated the project against standard risk management criteria for large scale infrastructure projects and selected the risks applicable to the implementation of the project. We used the risk matrix below to determine a rating for each risk based on the risk's likelihood of occurrence and the severity of impact should they ensue.

Table 15: Risk Matrix

Risk Matrix					
	LIKELIHOOD OF OCCURENCE				
SEVERITY	1. Rare	2. Unlikely	3. Moderate	4. Likely	5. Almost Certain
1. Minor	1	2	3	4	5
2. Moderate	2	4	6	8	10
3. Serious	3	6	9	12	15
4. Major	4	8	12	16	20
5. Catastrophic	5	10	15	20	25

The categories of risks assessed are:

- Project Risks;
- Finance Risks;
- Political and Regulatory Risks;
- Design and Construction Risks;
- Operational Risks; and
- Production and Service Design Planning.

Boankra Inland Port

Based on our risk assessment for the development of Inland Port, it was established that the private party bears the significant proportion of the key risks.

Table 16: Key Risks Allocation for the Boankra Inland Port

Risk	Allocated to
Project Risks	Shared
Finance Risk	Private Party
Political and Regulatory Risk	Government
Design and Construction Risk	Private Party
Operational Risk	Private Party
Demand/Revenue Risk	Private Party

Eastern Railway Line

Government bears a significant proportion of the key risks for the development of the Eastern Railway Line Project.

Table 17: Key Risks Allocation for the Standalone Eastern Railway Line

Risk	Allocated to
Project Risks	Government
Finance Risk	Government
Political and Regulatory Risk	Government
Design and Construction Risk	Government
Operational Risk	Private Party
Demand/Revenue Risk	Private Party

The risks we assessed and their corresponding matrices are discussed in detail in chapter 13 of this feasibility report.

Financial Analysis

Our financial analysis chapter assessed the financial viability of the Inland Port and Eastern Railway Line Projects as standalone and combined projects respectively.

In order to assess the financial soundness (viability and bankability) of the projects, we developed a base case financial model (i.e. without any form of Government support) for the standalone and the combined projects. We then developed proposed models (i.e. with GoG support) to make the projects viable and bankable.

Our financial model included the following interlinked sheets:

- Data input and assumptions;
- Capital costs (construction);
- Operating costs;
- Taxes;
- Depreciation;
- Financings/Capital Structure/Loan Schedules;
- Income statement;
- Balance sheet; and
- Cash flow.

The approach, inputs and assumptions that we used in our analysis as well as the resultant outputs are discussed in detail in Chapter 14 of the report.

The financial viability assessment of the project options was carried out using a discounted cash flow model that takes into account capital, maintenance, operating costs and revenues anticipated for the project.

The major indicators of project financial viability are the ability of the project to service the debt raised for the project and generate returns on equity investment more than or equal to the Weighted Average Cost of Capital ("WACC").

We thus computed the following performance indicators to assess the viability of the project:

- Project Internal Rate of Return ("PIRR");
- Equity Internal Rate of Return ("EIRR");
- Debt Service Coverage Ratio ("DSCR"); and
- Loan Life Cover Ratio ("LLCR").

We used a benchmark/criteria for assessing the financial viability[2] of infrastructure projects in our market. These are:

- Equity internal rate of return (Equity IRR) equal or greater than 22%; and
- Average Debt Service Coverage Ratio (DSCR) equal or more than 1.5.

Financial Viability Assessment of the Standalone and Combined Projects without Government Support

In the base case assessment we assumed that there is no form of government assistance towards the development of the project. Additionally, we have assumed that the entire capital cost of the project is financed using equity and debt. The equity capital is provided by the private concessionaire and the debt financing is

[2] Based on market sounding activities to gauge investor interest in the project; and the publication - "Mobilising Finance for Infrastructure, Ghana Country Case Study". August 2015. DFID.

sought from development finance institutions and export credit agencies to support the development of the project.

Table 18 below summarises the financial results for the base case assessment (i.e. without GoG Support) of the project for all four (4) project options.

Table 18: Financial Results for Base Case Scenario (i.e. Without Government Assistance)

Project Option	Details	Results
Standalone Boankra Inland Port with Road Connection	Project IRR	4.4%
	Equity IRR	5.0%
	Net Present Value (NPV) -in US$ million	(52.45)
	Average DSCR	1.64
	Minimum DSCR	1.30
	Average LLCR	2.08
Standalone Eastern Railway Line for Freight Services Only	Project IRR	13.9%
	Equity IRR	19.5%
	Net Present Value (NPV)-in US$ million	296.97
	Average DSCR	7.28
	Minimum DSCR	2.06
	Average LLCR	12.62
Combined Boankra Inland Port and Eastern Railway Line with Freight Services Only	Project IRR	12.6%
	Equity IRR	17.2%
	Net Present Value (NPV)-in US$ million	177
	Average DSCR	5.36
	Minimum DSCR	1.15
Combined Boankra Inland Port and Eastern Railway Line with Freight and Passenger Services	Project IRR	10.4%
	Equity IRR	13.7%
	Net Present Value (NPV)-in US$ million	(36)
	Average DSCR	4.84
	Minimum DSCR	1.16

Our analysis indicated that all the four project options, are not financially viable without GoG support. All four projects fail to meet the viability criteria of having an Equity IRR of 22% and an Average DSCR of 1.5.

For the Boankra Inland Port Standalone with road option, the results showed an average DSCR of 1.64 which is greater than 1.5 but the Equity IRR of 5.0% was significantly less than the 22% benchmark.

The standalone Eastern Railway Line with only freight operations had an Equity IRR of 19.5% which is less than the required Equity IRR of 22% and an average DSCR of 7.28 which is greater than the required average DSCR of 1.5. Since this project option was unable to meet both elements of the criteria, it implies that the base case assessment of this option is also not financially feasible.

Similarly, both combined project options showed relatively strong Average DSCR which were greater than the required 1.5 but their required Equity IRR fell short of the required 22%. Hence the two (2) combined project options did not meet the required project viability criteria to pass for financial feasibility.

From the financial results above, the standalone and combined projects are not financially viable and bankable without any form of Government support.

Viability Assessment of the Proposed Options with Government Support

Based on the assessment of the respective cost of funding for each option as well as the prospects of obtaining financing and capital investment for the project options, we were able to establish from the outcomes of our options analysis that for the Boankra Inland Port and Eastern Railway Line Project to meet its objectives and be implemented successfully as a PPP, it would have to be carried out as two separate concessions.

It is on this basis that our viability assessment of the project considered only the standalone options. Although both standalone projects from our base case assessment emerged to be not financially viable, we proposed some financial support measures from GoG such as grant, availability payment and public investment of the infrastructure to make the projects financially viable/bankable and these included:

- For the standalone Boankra inland port with road connection, we proposed that either GoG pays a fixed periodic availability payment or an upfront grant payment towards the construction of the infrastructure. Another option we considered is that GoG/public sector pays for the infrastructure risk whereas the equipment, operations and maintenance is with the private sector; and

- Regarding the Standalone Eastern Railway Line, we proposed that public sector /GoG develops the infrastructure through public funding whereas the rolling stock, operations and maintenance is with the private sector.

The financial results from our viability assessment of the proposed options are shown in Table 19 below.

Table 19: Financial Results from the Viability Assessment of the proposed options with Goverenment Support

Project Option	Financial Viability Consideration	Details	Results
Standalone Boankra Inland Port with Road	Availability Payments	Annual Availability Payment required	US$33 million
		NPV of Availability Payments over the concession period	US$250 million
		Project IRR	13%
		Equity IRR	22%
		Net Present Value (NPV)	US$160.3 million
		Average DSCR	4.0
		Minimum DSCR	2.9
		Average LLCR	3.8
Standalone Boankra Inland Port with Road	Grant	Grant Percentage of Project Cost	61.6%
		NPV of Grant	US$65.0 million
		Total Grant **	US$80.59 million
		Project IRR	4.4%
		Equity IRR	22.0%
		Net Present Value (NPV)	US$6.3 million
		Average DSCR	3.1
		Minimum DSCR	2.6
		Average LLCR	4.4
Standalone Boankra Inland Port with Road	Landlord Model with revenue share	Project IRR	11.7%
		Equity IRR	22.4%
		Net Present Value (NPV)	US$2.16 million
		Average DSCR	3.00
		Minimum DSCR	1.86
		Average LLCR	3.18
		Revenue Share % of Total Revenue over Concession Period	46%
Standalone Eastern Railway Line	Landlord Model with revenue share	Project IRR	15.2%
		Equity IRR	22.1%

Project Option	Financial Viability Consideration	Details	Results
		Net Present Value (NPV)	US$95 million
		Average DSCR	3.07
		Minimum DSCR	2.34
		Average LLCR	12.92
		Revenue Share % of Total Revenue over Concession Period	68.0%

NOTE:
For the Eastern railway line, landlord model, the rolling stock/ port equipment costs and operation and maintenance will be borne by the private concessionaire whilst GoG fund the railway infrastructure.
** The GoG grant support applied towards the Boankra Inland Port

The results above show that with GoG financial support either through availability payments, grant or funding the infrastructure, the financial viability criteria for Equity IRR of 22% and Average DSCR of 1.5 for the standalone Inland Port and Eastern Railway line are met.

For the Standalone Boankra Inland Port, we suggest that this project is developed with a grant support from GoG whilst the private party finances the port infrastructure, port equipment and operations and maintenance. The financial support using the grant measure is cheaper to GoG than either funding the port infrastructure or making fixed periodic availability payments.

Based on the financial results above, the standalone Inland Port and Eastern Railway Line projects are more viable as two separate transactions than as a combined transaction. However, we suggest that the Inland port and the Eastern railway line projects should work together due to the inherent synergies that exist between the two activities.

Transaction Structuring

We have provided a summary of the transaction structures that we are proposing for the development of the Boankra Inland Port and the Eastern Railway Line. The proposed options were based on our assessment of the project features and requirements as well as the results from our financial and economic analysis among other considerations in our feasibility study.

BOT PPP Transaction Structure – Boankra Inland Port
The main objective of the BOT option is to maximise risk transfer to the private party. This option typically delivers the most value for money if the private sector has both the appetite to accept the risk and the ability to manage it better than the Government.

Under this proposed structure, the private party will be responsible for all functions and associated risks in relation to the design, construction, operation and maintenance of the port assets whilst Government through its Implementing Authority, GPHA/GSA will be responsible for regulating the activities of the private party and ensuring they perform to the required standards.

Table 20 highlights the key functions or responsibilities that each party to this project assumes as per the proposed BOT structure.

Table 20: Responsibility Matrix for the Boankra Inland Port under the BOT Structure

Responsibility	GPHA/GSA	(Inland Port Concessionaire)	Description
Inland Port Development/Assets			
Land	√		Land Acquisition
Inland Port Design		√	Planning and Design
Basic Infrastructure		√	Main Roads, Power Connections, Drainage Systems,
Superstructure		√	Container Freight Station, Container Yard Area, Commercial Complex, Administration Complex, Truck Parking Area
Equipment		√	Warehouse Forklifts, Reach Stackers, Container Forklifts, Weighbridge, Trailers
Inland Port Management			
Traffic Management		√	Container and Cargo Traffic Monitoring System, Control Room
Safety and Security		√	Control systems, CCTV Cameras, Patrol Teams, Tracking Devices
Administration of Inland Port, Customs and Regulation	√		Inland Port Regulations, Customs Procedures, Environmental & Safety Safeguards, Inspections Team
Tariffs/Commercial			
Inland Port Fees/ Terminal Fees		√	Cargo Handling Charges, Cargo and Container Storage, Reefer Storage
Rental and Royalties		√	
Penalties and Fines	√		

The private party in this scenario takes up majority of the risks for developing the Inland Port infrastructure including the revenue/demand risk.

However, from our financial analysis as shown in Chapter 14, the Inland Port project is not financially viable (i.e. viability gap) and the revenue risk may not be acceptable to private bidders considering the low traffic levels. Government as part of its obligation to the PPP agreement will be required to support the project financially with a Grant (usually a one-time payment) towards the development of the Inland Port.

Due to the risk that Government assumes in making this financial commitment to the project, the grant payment for this project would have be phased out based on the Concessionaire's ability to perform or meet certain milestones throughout the project's construction phase which will be defined and agreed on between the parties to the contract. The purpose of this measure is to minimise Government's risk as much as possible as well as enable Government to safeguard its contribution to the development of the project.

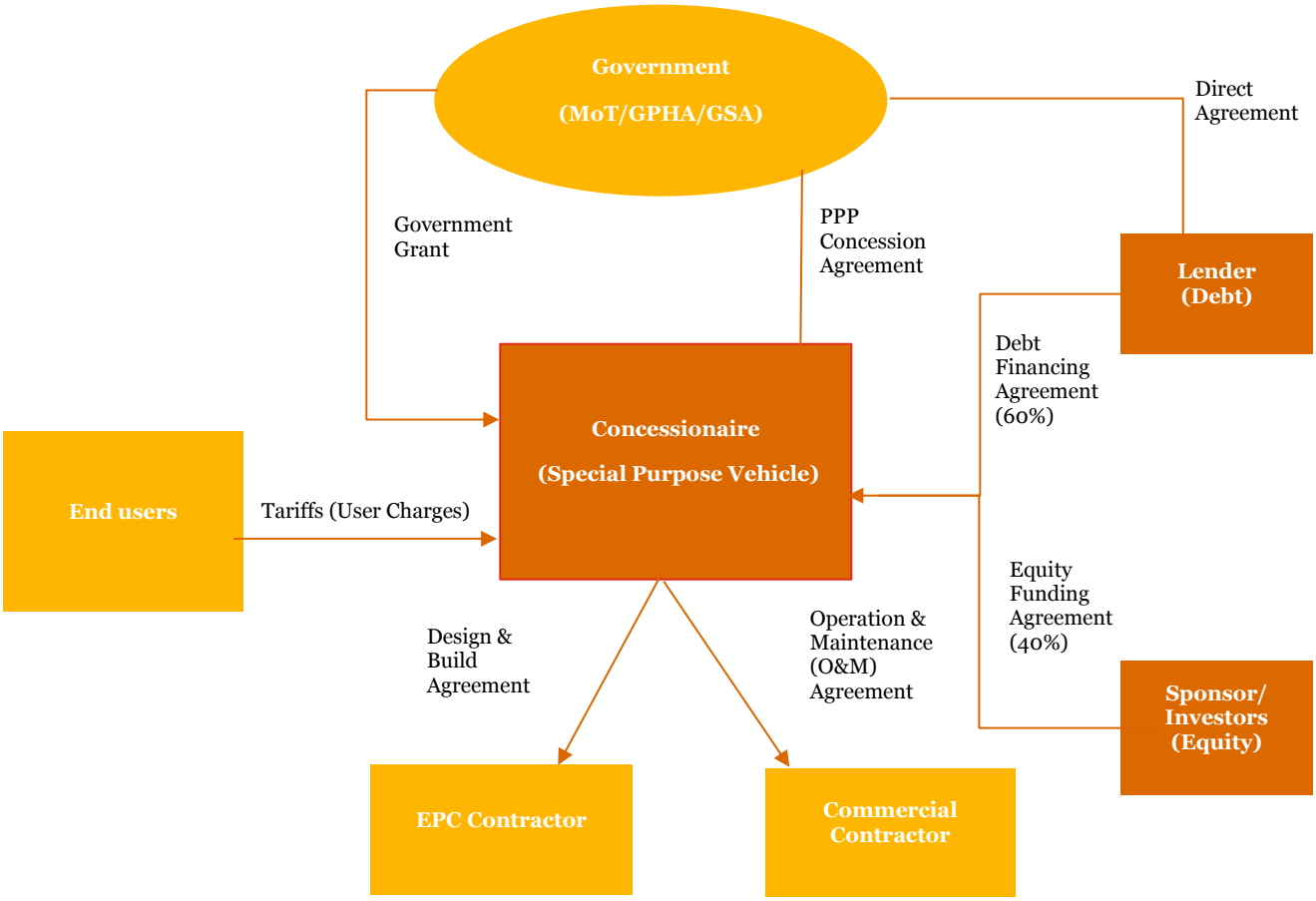
The payment of the Grant will be made against the delivery of key output specifications or indicators that Government will specify in the contract in relation to the:

- High quality of the asset/construction;
- Quality maintenance condition of the infrastructure;
- Quality of service of operations; and
- Compliance with specified standards and regulations.

Failure on the part of the private party to meet the required output specifications or performance measures clearly defined in the PPP agreement results in penalties which will be enforced by the Implementing Authority or governing body.

The figure below shows the proposed transaction structure for the Boankra Inland Port using the BOT PPP structure with Government Grant.

Figure 3: Build Operate Transfer (BOT) PPP Structure for the Boankra Inland Port with Government Grant



Lease Contract (Landlord Model) for the Eastern Railway Line

Given that developing the Eastern Railway line requires a lot of capital investment and has significant associated risks, we have proposed a Lease Contract (landlord model) where Government provides all the basic railway infrastructure whilst the private party provides the rolling stock, operation and maintenance of the infrastructure for the specified contract duration.

Table 21 highlights the key functions or responsibilities that each key party assumes as per the recommended structure.

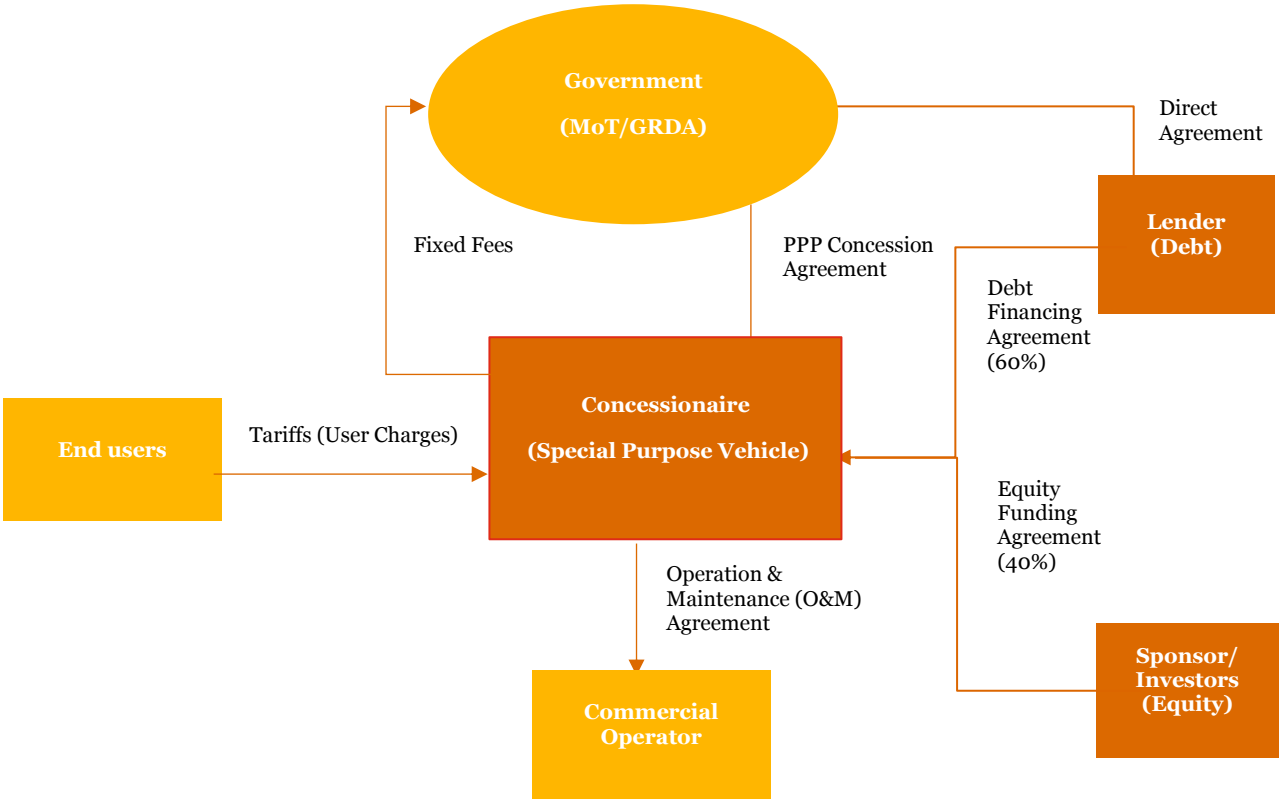
Table 21: Responsibility matrix for the Eastern Railway Line under the Lease Contract Structure

Responsibility	GRDA	Concessionaire (Railway Operator)	Description
Railway Line Development/ Assets			
Land	√		Relocation and Resettlement
Railway Line Design	√		Planning and Design
Infrastructure and Equipment	√		Railway Track, Power Connections, Drainage Systems, Electrical Works, Signalling and Telecommunications Equipment
Superstructure	√		Station Buildings, Terminal Facilities, Incident Management Facilities
Rolling Stock		√	Locomotives, Wagons, Coaches, O&M Vehicles
Railway Line Management			
Traffic Management		√	Train and Track Monitoring System, Control Room
Safety and Security		√	Control Systems, CCTV Cameras,
Railway Line Regulation	√		Railway regulations, Environmental & Safety Safeguards, Inspections Team, Maintenance standards
Operations and Maintenance of Rail Facilities		√	Ticketing, Train Operations, Railway Track Maintenance, Train Maintenance,
Tariffs/Commercial			
Railway Tariffs		√	Charge per TEU of Container, Charge per ton of Commodity per Kilometre, Passenger Fares,

The private party in this agreement bears the demand and revenue risk and will be responsible for the collection of proposed tariffs based on user charges which will be agreed with the respective regulatory authority. The private party thus is remunerated from the tariffs (user charges) that is collected from end-users of the railway infrastructure and services.

Taking into consideration the level of financial and capital investment that Government makes in establishing the railway infrastructure, the private party as part of its obligation to the contract will be required to compensate Government over the contract period with pre-determined fixed payments as a proportion/share of revenue generated from the project. This arrangement will also form part of the contractual agreement between both parties.

Figure 4: Lease Contract (Landlord Model) PPP Structure for the Eastern Railway Line



Legal and Regulatory Framework

We have reviewed the following legal and regulatory documents in relation to the:

- National PPP Policy of June 2011;
- Ghana PPP Bill Draft of May 2013; and
- Railway Act 2008, Act 779.

PPP Framework

The development of the Boankra Inland Port and Eastern Railway Line seeks a PPP arrangement between GoG and the Private Sector. Therefore all aspects of the PPP process including project identification, evaluation, selection, procurement, operation, maintenance and performance monitoring will be guided by the National Policy on PPPs as well as the Ghana Public Private Partnership Bill Draft (May 2013). This Feasibility Study is one of the stages required to be completed under the policy.

The National PPP Policy describes a PPP arrangement as a contract between a public entity and a private sector party with a clear agreement on shared objectives for the provision of public infrastructure and services traditionally provided by the public sector.

In effect, the private entities will be performing a Government service delivery function, as well as take on project associated risks for a significant period of time. In return, the private entity enjoys benefits or financial

remuneration which may be derived from either end-user charges or payments made by GoG or a combination of both.

Railway Act 2008

The main legislation to be considered in pursuing the development of a railway network in Ghana is the Railways Act 2008 ("the Act"). The Act established the Ghana Railways Development Authority ("GRDA" or "the Authority"), the body responsible for railway regulation.

The Railway Act 2008 also identifies clearly what is to be done to any liabilities incurred by the Ghana Railway Company Limited or any of its predecessors to any person before the coming into force of the Railway Act 2008. Such liabilities are to be assumed by the Authority subject to the right to transfer those liabilities or any portion of them to any party who has entered into a contract or other transaction with the Authority. In undertaking our Feasibility Assessment, we have assumed that no liabilities of Ghana Railway Company Limited will be transferred to a prospective Concessionaire for the Eastern Railway Line.

Legal Issues – African Rail Ghana Limited ("Africa Rail")

We have reviewed the following draft contract documents between GoG and African Rail for the financing, construction and operation of the Eastern Railway Line:

- Draft Concession Agreement, (neither dated or signed); and
- Memorandum of Understanding dated 12 December, 2008

Here are some legal issues we have identified:

The Validity of the Draft Concession Agreement

There is currently an unsigned and undated Draft Concession Agreement between GoG, represented by MoT and GRDA, and the private party, African Rail (GH) Ltd. This concession agreement was intended for the financing, construction and operation of the railway line linking Tema, Accra, Nsawam, Koforidua, and Kumasi

The agreement has not been signed by the legal parties aforementioned therefore it is in not legally binding. Most importantly, the agreement should go through the PPP process and must be approved by Parliament to render it a valid Policy.

As it stands now, we are of the view that the Draft Concession Agreement is not valid or binding on GoG, since Parliamentary approval has not been received.

Legal Effect of the MoU

A Memorandum of Understanding ("MoU") signed and dated 12 September 2008, between GoG and Baneservice A.S and African Rail A.S, elapsed after six (6) months. Basic elements of contract i.e. offer and acceptance for the project, consideration pertaining to the project and an intention to create legally binding relations are absent.

According to the MoU, African Rail A.S. shall have the first option and right of first refusal in the selection for the execution of only the Eastern Railway Line Project having financed Feasibility Studies. However, since detailed legal documents concerning the preceding clause have not been signed, we do not believe that any legal rights have accrued to African Rail A.S.

Advice on African Rail

Based on the issues highlighted above, we present the following advice:

- African Rail does not have strong legal grounds for suing the MoT. This advice is based on grounds that the MoU has expired and was not renewed and also the Concession Agreement was not fully executed by both parties;
- Notwithstanding the above, it is possible to attempt to resolve any disputes that may arise amicably in accordance with Section 33(1), Ghana Investment Promotion Centre Act 2013 (Act 865). The other option is to attempt to resolve any dispute by inviting African Rail (GH Ltd) to be part of the PPP project;
- African Rail Ghana Limited has a choice of commencing proceedings within Ghana or in the international arena, the choice of which is granted to African Rail under the GIPC Act 2013 (Act 865). In the event that proceedings are brought in Ghana it is likely that the MoU and the Concession Agreement would not be deemed legally binding as a contract cannot be inferred from the contents of the MoU or from the unexecuted Concession Agreement.
- However, since the conduct of the parties is likely to be taken into account in international arbitration to determine whether a contract existed between the parties, African Rail is likely to seek protection from international investment arbitration law and practice. In its determination, an international arbitral tribunal may consider whether or not African Rail had acquired legitimate expectations due to the provisions of the Public Procurement Act 2003 (Act 663) at the stage where it was awarded the single-source procurement status;
- The investor's legitimate expectation is based on Ghana's legal and regulatory framework of which the international investor is entitled to rely on. A reversal of assurances/conduct by the MoT/GRDA (organs of State) that has led to legitimate expectations of African Rail will violate the international investment law principle of fair and equitable treatment;
- It is important to note that there is a conflict between Ghana national law and international investment law. It is a provision of the Constitution of the Republic of Ghana that an international business transaction involving the State must be approved by Parliament. However, under international investment law and practice, where the provisions of the national Public Procurement Act 2003 (Act 663) are not adhered to, an international arbitral tribunal may invoke the international investment law principle of legitimate expectations to protect the investor's investment; and
- In international investment arbitration law and practice, there is no established precedence to guide arbitrators but there is increasing awareness that arbitral awards tend to favour international investor's claims against States. In spite of the appearance of favourable treatment of international investors, African Rail may not succeed in an international arbitration claim as they may not meet the threshold for the invocation of the doctrine of legitimate expectations before any international arbitral tribunal.

Next Steps

The activities we need to carry out after the issuance of this feasibility report and a corresponding work plan include the following:

- Market the project;
- Prequalify potential operators;
- Draft bidding documents;
- Release RFP to pre-qualified bidders;
- Undertake competitive bidding and evaluation
- Assist in selection of winning bidder;
- Assist in negotiation/signing of the PPP contract; and
- Facilitate the financial closure process.

Work Plan

Our work plan for the outstanding activities highlighted above is shown in Table 22 as follow

Table 22: Work Plan

TASK	Dec-16		Jan-17		Feb-17		Mar-17		April-17		May-17		Jun-17	
Draft Approval Note for seeking Approval II from MoF-PID	■													
Procurement Documents and Draft PPP Agreement														
Prequalify Bidders (ie Request for Expression of Interest, Request for Proposal etc)	■	■												
Finalise Bid Documents (i.e. EoI, RFP including draft legal agreement)		■	■											
Draft Approval Note for seeking Approval IIIA from MoF-PID				■										
Issue RFP including draft Legal Agreement				■										
Submit Detailed Proposals by Investors/Developers/Operators				■	■	■	■							
Evaluation of Proposals and selection of a preferred bidder								■	■					
Draft Approval Note to approve the Winner Bidder -(Approval IIIB) from MoF-PID										■				
Negotiations, Final Agreement and Contract Signing														
Assist MoT in Negotiations											■	■		
Prepare Final Legal/Concession Documents									■	■	■	■		
Draft Approval Note for seeking Approval IV from Cabinet and then Parliament													■	
Assist MoT in Contract Signing/Commercial Close														■
Assist with Financial Close											■	■	■	■

1. *Introduction*

1. Introduction

1.1. Project Background

The Government of Ghana ("GoG") recognises the limited public resources at its disposal to carry out the necessary infrastructure investments. As such, the Government has re-emphasised the need to rely on the private sector to make some investments in infrastructure by promoting a robust Public Private Partnership ("PPP") agenda.

In this regard, GoG, through the Ministry of Transport ("MoT") and its Agencies namely Ghana Shippers Authority ("GSA"), Ghana Ports and Harbours Authority ("GPHA") and the Ghana Railway Development Authority ("GRDA"), intend to pursue a PPP arrangement for the development of the Boankra Inland Port ("the Inland Port"), together with the reconstruction of the Eastern Railway Line ("the Railway Line"), which will connect to the Inland Port. The development of the combined- projects on a PPP basis, if ultimately approved by GoG, will be guided by the National PPP Policy dated June 2011.

A team led by PricewaterhouseCoopers Ghana Ltd and its consortium members have been appointed by the Ministry of Transport to provide transaction advisory services for the above Project. Our consortium members are:

- Fugar & Co of Ghana – Local Legal Advisors;
- AECOM of South Africa – Technical (Rail and Port) Experts;
- Patton Boggs of USA – International Legal Advisors; and
- Vision Consult Ltd of Ghana – Transport Engineers/Transport Economist.

1.2. Congestion Issues at Tema Port

Tema is Ghana's first-ranked port, located near the capital Accra. The port serves the city's role as a manufacturing centre and oil refining hub and handles cargo in transhipment to and from the nearby countries of Burkina Faso, Niger and Mali.

With its central location in the sub-region, Ghana is able to offer a wider range of maritime services to the neighbouring ports and deliver those services quickly and cost-effectively.

The table below highlights the performance of the Tema Port between 2003 and 2015.

Table 1-1: Summary of Tema Port Performance 2003-2015

Years	Vessel call	Total cargo traffic	Export	Import	Transit	Transshipment	Container traffic
	Units	Tonnes					TEUs
2003	1,172	7,391,268	809,589	5,490,893	885,093	138,520	305,868
2004	1,381	8,447,655	1,072,006	6,403,422	764,128	71,082	342,882
2005	1,643	9,249,977	1,182,469	6,936,688	875,325	155,815	392,761
2006	1,994	8,046,838	955,084	5,675,027	887,589	339,841	425,408
2007	1,672	8,378,682	1,099,094	6,120,583	843,656	119,209	489,147
2008	1,568	8,727,049	1,305,451	6,259,412	864,307	195,326	555,009
2009	1,634	7,406,490	981,075	5,694,280	509,124	192,565	525,694
2010	1,787	8,696,951	1,154,826	6,823,488	447,071	236,615	590,147

Years	Vessel call	Total cargo traffic	Export	Import	Transit	Transshipment	Container traffic
	Units	Tonnes					TEUs
2011	1667	10,748,943	1,532,139	8,431,531	614,078	171,195	756,899
2012	1,521	11,468,962	1,477,390	9,383,462	530,457	50,403	824,238
2013	1,553	12,180,615	1,493,956	10,014,243	620,668	51,748	841,989
2014	1,504	11,126,355	1,463,273	8,922,550	577,227	163,305	732,382
2015	1,514	12,145,496	1,303,090	10,043,146	722,508	76,752	782,502

Source: Ghana Ports and Harbours Authority (Tema Port Performance)

From the table above, we can tell there is an increasing volume in container traffic. Also, based on observations from our site visit and interactions with representatives of GPHA, port operators and users, we were able to get more insight into the challenges currently facing the port and these include:

- Recurring issues of congestion;
- Inefficient intermodal interchanges and hinterland movements;
- Longer cargo dwell times than what is the norm for modernised port systems;
- Prolonged customs procedures due to too much paperwork; and
- Lack of rail network leading to high utilisation of the port's internal and surrounding road network.

Considering the issues that currently hinder the efficiency of the Tema Port operations, the introduction of the Boankra Inland Port will be key in:

- Facilitating the efficient transportation of transit traffic to and from land locked countries such as Burkina Faso, Mali and Niger, done primarily in bond; and
- Facilitating the objective of decongesting the Tema Port by providing facilities such as customs control and documentation, as well as light industrial processing activities, for southbound and northbound traffic.

1.3. Scope of Work

Our mandate is phased as follows:

- **Phase 1**: Review what has been done so far by MoT and its Agencies in terms of this project and undertake both a Pre-feasibility study and a Feasibility study as per the National PPP Policy and the draft PPP Law, to a standard that will enable MoT to seek relevant Approval Authority's ("AA") approval, as provided in the National PPP Policy and the draft PPP Law; and
- **Phase 2**: Provide advisory services for the procurement of the project under a PPP arrangement including preparing all necessary documentation (Expression of Interest, Request for Qualification and Request for Proposal), to enable MoT in collaboration with its Agencies obtain AA approval and financial closure.

Specifically, the assignment involves PPP transaction structuring and international competitive tendering and includes the tasks below:

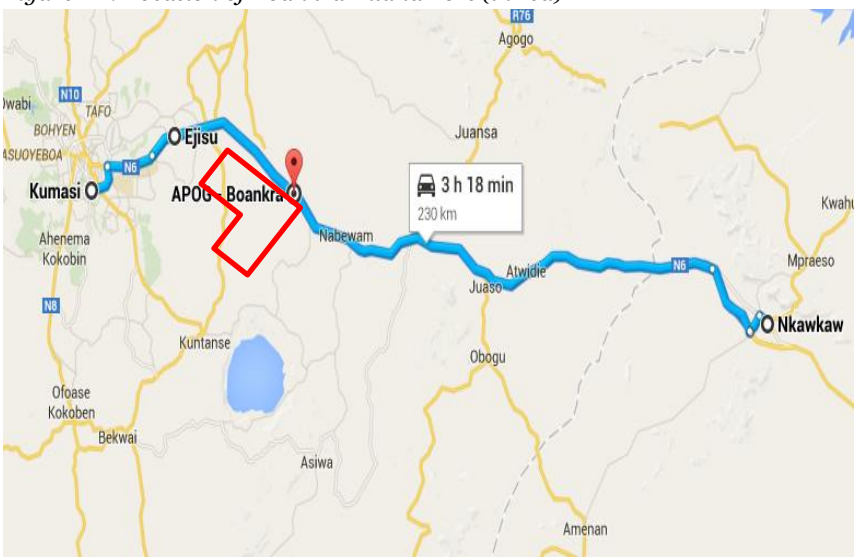
- Review of work done to date by MoT and its agencies;
- Undertake Pre-feasibility and Feasibility studies;
- Market the project;
- Prequalify potential operators;
- Draft bidding documents;
- Assist in selection of winning bidder;
- Assist in negotiation/signing of the PPP contract; and
- Facilitate the financial closure process.

1.4. Project Concept and Requirements

1.4.1. Boankra Inland Port Project

The Boankra Inland Port ("the Inland Port"), strategically located near Kumasi, was initiated by GPHA and GSA in order to create an inland extension to the Tema Port. Currently, the Inland Port has been partially developed with an administration block, access roads and utility connections. Other plans for the further development of the Inland Port will include an Inland Container Depot ("ICD"), port administration, shippers and freight forwarders offices, warehouses and commercial buildings. Figure 1.1 below shows the location of the Inland Port.

Figure 1-1: Location of Boankra Inland Port (in red)



Source: Google Maps

The Inland Port will also require the development of customs coordination protocols, customs clearance procedures and controls.

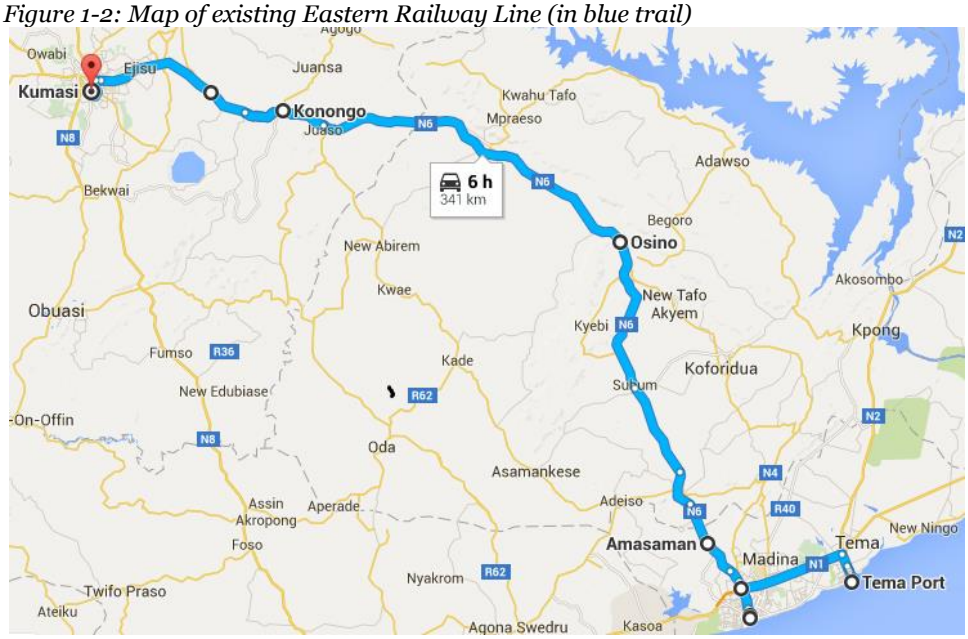
The concept is to attract private businesses to the area and develop it as an Industrial/Commercial Estate to serve the maritime business community. The Concessionaire would act as landlord, responsible for estate management, marketing and development of the main roads and utilities. The individual lots would be developed by the Concessionaire.

1.4.2. The Eastern Railway Line Project

The Eastern Railway Line links Accra to Kumasi with a branch line from Achimota to Tema port. The total track length is 330 km, and the gauge is 1,067 mm. Apart from the stretch from Accra to Nsawam and Accra to Tema which are being used for passenger traffic, the line is currently not operational due to its poor state.

Figure 1.2 below shows a map of the existing Eastern Railway Line from Tema to Kumasi and a branch line to Accra.

Figure 1-2: Map of existing Eastern Railway Line (in blue trail)



Source: Google Maps

The reconstruction of the Eastern Railway Line will include financing, development and operation of the 330km line and will include the provision of rolling stock, station upgrades, signalling and communication equipment.

The concept is to develop the Eastern Railway Line to modern standards in order to provide an alternative, faster, safer and more efficient mode for transportation of freight from Tema Port to an Inland Port at Boankra. In addition, it is being proposed to use the re-constructed Eastern Railway Line for passenger service from Tema Port/Accra to Kumasi hence the reason for using Kumasi as the destination for the Railway Line.

1.4.3. Benefits of the Combined Boankra Inland Port and Eastern Railway Line Project

It is expected that the combined Boankra Inland Port Project and the Eastern Railway Line when implemented would:

- Complement each other and thereby create business synergies;
- Decongest Tema port and enhance the operational efficiency of the port;
- Provide an efficient and safer alternative to the road network, which is already congested;
- Enhance Ghana's role as a transit corridor to landlocked neighbouring countries;
- Feed traffic from other modes of transport to the Inland Port;
- Enhance socio-economic and commercial development in the Ashanti Region and the Eastern Corridor; and
- Improve services to customers and reduce the cost of transport especially in trade to and from the hinterland and the Northern regions of Ghana.

1.5. Approach to the Feasibility Study

Our approach to this Feasibility Study was as follows:

- Undertook initial site visits in August 2014 in order to have a first-hand preliminary assessment of the current condition of the existing Eastern Railway Line and the Boankra Inland Port;

- Reviewed available documents from GSA, GPHA and GRDA, a list of which is included in Appendix 1 of this report;
- Undertook initial surveys and investigations:
  - Traffic Survey
  - Topographical Survey

- Conducted an initial environmental and social impact Assessment;
- Prepared conceptual designs for Boankra Inland Port and Eastern Railway Line;
- Prepared initial cost estimates for Boankra Inland Port and Eastern Railway Line;
- Carried out initial financial analysis to assess the viability of the Project;
- Identified, proposed an initial allocation of risks between the public and private sector and suggested mitigation steps for risks associated with the Project;
- Reviewed legal issues which may have an impact on the development of the Project and identified requirements for licenses/permits; and
- Undertook human resource due diligence on the Eastern Railway staff to ascertain the current employee strength.

2. Current State of the Transport Network along the Eastern Corridor

2. Current State of the Transport Network along the Eastern Corridor

2.1. Introduction

This section describes our observations of the existing conditions of the N6 Road from Accra to Kumasi Road, existing conditions of the Eastern Railway Line and the existing conditions of the Boankra Inland Port and their issues identified during our site visits.

2.2. Typical Sections of the Accra-Kumasi (N6) Road

Given the function, of the N6 (Accra – Kumasi Road), the GHA Road Design Guide, 1991 classifies it as a Primary Road (National) and under AASHTO design guidelines; it is classified as an Arterial Road.

The functions of the road are:

- Linking Ghana to neighbouring countries;
- Connecting two major centres of population i.e. Accra and Kumasi; and
- Providing for large traffic movement.

The Accra-Kumasi road forms the first section of the National Road N6, and is predominantly a single carriageway that connects two main economic metropolises, i.e. Accra-Tema business area in the Greater Accra Region and Kumasi area in the Ashanti Region. This highway provides primary access from the southern parts of the country to the northern parts and vice versa.

The strategic location of the Accra-Kumasi road makes it one of the most important links in Ghana's trunk road network as it serves the northern, central, western, and southern parts of the country, and thus generates a very huge band of influence on road transportation for the over 26 million population of Ghana. Currently, there are three toll booths on the road at Bunso, Ofankor and Kubease.

The road is also an international transit route between Ghana and her landlocked neighbours of Burkina Faso, Mali and Niger.

Figure 3.1 and 3.2 shows the typical sections of the N6 road to Kumasi and the layout of the rural section

Figure 2-1: Single Carriageway to Kumasi

Figure 2-2: Dual Carriageway to Kumasi

The table below gives the current configuration of the road from Accra to Kumasi

Table 2-1: ad Sections and Lane Configurations

Section	Road Section	Length (Km)	Remarks
1	Ofankor-Nsawam	17.65	Existing Dual Carriageway
2	Nsawam Bypass	10.85	Existing Dual Carriageway
3	Kwafokrom-Apedwa	31	On-going construction of Dual Carriageway
4	Apedwa-Anyinam	30	Single Carriageway
5	Anyinam Bypass	6	Single Carriageway
6	Anyinam-Enyiresi	2	Single Carriageway
7	Enyiresi Bypass	4	Single Carriageway
8	Enyiresi-Nkawkaw	17	Single Carriageway
9	Nkawkaw Bypass	14	Existing Dual Carriageway
10	Nkawkaw-Konongo	45.8	Single Carriageway
11	Konongo Bypass	3.4	Single Carriageway
12	Konongo-Ejisu	36.3	Single Carriageway
13	Ejisu-KNUST	12	Existing Dual Carriageway
Total Road Length		**230**	

2.3. Operational Efficiency and Safety of the Road

Visual inspections of the road that we undertook in March 2014 and October 2014, revealed two major problems as well as their contributing factors. These are:

- Long travel time, as a result of delays and congestion; and
- Poor Road Safety record

Our observations also revealed other problems along the corridors which are:

- The lack of safe pedestrian crossing facilities and proper separation of pedestrians and vehicles was evident in the villages through which the road passes;
- Most safety barriers have been damaged by accidents;
- Broken down vehicles were left on the carriageway which represent a major hazard, particularly at night;
- Overtaking on bends was frequent and speed restrictions are poor;
- There were few facilities/rest stops provided for travellers along the corridor;
- The existing carriageways, whether dual or single, generally appeared to be in good condition except the section between Nsawam and Suhum that is being constructed;
- There were two toll points on the route, at Pokuase and Konongo collecting the nationally set toll rates; and
- The Pokuase toll point, despite its closeness to Accra and the obviously higher traffic levels, has only one booth per lane, and so causes queuing, resulting in a significant delay.

2.3.1. Long Travel Time

Delays were observed between Kwafokrom and Suhum, particularly in market areas, at junctions and at toll stations. These were caused by a variety of factors discussed further below. During off-peak hours, (i.e. between 9:00 and 16:00) it took the study team approximately 4 hours, in each direction, to travel the project road, implying a mean speed of approximately 64km/hr.

Visits made during peak hours (i.e between 07:00 and 09:00; between 12:00 and 14:00 and between 16:00 and 19:00) took about 5.5 hours in each direction, which works out to an average speed of approximately 46km/hr. We experienced slow speeds and stoppages in the Accra – Kumasi direction during the morning peak hours (i.e. between 07:00 and 09:00), while in the afternoon peak hours (i.e. 12:00 and 14:00), we experienced the same in the Kumasi – Accra direction. We noted that the number of vehicles on the road was remarkably higher during peak periods, and so was the percentage of medium to heavy vehicles, particularly in the Accra –Kumasi direction. This traffic pattern is not desirable for a national road on which traffic is expected to travel close to the design speed of 100km/hr.

An average speed of 55km/hr is common on this road whereas the design speed is 100 km/h. The main factors contributing to the reduced or limiting speed are as follows:

- Road is predominantly a single carriageway;
- Poor road sections (i.e. untarred road section between Apedwa and Suhum);
- Inefficient tollbooth operations;
- Unrestricted access control;
- Inadequate non-motorised transport facilities;
- Encroachment of the Right of Way; and
- Inadequate traffic control devices.

The figure below shows encroachment of the Right of Way at Anyinam.

Figure 2-3: Anyinam Town Center

2.3.2. Poor Road Safety Record

The Accra – Kumasi road is one of the most accident-prone corridors in the country. The bad condition of some sections, driver misbehaviour, overloading of vehicles plying the route and inadequate provision for distressed vehicles contribute to the high accident rates on this road. This road alone, according to research by Building and Road Research Institute ("BRRI") has 38% of the black spots (i.e. accident-prone locations) in the country.

Most sections of the road, approximately 92%, fall within the Eastern and Ashanti Regions. The table below show the accident volumes for all Regions over the period 2000-2012.

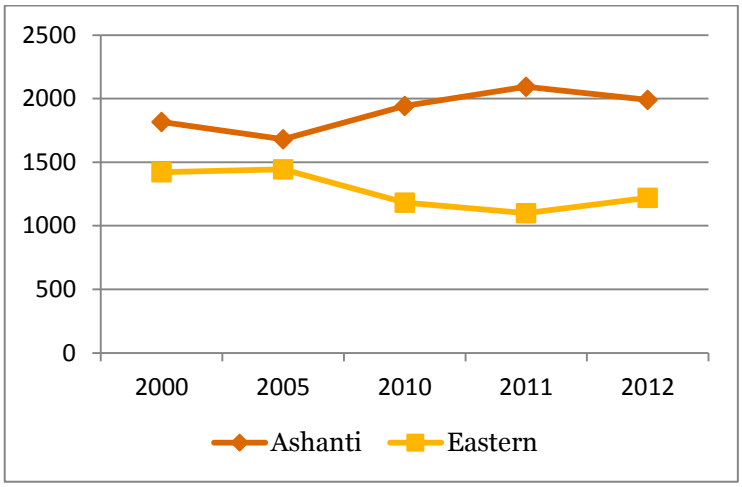
Table 2-2: Distribution of Road Traffic Accidents

Distribution of Road Traffic Accidents by Regions											
Year	Ashanti	Brong Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western	Total
2000	1,818	630	918	1,421	5,234	188	169	103	509	724	11,714
2005	1,680	655	916	1,445	4,983	224	181	82	567	595	11,328
2010	1,944	543	982	1,182	5,122	257	88	90	599	699	11,506
2011	2,094	726	1,046	1,100	4,311	260	110	118	481	641	10,887
2012	1,990	669	1,041	1,220	5,247	223	114	155	488	936	12,083
Total	9,526	3,223	4,903	6,368	24,897	1,152	662	548	2,644	3,595	

Source: BRRI, Ghana

The figure below indicates the number of road accident volumes within the Eastern and Ashanti Regions.

Figure 2-4: Trend of Road Accidents in Regions of the Project Road

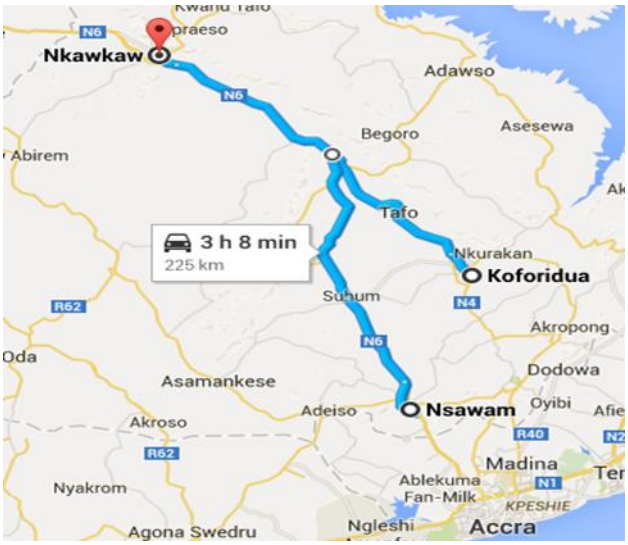


Eastern and Ashanti Regions accounted for approximately 16.56% and 11.07% of all road accidents in Ghana from 2000 to 2012 respectively.

The number of road traffic accidents in the Eastern Region dropped from 1421 in year 2000 to 1100 in year 2011, and rose to 1220 in year 2012. The drop in number of road traffic accidents between 2000 and 2011 may be attributed to extensive construction works in that section (Nsawam-Apedwa-Bunso) that either slowed down traffic on the N6 or caused traffic to use other alternative roads like the N4 (i.e. Koforidua – Tafo-Bunso Road).

The figure below shows Koforidua-Tafo Road which served as an alternative road to Kumasi due to the construction works at Apedwa.

Figure 2-5: Koforidua – Tafo - Nkawkaw Road (in blue)



Source: Google Maps

For the Ashanti Region the number of road traffic accidents dropped from 1,818 in year 2000 to 1,680 in 2005, rose steeply to 2,094 in 2011 and dropped slightly to 1,990 in 2012. The number of road traffic accidents dropped between 2000 and 2005 maybe as a result of extensive construction works in that section (Dadieso-Nkawkaw-Konongo-Ejisu-Kumasi) that slowed down traffic on the N6.

The rise in number of road traffic accidents from 2005 to 2011 may be attributed to increased speeds on the N6 upon completion (single carriageway) of a substantial portion of road construction within this section. The drop in number of road traffic accidents between 2011 and 2012 in the Ashanti Region may be attributed to the dualisation of the Nkawkaw bypass and Ejisu-Kumasi sections which were constructed in December 2011 and May 2010 respectively.

The figure below shows the existing state of Nkawkaw bypass and Ejisu-Kumasi.

Figure 2-6: Dualised Nkawkaw bypass

Figure 2-7: Existing Ejisu – Kumasi Road

From 2008 to 2010, the estimated number of accidents on the Accra to Kumasi Road amounts to a total of 3,000 accidents. The table below presents various sections along the road where a number of incidents from fatal to damaging accidents have occurred.

Table 2-3: Traffic Accidents on the Accra to Kumasi Road from 2008 to 2010

Year	Route	Road Length (km)	Accidents					
			Acc./km	Fatal	Serious	Slight	Damage	Total
2008	**Accra -Kumasi**	**243.1**	**3.6**	**125**	**194**	**254**	**292**	**865**
	Accra (Joy FM/Kokomlemle Junction)-Nsawam	30.9	11.7	24	69	110	157	360
	Nsawam-Dadieso	130.1	2.6	66	82	103	89	340
	Dadieso-Kumasi (KNUST)	82.1	2	35	43	41	46	165
2009	**Accra -Kumasi**	**243.1**	**4.3**	**181**	**210**	**319**	**342**	**1052**
	Accra (Joy FM/Kokomlemle	30.9	16.4	53	89	165	201	508

Year	Route	Road Length (km)	Accidents					
			Acc./km	Fatal	Serious	Slight	Damage	Total
	Junction)-Nsawam							
	Nsawam-Dadieso	130.1	2.7	85	68	105	90	348
	Dadieso-Kumasi (KNUST)	82.1	2.4	43	53	49	51	196
2010	**Accra -Kumasi**	**243.1**	**4.3**	**161**	**178**	**286**	**418**	**1,090**
	Accra (Joy FM/Kokomlemle Junction)-Nsawam	30.9	18.3	46	75	167	276	564
	Nsawam-Dadieso	130.1	2.1	67	55	70	80	272
	Dadieso-Kumasi (KNUST)	82.1	2.5	48	48	49	62	207

Source: BRRI, Ghana

For both Eastern and Ashanti Regions, other factors like policing, toll station installations and speed-calming installations have also contributed to the trend in the number of road traffic accidents. Moreover, other contributory factors include:

- Unrestricted access to the road;
- Geometrics of the road;
- Overloading of vehicles plying the road;
- Age of vehicles;
- Poor driving habits;
- Inadequate traffic control devices along the route;
- Lack of enforcement of traffic rules; and
- Encroachment of the right of way.

The aforementioned two problems and the root causes are summarised in the table below.

Table 2-4: Problems on the Road and their Causes

Cause	Problem	
	Travel Time Loss	Poor Road Safety
1. Unrestricted Access	√	√
2. Poor Geometry of Road	√	
3. Inadequate Non-Motorised Transport (NMT) Facilities		√
4. Inefficient Operations at Toll Booths	√	√
5. Inadequate Traffic Control Devices		√
6. Lack of Enforcement of Traffic Rules		√
7. Encroachment of the Right-of-Way	√	√
8. Inadequate Capacity	√	√

2.4. Eastern Railway Line

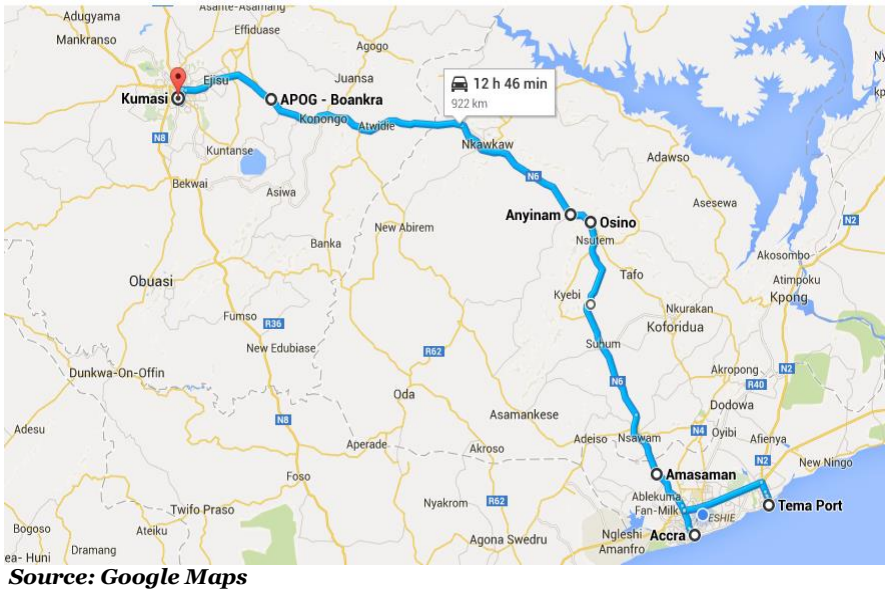
The existing Eastern Railway Line was built in 1923 using narrow gauge standards and was designed for an axle load limit of 13 tonnes. A Railway Master Plan dated December 2013, prepared by TEAM Group on behalf of GRDA and recently approved, will see the implementation of new standards on the railways, key of which are:

- Standard gauge axle load of 22 tonnes;
- Maximum speed of 120km/hr for passenger; and
- Maximum speed of 100km/hr for freight.

The Eastern Railway Line is intended to be used for both freight and passenger services.

The map below shows the site location of the Eastern Railway Line (in blue)

Figure 2-8: Location of Eastern Railway Line (in blue)



Source: Google Maps

2.4.1. Initial Site Observations

We observed from an initial site visit on Monday, 4 August 2014, that the Eastern Railway Line is virtually non-operational and the rail tracks are in a deplorable state. The tracks are worn out, the wooden sleepers are rotten and the track ballast cushions are thin. Beyond Nsawam, the tracks have mostly been removed or stolen.

Some sections of the railway line as shown in Figure 2.8 have been rendered unusable. In these affected areas, there must be a complete overhaul of the railway formation in order to give it the requisite capacity to hold new tracks and the expected axle load, if the existing alignment is to be maintained.

Figure 2-9: A section of the railway line being used by pedestrians

Figure 2-10: A section of tracks with weeds

The Right of Way ("RoW") has been encroached by commercial and resettlement activities. Human resettlement and commercial activities along the rail as shown in Figure 2-9 pose a major threat to the safety and efficient running of a rail operation.

Several permanent and temporary structures have developed within the RoW which may present social challenges to the development of the line in Tema, Achimota, Amasaman, Koforidua and other areas. In most rural sections the tracks are overgrown with weeds as shown in figure 2.3 above.

Signals and signal control equipment have been vandalised and will require rehabilitation or replacement. The crossing protection signals in the Accra to Nsawam section, which is currently in operation, are not only obsolete but require crossing keeper personnel to manually operate them.

Some bridges and culverts are showing signs of fatigue and collapse. The bridges were designed to support 13.5 ton axle loads and will have to be strengthened to support 22 ton axle load.

Rolling stock and locomotive maintenance depots at Tema and Kumasi will also require rehabilitation and expansion.

2.4.2. Existing Conditions of the Railway Line

A review of the available documents from GRDA/ GSA and our site observations indicated the following:

2.4.2.1. Rails

The existing rails are of 30 and 40 kg/m British and American standard 60, 75, 80 and 90 lb/yd rail sections. The rail sections currently in operation (i.e. Accra –Tema and Accra – Nsawam) are generally appropriate for current loading of 13 tonnes axle load (i.e. for a narrow gauge system). However when heavier axle loads of 22- 25 tonnes axle loads (i.e. standard gauge system) is introduced, heavier rails (i.e. 60kg/m) will be required. Figure 2.10 shows the current 30kg/m rail.

Figure 2-11: A section of Eastern Railway Line in Kumasi

Figure 2-12: Rail section completely destroyed by illegal mining

2.4.2.2. Formation

The current formation was built for 13.5 ton axle load. Activities of illegal mining ("galamsey") along the banks of River Birim at Ankaase Halt and other areas, particularly between Osino and Anyinam have completely destroyed substantial sections of the rail as shown in Figure 2.11 above. In these affected areas the land is badly disturbed that it may take some geotechnical engineering to stabilise the formation (route soil) in order to give it the requisite capacity to hold new tracks and the expected axle loading if the existing alignment is to be maintained.

2.4.2.3. Alignment

The current alignment has very steep gradients and sharp curves for example between Mangoase and Koforidua and between Dome and Amasaman. The steep gradient and sharp curves will need to be flattened or straightened in order to cope with the higher speeds being proposed (i.e. Maximum 120km/hr) by the Railway Master Plan. This may require a re-alignment which we have examined as part of our work.

2.4.2.4. Track Structure

An overview of the track structure along the Eastern Railway Line is as follows:

Table 2-5: Characteristic of Eastern Railway Line Track Structure

From	To	Distance (km)	Rail (lbs)	Sleeper	Fastening	Grade	Axle load (ton)
Tema	Achimota Junction	23.7	80	Wood/steel	Rigid/elastic	1.0%	16.0
Accra	Osino	122.4	60/80	Wood/steel	Rigid/elastic	1.25%	13.5
Osino	Konongo	121.5	80	Steel	Rigid	1.25%	13.5
Konongo	Kumasi	59.2	80	Wood	Elastic	1.25%	13.5
Total		xxxx					

Source: GRDA

2.4.2.5. Sidings

A rail siding is a low speed track section separate from the main line (i.e. the Eastern Rail Line) which connects major commodity producing companies.

In Kumasi, there are 21 railway sidings connecting timber companies, cocoa and oil companies to the Western and Eastern Railway Lines. Only 7 of these railway sidings are currently operational. The 14 non-operational sidings are direct connections to major timber companies.

2.4.2.6. Bridges

The distribution of bridges over the Eastern Railway network is shown in the table below:

Table 2-6: Distribution of Bridges on the Eastern Railway

Location	Number of Bridges	Total Length (m)
Accra – Kumasi Section	88	823.0
Tema – Achimota Section	13	232.1
Total	**101**	**1,055.1**

Source: GRDA

2.4.2.7. Stations

There are eight major stations on the Eastern Railway Line. These are shown in Table 2.7 below.

Table 2-7: Major Stations on the Eastern Railway Line

Major Stations	Distance (km)
Accra	0
Achimota	7.2
Tema	23.7
Kotoku	31.4
Nsawam	40.6
Koforidua	80.1
Nkawkaw	173.5
Kumasi	303.9

Source: GRDA

The other stations are either minor stations or halts stations.

2.4.2.8. Buildings

We understand that GRDA currently owns 2,643 buildings with a total floor area of 442,420 m2. Majority of buildings are made of concrete constructions with tiled roofs.

GRDA buildings include stations, administrative offices, workshops, sheds and residential buildings. Most of these buildings which are critical to the efficient implementation of the project would require refurbishment. Figure 2.12 below shows the current condition of a railway station in Ejisu.

Figure 2-13: Current condition of a railway station in Ejisu

Figure 2-14: A new railway station at Odaw

A very large percentage of buildings (over 70%) are residential in purpose. The breakdown between residential and other types of buildings:-

- Residential - 1,923 buildings, area 288,788 m2; and
- Other types - 720 buildings, area 153,631 m2.

The residential buildings include single-family homes, apartment complexes and bunkhouses. Due to the current reduced size of the GRCL workforce, many of the residential properties are vacant and are not in a good state.

2.4.2.9. Signals and Telecommunications

Most of the signals, level crossings and telecommunication systems on the Eastern Railway Line are broken down except the Accra to Tema and Accra to Nsawam sections which are current in operation. Figure 2.14 shows the current condition of signal control system which is broken down.

Figure 2-15: State of a Signal Control Structure

2.4.2.10. General Rolling stock

GRDA's rolling stock fleet consists of locomotives, freight wagons, passenger coaches, a small selection of track-mounted cranes and other track-mounted cars for inspections of the infrastructure. The rolling stock is conventional 1,067 mm gauge bogie-mounted equipment. All these will need to be replaced with standard gauge rolling stock.

Currently there are 3 locomotives of class 1671 operating on the Eastern Railway Line.

Table 2-8: Locomotives on Eastern Railway Line

Class of locomotive	Number of Locomotives
1671	3

Source: GRDA

The number of wagons on the Eastern Railway Line is also shown in Table 2.9 below.

Table 2-9: Classes of Wagons on the Eastern Railway Line

Class of coaches	Number of Wagons
Sitting I	2
Sitting II	7
Brake Composite	1
Total	**10**

Source: GRDA

2.5. Overview of Rail Infrastructure in Sub Sahara Africa

Between the late 1990s and early 2000s a number of major railway lines within the Sub-Saharan African region were concessioned. The railway line infrastructure shown in Table 2-10 and Table 2-11 are predominantly Cape gauge (1,067mm) or Metre gauge (1,000mm) despite plans for the development and conversion of such railway lines into standard gauge (1,453mm) lines in selected locations within the region including Kenya and Nigeria.

Considering the high cost of investment for the rail infrastructure, the responsibilities for the provision of rolling stock and maintenance has been observed to be assigned to the concessionaire as part of the agreement.

Funding for these projects has mostly been supported by Development Partners (bilateral and multilateral donors) such as the International Development Agency (IDA) and the International Finance Corporation (IFC) with funding from the these agencies for these railway lines estimated to be almost US$1billion over the years.

Table 2-10 indicates the characteristics of concessioned railway infrastructure in the region. Table 2-11 indicates the characteristics of state-owned railway infrastructure in the region.

Table 2-10: Summary of Concessioned Railways in Sub-Saharan Africa

Country	Company name	Concession duration (initial) years	Type of gauge	Total support		Investment responsibility	
				IDA (US$ million)	IFC (US$ million)	Infrastructure	Rolling stock
Burkina Faso	Sitarail (operated by Bollore Africa logistics)	15	Metre gauge	21	None	Public	Private
Cote d'Ivoire						Public	Private
Zimbabwe	Beithbridge Bulawayo Rail (BBR)		Cape gauge		None		
Cameroon	Camrail	20	Metre gauge	113	None	Public	Private
Malawi	Central East Africa Railway co. (CEAR)	20	Metre gauge	10	None	Private	Private
Zambia	Railway of Zambia (RSZ)	20	Cape gauge	35	None	Private	Private
Madagascar	Madarail	25	Metre gauge	65	None	Public	Private
Mali	Transrail	25	Metre gauge	45	None	Public	Private
Senegal						Private	Private
Mozambique	Companha dos Caminhos de Ferro da Beira (CCFB)	25	Cape gauge	110	None	Private	Private
Gabon	Setrag	30	Standard gauge	0	None	Public	Private
Mozambique	Corredor de Desenvolvimento do Norte (CDN)	15	Cape gauge	20	None	Private	Private
Kenya	Kenya Railway co. (KRC)	25	Metre gauge	74	32	Private	Private
Uganda	Uganda Railway co. (URC)					Private	Private
Tanzania	Tanzania Railway co. (TRC)	25	Metre gauge	35	44	Private	Private
Democratic Republic of Congo	Societe Nationale des Chemin de fer du Congo (SNCC)	-	Cape gauge	380	-	Public	Private/public

Sources: a) *A Comparative Study of Dry Ports in East Africa and China*. Developing Country Studies.Vol.5, No.2, 2015.
b) *Off Track: Sub-Saharan African Railways*. Africa Infrastructure Country Diagnostic (AICD) Background Paper 17. IBRD/World Bank, 2009.
c) *Results of Railway Privatization*. Transport Papers. World Bank, 2005.
d) *Logistics Cost Study of Transport Corridors in Central and West Africa*. World Bank, 2013.
e) *Africa's Infrastructure: A time for transformation*. World Bank, 2009.

Table 2-11: Summary of State Owned Railways in Sub-Saharan Africa

Country	Company name	Network length (km)		Net tonne per km	Passenger per km	Type of gauge
		Total	Operating	(1995-2005)	(1995-2005)	
Namibia	Transnamib	2,382	1,683	1,000	49	Cape gauge
Sudan	Sudan Railways Corporation(SRC)	4,725	4,725	1,250	104	Narrow gauge
Tanzania	Tanzania-Zambia Railway(TAZARA)	969	969	822	400	Cape gauge
Botswana	Botswana Railways (BR)	882	882	854	96	Cape gauge
Swaziland	Swaziland Railways (SR)	301	301	673	0	Cape gauge
Dem. Rep. of Congo	Société Nationale des Chemins de Fer du Congo(SNCC)	3,641	2,200	407	145	Cape gauge
Mozambique	Caminhos de Ferro do Mozambique (CFM)	1,129	1,129	423	58	Cape gauge
Togo	Chemin de Fer du Togo (CFT)	492	77	-	-	Metre gauge
Rep. of Congo	Chemin de Fer Congo-Océan(CFCO)	795	610	254	178	Cape gauge
Ethiopia	Chemin de Fer Djibouto-Ethiopien(CDE)	681	681	100	118	Metre gauge
Benin	Organisation Commune Bénin-Niger;(OCBN)	579	438	131	85	Metre gauge
Democratic Rep. of Congo	Chemin de Fer Matadi-Kinshasa (CFMK)	366	366	87	16	Cape gauge
Nigeria	Nigeria Railways Corporation (NRC)	3,505	3,505	59	131	Cape gauge
Madagascar	Fianarantsoa Côte Est (FCE)	163	163			Metre gauge
South Africa	Transnet Freight Rail (Spoornet)	20,247	20,247	104,049	1,386	Cape gauge

Sources: a) *A Comparative Study of Dry Ports in East Africa and China*. Developing Country Studies.Vol.5, No.2, 2015.
b) *Off Track: Sub-Saharan African Railways*. Africa Infrastructure Country Diagnostic (AICD) Background Paper 17. IBRD/World Bank, 2009.
c) *Results of Railway Privatization*. Transport Papers. World Bank, 2005.
d) *Logistics Cost Study of Transport Corridors in Central and West Africa*. World Bank, 2013.
e) *Africa's Infrastructure: A time for transformation*. World Bank, 2009.

2.5.1.1. Review of Rail Infrastructure in Africa

Railways have played a key role in the economic development of most African countries particularly in the transportation of freight and passengers. However, the rapid expansion and development of road transport across all regions has seen the patronage of rail services diminish considerably.

Currently, most of the railway infrastructure in Africa is characterised by:

- Dilapidated railway tracks, terminals, platforms;
- Rail signalling and telecommunications with obsolete equipment; and
- Inadequate spare parts for maintenance works.

African Governments on their part have invested mainly in road infrastructure improvement to the detriment of the railways. The liberalisation of road transport and the slow response of railways to adapt to the new market conditions have also contributed to the dramatic traffic decline in rail transport.

However, Governments in Africa, in recent times have resorted to using concessions as a means of reducing the large infrastructure deficit in the railway sector with a majority of railways concessioned between the mid-1990s and 2010. According to the Framework for Improving Railway Sector Performance in Sub-Saharan Africa Report, currently, more than 70 percent of rail transport activities are managed by private operators with continued financial support coming from international finance organisations including the World Bank and the International Development Agency (IDA).

The pattern of railway development across Africa has been similar across most rail transport corridors across the continent. Notable amongst them, is the development of isolated rail lines that reach inland from ports to link with trading centres or mines, with branch lines being subsequently built over time. Historically, most of the railway lines have been state-owned; but over time, development of rail infrastructure have been given as concessions to private parties or, in some cases, taken up as part of mining developments as an integral part of the mining company's operations.

Even though frameworks and master plans for integrated rail systems have been proposed for rail development in the Africa, none have been fully implemented. Most African rail systems remain fragmented, with lines connecting cities within a single country or linking a port and its immediate regional hinterland.

A few railways run across borders to link landlocked countries to ports, and others provide inland railheads from which goods can be on-forwarded by road. But there has historically been little trade between most African countries outside southern Africa and the financial and economic case for more general interregional links may not be convincing3.

2.5.1.2. Historical Challenges Faced in the Development and Operation of Rail Infrastructure in Africa

Over the last few years, it has been observed that most of the general challenges associated with the development of rail infrastructure in Africa cut across the various railway lines operating within the region.

Some of these challenges are highlighted below4:

- The occurrence of conflicts and wars, natural disasters and general neglect have rendered sections of several rail lines unusable;

[3] Africa's Infrastructure: A Time for Transformation. The International Bank for Reconstruction and Development/ World Bank (2009)
[4] Africa's Infrastructure: A Time for Transformation. The International Bank for Reconstruction and Development/ World Bank (2010)

- Trade between African countries (other than to and from South Africa and its neighbours) has always been minimal, largely because of the similarity in the products exported ;
- Traffic density on African railways generally tends to be low and with such light usage, many networks have struggled to generate enough funds just to maintain, much less renew their infrastructure;
- Most rail systems have considerable sections of track in need of repair or replacement. Some have major sections that are not in operation and will require rehabilitation before operations can resume. Even where service exists, poor track condition forces speed restrictions, resulting in lower railway competitiveness, poor rolling stock productivity and general railway operational efficiency; and
- Bureaucratic constraints and the lack of commercial incentives from Government operated railway lines has led to a decline in the patronage of most railway services in Africa.

Table 2-12: Selected African Railway Lines and their Challenges or why they failed

Railway and Location	Challenges/Reasons why they failed
Camrail (Cameroun)	• Insufficient locomotives and wagons in operation, with majority of facilities needing refurbishment; • Excessive derailments over time; • Poor management of the rail infrastructure coupled with corruption; • Insufficient funds to support the long-term operations of rail infrastructure; and • Decrease in traffic volumes due to the 2008 global financial crisis.
Railway Corporation of Nigeria (Nigeria)	• Improper management practices by operators (e.g. Negligence of customer's belongings, poor time-keeping etc.); • Failure of the Government to inject sufficient funds into the railway sector; • Overcrowding in train compartments; and • Poor sanitary conditions of train coaches rendering them unattractive to customers.
Transrail (Senegal)	• Dilapidated tracks and outdated rolling stock; • Low traffic volumes to generate enough revenue; and • Insufficient financing or investment.
Transrail (Mali)	• Lack of investment to support production activities; • Existence of an aging workforce with a need to train new employees; and • Stiff competition from road transport.
Sitarail (Burkina Faso & Ivory Coast)	• Accumulation of financial liabilities (debt) over the years; and • In need of a revision of the concession agreement in order to survive.
Organisation Commune Benin Niger (Benin)	• Insufficient freight and passenger traffic demand; and • Lack of productivity.
Transnet Freight Rail (South Africa)	• Lack of integrated planning; and • Inappropriate regulatory framework and institutional structure.
National Railways Of Zimbabwe (Zimbabwe)	• Staff or labour turnover has been very high due to "brain drain" from neighbouring countries including South Africa; • Poor management and inappropriate Government interference; and • Custom border delays resulting from cumbersome inspection regimens.
Zambia Railways Limited (Zambia)	• Worker inefficiencies as a result of poor supervision and monitoring; • Poor state of railway line leading to low average travel speeds;

Railway and Location	Challenges/Reasons why they failed
	• Encroachment along the rail lines and illegal settlements on the railway reserve land leading to vandalism and theft; and • Progressive degradation of obsolete plant machinery, equipment and tools used in the maintenance of rolling stock
Tanzania Zambia Railway Authority (Tanzania & Zambia)	• Lack of adequately skilled manpower; and • Inability to adequately generate funds to support rolling stock and other operational requirements.

2.5.1.3. The Way Forward for the Development of and Efficient Operation of Rail Infrastructure in Africa

It is evident that there are several challenges in the development and operations of railway infrastructure in Africa, but there are ways to manage these challenges to harness operational efficiency and maximise benefits to all stakeholders.

These include the following:

- The development of long-term strategic plans for the rehabilitation and development of rail transport infrastructure;
- The implementation of an appropriate framework that would stimulate increased private sector participation as well as ensure successful PPP's in the railway sector;
- The development of an adequate regulatory framework which provides a well-coordinated, sound, independent, and accountable structure vital for the improvement of concessions' performance;
- The efficient utilisation of international financial support meant for the development of the railway transport sector; and
- The goal of the rehabilitation of railway infrastructure should be aimed towards making railways competitive in comparison with road transport.

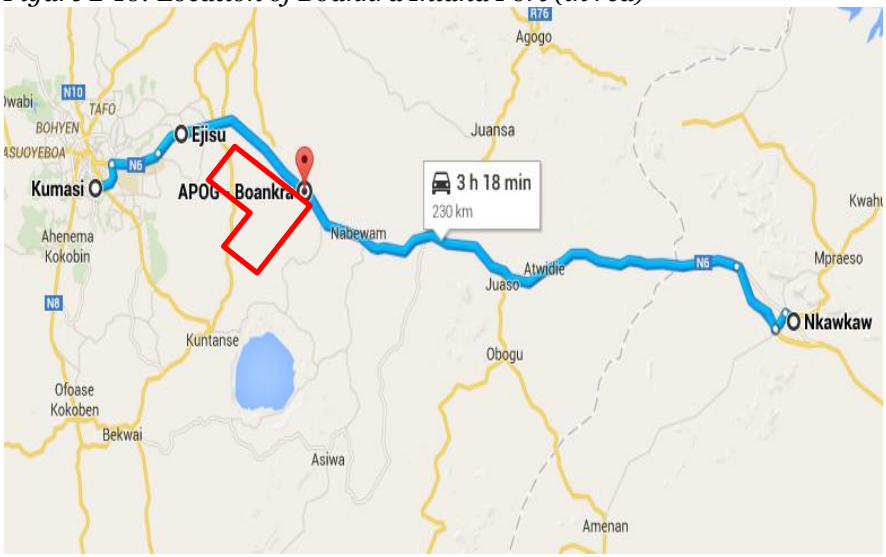
2.6. Boankra Inland Port

The Inland Port is being developed on a 400 acre parcel of land located at Boankra, 27 km away from Kumasi. The site is currently accessible by road.

2.6.1. Existing Conditions at the Boankra Inland Port

At the Inland Port site, the Eastern Railway Line runs parallel to the N6 (Accra – Kumasi Highway). The site area is L-shaped with a fairly flat terrain and a stream running through the site. Some major works including land preparation, fencing and office buildings have been completed. We have however considered the Inland Port a Greenfield since it is not in operation.

Figure 2-16: Location of Boankra Inland Port (in red)



Source: Google Maps

An administrative block referred to as Boankra Shippers Complex has been completed with car parks. The main access road linking this block to the N6 has been constructed with two major new culverts on the access road. The figures below show some of the facilities at the Boankra Inland Port.

Figure 2-17: Teak Fencing

Figure 2-18: Main Entrance

Figure 2-19: Administration Block

Figure 2-20: Car Park

Figure 2-21: Boundary Fence

2.7. Overview of Dry Port Infrastructure in Sub-Saharan Africa

Currently, there are quite a limited number of dry ports in sub-Saharan Africa relative to the number of seaports, some of which have been in existence since 1970's. However, the relevance of dry ports cannot be understated considering the fact that most seaports are struggling to cope with obsolete infrastructure as well as congestion and capacity related issues.

Table 2-13 below shows that dry ports are mostly connected by road and rail networks and as such play a major role as transportation hubs for transit traffic as well as linking landlocked countries to international trade via countries within the region with sea port facilities.

Port capacity (in TEUs) for the dry ports considered in Table 2-13 averaged about 190,000 TEUs per year with the Mombasa port in Kenya recording about 771,000 TEUs in 2011 as compared to 6,300 for the Modjo Port in Ethiopia. The variation in port capacity across these countries can be attributed to factors such as:

- The area/size of the port;
- The level and components of trade activity;
- The location of the port; and
- The level of technology and equipment available.

Table 2-13: Selected Dry Ports in Sub-Saharan Africa

Dry port	Country	Management/operator/ownership	Investment (US$ million)	Mode of transportation	Concessionaire	Capacity
Modjo Dry Port	Ethiopia	ESLSE (Ethiopian Shipping & Logistics Services Enterprise)	1.4*	Road	ESLSE (Ethiopian Shipping & Logistics Services Enterprise)	6,300 TEU per year
Semera Dry Port	Ethiopia	ESLSE (Ethiopian Shipping & Logistics Services Enterprise)	1.3*	Rail/Road	ESLSE (Ethiopian Shipping & Logistics Services Enterprise)	
Viana Dry Port	Angola	Multiparques/ Multiterminais	70	Rail/Road	Multiparques/ Multiterminais	35,000 TEU per year
Matsapha Dry Port	Swaziland	Swaziland Railways Corporation	-	Rail/Road	-	-
City Deep Dry Port	South Africa	Transnet Freight Rail	-	Rail/Road	-	-
Tororo Dry Port	Uganda	Great Lakes Port Ltd	120	Rail/Road	Great Lakes Port Ltd	-
Kisarawe Dry Port	Tanzania	DSM Corridor Group Ltd	17	Rail/Road	DSM Corridor Group Ltd	2 million tonnes per year
Isaka dry port	Tanzania	Tanzania Railway Corporation (TRC), Reli Assets Holding Company (RAHco)	-	Rail/Road	Reli Assets Holding Company (RAHco)	1.8 million metric tonnes per year/ 13,000 TEUs per annum
Magerwa Ltd	Rwanda	Portek East Africa Terminals Ltd	-	Rail/Road	Portek (75% Acquisition of shares in 2011)	
Mombasa dry port	Kenya	APM Terminals (APMT)/ Great Lakes Port Ltd	-	Rail/Road	Joint Venture between APM Terminals (APMT) and Great Lakes Port Ltd	771,000 TEU in 2011

Note: * represents amount invested in port expansion activities
Sources: a) *A Comparative Study of Dry Ports in East Africa and China*- Developing Country Studies -Vol.5, No.2, 2015.
b) *The role of dry ports in South Africa*- Transport and Communications Bulletin for Asia and the Pacific- No. 78, 2009.

2.7.1.1. Review of Port Infrastructure in Africa

Since the mid-1990s, both general cargo and containerised cargo passing through African ports have more than doubled. Southern Africa has had the fastest growth in general cargo traffic and West Africa in container traffic. West and Central African economies which depend on maritime transport for an overwhelming proportion of their trade rely on efficient maritime transport and port sectors to be competitive on world markets.[5]

Dry bulk traffic (coal, grain, and some chemicals) and liquid bulk traffic (mostly oil) in Africa have also been growing rapidly. By international standards, however, these traffic categories are unbalanced, increasing the costs for African trade. Export volumes greatly exceed import volumes for dry and liquid bulks, while imports tend to dominate exports for general cargo and container trades.

It is generally recognised that the African continent lacks natural ports, while its artificial seaports[6] have been poorly developed. African ports have become more congested following the rise in GDP growth and levels of global trade witnessed in most African countries in the years leading up to the global financial crisis of 2008. Over the last decade, the amount of cargo transiting through Africa's ports tripled, but containerisation is still low and the inland transportation linkages remain weak.

2.7.1.2. Selected Examples of Unimodal Terminals in sub-Saharan Africa

Unimodal terminals are essentially those that rely on a particular mode of transportation for the transfer of goods within the country, which in this case is road transport.

There are a number of intermodal dry ports or terminals currently operating within Africa although there are plans to establish new terminals in some locations across the sub-region.

Most of these terminals were established for specific reasons but it is more difficult to identify unimodal terminals that operate on a common-user basis. Most of the terminals either a depot operated by one haulier to allow for transfer of cargoes from owned trucks or aimed at easing congestion for cargo owners and allowing for activities to be performed on cargo (customs clearing or transhipment) without delaying the road truck.

The table below shows examples of selected unimodal terminals in sub-Saharan Africa.

[5] Port and Maritime Transport Challenges in West and Central Africa, SSATP Working Paper No. 84 (2007)
[6] Africa Development Report (2010), Chapter 2: Port Development in Africa.

Table 2-14: Selected Unimodal Terminals in Sub-Saharan Africa

Dry Port	Country	Management/Operator/ Ownership	Investment (US$ million)	Concessionaire	Capacity
Kigali Logistics Platform	Rwanda	Dubai Port World	40	Dubai Port World	50000 TEU/Annum
Oshikango Border Post: Namibia/Angola	Namibia/Angola	European Investment Bank	N/A	European Investment Bank	N/A
Kasumbalesa Border Post	Zambia	Zambiam (IP) Border Crossing Company	25	Zambian (IP) Border Crossing Company	600 Trucks/day
CONDEP Manica Terminal	Zimbabwe	Container Deport	N/A	N/A	N/A
Cato Ridge: City Ventures container and VDS automotive terminals	South Africa	Royal HaskoningDHV	1,519	N/A	N/A

2.7.1.3. Major Challenges Faced in the Development and Operation of Port Infrastructure in Africa

In terms of the challenges encountered in the development and operation of port infrastructure in Africa, it is quite evident that congestion has been a key factor in limiting the efficiency of most ports within the region.

The general reasons for port congestion in African ports have been observed to be:

- Increased container traffic volumes not consistent with infrastructure development, thus growth outstrips available capacity;
- Long container dwell times caused by poor off-take by rail and the use of ports as storage areas, etc.;
- Lack of adequate capacity and poor hinterland transport infrastructure, especially rail and road;
- Inadequate and aging technology, unsuitable equipment;
- Poorly integrated supply chains;
- Low productivity levels;
- Capacity constraints, for example insufficient container storage space;
- Poor planning such as overbooking of cargo by shipping lines, leading to cancelations and rollovers;
- Resistance to change in management styles; and
- Cumbersome regulatory systems, decentralised documentation processes coupled with bureaucratic clearance procedures.

Aside the main problem of congestion, other challenges that have also impacted on the development and performance of African ports include:

- High tariff charges resulting in increased cost of transporting goods through the ports; and
- Lack of regulatory framework to monitor port activities;
- Low level of containerisation relative to the rest of the rest of the world despite its increasing annual growth; and
- Safety and security concerns.

2.7.1.4. Summary of Selected African Ports and their Challenges

The table below gives a brief summary of some selected ports in Africa and the challenges they have encountered over the years.

Table 2-15: Selected African Ports and their Challenges or why they failed

Railway and Location	Challenges/Reasons why they failed
Mombasa Port (Kenya)	• Severe capacity constraints; • High dwell times; • Slow cargo clearance and transfer processes; • High trucking tariffs; and • Low utilisation of rail transport.
Lagos Port (Nigeria)	• Inadequate facilities to support port activities; • Congestion; • Delayed customs clearance procedures; and • Location of the port in an urban area may make its sustainability difficult in the future
Tema Port (Ghana)	• Congestion; • Insufficient equipment for operations; and • Strong competition from rival ports in neighbouring countries.
Port of Dakar (Senegal)	• Congestion;

Railway and Location	Challenges/Reasons why they failed
	• Inadequate facilities for key support services such as cooling/refrigerated storage and trucks for agricultural and perishable goods; and • High storage /warehousing costs.

2.7.1.5. The Way Forward for the Development of and Efficient Operation of Rail Infrastructure in Africa

In view of the challenges that African ports experience in relation to their development and operation, measures have been proposed that seek to reduce the impact of these challenges to the barest minimum.

These proposed measures include:

- The need for comprehensive policies for modal integration including concepts such as the development of links between rail and port concessions as an incentive to good modal integration;
- More consideration for the planning and development of Inland Ports;
- Developing knowledge sharing and collaboration between ports and countries on current reforms in the region using platforms such as the Port Management Association of West and Central Africa (PMAWCA) and the Port Management Association of Eastern and Southern Africa (PMAESA);
- Increased investment in information systems, communications technology, and modern customs practices to reduce dwell times and handling costs;
- Improvement in customs processing procedures;
- Promoting private sector participation in the ports sector with the objective to provide investment for new installations and equipment, and to transfer technical knowledge and more efficient terminal management;
- Increased investment in port expansion (facilities, equipment etc.) to manage congestion and its related issues; and
- Cooperation between port authorities, shipping lines and donors to benchmark port efficiency, so that individual ports and terminals can compare their performance against their neighbouring countries as well as the globally.

3. Macroeconomic Outlook for Ghana and the Neighbouring Landlocked Countries

3. Macroeconomic Outlook for Ghana and the Neighbouring Landlocked Countries

3.1. Introduction

Despite the projected slight improvement in economic growth in the global economy in 2015 and 2016, Ghana's GDP growth rate was projected to fall in 2015 but then rise in 2016 (IMF, 2015). This scenario is in concert with the projected pattern for Sub-Saharan Africa generally.

The composition of Ghana's trade continues to be dominated by the primary commodity exports, gold, cocoa and recently oil, all of which have declined in price in recent times. The declining commodity prices, structural limitations in infrastructure and labour markets and Government over spending have contributed greatly to the slowdown in the growth momentum in Ghana and many emerging and developing economies.

The near-term for Ghana seems quite challenging, given the infrastructural deficit, particularly in the energy sector. The instability in electricity, which is locally referred to as 'dumsor' - continues to have detrimental effects on productive economic activities, as well as resulting in negative implications for employment via decreasing derived demand for labour. Unemployment remains a key challenge, however, opportunities for employment in the industrial sector remain limited and highly specialised. These challenges suggest that Ghana needs to be committed to the prioritisation of its public finances. Such an undertaking would entail major political decisions.

Backed by strong investment in the oil and gas sectors, as well as by public infrastructure and favourable commodity prices, Ghana can sustain continuous economic growth well into the future, provided the country improves its macroeconomic management which requires bold efforts to reduce its budget imbalances. In order to ensure that medium-term growth targets are met, there is the need for significant investment in productive infrastructure and the need to prioritise non-traditional exports.

The table below gives a summary of the economic indicators representative of Ghana's economic performance (real growth) in 2015.

Table 3-1: Overview of Real GDP Projections

Description	Outturn 2015	Budget 2015	Target 2016
Growth in Real GDP Including Oil	4.1%	3.5%	5.4%
Growth in GDP (non-oil)	4.2%	2.3%	5.2%
End of Period Inflation	17.4%	13.7%	10.1%
Overall Fiscal Deficit (% of GDP)	5.1%	7.3%	5.3%
Gross International Reserves	Not less than 4 months of import cover	Not less than 3 months of import cover	Not less than 3 months of import cover

Source: Budget Statement 2016

Table 3.2 to 3.4 show the growth rates for the principal sectors of the Ghanaian economy between 2013 and 2015. These tables highlight the main components or contributors for these sectors as well their respective growth rates.

Table 3-2: Growth Rates for the Services Sector

Component	2013 Actual Growth Rate (%)	2014 Target Growth Rate (%)	2014 Actual Growth Rate (%)	2015 Actual Growth Rate (%)
Services	10.0	4.6	5.6	4.7
Trade, repair of vehicles, household goods	14.5	(1.5)	(1.6)	2.0
Hotel and Restaurants	24.6	0.8	(1.2)	(4.8)
Transport and Storage	(0.5)	6.0	0.3	(6.3)
Information and Communication	24.3	1.9	38.4	14.2
Financial Intermediation (Indirectly measured)	29.5	20.7	6	15.8
Real Estate, Professional, Administrative & Support Service Activities	(17.5)	(2.7)	(1.5)	5.1
Public Administration and Defence, Social Sec.	8.4	11.4	(4.7)	20.3
Education	6.9	4.8	7.1	9.3
Health and Social Work	7.8	(7.0)	(1.7)	10.9
Community Social and Personal Service Activities	36.5	5.0	(1.6)	(1.5)

Source: Ghana Statistical Service, 2015

Table 3-3: Growth Rates for the Agriculture Sector

Component	2013 Actual Growth Rate (%)	2014 Target Growth Rate (%)	2014 Actual Growth Rate (%)	2015 Actual Growth Rate (%)
Agriculture	5.7	5.3	4.6	0.04
Crops & Cocoa	5.9	3.6	5.7	(1.7)
Livestock	5.3	5.3	5.3	9.3
Forestry and Logging	4.6	16.5	3.1	1.6
Fishing	5.7	7.1	(5.6)	5.3

Source: Ghana Statistical Service, 2015

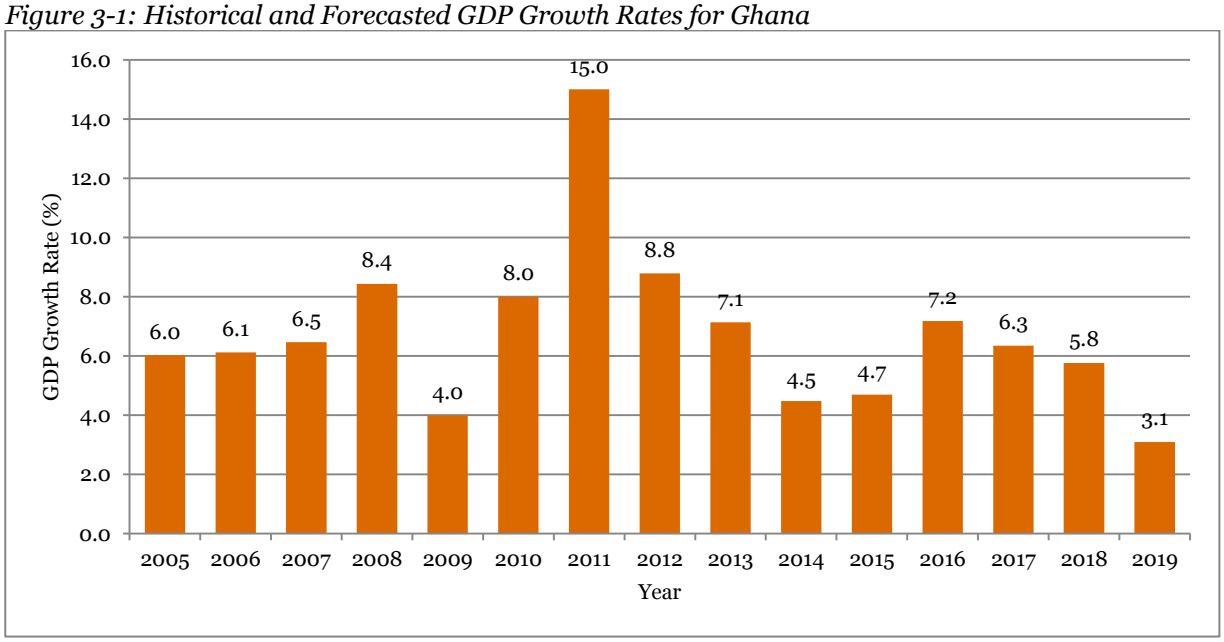
Table 3-4: Growth Rates for the Industry Sector

Component	2013 Actual Growth Rate (%)	2014 Target Growth Rate (%)	2014 Actual Growth Rate (%)	2015 Actual Growth Rate (%)
Industry	6.6	4.6	0.8	9.1
Mining and Quarrying	11.6	6.9	3.2	(3.8)
Petroleum	18.0	18.2	4.5	2.0
Manufacturing	(0.5)	(8.0)	(0.8)	(2.0)
Electricity	16.3	6.7	0.3	3.2
Water and Sewage	(1.6)	0.1	(1.1)	15.6
Construction	8.6	12.8	0	30.6

Source: Ghana Statistical Service, 2015

Figure 3-1 below highlights the IMF historical and forecasted GDP growth rates for the Ghanaian economy from 2005-2019. The GDP growth rates for the period under consideration reached a high of 15% in 2011 due to positive economic growth factors such as increased investments and increased exports but gradually declined to a rate of 4.5% in 2015 (actual in 2015 was 4.1). It is however expected to increase in 2016 but then assume a downward trend based on current projections.

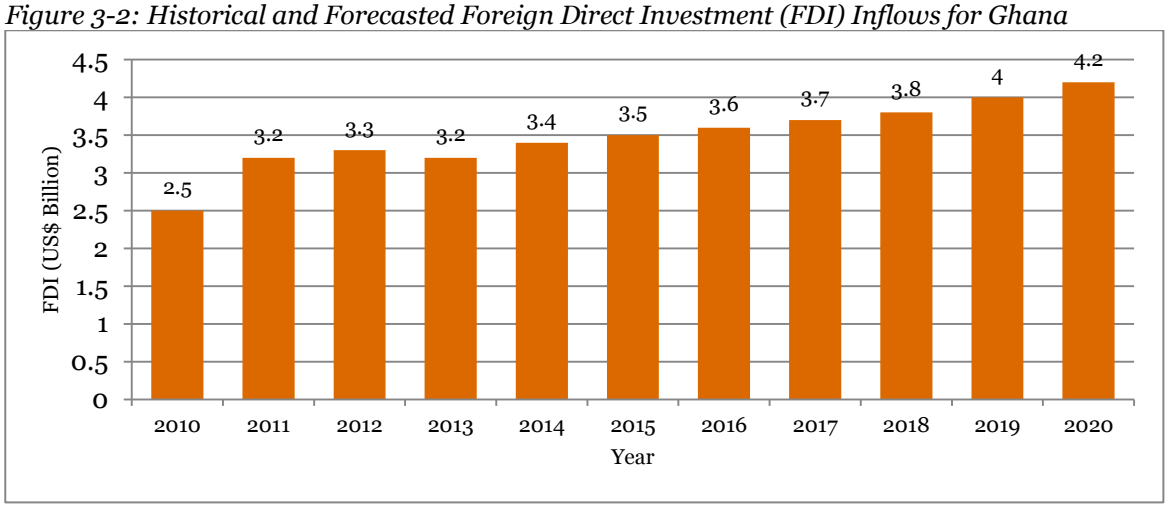
Figure 3-1: Historical and Forecasted GDP Growth Rates for Ghana



Source: International Monetary Fund (Growth Estimates)

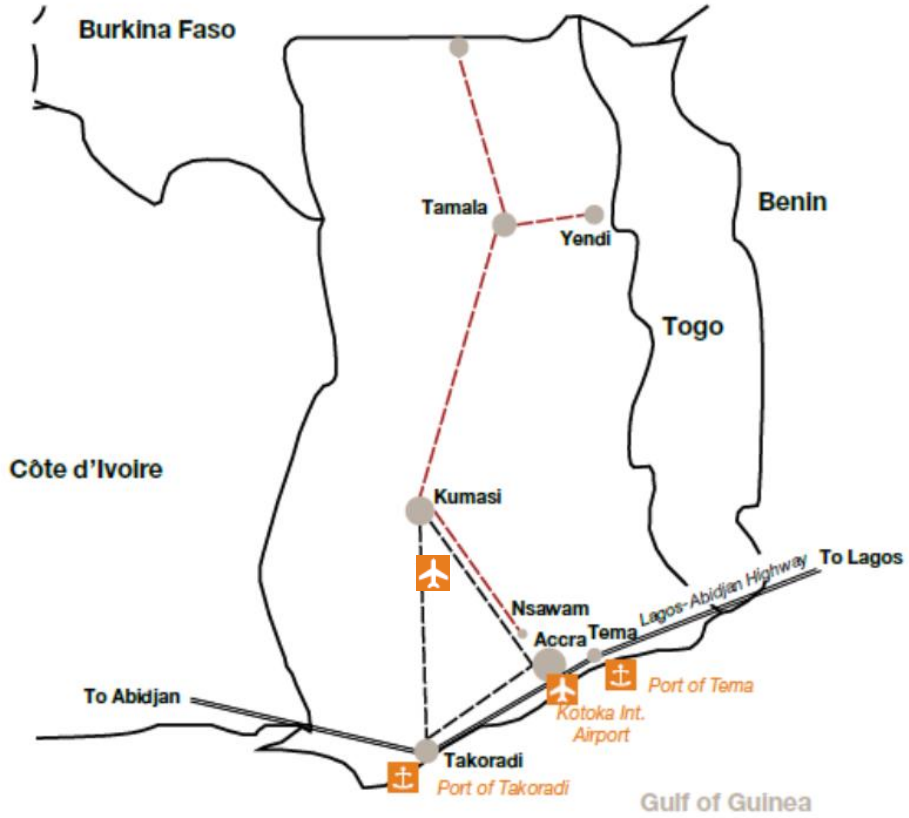
In terms of Foreign Direct Investment in the country, inflows are expected to continue their steady growth with an increase in the 2015 figure of US$3.5 billion to US$3.7 billion in 2016. This is projected to reach US$ 4.2 billion in 2020 based on the current trend. These projections are an indication of foreign investors' willingness to inject financial resources into the Ghanaian economy and this is represented in figure 3-2 below.

Figure 3-2: Historical and Forecasted Foreign Direct Investment (FDI) Inflows for Ghana



Overview of the Transport Industry in Ghana

Figure 3-3: Transport Map of Ghana



Source: PwC 'Africa Gearing Up Report', 2013

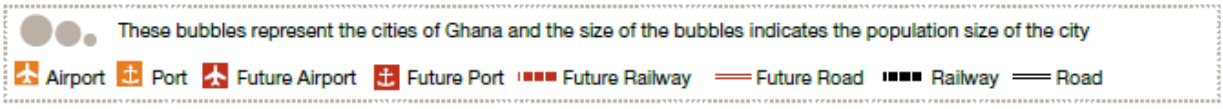


Figure 3-3 above shows the existing major transport infrastructure in Ghana. From the map, we can observe that Ghana's transportation system is concentrated in the Southern parts of the country, particularly in the areas in which gold, cocoa, cement and timber are produced. The Northern and Central regions on the other hand are connected through a major road system although some locations remain relatively disconnected.

The Ministry of Roads and Highways (MRH) estimates that road transport accounts for 96% of passenger and freight traffic in Ghana and about 97% of passenger miles in the country. Road transport is the predominant mode of transport in Ghana, accounting for the vast majority of freight and passenger movement. However, the transportation network over the years has deteriorated due to the lack of maintenance of the various roads.

The cost of road construction and maintenance has been borne mainly by the Government. The Government through the MRH appoints both local and international engineering firms via competitive bidding to construct and maintain roads. Development partners (DPs) such as the World Bank, International Development Association and the African Development Bank provide significant support to road development programmes and other important infrastructure initiatives in the country.

According to the World Bank, the population of the major cities in Ghana are growing at an average rate of nearly 2.35% as at 2014, resulting in enlarged population sizes. Similarly, the transport industry has grown correspondingly over the period, with scores of small and medium-sized service providers emerging to satisfy the growing demand.

As we have discussed in Chapter 2, the rail network in Ghana is currently very under-developed, and an objective of the MoT is for the rail subsector is to acquire sustainable funding to revive Ghana's rail network to all strategic economic destinations. This is intended to considerably reduce the traffic, pressure and accidents on our roads, and thus minimise the cost of repairing and maintaining the road networks in the country. Though not a major system of transportation, mining companies rely heavily on the system. The rail subsector is thus key to promoting economic growth.

Ghana Railway Company Limited (GRCL) currently operates the total rail network of Ghana of length of 947 route kilometres of tracks (1,200km) all located in the Southern part of Ghana. This is made up of the Western, Central and Eastern lines. With the exception of the 30-kilometre Takoradi to Manso double track section, the rest of the network is a single track system of 1067 mm (3' 6") cape gauge.

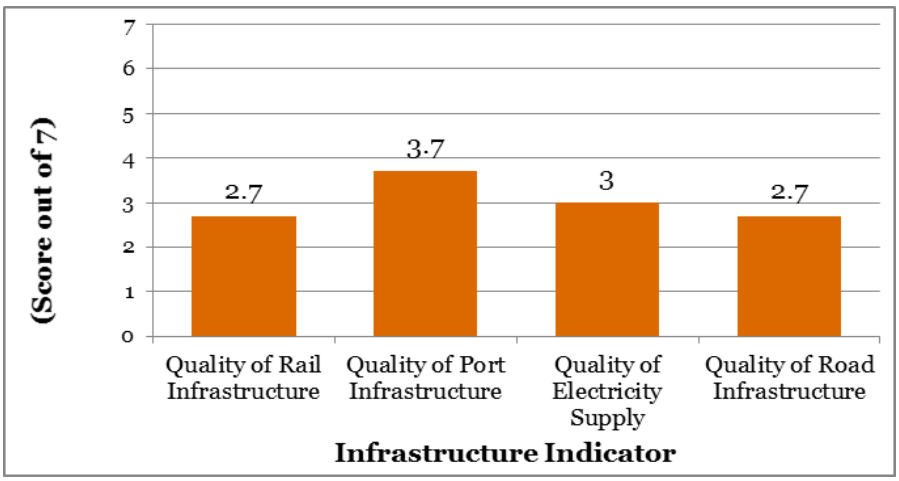
Considering that Ghana's railway infrastructure has heavily deteriorated due to lack of funds for maintenance and modernisation (i.e. using the Western Railway Line as an example), the rail transport system is currently characterised by:

- Dilapidated railway tracks, terminals, platforms;
- Insufficient rail linkages to key mineral deposits and key agricultural "breadbasket" centres of the country; and
- Insufficient rail linkages to land-locked West African trading partners, i.e. Burkina Faso, Niger, Mali.

The above problems on the Western Line have resulted in an over-utilised road system that has also deteriorated quickly. Majority of the railway freight traffic is bulk minerals (bauxite and manganese) transported from the mines at Awaso & Nsuta to Takoradi port for export. Most passenger services have been suspended due to lack of rolling stock, station disrepair, and fuel costs and most of the other traditional freight commodities such as timber, cocoa, petroleum products and cement, as well as intercity passenger traffic, has been lost to road transport.

The current state of Ghana's road and rail system is further evidenced by the 2015 Global Competitiveness Index (GCI) which rates the overall quality of Ghana's infrastructure 3.4 out of 7. The GCI rates infrastructure in the 1-7 score point, 1 indicating extreme underdevelopment- amongst the worst in the world, whilst 7 indicates extensive and effective – amongst the best in the world. For the quality of roads, Ghana scored 2.7 out of 7. For quality of railroad infrastructure it scored 2.7, 3.7 for quality of port infrastructure and a 3.0 for quality of electricity supply.

Figure 3-4: Global Competitive Index (GCI) Ratings for Ghana 2015 - Infrastructure



Source: Global Competitiveness Report (2015)

These ratings highlight Ghana's poor infrastructure development, however, there are plans to develop and rehabilitate some of its infrastructure with the proposed construction of the Boankra Inland Port and the development of Eastern Railway Line as one of such projects to boost the transport sector.

The development of the port and railway line is expected to increase the level of economic activity in the country particularly with regards to import and export related activities, as well as result in the creation of value added services. The modal shift from road to rail would relieve the pressure on the road networks and at the same time increase the level of production and distribution of commodities by providing a faster and better means of transporting freight.

The development of transport infrastructure would further promote trade not only within the country but also between its landlocked neighbours taking into consideration the economic activities that are shared across borders. This would also support the exploitation of newly identified resources (for example bauxite mining at Kibi in the Eastern Region, 92 km North of Accra) and the production of other commodities that would bring additional economic benefits to the country.

Government also has plans of extending the railway line towards the far north with the aim of gaining easier access to the traffic coming from the landlocked countries and the northern part of the country.

3.2. Review of the Neighbouring Landlocked Countries and their Economic Activities

The discovery of mineral products such as oil, gold, bauxite, diamond, manganese, limestone, graphite, lead, zinc, iron ore and many other mineral deposits available in commercial quantities in recent times has led to an increase in mining and general economic activities within the West African region.

These discoveries despite their potential to transform the region's economic prospects have been hindered by Governments' inability to meet the high infrastructure and funding demands attached to the mining industry. However, collaboration with institutions such as the World Bank and the International Finance Corporation has led to the development of transparent and investor-focused mining laws and policies some of which are meant to aid and facilitate mining concessions and specific import duty exemptions all with the aim of promoting foreign investment in infrastructure and mining exploitation.

The development of the Boankra Inland Port and Eastern Railway Line project is expected to facilitate faster transportation of goods from landlocked states that depend on neighboring seaports (i.e. Tema Port, Abidjan Port etc.) and road infrastructure to move its exports and imports. The rail integration is also expected to speed up transit times for freight and reduce the prices of consumer goods for the landlocked countries.

We have further provided in this section a brief description of the neighbouring landlocked countries and their economic activities that could benefit as well as impact on the development of these two facilities

Burkina Faso

Burkina Faso acts as a natural transit hub for West Africa as its location is a hub of regional corridors. Burkina Faso is a young country with a population of 17.42 million people and a GDP of $12 billion (World Bank, 2014). Recent in-country political crisis, along with lowering gold and oil prices around the world continue to affect the growth of the Burkina Faso economy. Being significantly dependent on gold prices for exports and oil prices for imports, the GDP growth rate reduced from 6.7% in 2013 to 4% in 2014, but was projected to increase to 4.4% in 2015. Agriculture and mining are its main growth generators.

The table below shows the GDP forecasts for Burkina Faso from 2016 to 2020.

Table 3-5: GDP Forecasts for Burkina Faso

Burkina Faso	
Year	GDP (USD billion)
2016	12
2017	13.1
2018	14.5
2019	16.1
2020	17.9

Source: World Bank

Year on year growth in Real GDP is estimated to be 6.3% for the period assessed.

In terms of the mining sector, Burkina Faso is considered one of the largest producers of gold aside the other available mineral resources such as diamonds, copper, iron, manganese, uranium, limestone, marble, tin ore and phosphates.

Of all West Africa's landlocked states, Burkina Faso provides the highest potential traffic southbound and as at 2013, potential minerals located in Burkina Faso by its Ministries of Mines and Energy were as follows;7

Table 3-6: Mineral Deposits in Burkina Faso

Mineral	Description
Gold	Found virtually everywhere in the country; the overall mining production expected from existing deposits is at least 260 tonnes of metal gold.
Diamonds	Found several indications in the region of Barsalogho and in the alluvia in the Comoé, Mouhoun, Léraba and Sissili river basins.
Copper	Deposits located in the regions of Gaoua, Dienemera - Gongondy , Wayen and Goren, with more than 80 million tons of reserves (at 0.25% and 0.35% Cu).
Zinc	Deposit of massif sulphide in Perkoa that contains more than 6.9 million tons of ore with 18% zinc and 20g/tonne of silver.
Marble	Located at Tiara near Bobo Dioulasso.
Lead	Found an indication at Gan near Tougan.
Siliceous sand	The Sonssorobougou deposit is located not far from Bobo-Dioulasso and contains 32 million tons of reserves.
Kaolin	This can be found in many areas (Diekui, Koreba, Bobo Dioulasso, Titao, Kongoussi, Ouagadougou, etc.).
Granite	Includes pink granites located in Pama.
Others	• Some indications of uranium found in the East and the West of the Country; and • Dolomitic limestones including a deposit at Tiara.

Source: Ministry of Mines and Energy, Mining Sector of Burkina Faso and Investment Opportunities, PDAC 2013

Burkina Faso is also endowed with one of West Africa's highest grade manganese deposits at Tambao which is situated in the remote north-eastern parts of the country. Initial ore resource estimated that Tambao contained a geological resource of 14 to 17 million tonnes at a grade of approximately 51.5% manganese. Pan African Minerals Limited (PAM), a subsidiary of the Timis Corporation, has been awarded the rights to explore the large Tambao Manganese deposit in Burkina Faso.

Ghana's Railway Master Plan outlines future plans to extend the railway network to Burkina Faso. The vast mineral resources in Burkina Faso could serve as a significant source of freight traffic if the Railway Line is extended to the North of Ghana.

Mali

GDP growth increased in 2014 to an estimated 5.8% after a 1.78% recovery in the previous year. The growth was due to the primary and service sector. The economy was expected to advance with a forecasted GDP growth of 5.4% in 2015 and 5.1% in 2016. There was also an expected revival in the construction sector, where a predicted growth of 5.6% in 2015 was projected.

The country's current account deficit was forecasted to improve in 2015 and 2016 despite worsening from 1.8% of GDP in 2013 to 6.2% in 2014. This is attributed to reduce import prices as well the fall in global oil prices improving its terms of trade.

Deficit in current operation was expected to decrease to 5.5% of GDP in 2015 due to injections of foreign loans and FDI in gold and telecommunications sectors. These expectations could however be unrealized due to the unpredictability of gold and cotton, which are Mali's main exports.

GDP projections for the country are shown in the table below.

[7] Ministry of Mines and Energy, Mining Sector of Burkina Faso and Investment Opportunities, PDAC 2013
[8] Word Bank

Table 3-7: GDP Forecasts for Mali

Mali	
Year	GDP (USD billion)
2016	11
2017	11.8
2018	13
2019	14.2
2020	15.6

Source: World Bank

Year on year growth in Real GDP is estimated to be 4.7% for the period under consideration (2016-2020)

The Malian economy is highly dependent on the revenues from gold and agricultural exports such as cotton, an indication that the economy fluctuates with prices of commodities. Mali has begun developing its iron ore extraction to diversify its revenue stream, to deal with the present fluctuation in commodity prices particularly gold.

Niger

Niger experienced a growth in GDP of 7.1% in 2014. This growth in GDP was attributed mainly to its agricultural sector and large public investment projects. The construction and communication sectors also played a part in this growth. In spite of the current challenges that Niger faces, forecasted growth for the country was projected to reach 6.0% in 2015 and 6.5% in 2016.

The ongoing military intervention against Boko Haram has impacted on the country's fiscal regime with regards to additional security expenditure. Furthermore the need to host Nigerian refugees is set to account for 1% of GDP on annual basis. This would mean the diversion of resources to finance economic development investments.

In 2014, Niger's external public debt increased from 23% of its GDP in 2013 to 33% of its GDP, this was due to the financing of projects in the extractive industries. With the declining prices of uranium and oil prices, the state was not able to get a sufficient return on investment. Also, with the continuous fluctuations of these commodity prices, it is predicted that public debt would increase to 37% of GDP in 2018, before any decline is expected.

The GDP forecasts for Niger are shown in the table below.

Table 3-8: GDP Forecasts for Niger

Niger	
Year	GDP (USD billion)
2016	7.4
2017	7.9
2018	8.7
2019	9.5
2020	10.4

Source: World Bank

Year on year growth in Real GDP is estimated to be 4% for the period under consideration (2016-2020).

Climate conditions also have an adverse role on the state of Nigerien economy since the economy is highly dependent on agriculture and mining, both of which are affected by weather conditions. Although low average rainfall and insecurity affected the production of uranium, the increase in oil revenues from the production of an estimated 12,000 barrels per day, made up for the losses in uranium.

4. Options Analysis

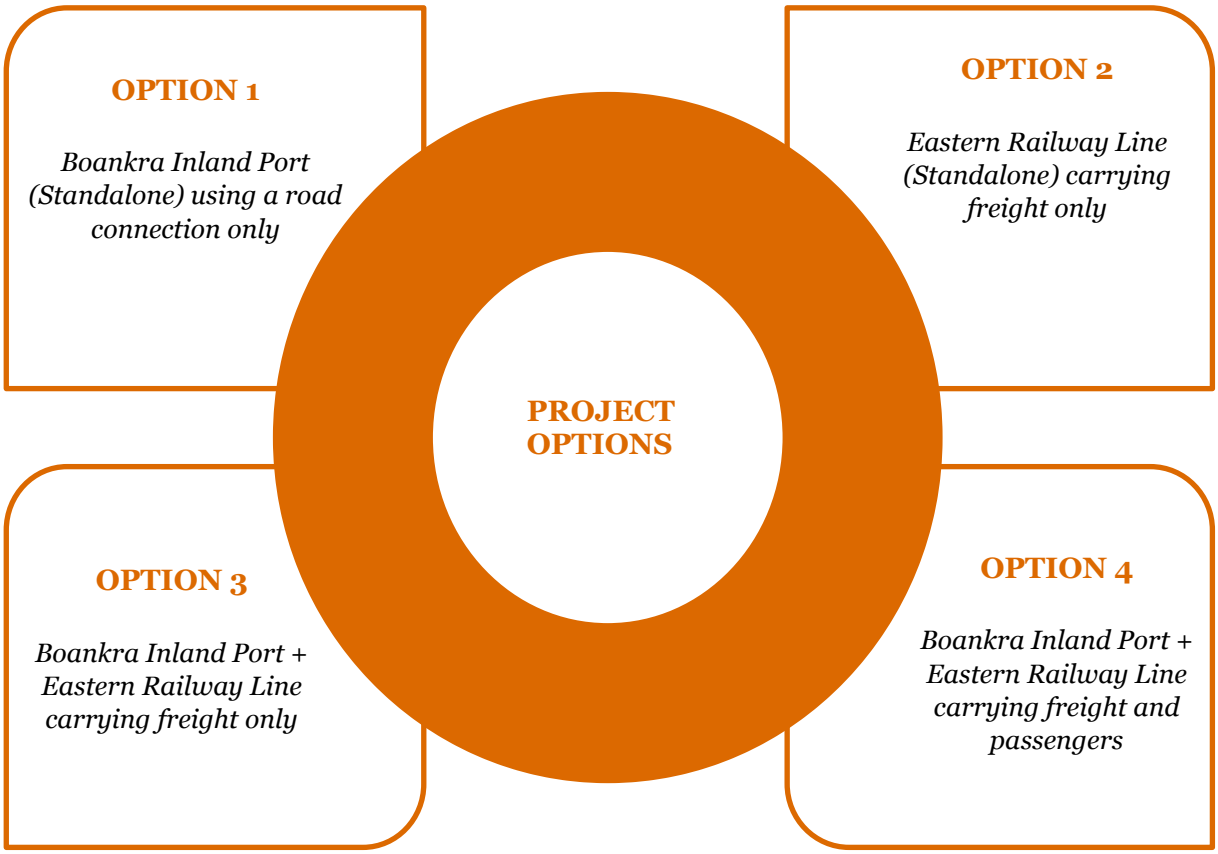
4. Options Analysis

4.1. Project Options

We considered four (4) options for assessing the feasibility of the Boankra Inland Port and Eastern Railway Line project. These options are shown in the diagram below:

- Option 1 – Standalone Boankra Inland Port using a road connection only;
- Option2 – Standalone Eastern Railway Line carrying freight traffic only;
- Option 3 - A combination of Boankra Inland Port and Eastern Railway Line for freight traffic only; and
- Option 4 - A combination of Boankra Inland Port and Eastern Railway Line for both freight and passenger traffic.

Figure 4-1: Project Options



In this section, we go further to review the development of each of the options shown above by individually assessing their intended modes of operations and the likely implications (i.e. advantages and disadvantages) of their implementation.

4.2. Option 1- Standalone Boankra Inland Port using a road connection only

4.2.1. Review of Option 1

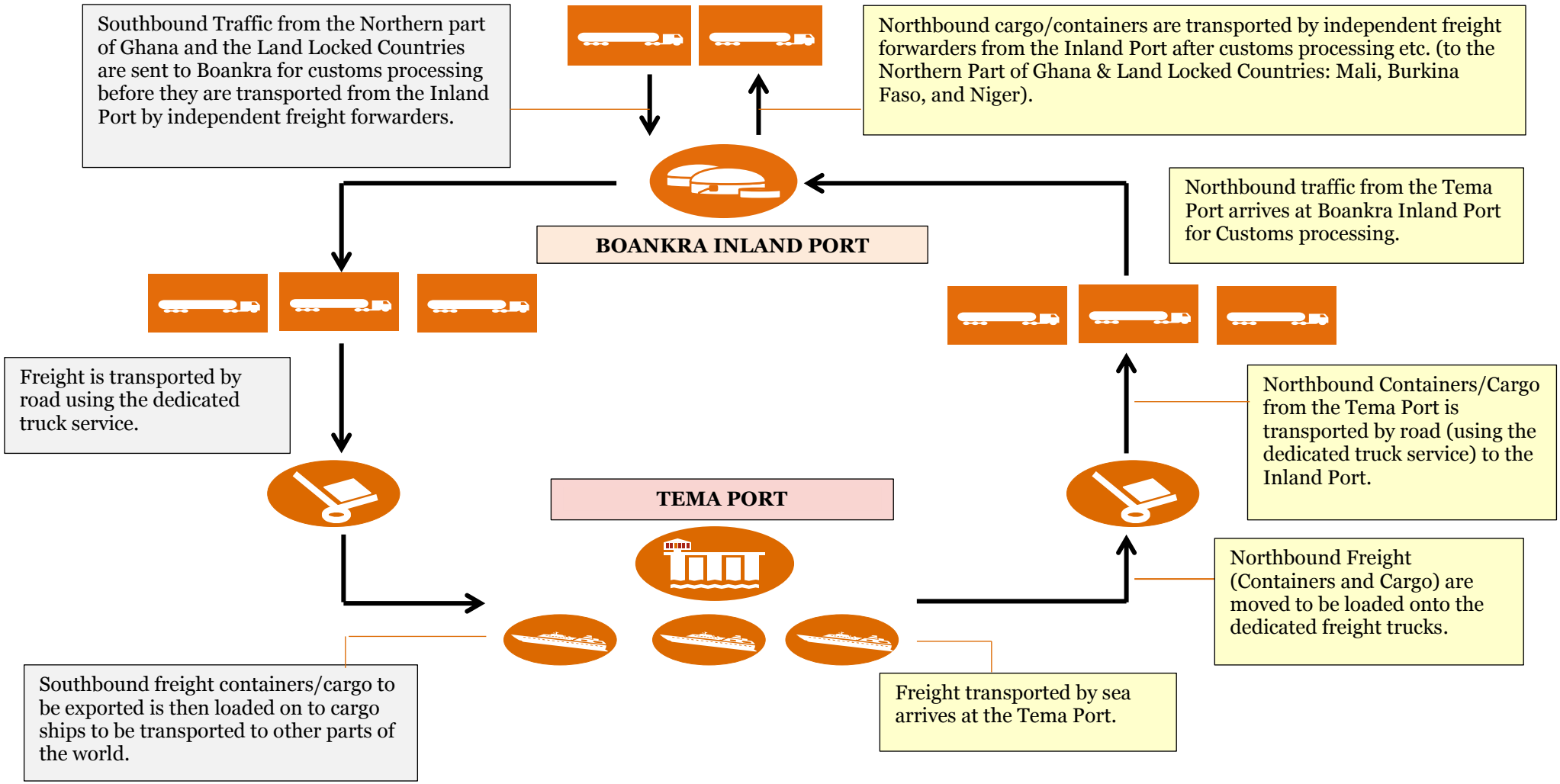
This option considers the construction and operation of the Boankra Inland Port only. The transportation of freight to and from the Inland port under this option will be facilitated by road (specifically the Accra-Kumasi Highway).

For this option, northbound traffic will be transported straight to the Boankra Inland Port by road (trucks) as soon as it is offloaded from vessels at the Tema Port. Upon arrival at the Inland Port, the containers or cargo will be processed by customs and the necessary documentation approved before the freight is allowed to be transported to its final destination.

Conversely, the southbound traffic will be handled in a similar manner. Freight from the Northern parts of Ghana and land-locked countries will be sent directly to the Inland Port for processing and customs documentation before it is authorised to be transported by road to the Tema Port.

The diagram below summarises the operation of this option:

Figure 4-2: Operation of the Standalone Boankra Inland Port using a road connection only



We are aware of Government's intention to dualise the Accra-Kumasi road particularly the single carriageway sections. This is likely to have an impact on the performance of the Inland Port with road connection option. Our assessment however considers the current state of the highway road infrastructure.

Below are advantages and disadvantages of the Standalone Inland Port with road connection.

4.2.2. Advantages of Option 1

There are some important advantages of operating the Inland Port at Boankra to support the activities at the Tema Port. Some of these include:

- Pursuing the Boankra Inland Port on a standalone basis will be cheaper than including the construction of the Eastern Railway Line (which involves a relatively larger initial capital cost);
- The construction of the Boankra Inland Port on a standalone basis will be faster (3 years) than including the construction of the Eastern Railway Line which requires a longer time to construct (5 years). This would allow port users to derive the benefits from the Inland Port earlier;
- It will facilitate the efficient transportation of transit traffic to and from landlocked countries such as Burkina Faso, Mali and Niger;
- The Boankra Inland Port will facilitate the concept of decongesting the Tema Port by providing facilities such as customs control and documentation as well as light industrial processing activities for southbound and northbound traffic;
- The Inland Port at Boankra will attract other businesses such as hotels, other accommodation facilities, trucking services, shipping and port management firms as well as other service providers to the Boankra community. This will make Boankra another transport hub in Ghana in addition to Takoradi and Tema; and
- The activities at the Inland Port will provide job opportunities for residents and boost the economy of the community to support the development of social amenities such as schools, housing, community centres and shops which will improve the living standards of the people in and around Boankra.

4.2.3. Disadvantages of Option 1

There are also some disadvantages that operating the Inland Port on a standalone basis presents. Some of the disadvantages include the following:

- Transporting freight by road to Boankra for customs processing and other protocol after they arrive at Tema Port will not guarantee 100% the safety of the freight due to the tendency for freight diversions by unscrupulous persons who may try to bypass the process and its associated costs;
- The transport by road to and from the Tema Port to the Boankra Inland Port would likely increase traffic along the Eastern Corridor. This would potentially increase accident rates, reduce safety for other road users as well as increase the cost of road maintenance;
- Consultations with stakeholders, have shown that they are not likely to use the Inland Port if it is not constructed in conjunction with the Eastern Railway Line. This risk in conjunction with the transport of freight traffic by road (increased congestion and potential diversion of freight) can increase the freight transportation costs along the corridor;
- With the potential increase in transportation costs as indicated above, transporters of freight to the landlocked countries will divert the transit traffic away from Ghana to cheaper competing countries such as the Ivory Coast and Benin. This will have a negative impact on the profitability of the project; and
- Generally, road transportation of freight has a relatively longer travel time compared to railway transportation. The long travel time for freight will further increase the waiting time for shippers awaiting the delivery of their freight, making the operation of this option inefficient and costly to the operator.

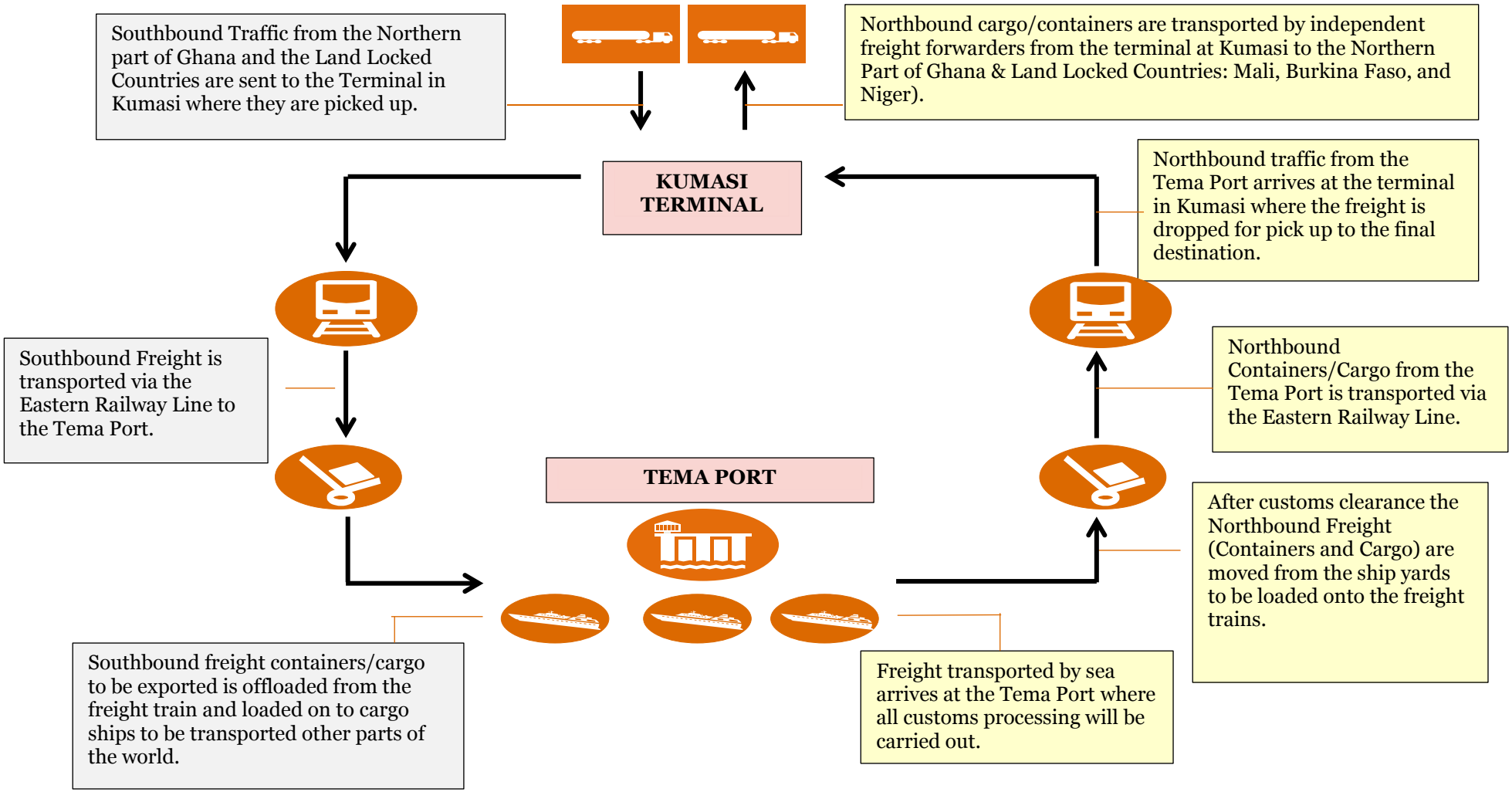
4.3. Option 2- Standalone Eastern Railway Line carrying freight only

4.3.1. Review of Option 2

Option 2 involves the construction and operation of the Eastern Railway Line for the sole purpose of freight transportation. The Railway Line would be constructed from the Tema Port to Kumasi. Northbound freight from the Tema Port will be offloaded from vessels and loaded onto the Railway Line for transportation to Kumasi.

Southbound freight, which includes transit traffic, will be deposited at the terminal in Kumasi, loaded on to the Railway Line and transported to the Tema Port for export or delivery to its final destination in the south of the country.

Figure 4-3: Operation of the Standalone Eastern Railway Line carrying freight only



4.3.2. Advantages of Option 2

There are some advantages of considering the Standalone Eastern Railway Line option for freight transportation and these include:

- Travel time for cargo/containers from the Tema Port to the Boankra and vice versa will be significantly reduced. This will help reduce the length of time it takes for trucks transporting freight by road to move their goods to Kumasi, Northern Ghana and the landlocked countries and vice versa;
- Freight transportation with rail infrastructure will reduce the rate of deterioration of the road network along the Eastern Corridor, therefore minimising the frequency of maintenance; and
- The use of rail has a relatively larger capacity in terms of fleet sizes (wagons) that can go on a particular trip and the tonnage it can carry for that trip. This greater capacity of freight transportation by rail increases the efficiency of freight transportation in terms of a lower turn-around and delivery time.

4.3.3. Disadvantages of Option 2

Some of the disadvantages of pursuing this option include:

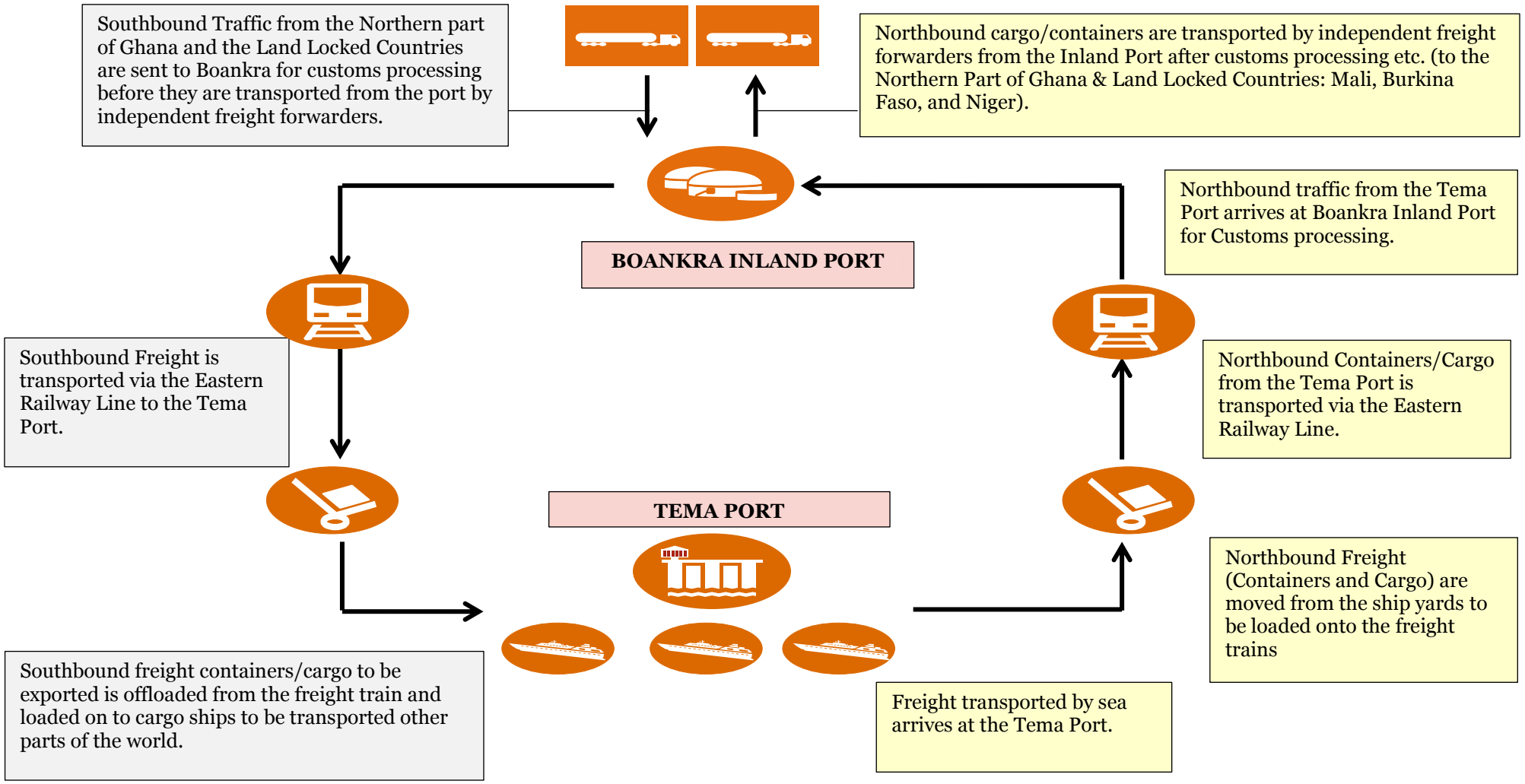
- Since this option does not include the facilitation of transferring some or all clearing and other customs protocol away from the Tema Port, it is likely that this option may not be able to fully support the initiative of decongesting the Tema Port;
- This option does not include a passenger service, which has the ability to improve the social life of the people (once it is made affordable) as well as support economic activities along the corridor; and
- This project involves a substantial amount of capital investment and may not be attractive to the market.

4.4. Option 3- Combined Boankra Inland Port and Eastern Railway Line (carrying Freight only)

4.4.1. Review of Option 3

Another option we have considered is connecting the Boankra Inland Port with the Eastern Railway Line to facilitate the transportation of freight only. Under this option, the Boankra Inland Port will have customs and other freight processing activities at the site.

Figure 4-4: Operation of the Combined Boankra Inland Port and the Eastern Railway Line carrying freight traffic only



4.4.2. Advantages of Option 3

Some of the key advantages of pursuing Option 3 include:

- Combining the Railway Line to support the transportation of cargo and containers to and from the Boankra Inland Port will help ease congestion as well as support freight transportation for the land locked countries identified;
- The railway service for freight under this option will help reduce the turn-around time for the pick-up and drop-off of freight from Boankra to the Tema Port and vice versa because the travel time for rail is shorter than road transportation;
- Once the optimal efficiency of this option is reached i.e. the Inland Port and Railway Line operate seamlessly, the operations will be able to support the relatively less expensive freight transportation by rail compared to road; and
- Rail will be less expensive because the tariffs have been estimated to be 30% lower than the road tariffs (as discussed in Chapter 6 Traffic Demand Forecasts and Competition Analysis). This will support a growth in the modal shift of freight from road to rail which will protect the quality of the road network along the corridor.

4.4.3. Disadvantages of Option 3

Some disadvantages of Option 3 include:

- A relatively cheaper mode of passenger transportation between the 2 largest cities in Ghana (Kumasi and Accra) will not be realised if the Railway Line carries freight transport only; and
- Given that intermediate passenger stations are not developed, the potential economic activities that a passenger rail brings are not realised.
- In the event of a train break down or some other issue on the Railway Line, the route of the Eastern Railway Line does not provide an alternative line to allow operations to continue while the problem is resolved. Major problems along the Railway Line could halt operations totally and cause delays in the supply chain and disrupt the processing of freight to and from Tema port. This could jeopardise the main objectives of this project

4.5. Option 4- Combined Boankra Inland Port and Eastern Railway Line (carrying Freight and Passengers)

4.5.1. Review of Option 4

Option 4 looks at constructing the Eastern Railway Line from Tema to Kumasi with an extended line to Accra to serve passengers. Unlike Option 3, this option will facilitate both passenger and freight transportation. Passengers will be transported from the passenger train station in Accra to Kumasi and freight will be transported from Tema Port to Boankra.

Below is a first diagram showing how the freight transportation will work under this option and a second diagram below shows how the passenger service will work under this option.

Figure 4-5: Operation of the Combined Boankra Inland Port and the Eastern Railway Line carrying freight and passenger traffic – ***Freight Service***

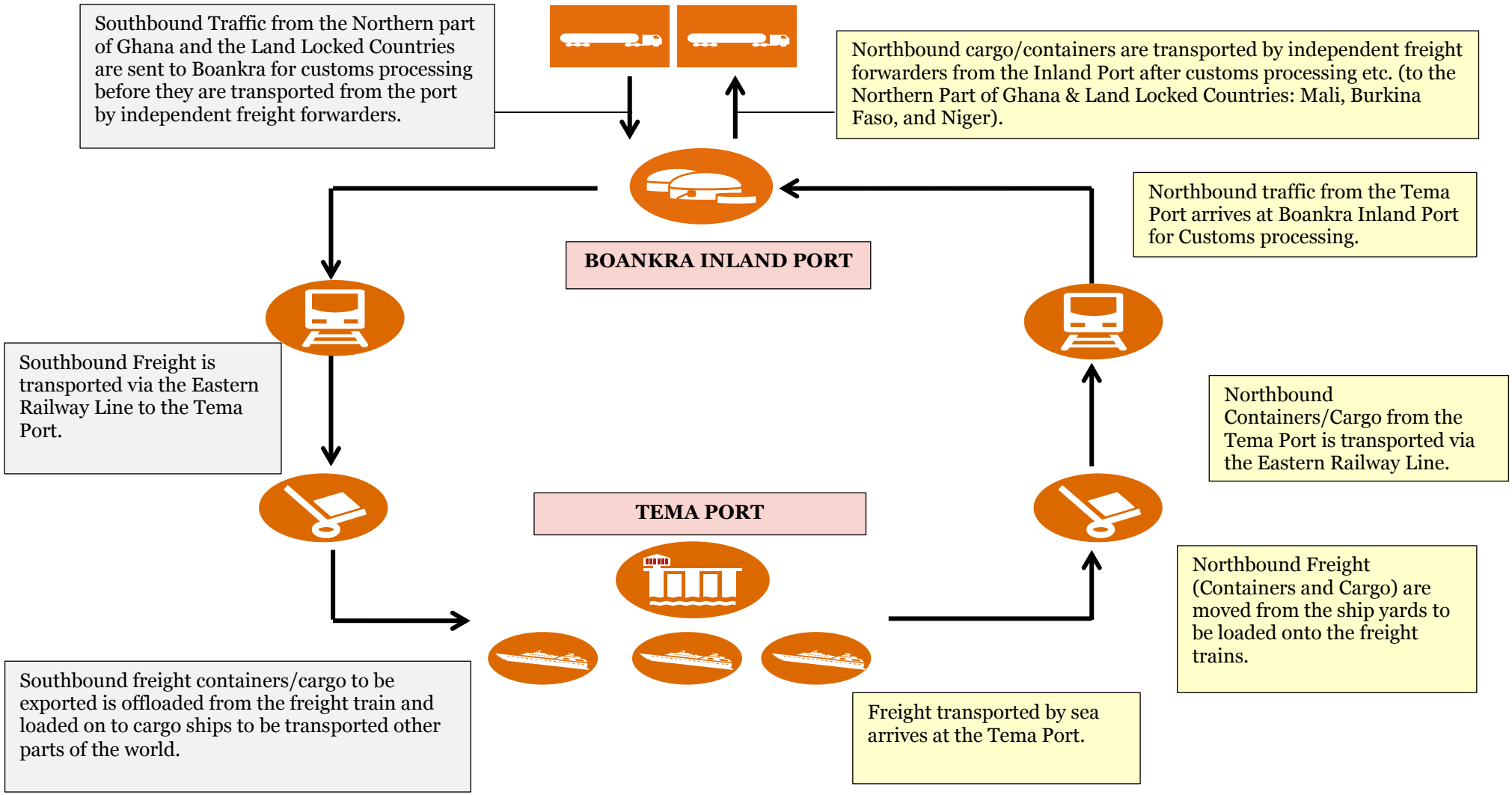
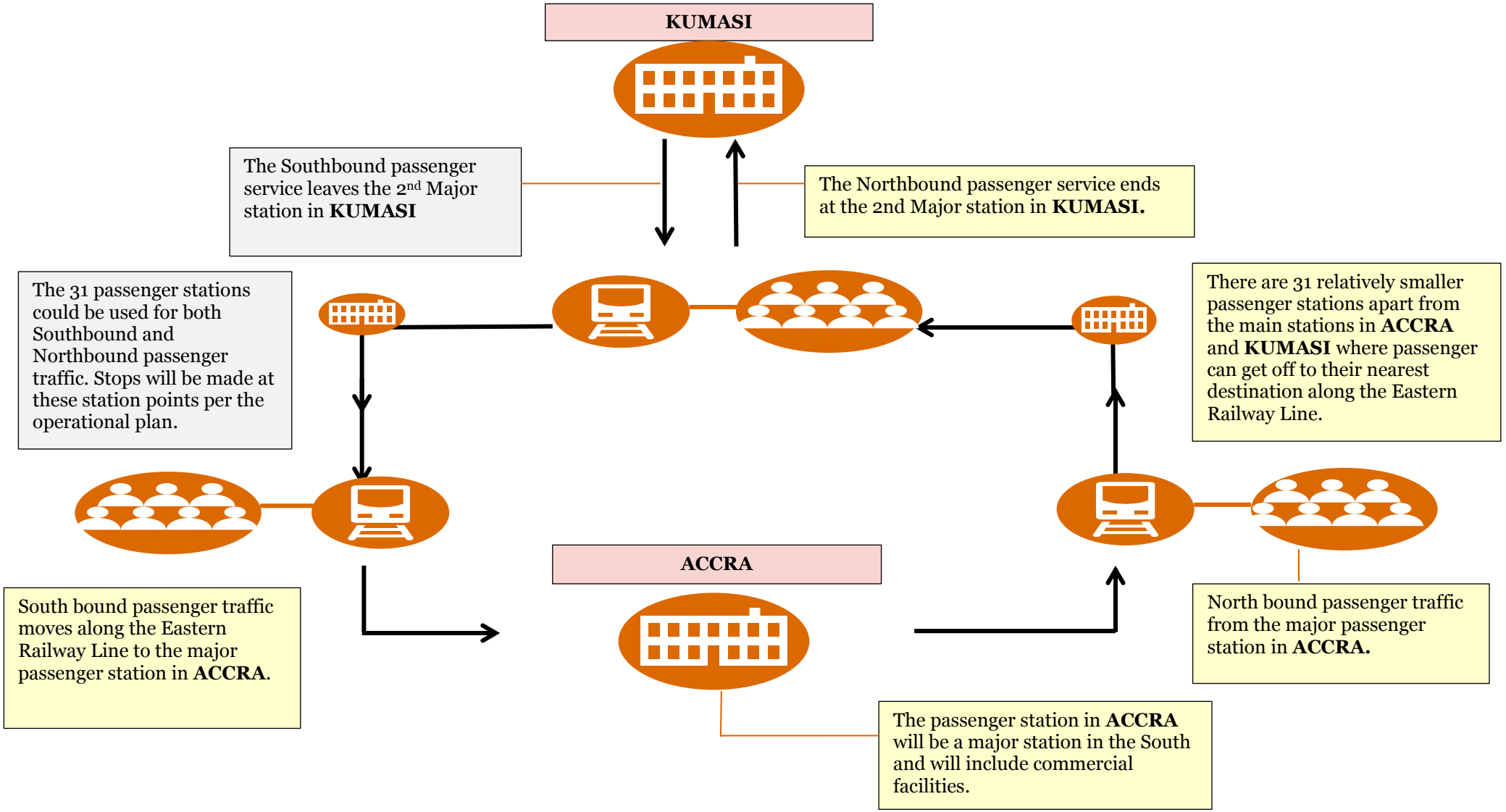


*Figure 4-6: Operation of the Combined Boankra Inland Port and the Eastern Railway Line carrying freight and passenger traffic – **Passenger Service***



4.5.2. Advantages of Option 4

The combined construction and operation of the both the Boankra Inland Port together with the Eastern Railway Line (for freight and passenger transportation) has the following advantages:

- Similar to Option 3, merging the operations of the Railway Line to support the transportation of cargo and containers to and from the Boankra Inland Port will help ease congestion at the Tema Port as well as support the freight transportation of the land locked countries identified which include Burkina Faso, Mali and Niger;
- It would reduce the cost freight transportation by rail compared to road as well as help preserve the quality of the road network along the corridor;
- The combination of freight and passenger services if strategically planned and executed could lead to concessionaire diversifying the sources of profit;
- The establishment of Boankra into a transport hub will help facilitate the growth of economic activities in and around Boankra. This will also improve the standard of living in the area, generate additional employment opportunities and help develop other social amenities around Boankra; and
- The presence of rail transport for passengers will not only provide a relatively affordable alternative transport mode along the corridor but also facilitate competition among the other modes of transport such as air and road transport. This could help reduce their current high costs.

4.5.3. Disadvantages of Option 4

Some of the disadvantages of carrying out Option 4 under this project include the following:

- The total investment required to undertake both projects simultaneously from our analysis is quite substantial. If the operations do not attract sufficient traffic demand and operate efficiently, it may be difficult to generate enough revenue to recoup the investment made;
- Given the size of the project and the nature of operating the Inland Port and the Railway Line to serve both passengers and freight, it is likely that the high maintenance costs will be incurred in ensuring that the operations are carried out efficiently; and
- In the event of a train break down or some other issue on the Railway Line, the route of the Eastern Railway Line does not provide an alternative line to allow operations to continue while the problem is resolved. Major problems along the Railway Line could halt operations totally and cause delays in the supply chain and disrupt the processing of freight to and from Tema port. This could jeopardise the main objectives of this project.

4.6. Assessment of Project Options against Project Objectives

As part of our considerations for finding the most viable option for the development of the Boankra Inland Port and Eastern Railway Line, we have assessed the four identified project options against the primary objectives set out for the project's development and implementation. The project options as defined earlier are as follows:

- Option 1 – Standalone Boankra Inland Port using a road connection only;
- Option2 – Standalone Eastern Railway Line carrying freight traffic only;
- Option 3 - A combination of Boankra Inland Port and Eastern Railway Line for freight traffic only; and
- Option 4 - A combination of Boankra Inland Port and Eastern Railway Line for both freight and passenger traffic.

The identified objectives by which we are assessing the project options above are shown in the table below:

Table 4-1: Identified Objectives for the Development of the Boankra Inland Port and Eastern Railway Line

Objectives	Description
Decongestion of Tema Port and enhance its operational efficiency.	This is the main objective of the project aimed at decongesting the Tema Port through the development of the Boankra Inland Port. The Boankra Inland Port is expected to serve as an extension of the Tema Port as well as prevent it from exceeding its capacity.
Efficient and safer mode of transporting freight and passengers	This assesses the project's capacity in providing an efficient and safer mode of transportation.
Enhance Ghana's role as a transit corridor to landlocked countries	This aims to solidify Ghana's role as a transit corridor to landlocked neighbouring countries through the project's development and implementation.
Feed traffic from other modes of transport to the Inland port	This is aimed at shifting the movement or transportation of traffic by other modes of transport to the Inland Port.
Enhance socio-economic/commercial development in the Ashanti Region and Eastern Corridor	This assesses the extent to which the standard of living and economic activities along the Eastern Corridor improve, surrounding communities and the region as a whole benefit as a direct result of the project.
Provide value-added services and reduce cost	This aspect assesses the project with regards to the extent to which it improves the services offered to customers as well as reduce the total transportation cost they will incur from their activities.

We have applied a scoring system for the assessment of the project options as a matrix. This is summarised below:

Score	1	2	3	4	5
Interpretation	Very Low	Low	Medium	High	Very High

- **Score 1** *'Very Low '*- Options that score a 1 indicate that they do not satisfy the requirements of the objectives' assessment parameter (i.e. 0%);
- **Score 2** *'Low'*- Options that score a 2 are considered to meet a least 25% of the standard requirements of the identified parameter;
- **Score 3** *'Medium'*- Options that score a 3 are considered to meet a least 50% of the standard requirements of the identified parameter;
- **Score 4** *'High'*- Options that score a 4 are considered to meet a least 75% of the standard requirements of the identified parameter; and
- **Score 5** *'Very High'*- Options that score a 5 indicate that they satisfy all the requirements of the assessment parameter (i.e. 100%)

The total score for each option is computed and the options ranked by the highest to the lowest score. The ranking will then be used to inform the selected option based on the identified objectives.

The assessment of the 4 project options has been shown in the table below:

Table 4-2: Assessment of Project Options against Identified Objectives

Project Objectives	Standalone Boankra Inland Port with road connection	Standalone Eastern Railway Line carrying Freight Only	Combined Boankra Inland Port and Eastern Railway Line carrying Freight Only	Combined Boankra Inland Port and Eastern Railway Line carrying Freight and Passenger
Decongestion of Tema Port and enhance its operational efficiency.	4	1	5	5
Efficient and safer mode of transporting freight and passengers	2	3	5	5
Enhance Ghana's role as a transit corridor to landlocked countries	3	4	5	5
Feed traffic from other modes of transport to the Inland port	2	1	4	4
Enhance socio-economic/commercial development in the Ashanti Region and Eastern Corridor	3	3	4	4
Provide value-added services and reduce cost	3	3	5	3
Total	**17**	**15**	**28**	**26**

Based on the scores from the assessment above, it is evident the combined Boankra Inland Port and the Eastern Railway Line carrying freight only best meets the objectives of the project. This is mainly due to the advantages that integrating both the Inland Port and Railway Line operations provide in terms of the efficient import/export of freight as well as offering a faster, cheaper and safer means of transportation.

We recognise that the combined Boankra Inland Port and Eastern Railway Line carrying freight only will require a substantial capital investment to develop and may be challenging to fund by an investor. Also, it would be challenging to find a private investor with the capacity and experience in running both the Inland Port and Railway Line business together, as the two require very different skills and competencies.

Based on these considerations, we recommend that the combined Boankra Inland Port and Eastern Railway Line projects are implemented as two separate PPP transactions.

The Boankra Inland Port with road connection will require the lowest capital investment whilst the Eastern Railway Line on the other hand will require substantial financial and capital investment to develop and may be challenging to fund by an investor. However, if it is structured such that Government builds or provides the railway infrastructure, whilst the private party provides the rolling stock as well as the operation and maintenance functions, the Standalone Eastern Railway Line project can also be considered as a PPP.

Although, we have recommended two separate PPP transactions, it should be noted that the Boankra Inland Port and Eastern Railway Line should still function as a combined project as this is the option which best meets the objectives of the project.

4.7. Review of PPP Policy and Principles

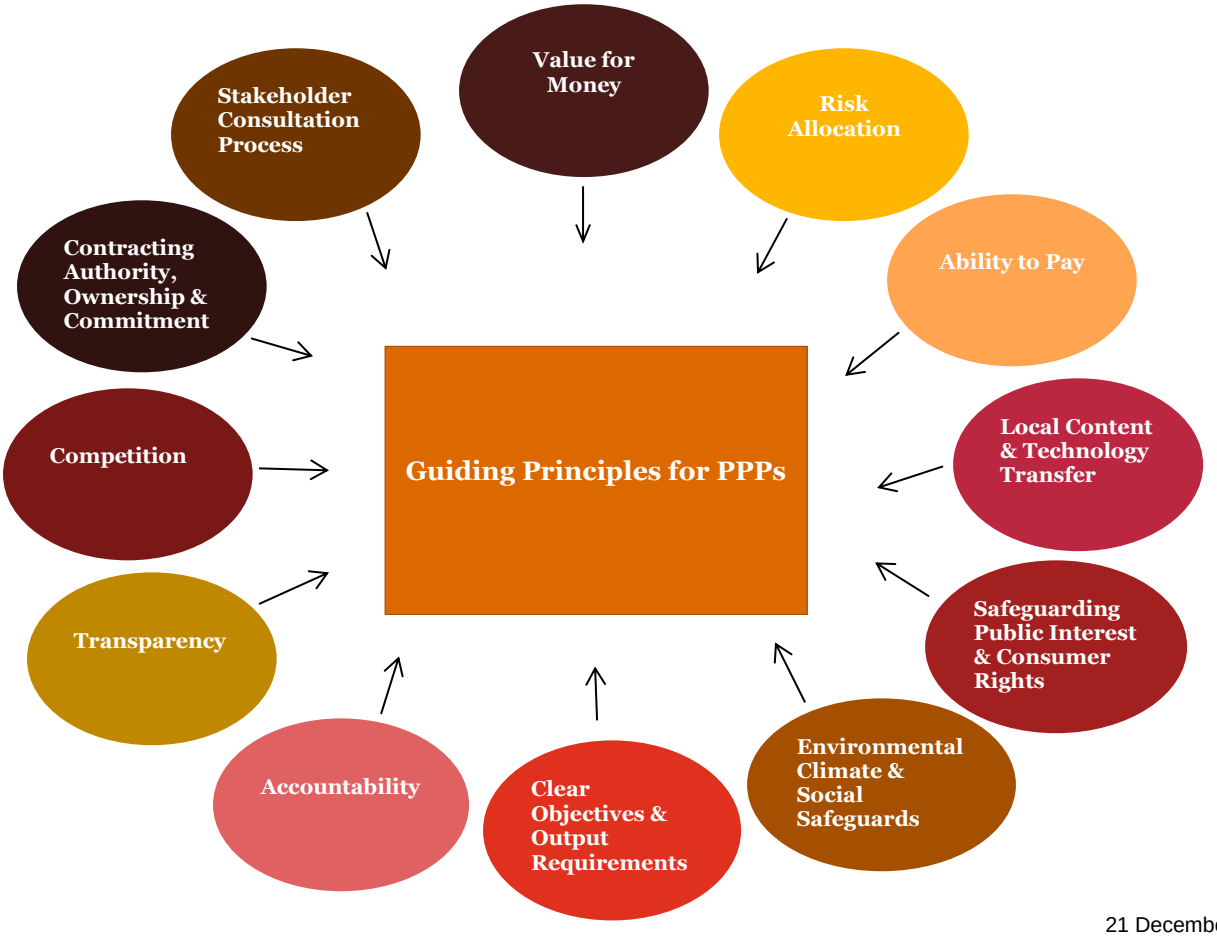
The National PPP Policy of June 2011 defines a Public Private Partnership (PPP) as a contractual arrangement between a public entity and a private sector party, with clear agreement on shared objectives for the provision of public infrastructure and services traditionally provided by the public sector.

The key objectives of this policy are to:

- Leverage public assets and funds with private sector resources from local and international markets to accelerate needed investments in infrastructure and services;
- Encourage and facilitate investment by the private sector by creating an enabling environment for PPPs where value for money for Government can be clearly demonstrated;
- Increase the availability of public infrastructure and services and improve service quality and efficiency of projects;
- Ensure attainment of required and acceptable local and international social and environmental standards;
- Protect the interests of all stakeholders including end users, affected people, Government and the private sector;
- Set up efficient and transparent institutional arrangements for the identification, structuring and competitive tendering of PPP Projects;
- Provide a framework for developing efficient risk sharing mechanisms; and
- Encourage and promote indigenous Ghanaian private sector participation in the delivery of public infrastructure and services.

It is with these objectives in mind that the National PPP Policy provides the principles below to guide the implementation of PPP arrangements in Ghana:

Figure 4-7: Guiding Principles for PPPs According to the National Policy on PPP 2011



Governments in recent times face challenges in infrastructure development and public service delivery which constrains the growth of the economy. The provision of public infrastructure and services has typically been viewed as the responsibility of Government.

However, given Government's limited budget resources, the huge deficit in infrastructure cannot be met alone by the public sector through budget allocations considering that addressing Ghana's infrastructural deficit could require sustained spending of at least US$ 1.5 billion annually over the next decade.

GoG thus encourages the use of Public Private Partnerships (PPPs) through the National Policy on PPP document of June 2011 as a means of leveraging public resources with private sector resources and expertise in order to close the infrastructure gap and deliver efficient public infrastructure and services.

It is with this consideration among other factors that our assessment of the project options in this chapter seeks to identify the option that meets the necessary project requirements and is most suitable for implementation as a Public Private Partnership (PPP).

4.8. Assessment of Project Options using PPP Considerations

As part of our efforts in identifying the most suitable transaction option as required for the development of the Boankra Inland Port and the Eastern Railway Line, we have assessed the project options based on key criteria that are required for PPP projects.

The assessment criteria are highlighted in the table below:

Table 4-3: Selected criteria for assessing Project Options

Assessment Criteria	Description
Strength and Capacity of the Market to Deliver the Project	This criteria considers the ability of key parties such as operators, financiers, developers, investors and sponsors in providing the necessary financial, human and capital resources needed to develop the project to meet its optimum requirements.
Efficiency in Operation	This aspect considers which party provides the highest level of performance or output given its functions, available resources and limitations.
Transfer of Risk to the Private Sector	This criteria looks at the amount or level of risk that the private party will be expected to assume based on the project requirements and responsibilities.
Minimisation of Public Sector Risk	This criteria assesses the level of risk that the Government will be expected to assume based on the project requirements and responsibilities.
Viability and Bankability	This criteria looks at the ability of the project to attract the needed finance from the relevant parties towards its development based on established revenue and cost estimates (i.e. cash flow).
Absence of Fiscal Commitment from Government	This criteria assesses the level or amount of financial contribution that GoG may be required to provide to the project as part of its obligation to the agreement as and when necessary.
Health and Safety Improvements	This criteria assesses the project with regards to the impact it has on the general health and safety of users or general public.
Accordance with MDAs Strategic Plan	This aspect assesses whether the project is in line with the objectives or long term plans of the key stakeholders or regulators of the respective sectors (i.e. MoT, GSA, GPHA, GRDA etc.).
Absence of Legal Issues	This criteria considers the legal ramifications associated with the project's development and implementation as well as compliance with the relevant legal and regulatory frameworks. The key legal issues in this case would relate to encroachment and relocation.
Environmental and Social Soundness	This criteria assesses the environmental and social impact that the project poses by identifying potential environmental and social concerns associated with the project's implementation as well as the necessary measures which should be applied in mitigating them.
Affordability/Ability to Pay	End user ability to pay is a key consideration for the project's implementation. The project should be affordable to the public and overall Government budgetary sustainability, forward commitments in relation to public expenditure and the potential for returns on private sector investment, given other priorities and commitments.

The scoring system we have applied to the assessment of the project options is summarised below:

Score	1	2	3	4	5
Interpretation	Very Low	Low	Medium	High	Very High

- **Score 1** *'Very Low'*- Options that score a 1 do not satisfy the requirements of the assessment criteria (0%);
- **Score 2** *'Low'*- Options that score a 2 are considered to meet a least 25% of the requirements of the identified criteria;
- **Score 3** *'Medium'*- Options that score a 3 are considered to meet a least 50% of the requirements of the identified criteria;
- **Score 4** *'High'*- Options that score a 4 are considered to meet a least 75% of the requirements of the identified criteria; and
- **Score 5** *'Very High'*- Options that score a 5 indicate that they satisfy all the requirements of the assessment criteria (i.e. 100%).

The total score for each option is computed and the options ranked by the highest to the lowest score. The ranking will then be used to inform which project option should be developed as a PPP or traditionally procured.

The assessment of the four project options under this matrix has been summarised in the following table.

Table 4-4: Project Options Assessment Matrix using PPP Considerations

Assessment Criteria	Standalone Boankra Inland Port with road connection	Eastern Railway Line carrying Freight Only	Combined Boankra Inland Port and Eastern Railway Line carrying Freight Only	Combined Boankra Inland Port and Eastern Railway Line carrying Freight and Passenger
Strength and Capacity of the Market to Deliver the Project	5	3	2	2
Efficiency in Operation	5	4	2	2
Transfer of Risk to the Private Sector	4	3	4	4
Minimisation of Public Sector Risk	4	4	2	2
Viability and Bankability	4	2	1	1
Absence of Fiscal Commitment from Government	3	2	2	2
Health and Safety Improvements	2	3	3	3
Accordance with MDAs Strategic Plan	2	4	4	3
Absence of Legal Issues	4	2	2	2
Environmental and Social Soundness	3	3	3	3
Affordability/Ability to Pay	4	3	3	3
Total	**40**	**33**	**28**	**27**

Based on the scores from the assessment above, particularly considering the strength and capacity of the market to deliver the project, the Standalone Boankra Inland Port with road connection showed the best results and is thus the preferred option for the development of the project as a PPP.

As established earlier in section 4.6, the Standalone Eastern Railway Line Project will require substantial financial and capital investment to develop and may be challenging to fund by an investor. However, if it is structured such that Government builds or provides the railway infrastructure, whilst the private party provides the rolling stock as well as the operation and maintenance functions, the Standalone Eastern Railway Line project can also be considered as a PPP.

Based on these considerations, we recommend that the Boankra Inland Port and Eastern Railway Line projects be implemented as two separate PPP transactions. This is because it would be challenging to find a private investor with the capacity and experience in running both the Inland Port and Railway business together.

5. Traffic Demand Forecasts and Competition Analysis

5. Traffic Demand Forecasts and Competition Analysis

5.1. Introduction

Given that the Eastern Railway Line does not presently carry any notable freight traffic, an assessment of potential freight transport demand by for the project begins with a consideration of the existing total market demand. Domestic production (i.e. exports) and imports are the two main sources of freight transport demand and provide an indication of the amount and composition of the goods requiring rail transport. Thus, the subsequent sections highlight the volume of freight traffic at the Tema Port and along the Accra-Kumasi Road.

The Traffic Demand Study was undertaken by Vision Consult Ltd who are our Local Technical Sub-consultants on the Project. The Traffic Demand Report which was produced by Vision sets out the methodology for the traffic demand study which was agreed in advance with the Ministry of Transport (MoT). It also shows the current and estimated future traffic demand along the Eastern Corridor. This chapter is based on the results of the Traffic Demand Report which is included in Appendix 2.

5.2. Container and Cargo Traffic at Tema Port

Considering the importance of traffic to the development of this project, we have reviewed the performance of the port sector based on the major trade components namely containers and general cargo from 2013 to 2015.

The tables below give a summary of the traffic volumes for container and cargo from 2013 to 2015. The figures provided include the various constituents of the indicated category of traffic.

Table 5-1: Summary of Container Traffic/Throughput (TEUs) by Trade

Summary of Container Traffic/Throughput (TEUs) - By Trade	2013	2014	2015
Transit in	33,433	27,353	41,088
Transit out	976	553	312
Import	395,243	332,311	351,578
Export	407,632	357,390	383,824
Total traffic - TEUs	841,989	732,382	782,502
Total imports and exports	802,875	689,701	735,402
Total traffic excluding (sum of imports and exports)	39,114	42,681	47,100
% of imports and exports in relation to total traffic	95.35	94.17	93.98
Total transit (in and out)	34,409	27,906	41,400
Total traffic excluding (transit in and out)	807,580	704,476	741,102
% of transit (in and out) in relation to total traffic	4.09	3.81	5.29
% Attributed to transhipment	0.56	2.02	0.73

Source: Ghana Ports and Harbours Authority (GPHA)

From the table above, it can be seen that total traffic in TEUs declined significantly from the 2013 throughput of 841,989 to 732,382 in 2014. However, there was a reasonable improvement in 2015 with container traffic rising to 782,502. This was attributed to increases in the various traffic components including imports and exports. The reduction in traffic in 2014 was a result of the landlocked countries, particularly Burkina Faso, importing and exporting more of their commodities through Cote d'Ivoire due to increasing capacity and improving efficiency at Abidjan Port.

Table 5-2: Summary of Cargo Traffic/Throughput (Metric Tonnes) by Trade

Summary of Cargo Traffic/Throughput (Metric Tonnes) - By Trade	2013	2014	2015
Import	10,014,243	8,922,550	10,043,146
Export	1,493,956	1,463,273	1,303,090
Total Transit Traffic (In and Out)	620,668	577,227	718,556
Total traffic	12,180,615	11,126,355	12,145,496
Total imports and exports	11,508,199	10,385,823	11,346,236
Total traffic excluding (sum of imports and exports)	672,416	740,532	799,260
% Of imports and exports in relation to total traffic	94.48	93.34	93.42
Total transit (in and out)	620,668	577,227	722,508
Total traffic excluding (transit in and out)	11,559,947	10,549,128	11422988
% Of transit (in and out) in relation to total traffic	5.10	5.19	5.95
% Attributed to transhipment in	0.42	1.47	0.63

Source: Ghana Ports and Harbours Authority (GPHA)

The traffic distribution for cargo traffic also followed the same pattern as the container traffic for the same period under consideration (2013 to 2015) due to the same factors. Cargo traffic in metric tonnes fell from 12.180 million in 2013 to 11.126 million in 2014 and later increased to 12.145 in 2015. Total imports and exports within that same period also fell from 11.508 metric tonnes in 2013 to 10.386 metric tonnes in 2014. This later improved to 11.346 metric tonnes in 2015. These outcomes are indicative of the direct relationship between total import and export and total traffic.

5.3. Current Usage of Freight along Accra-Kumasi Road Corridor

The use of containers in the movement of freight along the corridor, either in a Northbound or Southbound direction, is not widespread.

As part of the Traffic Demand Study we observed that most of the container trucks moving along the corridor are those with destinations in Burkina Faso, Niger and Mali, carrying rice, sugar, iron rods, mild steel coils and, in general, manufactured goods.

We also noticed few containers carrying specifically imported freight along the corridor destined for areas in Kumasi/northern Ghana as well as industrial or manufacturing establishments.

We observed that most import containers are stripped or de-stuffed at the Port of Tema, especially when several consignees' goods are consolidated and shipped in a single box. Subsequently, these goods are then shipped to various destinations within the Accra/Tema area or to other destinations such as Kumasi and beyond using 40-feet flat-bed trucks or small and medium sized freight vehicles.

We also noticed that when smaller weights or volumes of personal items (including vehicles) are imported in containers, they are de-stuffed and shipped to their final destinations; including those along the corridor and beyond it.

In the case of export cargoes from Niger, Burkina Faso and Mali (i.e. land locked neighbouring countries), we observed that stuffing of containers for example with cotton is done in warehouses in the respective countries.

5.3.1. Area Wide Origin and Destination (O-D) Survey

To capture a fair representation of cargoes with various origins in and around Accra/Tema Metropolitan area but with destinations in the sphere of influence of the Boankra Inland Port and the Eastern Railway Line (and vice versa), origin and destination surveys were carried out along selected arterial roads connecting Accra/Tema and Kumasi.

We conducted our traffic surveys between the following periods:

- 6 October and 27 October 2014;
- 6 February and 9 February 2015; and
- 27 April and May 5 May 2015.

The objective of the surveys was to determine the extent of usage of the Accra-Kumasi highway (N6) and the volume of different goods (freight) and passengers currently travelling on it. This would enable us estimate the volumes of traffic which are likely to divert onto the improved rail service.

With the assistance of the Police, selected freight vehicles were stopped and pulled onto the side of roads for questionnaires to be administered. The questions were primarily aimed at obtaining the following information:

- Origin and destination of trips;
- Trip purpose;
- Weight or volume of goods carried;
- Location of any intermediated stops;
- Mode or type of freight vehicle; and
- Willingness to shift from road to rail in future under various scenarios including reduction in freight tariffs or charges.

The survey census points (Shown in Figure 5.1 and Figure 5.2) included the following:

- North of Toll Booth at Doboro;
- Yamoransa – Kumasi road before the first Police Check Point;
- Tema – Aflao road near Toll Booth at Kpone; and
- Between Nkawkaw and Kumasi around Asankare.

In theory, there are several alternative routes between Accra/Tema to Kumasi and areas beyond it for the movement of freight but not limited to the N6 route (Accra – Nsawam – Nkawkaw – Konongo – Ejisu – Kumasi). These vehicles have the potential to divert onto the improved rail line through Boankra. The alternative routes shown in Figure 5.1 and Figure 5.2 are:

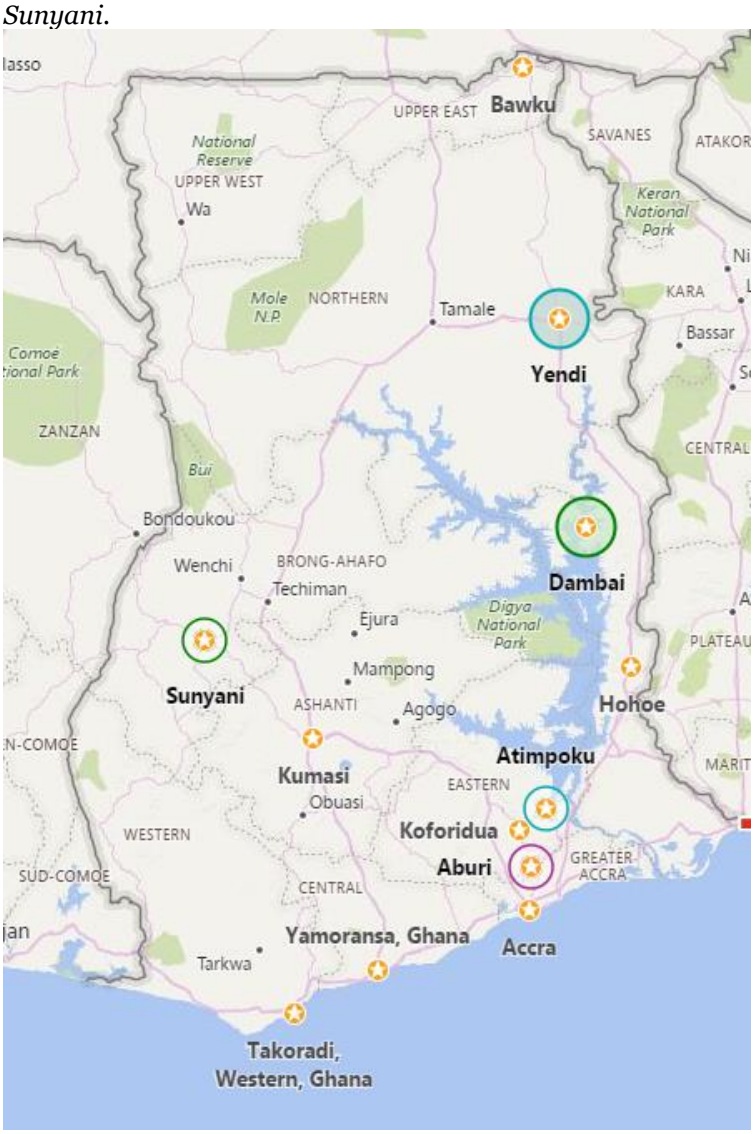
- Accra/Tema – Kumasi;
- Accra/Tema – Aburi – Koforidua – Kumasi;
- Accra/Tema – Yamoransa – Kumasi;
- Accra/Tema – Atimpoku – Hohoe – Dambai – Yendi – Bawku; and
- Takoradi – Kumasi – Sunyani.

Our discussions with the haulier associations mentioned in Section 5.3.4 in Tema revealed that while there may be the following alternative routes from Accra to Kumasi, there is an established travel route. The pattern of movement for freight vehicles is primarily through the Accra/Tema – Kumasi route. Freight vehicles rarely use the Accra/Tema – Aburi – Koforidua route because of the difficult topography between Ayimensah and the foot hills just beyond Mamfe. The Accra/Tema – Yamoransa is also rarely used by freight vehicles moving to the north and beyond except those with destinations or intermediate stops in Obuasi.

The Accra/Tema – Yendi – Bawku road is hardly used by freight vehicles because of the difficult terrain around the Nakpanduri Scarp area unless the trip destination along that route. The Takoradi – Yamoransa – Kumasi road is used by freight vehicles with destinations in Kumasi and beyond but they are unlikely to divert their

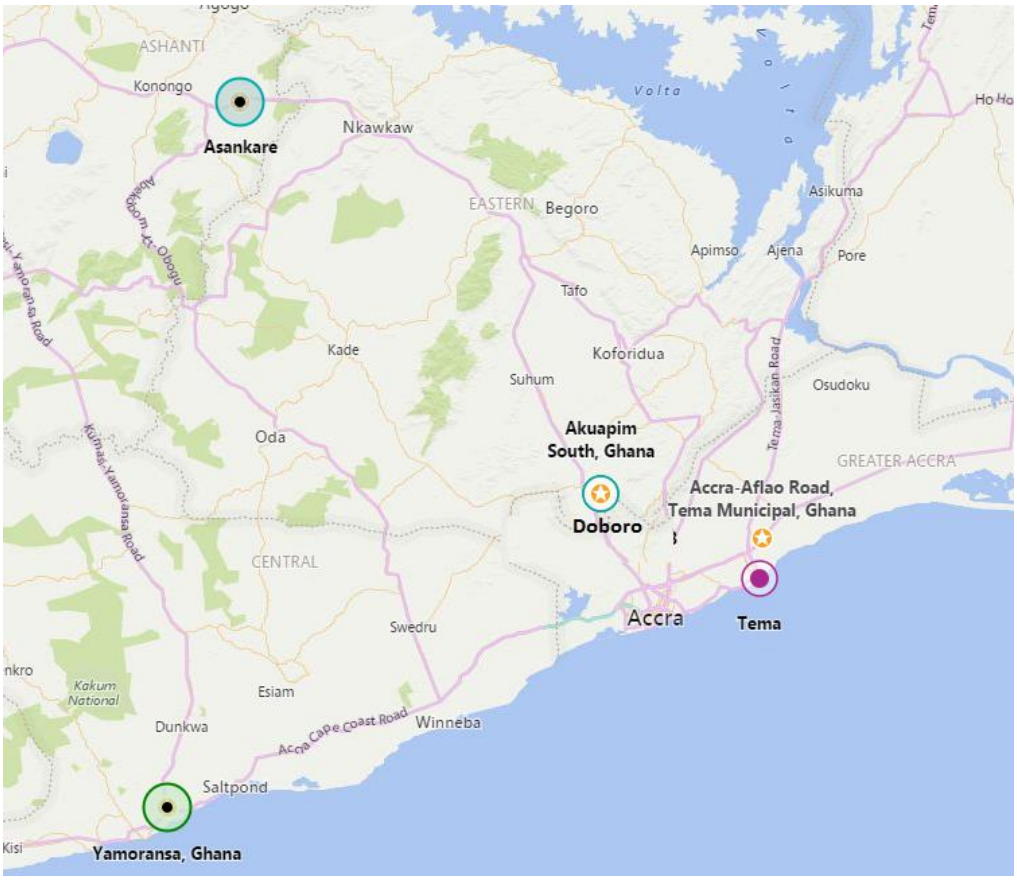
trips to use the Eastern Railway Line to Boankra. Surveys were conducted along all the identified arterial routes to ensure that none of such vehicles filter through.

Figure 5-1: Survey census points Atimpoku – Hohoe – Dambai – Yendi – Bawku; and Takoradi – Kumasi – Sunyani.



Source: Google Maps

Figure 5-2: Yamoransa – Asankare – Daboro



Source: Google Maps

5.3.1.1. Results of Origin and Destination (O-D) Survey

From these surveys, the proportion of traffic likely to use the Boankra Inland Port and Eastern Railway Line, the tonnage of freight transported as well as the origins and destinations were extracted. The surveys revealed that a wide range of freight types is moved along the corridor to destinations in Kumasi and its immediate environs as well as areas beyond to Burkina Faso, Niger and Mali.

The different types of freight include:

- Containers – Predominantly 20 and 40-footers. 10 and 45-footers are rarely used in transportation along the corridor;
- Bagged Cargo – Cement, corn, fertilizer, flour, rice, sugar, fish meal etc.;
- Chemical & Inputs for the breweries, the mining companies and distilleries;
- Iron/Steel bars and rods – Used in the construction industry as well as angle irons, pipes, coiled steel, cables etc.;
- Agricultural/Constructional Machinery and Equipment including tractors, graders, bulldozers, excavators, loaders, jumpers, drilling machines and other earth moving machinery;
- Import Vehicles – This includes cars, ambulances, buses, dumpers, tipper trucks etc.; and
- Petroleum Products – Petrol, diesel and liquefied petroleum gas.

All the above are essentially imports which are moved northwards between Tema and destinations in Kumasi and within its sphere of influence. The exports from Kumasi and the Northern regions, Niger, Mali and Burkina Faso include the following:

- Bagged cargo – Cocoa beans, cashew nuts, and non-traditional crops;
- Empty or partially empty containers;
- Logs and sawn timber;
- Shea butter, palm kernel oil, crude palm oil etc.; and
- Fresh fruits and local foods stuff.

Results from our O-D survey shown in the Table 7-3 indicates that majority of the freight vehicles moving to the Kumasi region and beyond have origins in Accra and Tema, 50% and 46% respectively as shown in table 6-5 below. Similarly, about 54% of these trips end up in the Kumasi. A substantial proportion of the traffic from Tema and Accra, about 9% each, have destinations in Nkoranza and in the Akwapin South area. The remaining traffic ends up in other different parts of the Northern sector. It is worth noting that about 3% of this traffic stream has destinations in Mali, Niger and Burkina Faso.

Table 5-3: Summary of O-D Survey Results in Vehicles (To Kumasi region and beyond)

Origin	Destination																	Total	(%)
	Bolgatanga	Bawku	Tamale	Kenyasi	Jaman	Nkoranza	Atebubu	Kumasi / Ejisu	Afigya Sekyere	Obuasi	Kwahu West	Afram Plains	New Juabeng	Akwapim South	Upper Denkyira	Accra	Paga Border (external)	Kulungugu Border (external)		
15	0	0	0	0	0	0	0	5	0	0	0	0	0	1	0	0	0	0	**6**	**4**
60	1	1	2	1	2	7	1	40	0	0	4	2	2	6	0	0	2	3	**74**	**46**
61	0	0	3	1	4	7	0	41	2	1	4	4	3	8	1	1	0	0	**80**	**50**
TOTAL	**1**	**1**	**5**	**2**	**6**	**14**	**1**	**86**	**2**	**1**	**8**	**6**	**5**	**15**	**1**	**1**	**2**	**3**	**160**	**100**
(%)	**1**	**1**	**3**	**1**	**4**	**9**	**1**	**54**	**1**	**1**	**5**	**4**	**3**	**9**	**1**	**1**	**1**	**2**	**100**	

Table 5-4: Summary of O-D Survey Results in Vehicles (To Accra)

Origin	Destination					Percent (%)
	Akwapim South	Awutu/Efutu/Senya	Tema	Accra	Total	
Bolgatanga	0	0	2	1	3	2%
Wa	0	0	0	2	2	1%
Bole	0	0	1	1	2	1%
Tamale	0	0	2	6	8	6%
Chamba	1	0	0	0	1	1%
Sunyani	0	0	4	7	11	8%
Kintampo	0	0	0	1	1	1%
Jaman	0	0	3	1	4	3%
Dormaa	0	0	1	3	4	3%
Nkoranza	0	0	0	2	2	1%
Atebubu	0	1	1	0	2	1%
Kumasi / Ejisu	0	0	30	12	42	31%
Amansie West	0	0	2	0	2	1%
Ejura-Sekyedumase	0	0	0	4	4	3%
Asante Akim North	0	0	0	3	3	2%
Amansie East	0	0	1	0	1	1%
Obuasi	0	0	1	0	1	1%
Kwahu West	0	0	5	4	9	7%
Afram Plains	0	0	1	0	1	1%
East Akim	0	0	5	8	13	10%
New Juabeng	0	0	1	3	4	3%
Akwapim South	0	0	1	1	2	1%
Sefwi Wiawso	0	0	0	2	2	1%
Bibiani	0	0	0	1	1	1%
Cape Coast	0	0	0	1	1	1%
Accra	0	0	1	1	1	1%
Paga Border (external)	0	0	5	1	6	4%
Kulungugu Border (external)	0	0	2	0	2	1%
Total	**1**	**1**	**69**	**65**	**136**	**100%**
Percent (%)	**1%**	**1%**	**51%**	**48%**	**100%**	

With respect to trucks moving in the Southbound direction, a dominant 31% originate from the Kumasi region, with the remaining originating from different locations in the Northern sector of the country. Over 50% of these trips end in the Tema area as most of these trucks carry cargo to the Tema Port for export. Similarly, 45% of these trucks carry cargo to destinations in and around Accra to meet local demand. Table 7-4 shows the distribution of freight traffic from the Kumasi region to Accra.

In summary, the results of the O-D survey highlight the fact that Accra/Tema and Kumasi contribute a significant amount of freight demand, coupled with the increasing freight volumes at the Tema Port. Therefore, the Eastern Corridor serves as a major route connecting the two largest commercial hubs in the country.

5.3.2. Institutional / Shipper Surveys

We also carried out institutional surveys in Accra/Tema and Kumasi to assess the volume of traffic that exists for the haulage of goods between Accra/Tema and Kumasi. These institutions included importers and producers of industrial goods such as cement, alcoholic beverages, iron rods, and petroleum products. Namely, the Ghana Ports and Harbours Authority (GPHA), cement distributors, agents of breweries and manufacturers of iron rods, among others.

Some of the data collected from these establishments include the following:

- Types of commodity produced or distributed;
- Production output for 2009 – 2014;
- How product is distributed or marketed in Kumasi and further north;
- Shipment of product by different modes of transport;
- Frequency of shipments to Kumasi and its environs; and
- Willingness to ship by the Eastern Railway Line if tariffs are reduced to 20% of current road charges.

5.3.2.1. Results of Institutional / Shipper Surveys

The institutional surveys we undertook enabled us to assess the size of traffic that exists and their distribution. The outcomes of the surveys were characterised based on the following results:

5.3.2.2. Trip Distribution

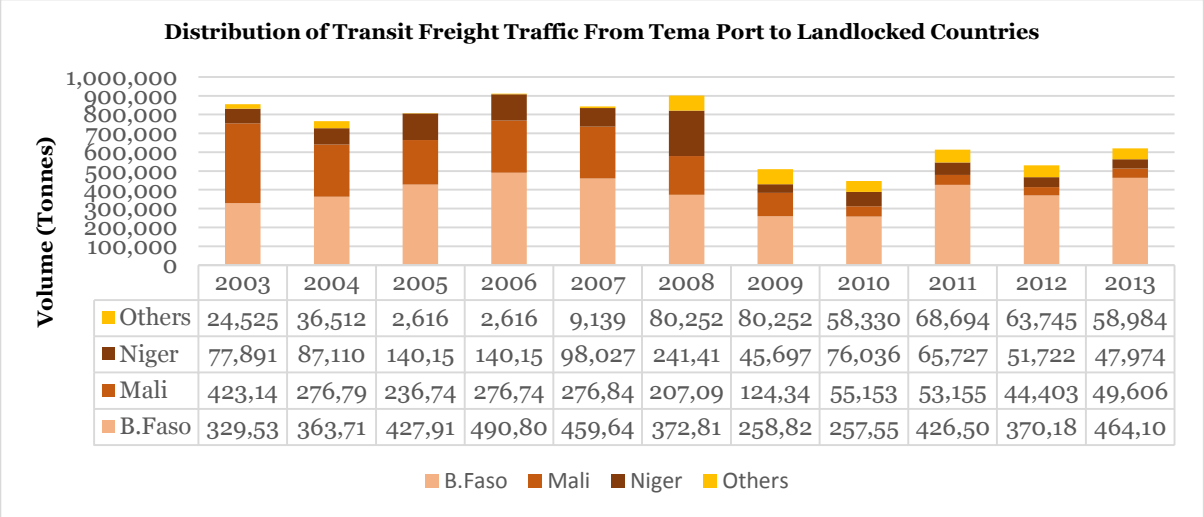
Examining the major characteristics of freight along the corridor provides a basis for the future estimates of freight types, volumes or weight, and movement along the corridor. Trips generated on the corridor have destinations in Burkina Faso, Mali, Niger, Kumasi and other Northern areas.

GPHA records from 2003 to 2013, indicate that a small proportion of port traffic originates from landlocked countries within the vicinity of the Northern border. Statistics from the Tema Port show that on average over 50% of freight transit traffic ends up in Burkina Faso.

These neighbouring landlocked countries rely on Ghana for their import and export trade via the Tema Port. Therefore, trips generated along the corridor would be influenced by transit traffic which would also serve as potential demand for the Boankra Inland Port and the Eastern Railway Line.

The table below shows the distribution of freight transit traffic along the corridor.

Figure 5-3: Transit Freight Traffic Distribution



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Others	24,525	36,512	2,616	2,616	9,139	80,252	80,252	58,330	68,694	63,745	58,984
Niger	77,891	87,110	140,15	140,15	98,027	241,41	45,697	76,036	65,727	51,722	47,974
Mali	423,14	276,79	236,74	276,74	276,84	207,09	124,34	55,153	53,155	44,403	49,606
B.Faso	329,53	363,71	427,91	490,80	459,64	372,81	258,82	257,55	426,50	370,18	464,10

Source: Ghana Ports and Harbour Authority (GPHA)

5.3.3. Freight Owners Survey Results

From our survey, we identified that the major freight owners along the corridor were producers of beverages, steel, plastic products, cement and major distributors in Accra – Tema Metropolis. These included:

- Guinness Ghana Breweries Ltd - Beverages;
- Accra Brewery Ltd - Beverages;
- GHACEM- Cement;
- Kasapreko Company Ltd - Beverages;
- Aluworks Ltd - steel;
- Ghana Aluminium Products – Aluminium;
- Tema Steel Co. Ltd - steel;
- Ghana Pioneer Aluminium Products Ltd – Aluminium;
- Sentuo Steel Ltd - steel;
- Amani/SRG Industries Ghana Ltd - Plastic products;
- Interplast Ltd - Plastic products; and
- Qualiplast Ltd - Plastic products.

In order to estimate the current volume of freight transported along the corridor, we further carried out interviews with the following:

- Guinness Ghana Ltd;
- Qualiplast Ltd;
- GHACEM;
- Melatex Ltd;
- Amani/SRG Industries Ghana Ltd; and
- Kasapreko Co. Ltd.

Data gathered from Guinness Ghana Ltd (producers of alcoholic and non- alcoholic beverages) indicates that the company transports about 65% of its products to Kumasi and beyond by road on a daily basis. The company has considered transporting its products by rail based on their perception that it would be relatively cheaper in terms of transport costs.

Qualiplast Ltd (manufacturers of plastic products) transports between 30 – 40% of its products 3 times a week by road to Kumasi and beyond to serve the increasing demand in the Northern sector of the country. The company believes that transporting its products by rail would be cheaper than by road.

GHACEM produces Portland cement and transports between 30 – 40% of its annual production (3.10 metric tonnes in 2008) to meet demand in and around Kumasi. With an increasing demand for its products as a result of increase in construction activities, the company is of the opinion that rail transport would be a better alternative to enhance its productivity because it provides a reliable, safer and cheaper means of transport than road. They are of the perception that a shift to rail could affect the retail price of cement and overall inflation in Ghana.

Metalex Ltd (manufacturers of roofing sheets) transports 10 – 20% of its products transported to meet demand in Kumasi and beyond. The company would shift from road to rail transport because it believes rail provides a faster, more convenient and cheaper service than road.

Amani/SRG Industries Ghana Ltd (produces all kinds of plastics and general household items) has a seasonal demand for its products. The company transports less than 10% of its output to Kumasi and beyond. The company believes that though rail transport is an important option to reduce transportation cost, its patronage depends on the quality of services to be provided.

Kasapreko Co. Ltd (manufacturer of alcoholic beverages) transports about 10 – 20% of its products to Kumasi and beyond but has no plans of increasing output over the next five years due to product loss owing to

breakages. Based on data gathered, the company would seriously consider transporting its products by rail to minimise transport costs and breakages.

5.3.4. Logistics Service Providers and Industrial Survey Results

Surveys of industrial establishments in the Accra/Tema enclave revealed that there are a sizeable number of such logistics service providers offering vital services to various industrial establishments by linking them to several markets or consumers.

The surveys revealed that there are large foreign based companies as well as small local logistics companies offering a range of services with different levels of efficiency. The large companies include Global Haulage, BB Transport, Renaissance Supply Chain, Hull Blyth (GH) Ltd and Sharp Auto International; which incidentally have a smaller fleet of vehicles compared to the local providers when considered as a group.

Some of the many medium and small-sized logistics service providers include individual companies as well as group service providers. The individual service providers include J. Adom, Yaw Ofori Enterprise, and Freddy Mus which belong to individual proprietors who run them as limited liability companies. The group service providers are essentially associations to which individual service providers can register to provide the required services. They include the following:

- Ghana Haulage Transport Owners Association (GHATOA);
- Ghana Private Road Transport Union (GPRTU);
- Ghana Haulage Transport Drivers Union (GHTDU); and
- Joint Association of Port Transport Union (JAPTU).

These associations or unions have a membership of drivers, vehicle owners or both. Their primary reason for coming together is to protect their interests in the industry as well as ensure that there is uniformity of tariffs or freight charges throughout the industry. The shippers mentioned in our interviews with them that because of the reductions in revenue earned by vehicle owners as a result of deteriorating macro-economic conditions, the freight charges are now normally negotiated between the service provider and the consignee. Apart from rendering services at the Tema Port, the members of various unions are also usually called upon to provide logistics services to several of the previously mentioned industrial establishments.

We realised that in the case of services rendered to large industrial establishments in the Accra/Tema enclave, the services are outsourced to various private sector organisations on a contract basis. In the case of Guinness Ghana Breweries Ltd., for example, the annual volume of products shipped to five distributors in Kumasi involves the use of between 700 and 800 trucks.

Some of the aspects of the services provided by the large, formal private operators could be provided by the smaller service providers. Our survey showed that, even though they may be cheaper; they do not have the capacity to reliably deliver large volumes of cargo. Therefore, as expected, almost all the establishments interviewed or visited made it very clear that they would positively consider the shipment of their cargoes and freight by rail subject to a few conditions some of which are summarised as follows:

- Reduced tariffs by rail;
- Enhanced security of cargo;
- Increased time savings
- Enhanced levels of service (including hygiene); and
- Safety of the rails so that products can get to their destinations with very limited damage.

Based on our field surveys of industrial establishments in the Accra-Tema enclave as well as the frequency of trips made along the corridor to Kumasi, approximately 40% of freight companies are large contracted service providers and the remaining 40% are smaller logistics companies.

Table 5-5: Summary of Responses from Logistics Service Providers and Large Industrial Companies

Questions	UT Logistics	Bajfreight and Logistics	Cocoa Processing Company	Nestle	Se7en Log
Would you contract the new Eastern Railway line operator as part of your service mix to customers in Kumasi and beyond?	Yes	Yes	No	Yes	Yes
If No, why would you not consider rail as a partial solution to your service offering?			• Low production levels • Nature of products requiring cooler temperature		
If Yes, what would be the most important determinant for you?	• Reliability of service • Tariff	• Reliability of service • Tariff		Reliability of service	• Reliability of service • Possible delay
Would you consider using the rail with a 20% reduction in current cost on the corridor?	Yes	Yes	No	Yes	Yes
If No, what would you consider to be an attractive rail tariff?					
What service offering by the rail operator would be important to you if you had an acceptable tariff?		Convenience and safety of freight		Reliability On time service delivery	Convenience, well established terminals and adequate port equipment
Would you consider moving containers from Tema to Kumasi (Boankra) (and vis versa) via rail or would you prefer to deconsolidate these products and move them as mixed traffic?	Containers	Containers due to nature of freight handled		General mixed traffic	General mixed traffic

Questions	UT Logistics	Bajfreight and Logistics	Cocoa Processing Company	Nestle	Se7en Log
If you could only use containers on rail would could this align to your current business model and Would you be prepared to adjust your service offering to accommodate this?	Yes	Yes		Yes but depends on the location of the consignee	Depends on nature of product and location of consignee
If rail offered a general mixed freight service (probably using pelletized loads) would you consider this as an alternative to containers?	No			Yes	Yes

5.4. Classification and Movement of Freight Traffic along the Accra - Kumasi Road Corridor

To enable us estimate the freight demand, we have classified it into different types of commodities, taking into consideration the direction of travel along the Accra-Kumasi Corridor. This is shown in the table below.

Table 5-6: Classification of Freight Traffic and Movement

Class of Freight or Cargo	Direction	
	Northbound	Southbound
Containers	✓	✓
Transit Containers	✓	✓
Petroleum Products	✓	—
Cement	✓	—
Cocoa	—	✓
Other Bulk Cargo* *(i.e. iron and steel, frozen cargo and forest cargo)*	✓	✓

NB: Other Bulk Cargo* are other types of cargo apart from the above which are mobilised in bulk or bagged for transportation by road.

As shown above, containers, transit containers, and bulk cargo are the only categories of traffic that are likely to be transported in both directions. In view of the import-driven nature of the economy, it is expected that import Northbound containers are likely to be more stuffed than export Southbound containers.

Currently, in the case of petroleum products, special wagons return empty on their Southbound trips after the products have been discharged at the fuel depots near Kumasi. Cement wagons or flat beds are also likely to return empty on their Southbound trips but this is dependent on the volume and weight of the wagons.

In accordance with shipping best practice, Government should encourage shippers to containerise every item of cargo travelling Southbound to Accra and Tema, including commodities such as timber products, charcoal, cotton, and non-traditional exports such as cashew nuts. This would minimise the risk of damage and pilferage.

5.5. Approach and Methodology

In order to realistically estimate the traffic demand for rail services and the Inland Port, we have adopted a combined approach of including data from both primary and secondary sources. This is to ensure that the items in the ToR are captured and addressed appropriately in the study.

Our traffic demand analysis for this study involved:

- Estimating the volume and type of freight that is currently moving Northbound and Southbound from Tema Port and how fast we expect this freight to grow;
- Estimating the percentage of total freight by type that would shift from the current road option to rail (dependent on the competing road versus rail service mix, rail frequency, rail service pattern and reliability and tariff of the competing modes); and
- Estimating the revenue that will be generated from the rail service based on the expected demand and tariff that can be realistically charged.

The main objective of the data collection was to enable us:

- Establish the current freight and passenger count on the Accra/Tema – Kumasi corridor;
- Determine the potential rail freight volume;
- Determine traffic growth rate for freight; and
- Estimate traffic forecast.

Secondary data was collected from published sources and interactions with various key stakeholders.

5.5.1. Results of Truck Volume

To determine the characteristics of road freight on the Accra-Kumasi road, vehicle counts were carried out on the 29th and 30th of April, 2015 along the road corridor at the Breku census point to minimise the effect of Accra and Kumasi on the counts which were done over a period of 12 hours (6am to 6pm). To account for night time freight traffic, the proportion of the 12-hour count (day time traffic) in relation to the 24-hour count was determined and used in adjusting the 12-hour count.

It is generally known that, in view of Ghana's import dominated economy, trucks moving in the Northbound direction tend to carry more freight than those moving in the Southbound direction; hence the former tend to have higher volumes and weights. As already established, about 31% of trucks moving in the Southbound direction move with no cargo or are empty, compared to about 4% of empty trucks on Northbound trips. This has a direct effect on the weight of truck loads moving in the Southbound direction.

We obtained average weights of truck load by vehicle type from the Ghana Highway Authority (GHA) Axle Load Station at Boankra and this is shown in the table below.

Table 5-7: Average Weight of Truck Load by Vehicle Types

Vehicle Type	Average Weight of Truck Load (tonnes)
Light trucks	14
Medium trucks	14
Heavy trucks	19.5
S/Trailer (Light)	19.5
S/Trailer (Heavy)	29.3
Truck trailer	35.5
Extra-large truck and others	41.5

Source: GHA Axle Load Station, Boankra, 2015

Based on these average weights of loaded trucks and the number of vehicles from the ground count, the total daily truck volumes were estimated as shown in the tables below.

Table 5-8: Estimation of Total Truck Volume or Weight of Freight (tonnes) to Kumasi

Vehicle Type	Predominant Freight Type	Ground Count	Average Weight (Tonnes)	Total Weight (Tonnes)
Light trucks	Processed foods	244	14	3416
Medium trucks	Processed foods	116	14	1624
Heavy trucks	Processed foods	143	19.5	2789
S/Trailer (Light)	Processed foods/ Miscellaneous	2	19.5	39
S/Trailer (Heavy)	Miscellaneous	27	29.3	791
Truck trailer	Processed foods	133	35.5	4722
Extra-large truck and others	Petroleum/ Miscellaneous/ Processed Foods	396	41.5	16434
Total	-	1,061	-	29,814
TOTAL DAILY TRUCK VOLUME (TONNES) =		29,814 Tonnes/day		

* Total annual truck volume » 29,814 * 365 = 10,882,147 tonnes/annum

Note: Columns 2, 3 and 5 are based on Sample Survey

Table 5-9: Estimation of Total Truck Volume or Weight of Freight (tonnes) to Kumasi

Vehicle Type	Predominant Freight Type	Ground Count	Average Weight (Tonnes)	Total Weight (Tonnes)
Light trucks	Agric. Products/Empty	100	14	1400
Medium trucks	Manufactured products/Empty	49	14	686
Heavy trucks	Empty/Agric. Products	46	19.5	897
S/Trailer (Light)	Empty/ Agric. Products	4	19.5	78
S/Trailer (Heavy)	Agric. Products	11	29.3	322
Truck trailer	Agric. Products	80	35.5	2840
Extra-large truck and others	Agric. Products/ Empty	268	41.5	11122
Total	-	558	-	17,345
TOTAL DAILY TRUCK VOLUME (TONNES) =		17,345 tonnes/day		

* Total annual truck volume » 17,345 * 365 = 6,331,035 tonnes/annum
We assumed 365 days in a year.
Note: Columns 2, 3 and 5 are based on Sample Survey
Sources: Breku Ground Count, 2015; GHA Axle Load Station, Boankra, 2015

5.6. Container and Cargo Traffic along Accra-Kumasi Road

To determine the volume of traffic for the various freight types along the road corridor, we used data from the Ghana Highway Authority (GHA) Axle Load Station at Boankra, traffic counts and O-D data including information collected from interviews of freight owners and shippers. This is shown in the table below.

Table 5-10: Annual Volumes of Container and Cargo Traffic along Accra-Kumasi Road

Freight Items	Direction	Year 2015
Container within Ghana (TEUs/year)	Northbound & Southbound	46,136
Transit Container to landlocked countries (TEUs/year)	Northbound & Southbound	50,347
Petroleum (metric tonnes/year)	Northbound & Southbound	416,000
Cement (metric tonnes/year)	Northbound	143,578
Cocoa	Southbound	175,030
Other Cargo (metric tonnes/year)	Northbound & Southbound	676,447

5.6.1. Assumptions Considered

5.6.1.1. Containers

From the GHA's Axle Load Station at Boankra, the estimated daily container traffic to Kumasi and its surroundings is 114 TEUs which is slightly less than the daily container transit traffic volume of 138 TEUs to Mali, Niger and Burkina Faso.

According to the data provided by GPHA, one TEU was determined to be 16.4 metric tonnes.

5.6.1.2. Petroleum

Discussions with the Bulk Oil Storage and Transport (BOST) Ltd revealed that 416,000 tonnes/year of petroleum products could be made available initially, to be transported from Tema by rail to Kumasi annually.

5.6.1.3. Cement

Currently, there is no plant for cement production in Kumasi and hence the reliance on, particularly, Tema to meet the city's requirements. In short, of the four cement factories in Ghana, Kumasi relies primarily on supplies from factories located in Tema and Takoradi.

From our discussions with producers such as GHACEM Ltd in Tema, it was determined that about 30% of the total cement sales (and implicitly total cement production and imports) is procured and shipped to Kumasi and its environs. GHACEM's total cement production for 2015 was estimated to be 478,592 tonnes/year of which 30% is expected to be transported along Accra-Kumasi Road corridor (i.e. 143,578 tonnes/year).

5.6.1.4. Cocoa

Based on our discussions with The Ghana Cocoa Board (Cocobod) and according to the Cocobod (2007) policy and warehouse capacity at Tema, 60% of cocoa exports is handled by Tema Port. Of the 60% to be handled at Tema Port, it is assumed that 50% of the cocoa beans will be shipped from the Inland Port.

5.6.1.5. Other Bulk Cargo

Other bulk cargo includes commodities such as rice, sugar, fertilizer, iron rods, plastics and non-traditional exports or industrial products from Accra-Tema and the Northern parts of Ghana. This is estimated to be 676,447 tonnes.

From the interviews we conducted with the freight owners and shippers, we observed that major considerations to patronise rail transport services were dependent on the following factors or guarantees:

- Competitive tariffs in the range of between 20-30% lower than the current road tariffs;
- Reliability of service;
- Convenience and safety of freight;
- All cargo moving by rail must be insured;
- A good communication system; and
- On-time delivery of goods.

Most freighters and shippers would consider rail transport services as an alternative mode of transport for freight, but this is conditional on tariff charges at least 30% less than the tariff charges for road transport.

5.7. Future Traffic Growth Rate

In order to project future freight volumes, a realistic growth rate has to be estimated. To do so, we examined Tema Port data from 2008 to 2013 to assess the historical growth rate.

By comparing the historical freight traffic growth rate to the growth rate of GDP, we noted the following:

- Total traffic volume (in metric tonnes) is closely related to GDP. High freight traffic volumes are therefore influenced by increases in GDP; and
- Annual growth rates and GDP growth rates also supports the above observation because high annual growth rates in traffic volumes are also closely associated with high GDP growth rates.

The table below depicts the relative growth and positive relationship between freight traffic growth and the GDP growth rate from 2006 to 2014.

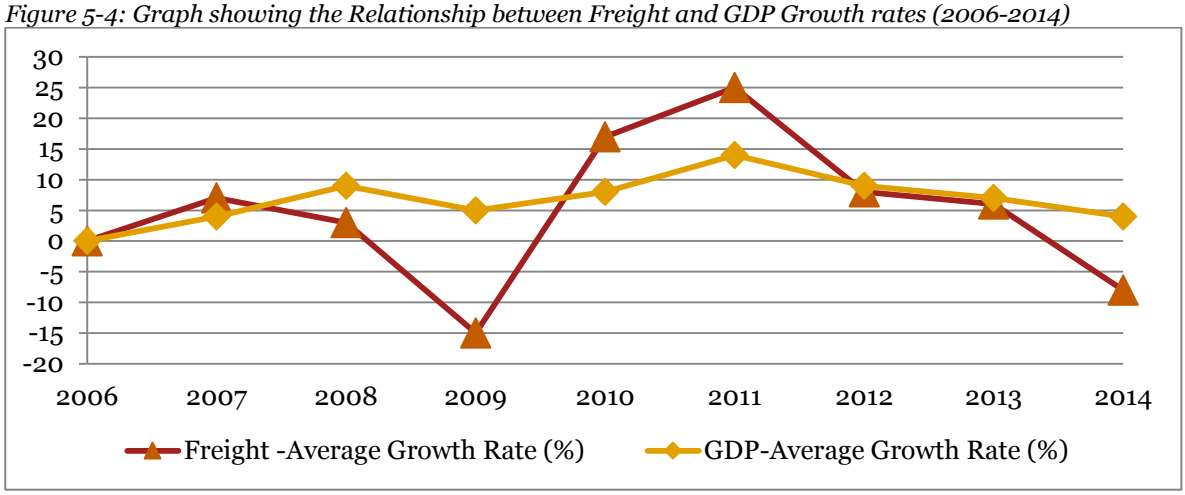
Table 5-11: Relationship between Freight Traffic and GDP

Year	Freight Volume	Average Freight Growth Rate (%)	GDP (GHS million)	Average GDP Growth Rate (%)
2006	7,706,997	N/A	18,705	N/A
2007	8,259,473	7	19,518	4
2008	8,531,723	3	21,304	9
2009	7,213,925	(15)	22,336	5
2010	8,460,336	17	24,101	8
2011	10,577,748	25	27,486	14
2012	11,418,559	8	30,040	9
2013	12,128,867	6	32,237	7
2014	11,126,355	(8)	33,522	4

Source: International Monetary Fund (IMF)

Based on the above observation, we observed that the GDP growth rate is a reliable predictor of freight traffic growth. Consequently, we adopted the forecasted GDP growth rate by the IMF as a realistic benchmark for projecting freight traffic growth from 2016 and beyond. Figure 6-1 below further demonstrates the relationship between freight and GDP Growth rates.

Figure 5-4: Graph showing the Relationship between Freight and GDP Growth rates (2006-2014)



5.7.1. Assumptions Considered

We assumed different growth rates for the various types of freight and the following table details the basis of our estimates.

Table 5-12: Assumptions considered for various freight types

Freight Items	Direction
Container	A growth rate of 5.07% was used because growth in container traffic will be in tandem with Ghana's GDP growth. This growth rate is the average GDP growth rate for 1980-2015 period based on empirical data and the IMF outlook for 2015.
Petroleum Products	Based on discussions with the Bulk Oil Storage and Transport (BOST) Ltd, BOST intends to increase its production by 4% annually. We have assumed this growth rate for estimating future potential traffic to Kumasi.
Cement	The average annual growth in production of cement from 2004 to date was determined to be 6.9% based on GHACEM's production and distribution of cement from 2004 to 2013. We have assumed this growth rate as the basis for estimating future potential traffic.
Cocoa	We assumed an annual growth rate in cocoa production of 4% based on empirical considerations but this could increase with favourable weather conditions. (Source: Global Agriculture Information Network Report Number GH1202, Issued by USDA, Foreign Agriculture Service, dated 15/03/2012).
Other Cargo	Other bulk cargo (i.e. rice, sugar, fertilizer, flour, aluminium sulphate, forest products, export fruits etc) was projected to grow at 5.07 % annually based on GDP growth.

The table below shows the future growth rates of the various freight types.

Table 5-13: Summary of Estimated Future Traffic Growth Rates

Freight Items	Direction	Growth Rate (%)
Container (TEUs/year)	Northbound & Southbound	5.07
Petroleum (metric tonnes/year)	Northbound & Southbound	4
Cement (metric tonnes/year)	Northbound	6.9
Cocoa (metric tonnes/year)	Southbound	4
Other Cargo (metric tonnes/year)	Northbound & Southbound	5.07

5.8. Traffic Demand for the Standalone Boankra Inland Port with Road Connection

Based on Institutional/Shippers Survey in Section 5.3 and the Willingness to Shift Survey in Section 5.14, the Boankra Inland Port is not likely to have sufficient patronage unless some measures are taken to encourage its use.

The key measure which will ensure that freight forwarders use the Inland Port is that GPHA has to make the cost of importing or exporting goods through the Inland Port the same or cheaper than the cost of shipping goods through the Tema Port. Also for the Boankra Inland port with road connection to work, the service would have to be efficient and the safety of freight will have to be ensured. For the Inland Port to be affordable, safe and efficient, the following will have to be done to ensure patronage:

- Freight will be bonded and tracked to Boankra Inland Port;
- Customs and other shipping line services will be provided at the Inland Port;
- Trucking licenses/agreements will be awarded on a competitive basis to qualified and credible companies who can meet the customs bonding/transportation requirements;
- The transportation cost of freight using the road connection to the Inland Port will be the same or less than the current road transport cost;
- Tracking and insurance cost from Tema to Boankra will be wholly or partially subsidised by Government to ensure that the cost is the same or less than the current road transport cost ;
- The unimodal terminal (road-road) to Boankra will be a temporary alternative until the period where the railway line is constructed and operational;
- The Northbound traffic and transit cargo/container will be transported straight to the Boankra Inland Port by road as soon as it is offloaded from vessels at the Tema Port;
- Southbound traffic from the Northern parts of Ghana and land-locked countries will be sent directly to the Inland Port for processing and customs documentation before it is authorised to be transported by road to the Tema Port; and
- All containers or cargo will be processed by customs and the necessary documentation approved before the freight is allowed to be transported to its final destination.

5.9. Projected Traffic Demand for the Standalone Boankra Inland Port with Road Connection

For shippers who are currently using the Accra-Kumasi road to transport their goods (to and from Tema Port) to shift to the Boankra Inland Port, We assumed that the volume of freight that is currently using Accra-Kumasi road is the same for the standalone Inland Port with road connection. Based on the traffic growth rates and the traffic volumes for the Standalone Boankra Inland Port, we projected the traffic demand for the Inland Port with road connection and this is shown in the table below.

Table 5-14: Boankra Inland Port (Standalone) Traffic being transported by Road

Freight Items	Direction	2015	2018	2020	2025	2030	2035	2040	2045	2048
Container (TEUs) within Ghana										
Volume of container traffic to be transported by rail	Northbound-Southbound	46,136	53,517	59,082	75,660	96,891	124,079	158,895	203,482	236,027
Transit Containers (TEUs) to landlocked countries										
Volume of container transit traffic to be transported by rail	Northbound-Southbound	50,347	58,400	64,472	82,559	105,720	135,379	173,359	221,993	257,499
Cocoa (Metric Tonnes)										
Volume of cocoa to be transported by rail	Southbound	175,030	196,885	212,951	259,087	315,219	383,512	466,601	567,692	638,576
Other Cargo (Metric Tonnes)										
Volume of other cargo to be transported by rail	Northbound-Southbound	676,447	784,662	866,260	1,109,335	1,420,617	1,819,245	2,329,730	2,983,458	3,460,638
Total Container Traffic (TEUs)		**96,483**	**111,917**	**123,554**	**158,219**	**202,611**	**259,458**	**332,254**	**425,475**	**493,526**
Total Cargo Metric Tonnes		**851,477**	**981,547**	**1,079,211**	**1,368,422**	**1,735,836**	**2,202,757**	**2,796,331**	**3,551,150**	**4,099,214**

Note: *1) Other Cargo traffic consists of dry bulk, general cargo, bagged cargo and frozen cargo.*
2) 1 TEU = 16.4 Metric tonnes.

5.10. Traffic Demand for the Standalone Eastern Railway Line

We assumed that the volume of freight that is currently using Accra-Kumasi road (i.e. 2015) will approximately be the same for the Standalone Eastern Railway Line for the following reasons:

- Most of the respondents surveyed said they will shift to use rail if the current transportation cost of freight by road is reduced by 30% (i.e. a 30% discount). Therefore we have assumed that traffic will shift to the Railway Line if this 30% discount is in place;
- A reliable, safe and efficient service is provided; and
- A GoG policy is in place to obligate the shippers of freight such as containers, petroleum, cocoa and cement to use the Railway Line.

If these measures are in place, the Railway Line will be well patronised, cheaper than road transport, safer and more efficient. The Standalone Eastern Railway Line will function in the following way:

- The Northbound traffic and transit cargo/container will be transported straight to Kumasi by rail after customs duty paid at the Tema Port;
- Southbound traffic from the Northern parts of Ghana and land-locked countries will be sent directly to the Kumasi Terminal for onward transportation on rail to Tema Port.

5.11. Projected Traffic Demand for the Eastern Railway Line

Based on the traffic growth rates and the base traffic volumes for the Eastern Railway Line, we projected the traffic demand for the Railway Line shown in the table below.

Table 5-15: Estimates of Freight Traffic to be transported by Eastern Railway Line (Freight Only)

Freight Items	Direction	2015	2018	2020	2025	2030	2035	2040	2045	2048
Container (TEUs) within Ghana										
Volume of container traffic to be transported by rail	Northbound-Southbound	46,136	53,517	59,082	75,660	96,891	124,079	158,895	203,482	236,027
Transit Containers (TEUs) to landlocked countries										
Volume of container transit traffic to be transported by rail	Northbound-Southbound	50,347	58,400	64,472	82,559	105,720	135,379	173,359	221,993	257,499
Petroleum Products (Metric Tonnes)										
Volume of petroleum products to be transported rail	Northbound	416,000	467,943	506,128	615,782	749,192	911,507	1,108,988	1,349,253	1,517,726
Cement (Metric Tonnes)										
Volume of cement to be transported by rail	Northbound	143,578	175,396	200,436	279,810	390,618	545,306	761,253	1,062,717	1,298,227
Cocoa (Metric Tonnes)										
Volume of cocoa to be transported by rail	Southbound	175,030	196,885	212,951	259,087	315,219	383,512	466,601	567,692	638,576
Other Cargo (Metric Tonnes)										
Volume of other cargo to be transported by rail	Northbound-Southbound	676,447	784,662	866,260	1,109,335	1,420,617	1,819,245	2,329,730	2,983,458	3,460,638
Total Container Traffic (TEUs)		**96,483**	**111,917**	**123,554**	**158,219**	**202,611**	**259,458**	**332,254**	**425,475**	**493,526**
Total Cargo Metric Tonnes		**1,411,055**	**1,624,886**	**1,785,775**	**2,264,014**	**2,875,646**	**3,659,570**	**4,666,572**	**5,963,120**	**6,915,167**

Note: *1) Other Cargo traffic consists of dry bulk, general cargo, bagged cargo and frozen cargo*

5.12. Potential Mineral Resources

Our interactions with a Principal Officer at the Minerals Commission on 22 January 2016, gave us additional insight into the recent discoveries of vast iron and bauxite deposits in Ghana expected to boost the mining industry once exploitation of these resources begin. The iron ore and bauxite deposits discovered in commercially viable quantities are expected to attract a lot of investment in the sector as well as increase local economic activities.

Currently, only between 10 to 20 percent of the country's entire mineral resources are being exploited and it is expected that investors through their activities and resources would promote the development of the entire value chain for these mineral resources.

The table below gives a summary of the mineral resources identified and their respective locations.

Table 5-16: Potential Mineral Resources in Ghana and their Locations

Mineral Resource (Deposit)	Commercial Quantity	Location
Iron Ore	1.27 billion metric tonnes	Sheini near Tamale in the Northern Region/ 616 km North of Accra
Iron Ore	150 million metric tonnes (iron content between 43-56 percent Fe)	Oppon Manso in the Western Region
Iron Ore	5 million metric tonnes	Pudo in the Upper West Region
Bauxite	200 million metric tonnes	Kibi, 92 km North of Accra
Bauxite	700 million metric tonnes	Nyinahin, near Kumasi,(beside the Prestea mines) 218 km North of Accra
Bauxite	Quantity yet to be established	Akpafu, 234 km North-East of the capital, Accra.

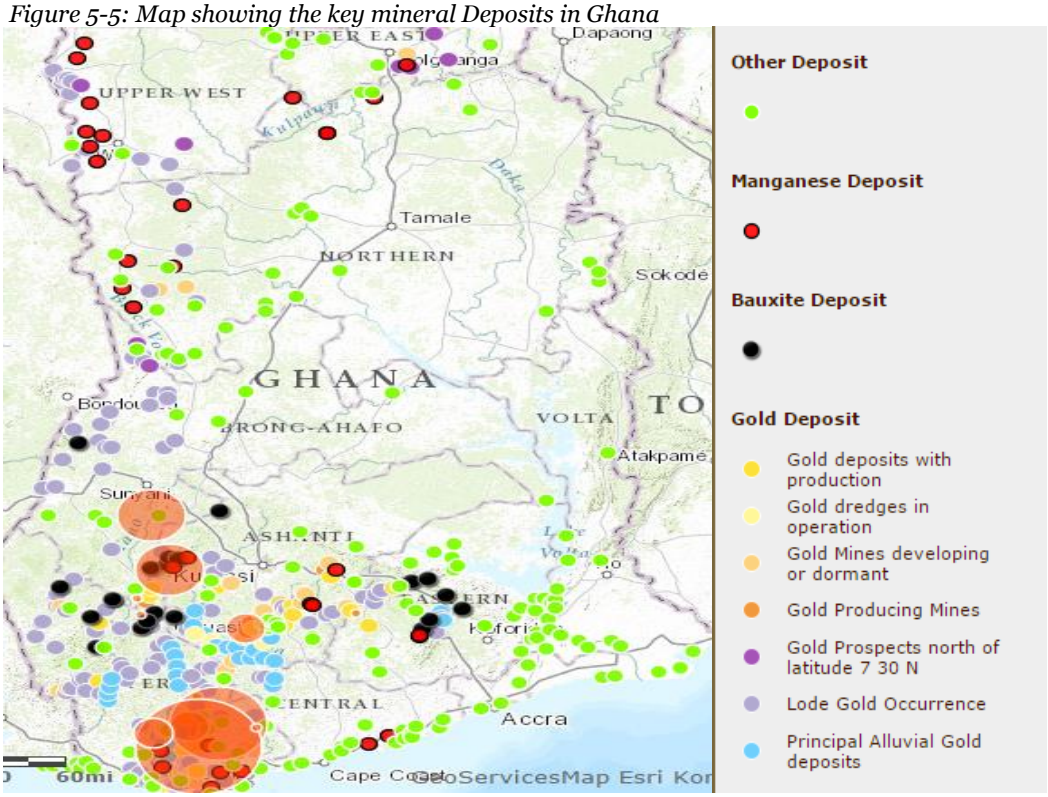
Source: Minerals Commission, Ghana

GoG's new policy concerning the use of bauxite prohibits the exportation of raw bauxite but rather requires that the ore is processed into alumina for use by local companies. Due to the high energy consumption in the industry, prospective bauxite miners in the country will be expected to provide their own means of electricity for developing the entire value chain.

Based on this regulation and the high volumes forecasted for bauxite particularly around Kibi, some of the traffic could be transported along the Eastern Corridor once exploitation commences. There is also the possibility that some of the Bauxite traffic will be transported via the Western Line to the Takoradi Port. As a result we have not included the bauxite traffic in our assessment.

Illustrated below is a map showing the key mineral deposits in Ghana.

Figure 5-5: Map showing the key mineral Deposits in Ghana



Source: CERSGIS-Centre for Remote Sensing and Geographic Information Services, University of Ghana.

5.13. Estimating Passenger Traffic Demand

5.13.1. Introduction

The passenger traffic between Accra/Tema and Kumasi on the Eastern Railway Line was estimated by undertaking road and air passenger traffic surveys along the Eastern Corridor (N6) i.e. Accra-Kumasi. The results of these surveys serve as inputs in the assessment of current passenger throughput for the estimation of the potential passenger traffic that would travel by rail.

5.13.2. Passenger Traffic Surveys

The road passenger traffic surveys were undertaken on 6th - 27th of October 2014, at the selected census stations to determine the proportion of road passengers who are likely to shift mode to rail. Surveys were undertaken at, Neoplan Station, VIP Bus Service, VVIP, Intercity STC Coaches Limited (STC), Ghana Express Transport Services and OA Travel and Tours bus terminals. Vehicle loading and occupancy counts were undertaken to determine the following:

- Bus loading and vehicle occupancy counts:
  - Bus journey times;
  - loading information;
  - Average passenger carrying capacity;
  - Travel speeds;
  - Average delays at the terminals; and
  - Average occupancy rates.

Air passenger traffic surveys were carried out at the Domestic terminals of the Kotoka International Airport and the Kumasi Airport to capture the proportion of air passenger traffic that is likely to shift mode to rail. The surveys took place on 27th May, 2015 and 1st June, 2015. Data was also collected from Ghana Airport Company Ltd (GACL). The following information was obtained from the surveys:

- Trip purpose;
- Time of day of travel;
- Frequency of travel; and
- Willingness to shift from air travel to rail and under what conditions.

5.13.3. Road Passengers Survey Results

The number of passengers currently travelling by road on the Accra-Kumasi route but willing to consider travelling by rail on the Eastern Railway Line was subsequently estimated. Currently, an estimated 2,565 passengers travel by road from Accra to Kumasi and vice versa on a daily basis. Bus fares from Kumasi to Accra and vice versa varied between transport company and bus type. The table below shows the charges for selected bus types that travel from Accra to Kumasi.

Table 5-17: Bus Types and fare charges (Accra-Kumasi)

Bus Operator	Charge (GH₵)
VVIP and VIP	30
Yutong Bus	25
GH Express	22
Mercedes Sprinter	18

The average bus fares between Accra and Kumasi was estimated to be Gh₵30.

Road passengers were interviewed to determine their willingness to shift rail if they are given fare reductions of 15%, 25% or 50%. 1,293 passengers, which represent 66% of the total road passengers interviewed expressed their willingness to consider travelling by rail from Accra to Kumasi and vice versa. The results are shown in the table below. The willingness of passengers to shift mode to rail was also dependent on a reduced travel time of 210 and 240 minutes (3 hours 30 minutes to 4 hours).

We have assumed that the median reduction in the current cost (25% reduction) of road transport is most realistic and the associated shift of 66% (1,293 passengers) has been used in the assessment.

Table 5-18: Cost Reduction Scenarios and Road Passengers' Willingness to Shift to Rail

	Cost Reduction Scenario		
Trip Purpose	**15% (Gh₵ 25.50)**	**25% (Gh₵ 22.50)**	**50% (Gh₵ 15.00)**
Accra-Kumasi	26	26	38
Kumasi-Accra	38	49	52
Both	64	75	90
Total	**128**	**150**	**180**
Percentage (%)	**57%**	**66%**	**80%**

5.13.4. Air Passenger Traffic Survey Results

In recent years, domestic aviation has gained popularity and total passenger throughput between Accra and Kumasi has maintained a steady increase from 72,898 in year 2010 to 467,629 in 2013. The years 2011 and 2012 recorded 126,337 and 365,893 respectively as passenger throughput between Accra and Kumasi only and vice versa (GACL, 2014). This upsurge poses a threat to the viability of rail transport given the level of service currently being offered as well as the speed and safety.

The results of the air passenger traffic survey combined with data received from Ghana Airport Company Limited ("GACL")was used in estimating the number of air passengers willing to shift to rail transport. On that account, we estimated that approximately 1,346 air passengers travel daily from Accra to Kumasi and vice versa.

The survey results indicated that approximately 75% and 62% of the air passengers to Kumasi and Accra respectively travel for business or official trips. The remainder travel on family visits, social trips or for leisure.

On average, it takes 40 minutes to travel by air from Accra to Kumasi and vice versa. As a result of the speed of air travel relative to other modes, businessmen and women, in particular, and passengers in general preferred it for travel between Accra and Kumasi as they were able to make round trips in the same day. This also saves passengers the additional cost of checking into hotels and guest houses overnight and make their return journey the following day. The trip purpose split is shown in the table below.

Table 5-19: Trip Purpose by Destination

Trip Purpose	To Kumasi	To Accra
Official	42%	33%
Business	33%	29%
Leisure	25%	38%
Total	**100%**	**100%**

The surveys also revealed that close to 11% of passengers travelled between one and three times a week by air transport. This consisted mainly of the business and official trips from Accra to Kumasi and surrounding towns including Obuasi, Sunyani and Techiman. Overall, about half the passengers interviewed travelled once a while to Accra and Kumasi as shown in the tables below.

Table 5-20: Frequency of travel by Trip purpose (To Accra)

	Frequency of travel				
Trip Purpose	Once a week	Once a month	2-3 times weekly	Once a while	Total
Official	0	7	2	9	18
Business	3	6	2	5	16
Leisure	0	2	1	10	13
Total	**3**	**15**	**5**	**24**	**47**
Percentage (%)	**6.4%**	**32.0%**	**10.6%**	**51.0%**	**100%**

Table 5-21: Frequency of travel by Trip purpose (To Kumasi)

	Frequency of travel					
Trip Purpose	Once a week	Once a month	Twice a month	2-3 times weekly	Once a while	Total
Official	1	5	1	2	7	16
Business	1	5	0	3	5	14
Leisure	0	5	1	0	12	18
Total	**2**	**15**	**2**	**5**	**24**	**48**
Percentage (%)	**4.2%**	**31.2%**	**4.2%**	**10.4%**	**50.0%**	**100%**

The air passenger survey results indicated that a majority of air transport passengers were not willing to shift mode from air to rail. The following were some of the reasons they outlined for not considering to travel by rail on the Eastern Railway Line when it becomes operational:

- Air travel offered a relatively lower travel time compared to rail;

- Possible delays with train;
- Reliability and convenience of railway services; and
- Unavailability of basis for comparison.

A percentage reduction in the current cost of air transport of 10%, 20%, 30% and 40% was considered. A moderate proportion, 41% of passengers interviewed were willing to consider travelling by rail when the Eastern Railway Line is operational with up to a 40% reduction in the current cost of air travel.

Currently, it costs an average of GH₵500 to make a round trip from Accra to Kumasi and vice versa. It was expected that given the percentage reduction in cost, some air travel passengers would be willing to shift modes but unanimous responses suggest a rather pessimistic view. Overall, no substantial mode shifts from air to rail travel is anticipated, however a moderate proportion will consider travelling on the Eastern Railway Line when it is operational.

5.13.5. Total Passenger Traffic to Shift to Rail Transport

From our passenger survey, 66% of road passengers expressed their willingness to consider travelling by rail from Accra to Kumasi and vice versa given up to a 25% reduction in current cost of road transport and travel time of 3hours to 4hours. 41% of air passengers interviewed were willing to consider travelling by rail when the Eastern Railway Line is operational with up to a 40% reduction in current cost of air travel.

The table below presents 2015 base year estimate for rail passenger traffic.

Table 5-22: Estimated Rail Passenger Traffic in 2015

Passenger Traffic Type	Passenger Per Day	Passengers Per Annum (365 days)	Potential Shift to Rail (%)	Potential Rail Passengers
Road	2,565	936,225	66%	617,909
Air	1,346	491,290	41%	201,429
Total	**3,911**	**1,427,515**	**N/A**	**819,338**

5.13.6. Rail Passenger Forecast

Future road and air passenger traffic forecasts have been projected based on the national population growth rate of 2.5% per annum as a strong correlation exists between annual national population and air passenger traffic along the Kumasi – Accra route.

The table below shows the projected rail passenger traffic based on the growth rate of 2.5% per annum.

Table 5-23: Forecasted Rail Passenger Traffic

2015	2018	2020	2025	2030	2040	2045	2048
819,338	882,337	927,006	1,048,822	1,186,646	1,519,007	1,718,617	1,850,762

5.14. Willingness to Pay

We conducted Institutional/Shippers surveys as discussed in the section 5.3.2 of this chapter to assess the volume of traffic that exists on the corridor as well as to determine their willingness to pay for the service on the Eastern Railway Line once it become operational.

The willingness to pay as expressed in monetary terms is an important indicator of the project's perceived benefit. It must be noted that willingness to pay has a correlation with the ability to pay. Users will be willing to pay for a very high class service that will reduce travel time, accidents, and road user costs. However the ability to pay will depend on how the benefits translate into income. Raising prices too high will deny services to shippers and maintaining needlessly low prices will perpetuate reliance on GoG and/or external donors for infrastructure development.

5.14.1. Freight Willingness to Pay

Ghana does have not have a functional freight rail system, therefore, our survey tried to make the interviewees picture a high quality Railway Line. Almost all the establishments interviewed made it very clear that they would consider the shipment of their cargo and freight by rail subject to the following conditions:

- Reduced tariffs by rail;
- Enhanced security of cargo;
- Enhanced levels of service (including hygiene); and
- Safety of the rails so that products can get to their destinations with very limited damage.

The demand survey results in the previous chapter shows that, 80% of freight companies interviewed expressed willingness to shift to rail transport given a 30% reduction compared to current road fares.

The existing road freight tariffs and the willingness to pay tariffs are shown in the table below.

Table 5-24: Existing Road and Willingness to Shift to Rail Tariffs for Freight

Commodity	Unit	Current Road Tariff (US$)	Willingness to Pay Tariff (US$) - 70% of Current Rate
Cocoa	US$ per ton.km	0.25	0.175
Cement	US$ per ton.km	0.06	0.042
Petroleum	US$ per ton.km	0.21	0.147
Bulk Cargo	US$ per ton.km	0.15	0.105
Other Cargo	US$/Tonnes/km	0.12	0.084
20 ft Container	US$ per TEU	2.26	1.75
40 ft Container	US$ per TEU	-	-

It should be noted that the willingness to shift is not dependent on the tariff reduction alone but is also dependent on the fulfilment of the conditions mentioned by the shippers in Section 5.3.4.

66% of road passengers expressed their willingness to consider travelling by rail from Accra to Kumasi and vice versa given the following:

- Up to a 25% reduction in current cost of road transport; and
- A travel time of between 3 and 4 hours.

41% of air passengers interviewed were willing to consider travelling by rail when the Eastern Railway Line is operational with up to a:

- 40% reduction in current cost of air travel.

5.14.2. Passenger Willingness to Pay

From the previous section, the passenger survey results show that 66% of road passengers expressed their willingness to pay under the conditions mentioned in Section 5.14.1.

The existing passenger tariffs and the willingness to pay tariffs are shown in the table below.

Table 5-25: Cost Reduction Scenarios and Road Passengers' Willingness to Shift to Rail

Accra-Kumasi via	Current Tariff (Gh₵)	Current Tariff (US$)	Willingness to Pay Tariff - 70% of Current Rate (US$)
Road	30	8.108	5.676
Air	500	135.135	94.595

* Assuming a cedi to dollar rate of 3.7

5.15. Competition Analysis

As part of our assessment of the willingness of shippers to shift from road to rail, we have assessed the competition between the two modes of transport.

The project presents several challenges relating to encouraging a shift from road to rail. Due to the relatively short distance between Tema and Kumasi compared to other road corridors, hub-to-hub rail will, for the majority of container customers, not be as competitive in price or time savings, as direct road when measured from origin to destination. To address this challenge the project will have to be developed around the following two key concepts to make it competitive compared to road.

- **Improved Rail Service and Interchange:** Demonstrating improvements in time in transit, acceptable tariff levels and reliability of service; and
- **Improved Container Terminal Interchange:** The intermodal terminal at Boankra must provide operational benefits to its users. The terminal layout must reduce handling costs and improve speed of access to rail. A logistics-focused property 'tenancy strategy' must be adopted. The property adjacent to the terminal must be developed in a way that is "logistics aware" attracting to terminal anchor clients who can exert influence over terminal operations, terminal expansion and the road-rail interface.

We have compared the pros and cons of road and rail using the considerations above which would influence the willingness of shippers to use the Rail Line.

Interactions with the shippers indicated that they would consider shifting to rail if the cost of the rail service is at least 70% cheaper than the cost of transporting freight via road. We have compared the cost of transporting a 20-foot container for the following scenarios in the table below:

- Tema - Kumasi via Road; and
- Tema - Boankra via Rail + Boankra - Kumasi via Road.

Table 5-26: Cost of Road and Rail for transporting a 20-foot Container from Tema to Kumasi

Scenario	Mode of Transport	Tema-Boankra			Boankra-Kumasi Central Business District			Grand Total (US$)
		Distance (km)	Cost per TEU.km (US$)	Total Cost (US$)	Distance (km)	Cost per TEU.km (US$)	Total Cost (US$)	
Scenario 1	**Road Only**	246	2.26	555.96	44	2.26	99.44	**655.40**
Scenario 2	**Combined Rail and Road**	246 (via Rail)	1.58	388.68	44 (via Road)	2.26	99.44	**488.12**

From the table above it can be seen that the cost of transporting freight from Tema-Kumasi by road only costs US$655. The costs of travelling from Tema-Boankra using the Eastern Railway Line and continuing the journey from Boankra to Kumasi via road is US$488. The cost of travelling from Tema to Kumasi via the combined modes of road and rail is cheaper than travelling via road only.

The table below summarises all the considerations, including cost in our competition analysis.

Table 5-27: Considerations for Competition Analysis

	Tema - Kumasi via Road		Tema - Boankra via Rail + Boankra - Kumasi via Road	
	Pros	**Cons**	**Pros**	**Cons**
Transport Cost	Nil	More expensive: a. US$655.40 for a 20-ft container b. 100% of existing tariffs	Less expensive: a. US$488.12 for a 20-ft container b. 70% of existing tariffs has been assumed based on Shippers Surveys.	Nil
Travel Time	Nil	Approximately 8 hours	Approximately 6 hours	Nil
Transit Time	Nil	Shorter process: a. Off-loading and clearing at Tema b. Truck to Kumasi	Longer process: a. Off-loading at Tema b. Rail to Boankra c. Clearing at Boankra d. Truck to Kumasi	Nil
Customs Processing Time	Nil	1. Existing inefficient processes with long processing times	1. Customs buy-in when designing the process 2. The port is private sector operated and funded therefore, is more likely to be efficient	Nil
Reliability	1. Unreliable journey times due to congested roads 2. Accidents 3. Vehicle breakdowns	1. The shipper has more control over the process 2. Easy communication with driver to assess the progress of the journey and give peace of mind	1. No delays due to congestion 2. Safer than road 3. Good maintenance regime because of private operator with a good track record in rail	1. Lack of control over shipment times
Efficiency	1. Inefficient with various logistics providers operating in the market	Nil	1. Operator is experienced in rail transport and will operate efficiently to ensure profit and meet KPIs	Nil
Security	1. Shipper can select a trusted freight company for peace of mind	1. Cargo can be pilfered or tampered with on the journey	1. The operator can employ a reputable security company to maintain security on the journey	1. Cargo can be pilfered or tampered with on the journey if there isn't adequate security

5.16. Competition Analysis between Accra-Kumasi Road, Alternative Roads and River Transport

We are aware that Accra-Kumasi road is the most heavily trafficked road link in Ghana particularly in the transport of freight and other commodities moving Northbound and Southbound.

Considering that a few amount of freight traffic is transported along other roads such as the Eastern Road corridor and Tema-Takoradi-Kumasi corridor, we have assessed the impact of these alternative road routes on the financial viability of both the inland Port port and Eastern railway line projects by undertaking a sensitivity analysis of an increase/decrease in traffic demand (see Chapter 14.4.3 and Appendix 11).

Currently, the Volta Lake Transport Company (VLTC) operates a fleet of passenger vessels, cargo ships and barges totalling 19 sailing vessels. The VLTC operates Pusher tugs along with cargo barges and pusher trains which can transport approximately 140 TEUs of cargo per voyage. The commodities transported on the Volta Lake include lint cotton, cotton seeds, sheanuts, cement, industrial products and general cargo.

We have assessed the impact of this Volta Lake transport on the financial viability of both the inland Port port and Eastern railway line projects by undertaking a sensitivity analysis of an increase/decrease in traffic demand (see Chapter 14.4.3 and Appendix 11).

5.17. Competition Analysis between Neighbouring Countries

As part of our efforts in estimating the total traffic volumes for the Inland Port and the Railway Line, we have assessed the competition between the Tema Port and the neighbouring ports such as Togo, Cote d'Ivoire and Benin.

The table below shows the comparison between Tema Port and the other neighbouring ports based on selected criteria.

Table 5-28: Competition Analysis between Tema Port and Neighbouring Ports

Criteria	Tema Port - Ghana	Lomé Port - Togo	Port of Abidjan - Cote d'Ivoire	Cotonou Port - Benin
Import Cost (USD) for a 20-ft container	1,360[9]	1,190	1,960	1,487
Customs Costs (USD)	335	373	751	652
Total Costs (USD)	1,695	1,563	2,711	1,487
Number of Checkpoints	4	7	4	4
Dwell Time	20 days	18 days	21 days	19 days
Security	• ISPS Approval[10] • CCTV • Container Scanning	• ISPS Approval • CCTV • Container Scanning	• ISPS Approval • CCTV • Container Scanning	N/A
Communication Barrier	Ghana is a predominantly English speaking country, therefore, communicating with Francophone people from the landlocked countries is a challenge.	Togo is a predominantly French speaking country, therefore, it is easy to communicate with fellow Francophone people from the landlocked countries	Cote d'Ivoire is a predominantly French speaking country, therefore, it is easy to communicate with fellow Francophone people from the landlocked countries	Benin is a predominantly French speaking country, therefore, it is easy to communicate with fellow Francophone people from the landlocked countries
Local Currency	GHS	CFA Franc	CFA Franc	CFA Franc

Currently, traffic to Niger has gradually moved from the Tema port to the ports in Benin. This is due to the more liberal axle loads in the neighbouring countries although it is relatively cheaper to use Tema Port as shown in the table above. Shipping through these countries is also easier for the Nigeriens due to the common languages as well as the common currency shared between Niger and Benin.

Proportions of transit traffic are also currently being moved through Cote d'Ivoire and Togo due to the relatively liberal axle load regulations in those countries.

Various factors are considered by importers when transporting freight including distance, cost, language, regulations among others and as such the preferred port for some freight transporters is often subject to the preference of a particular condition.

For example in meetings with the representatives from the Niger Shipping Council, they indicated that a reduction in costs of shipping of about 30% would likely move shipping to the ports in Ghana, despite the increased distance and stricter axle load.

[9] World Bank Group website/ http://data.worldbank.org/indicator/IC.IMP.COST.CD
[10] Africa Infrastructure Country Diagnostic

Freight movement from Tema to Burkina Faso has also diminished, again due to the shared currency and language. In moving the freight to Burkina Faso, there is also likely to be a shift if there is a reduction in transportation costs.

These dynamics are expected to have an effect on the traffic volumes for the project, this we have highlighted in our sensitivity analysis as shown in chapter 14.

5.18. Cost Assessment of the Project - with and without Boankra Inland Port Scheme

In this section, we assess the current status of freight transportation to and from the Tema Port where there is no operational Inland Port as against an arrangement where an operating Boankra Inland Port is integrated into the process for the movement of freight to and from Tema Port.

The purpose of this assessment is mainly to compare the two scenarios and to determine whether the Boankra Inland Port will be an attractive option to customers.

Currently, traffic that comes to the Tema Port is transported by road to intended destinations as soon as it is offloaded from vessels at the Tema Port and has undergone the necessary customs clearance and other procedures. Southbound traffic headed to Tema from the Northern parts of Ghana and the landlocked countries undergo processing at Tema Port upon arrival before being transported elsewhere.

With the introduction of Boankra Inland Port scheme, Northbound traffic would be transported straight to the Inland Port by road (trucks) as soon as it is offloaded from vessels at the Tema Port. Upon arrival at the Inland Port, the containers or cargo will be processed by customs and the necessary documentation approved before the freight is allowed to be transported to its final destination.

Conversely, the Southbound traffic will be handled in a similar manner. Freight from the Northern parts of Ghana and the landlocked countries will be sent directly to BIP for processing and customs clearance before it is authorised to be transported by road to Tema Port. This is described in detail in Section 3.2 of our options analysis chapter

We have further evaluated these two scenarios based on the criteria shown in the table below:

Table 5-29: Cost Assessment Criteria - with or without Boankra Inland Port Scheme

Criteria	Description
Tangible Expenses	
Tracking System	This criteria looks at the application of tracking device technology in monitoring the movement of freight because they are bonded and have to clear customs before travelling to their destination. This will also ensure safety and minimise the occurrence of diversions.
Insurance	This criteria assesses the cost of insuring freight from Tema to Boankra.
Transportation Cost	This criteria considers the cost involved in moving goods to and from their respective origins and destinations.
Checkpoints	The number of checkpoints is a key feature that is factored into the transportation of freight with regards to inspection and security checks.

The table below shows the comparison between the Tema Port and the Boankra Inland Port based on the identified parameters as shown above:

Table 5-30: Cost Assessment – Freight Transport from Tema to Boankra - With and without the Boankra Inland Port Scheme

Criteria	Without Boankra Inland Port Scheme		With Boankra Inland Port Scheme	
	Description	Cost in US$	Description	Cost in US$
Tangible Expenses				
Tracking System	A tracking system is not necessary because freight has already cleared customs at Tema Port.	N/A	A tracking system will need to be implemented when the Boankra Inland Port is operational.	50
Insurance Cost per day (e.g. for a 2013 Toyota Corolla car)	Freight and container traffic to and from the Tema Port are not insured by the Shipping Line because they either take delivery or deliver to Tema and the rest is the Shipper's responsibility.	N/A	Traffic to and from the Inland Port will be insured at 0.2% of the cost of import as quoted by the Ghana Community Network Services Limited (GC Net) (See Section 17.4.2). As an example we, have assumed that the cost of import for a Toyota Corolla car is about US$ 5,000	10
Transportation Cost for 20 ft. Container	It cost about US$ 600 to transport a 20 ft. container from Tema to Boankra (i.e. near Kumasi)	600	We have assumed that it will also cost about US$ 600 to transport a 20 ft. container to Boankra Inland port from the Tema Port	600
Checkpoints	There are currently 4 checkpoints. Truckers pay approximately US$ 0.6 per checkpoint.	2.4	We have assumed that the current number of checkpoints will apply with the proposed scheme.	2.4
Total Cost		**602.4**		**662.4**

From the results shown above, it is evident that the project with the Boankra Inland Port Scheme costs more than current arrangement given the additional expenses or costs involved in its operation thus making it is less attractive to potential customers.

For our assessment of the two scenarios, we assumed that:

- Freight movement is from Tema to Boankra and vice versa;
- The cost for the use of the tracking system was based on information obtained from GC Net. (see Chapter 21); and
- Current road characteristics remain unchanged.

5.19. Findings and Suggestions

The outcome from our assessment above shows that the Boankra Inland Port scheme for freight and container transportation costs more than the current Tema Port arrangement. Government through its implementing agencies (i.e. GPHA/GSA) in pursuing the development of the Boankra Inland Port with road connection would have to implement certain policies or subsidy measures to make the cost for using the Inland Port lower or the same as the costs for using Tema Port to make this option more attractive to customers.

Some of the policies or measures could include:

- Subsidising the transportation cost of trucking companies upon negotiations with them;
- Waiving all port entry tolls on trucks transporting freight to and from the Boankra Inland Port;
- Waiving all road tolls for trucks going to and from the Boankra Inland Port; and
- Ensuring shipping lines and shipping companies issue Through Bills of Lading, with Boankra Inland Port as the Port of Discharge as well as with the Electronic Tracking of freight to make sure cargo and sea freight containers are not diverted. This will ensure security of freight and make the Inland Port more attractive to shippers.

6. Current Tariff Regime

6. Tariff Regime

6.1. Introduction

This chapter highlights the port and rail tariffs and sets out the existing tariffs for ports and railway operations in Ghana. We have also proposed tariffs which would be applicable to the Eastern Railway Line.

6.2. Tariff Regime for Port Operations

As per PNDCL 160 under GPHA Act (1986), GPHA within the limits fixed by the Minister can prescribe rates, charges and dues for services provided by the Authority or specify the persons liable to pay the rates, charges and dues prescribed under section 75. Therefore, GPHA currently sets tariffs at ports in Ghana and would be responsible for setting the tariffs at the Inland Port.

The tariff regime currently being implemented by the GPHA are shown in Tables 6-1 to 6-6 below

Table 6-1: Current Handling Charges for Containers

Tariff	Current Rate (GH¢ per Unit)
Lift-On- Lift Off of Container (20ft full)	38.50
Shore Handling Charges (20ft)	139.30
Opening of containers (20ft)	58.50
Lift-On- Lift Off of Container (40ft full)	77.00
Shore Handling Charges (40ft)	279.00
Opening of containers (40ft)	58.50

Source: Tema Port Tariff Guide 2014

Table 6-2: Current Average transfer Charges for Containers

Tariff	Current Rate (GH¢ per Unit)
20ft full transfer to/from ICD	100.00
20ft Empty transfer to/from ICD	41.50
40ft full transfer to/from ICD	100.00
40ft Empty transfer to/from ICD	71.00

Source: Tema Port Tariff Guide 2014

Table 6-3: Current Storage Charges Containers

Tariff	Current Rate (GH¢ per Unit)
20ft empty/full first 7 days per day	6.00
20ft empty/full next 7 days per day	11.50
20ft empty/full after 14 days per day	34.00
40ft empty/full first 7 days per day	12.00
40ft empty/full next 7 days per day	23.00
40ft empty/full after 14 days per day	68.00

Source: Tema Port Tariff Guide 2014

Table 6-4: Current Storage Charges for Dry Bulk

Tariff	Current Rate (GH¢ per ton)
Dry Bulk first 7 days per ton per day	1.00
Dry Bulk next 7 days per ton per day	1.50
Dry Bulk after 14 days per ton per day	2.50

Source: Tema Port Tariff Guide 2014

Table 6-5: Current Port Dues Tariff

Tariff	Current Rate (US$ per unit)
20ft full	45.00
20ft empty	23.00
40ft full	83.50
40ft empty	42.00

Source: Tema Port Tariff Guide 2014

Table 6-6: Other current Port Charges

Tariff	Unit	Current Rate
ISPS Charges Full (20/40)	Per TEU GH¢	14.00
ISPS Charges empty (20/40)	Per TEU GH¢	9.00
Parking charges		

Source: Tema Port Tariff Guide 2014

6.3. Tariff Regime for Railway Operations

Railway operation in Ghana is governed by the Railways Act, 2008 (Act 779) hereinafter (the "Act"). Act 779 established the Ghana Railway Development Authority (GDRA) as the statutory body with responsibility to regulate and approve tariffs of railway companies.

By section 65 of Act 779, a concessionaire is required to provide the following minimum information to be included in tariffs:

- A statement of the rates for designated unit of weight or volume for each type of freight;
- The service rendered;
- The date of issuance, commencement and expiration of the tariff;
- Terms and conditions of the tariff or an explanation with reference to where the terms and conditions can be found;
- The rates for each passenger;
- A brief description of the category of traffic that is transported; and
- An explanation of the symbols or abbreviations used in the tariff.

Railway companies are also required under Act 779 to publish and display their tariffs in a prominent manner at its offices and railway stations. Further, they are to keep record of copies of their tariffs up to three (3) years after cancellation.

Where a concessionaire intends to increase tariffs they must adhere to the following:

- Publish a notice of the increase at least twenty-one (21) days before the effective date of the increase; and
- Display the increased tariff in conspicuous writing and in a prominent manner in a public place at the offices and railway stations of the company.

Where a shipper requests for a tariff in relation to movement of traffic on the company's railway lines, the company shall issue a tariff no less than thirty (30) days following the request. In the event that traffic would be continuous on the same route and that portion of the route are operated by two or more railway companies, the companies are required to agree a joint tariff for that continuous route. In circumstances where a shipper provides its own railway equipment for the carriage by a concessionaire of the shipper's traffic, the established tariff, on request by the shipper, must be reduced by way of compensation as a set-off against the specific provision of the railway equipment by the shipper.

A concessionaire is authorised under Act 779, to enter into a contract to keep confidential the rates that are being charged by the concessionaire for the carriage of traffic to a specific shipper. These contracts can provide for reductions, allowances or rebates of rates of tariffs that has been approved, issued and published in accordance with Act 779. These contracts can also be in relation to conditions of traffic to be moved by the concessionaire and the manner by which the concessionaire fulfils its service and/or obligations under the contract.

Although, discrimination by the concessionaire between shippers as regards rates and conditions of service is prohibited under Act 779, a concessionaire may implement policies that differentiate shippers or classes of shippers on the basis of the volume or value of goods shipped or on any basis that is generally accepted by commerce and industry.

It is important to note that prior to increasing tariffs rates, approval would have to be sought from the regulator, the Ghana Railway Development Authority.

Table 6-7 below shows the existing rail and road tariff.

Table 6-7: Existing Tariffs by Road and Rail

Commodity	Unit	Current Road Tariff (US$)	Current Rail Tariff (US$)
Cocoa	US$ per ton.km	0.25	-
Cement	US$ per ton.km	0.06	-
Petroleum	US$ per ton.km	0.21	-
Bulk Cargo	US$ per ton.km	0.15	-
Other Cargo	US$/Tonnes/km	0.12	-
20 ft Container	US$ per TEU	2.26	-
40 ft Container	US$ per TEU	-	-
Passenger	US$ per km	0.03	0.02

* Rate charged is per TEU of 20/40ft Container

** Rate is per passenger per km

The existing tariff is not high enough to cover passenger railway service costs and would require a subsidy from GoG or cross-subsidy between freight and passengers.

7. Conceptual Design and Cost Estimates of the Boankra Inland Port Project

7. Conceptual Design and Cost Estimates for the Boankra Inland Port Project

7.1. Introduction

This chapter highlights the assumptions we have considered for developing the Standalone Inland Port, and outlines the conceptual design of the Inland Port site. The conceptual design of the port includes the proposed layout, associated area requirements for each facility and the equipment required for the port. We have also estimated the cost associated with implementing the proposed design. Our proposed layout showing these facilities on the Inland Port is included in Appendix 3 of this report.

7.2. Assumptions for Developing Boankra Inland Port

In the interim, we have considered the assumptions below in developing the Boankra Inland Port ("BIP") with road connection.

- Customs and shipping line services will be at BIP;
- The unimodal terminal (road-road) at Boankra will be an alternative until the period where the railway line is upgraded/constructed;
- Trucking licenses/contract agreements will be issued to qualified and credible companies on a competitive basis who can meet customs bonding specifications requirements to transport cargo/container between Tema port and Boankra Inland Port.
- The northbound traffic and transit cargo/container will be transported straight to BIP Port by road as soon as it is offloaded from vessels at the Tema Port;
- Southbound traffic from the northern parts of Ghana and neighbouring land-locked countries will be sent directly to BIP for processing and customs documentation before it is authorised to be transported by road to the Tema Port;
- All containers or cargo will be processed by customs and the necessary documentation approved before the freight is allowed to be transported to its final destination;

Generally, the use of unimodal road-road terminals depends on bridging a congestion or regulatory issue and its success can be fleeting unless it is able to find a viable value added service to remain attractive to road hauliers. The long term survival of BIP may well be derived from its eventual ability to integrate into the Eastern Railway line so it can provide meaningful value add to its clients.

7.3. Driving Forces to Establish a Terminal

Most of the unimodal terminals in sub-Saharan Africa have developed due to a market or regulatory requirement that needed to be satisfied.

The long term future of these terminals in many ways was only guaranteed while the need was being satisfied.

Generally, terminal operators have either looked at short term gains or have looked longer term to gravitate to an intermodal model which would include rail access too. This concept would allow the terminal to participate in the relatively more cost effective rail movement over longer distance while retaining client flexibility by delivering cargo/containers by road over short distances.

The factors that drove the early development of unimodal terminals include:

- Providing value added services in the dry port, including customs services, container turn-in and warehousing;
- Be utilised as a location where containers can be moved to from a congested sea port, so that the container does not incur excessive storage charges;
- A trans-shipment point near a congested border post so as to allow capital intensive road vehicles the opportunity to leave cargo for an older road vehicle to complete the short haul to a final destination. In this case it is important that the savings on the transport leg be greater than the extra costs incurred for handling the cargo and storing it at the terminal. This is especially applicable close to a congested border post with final destination being a relatively short distance into the country of destination; and
- A regulatory drive by government whereby road hauliers are forced to utilise the unimodal dry port for customs inspections and final clearance. This is to prevent possible diversions of bonded cargo into the local market, prior to finalising the customs payment.

7.4. Proposed Layout

Based on our assessment of traffic demand, as set out in Chapter 5 of this report, we do not believe that there will be an immediate need to develop all the facilities upfront and that the development can be phased to meet demand as it builds up. This will also have the benefit of minimising the upfront investment required.

We have therefore proposed a two phased development of BIP. Based on the forecast traffic demand, the total area that we have estimated for the first phase is approximately 64 acres for the Standalone Inland Port feeding traffic from road traffic only.

The proposed key development features for Phase 1 are:

- A road network consisting of the main access road and a primary road that connects the main access road to the Commercial and Port Administration Zone;
- Buildings i.e. Container Service Yard, Warehouses, Commercial Complex and Administration Complex and Fuel Station;
- Equipment Storage Area;
- Customs Bonded Area;
- Services such as electric power lines, water lines, sewage and drainage systems; and
- Parking areas for trucks.

7.4.1. Commercial Complex

The commercial complex at BIP will have office space to accommodate third party and fourth party logistics companies and agencies that are involved with other import and export companies within the proximity of the dry port. It will also include secondary business services such as banking, insurance and currency exchange.

7.4.2. Administration Complex

The administration complex which already exists will consist of offices composed of the Terminal Management Company ("TMC"), the Customs Division of GRA, security services, other regulatory agencies and an Information Technology Centre ("ITC"). Additionally, there will be shipping line companies, Carry and Forwarding ("C&F") agents, a post office, a staff canteen, a convenience store block, and facilities centre (including a call centre, photocopy/ document scanning, etc.).

7.4.3. Container Service Yard

The container service yard will consist of an area for stacking export containers prior to dispatch. The import containers will be stored in a designated area until customs clearance. Loaded containers are stored for relatively short periods, whilst waiting for onward transportation, whilst empty containers may be stored for longer periods awaiting their next use.

7.4.4. Warehouses

Warehouses for storing goods for importers, exporters and transport operators will also be at the site.

7.4.5. Customs Bonded Area

The customs bonded estate, the largest area at BIP, will be fenced off entirely. The customs gate, providing access to the bonded estate, will be conveniently located along the main access road. All bonded activities will be concentrated in one area instead of creating several separate bonded pockets in a generally non-bonded Inland Port.

7.4.6. Parking Area for Trucks

The parking area for trucks is solely an area for the parking of trucks, trailers delivering goods, picking up goods or transiting. The parking area requires enough parking space for empty trucks awaiting the arrival of the appropriate cargo or completion of procedures before unloading container or cargo.

7.5. Area Requirements

The area required for each facility below was based on the traffic forecast, dwell time of containers/cargo, and the amount of space for equipment to maneuverer. The estimated area required for each facility is shown in Table 7-1 below.

Table 7-1: Area Assessment for the Inland Port

Facility	Area (Acres)
Container Yard Area	12
Empty Yard Area	4.5
CFS Area	10
Warehouse Area	13.5
Truck Parking Area	9
Commercial Complex	5.2
Utility Zone	4
Equipment Storage Zone	2
Fuel Station	1
Other Services (Post Office, Telecom, Security office and Fire Station)	0.5
Container Services Yard (Cleaning, Repair, Disinfection)	1.6
Truckers' facilities	1
Total (Acres)	**64.3**

7.6. Estimated Project Cost

We have estimated the costs of the infrastructure and equipment required at BIP and these are discussed in the following subsections.

7.6.1. Building Costs

Based on our proposed layout, we have estimated the total construction cost of the buildings at BIP to be US$ 77.5 million. This estimate is based on unit prices/rates of similar expansion works at the Takoradi port. The breakdown of the cost is shown in Table 7-2 below.

Table 7-2: Estimated Construction Cost of Proposed Buildings and Other Facilities at Inland Port

Particulars	Area (Acres)	Actual (sq. metre)	US $/Sqm	Construction cost (US$ million)
Container Yard Area	12	48,000	100	4.8
Empty Yard Area	4.5	18,000	100	1.8
CFS Area	10.0	40,000	500	20.0
Warehouse Area + Packaging/Labeling+ Cold Storage	13.5	54,000	500	27.0
Truck Parking Area	9.0	36,000	70	2.5
Commercial Complex	5.2	20,875	660	13.8
Utility Zone	4.0	16,000	70	1.1
Equipment Storage Zone	2.0	8,000	70	0.6
Fuel Station	1.0	4,000	70	0.3
Other Services(Post Office, Telecom, Security office and Fire Station)	0.5	2,000	500	1.0
Container Services Yard (Cleaning, Repair, Disinfection)	1.6	6,500	400	2.6
Truckers' facilities	1.0	4,000	500	2.0
Total	**64.3**	**209,375**		**77.5**

7.6.2. Equipment Costs

Some of the key equipment for handling containers/cargo are:

- **Forklift trucks -** A forklift truck is capable of stacking/unstacking only one row and up to 4 containers high;
- **Reach stacker** - Reach stackers are capable of stacking between 2 and 3 rows and capable of stacking up to 4 containers high;
- **Rubber Tyre Gantry System (RTG)** - These are container handling machines that move on tyres and are capable of stacking up to 8 containers wide and 4 containers high;

Based on prevailing industry rates from Kalmar Global Ltd of Finland and Ashbee Systems PvT Ltd of India, we have estimated the total equipment cost to be US$ 16.4 million. The number of equipment we are proposing is based on the traffic demand anticipated to use the port.

Table 7-3: Estimate of Inland Port Equipment Cost

Equipment	Unit Cost (US $)	Quantity	Cost (US$ million)
Warehouse Forklifts*	40,000	3	0.1
Reach Stackers (45 Tonne)	620,000	8	5.0
Trailer Heads	60,000	19	1.1
Container Fork Lift (Tele Truck - 3.5 Tonnes)	140,000	19	2.7
Container Fork Lift (Tele Truck - 10 Tonnes)	320,000	2	0.6
Container Fork Lift (Tele Truck - 16 Tonnes)	340,000	2	0.9
Rubber Tyred Gantry (RTG)	2,000,000	2	4.0
Empty Container Handlers (ECHs) - 10 Tonnes	380,000	2	0.8
Weigh Bridge	30,000	4	0.1
Trailers	60,000	19	1.1
Total			**16.4**

7.7. Total Estimated Capital Expenditure

Based on our analysis above, our overall estimate of the capital expenditure required to develop and operate BIP is as summarised in Table 7-4.

Table 7-4: Estimated Capital Expenditure for the Inland Port

Particulars	Amount (US$ Million)
Building Costs	77.5
Equipment Costs	16.4
Core Infrastructure(Power, road, IT, water, sewage)	10.0
Sub Total (EPC)	103.9
Contingency 15% of EPC*	15.6
Total Project Cost	**119.5**

*Contingency @ 15% EPC -This is to cover any extra work by the contractor

7.8. Total Estimated Operations and Maintenance Costs

In addition to capital expenditure, the operation and maintenance costs will be incurred in the course of the project. These costs include employee salaries, administrative costs, fuel and energy costs etc. These costs were based on the following assumptions:

- Total operational hour per equipment
- Standard maintenance cost per hour per equipment.
- Number of equipment in use

7.8.1. Operations Costs

The annual salaries and the personnel required to manage and operate the port was based on our discussions with various stakeholders.

Table 7-5: Payroll Expenses for Support Staff

Employee/Labour	Base Salary (US$)	No. of Employees	Estimated Total Salary (US$) Million
Manager	100,000	1	0.100
General Manager	80,000	1	0.080
Finance and administration	40,000	1	0.040
Accounts clerk	13,000	2	0.026
Internal Audit Personnel	13,000	1	0.013
Warehouse Manager	30,000	1	0.030
Supervisors	17,000	3	0.051
Administrative clerks	13,000	2	0.026
Security	5,650	2	0.011
Operational Clerks	13,000	2	0.026
IT Unit Officers	30,000	1	0.030

Employee/Labour	Base Salary (US$)	No. of Employees	Estimated Total Salary (US$) Million
IT Unit Clerks	13,000	2	0.026
Drivers (buses)	10,000	2	0.020
Drivers (pick-ups)	10,000	6	0.060
Engineering Manager	40,000	1	0.040
Engineering Officer	30,000	1	0.030
Mechanical Engineers	13,000	1	0.013
Civil Engineers	13,000	1	0.013
Electrical Engineers	13,000	1	0.013
Sub-Total		32	**0.648**

Table 7-6: Payroll Expenses for Equipment Operators/Staff

Employee/Labour Per Equipment	Base Salary (US$)	No. of Employees	Total Salary US$ Million
Warehouse Forklifts*	10,000	3	0.030
Reach Stackers (45 Tonnes)	20,000	14	0.280
Trailer Heads	10,000	18	0.180
Container Fork Lift (Tele Truck - 3.5 Tonnes)	10,000	14	0.140
Container Fork Lift (Tele Truck - 10 Tonnes)	10,000	2	0.020
Container Fork Lift (Tele Truck - 16 Tonnes)	10,000	2	0.020
RTGs	20,000	4	0.080
Empty Container Handlers (ECHs) - 10 Tonnes	10,000	2	0.020
Weigh Bridge	10,000	4	0.040
Sub-Total		**63**	**0.810**

Table 7-7 below indicates our estimates of Fuel/Energy costs on an annual basis. The fuel consumption was based on the following:

- Diesel fuel cost of 1.22 US$ per litre and electricity tariff of 0.06 US$ per Kilowatt hour (rates as at 2015 in Ghana).
- Effective operating hours/days per equipment
- Maximum number of shifts per equipment

Table 7-7: Operating Costs – Fuel/Energy Expense

Fuel Consumption	Cost of fuel per year (US$ Million)
Warehouse Forklifts	0.019
Reach Stackers (45 Tonnes)	0.059
Trailer Heads	0.019
Container Fork Lift (Tele Truck - 3.5 Tonnes)	0.015
Container Fork Lift (Tele Truck - 10 Tonnes)	0.017
Container Fork Lift (Tele Truck - 16 Tonnes)	0.019
RTGs	0.033
Empty Container Handlers (ECHs) - 10 Tonnes	0.027
Sub-Total	**0.209**

Table 7-8: Overall Operations Cost

Operating Costs	Average per year (US$) Million
Payroll Expenses Support Staff	0.648
Payroll Expenses Equipment Operators/Staff	0.810
Fuel/Energy Expenses	0.209
Total Operation Cost	**1.667**

7.8.2. Maintenance Costs

Table 7-9 below indicates our initial cost estimates for the maintenance of equipment, vehicles and infrastructure. Our maintenance cost was based on the following:

- Total operational hour per equipment;
- Number of equipment in use;
- Operation and maintenance escalation factor of 2%;
- Useful life and depreciation per equipment; and
- Standard maintenance cost per hour per equipment.

Table 7-9: Equipment and Vehicles Maintenance Costs

Maintenance Cost	Average per year (US$) Million
Warehouse Forklifts*	0.007
Reach Stackers (45 Tonnes)	0.117
Trailer Heads	0.089
Container Fork Lift (Tele Truck - 3.5 Tonnes)	0.079
Container Fork Lift (Tele Truck - 10 Tonnes)	0.005
Container Fork Lift (Tele Truck - 16 Tonnes)	0.005
RTGs	0.042

Maintenance Cost	Average per year (US$) Million
Empty Container Handlers (ECHs) - 10 Tonnes	0.020
Weigh Bridge	0.030
Sub-Total Maintenance Expenses-Vehicles and Equipment	**0.394**

The total maintenance cost of the equipment, buildings and infrastructure at the Inland Port is estimated to be approximately US$ 645,000 per year and the breakdown is shown in Table 7-10 below.

Table 7-10: Overall Maintenance Cost

Maintenance Costs	Estimated Average (Per Year) US$ Million
Maintenance Expenses-Infrastructure	0.250
Maintenance Expense- Equipment	0.394
Total Maintenance Cost	**0.644**

8. Conceptual Design and Cost Estimates of the Eastern Railway Line

8. Conceptual Design and Cost Estimates for the Eastern Railway Line

8.1. Introduction

This chapter sets out the surveys we carried out, the alignments developed, designs and project cost estimated for the Eastern Railway Line. Based on our Terms of Reference ("ToR") we assessed both passenger and freight services in our design but then our financial and options analyses chapters considers them separately as well as combined.

8.2. Surveys and Investigations

We undertook multiple surveys and investigations along the alignment to establish the feasibility of constructing the Eastern Railway Line and these are:

- Topographical Survey;
- Geology and Soil Investigation; and
- Hydrology Survey.

8.2.1. Topography

The objective of a topographical survey is to understand the physical features of the terrain on which to develop the design.

Based on our site visits and satellite imagery, the terrain of the existing alignment consists of narrow coastal plains, alternate stretches of hills and grassland. Starting from coastal plains at Accra, the alignment is a rolling terrain with scattered hillocks of small to moderate height up to Kumasi. Generally, the topography is undulating.

In order to obtain the topographical map for the project area, we undertook ground levels/spot heights along the proposed alignment and also undertook cross section surveys with corresponding spot heights, surveyed existing bridges, houses and provided further details of location of new bridges etc.

8.2.2. Geology and Soil Investigations

The aim of our geological and geotechnical investigations was to acquire information on characteristics of bearing rocks and soil conditions of the areas along the railway corridor.

We undertook field investigations to obtain ground data to facilitate the design of pavements and structures which includes bridges, tunnels and drainage structures.

Specifically, our site investigations were undertaken to obtain ground conditions on the following drainage structures and construction materials:

- Bridges and tunnels;
- Culverts, drainage structures and swampy areas;
- Subgrade materials; and
- Construction materials.

8.2.3. Hydrological Survey

We have undertaken hydrological investigations of the existing drainage structures and also proposed new structures. We observed that there are streams that cross the existing alignment and these streams dry up during the dry season.

8.3. Key Considerations for Selection of Railway Alignment

In order to minimise the project cost, we considered the following guidelines in reviewing and selecting an alignment for the Eastern Railway Line:

- Avoid geologically unstable formations, mineral parcels, national parks, archeologically sensitive areas to the extent possible;
- Avoid long tunnels and viaducts to the extent possible
- Avoid infringement of built-up areas to the extent possible
- Avoid infringement of religious sites, graveyards etc.
- Provide yards and stations at locations for easy access by users
- Provide adequate clearance from Highest Flood Levels (HFL)
- Provide drainage works as required
- Provide crossings for animals at suitable locations
- Balance cut and fills (i.e. earthworks) so that suitable cut would be used for adjacent fills
- Minimise environmental pollution;
- Provide curvature and gradient suitable for the design speed
- Follow sound engineering practice.

Based on the above guidelines, we have considered three alignments for the railway line. These alignments are as follows:

4. Option 1/Minimum – This alignment considers the minimum specifications. The design speed we adopted was 80km/hour for freight /container and a horizontal curve up to 360m
5. Option 2/Desirable – This option meets the desirable specifications. The design speed for container was 100km/hour and for other freight is 80km/hour and has a horizontal curve up to 680m
6. Option 3/Ideal – This option meets the ideal design specifications. The design speed we adopted for freight / container is 120km/hour and has a horizontal curve up to 1,200m

Table 8-1: Detailed Sections of Alignments

Section	Rail Section	Existing Distance	Option 1	Option 2	Option 3
1	Accra-Achimota	0km-7.2km	The proposed alignment follows the existing alignment	Same as Option 1	Same as Option 1
2	Tema – Achimota (Branch Line)	23 km	The proposed alignment follows the existing alignment	Realignment of Achimota approach	Same as Option 2
2	Achimota-Kotoku – Nsawam	7.2km-31.4km-40.6km	The proposed alignment follows the existing alignment	A straight tunnel of approximately 2 km is proposed between Dome and Amasaman in order to avoid very steep gradients, sharp curves and demolition of permanent structures in this built up area.	Same as Option 2
3	Nsawam – Koforidua	40.6km-80.1km	The proposed alignment follows the existing alignment	The existing alignment between Nsawam and Mangoase was maintained but the alignment from Mangoase to Koforidua (i.e. 11km) was realigned starting from Mangoase Station such that the proposed alignment gradually follows the higher contours with much milder gradient and without the need for either a tunnel or viaduct. This would involve bypassing both existing Mangoase and Asuoya stations and rebuilding new stations	Same as Option 2 But the existing alignment between Nsawam and Mangoase was re-aligned to avoid sharp curves
4	Koforidua-Nkawkaw	80.1km-173.5km	The proposed alignment follows the existing alignment. Koforidua City Centre was maintained for both freight and passenger traffic;	The existing alignment between Koforidua and Nkawkaw was re-aligned to avoid steep gradients and sharp curves. However, the alignment at Koforidua City Centre was maintained for passenger traffic only. In addition we have also proposed a new alignment/Bypass at Koforidua for freight traffic only.	Same as Option 2
5	Nkawkaw-Ejisu	173.5km-282.5km	The proposed alignment follows the existing alignment	The existing alignment between Nkawkaw and Ejisu was re-aligned in order to straighten the sharp curves and steep gradients. In addition, building structures	Same as Option 2

Section	Rail Section	Existing Distance	Option 1	Option 2	Option 3
				within the Right of Way were removed.	
6	Ejisu-Kumasi	282.5km-303.9km	The proposed alignment follows the existing alignment	Same as Option 1	Same as Option 1
	Length of Alignment (Km)	326.9	325.5	317.4	312.5
	Total Cost		**$1173 million**	**$1380 million**	**$1670 million**

Using the best-value least-cost approach, we have recommended Option 2 as the preferred alignment option to be taken forward at detailed design stage (See Appendix 4 for our proposed alignment design).

One of the goals of the Economic Community of West Africa States ("ECOWAS") is the development of an integrated rail network between member countries. ECOWAS aims include the extension of railways in member countries, the interconnection of previously isolated railways and the standardisation of gauge, brakes, couplings, and other parameters. Thus, a standard gauge is being adopted for the region. This is because standard gauge railway lines with matching rolling stocks are widely being used around the world than the other types of gauges such as narrow gauge and cape gauge. It is also widely used because of less maintenance cost.

Based on the above plan, GoG/MoT/GRDA have adopted the Railway Master Plan of December 2013 ("Railway Master Plan") prepared by TEAM Engineering Ltd on behalf of GRDA. The Railway Master Plan has certain specifications and requirements for designing, the formation, alignment, structures, stations and tracks for a standard gauge line.

The key standards that we have used for the concept design of the Eastern Railway Line are shown in Table 8-2 below. The detailed specifications per the Railway Master Plan are included in Appendix 5 of this report.

Table 8-2: Design Standards Adopted

Description	Technical Features as per Railway Masterplan
Gauge:	• Standard Gauge 1,435 mm (4 ft 8 ½ in)
Design Speed	• Passenger nominal speed Velocity = 120km/h • Freight Speed: Velocity = 80km/h • Special Container flats: Velocity = 100km/h
Minimum Horizontal Curve Radius	• Min. without any constraint of RoW = 680m • Min. in populated with line within available RoW = 460m • 3 or 4 obligatory points through Koforidua with limited radius = 350 m
Minimum rising and falling gradient/Ruling Gradient	• Ruling gradient proposed is 1 in 100 compensated, so as to ensure that even on continuous rising gradients, reasonable speeds are maintained without the need for a pusher engine
Axle Load	• Considering mixed traffic on the proposed line, an axle load of 21 tonnes has been proposed.
Minimum length of Vertical Elements	• Minimum distance between adjacent Vertical Intersection Points (VIPs) has been restricted to Vmax/2.5 or 100m, whichever is more in the design
Vertical Curves	• We have proposed a circular curve with a minimum radius of 2500metres
Yard Gradient	• The gradient in the yards has been kept as flat as possible, however, for line passing through hills, sharper limiting gradient of 1:400 has been adopted
Rail Pads	• We have proposed to use rail pads of high stiffness having a thickness of 10mm
Points and Crossings	• Points and crossings will be 1 in 12 on main running lines and 1 in 9 for loops and service tracks
Rails	• UIC 60 (with weight of 60 kg/m) rail section as per UIC 860 specification has been proposed with Pre-Stressed concrete (PSC) sleepers • Continuously Welded Rails (CWR) on the main line track and Long Welded Rails (LWR) on loop lines
Sleepers	• Mono-block Pre Stressed Concrete (“PSC”) Sleepers with nominal length of 2.52m and nominal depth of 200mm have been proposed
Fastenings	• Pandrol Fastening System is proposed for the Eastern Railway Line
Ballast	• We have proposed a minimum of 300mm deep cushion of crushed stone of 65mm nominal size

8.4. Alignment Design Methodology

The objective of a design is to assist in estimating the total project cost.

We traced the existing rail alignment on satellite imagery provided by 'Google Earth Pro' using the Geographic Information System ("GIS") software 'Global Mapper' in order to have an idea of the terrain. The Global Mapper was then used to produce a Digital Elevation Model (DEM) (i.e. a 3D representation of the project area). This model was then used as the basis for the design of the proposed railway alignment.

In order to validate the alignment, we used data from GRDA/Lands Commission and these are:

- Topography sheets of the project area with some indication of existing railway line;
- Old track diagrams for the Accra-Kumasi portion;
- List of culverts;
- List of Bridges; and
- List of curves.

We also undertook ground levels/spot heights at locations where the proposed alignment has shifted from the existing alignment.

With the help of the above data, the horizontal alignment which defines the route/path of the track was designed by considering the following parameters:

- Radius of Circular Curve;
- Minimum Radius for Mixed Traffic;
- Actual Cant;
- Cant Deficiency;
- Cant Excess;
- Rate of Change of Cant Deficiency;
- Rate of Change of Cant;
- Length of Transition Curve;
- Shape of Transition Curve; and
- Straights between adjacent curves

Similarly, the vertical alignment which defines the elevation (i.e. rise and fall) of the track was designed using a circular curve with a minimum radius of 2,500 metres

We also carried out preliminary designs for pavement, drainage, track work and signaling and communications.

8.5. Project Cost for Freight Service

The scope of works for the Eastern Railway Line project comprises:

- Approximately 25.8 million cubic metres of earthworks;
- 447 bridges, 30km of retaining wall and tunnel of 4.8km;
- 331 km of track works including a branch line from Tema to Achimota of 23km and Koforidua bypass of 13.6km ;
- Signalling & Telecommunications comprising 24 Core fibre optic cables, a radio communication system and Centralised Traffic Control (CTC), with Cab Signalling and Automatic Train Stop etc.;
- Railway stations, workshops with facilities for maintenance of locomotives and wagons; and
- Terminal facilities at Tema and Kumasi

Based on the above scope of work, capital expenditure of the Eastern Railway line project cost capital is made up of the following:

- Infrastructure;
- Resettlement and land acquisition;
- Rolling stock; and
- Other freight facilities (Terminals, signaling & telecommunications, sidings, maintenance facilities).

The total Infrastructure cost for developing the Eastern Railway Line for freight only is made up civil cost and infrastructure facilities above and is estimated at US$ 1.4 billion as seen below.

The summary of the total project costs for capital expenditure of the Eastern Railway Line is seen in the table below:

Table 8-3: Summary of Total Project Cost

Description	Total Cost (Millions)
Rail Infrastructure (i.e. Earthworks, Bridges & Track work)	641.2
Relocation, Resettlement and Land Acquisition	151.3
Rolling Stock for freight	52.2
Other Freight Facilities (Terminals, Signalling & Telecommunications, Sidings, Maintenance Facilities, Other)	354.4
15% Contingency	179.8
Total	**1378.9**

*Contingency @ 15% on EPC Cost is to cover any extra work from earthwork contractor, track work contractor, bridgework contractor and signaling contractor.

8.5.1. Rail Infrastructure Cost

Based on quantities estimated from the design and the rates used in the Western Railway Line project prepared by TEAM Engineering Ltd, we estimated the construction cost for the earthworks, drainage works and track work below. A detailed cost breakdown is included in Appendix 6 of this report.

Table 8-4: Construction Cost Breakdown

Civil Works					
Sections	**Length**	**Cost of Earth Works (US$ Million)**	**Structural Engineering Works Bridges, Retaining Wall and Tunnels (US$ Million)**	**Cost of Track work/ Permanent Way (US$ Million)**	**Sub Total (US$ Million)**
Accra-Achimota	7.2	0.3	0.1	4.1	**4.5**
Tema-Achimota	23	0	0.9	13.3	**14.2**
Achimota-Kotoku	22.9	7.8	21.3	13.2	**42.3**
Kotoku-Nsawam	9.7	2.7	0.5	5.62	**8.8**
Nsawam-Koforidua	40.2	35.1	68.2	23.2	**126.5**
Koforidua Bypass	13.6	2.5	0.9	5.9	**9.3**
Koforidua – Nkawkaw	89.2	59.5	19.8	51.6	**130.9**
Nkawkaw-Ejisu	104.7	63.7	111.2	60.6	**235.5**
Ejisu-Kumasi	20.5	20.2	37.2	11.8	**69.2**
Total	**331**	**191.8**	**260.1**	**189.3**	**641.2**

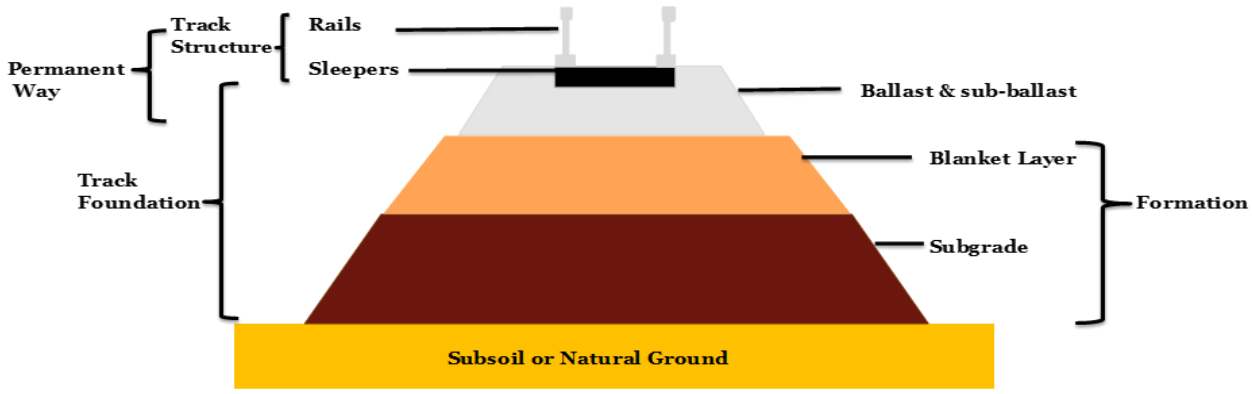
Bridge Works

The proposed bridges for the Eastern Railway Line project are included in Appendix 7 of this report.

Typical Track Work

The Railway Track Structure comprises of the permanent way and formation. The permanent way is made up of the rails, sleepers and ballasts whilst the formation is made up of the blanket and sub-grade. A typical railway track is shown in the Figure 9.1 below.

Figure 8-1 Typical Cross-Section of Railway Track



8.5.2. Other Freight Facilities

We have also separately estimated the cost of the infrastructure facilities that would be required during operation stage of this project and this is shown in the Table 8.5 below. A detailed cost breakdown is included in Appendix 6 of this report

Table 8-5: Total Cost of Additional Facilities for Freight Rail Only

Description	Design Cost Estimate (US$ Million)
Terminal Facilities at Tema	30.0
Terminal Facilities at Kumasi	30.0
Siding to Petroleum at Kaase (6km)	25.0
Siding and Rail Infrastructure within Boankra Inland Port	35.6
Maintenance Facilities	45.0
Operations Control Centre/ Other Support Buildings	25.0
Signalling and Telecommunication equipment	111.9
O&M Vehicles, Plant and Equipment	44.5
Electrical Works	7.4
Sub Total	**354.4**

8.5.3. Signalling and Telecommunications

We are proposing below these key equipment/items for the signalling and telecommunication systems:

- A centralised control system, ETCS Level 1 System-Control Centre
- Train Control Communication
- VHF Radio Communication for Train- to -Station Mobile Communication
- 24 Core Optical Fibre Cable

- Electric Point Machines

We have estimated the cost for the signalling and telecommunication items to be US$112 million. A detailed breakdown of the cost is included in Appendix 8 of this report.

8.5.4. Land Acquisition and Resettlement

Our proposed alignment follows the existing route as much as possible and within the Right of Way ("RoW") of 30m either side from the centre line. However, some land and property would have to be acquired at certain locations along the corridor as shown in Table 8.6 below. We are aware that there are encroachers within the RoW who would have to be relocated and compensated.

The cost rates we used were based on the Western Railway Line study prepared by TEAM Engineering Ltd. We suggest that a detailed Resettlement Action Plan ("RAP") should be undertaken to firm up the land acquisition cost at detailed design stage.

Table 8-6: Land Acquisition and Resettlement

Section Number	Sections	Area Description	Estimated Cost for Compensation (US$ million)	Land Acquisition Locations in Kilometres (Km)
1	Accra-Achimota	We have identified some encroachers within the RoW and these people would have to be relocated and compensated. Based on our alignment design, we have estimated that about 1 hectare of land would have to be acquired.	1.0	Km 0.0 – 0.6
2	Achimota - Kotoku	Based on our alignment design, approximately 6.8 hectares of land would have to be acquired including approximately 2.8 hectares of urban land with buildings.	6.6	Km 18.5 Km 20.2 Km 21.5 Km 24.8 Km 34.3
3	Kotoku-Nsawam	Based on our alignment design, we have estimated that about 13 hectares of farm/forest land would have to be acquired. This is based on our alignment design.	3.3	Km 38 Km39.8 Km 43
4	Nsawam – Koforidua	Based on our alignment design, we have estimated about 150 hectares of land to be acquired for Koforidua bypass. There are about 35 residential structures within this section that need to be demolished.	49.3	Km 48.3 Km 49-52 Km 56 Km 59 Km 92.9 – 94.9

Section Number	Sections	Area Description	Estimated Cost for Compensation (US$ million)	Land Acquisition Locations in Kilometres (Km)
5	Koforidua-Nkawkaw	Based on our alignment design, approximately 76 hectares of new land would have to be acquired of which about 10 hectares is heavily encroached. In addition, there are about 48 properties within this section that would have to be acquired.	27.6	Km 106-107 Km 136.7 – 137.9 Km 151.2-152.8 Km 160.5 – 167.5
6	Nkawkaw - Ejisu	Based on our alignment design, we have estimated approximately 17 hectares of urban land and farm land. We also estimated approximately 130 properties would have to be demolished.	17.8	Km 234.2 - 237.5 Km 269.5-271.6
7	Ejisu-Kumasi	Based on our alignment design, we have estimated approximately 22 hectares of urban and semi urban land would have to be acquired. Also, 182 properties would have to be demolished.	45.8	Km 279.4-280.3 Km 281.4-283.3 Km 285.5 – 286.8
	Total Cost (US$ Million)		**151.3**	

8.5.5. Rolling Stock for Freight

We are proposing the following rolling stock types for the rail line:

- Flat wagons: suitable for containers, timber, rails and long steel products;
- Covered Wagons: suitable for bagged commodities like cement, food grain, cocoa etc. can also be used for bulk commodities; and
- Tank Wagons: suitable for liquid cargo like petroleum products, hazardous chemicals.

8.5.5.1. Rolling Stock Procurement

Based on the traffic demand, we have proposed the following:

- 12 locomotives (capacity of 3000 horse power);
- 505 wagons to move container and cargo in both the northbound and southbound directions.

The estimated cost for rolling stock as per international standards is indicated in the table below

Table 8-7: Rolling Stock for Freight Service

Equipment-Rolling Stock	Capacity	Specification	US$ million per Unit	Total Number of Units Estimated	Total Cost-US$ Million
Locomotives					
Locomotives	3000 horse power	UIC Class (i.e. Co-Co)	3.20	12	**38.4**
Wagons					
Flat Wagons	90 TEU's	UIC Class R	0.09	260	23.4
Tank Wagons	2000 tons	Class Z/ UIC-type 7	0.12	120	14.4
Covered Wagons	3000 tons	Class G/ UIC 571-2	0.115	125	14.4
Sub-total (Wagons)				505	**52.2**

8.6. Operations and Maintenance Cost for Freight Service

In addition to capital expenditure, the operation and maintenance costs will be incurred in the course of the project. These costs include employee salaries, administrative costs, fuel and energy costs, equipment maintenance etc.

8.6.1. Operations Cost for Freight Service

The annual salaries and the personnel required to manage and operate the port was based on our discussions with various stakeholders.

Table 8-8: Summary of Payroll Expense for Railway Carrying Freight

Employee/Labour	No. of employees (Per Terminal)	Salary per person (US$ per year)	Estimated Salary Annual Total (US$ per year) Million
Chief Executive Officer	1	180,000	0.2
General Manager	1	100,000	0.1
Middle Manager	5	60,000	0.3
Supervisor	15	40,000	0.6
Operating Staff	10	20,000	0.2
Maintenance Staff	10	20,000	0.1
Workers (unskilled)	12	10,000	0.1
Driver	18	10,000	0.2
Station Security	21	10,000	0.2
Total			**2.1**

Our estimates of the operations costs was based on the usage of equipment, the number of staff, infrastructure usage and fuel cost.

Table 8-9: Overall Operations Cost

Operating Costs	Average (Per Year) US$ Million
Payroll Expenses	2.1
Fuel/Energy Expenses	21.9
Consumables Expenses	20.0
Total Operating Expenses	**44.0**

8.6.2. Maintenance Cost for Freight Service

Our estimates of the maintenance costs was based on the usage of equipment, the number of staff, infrastructure usage, and fuel cost etc.

Table 8-10: Overall Maintenance Cost

Maintenance Costs	Average (Per Year) US$ Million
Infrastructure	27.0
Cost Of Spares-Locomotive	1.6
Wagons/Coaches/DEMU's	3.6
Total Maintenance Expenses(Depreciation)	**32.2**

8.7. Passenger Infrastructure Cost

Based on the cost rates from Western Railway Line project, we have also estimated the additional cost for providing a passenger service on the Eastern Railway Line to be US$ 336.1 million and the breakdown is shown in Table 8-11 below.

Table 8-11: Additional Cost Breakdown for Passenger Rail Service

Description	Cost (US$ Million)
Rolling Stock for Passenger Service	83.3
Station Buildings and Other Facilities	209.0
Sub Total	**292.3**
Contingency @ 15%	43.8
Total Cost – Passenger Service	**336.1**

8.7.1. Rolling Stock for Passenger Service

Based on the traffic demand, we are proposing the following:

- 3 sets of Diesel Multiple Unit (DMU) for short passenger service;
- 7 Passenger heads (capacity of 1600 horse power) – for long passenger service; and
- 112 passenger coaches – for long passenger service.

The total cost of rolling stock for passenger during the concession period is US$ 83.9 million as seen in Table 8-12.

Table 8-12: Rolling Stock for Passenger

Equipment-Rolling Stock	Capacity	Specification	US$ million per Unit	Total Number of Units Estimated	Total Cost-US$ Million
Diesel Multiple Unit ("DMU") "12x3" for short passenger service	100 persons	UIC	10	3	30.0
Passengers "16x4" (Head) for long passenger service	1600 hp	UIC	2.8	7	19.6
Passengers Coaches for long passenger service	100 persons	UIC Class AB	0.306	112	34.3
Total					**83.9**

8.7.2. Station Buildings and Other Facilities for Passenger Service

Based on the cost rates from Western Railway Line project, we have also estimated the cost for providing station buildings and other facilities for railway passenger service to be US$ 209 million.

Table 8-13: Station Buildings and Other Facilities

Description	Design Cost Estimate (US$ Million)
Station Buildings	150
Electrical Works Including (Lighting, Generators, Solar Panel)	5
Security Infrastructure	15
Platform Indicator Boards, Passenger Information System	25
Incident Management Facilities	14
Total	**209**

8.7.3. Stations

For our proposed alignment, all the existing stations will be used for passenger service whilst Tema terminal is used for freight only. At Koforidua, we have proposed a bypass for freight train to pass round the city centre whilst passenger train will be routed through the city with a station located in the city centre. We have proposed four different types of stations:

- **Terminal stations** - These are stations at the end of a railway line. Trains arriving there have to terminate or reverse out of the station. Our proposed terminal stations are Accra, Tema and Kumasi;
- **Junction Stations**- A junction is a station where two or more rail routes converge or diverge. Our proposed junction stations are Achimota, Nsawam and Bosuso;
- **Commuter stations** – These are stations that are primarily located at city centres and commuter towns that draw large numbers of people who travel on a daily basis. Our proposed commuter stations are Accra, Tema, Nsawam, Ejisu and Kumasi.

A typical drawing for terminal station and the proposed stations from Tema/Accra to Kumasi are included in Appendix 9.

General Facilities at Stations

The basic facilities we have proposed for the passenger stations are:

- Three passenger platforms – one mainline and two loop lines;
- One foot bridge /underpass lifts for physically challenged persons;
- A platform shelter with a minimum covering of 50m in length;
- Booking counters, circulation area, drinking water and toilet facilities; and
- Barrier free entry, audio and visual announcements and signage's in conformity with international standards.

For rail operators and staff at the station, we have proposed the following facilities:

- Station control room;
- Station masters office;
- Cleaner's and store room;
- Security and first aid room;
- Generator and other electrical equipment room;
- Ticketing staff room;
- Staff toilet; and
- Fire extinguishers.

8.7.4. Additional Facilities

We have proposed that terminal stations in Accra, Tema and Kumasi would require additional facilities as set out below. These additional facilities are needed because these stations are the final end points of the line and are also the main stations on the line. The Tema terminal station will be for freight only whilst Accra and Kumasi stations are for passengers only. Ejisu, Koforidua and Nsawam stations where trains are likely to originate or terminate will also require similar facilities for passengers. The list below shows the additional facilities at these stations:

- Additional platform for terminating and originating trains;
- Stabling line;
- Left luggage office;
- Waiting room and retiring room separately for ladies and gentlemen, with sleeping and toilet facilities;
- Multi modal integration and public transport facility for last mile connectivity;
- Fire protection system; and
- Parcel handling facilities.

8.8. Operation and Maintenance Cost for Passenger Service

The private investor will incur the cost of the maintenance of the passenger service. The cost of the maintenance will be determined by the operational costs which include employee salaries, administrative costs and equipment use.

8.8.1. Staff Cost for Passenger Service

The requirement of staff will depend on several factors such as the level of outsourcing, bench marks or key performance indicators, amongst others.

Accordingly, the tables below provide a summary of the manpower requirements for both freight and passenger services.

Table 8-14: Summary of Payroll Expense Additional Staff for Railway Passenger Service

Employee/Labour	No of Employees	Salary (US$) Per Person per year	Estimated Salary (US$ Million) Annual Total per year
Station Manager	6	60,000	0.4
Operating Staff	30	20,000	0.6
Shunting Staff	20	10,000	0.2
Station Staff	20	10,000	0.2
Maintenance Staff	5	20,000	0.1
Station Security	20	10,000	0.2
Total			**1.7**

The payroll expense for railway operations carrying passengers is approximately US$ 1.66 million per year.

8.8.2. Operations and Maintenance Cost for Passenger Service

Our estimates of the operations and maintenance costs are based on the traffic demand which determines the usage of equipment, the staff quantity, infrastructure usage, fuel cost etc. as based in our financial model .Table 8-15 and Table 8-16 shows the overall operations and maintenance cost for passenger rail lines.

Table 8-15: Overall Operations Cost for Passenger Service

Operating Costs	Average (Per Year) US$ Million
Payroll Expenses	1.7
Fuel/Energy Expenses	21.0
Consumables Expenses	14.0
Total Operating Expenses	**36.7**

Table 8-16: Overall Maintenance Cost for Passenger Service

Maintenance Costs	Average (Per Year) US$ Million
Infrastructure	31.0
Cost Of Spares-Locomotive	0.95
Wagons/Coaches/DEMU's	3.85
Total Maintenance Expenses(Depreciation)	**35.80**

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9. Proposed Operational Plan for the Boankra Inland Port

9. Proposed Operational Plan for the Boankra Inland Port

9.1. Introduction

Operational planning for an Inland Port is one of the key tasks that needs to be undertaken prior to or during the operations. The process will involve short term planning (days/weeks) and longer term planning (yearly) of activities. Some fundamental reasons why the Inland Port operational planning is so important include the following:

- It ensures the effective allocation of resources. These include, labour, equipment, facilities and other infrastructure on the site which are utilised to ensure the efficient functioning of processes and physical infrastructure used in operations;
- It facilitates the effective co-ordination of the Inland Port facilities, particularly for those activities involving individuals, shipping lines and logistics companies as well as other organisations; and
- It ensures a smooth, cost effective and well managed flow of containers and cargo into and out of the Inland Port, thereby minimising congestion and improving performance factors such as turnaround time and the productive capacity of the port's facilities.

The value of operational planning extends from efficiency and productivity, to providing cost effective and profit maximising steps in the day-to-day port activities. It is important that the considerations for the operational plan for the Boankra Inland Port be reviewed and revised annually.

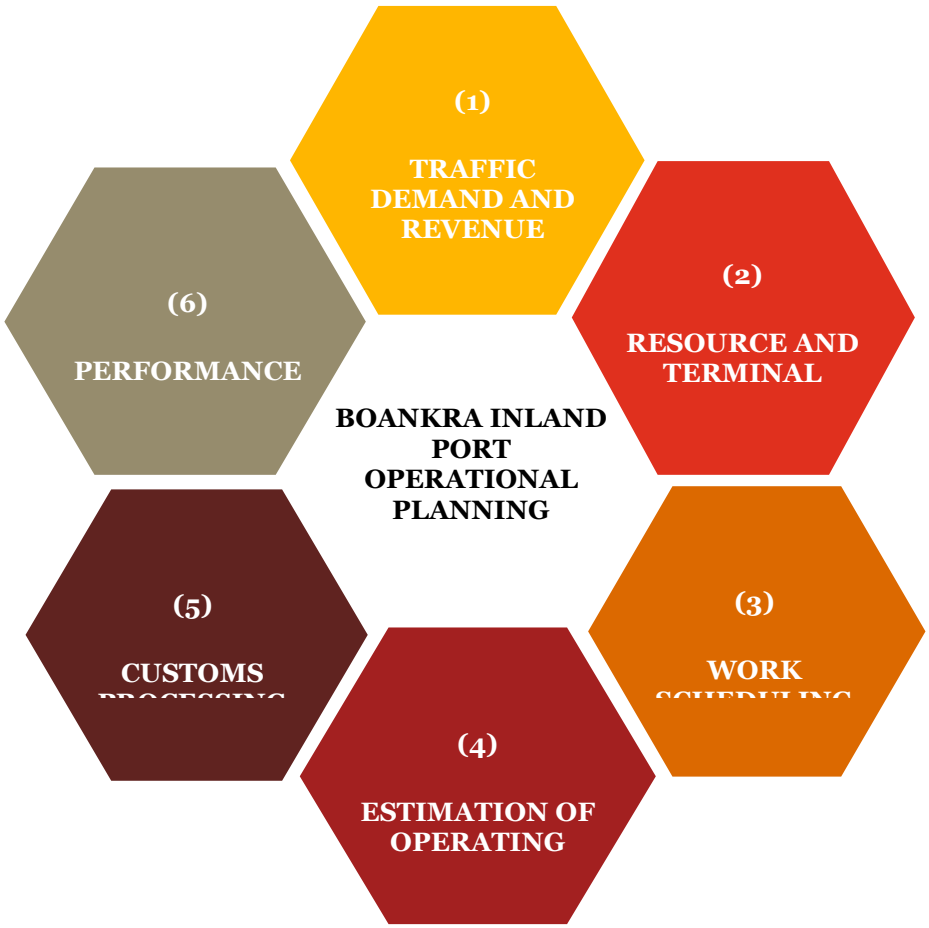
9.2. Key Considerations for Operational Planning

The fundamental elements or considerations in designing an operational plan for an Inland Port include the following11 and set out in Figure 9.1 below:

- Traffic Demand and Revenue Forecasting;
- Resource and Terminal Allocation;
- Work Schedule;
- Estimating of Operating Times;
- Customs Processing; and
- Performance Assessment.

[11] *Operations Planning in Ports*, UNCTAD Monographs on Port Management, Monograph No.4 (1985). *Handbook on the Management and Operation of Dry Ports*, UNCTAD (1991).

Figure 9-1: Fundamental Elements of Inland Port Operational Planning



9.2.1. Traffic Demand and Revenue Forecasting

One of the key considerations in designing the operational plan for the Boankra Inland Port is the estimation and forecasting of the traffic demand expected at the Inland Port annually. Traffic demand forecasting serves as a starting point for all the activities necessary in preparing the operational plan for the Inland Port.

In addition, traffic demand forecasting is essential for adequate capacity planning to ensure productive and efficient operations.

As set out in our traffic demand chapter (Chapter 5, Traffic Demand Forecasts and Competition Analysis) of this report, we carried out the following activities:

- Estimated the volume and type of freight that is currently moving northbound and southbound from Tema Port and how fast we expect this freight to grow.

With Future Railway Line Option:

- Estimated the percentage of total freight by type that would shift from the current predominantly road option to rail (dependent on the competing road versus rail service mix, rail frequency, rail service pattern and reliability and tariff of the competing modes); and
- Estimated the revenue that will be generated from the rail service based on the expected demand and tariff that can be realistically charged.

In order to ensure that its traffic demand forecasts are as realistic as possible, we engaged with key stakeholders including shipping lines and logistics companies and associations to reinforce the quality of our demand forecast prior to designing the operational plan.

9.2.2. Resource and Terminal Allocation

This involves making provision for the labour, equipment, facilities, terminal area and other resources required to facilitate the loading or unloading of cargo/containers from the trucks, maintenance works, safety and security services at the port. It involves activities that are carried out before and after the arrival of freight into the port and at the same time enables the port operators to assess the port's capacity to ensure they meet the set operational, safety and security standards for port operations.

The suitability of the terminal allocation for stacking containers, de-stuffing and stuffing activities, packaging, storage etc. will have a significant impact on the efficient performance of activities at the Inland Port. Terminal allocation is key to helping prevent and control congestion while maintaining a free flow of other activities at the port. There should be frequent (at least daily) review of the terminal allocations planning based on the expected traffic coming into the port by rail or road.

The primary objective of initial resource allocation is to reduce the turnaround time for the receipt and delivery of cargo whilst at the same minimising the cost involved in utilising labour, equipment and terminal facilities in port operations.

We have prepared the systematic resource and terminal allocation procedure for the Boankra Inland Port as follows:

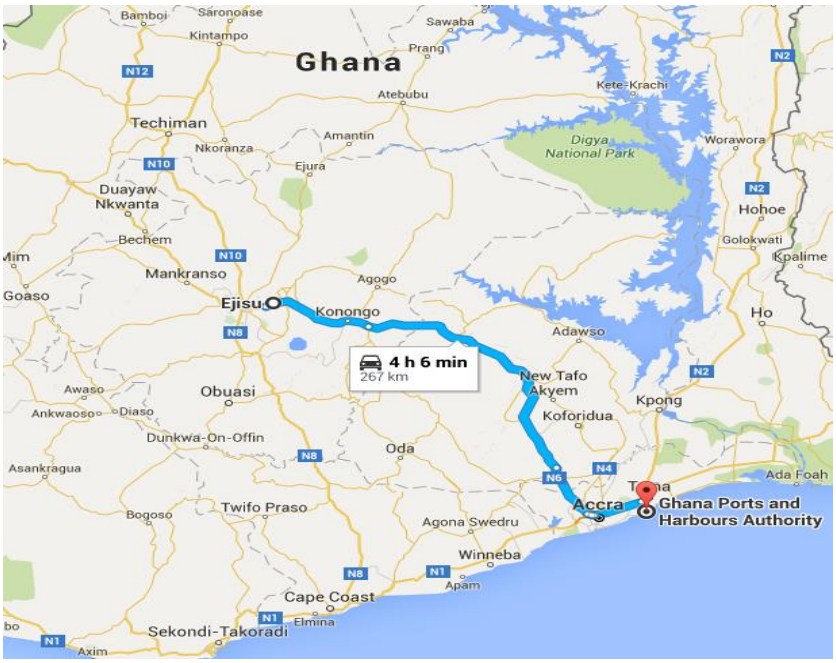
Road Option:

- The import of freights by road will be received at Boankra Inland Port from Tema. The port staff will make certain of receivership of the freight and then dispatch it to storage at the container yard;
- All Cargo that arrive at Boankra by trucks will first stop at the main entrance at the port for scanning and screening, then delivered to the port's handling yard where it is received by port staff and then the cargo is sent to its prescribed location on the port either for storage, stuffing, destuffing or its transhipment location;
- The export containers will be taken to the Port handling Yard where tracking is placed and registered before sent to its final destination;
- Upon arrival at the Inland Port, the containers or cargo will be processed by customs and the necessary documentation approved before the freight is allowed to be transported to its final destination;
- All the Container Yards will be equipped with RTG cranes and Reach Stackers. The import containers will be unloaded from trailer trucks and put in the stacks;
- The dry port has warehouse, cold storage and packaging/labelling facilities. The cargo requiring these facilities will be shifted there accordingly;
- The empty containers will be shifted to the Empty Container Yard. This yard will also have parking of empty containers based on the requirements of the shipping lines;
- On development of full scale logistics, the export cargo can be received at the warehouses for packaging/labelling, storage and aggregation; and
- The export cargo from Container Freight Station ("CFS") will be stuffed in empty containers and taken to the export container yard.

With the Future Railway Line Option:

- The import traffic trains will be received at Ejisu station from Tema port (Ejisu is about 267 km from the Tema Port see Figure 10-2) below. The station operating staff will ascertain the availability of the handling line at the Boankra Rail Terminal and dispatch it to Boankra as shunting movement;

Figure 9-2: Map showing the location and distance between Ejisu and Tema Port



Source: Google Maps

- Any given train that will arrive at Boankra at its scheduled time will stop at the entrance of Inland Port's handling yard and will be received at the pre-nominated line by the shunting staff;
- Once the train is received at the Boankra Inland Port, the engine will be detached and reversed using the engine line. It will be attached on to an export train, in case this is ready to be dispatched;
- In the intervening period, the crew will be changed and fuelling of locomotives will be carried out;
- The export train, when ready, will be dispatched to the Eijsu station as a shunting movement and will be received there by station staff. It will be dispatched to Tema, depending on availability of the path;
- At full capacity usage, an average of 10 incoming and 10 outgoing trains are required to be handled daily;
- Separate container yards for import, export and empty containers have been allocated in the layout for the port. RMG will load the import containers in trailer trucks, which will take it to Import Container Yard. At full capacity utilisation, about 900 containers will be received daily. The population of containers in the stack yard at any point in time will be decided based on the efficiency of custom clearance;
- The export containers will be taken to rail yard for loading into export trains and dispatched to Tema;
- Before train dispatch, the driver and guard of the train will check and ensure brake power continuity; and
- The bulk traffic trains will be handled largely in customer's sidings. Petroleum traffic will have a separate siding having unloading sumps and storage tanks. These sidings will take off from Ejisu station. The trains will move between the station and siding as shunting movement; and the freight traffic other than the siding traffic will be handled at the bulk handling line provided at Boankra. One handling line has been provided for this purpose.

9.2.3. Estimation of Operating Times

The team in charge of operations should estimate operating times for loading or discharging for every consignment in order to plan resources for the various activities (operational and maintenance) at the terminals of the port. Operating times should also be estimated for the receipt and delivery of cargo to and from the port's storage facilities.

It must be noted that the estimation of operating times at the Inland Port should also factor in lifting equipment in and out of where they are to be deployed as well as other preparatory tasks prior to moving the cargo or container. The entire exercise should be supported by the preparation of work schedules for each shift for cargo and containers arriving or leaving the port. This is very important particularly because of the high volume of cargo that will be handled at the Boankra Inland port on a daily basis.

We have estimated the following key operating times at the Inland Port:

Road Option:

- The handling time for both loading and unloading of trucks will be nearly4 hours. The trucks will be in a queue on a first come first load/unload basis unless the truck is given priority due to late delivery of cargo which occurred during unforeseen circumstances; and
- The loading/unloading operations will be carried out using RTGs and Reach Stackers.

9.2.4. Work Scheduling

This aspect of operational planning for the Inland Port considers the general stage-by-stage planning of operations upon the arrival of freight at the Inland Port with a view to optimising their processing for clearance, customs and eventual storage or repackaging for further transport.

The basic instrument used in work scheduling for Inland Port operations is the Work Schedule Form. This should be utilised when assigning labour shifts and equipment moves at the various facilities at the Inland Port as well as the estimated time it should take to complete those tasks per volume/weight of freight.

Some of the key considerations that the Port Manager and his Facility Supervisors must take into account in work scheduling arrangements for subsequent shifts for the activities identified at the Inland Port include:

- Checking the estimated operating times and where the respective shift gangs should be deployed when the current shift ends;
- Developing a detailed work schedule listing all the consignments to be handled;
- Confirming or adjusting the overall plan for the labour needed for a specific job and requisitioning the required manpower for the shift;
- Updating the requisitioning for the equipment and gear for the shifts at the terminals and the other facilities at the Inland Port;
- Using the work schedule to check and confirm storage requirements and adjusting the terminal allocation arrangement if necessary. It should also be used to confirm the arrival time for the receipt of freight at the port entrance, truck parking area or storage facility at the Inland Port. In the case of loading freight for departure, the work schedule will enable the Port Manager confirm the time for collecting freight from the facilities at the Inland Port; and
- Checking road vehicle appointment bookings, and the arrival of freight at the Inland Port by road. Here, if adjustments have to be made to the receipt and delivery timings, it must be communicated to the cargo owners or their representatives.

9.2.5. Customs Processing

At this stage of the official examination, authorisation and clearance of the containers and cargo is carried out before they are made available for collection. We propose the following key considerations at this stage:

- The containers from Import Yard will be shifted for customs examination as per requirement;
- After custom clearance the container will leave the Inland Port, to the consignee location. Those requiring de-stuffing at Inland Port will be taken to the CFS. The design of the Boankra Inland Port assumes 80% factory stuffing/de-stuffing and 20% CFS operation; and
- For export cargo the containers will be brought to Inland Port and stacked in Export Container Yard. They will be offered for custom examination and completion of the required formalities.

9.2.6. Performance Assessment

The final consideration that needs to be carried out in the operational planning process for the Boankra Inland Port is a comprehensive review and evaluation of the Inland Port's integral activities relative to its benchmark Key Performance Indicators. It involves a thorough scrutiny of cargo handling efficiency, organisation, supervision and performance. The exercise allows management to identify problems and challenges affecting

the Inland Port's efficiency and productivity as well as to ensure they meet the performance specifications set out in the concession agreement. The Key Performance Indicators can be located in Chapter 11 of this report.

The ultimate benefit of assessing the performance of the port (annually), as part of the operational planning process, is to enable management ensure that the productivity, efficiency and capacity of the port is maintained at an optimal and agreed-upon level .This will help management minimise its annual operation costs, help improve its profitability over time and more importantly ensure that asset meets its capacity and operational requirements. Once the assessments have been carried out we advise that management of the port meet with the port supervisors and technical staff to assess the shortfalls identified in order to plan how to resolve them and improve performance.

The good value that performance assessment gives to the operations of the Inland Port makes it advisable for the exercise to be conducted more frequently than just on an annual basis. This will help management spot operational inefficiencies sooner and take the necessary corrective actions during the year to maintain an optimal level of operations.

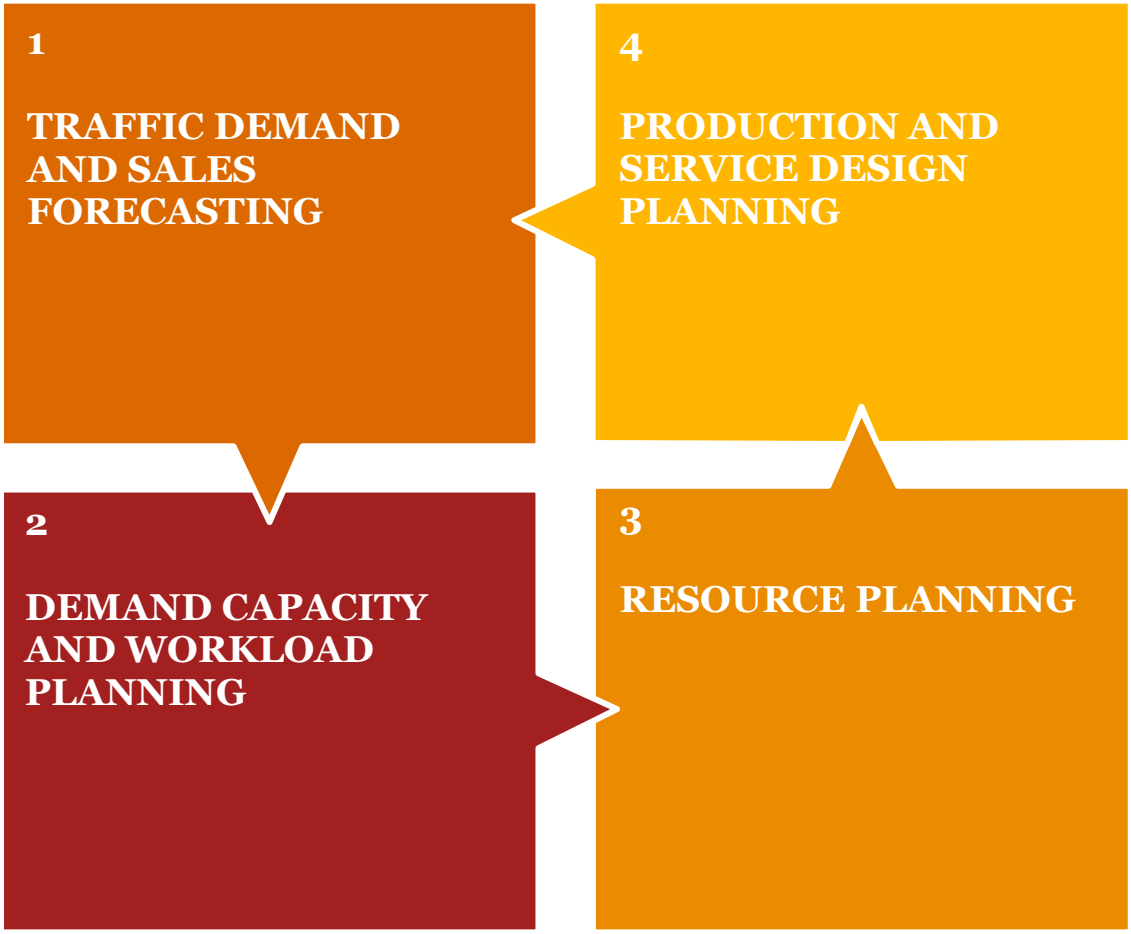
10. Proposed Operational Plan for the Eastern Railway Line

10. Proposed Operational Plan for the Eastern Railway Line

10.1. Main Features of the Suggested Operational Plan

In designing an operational plan for the Eastern Railway Line, one major underlying principle is to ensure that forecasting the traffic demand and the projected sales for each calendar year is determined in advance. This would make available, adequate resources in terms of specialised and unspecialised manpower, equipment and rolling stock and other infrastructure amongst others to support the expected traffic demand without sacrificing the benchmarked performance and efficiency.

We have examined and identified the key elements and considerations that have to be factored into preparing the operational plan for the Eastern Railway Line. These include:



10.2. Traffic Demand and Sales Forecasting

Traffic demand is one of the most important factors that will drive the success of the project. Demand drives the revenue required to finance the debt and equity used to support the project's capital investment, operations and maintenance costs, future investment in rolling stock and other infrastructure.

Given that the Eastern Railway Line does not presently carry out any meaningful freight traffic, an assessment of potential freight transport demand by rail begins with a consideration of total market demand. Domestic production (i.e. exports) and imports are the two main sources of freight transport demand and provide an indication of the amount and composition of the goods requiring rail transport.

As set out in our traffic demand chapter (i.e. Chapter 5) of this report, we carried out the following activities:

- Estimated the volume and type of freight that is currently moving northbound and southbound from Tema Port and how fast we expect this freight to grow;
- Estimated the percentage of total freight by type that would shift from the current predominantly road option to rail (dependent on the competing road versus rail service mix, rail frequency, rail service pattern and reliability and tariff of the competing modes); and
- Estimated the revenue that will be generated from the rail service based on the expected demand and tariff that can be realistically charged.

10.3. Demand Capacity and Workload Planning

Assuming that traffic demand forecast and the necessary infrastructure that will be needed to support the transportation of freight have been considered, it is important for a closer look to be taken at the capacity of the railway operations. This would allow the operator to further assess the ability to handle the expected demand and how the demand will be managed through workload planning.

We believe that this will go a long way to help improve the efficiency of the operations along the Eastern Railway Line and adequately manage any unexpected changes in the traffic demand.

10.3.1. Proposed Capacity and Workload for Freight Operations

The estimated average train length that has been factored in the freight workload planning is 45 wagons. The container flat rake that will be used for transporting containers on the Railway Line should have capacity of 90 TEUs each. That is, each container flat rake can carry either one 40-footer container or two 20-footer containers.

The tank wagon rake, which will be used for transporting liquid cargo along the line, should have a capacity of 2200 tons .Open wagons and covered wagon rakes used in operations should have a carrying capacity of 3000 tons each.

Based on our Traffic Demand Study as set out in Chapter 5 of this report, the number of trains required to be operated from South to North (i.e. Northbound from the Tema Port) in the year 2023, when operations commence, will be as follows:

Table 10-1: Number of Trains Northbound from Tema Port for selected projected years once operations commence in 2023

Type of Freight	2023	2033	2038	2048	Average Load per train
Container	4.trains per day	7 trains per day	8trains per day	12 trains per day	90 TEUs
Petroleum	1 train every 2 days	1 train per day	1 train per day	1 train per day	2200 tonnes
Cement	1 train every 4 days	1 train every 3 days	1 train every 2 days	1 train per day	3000 tonnes
Other Cargo	2 trains per day	3 trains per day	3 trains per day	6 trains per day	1500 tonnes

The number of trains required to be operated from North to South (i.e. Southbound to the Tema Port) in the 2023, when operations commence, will be as follows:

Table 10-2: Number of Trains Southbound to Tema Port for selected projected years once operations commence in 2023

Type of Freight	2023	2033	2038	2048	Average Load per train
Container	4.trains per day	7 trains per day	8trains per day	12 trains per day	90 TEUs
Cocoa	1 train every 3 days	1 train every 2 days	1 train every 2 days	1 train per day	2000 tonnes

10.3.2. Proposed Capacity and Workload for Passenger Operations

Based on our traffic studies, we estimated that for the long distance passenger service (full distance passenger service) about 2 trains will required to travel each way per day to cater for approximately 2,244 passengers (i.e. 1,122 each way). The average load per train for passenger is estimated at 1000 passengers.

For passenger short distance we proposed the operation of 4 trains each way. That is, 2 trains in the morning and 2 trains in the evening, per day, in each of three sections that is the:

- Kumasi – Ejisu section;
- Accra – Nswam section; and
- Tema – Achimota section.

10.4. Resource Planning

Resource or supply planning involves using personnel and systems used to assess and allocate the resources used in rail operations to support its optimal utilisation and performance. Some of the elements of the railway operations that feed into supply planning include:

- Provision of utilities at the stations (water and electricity);
- Operational Logistics (Rolling Stock) such as locomotives, wagons, operational and maintenance services and facilities;
- Infrastructure such as station points and rail tracks;
- Maintenance Works Scheduling;
- Human Capital Management; and
- Management Information Systems for railway operations.

Inefficient use of resources can inflate the annual cost of passenger and freight operations. In today's increasingly competitive and challenging economic climate, management of the Eastern Railway Line need to implement measure that will help optimise the elements listed above in the most efficient and cost effective way to ensure profitability.

10.4.1. General Resource Requirements for Freight Operations

The main types of rolling stock required for freight operations on the Eastern Railway Line include:

- Flat Wagons - this is suitable for containers, timber , rails and long steel products;
- Covered Wagons - this is suitable for bagged commodities like cement, food, grains, cocoa etc. can also be used for bulk commodities;
- Open Wagons - this is suitable for coal, ore, crushed stones, boulders etc;
- Tank Wagons - this is suitable for liquid cargo such as petroleum products and hazardous chemicals; and
- Specialised Wagons- to save on the transportation cost and terminal handling costs, specialised wagons are used such as bottom discharge hoppers, automobile transport, RORO vehicles etc.

The traffic for the other commodities (i.e. other than container traffic) is very low. Based on this, we believe it does not justify investments in full rakes. As per our traffic demand assessment, if full rakes are operated then it is likely that the cement train transported on the Eastern Railway Line will operate once in ten days only. This is not very desirable and unless there is higher frequency the operations for this commodity, traffic will not shift from road to rail.

We therefore recommended that 1/2 rake each of open wagons, covered wagons and tank wagons should be maintained for all freight traffic. The length of rakes should be kept at 20 wagons initially and increased to 30 wagons when necessary, in order to improve hauling capacity requirements.

10.4.2. General Resource Requirements for Passenger Operations

We have assessed and estimated that the long distance passenger train service on the Eastern Railway Line will carry 16 coaches. This is made up of the following:

- 12 coaches of air conditioned chair cars;
- 2 coaches of executive chair cars; and
- 2 parcel vans with space for guard and passenger luggage compartment.

We estimate that the average turnaround time for each long distance passenger train service, including the cleaning & maintaining at the end of each service, is likely to be about 6 hrs.

Based on our evaluation and assessment, given the expected traffic levels and the level of service required along the line, we propose 3 separate commuter trains.

The length of longest section is limited to 40 km and taking into account the average commercial speed of 40 km/hr, the running time will be limited to 40 mins.

Based on this, we propose 12 coaches of urban transport Diesel Electrical Multiple Units (DEMU).These urban transport DEMUs have automatic door opening, no steps and no toilets. Additionally, we propose only 1 rake is planned to be used for each section without any spare rake since the average utilisation is going to be quiet low and the maintenance can be done during night hours.

Note: *The DEMUs will be used for the commuter services and the coaches will be used for long distance direct Kumasi to Accra and Accra to Kumasi.*

10.4.3. Summary of Operations and Maintenance Rolling Stock Requirements

We have identified some key resources that will be useful for the operations and maintenance as well as for safety and disaster management along the Eastern Railway Line.

Our proposed operations and maintenance rolling stock requirements are outlined in the table below:

Table 10-3: Key Rolling Stock Items for Operations and Maintenance

Rolling Stock	Quantity Required
Hopper wagons for ballast	15
Inspection carriage	1
Kitchen Car	1
Generator Car	1

Our proposed plant and equipment for Disaster Management along the Eastern Railway Line is outlined in the table below:

Table 10-4: Plant and Equipment for Disaster Management

Plant/Equipment	Quantity Required
Self-Propelled Accident Relied and Medical Van	1
140-Ton Rail Mounted Crane	1
Self-Propelled Inspection Car	1
Hydraulic Re-railing equipment set	2

10.5. Production and Service Design Planning

10.5.1. Importance of Designing a Well-Defined Service Plan

After the traffic forecasts and tariff authorisation have been completed and the necessary stakeholder engagements have been carried out to access the required capacity, workload and supply needs, the management of the railway have to design a service plan.

The service plan essentially gives a schedule or time table as to the frequency of trips required daily and weekly and for what specific cargo as well as, if required, passenger timetables from Accra to Kumasi and vice versa. The service plan will facilitate an efficient and productive flow of freight and passengers.

10.5.2. Estimated Running Times for Rail Operations on the Eastern Railway Line

The following table lists and identifies the nature of various points along the Eastern Railway Line as well as estimations of the running times for passenger, container and general freight services offered on the Eastern Railway Line.

Table 10-5: Running times for rail operations on the Eastern Railway line

No.	Station	Distance (km)	Description	Running Time (in seconds)		
				Passenger	Container	Freight
1	Accra	0	Terminal	-	-	-
2	Odaw	2.4	Crossing	76	-	-
3	Achimota	7.2	Junction	153	-	-
4	Dome	12	Crossing	154	192	240
5	Amasaman	22.7	Crossing	345	428	535
6	Kotoku	30.8	Crossing	268	324	405
7	Papase	34	Crossing	106	128	160
8	Nsawam	39.8	Junction	186	232	290
9	Pakro	51.5	Crossing	366	468	585
10	Mangoase	59.2	Crossing	235	308	385
11	Asuoya	68.4	Relocated	276	368	460
12	New Koforidua	73.5	Diversion	153	204	255
12A	Koforidua Road	77.2	Diversion	156	-	-
12B	*Cabin ***	*85.1 (86.8)*	-	*384*	*464*	*580*
13	Jumafo	90.2	Crossing	153	204	255
14	Tafo	100.6	Crossing	312	416	520
15	Bosuso	111.9	Junction	355	452	565
16	Osino	122.4	Crossing	331	420	525
17	Anyinam	132.8	Crossing	327	416	520
18	Kankang	142.5	-	333	452	485
19	Jejeti	152.9	Crossing	334	420	520
20	Asuboni	160.4	Crossing	255	300	375

No.	Station	Distance (km)	Description	Running Time (in seconds)		
				Passenger	Container	Freight
21	Nkawkaw	169.2	Crossing	297	352	440
22	Akwaseho	177.5	Crossing	273	332	415
23	K Prasu	191.8	Crossing	468	572	715
24	Pra River	199.8	Crossing	254	320	400
25	Asankare	215.9	Crossing	528	644	805
26	Juaso	226.2	Crossing	335	412	515
27	Konongo	237.9	Crossing	394	468	585
28	Bomfa	249.1	Crossing	360	448	560
29	Wireso	262.0	Crossing	405	516	645
30	Boankra	268.9	Junction	227	276	345
31	Ejisu	273.9	Crossing	166	200	250
32	Fumisua	281.8	Crossing	260	316	395
33	Kumasi	294.4	Terminal	401	504	630
	TOTAL (in seconds)			**9,626**	**11,540**	**14,360**
	TOTAL (in hours)			**2.67**	**3.21**	**3.99**

** The Koforidua route will take off from Koforidua by-pass at the Station "New Koforidua" and merge at the point where a passenger station is not proposed. Based on this arrangement, only a cabin service will be provided for operational purposes. Hence the label 'cabin' at 12 B in the table above.

10.5.3. Proposed Timetable for Passenger Service along the Eastern Railway Line

Based on our assessment of traffic demand and the considering the most optimal level of operations along the railway line, we propose the timetable below for the railway passenger service operations as follows in the table below (Also see Appendix 10 of this report).

Table 10-6: Proposed Passenger Service Timetable (Accra-Kumasi and Kumasi-Accra)

Accra to Kumasi									Station Points	Kumasi to Accra								
F1	S1	F2	P1	F3	F4	P2	F5	S2		F1	S1	F2	P1	F3	F4	P2	F5	S2
04.20	06.00	08.00	10.00	12.00	14.00	17.00	19.20	21.20	ACCRA	08.35	09.20	12.20	15.45	16.00	17.30	22.30	23.00	00.30
04.50	--	08.30	10.55	12.30	14.30	18.10	19.50	--	NSAWAM	07.55	--	11.35	14.30	15.30	17.00	21.25	22.25	--
05.30	--	09.10	11.40	13.00	15.00	18.55	20.15	--	KOFORIDUA	07.30	--	10.55	13.40	15.00	16.30	20.50	21.50	--
08.00	--	11.40	14.40	15.15	15.30	21.45	22.50	--	EJISU	04.20	--	08.20	10.30	12.20	14.20	17.00	19.40	--
08.25	08.50	12.00	15.10	15.35	17.50	22.15	23.10	00.20	KUMASI	04.00	06.00	08.00	10.00	12.00	14.00	17.30	19.20	21.20

KEY

F-Denotes the fast trains with limited stops.

S-Denotes superfast trains nonstop.

P- Denotes slow passenger trains stopping at all stations including halt stations

Table 10-7: Proposed Timetable for the Passenger Service between Accra and Nsawam

Accra to Nsawam				Station Points	Nsawam to Accra			
06.05	09.05	15.30	19.00	ACCRA	08.55	11.55	18.15	21.35
06.20	09.20	15.45	19.15	ACHIMOTA	08.40	11.40	18.00	21.20
07.20	10.20	16.45	20.15	NSWAM	07.40	10.40	17.00	20.20

Table 10-8: Proposed Timetable for the Passenger Service between Tema and Nsawam

Tema to Nsawam				Station Points	Nsawam to Tema			
06.00	10.50	15.10	20.50	TEMA	09.55	15.05	20.00	00.45
06.50	11.40	16.00	21.40	ACHIMOTA	09.05	14.20	19.10	00.00
07.50	12.40	17.00	22.40	NSAWAM	08.05	13.20	18.10	23.10

Table 10-9: Proposed Timetable for the Passenger Service between Kumasi and Ejisu

Kumasi to Ejisu				Station Points	Ejisu to Kumasi			
06.20	09.00	18.00	20.00	KUMASI	08.10	11.20	19.40	21.30
07.00	09.40	18.40	20.40	EJISU	07.30	10.40	19.00	20.50

11. Performance Specifications for the Boankra Inland Port and Eastern Railway Line

11. Performance Specification for the Boankra Inland Port and Eastern Railway Line

11.1. Introduction

Performance specifications and their associated benchmarks will help provide a standardised requirement for quality, efficiency and safety of operations, which the concessionaire(s) of the Inland Port and the Railway Line will be expected to meet. This will maximise profit and ensure that the intended benefit of the project to society is realised.

The Key Performance Indicators (KPIs) which serve as a benchmark for measuring these specifications are discussed in this chapter. The KPIs identified will also inform the drafting of the concession agreement(s) to ensure that the concessionaire maintains optimal operational and capacity standards in the provision of its services to consumers.

Our performance Indicators and performance targets were selected by reviewing the best business practices in ports in Africa and around the world. We then compared these best practices with standards in Ghana to develop our required KPIs for ports. The KPI serves as a guide to measure and suggest key business areas on the ports.

11.2. Performance Indicators for Inland Port Operations

For port operations, we have identified the following KPIs as important in ensuring the optimal performance of operations at the Inland Port. The KPIs for the operations at the Boankra Inland Port have been grouped into the following categories:

- Capacity Measures;
- Utilisation Measures; and
- Productivity and Service Measures.

The description of the categories and the indicators that fall within these categories are discussed as follows.

11.2.1. Capacity Measures

The capacity of an Inland Port refers to the maximum traffic it can handle over a specified period of time. The higher the handling capacity of a port terminal, the greater its output. The information concerning capacity performance indicators of an Inland port can be used to:

- Identify past and current capacity problems;
- Identify future capacity gaps;
- Control a capacity development program;
- Verify whether a capacity development activity has been successful;
- Inform stakeholders about current capacities in key areas; and
- Support internal and external decision-making processes related to the Inland Port's management and business.

Table 11-1 below shows the proposed benchmarks for the capacity measures.

Table 11-1: Key Performance Indicators for Boankra Inland Port-Capacity Measures

Indicator	Definition	Proposed Benchmark for the Boankra Inland Port
Actual Containers Handled	The estimated volume of container traffic expected to come through the Boankra Inland Port for a given year.	100,000 TEUs per annum
Actual General Cargo Handled	The estimated volume of cargo expected to come through the Boankra Inland Port for a given year.	126,000 tonnes per annum
Throughput per acre	The efficient use of land area allocated for operations at the Inland Port.	2,340 TEUs per annum
TEUs handled per staff (only Commercial and Operational-C&O Staff)	The level of efficiency at which the Inland Port's each C&O staff handles the container traffic at the Inland Port.	1500 TEUs per annum
Equipment availability	The level of upkeep and availability-for-use of equipment at the Inland Port at any given point in time during operations.	85%
Service delivery standards	A quantitative measure of the quality of service provided at the Inland Port against laid down parameters.	80% of adherence

11.2.2. Utilisation Measures

Utilisation measures assess the required optimal operational level for the facilities and equipment used at the Inland Port. Table 11-2 shows the utilisation performance benchmarks for Boankra.

Table 11-2: Key Performance Indicators for Boankra Inland Port-Utilisation Measures

Indicator	Definition	Proposed Benchmark for the Boankra Inland Port
Storage utilisation	The utilisation of warehouse capacity (other than the transit warehouse) at the Boankra Inland Port. It assesses the storage space utilisation relative to the floor area in percentage terms.	70%
Equipment Utilisation	This measures equipment utilisation (in terms of average equipment utilisation hours) relative to the total equipment hours at the Boankra Inland Port.	65%

11.2.3. Productivity and Service Measures

Productivity and service measures assess the amount of cargo/containers that a terminal handles at the Inland Port per unit time based on its resources such as labour, terminal, storage capacity, equipment etc.

Table 11-3: Key Performance Indicators for Boankra Inland Port-Productivity and Service Measures

Indicator	Definition	Proposed Benchmark for the Boankra Inland Port
Crane Productivity	This measures the gross moves handled by a specified crane at the Inland Port within an hour.	20 moves per hour
Average Dwell Time in Terminal (Container/Cargo)	It measures the average time containers/cargo are expected to remain stacked at the port terminal.	2 days
Total Working Time	Estimates the average active operational hours of the Inland Port and its associated operations for a given day.	10 hours per day
Number of Labour Units	An estimate of the average number of skilled and unskilled labour working at the various terminals, warehouses and other facilities at the Inland Port.	180
Truck Turnaround Time	It measures the average time spent between the vehicle's arrival at the terminal entrance gate or port and its departure from the terminal exit gate of the Inland Port. It captures the length of time it takes for customs and clearing processes, stuffing and de-stuffing, repackaging etc. at the Inland Port.	4 hours
Heavy Equipment Moves (Overall)	It measures the efficiency of machine operation and utilisation at the Boankra Inland Port.	15 TEUs per hour
Placement time of imports (Shifting time for customs examination)	It measures the efficiency of import yard operations at the Boankra Inland Port.	2 hours
Container only loading/unloading	This parameter estimates the length of time it should take a container to be unloaded from the truck on to the terminal for the required procedures such as customs processing, stuffing and de-stuffing, repackaging, storage other processes to be carried out before it is loaded for transport to its next point of delivery	2 hours
Bulk only loading/unloading	This parameter estimates the minimum length of time it should take a bulk cargo to be unloaded from the truck on to the terminal for required procedures such as customs processing, stuffing and de-stuffing, repackaging and other processes to be carried out before it is loaded for transport its next point of delivery.	2 hours
Customs Clearance Time	This measures the average time it takes vehicles to go through customs procedures upon arrival and exit of the port.	2 hours

11.3. Performance Indicators for the Eastern Railway Line Operations

Our rail performance indicators were selected by reviewing international rail standards and rail performance indicators from the rail companies in Africa. We based our KPIs on the best practices from these rail companies that have produced the best results in the business performance of the railway companies.

We have also identified the following KPIs to be considered in ensuring the optimal performance of operations along the Eastern Railway Line. The KPIs for the operations along the Eastern Railway Line have been grouped into the following categories:

- Specifications and Design Criteria;
- Productivity and Service Measures; and
- Asset Reliability Measures.

The description of the categories and the indicators that fall within these categories are discussed below.

11.3.1. Specifications and Design Criteria

As a means of ensuring the high quality of the construction/infrastructure for the project, the specifications and design criteria for the construction and maintenance of the railway infrastructure will form the basis for measuring its performance.

The standards and requirements for designing the formation, alignment, structures, stations and tracks among other details related to the construction and maintenance of the infrastructure are discussed into detail in chapter 8 of this report.

11.3.2. `Productivity and Service Measures

Productivity and services measures assesses the amount of cargo/containers that the Railway Line and its terminals handle per unit time based on its resources such as labour, rail tracks, wagons, locomotives etc.

Table 11-4: Key Performance Indicators for Eastern Railway Line-Productivity and Service Measures

Indicator	Definition	Proposed Benchmark for the Eastern Railway Line
Track Density	Track density is defined as a measure of the volume of traffic produced with the railway infrastructure. It is estimated as the ratio of the total passenger-km and tonnage-km to the total track length.	40 Million Gross Tonnes per annum
Train Turnaround Time	It measures the average time spent between the train's arrival and departure at the terminal. It also captures the length of time it takes for customs and clearing processes, stuffing and de-stuffing, repackaging etc. at the terminal	4 hours
Average running speed for passenger service	This is the estimated average running speed for the passenger train service along the Eastern Railway Line taking into account the extra time lost in crossing and excluding scheduled stoppages at the station and other designated points. The passenger service runs from Accra to Kumasi and from Kumasi to Accra.	70 km/h per day
Average speed of freight end to end - Container train.	This is the estimated average travel speed for a container freight train from Boankra Inland Port to Tema Port or from Tema Port to Boankra Inland Port.	50km/h per day
Average speed of freight end to end - Other freight	This is the estimated average travel speed for a container freight train from Boankra Inland Port to Tema Port or from Tema Port to Boankra Inland Port.	45km/h per day

Indicator	Definition	Proposed Benchmark for the Eastern Railway Line
Punctuality of time tabled passenger trains	This parameter estimates the level of adherence to the set times for the train's arrival at the final destination or at an intermediate station. The set times for this parameter is 5 minutes at the destination and 10 minutes on an intermediate station basis.	90%
Average running per day-Wagons/ Wagon Productivity	This parameter measures the amount travel distance covered by the number of wagons used in the rail operations along the Eastern Railway Line on a daily basis.	200km per day
Average running per day-Locomotives/Locomotive Productivity	This parameter measures the total amount of travel distance that should be covered by the locomotives used in the rail operations along the Eastern Railway Line, on a daily basis.	500km per day
Average running per day-Diesel Electric Multiple Unit (DEMU) Coaches /Coach Productivity	This parameter measures the total amount of travel distance that should be covered by the DEMU Coaches used in the rail operations along the Eastern Railway Line, on a daily basis.	250 km per day
Average running per day-Coaches Mainline/Coach Productivity	This parameter measures the total amount of travel distance that should be covered by the Mainline Coaches used in the rail operations along the Eastern Railway Line, on a daily basis.	500 km per day
Terminal turnaround time –Container only loading/unloading	This parameter estimates the length of time it should take a container to be unloaded from the rail/truck on to the terminal for the required procedures such as customs processing, stuffing and de-stuffing, repackaging, storage other processes to be carried out before it is loaded for transport to its next point of delivery	5 hours
Terminal turnaround time –Bulk only loading/unloading	This parameter estimates the minimum length of time it should take a bulk cargo to be unloaded from the rail/truck on to the terminal for required procedures such as customs processing, stuffing and de-stuffing, repackaging and other processes to be carried out before it is loaded for transport its next point of delivery.	2 hours
Rail Track availability	One way of increasing the availability the tracks is through the implementation of a proper maintenance policy.	90%
Accidents	This parameter estimates the acceptable maximum number of accidents for a given year beyond which may attract operational penalties. It includes collision, fire, landslides, buckling of track derailments etc.	6 per year
Ratio of light running of locomotives/ total engine kms	This parameter estimates the number of kms that the locomotives used in the rail operations are run 'light' (i.e. running without being coupled to the rest of the train) relative to when they are pulling loads (freight and/or passengers).	Less than 10%

11.3.3. Asset Reliability Measures

Asset reliability measures assess the ability of the rolling stock locomotives, wagons, and other equipment used in rail operations as well as the rail infrastructure to provide the required capacity needed to efficiently operate the trains.

Table 11-5: Key Performance Indicators for Eastern Railway Line- Asset Reliability and Service Measures

Indicator	Definition	Proposed Benchmark for the Eastern Railway Line
Major failure of coaching and wagons	This parameter measures the minimum number of major accidents that may occur on the Eastern railway Line without disrupting the efficiency and safety of railway operations significantly within a given year. These include events such as poor brake power, brake binding, hot axle, and flat tyre.	12 per annum
Minor coaching and wagon troubles	This parameter measures the minimum number of minor accidents that may occur on the Eastern railway Line without disrupting the efficiency and safety of railway operations significantly within a given year. These include events such as doors not operating or cooling not working.	20 per annum
Train stalling	Train stalling is a situation which comes about as a result of the train not getting a supply of traction to drive the motors and hence leads to disruption of rail services and inconvenience and delay to passengers and other stakeholders.	2 per annum
Rail and weld fractures	These may occur as a result of fatigue load and harsh environmental conditions and has the potential to disruption of rail services and inconvenience and delay to passengers and other stakeholders if not kept to a minimum or adequate measures taken to resolve them as soon as they occur.	12 per annum
Signalling failures	Signalling failure may occur as a direct result of; The electrical supply to the signalling system failing, the signal cabling getting damaged or stolen, track points failing to operate correctly or as a result of track circuits becoming faulty making it difficult to identify the precise location of the trains	120 per annum
Communication failures	Communication Systems are vital to the smooth functioning of operations along the Railway Line. It is also key to quickly identifying and responding to any issues that may impede the Railway Line from running its trains. It is therefore important that communication system failures be kept to a minimum during any given year of operation.	4 per annum

Indicator	Definition	Proposed Benchmark for the Eastern Railway Line
Power supply failures	Power supply failures have the propensity to disrupt signalling and communication systems used to effectively monitor and control rail operations. Due to its impact on the efficiency and reliability of operations it must be kept to a minimum.	2 per year

12. Economic Assessment

12. Economic Assessment

12.1. Introduction

In this chapter, we present our economic assessment of the proposed project. The objective of this assessment is to identify the costs and benefits of the project and their impact on GoG, transport users and the wider economy.

The assessment measures the impact of the project on Travel Time, Vehicle Operating Costs (VOC), Road Maintenance Savings and Accidents using economic indicators such as the Net Present Value (NPV) and the Economic Internal Rate of Return (EIRR) to assess the economic viability of the project.

12.2. Costs and Benefits

Our economic assessment was based on a life-cycle analysis where the estimated costs and perceived benefits occurring during the life-time cycle of the project were considered. The costs of the project include:

- **Investment Costs** – The capital cost of the Inland Port and the Railway Line. It includes the cost land, preparation, supervision, resettlement etc;
- **Operations Costs –** The cost of operating the Inland Port and the Eastern Railway Line; and
- **Maintenance Cost** – The recurrent cost of maintaining the Accra-Kumasi road, the Inland Port and the Railway Line.

The estimated project costs are in market prices, therefore they include indirect taxes. Indirect taxes are the taxes levied on goods and services and therefore include excises, duties and VAT. Generally base engineering costs exclude VAT but still includes other indirect taxes (e.g. import levies on construction equipment and materials). Economic costs should exclude indirect taxes.

There is no standard economic conversion factor to converts costs from market prices to economic costs in Ghana. In the recently completed Feasibility Study for the Dualisation of the Accra Kumasi Toll Road, a conversion factor 0.83 was estimated, therefore this has been used.

The perceived economic benefits are:

- **Savings in VOC for motorised traffic (MT) -** This includes savings in cost of fuel, lubricants, labour, and vehicle maintenance due to reductions in road traffic and an associated increase in speed when the project is implemented;
- **Savings in Travel Time Costs -** Savings in travel time cost is another important parameter for obtaining benefits from road improvements to road users. This is determined by comparing the travel times in the 'without' and 'with' project scenarios. Monetary values (known as Values of Time (VOT)) are applied to derive the monetary benefits of those time savings over the appraisal period; and
- **Reductions in accidents -** It is expected that the reduction in road traffic as a result of the shift to rail is likely to reduce road traffic accidents improve safety.

12.3. Approach

We carried out an economic assessment of the Inland Port and the Eastern Railway Line using the Highway Development and Management ("HDM-4") analysis tool and MS Excel spreadsheet calculations. These have been used to calculate the economic costs and benefits of the Inland Port and the Railway Line.

12.3.1. The Use of HDM-4

The Highway Design and Maintenance Standards Model (HDM-4) analysis tool is a software used for planning, programming, project analysis, research and policy studies of a road network to optimise the overall performance of the network. It is a decision making tool which is used to determine the engineering and economic viability of road projects. Although both the Inland Port and Railway Line are not road projects, we have used HDM-4 as part of the economic assessment because when the projects become operational, they would cause a change in the traffic (increase or decrease) on the Accra – Kumasi road. The economic costs and benefits of this change in traffic on the Accra-Kumasi road have been assessed using HDM-4.

12.3.2. The Use of Microsoft Office Excel

We have used MS Excel spreadsheet calculations to assess the economic viability of the Inland Port and the Railway Line. This spreadsheet was used to assess the economic costs and benefits of the Inland Port and the Railway Line to assess their economic viability.

12.3.3. The Calculation of the Total Economic Costs and Benefits

We combined the results from HDM-4 (road related costs and benefits) and MS Excel (costs and benefits of Inland Port and Railway Line) to calculate the overall economic indicators for the projects. This calculation was done using an MS Excel spreadsheet.

12.3.4. The "With" and "Without" Project Case

The economic analysis involves comparison of a "with project case" against a "without project case".

The "without project case" (Do Minimum) reflects what would happen if the project is not implemented i.e. the Inland Port and/or Railway Line would not be constructed and users would only use the highway to travel from Accra/Tema to Kumasi. We defined the traffic characteristics in terms of volumes, growth rates, fleet data and types of loads transported along the corridor. This would be assessed using HDM-4 only as it is a road-based assessment.

The "with project case" (Do Something) is the implementation of the project with its technical and cost characteristics. We assessed the following "with project case" scenarios as considered in the Options Analysis in Chapter 4:

- **Option 1** – Boankra Inland Port (Standalone) – This has been assessed by using a spreadsheet to assess the costs and benefits of the project to the port users. HDM-4 has been used to assess the impacts of the change in traffic on the Accra-Kumasi highway as a result of the movement of freight to the Inland Port via road;
- **Option 2** –Eastern Railway Line (Standalone) and carrying freight – This has been assessed by using a spreadsheet to assess the costs and benefits for the Railway Line users. HDM-4 has been used to assess the impacts of the reduction in traffic on the Accra-Kumasi highway as a result of the shift onto the Railway Line;
- **Option 3** – Boankra Inland Port and Eastern Railway Line (Freight Only) – This has been assessed by using a spreadsheet to assess the costs and benefits of the project to the port users and Railway Line users. HDM-4 has been used to assess the impacts of the change in traffic on the Accra-Kumasi highway as a result of the movement of freight to the Inland Port and the shift of traffic from the road onto the Railway Line; and
- **Option 4** – Boankra Inland Port and the Eastern Railway Line, carrying freight and passengers – This has been assessed by combining the methodology for Options 1 and 2 with passenger inclusive.

In addition to the above, the following sensitivity tests were also carried out on each of the four scenarios to determine the effect of an increase in costs, benefits or both on the economic viability of the project:

1. An increase in project cost of 25%;
2. A reduction in demand of 25%;
3. An increase in demand of 25%; and
4. An increase in cost of 25% and a 25% decrease in demand.

12.4. Key Assumptions

The key assumptions we used in our analysis are:

- A 12% discount rate, a benchmark commonly used at the World Bank to demonstrate economic value of investments was used (Ref: World Bank's Handbook on Economic Analysis of Investment Operations[12]);
- The rehabilitation of the Eastern Railway Line is estimated to cost about US$ 1,378.9 million with an estimated construction period of five (5) years;
- The estimated cost of the BIP (developed on a standalone basis - excluding any rail facilities) is US$ 119.2 million;
- Overall general maintenance cost for both the Inland Port and Railway Line is assumed to be 1% of capital cost annually. Periodic maintenance cost is assumed to be 5% of capital cost occurring 10 and 20 years following project implementation;
- A depreciation rate of 1.5% per annum is assumed for all project assets based on similar rates adopted for real estate and landed properties in Ghana;
- In view of assumption (e), a salvage or residual value of 55% of the investment cost is assumed in the last year of project life and no maintenance cost is foreseen in the first and last years of operation;
- Environmental management cost and other socially related costs are assumed to be part of the overall project cost;
- All other costs input into the model are consistent with those used in the Financial Model; and
- All traffic flows used are consistent with the Traffic Demand Forecasts in Chapter 5.

12.5. Methodology

- The "without project case" (Do Minimum) and the "with project case" (Do Something) project scenarios for each option was defined with all the components of the costs and benefits;
- We calculated the economic cost of road and rail transportation for both passengers and freight based on the financial costs using a factor of 0.83. The capital costs of the Inland Port and the Railway Line were also calculated using the same factor;
- We determined the transportation cost savings as a result of modal shift for each major traffic stream based on the results of the Demand Surveys discussed in Chapter 5.
- Estimates of freight and passenger traffic over the concession period were extracted from the Demand Study; and
- Benefits and costs associated with each potential traffic stream for Travel Time, VOC, Road Maintenance Saving and Accident Cost Savings were compared for the Do Minimum and Do Something scenarios. This was undertaken using HDM-4 for the road appraisal and Excel spreadsheets for the Inland Port and Railway Line appraisals to assess the economic viability of each project option as described below.

12.5.1. Option 1 – Boankra Inland Port (Standalone)

We have assessed this using an Excel spreadsheet calculation to determine the economic costs and benefits of the Boankra Inland Port on a standalone basis. We have undertaken this assessment taking into account the construction costs, operations and maintenance costs, tariffs and the other key assumptions mentioned in Section 12.4.

We have used the HDM-4 software to assess the impact of the change in traffic on the Accra-Kumasi highway as a result of the movement of freight to the Inland Port via road. The impact of the road network is not likely to be significant, however there will be a marginal increase in traffic demand on the Accra-Kumasi Highway when the Inland Port is operational. Under this scenario, we have assumed that some minimal road improvements would

[12] Operational Core Services Network Learning and Leadership Center, (1998), Handbook on Economic Analysis of Investment Operations, Washington, DC: The World Bank

have to be undertaken on the Accra-Kumasi Highway if goods are transported via road to the Inland Port. We have assessed the impact of minimal road improvements which are described below using the HDM-4 model.

In the Do Minimum scenario, we have included routine maintenance including:

- Edge repair is to be carried out every year;
- Pothole patching is triggered when the number of potholes counted are found between 1 and 10 per kilometre; and
- Crack sealing is to be carried out if the wide structural cracks measured fall between 0 and 25% and the transverse cracks between 0 and 25 counts per km.

In the Do Something scenario, we have included:

- Carrying out routine maintenance as discussed above; and
- Rehabilitating the pavement when the roughness or the average IRI value
- Or the section falls between 7 and 15.

The economic costs (land, construction, maintenance etc.) and benefits (tariffs) which will be accrued over the concession period have been calculated by combining the results of the Excel spreadsheet (for the Inland Port) and HDM-4 assessment (for the road).

12.5.2. Option 2 – Eastern Railway Line (Standalone)

This was assessed using an Excel spreadsheet calculation to determine the economic costs and benefits of the constructing the Eastern Railway Line on a standalone basis for carrying passengers and freight. We have undertaken this assessment taking into account the construction costs, operations and maintenance costs, tariffs and the other key assumptions mentioned in Section 12.4.

The project would result in a shift in traffic from road to rail, therefore there will be less traffic on the road. The economic benefits of this reduction of traffic on the Accra – Kumasi road has been assessed using HDM-4 as described below.

In the Do Minimum scenario, we have included routine maintenance including:

- Edge repair is to be carried out every year;
- Pothole patching is triggered when the number of potholes counted are found between 1 and 10 per kilometre; and
- Crack sealing is to be carried out if the wide structural cracks measured fall between 0 and 25% and the transverse cracks between 0 and 25 counts per km.

In the Do Something scenario, we have included:

- Carrying out routine maintenance as discussed above.

The economic costs (land, construction, maintenance etc.) and benefits (tariffs) which will be accrued over the concession period have been calculated by combining the results of the Excel spreadsheet (for the Railway Line) and HDM-4 assessment (for the road).

12.5.3. Option 3 – Boankra Inland Port and Eastern Railway Line (Freight Only)

This was assessed using an Excel spreadsheet calculation to determine the economic costs and benefits of the Boankra Inland Port and the Eastern Railway Line for carrying freight only. The project would result in a shift in traffic from road to rail, therefore, there will be less traffic on the road. This option includes only routine

maintenance on the Accra-Kumasi Highway as described for Option 2. The economic benefits of this reduction of traffic on the Accra – Kumasi Highway has been assessed using HDM-4.

The economic costs (land, construction, maintenance etc.) and benefits (tariffs) which will be accrued over the concession period have been calculated by combining the results of the Excel spreadsheet (for the Inland Port and Eastern Railway Line) and HDM-4 assessment (for the road).

12.5.4. Option 4 – Boankra Inland Port and Eastern Railway Line (Freight and Passengers)

This assessment is similar to that for Option 3. The economic costs (land, construction, maintenance etc.) and benefits (tariffs) which will be accrued over the concession period have been calculated by combining the results of the Excel spreadsheet (for the Inland Port and Eastern Railway Line) and HDM-4 assessment (for the road).

12.6. Input Data

Inputs for the HDM-4 model involved both field data and calibration inputs. The field data entries, typically baseline values, give the order and magnitude of the costs and their effects, whilst the calibration input results in smaller adjustments for local conditions. Most of the default values in the HDM-4 model have now been calibrated for Ghanaian conditions. Consequently, the data used for the project were mostly obtained from Ghana Highway Authority (GHA) Database, Meteorological Service Agency and results of fieldwork on the prospective roads. The data sets we used as inputs for the HDM-4 model are:

- Road network data which includes basic inventory, geometry, pavement type, pavement strength and road condition;
- Vehicle fleet data which consist of vehicle physical characteristics, tyres, utilisation, loading and performance;
- Historic traffic data and current field surveys including details of traffic composition, volumes and growth rates, speed-flow types and traffic flow pattern; and
- Road works data comprises of construction and maintenance work items together with their unit costs.

12.7. Results of Economic Assessment

The following economic indicators were used to assess the viability of the project options. These economic indicators include:

- **Net Present Value (NPV) -** This is defined as the sum of revenues and costs over time, based on an assumed discount rate, referenced to the present (the first year). The NPV is the net benefits from the Do Something option relative to the Do Minimum option, thus, the higher the NPV, the greater the benefits. If the net present value is positive, then the infrastructure improvement is deemed to be economically viable.
- **Economic Internal Rate of Return (EIRR %) -** This is defined as the rate of discount at which the NPV becomes zero. The criterion of NPV and EIRR are commonly used for evaluating the economic viability of an investment or for comparing different investment options. The EIRR is generally viewed as the most comprehensive indicator of the two measures, and has been adopted here as the primary indicator for comparison. For economic viability, generally, the rule is that where the resulting EIRR is greater than the discount rate of 12%, then the project is deemed economically viable.
- **Road User Cost Savings -** This includes Savings in Vehicle Operation Cost (VOC) plus Savings in Travel Time Cost (TTC). These savings, which are the differences in current and future operation costs, were derived by the HDM-4 model relying on vehicle characteristics and costs as well as road characteristics. Savings in vehicle operating cost is one of the most important parameters for obtaining benefits from road improvements. Savings in travel time cost is another important parameter for obtaining benefits from road improvements and reduced congestion to road users. Passengers travelling on the road currently take longer time to complete journeys. The reduction in journey times accrues some savings which have been quantified into monetary terms.

12.8. Summary of Economic Assessment Results

The results of the economic assessment indicates that the all the 4 project options are economically viable and would benefit the wider economy if implemented. The results are summarised in Table 12.1.

Table 12-1: Summary of Economic Results

Alternative	Net Present Value (NPV)	Economic Internal Rate of Return (EIRR)
	US$ Million	Percentage (%)
Option 1 - Boankra Inland Port (Standalone)	**567**	**18.8%**
Option 2 – Eastern Railway Line (Standalone)	**9,949**	**21.6%**
Option 3 – Boankra Inland Port and Eastern Railway Line (Freight Only)	**9,227**	**17.9%**
Option 4 – Boankra Inland Port and Eastern Railway Line (Freight and Passenger)	**9,704**	**18.7%**

12.9. Option 1 – Boankra Inland Port (Standalone)

The results of the economic analysis show an NPV of US$ 567 million, and an EIRR of 18.8%, which demonstrates that the project is economically viable. This project has the lowest cost of all the options and the benefits it generates to users are significant, resulting in a high NPV and EIRR.. This demonstrates that the Boankra Inland Port on a standalone basis is economically viable. Table 12.1 summarises the results of our economic analysis.

12.10. Option 2 – Eastern Railway Line (Standalone)

The results of the economic analysis indicate an NPV of US$ 9,949 million, and an EIRR of 21.6%, which demonstrates that the project is economically viable. This option has a higher NPV and EIRR than Option 1 because it has a higher traffic demand and the rail users experience Travel Time and VOC benefits. This option has the most favourable economic results because the project costs are not as high as for the combined options (Option 3 and 4), but it has a high number of users deriving Travel Time, VOC and accident benefits from the Railway Line. Table 12.1 summarises the results of our economic analysis.

12.11. Option 3 – Boankra Inland Port and Eastern Railway Line (Freight Only)

The results of the economic analysis indicates an NPV of US$ 9,227 million, and an EIRR of 17.9%, which demonstrates that the project is economically viable. This option has a lower NPV and EIRR than the standalone options, although it combines Options 1 and 2, which are both economically viable. This is because Option 3 has a significantly higher cost than the standalone options which reduces the benefits derived by users of the BIP and the Eastern Railway Line. Table 12.1 summarises the results of our economic analysis.

12.12. Option 4 – Boankra Inland Port and Eastern Railway Line (Passengers and Freight)

The results of the economic analysis indicates an NPV of US$ 9,704 million, and an EIRR of 18.7%, which demonstrates that the project is economically viable. Similar to Option 3, this option has a lower NPV and EIRR than the standalone options because it has a significantly higher cost than the standalone options which reduce the benefits derived the Boankra Inland Port and the Eastern Railway Line. This option has a slightly lower NPV and EIRR than Option 3 because it includes the cost of a passenger service which makes it more

expensive and reduces the benefits derived from the project. Table 12.1 summarises the results of our economic analysis.

12.13. Sensitivity Analysis

As mentioned previously in this chapter, the following sensitivity tests were also carried out on each of the three scenarios to determine the effect of an increase in costs, benefits or both on the economic viability of the project:

- An increase in project cost of 25%;
- A reduction in demand of 25%;
- An increase in demand of 25%; and
- An increase in cost of 25% and a 25% decrease in demand.

The results of the sensitivity analysis are shown in the Table 12.2. The results of the sensitivity tests indicate the project continues to be economically viable when the cost and demand are varied as described above. The results show that as expected the EIRR and NPV decrease with an increase in costs and a decrease in demand. Conversely, the EIRR increases with an increase in demand.

Table 12-2: Summary of Results of Sensitivity Analysis

Project Option	Sensitivity Analysis	Net Present Value (NPV)	Economic Internal Rate of Return (EIRR)
		US$ Million	Percentage (%)
Option 1 **Boankra Inland Port (Standalone)**	Base Case	**566.67**	**18.8%**
	+25% cost	477.68	15.7%
	-25% demand decrease	336.01	15.0%
	+25% demand increase	797.34	20.3%
	+ 25% cost and -25% demand decrease	370	17.6%
Option 2 **Eastern Railway Line (Standalone)**	Base Case	**9,948.97**	**21.6%**
	+25% cost	9,573.93	18.2%
	-25% demand decrease	7,086.69	17.3%
	+25% demand increase	12811.26	25.3%
	+25% cost and -25% demand decrease	6,711.65	14.3%
Option 3 **Boankra Inland Port and Eastern Railway Line (Freight only)**	Base Case	**9,227.41**	**17.9**
	+25% cost	8,791.13	15.0
	-25% demand decrease	6,484 .28	14.2
	+25% demand increase	11970.54	21.1
	+25% cost and -25% demand decrease	6,048.00	11.5
Option 4 **Boankra Inland Port and Eastern Railway Line (Freight and Passenger)**	Base Case	**9,704**	**18.7%**
	+25% cost	9,268	15.6%
	-25% demand decrease	6,842	14.8%
	+25% demand increase	12,566	22.0%
	+25% cost and -25% demand decrease	6,405	12.1%

13. Risk Assessment

13. Risk Assessment

13.1. Introduction

Risks are an inherent part of PPP projects, particularly, a project of this size and complexity. This chapter identifies the risks associated with the various aspects of this project. These risks have been quantified and allocated to the party that is best placed to manage them in a cost effective way. Appropriate mitigation measures have also been identified to avoid the occurrence or minimise the impacts of these risks, should they materialise.

This risk assessment has been undertaken for the combined Boankra Inland Port and the Eastern Railway Line carrying freight which was identified as the most suitable for the project in the Options Analysis in Chapter 4. We have recommended two separate PPP transactions for the project, therefore, we have undertaken separate risk assessments for the Boankra Inland Port and Eastern Railway Line respectively because the risk characteristics for the Inland Port and Railway Line would be different.

13.2. Identification and Categorisation of Risk

We have evaluated the project against standard risk management criteria for large scale infrastructure projects and selected the risks applicable to the implementation of the project. We then used the risk matrix below to determine a rating for each risk based on the risk's likelihood of occurrence and the severity of impact should they ensue.

Table 13-1: Risk Matrix

Risk Matrix					
	LIKELIHOOD OF OCCURENCE				
SEVERITY	1. Rare	2. Unlikely	3. Moderate	4. Likely	5. Almost Certain
1. Minor	1	2	3	4	5
2. Moderate	2	4	6	8	10
3. Serious	3	6	9	12	15
4. Major	4	8	12	16	20
5. Catastrophic	5	10	15	20	25

13.3. Risk Register, Quantification and Proposed Risk Allocation

We have developed a risk register identifying and explaining all applicable risks in the table below. We have also allocated each risk to the parties (i.e. GoG and the Private Party) in the PPP arrangement and suggested measures for mitigation.

Table 13-2: Risk Register and Mitigation Measures

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
Project Risks	1. Environmental and social impact risk	**Low**	**Medium**	1. Comprehensive review and validation of existing Environmental Management Plans and Social Management Plans. 2. Identification and mitigation of environmental impacts of the project. 3. Procurement of environmental and social impact insurance.	**Low**	**Low**
	2. Concession risk	**Medium**	**High**	1. Concession agreement should set out penalties for inability of each party to meet obligations to ensure approvals.	**Low**	**Medium**
	3. Viability gap risk	**High**	**Low**	1. Comprehensive financial projections should indicate any viability gap. 2. Parties should agree on Government's viability gap funding arrangements.	**Medium**	**Low**
	4. Completion risk	**Low**	**High**	1. Cover with a performance bond. 2. Have regular monitoring, reviews and discussion of project status.	**Low**	**Medium**

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
				3. Comprehensive project planning, preparation and mobilisation. 4. Reduce time between planning or mobilisation phase and implementation stage.		
	5. Project Delays	**Medium**	**High**	1. Accelerate work by redefining critical procedures. 2. Monitor work done by contractor and make sure delays outside your control are recognised and documented.	**Low**	**Medium**
Finance Risks	1. Interest rate risk	**Medium**	**High**	1. Lock in rates for project loans. 2. Forward Rates Agreement which would serve as a way to maintain a fixed rate of interest over long concession periods. 3. Smoothing of Interest Rates to allow loans to be divided and part being a fixed rate and the other being a variable rate within the construction and operational phase of the concession periods.	**Low**	**Medium**

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
	2. Inflation risk	**Medium**	**High**	1. Benchmark tariff to inflation. 2. Obtain insurance cover for inflation above a certain baseline.	**Low**	**Medium**
	3. Exchange rate risk	**Medium**	**High**	1. Borrowing of Cedi component of debt to cover local currency denominated expenses. 2. Forward contracts to sell or purchase foreign currency amounts at a future time and a given exchange rate. 3. Credit Guarantees to cover losses in the event of a debt service default regardless of the cause of default. 4. Partial Credit Guarantees (PCGs) should be used to cover "part" of the debt service of a debt instrument regardless of the cause of default. Multilaterals and a few bilateral agencies offer PCG instruments.	**Medium**	**Medium**
	4. Lack of equity and debt funding for the project	**High**	**High**	1. Provision of sovereign guarantee to potential lenders.	**Medium**	**Medium**

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
				2. Escrow of equity by private partners prior to beginning of construction.		
	5. High finance costs	Medium	High	1. Lock in rates. 2. Provision of sovereign guarantees to lenders.	Low	Medium
Political and Regulatory Risks	1. Existing laws and frameworks	Medium	Medium	1. Review all agreements and project documents to ensure compliance with existing laws and policies. 2. Engage with key stakeholders and legal authorities to understand requirements for compliance and approvals.	Low	Low
	2. Future laws and directives	Medium	Medium	1. Obtain all necessary cabinet and parliamentary approvals before project commencement.	Low	Low
	3. Third party objections	Low	Low	1. Allow transparency to allow third parties to understand the project concept and processes.	Low	Low
	4. Government withdrawing from PPP	High	Medium	1. The contract for the project should have the necessary clauses built in to prevent any Government from backing out of the PPP contract without any justifiable reason.	Low	Low

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
				2. Guarantees or Insurance can be used to cover the default by a sovereign or corporate entity		
	5. Government changing terms of the contract or not fulfilling their contractual obligations	**High**	**Medium**	1. The contract for the project should include compensation to be paid to the investor if Government does not fulfil its obligations.	**Medium**	**Low**
	6. Government's failure to implement tariff increases	**High**	**Medium**	1. The contract for the project should include compensation to be paid to the investor if Government does not fulfil its obligations.	**Medium**	**Low**
Design and Construction Risks	1. Inadequate designs	**Low**	**Medium**	1. Review and inspection of designs by third party experts. 2. Cover with a performance bond or a contractor's insurance.	**Low**	**Low**
	2. Project cost overruns	**Low**	**High**	1. Create a contingency account to cover potential overruns. 2. Obtain insurance to cover unexpected increases in equipment and material cost. 3. Have regular reviews, monitoring and discussion of budget and projected costs.	**Low**	**Medium**

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
	3. Poor quality of construction	Low	Medium	1. Review and inspection of design by third party experts. 2. Agreement on quality of raw materials and construction methods to be used. 3. Monitoring and evaluation of project once construction starts.	Low	Low
	4. Equipment and material unavailability	Low	Medium	1. Sign supply agreements with potential suppliers. 2. Have back up plans for equipment and materials suppliers.	Low	Low
	5. Construction accidents	Low	High	1. Enforcement of health and safety standards agreed with contractors. 2. Use of Contractors' All Risk Insurance.	Low	Medium
	6. Construction force majeure events	Medium	Medium	1. Pre-agreed clauses on what happens in case of a force majeure event, with clearly defined triggers. 2. Force majeure insurance to cover events.	Low	Low

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
	7. Relocation of utilities infrastructure	Medium	Medium	1. Engage with utility companies and develop a plan agreed by all parties for relocating the infrastructure. 2. Adjust model and financial estimates to include the added cost of relocating infrastructure.	Low	Low
	8. Unforeseen site conditions	Low	Low	1. Detailed site investigations should be undertaken.	Low	Low
	9. Failure to meet agreed milestones	Medium	High	1. Strict adherence to schedule. 2. Planning for inefficiencies in labour and equipment utilisation. 3. Increasing working hours, including weekends, holidays, night and shift working.	Low	Medium
Operational Risks	1. Revenue/Demand risk	High	High	1. Rigorous financial forecasting, with realistic estimate of key drivers. 2. Scenario planning and analysis to include higher than forecasted tariff increases.	Medium	Low
	2. Maintenance cost overrun	Low	High	1. Rigorous financial projections.	Low	Medium

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
				2. Implementation of routine maintenance clauses to reduce the risk of major damage.		
	3. Breach of contract or expropriation	**Medium**	**Medium**	1. Penalty clauses for breach of contract 2. Procurement of political risk insurance by the concessionaire	**Low**	**Low**
	4. Operator performance issues	**Low**	**High**	1. Comprehensive due diligence on the operator and confirmation of capability 2. Agreement of performance standards and targets 3. Procurement of a performance bond to cover operator delivery of the project	**Low**	**Medium**
	5. Operational force majeure	**Medium**	**Medium**	1. Clear definition of force majeure events and agreement of action steps in case of a force majeure event 2. Procurement of operational force majeure insurance	**Low**	**Low**

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
	6. Residual value risk	Low	Medium	1. Agreement between parties on expected state of asset at transfer 2. Enforcement of routine maintenance and major maintenance contracts	Low	Low
	7. Wage Inflation	Medium	High	1. Fixed wages should have a flexibility clause to accommodate currency inflation	Low	Medium
	8. Accident risk	Medium	High	1. Compliance with health and safety rules and regulations. 2. Regular health and safety checks.	Low	Low
	9. Labour issues	Low	Low	1. Improved working conditions for workers. 2. Increased incentive for contractors.	Low	Low
	10. Customs risk	Medium	Low	1. The investor and Government should engage with customs prior to implementation of the project to receive their input and buy-in regarding the implementation of customs procedures.	Low	Low

Table 13-3: Key Risks Allocation for the Boankra Inland Port

Risk	Allocated to
Project Risks	Shared
Finance Risk	Private Party
Political and Regulatory Risk	Government
Design and Construction Risk	Private Party
Operational Risk	Private Party
Demand/Revenue Risk	Private Party

From Table 13-3, it can be seen that the private party takes up a significant proportion of the key risks for developing the Boankra Inland Port.

13.4. Risk Register, Quantification and Proposed Risk Allocation for the Eastern Railway Line

We have developed a risk register identifying and explaining all the applicable risks for the Eastern Railway Line in the table below. We have also allocated each risk to the parties (i.e. GoG and the Private Party) in the PPP arrangement and suggested measures for mitigation.

Table 13-4: Risk Register and Mitigation for the Eastern Railway Line

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
Project Risks	1. Environmental and social impact risk	**High**	**Medium**	1. Comprehensive review and validation of existing Environmental Management Plans and Social Management Plans. 2. Identification and mitigation of environmental impacts of the project. 3. Procurement of environmental and social impact insurance.	**Medium**	**Low**
	2. Concession risk	**Medium**	**High**	1. Concession agreement should set out penalties for inability of each party to meet obligations to ensure approvals.	**Low**	**Medium**
	3. Right of way and land compensation risk	**High**	**Medium**	1. Resettlement plan should be designed to include compensation packages for loss of property by affected persons along the route.	**Medium**	**Low**
	4. Viability gap risk	**High**	**Low**	1. Comprehensive financial projections should indicate any viability gap. 2. Parties should agree on Government's viability gap funding arrangements.	**Medium**	**Low**

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
	5. Completion risk	**High**	**Low**	1. Have regular monitoring, reviews and discussion of project status. 2. Comprehensive project planning, preparation and mobilisation. 3. Reduce time between planning or mobilisation phase and implementation stage.	**Medium**	**Low**
	6. Project Delays	**High**	**Low**	1. Accelerate work by redefining critical procedures. 2. Monitor work done by contractor and make sure delays outside your control are recognised and documented.	**Medium**	**Low**
Finance Risks	1. Interest rate risk	**High**	**Medium**	1. Lock in rates for project loans. 2. Forward Rates Agreement which would serve as a way to maintain a fixed rate of interest over long concession periods. 3. Smoothing of Interest Rates to allow loans to be divided and part being a fixed rate and the other being a variable rate within the	**Medium**	**Low**

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
				construction and operational phase of the concession periods.		
	2. Inflation risk	**High**	**Medium**	1. Benchmark tariff to inflation. 2. Obtain insurance cover for inflation above a certain baseline. 3. Agree between parties for tariff increases above a certain baseline to be covered by Government or passed on to taxpayers.	**Medium**	**Low**
	3. Exchange rate risk	**High**	**Medium**	1. Borrowing of Cedi component of debt to cover local currency denominated expenses. 2. Forward contracts to sell or purchase foreign currency amounts at a future time and a given exchange rate. 3. Credit Guarantees to cover losses in the event of a debt service default regardless of the cause of default. 4. Partial Credit Guarantees (PCGs) should be used to cover "part" of the debt service of a debt instrument regardless of the cause	**Medium**	**Low**

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
				of default. Multilaterals and a few bilateral agencies offer PCG instruments.		
	4. Lack of equity and debt funding for the project	**High**	**Medium**	1. Provision of sovereign guarantee to potential lenders. 2. Escrow of equity by private partners prior to beginning of construction.	**Medium**	**Low**
	5. High finance costs	**High**	**Medium**	1. Lock in rates. 2. Provision of sovereign guarantees to lenders.	**Medium**	**Low**
Political and Regulatory Risks	1. Existing laws and frameworks	**Medium**	**Low**	1. Review all agreements and project documents to ensure compliance with existing laws and policies. 2. Engage with key stakeholders and legal authorities to understand requirements for compliance and approvals.	**Low**	**Low**
	2. Future laws and directives	**Medium**	**Low**	1. Obtain all necessary cabinet and parliamentary approvals before project commencement.	**Low**	**Low**

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
	3. Third party objections	Medium	Low	1. Allow transparency to allow third parties to understand the project concept and processes.	Low	Low
	4. Government withdrawing from PPP	Medium	Medium	1. The contract for the project should have the necessary clauses built in to prevent any Government from backing out of the PPP contract without any justifiable reason. 2. Guarantees or Insurance can be used to cover the default by a sovereign or corporate entity	Low	Low
	5. Government changing terms of the contract or not fulfilling their contractual obligations	High	Medium	1. The contract for the project should include compensation to be paid to the investor if Government does not fulfil its obligations.	Medium	Low
	6. Government's failure to implement tariff increases	High	Medium	1. The contract for the project should include compensation to be paid to the investor if Government does not fulfil its obligations.	Medium	Low
Design and Construction Risks	1. Inadequate designs	High	Low	1. Review and inspection of designs by third party experts. 2. Cover with a performance bond or a contractor's insurance.	Medium	Low

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
	2. Project cost overruns	**High**	**Low**	1. Create a contingency account to cover potential overruns. 2. Obtain insurance to cover unexpected increases in equipment and material cost. 3. Have regular reviews, monitoring and discussion of budget and projected costs.	**Medium**	**Low**
	3. Poor quality of construction	**High**	**Low**	1. Review and inspection of design by third party experts to ensure the right quality of raw materials and construction methods is used. 2. Monitoring and evaluation of project once construction starts.	**Medium**	**Low**
	4. Equipment and material unavailability	**Medium**	**Low**	1. Sign supply agreements with potential suppliers. 2. Have back up plans for equipment and materials suppliers.	**Low**	**Low**
	5. Construction accidents	**High**	**Low**	1. Enforcement of health and safety standards agreed with contractors.	**Medium**	**Low**

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
				2. Use of Contractors' All Risk Insurance.		
	6. Construction force majeure events	Medium	Low	1. Pre-agreed clauses on what happens in case of a force majeure event, with clearly defined triggers. 2. Force majeure insurance to cover events.	Low	Low
	7. Relocation of utilities infrastructure	Medium	Low	1. Engage with utility companies and develop a plan agreed by all parties for relocating the infrastructure. 2. Adjust model and financial estimates to include the added cost of relocating infrastructure.	Low	Low
	8. Unforeseen site conditions	Medium	Low	1. Detailed site investigations should be undertaken.	Low	Low
	9. Failure to meet agreed milestones	High	Medium	1. Strict adherence to schedule. 2. Planning for inefficiencies in labour and equipment utilisation. 3. Increasing working hours, including weekends, holidays, night and shift working.	Medium	Low

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
Operational Risks	1. Revenue/Demand risk	**Low**	**High**	1. Rigorous financial forecasting, with realistic estimate of key drivers. 2. Scenario planning and analysis to include higher than forecasted tariff increases.	**Low**	**Medium**
	2. Maintenance cost overrun	**Low**	**High**	1. Rigorous financial projections. 2. Implementation of routine maintenance clauses to reduce the risk of major damage.	**Low**	**Medium**
	3. Breach of contract or expropriation	**Medium**	**Medium**	1. Penalty clauses for breach of contract 2. Procurement of political risk insurance by the concessionaire	**Low**	**Low**
	4. Operator performance issues	**Low**	**High**	1. Comprehensive due diligence on the operator and confirmation of capability 2. Agreement of performance standards and targets 3. Procurement of a performance bond to cover operator delivery of the project	**Low**	**Medium**

Risk Category	*Risk Factors*	*Risk Allocated to GoG*	*Risk Allocated to Private Party*	*Suggested Mitigations*	*Remaining Risk Allocated to GoG*	*Remaining Risk Allocated to Private Party*
	5. Operational force majeure	Medium	Medium	1. Clear definition of force majeure events and agreement of action steps in case of a force majeure event 2. Procurement of operational force majeure insurance	Low	Low
	6. Residual value risk	Low	Medium	1. Agreement between parties on expected state of asset at transfer 2. Enforcement of routine maintenance and major maintenance contracts	Low	Low
	7. Wage Inflation	Medium	High	1. Fixed wages should have a flexibility clause to accommodate currency inflation	Low	Medium
	8. Accident risk	Medium	High	1. Compliance with health and safety rules and regulations. 2. Regular health and safety checks.	Low	Low
	9. Labour issues	Low	Low	1. Improved working conditions for workers. 2. Increased incentive for contractors.	Low	Low

Table 13-5: Key Risks Allocation for the Eastern Railway Line

Risk	Allocated to
Project Risks	Government
Finance Risk	Government
Political and Regulatory Risk	Government
Design and Construction Risk	Government
Operational Risk	Private Party
Demand/Revenue Risk	Private Party

From Table 13-5, it can be seen that the Government takes up a significant proportion of the key risks for developing the Standalone Eastern Railway Line.

14. Financial Analysis

14. Financial Analysis

14.1. Introduction

This chapter assesses the financial viability of the Inland Port and Eastern Railway Line Projects as standalone and combined projects respectively.

14.2. Financial Viability Assessment of Inland Port and Eastern Rail Line

In order to assess the financial soundness (viability and bankability) of the projects, we developed a base case financial models. (i.e. without any form of Government support) for the standalone and the combined projects. We then developed proposed models (i.e. with GoG support) to make the projects viable and bankable.

Additionally, we have considered a project finance mechanism where the project is financed with limited recourse debt and this forms the basis for our assessment in this section.

The approach and assumptions that we have used are detailed below.

14.2.1. Financial Assessment Framework

Our financial model includes the following interlinked sheets:

- Data input and assumptions;
- Capital costs (construction);
- Operating costs;
- Taxes;
- Depreciation;
- Financings/Capital Structure/Loan Schedules;
- Income statement;
- Balance sheet; and
- Cash flow.

Generally, the input into the financial model included the following elements:

Table 14-1: Input List

Element	Inputs
Time based and macro-economic assumptions	• Inflation rate and forecast; • Foreign exchange rate and forecast; and • Concession period, construction period and operations period.
Project Costs	• Preliminary cost of civil works(inland port and rail for freight & passenger services); • Labour and management costs related to the development of the Project; and • Insurance and financing costs.

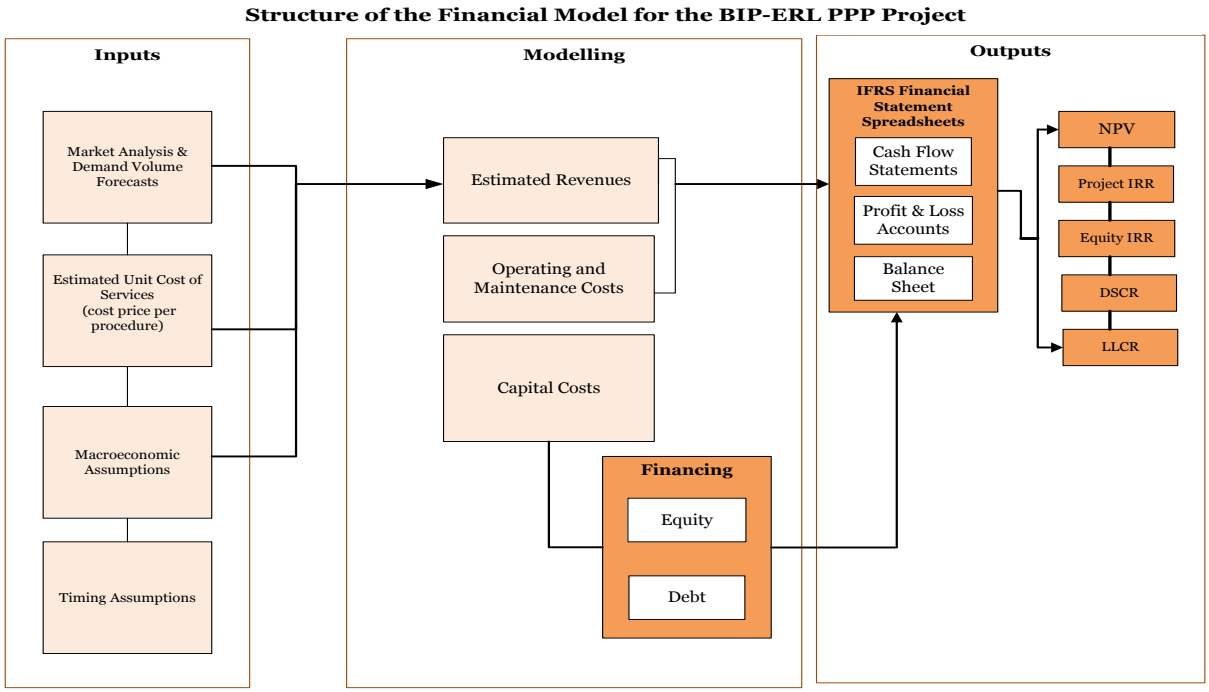
Element	Inputs
Revenue Input	• Tariff; • Traffic count, traffic mix; and • Growth rate and demand forecast.
Financing Inputs - funding sources	• Funding mix – debt, equity, grants; • Debt – Currency, Tenor, repayments, interest rate (fixed/floating); and • DSRA requirements.
Operation and maintenance cost	• Routine maintenance; and • Major maintenance.

The financial model output included:

- NPV;
- Project IRR;
- Equity IRR;
- DSCR (Minimum DSCR and Average DSCR); and
- LLCR.

The diagram below provides an overview of the architecture of the financial model that we have developed.

Figure 14-1*: Summary of Financial Modelling Framework*



14.2.2. Key Financial Model Assumptions for Standalone Boankra Inland Port

This section summarises the key assumptions that we have used in developing the models.

14.2.2.1. Timing Inputs

The model runs from January 2018 (expected start of construction) until December 2047 (3 years for construction and 27 years for operation period).

The construction period of 3 years is modelled on a yearly basis from year one until year three (3) whilst the operational period of 27 years is also modelled on an annual basis commencing from year four (4). The key dates assumed are set out in Table 14.1 below.

Table 14-2: Timeline Assumptions

Inland Port Construction of Inland Port (Standalone Option)	
Construction Starts	01-Jan-18
Duration	3 years
Construction Ends	31-Dec-20
Operations of Inland Port (Standalone Option)	
Pre-Operation Period/Testing/Commissioning (3 months)	01 Jan 21 – 31 Mar 21
Operation Starts	01-April-21
Duration	26.75 years
Operation Ends	31-Dec-47

14.2.2.2. Cost Assumptions

Table 14-3: Cost Assumptions

Category	Assumption	Comment
Construction cost Amount	US$119.23 million	See Chapter 7

14.2.2.3. Operations and Maintenance Costs

Our assumptions on the operations and maintenance cost elements for the Inland Port are shown in the table below.

Table 14-4: Cost Proportion Assumptions

Item	Basis	Value
Annual Cost of Overheads	% of overall O&M costs	7.5%
Maintenance Costs (Rail Infrastructure ,Buildings and other infrastructure)	% of Capex	1.0%
Estimated Insurance Costs	% of value of Asset	0.6%

14.2.2.4. Revenue Assumptions

Our revenue assumptions were built on three important stepping stones:

- Traffic counts as per Chapter 5.0 of this report
- Traffic growth forecast as per Chapter 5 of this report
- Tariffs as per Chapter 5 and GPHA Tariff Book. This book contains a tariff schedule which indicates the tax or duty to be paid on a particular class of imports or exports.

14.2.2.5. Financing Assumptions

The principal terms of the credit facilities used in the financial modelling are summarised in the table below.

Table 14-5: Financial Assumptions

Category	Value
Facility Description	Term loan
Capex Cost	US$119.23 million
Debt/Equity Ratio	60/40
Equity Amount – 40%	US$47.69 million
Debt Amount – 60%	US$71.54 million
Debt Split	
Debt - World Bank IBRD Fixed Spread Flexible Loan – 74% of Debt	US$52.8 million
Debt- Export Credit Agency (EXIM Bank) Loan – 26% of Debt towards Equipment	US$18.7 million
Blended Financing facility from (World Bank IBRD and ECA EXIM)	
World Bank IBRD Fixed Spread Flexible Loan interest rate	3.90%
World Bank IBRD Fixed Spread Flexible Loan tenor	20 years
World Bank IBRD Fixed Spread Flexible Loan moratorium period	5 years
Export Credit Agency of USA (EXIM Bank) Loan interest rate**	3.75%
Export Credit Agency of USA (EXIM Bank) Loan tenor**	12 years
Export Credit Agency of USA (EXIM Bank) Loan moratorium period**	3 years
NB: • The loan amount required for equipment was allocated to ECA –EXIM facility and the remaining loan for construction was allocated to multi-lateral, World Bank IBRD Fixed Spread Flexible Loan facility. *Debt Split (as a % of total project cost)* • Interest rate during construction and operations has been calculated at 3.90% • World Bank Treasury (http://treasury.worldbank.org/). • ** The Export Credit Agency of USA (EXIM Bank) Loan term was based on a similar financing of port equipment in Ghana	

We have also assumed that the debt facility used is blended finance approach. Under the blended debt financing, these projects are financed with loans from more than one development finance institution and/ or export credit agency. The decision to apply this form of financing was hinged on the fact that only one DFI will not be able to finance the relatively significant debt support required for these projects.

Table 14-6: Inland Port Capacity and Depreciation/Tax/Inflation Assumption

Category	Basis	Value
Depreciation Method	Straight Line Method	-
Corporate Tax Rate	25% (over the concession period)	
Total Capacity (TEUs) of the Inland Port	TEUs	150,000
US$ Inflation	Approximately 2% over the concession period (Source: US CPI from the Bureau of Labor Statistics (http://www.bls.gov/cpi/)	

14.2.2.6. Escalation

We have assumed the following escalation rates which are driven by inflation.

Table 14-7: Escalation Factor

Category	Basis	Value
US$ Inflation rate	Per annum	2%
Tariff Escalation factor	Per annum	2%
O&M Cost Escalation factor	Per annum	2%
Annual Salary Increment (Payroll Escalation Factor)	Per annum	2%

Table 14-8: Contingency Arrangements during construction Inland Port and Railway Line

Item	Basis	Value
Physical contingency during the construction period	% of EPC Costs	10%
Inflation contingency during the construction period	% of EPC Costs	5%

14.2.3. Assumptions for Standalone Eastern Railway Line ("ERL")

This section summarises the key assumptions used in the models.

14.2.3.1. Timing Inputs

The model runs from October 2020 (expected start of construction) until October 2025 (5 years for construction and 27 years for operation period).

The construction period of 5 years is modelled on a yearly basis from year one until year five whilst the operational period of 27 years is also modelled on an annual basis commencing from year six. The key dates assumed are set out in Table 14.8 below.

Table 14-9: Timeline Assumptions

Construction of Railway Line	
Land Acquisition and Resettlement (33 months)	01 Jan 18 – 01 Oct 20
Construction Starts	02-Oct-20
Duration	5 years
Construction Ends	02-Oct-25
Operations of Railway	
Pre-Operation Period/Testing/Commissioning (3 months)	03 Oct 25 – 03 Jan 26
Operation Starts	04-Jan-26
Duration	27 years
Operation Ends	04-Jan-53

14.2.3.2. Preparation Activities by Government/GRDA

Land acquisition and resettlement is assumed to be completed entirely by Government/GRDA.

14.2.3.3. Capex Allocations Assumptions

We have considered two alternatives to by which the capex for the Eastern Railway Line can be allocated between government and the private party. The total capex for both Alternative A and Alternative B is US$ 1,378.97 million.

Table 14-10: Capex Assumptions

	Assumption	Comment
Alternative A		
Private party invests in infrastructure, rolling stock and operations and maintenance	US$ 1378.97 million	See Chapter 8.
Alternative B		
GoG/GPHA/GSA invests in railway infrastructure	US$1048.57 million	See Chapter 8.
Private party invests in rolling stock, operation and maintenance	US$330.40 million	

14.2.3.4. Operations and Maintenance Costs

Our assumptions on the Operations and Maintenance Cost elements for the Eastern Railway line have been detailed in chapter 8 of this report.

14.2.3.5. Revenue Assumptions

Our revenue assumptions were built on three important stepping stones:

- Traffic counts as per Chapter 5
- Traffic growth forecast as per Chapter 5
- Tariffs as per Chapter 6

Table 14-11: Financing Assumptions

Category	Value
Facility Description	Term loan
Capex Cost (i.e. Rolling Stock, Sidings and Terminal/Other Facilities)	US$ 330 million
Debt/Equity Ratio	60/40
Equity Amount – 40%	US$132 million
Debt Amount – 60%	US$ 198 million
Debt Split (as a % of Debt)	
• Debt - AfDB Sovereign Guaranteed Fixed Spread Loan (Split is 37% of Debt)	US$73 million
• Debt- IFC Loan (Split is 37% of Debt)	US$73 million
• Debt - Export Credit Agency (EXIM Bank) Loan (Split is 26% of Debt for rolling stock)	US$52 million
Blended Financing facility from (AfDB, IFC and ECA EXIM)	
AfDB Sovereign Guaranteed Fixed Spread Loan interest rate	2.00%
AfDB Sovereign Guaranteed Fixed Spread Loan tenor	20 years
AfDB Sovereign Guaranteed Fixed Spread Loan moratorium period	5 years
IFC Loan interest rate*	6.86%
IFC Loan tenor*	3 years
IFC moratorium period*	12 years
Export Credit Agency of USA (EXIM Bank) Loan interest rate**	3.75%
Export Credit Agency of USA (EXIM Bank) Loan tenor**	12 years
Export Credit Agency of USA (EXIM Bank) Loan moratorium period**	3 years
Sources: • African Development Bank Treasury (http://www.afdb.org/en/documents/financial-information/lending-rates/) **Note:** • *IFC Loan terms were based on power projects with similar financial arrangement undertaken by the IFC in Ghana • ** The Export Credit Agency of USA (EXIM Bank) Loan terms were based on a similar financing for EPC and Rolling Sector in the transport sector in Ghana	

We have assumed that a blended finance approach will be used to finance the debt portion. This approach means that these projects will be financed with loans from more than one development finance institution and/ or export credit agency. The decision to apply this form of financing was hinged on the fact that only one Development Finance Institution ("DFI") will not be able to finance the relatively significant debt support required for these projects.

Table 14-12: Depreciation Assumptions

Category	Basis	Value
Depreciation Method	Straight Line Method	-

Table 14-13: Tariff Assumptions

Traffic	Basis	Road Tariff	Rail Tariff (70%)
Cocoa	US$ per tonnes per km	0.25	0.175
Cement	US$ per tonnes per km	0.06	0.042
Petroleum	US$ per tonnes per km	0.21	0.147
Passenger (Ticket Fare)	US$ per km	0.03	0.021
Other Cargo	US$ per tonnes per km	0.12	0.105

14.2.4. Project Evaluation Criteria

The financial viability assessment of the project options was carried out using a discounted cash flow model that takes into account capital, maintenance, operating costs and revenues anticipated for the project.

The major indicators of project financial viability are the ability of the project to service the debt raised for the project and generate returns on equity investment more than or equal to the Weighted Average Cost of Capital ("WACC").

We have computed the following performance indicators to assess the viability of the project:

- Project Internal Rate of Return ("PIRR"),
- Equity Internal Rate of Return ("EIRR"),
- Debt Service Coverage Ratio ("DSCR") and
- Loan Life Cover Ratio ("LLCR").

We have used a benchmark/criteria for assessing the financial viability13 of infrastructure projects in our market and these are:

- Equity internal rate of return (Equity IRR) equal or greater than 22%; and
- Average Debt Service Coverage Ratio (DSCR) equal or more than 1.5.

14.3. Financial Viability Assessment of the Standalone and Combined Projects without Government Support

In the base case assessment we have assumed that there is no form of government assistance towards the development of the project. Additionally, we have an assumed that the entire capital cost of the project is financed using equity and debt. The equity capital is provided by the private concessionaire and the debt

[13] Based on market sounding activities to gauge investor interest in the project; and the publication - "Mobilising Finance for Infrastructure, Ghana Country Case Study". August 2015. DFID.

financing is sought from development finance institutions and export credit agencies to support the development of the project.

Table 14-14 below summarises the financial results for the base case assessment (i.e. without GoG Support) of the project for all four (4) project options.

Table 14-14: Financial Results for Base Case Scenario (i.e. Without Government Assistance)

Project Option	Details	Results
Standalone Boankra Inland Port with Road Connection only	Project IRR	4.4%
	Equity IRR	5.0%
	Net Present Value (NPV) -in US$ million	(52.45)
	Average DSCR	1.64
	Minimum DSCR	1.30
	Average LLCR	2.08
Standalone Eastern Railway Line for Freight Services Only	Project IRR	13.9%
	Equity IRR	19.5%
	Net Present Value (NPV)-in US$ million	296.97
	Average DSCR	7.28
	Minimum DSCR	2.06
	Average LLCR	12.62
Combined Boankra Inland Port and Eastern Railway Line with Freight Services Only	Project IRR	12.6%
	Equity IRR	17.2%
	Net Present Value (NPV)-in US$ million	177
	Average DSCR	5.36
	Minimum DSCR	1.15
Combined Boankra Inland Port and Eastern Railway Line with Freight and Passenger Services	Project IRR	10.4%
	Equity IRR	13.7%
	Net Present Value (NPV)-in US$ million	(36)
	Average DSCR	4.84
	Minimum DSCR	1.16

Our analysis indicate that all the four project options, are not financially viable without GoG support. All four projects fail to meet the viability criteria of having an Equity IRR of 22% and an Average DSCR of 1.5.

For the Boankra Inland Port Standalone with road option, the results showed an average DSCR of 1.64 which is greater than 1.5 but the Equity IRR of 5.0% was significantly less than the 22% benchmark..

The standalone Eastern Railway Line with only freight operations has an Equity IRR of 19.5% which is less than the required Equity IRR of 22% and an average DSCR of 7.28 which is greater than the required average DSCR of 1.5. Since this project option was unable to meet both elements of the criteria, it implies that the base case assessment of this option is also not financially feasible.

Similarly, both combined project options showed relative strong Average DSCR which were greater than the required 1.5 but their required Equity IRR fell short of the required 22%. Hence the two (2) combined project options did not meet the required project viability criteria to pass for financial feasibility.

From the financial results above, the standalone and combined projects are not financially viable and bankable without any form of Government support.

14.3.1. Viability Assessment of the Proposed Models with Government Support

Based on the assessment of the respective cost of funding for each option as well as the prospects of obtaining financing and capital investment for the project options, we were able to establish from the outcomes of our options analysis that for the Boankra Inland Port and Eastern Railway Line Project to meet its objectives and be implemented successfully as a PPP, it would have to be carried out as two separate concessions.

It is on this basis that our viability assessment of the Boankra Inland Port and Eastern Railway Line project considers only the standalone options. Although both standalone projects from our base case assessment emerged to be financially unviable, we have proposed some financial support measures from GoG such as grant, availability payment and public investment of the infrastructure to make the projects financially viable/bankable and these include:

- For the standalone Boankra inland port with road connection, we propose that either GoG pays a fixed periodic availability payment or an upfront grant payment towards the construction of the infrastructure. Another option we have considered is that GoG/public sector pays for infrastructure risk whereas the equipment, operations and maintenance is with the private sector;

- Regarding the standalone Eastern Railway Line, we propose that public sector /GoG develops the infrastructure through public funding whereas the rolling stock, operations and maintenance is with the private sector.

The financial results for the proposed financial supports from GoG to make the projects financially viable are shown in Table 14-15 below.

Table 14-15: Financially Viable Considerations for the Project Options

Project Option	Financial Viability Consideration	Details	Results
Standalone Boankra Inland Port with Road Connection Only	Availability Payments	Annual Availability Payment required	US$33 million
		NPV of Availability Payments over the concession period	US$250 million
		Project IRR	13%
		Equity IRR	22%
		Net Present Value (NPV)	US$160.3 million
		Average DSCR	4.0
		Minimum DSCR	2.9
		Average LLCR	3.8
Standalone Boankra Inland Port with Road Connection Only	Grant	Grant Percentage of Project Cost	61.6%
		NPV of Grant	US$65.0 million
		Total Grant **	US$80.59 million
		Project IRR	4.4%
		Equity IRR	22.0%
		Net Present Value (NPV)	US$6.3 million

Project Option	Financial Viability Consideration	Details	Results
		Average DSCR	3.1
		Minimum DSCR	2.6
		Average LLCR	4.4
Standalone Boankra Inland Port with Road Connection Only	Landlord Model with revenue share	Project IRR	11.7%
		Equity IRR	22.4%
		Net Present Value (NPV)	US$2.16 million
		Average DSCR	3.00
		Minimum DSCR	1.86
		Average LLCR	3.18
		Revenue Share % of Total Revenue over Concession Period	46%
Standalone Eastern Railway Line for Freight Services Only	Landlord Model with revenue share	Project IRR	15.2%
		Equity IRR	22.1%
		Net Present Value (NPV)	US$95 million
		Average DSCR	3.07
		Minimum DSCR	2.34
		Average LLCR	12.92
		Revenue Share % of Total Revenue over Concession Period	68.0%
NOTE: For the Eastern railway line, landlord model, the rolling stock/ port equipment costs and operation and maintenance will be borne by the private concessionaire whilst GoG fund the railway infrastructure. ** The GoG grant support applied towards the Boankra Inland Port			

The results above show that with GoG financial support either through availability payments, grant or funding the infrastructure, financial viability criteria for Equity IRR of 22% and Average DSCR of 1.5 for the standalone Inland Port and Eastern Railway line are met.

For the Standalone Boankra Inland Port, we suggest that this project is developed with a grant support from GoG whilst the private party finance the port infrastructure, port equipment and operations and maintenance. The financial support using the grant measure is cheaper to GoG than either funding the port infrastructure or making a fixed periodic availability payments by GoG.

Based on the financial results above, the standalone Inland Port and Eastern Railway Line projects are more viable as two separate transactions than as a one combined transaction. However, we suggest that the Inland port and the Eastern railway line projects should work together due to the synergies between the two activities.

14.4. Revenue Estimation and Cash flows

We have used our financial model to estimate the expected revenue for our recommendation of both the Inland Port (with Grant Support) and Eastern Railway Line (Landlord Model with revenue share).

We have assumed that revenue generation from the Boankra Inland Port project will commence when operations begins in 2021 whilst he Eastern Railway Line on the other hand is expected to commence operations in 2026.

14.4.1. Estimated Revenue and Cash flows for the Boankra Inland Port Stand alone with Grant Support

We have estimated the revenue for the Boankra Inland Port based on the assessment of the forecasted traffic volumes and the respective tariffs for freight operations.Table 14-16 shows the estimated revenue for this option.

Figure 14-1 to Figure 14-3 also shows graphs of the following:

- Cumulative vrs Periodic Pre-Financing Cash flow;
- Operating Revenue vrs Operating Cost vrs EBITDA Margin; and
- Cash flow Available for Debt Service (CFADS) vrs Debt Service.

Table 14-16: Estimated Revenue for the Standalone Boankra Inland Port using road connection only

Year	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Revenue (US$ million)	203.14	217.22	232.28	248.39	265.62	284.06	303.78	324.89	347.47	371.64	397.49	425.16	454.77	486.45

Year	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052
Revenue (US$ million)	520.36	556.64	595.48	637.04	681.52	729.14	780.10	834.65	893.05	938.19	979.56	1,023.33	1,069.66

Figure 14-1: Cumulative vrs Periodic Pre-Financing Cash flow-Boankra Inland Port using road connection only (with GoG Grant)

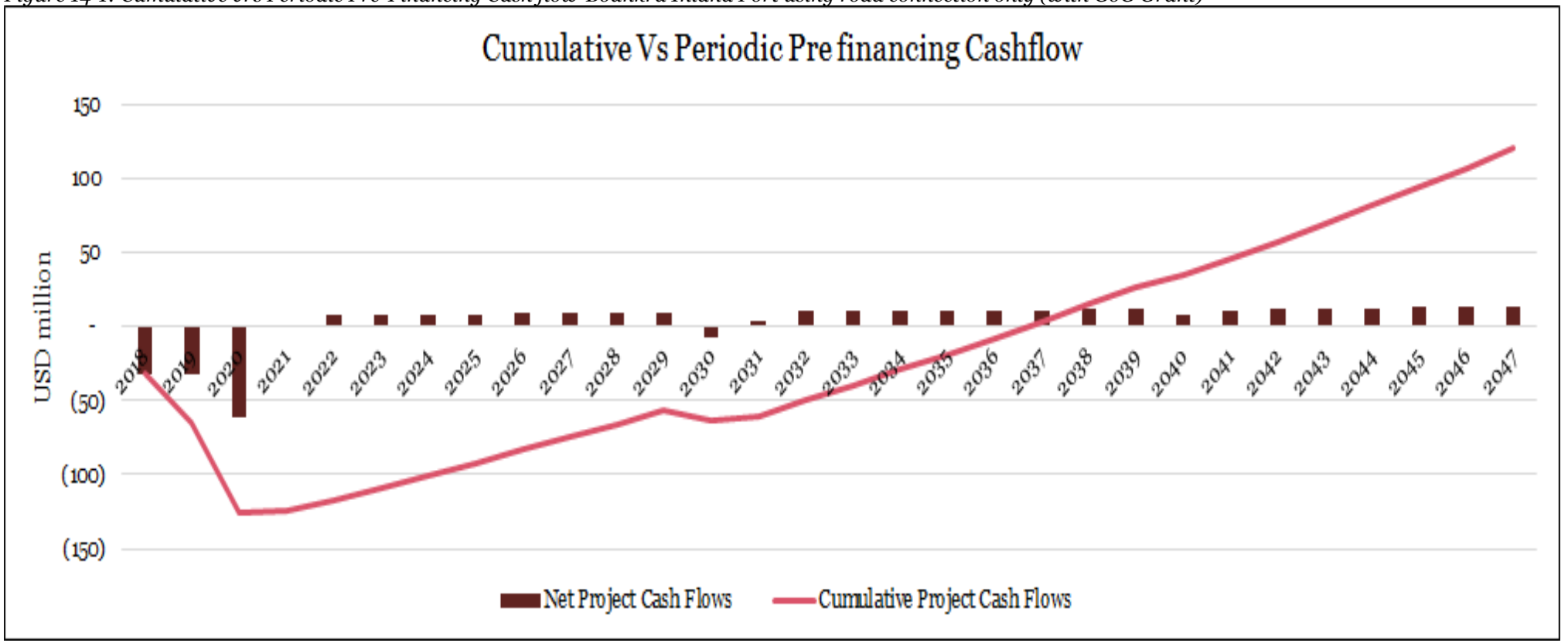


Figure 14-2: Operating Revenue vrs Operating Cost vrs EBITDA Margin-Boankra Inland Port using road connection only (with GoG Grant)

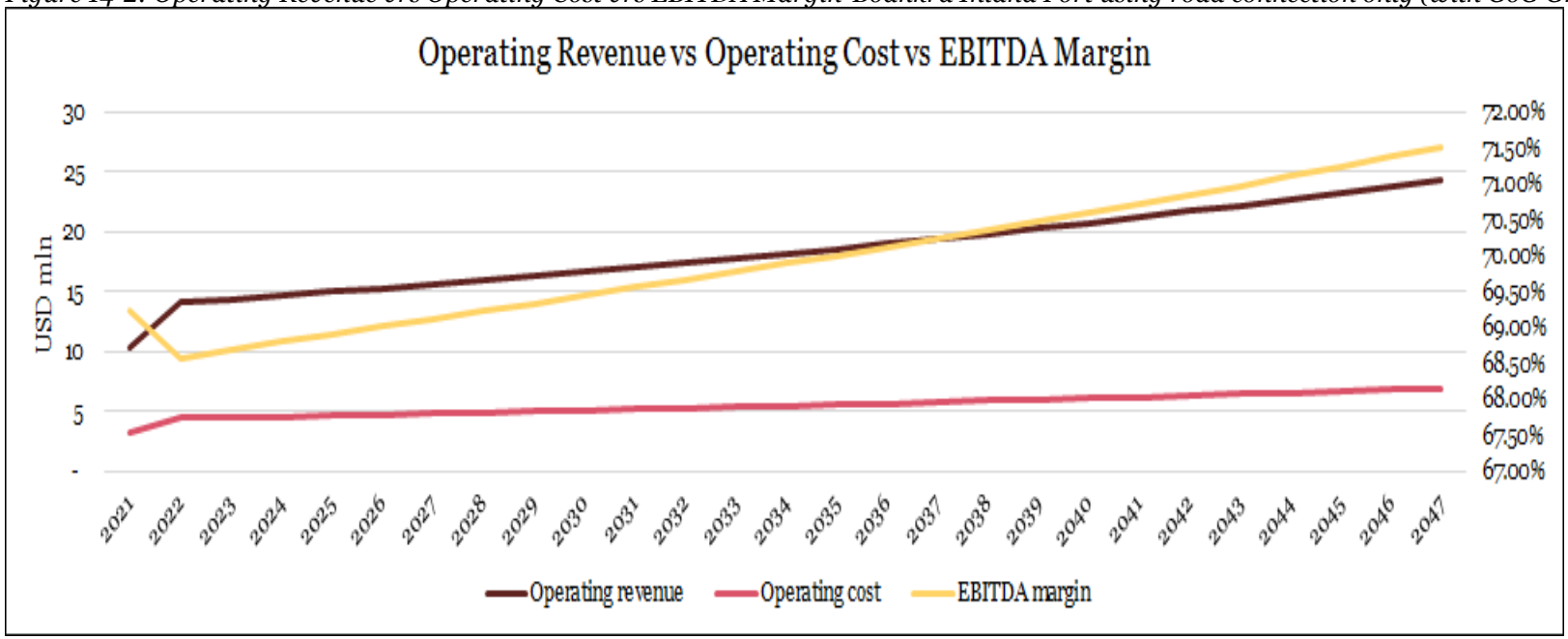
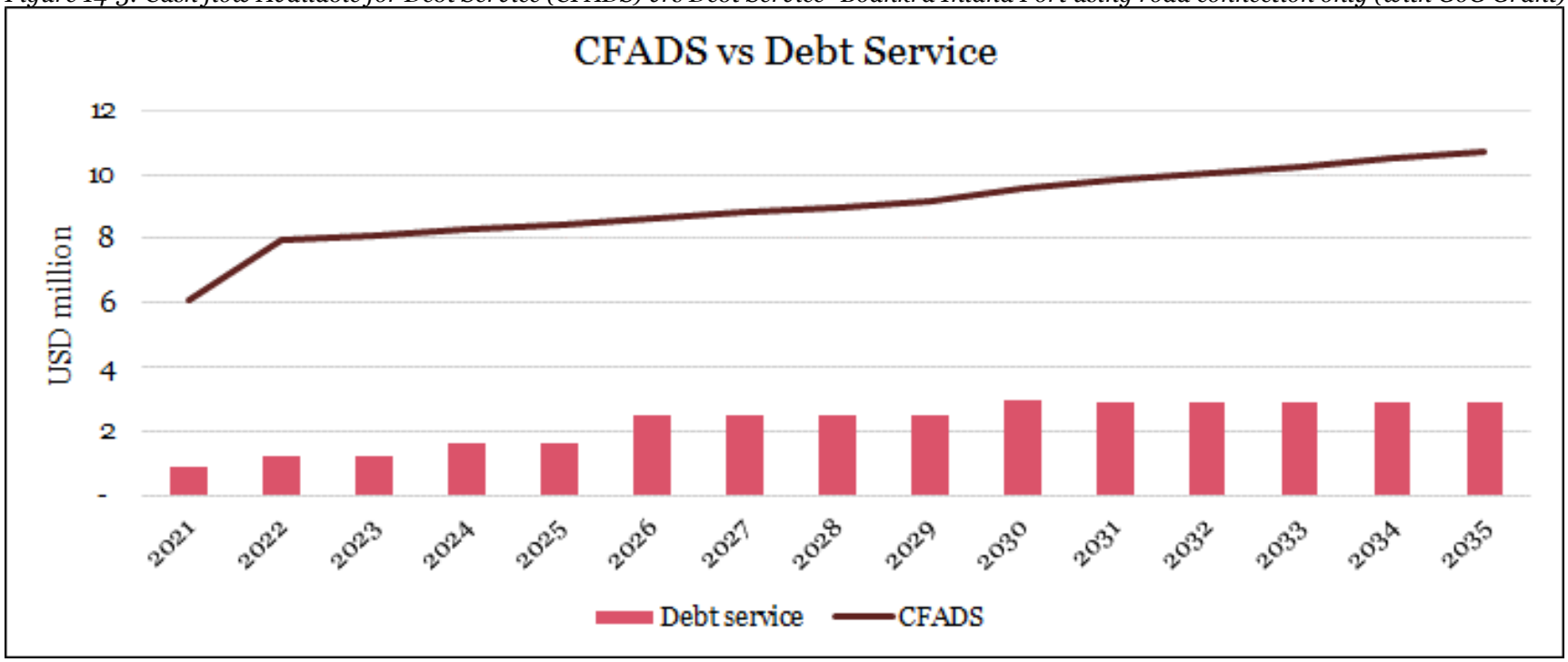


Figure 14-3: Cash flow Available for Debt Service (CFADS) vrs Debt Service -Boankra Inland Port using road connection only (with GoG Grant)



14.4.2. Estimated Revenue and Cash flows for the Eastern Railway Line standalone with Freight Operations only-Landlord Model with revenue share

We have estimated the revenue for the Eastern Railway Line Standalone (freight operations only) under the landlord model with revenue share based on the assessment of the forecasted traffic volumes and the respective tariffs for freight transportation along the line, to and from Tema Port.Table 14-17 shows the estimated revenue for this option.

Figure 14-4 to Figure 14-6 also shows graphs of the following:

- Cumulative vrs Periodic Pre-Financing Cash flow;
- Operating Revenue vrs Operating Cost vrs EBITDA Margin; and
- Cash flow Available for Debt Service (CFADS) vrs Debt Service

Table 14-17: Estimated Revenue for the Standalone Eastern Railway Line carrying freight only

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Revenue (US$ million)	10	14	14	22	23	25	26	26	27	27	28	28	29	43

Year	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Revenue (US$ million)	46	49	50	51	52	53	54	55	57	72	73	75	76

Figure 14-4: Cumulative vrs Periodic Pre-Financing Cash flow-Eastern Railway Line carrying freight only (Landlord Option with revenue share)

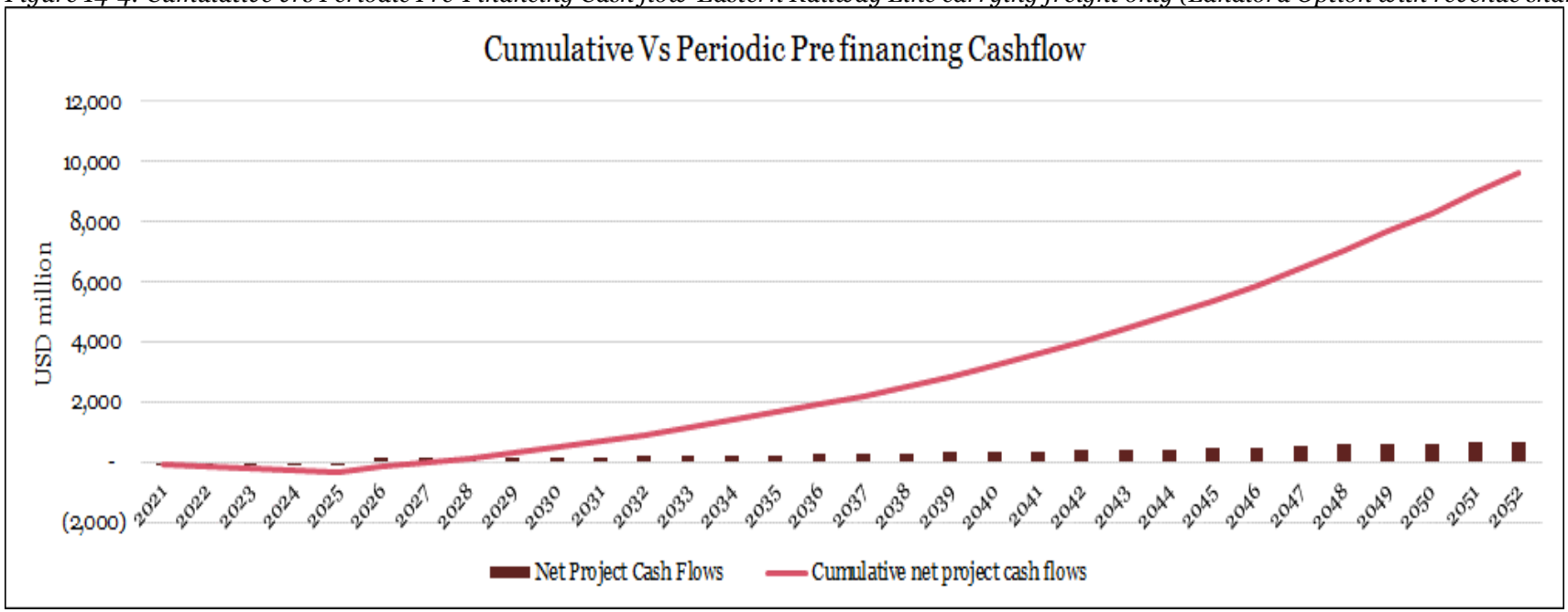


Figure 14-5: Operating Revenue vrs Operating Cost-Eastern Railway Line carrying freight only (Landlord Option with revenue share)

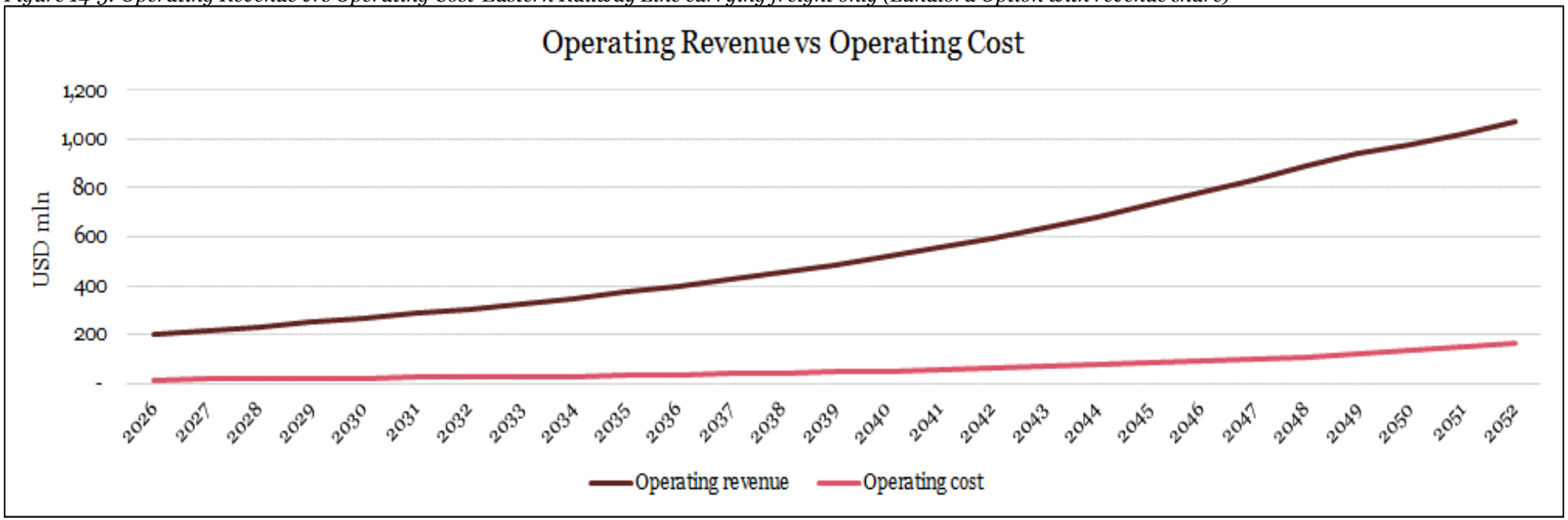
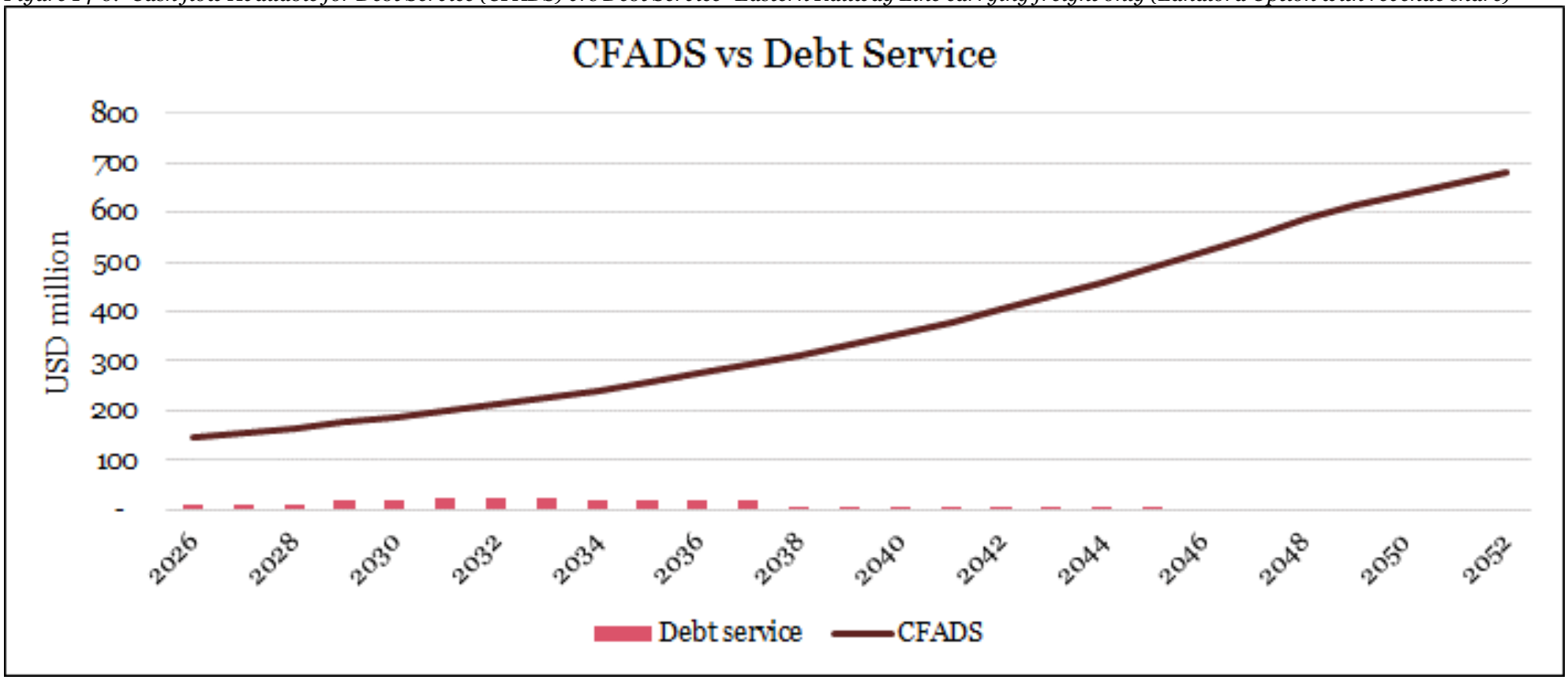


Figure 14-6: Cash flow Available for Debt Service (CFADS) vrs Debt Service -Eastern Railway Line carrying freight only (Landlord Option with revenue share)



14.4.3. Sensitivity Analysis- Standalone Boankra Inland Port with Grant and Standalone Eastern Railway Line using the Landlord Model

We have carried out sensitivity analysis for the Boankra Inland Port assuming that the project is developed using a grant from GoG. Also, we have carried out a sensitivity analysis for the Eastern Railway Line using the landlord model (i.e GoG finance the infrastructure).

The sensitivities have been run for increases/decreases (i.e. from -+10 to -+50) in a combination of the following factors:

- Traffic Demand and Construction Costs;
- Traffic Demand and Operating Costs;
- Traffic Demand and Length of the project term;
- Construction Cost and Operating Costs;
- Construction Cost and Length of project term; and
- Operating Cost and Length of project term.

The sensitivity results are detailed in Appendix 11 of this report.

14.5. Sources of Financing for the Project

In this section, we have identified some of the various sources of financing that can be explored to fund the Eastern Railway Line and the Boankra Inland Port projects. These have been grouped into:

- Local Financing Sources;
- Foreign Financing Sources; and
- Development Partner Financing Sources.

14.5.1. Local Financing Sources

Potential financing for infrastructure projects are usually from Government sources or from the local private sector. The table below shows the list of source of local financing.

Table 14-18: Local Funding Sources for the Project

Source of Funding (Actor)	Activities
Government of Ghana (GoG) consolidated Fund	These funds, obtained from taxable sources, are already stretched and fully committed. Lower priority investment projects (transport sector or otherwise) can be deferred, with the cash funds switched to funding these strategic priority projects.
Sales of Public Assets to Private Shareholder	GoG may consider selling public asset (s) and retaining a specific percentage of its shares. All future expansion and funding lies with the new institution.
Trade and Supplier Credits	Either suppliers or foreign trade banks could provide credit or credit guarantee that spread the cost of procurement over up to five years.
Revenue Charges from Port Operations	Hypothecated revenues are raised and linked to specific spending purposes. The tariff, fee or charge is often a user charge, to ensure that those who benefit meet the costs of providing the service. In theory the funds accrue to the spending institution.
Long Term User Agreements	The concessionaire may enter into long term revenue and tariff agreements with the principal or major users of the facility/ facilities.
Ghana Infrastructure Investment Fund	This is an independent fund set up by the Government of Ghana to mobilize, manage, coordinate and provide financial resources for investment in a diversified portfolio of infrastructure projects in Ghana.

14.5.2. Foreign Financing Sources

Foreign financing are either loans or grants from multinational groups, teams, equity firms or from large private sector companies. The table below shows the list of source of foreign financing companies that are interested in investing in infrastructure projects in Sub-Saharan Africa.

Table 14-19: Foreign Source of Funding

Source of Funding (Actor)	Activities
Emerging Africa Infrastructure Fund (EAIF) Ltd.	This fund was set up to provide long-term hard currency loans to private sector infrastructure projects in the least developed and other low income countries in Sub-Saharan Africa (excluding South Africa), where risks are perceived as unacceptably high by commercial lending institutions

Source of Funding (Actor)	Activities
AfDB Africa 50	This is a fund for Infrastructure in Africa that focuses on high-impact national and regional projects in the energy, transport, ICT and water sectors.
Capital Alliance	African Capital Alliance (ACA) is a leading international investment and independent equity firm operating in Sub-Saharan Africa, and the first institutional private equity fund manager to invest in Nigeria. We principally invest in Nigeria and surrounding West Africa countries.
New Partnership for Africa's Development-Infrastructure Project Preparation Facility (NEPAD-IPPF)	This facility supports regional infrastructure development projects in the transport, energy, ICT, and water resources management sectors. The activities eligible for financing under the Fund are prefeasibility and feasibility studies, project structuring, capacity building for infrastructure development, and facilitation and creation of an enabling environment for regional infrastructure development.
EU-Africa Infrastructure Trust Fund (EU-AITF)	This fund aims to increase investment in infrastructure in Sub-Saharan Africa by blending long term loans from participating financiers with grant resources.
InfraCo Africa	This is a multi-government funded, privately managed company providing early stage development capital and expertise to develop infrastructure projects in sub-Saharan Africa. It acts as an 'honest broker' seeking to create viable infrastructure investment opportunities that balance the interests of host governments, the national and international private sector and providers of finance
China EXIM Bank	The Bank's main mandate is to facilitate the export and import of Chinese mechanical and electronic products, complete sets of equipment and new and high-tech products, assist Chinese companies with comparative advantages in their offshore project contracting and outbound investment, and promote international economic cooperation and trade. It has supported substantial debt financing for infrastructure project across Africa especially in connection with transport and logistics (i.e. road, ports and railways)

14.5.3. Development Partner Financing

The role of development partners of is to help increase the flow of resources to Africa and to provide technical assistance where necessary. The table below shows the different development partners that can help fund this project.

Table 14-20: Development Partner Financing

Source of Funding (Actor)	Activities
African Development Bank (AfDB)	The AfDB houses the NEPAD-IPPF, which is a fund that aims to assist African countries, regional economic communities, specialised agencies, and related institutions by providing grant resources for infrastructure development. The bank also houses the Enhanced Private Sector Assistance Initiative and Accelerated Co-Financing Facility for Africa (supported by Japan) and funds projects on a concessional basis. Another fund hosted by the AfDB is the Pan-African Infrastructure Development Fund. This is a closed-end private equity fund designed to invest in infrastructure projects in the energy, transport, ICT, water and sanitation sectors Currently the bank is exploring innovative financing for infrastructure, such as diaspora bonds, which is one of the most common alternatives touted and would be used to mobilise the savings of African nationals living abroad.
World Bank Group	The World bank has available several facilities and funds available to support infrastructure projects in Africa and other developing countries.
International Finance Corporation	The IFC seeks to help develop infrastructure projects that can meaningfully improve the lives of people in developing markets with a special emphasis on fast growing cities where there are critical needs in power, utilities and transport. The organisation offers long-term financing, industry-leading sector expertise and an established track record in developing countries.
EU–African Union Infrastructure Partnership	Hosts the Infrastructure Trust Fund, which is a combination of grants from the European Investment Bank and other bilateral European financing institutions used to support infrastructure project in Africa,
Private Infrastructure Development Group	Comprises a coalition of donor agencies that invest in infrastructure development projects in developing countries.
UK Department for International Development (DFID)	Conducts feasibility studies for the SADC RIDMP, and supports the development of specific projects within the RIDMP and feasibility projects up to a point where projects are bankable
Japan International Cooperation Agency (JICA)	JICA aims to promote economic and social development and thus improve living standards in developing countries. Economic infrastructure is one of the main sectors benefiting from Japanese aid, a sector including communications and transportation.

Support of at least one of the Development Finance Institutions ("DFI") or Multilateral Lending Agencies ("MLA") such as the European Bank for Reconstruction and Development ("EBRD"), European Investment Bank ("EIB"), the World Bank Group ("WBG") and/or International Finance Corporation ("IFC") through the provision of debt financing and/or political risk guarantee will be particularly advantageous in helping develop the Railway Line under the Landlord model.

Early consideration of the DFI's requirements in terms of deal structuring and transparency of any procurement processes required to appoint Engineering, Procurement and Construction ("EPC") and other contractors who will be developing the Eastern Railway Line can save significant time later in the process and indeed make the difference between a DFI's ability to support a financing and not.

Consideration should also be given to the potential roles of bilateral development lenders such as Kreditanstalt fur Wiederaufbau ("KfW"), Proparco, Japan International Cooperation Agency ("JICA"), Canadian International Development Agency ("CIDA") etc. particularly where such banks have known regional and/or sectoral interests. We note however that such support is likely to be easier to access if it is confirmed that the EPC contractor and/or the source of the mechanical and electrical ("M&E") equipment purchased will be the home country of these lenders.

We anticipate that the ECAs may offer a potentially fruitful route to finance applicable elements of the Railway line development, taking into account of current market conditions in Ghana and the significant level of imported M&E equipment likely to be required. Their involvement may facilitate the participation of local and/or international commercial lenders and the DFIs with the involvement of specific bilateral agencies.

Debt financing from international banks, local institutions, capital markets and corporate funding are usually relatively more expensive. The high cost of debt from these private institutions has the tendency to make infrastructure project such as these less attractive that when relatively cheaper debt funding from DFI's is considered.

15. Value for Money Assessment

15. Value for Money Assessment

15.1. Introduction

This section focuses on conducting a Value for Money (VfM) analysis, in accordance with the Guiding Principles for PPPs in Ghana under the National Policy on PPPs (June,2011).

The objective of this assessment is to determine whether execution of the project through PPP offers costs savings, and hence value creation, over traditional public sector procurement. We have assessed the project in terms of both qualitative and quantitative VfM analysis14.

Based on the feedback we received from our market sounding activities and financial assessment, we conducted the Value for Money analysis on our recommended options identified in Chapter 15, Financial Analysis.

In this chapter, we have established whether or not our recommended options for the project give Value for Money to Ghana.

15.2. Qualitative VfM Analysis

Qualitative VfM analysis generally evaluates the rationale for using PPP, which involves knowing whether a proposed project is suitable under a PPP arrangement. This involves:

- Checking that this PPP project has been well structured based on the Guiding Principles as set out in the National Policy on PPP, June 2011; and
- Checking that this project has generated competitive tension.

Table 15.1 below shows our qualitative VfM assessment using the guiding principles as set out in the National Policy on PPP of June 2011.

[14] *Value-for-Money Analysis-Practices and Challenges: How Governments Choose When to Use PPP to Deliver Public Instructure and Services*. International Bank for Reconstruction and Development/International Development Association/World Bank (2013).

Table 15-1: Qualitative VfM Assessment

Guiding PPP Principle	Guiding Principles in Accordance with National Policy on PPPs	Activity Undertaken in this Project	Requirement Satisfied?
Value for Money	The PPP project should take into account the expected outputs of each project, allowing for optimal risk transfer to the private party and thereby ensuring greater Value for Money for public sector.	We have conducted both a qualitative and quantitative Value for Money Analysis of the project to determine whether the execution of the project through PPP offers costs savings, and hence value creation, over traditional public sector procurement	Yes
Risk Allocation	The allocation of the risks in the project should determine the chosen method of private sector involvement and the allocation of responsibilities while ensuring the protection of the public interest. The risks should be allocated to the party best able to control and manage them in a manner that the Value for Money is maximised.	The risk assessment in Chapter 13 outlines our suggested allocation of risks to the private party and Government. We have assessed the potential impacts of these risks and proposed appropriate mitigation measures.	Yes
Ability to Pay	End user ability to pay should be a key consideration in the PPP project. The use of the PPP option must show long-term affordability to the public and overall Government budgetary sustainability, forward commitments in relation to public expenditure and the potential for returns on private sector investment, given other priorities and commitments.	We administered a Willingness to Pay survey together with follow up stakeholder consultations, and most of the freight companies interviewed expressed their willingness to shift from road to rail transport should they have a 30% reduction in the current road tariff. Our analysis is detailed in Chapter 5 (Traffic Demand Forecasts and Competition Analysis).	Yes

Guiding PPP Principle	Guiding Principles in Accordance with National Policy on PPPs	Activity Undertaken in this Project	Requirement Satisfied?
Local Content and Technology Transfer	The PPP project should be structured to encourage the maximum use of local content and technology transfer by facilitating the promotion of local industries and the private sector in Ghana.	Given that this project was initiated by Government and requires private sector participation, there would be competition from interested private parties for this project. This should allow for the presentation of innovative solutions capable of meeting the objectives of the project.	Yes
Environmental, Climate and Social Safeguards	The Government is to ensure that the activities of the PPP conform to the environmental laws of Ghana and the highest standards of environmental, climate and social safeguards.	We have undertaken an environmental and social impact assessment to identify the potential impacts of the project. We have identified suitable measures to mitigate these impacts to ensure that the surrounding communities benefit from the project (Chapter 18)	Yes
Accountability	The PPP project must uphold accountability by ensuring that: a) Every stage of the PPP arrangement should follow laid down procedure and regulations. b) Decisions must be objective and in consonance with law and Government policies. c) Public sector entities involved in the PPP must follow prescribed processes for decision-making within their organisations.	We have emphasised to all stakeholders including the public sector participants involved in this project, the need to follow the laid down procedures and regulations.	Yes

Guiding PPP Principle	Guiding Principles in Accordance with National Policy on PPPs	Activity Undertaken in this Project	Requirement Satisfied?
Transparency	The PPP project must uphold transparency by ensuring that: a) There must be a well-defined procurement process to prevent manipulation or abuse of the process. b) Where a decision is taken to consider an unsolicited bid, there must be clear and objective reasons supporting the decision which should be in conformity with the PPP policy. c) The process shall be accessible to the public to the extent allowed by law except where National Security would be prejudiced. d) Equal opportunity and access to information must be given to all interested bidders.	Given that this a Government initiated project, all the interested private parties will have to undergo the full bidding and procurement process. It will be ensured that the process remains transparent by satisfying the requirements of the PPP policy.	Yes
Competition	As much as possible, the PPP project should be subjected to a competitive process so as to obtain Value for Money and efficiency.	Considering that this project is a Government initiative, it is expected to be subjected to a competitive bidding and procurement process in order to achieve Value for Money and efficiency.	Yes
Contracting Authority, Ownership and Commitment	Contracting authorities should have the primary responsibility for managing the process and implementing the project.	GRDA and GSA/GPHA is the contracting authority for this project and will be responsible for the management and implementation of the project	Yes

Guiding PPP Principle	Guiding Principles in Accordance with National Policy on PPPs	Activity Undertaken in this Project	Requirement Satisfied?
Stakeholder Consultation Process	Contracting authorities should identify and ensure adequate stakeholder consultation, understanding and support in advance of entering into a PPP arrangement.	Ministry of Transport and its Agencies as well as shipping lines and freight forwarders, have been consulted to provide information and other forms of support in advance to finalising the project.	Yes

15.3. Quantitative VfM Analysis

Quantitative VfM analysis compares the Value for Money of a proposed PPP (or actual bids received) with a "Public Sector Comparator" (PSC) – which is a model of the project if implemented through traditional public procurement. Quantitative VfM analysis essentially compares these two options.

15.3.1. Methodology

As identified above, VfM is the difference between the Present Values (PV) of the life cycle costs (capital expenditure, routine and major maintenance and other operational costs and risks) of procurement through two channels:

- Public Sector Procurement (i.e. using the PSC-Public Sector Comparator); and
- Public Private Partnership (PPP).

VfM for the project = Present value of PPP costs -Present Value of PSC Costs

In order to compute the VfM, the present value of procurement costs for each of these modes is calculated, as follows:

- **Public Sector Procurement:** The Public Sector Comparator (PSC) is estimated as the cost to the public sector of delivering an infrastructure project using a traditional procurement mechanism, for instance by using cash contracts, design build contracts, or others. In this case, all risks (such as construction, traffic, O&M, financing and others) are borne by the public sector.
- **Public Private Partnership:** The PPP cost is the cost to a private developer for implementing an identical project using PPP, wherein a high degree of risk is transferred to the private sector on a performance based life cycle asset management model (such as availability model, toll model, annuity model or a combination of these, etc.)

It has usually been observed, especially in developing countries within Africa, that there tends to be several inefficiencies associated with public sector procurement owing to cost and time overruns as well as long term asset management practices15. The private sector is expected to reduce the costs associated with these inefficiencies. Therefore, by comparing the PSC and PPP costs, it can be determined whether the present value of payments made to the private concessionaire is lower than lifecycle cost through traditional contracting. If the analysis returns a positive VfM value, it indicates that PPP is a cheaper procurement mechanism, making a case for procurement through PPPs.

15.3.2. PSC Costs Computation

EPC Construction Costs, Operation & Maintenance Costs

The PSC costs were computed based on the existing traditional contracting practices and the bill of quantities estimation conducted as part of the Value for Money analysis, incorporating three major costs namely:

- EPC Construction Cost; and
- Operations & Maintenance Cost.

Public Sector Inefficiencies

For calculating the Public Sector Comparator, historical data for the road projects procured and executed via the traditional route was used as a proxy. Data to this effect was been procured from Ghana Highway Authority.

[15] Africa's Infrastructure: A Time for Transformation. International Bank for Reconstruction and Development / World Bank (2010).

Using this data, the average inefficiencies due to cost overruns and time delays have been calculated in the table below:

Table 15-2: Estimated Public Sector Inefficiencies in the context of the project and other Inputs for considered for the VfM

Parameter	Assumption	Comments
Discount Rate	9.0%	Average Cost of Government borrowing
Cost Variation in PSC	26%	Average cost overrun of projects undertaken by the GHA for road projects in Ghana. This is the difference between the original estimated costs and the final completion cost of the historical projects (both of which were part of the historical project dataset)
Inflation Rate	2%	USD inflation rate assumption applied in our financial model
Construction Months-Boankra Inland Port with road connection(with GoG grant)	36 months	Initial estimate of 3 years of construction years
Construction in Months-Eastern Railway Line with Freight Operations (under the landlord model)	60 months	Initial estimate of 5 years of construction years
Construction Months with Delay-Boankra Inland Port with road connection (with GoG grant)	60 months	Taking maximum 24 months of construction delay. Based on Government funded road projects over the last 5 years
Construction Months with Delay-Eastern Railway Line with freight operations only (under the landlord model)	96 months	Taking maximum 36 months of construction delay. Based on Government funded road projects over the last 5 years
Note: *Ghanaian public sector funded road project data was used in these estimations due to the unavailability of data on government funded rail or port infrastructure. Our analysis of the data set has been shown within our financial model for each of the options. The Cost variation and Delay estimates were based on our analysis of the public sector funded project data set over the past 10 years in Ghana.*		

With these ratios identified above, the PSC with efficiency costs for the project can be identified as in the Table 15-3 as follows.

Table 15-3: Other Inputs for VfM- Boankra Inland Port with road (with GoG Grant)

Description	Amount (US$ million)	Comment
Cost of Construction (A)	245	Based on the Bill of Quantity costing.
Operation & Maintenance Costs (B)	70	Based on average percentage of construction costs (approximately 5%)
Raw Public Sector Comparator (C) (C=A+B)	315	**Total Base Costs**
Cost Impact on Construction Costs (D)	64	Based on average cost escalation in public sector road projects. These figures have been obtained as the average of cost overrun of historic Ghana road projects.
Time Delay (E)	-13	Value lost in the project due to time delays leading to economic losses. This is the product of time delay and the net revenue foregone.
Efficiency Costs – Construction (F) (F=D+E)	**51**	**Total inefficiencies during the construction stage**
Cost Impact on Operation & Maintenance costs (G)	18	Based on average cost escalation in public sector road projects.
Efficiency Costs – Operations (G)	18	Total inefficiencies during the operations stage
Total PSC costs (J) (J =C+F+G)	**384**	**Total cost (Base cost + inefficiencies)**
Note: The estimated amounts are based on the PSC factors estimated using the historical data set as well as the development, operations and maintenance cost over the concession period for Boankra Inland Port Project with road (with GoG Grant)		

Table 15-4: Other Inputs for VfM- Eastern Railway Line with Freight Operations only (under landlord model with revenue share)

Description	Amount (US$ million)	Comment
Cost of Construction (A)	292	Based on the Bill of Quantity costing.
Operation & Maintenance Costs (B)	189	Based on average percentage of construction costs (approximately 5%)
Raw Public Sector Comparator (C) (C=A+B)	**481**	Total Base Costs
Cost Impact on Construction Costs (D)	76	Based on average cost escalation in public sector road projects. These figures have been obtained as the average of cost overrun of historic Ghana road projects.
Time Delay (E)	336	Value lost in the project due to time delays leading to economic losses. This is the product of time delay and the net revenue foregone.
Efficiency Costs – Construction (F) (F=D+E)	**411**	Total inefficiencies during the construction stage
Cost Impact on Operation & Maintenance costs (G)	49	Based on average cost escalation in public sector road projects.
Efficiency Costs – Operations (G)	49	Total inefficiencies during the operations stage
Total PSC costs (J) (J =C+F+G)	**941**	Total cost (Base cost + inefficiencies)
Note: The estimated amounts are based on the PSC factors estimated using the historical data set as well as the development, operations and maintenance cost over the concession period for Eastern Railway Line (under the landlord model-with revenue share)		

15.3.3. PPP Cost Estimate

The lifecycle costs of undertaking the project through PPP are the net total pay-outs to the concessionaire made during the lifecycle of the project. These pay outs can be in the form of government grant support, viability gap funding and tariff collections. All tax pay-outs are deducted from the costs m. For the purposes of neutrality in comparing with the PSC costs, the taxes paid by concessionaire are excluded.

Table 15-5: NPV of Base Life cycle Costs for PPP

Scenario	Traffic Revenue (A)	Grant (B)	Tax (C)	Revenue Share (D)	PPP Costs (A)+(B)–(C)-(D)
Boankra Inland Port with road connection (with GoG Grant)	237	61	24	-	**275**
Eastern Railway Line with freight operations only (under the landlord option with revenue share)	1,983	-	94	1,349	**540**
Note: Tariff Revenues were based on the estimated revenue from the operations of each project option (per the estimated traffic estimates). The revenue share is the estimated portion of revenue that government will receive over the concession period after some of the revenue is used to pay debt repayments, equity investor returns and operations and maintenance costs.					

15.3.4. Summary of Results

VfM is the difference between the present value of life cycle PSC and PPP costs. As can be gauged from the table below, the project in any of the procurement models shows a positive VfM, therefore, there is clear quantitative evidence in support of PPP procurement. The VfM computation below is based on the formula stated in Section 15.3.1 and the PSC and PPP Cost estimates are based on the values in Table 15-4 to Table 15-5.

Table 15-6: VfM Computation

SCENARIO	PSC Costs	PPP Cost	VfM
Boankra Inland Port with road connection (with GoG Grant)	384	275	**110**
Eastern Railway Line with freight operations only (under landlord option with revenue share)	941	540	**401**

From the tables above, it can be seen that:

- Both the development of the Boankra Inland Port (using GoG Grant Assistance) and the Eastern Railway Line (under the landlord model with revenue share) provide Value for Money. In other words, for both projects, the use of a PPP arrangement and its associated costs is less than considering the traditional procurement using public development, operations and maintenance resources; and
- The development of the Eastern Railway Line using the landlord model with revenue share is estimated to provide the higher Value for Money relative to the development of the Boankra Inland Port using GoG Grant Assistance.

16. Transaction Structuring

16. Transaction Structuring

16.1. Introduction

This section provides a summary of the transaction structure that we are proposing for the project given the various analyses that we have performed as set out in the preceding chapters of the report.

Selecting a preferred PPP structure for the implementation of a PPP project is one of the key aspects that:

- Drives project feasibility and project bankability;
- Determines the PPP Procurement Plan and the required profile of private sector bidders; and
- Ensures that the public sector strategic objectives are met.

The structures we have considered for the development of the Boankra Inland Port and Eastern Railway Line are discussed further in the section below.

16.2. PPP Structuring Options

Given that each PPP arrangement has different features, we have developed a matrix below to highlight the salient features of each of the PPP arrangements. The PPP options we have considered are shown in the figure below. It highlights the level of risk borne by the public and private sector for each type of PPP:

Figure 16-1: Risk Allocation for Different Types of PPPs

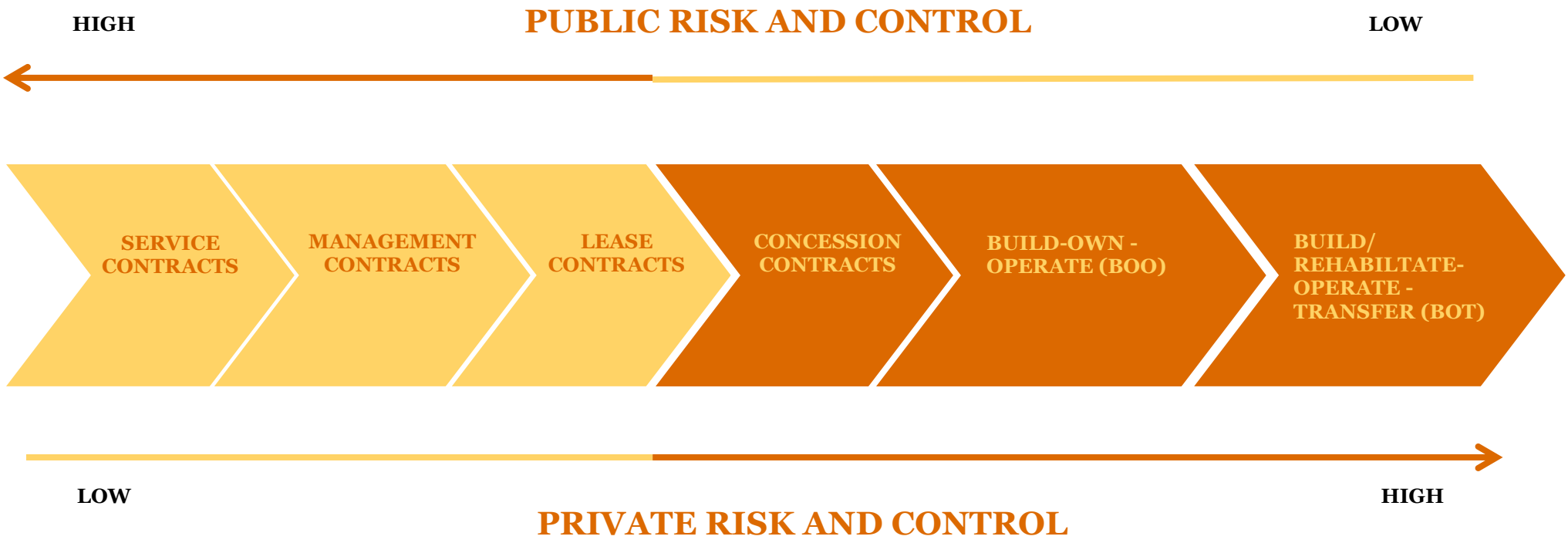


Table 16-1: Description of PPP Transaction Structuring Options

Parameter	Management Contract	Service Contract	Output performance based	Lease Contract	Concession	Build-Operate-Transfer	Build-Own-Operate	Rehabilitate Operate Transfer
Scope of private party	Management, Operations	Performance of specific services	Operations & Management (O&M) of assets	Operations & Management (O&M) of assets	Build, upgrade/ rehabilitation, operations and maintenance of assets	Design, build finance, Operations & Management (O&M) of assets	Design, Construct, finance, of assets	Refurbishment, Operations & Management (O&M) of existing assets
Asset Ownership	Public	Public	Pubic	Public	Public	Public	Private	Public
Duration	Not exceeding 10 years; typically 2-5 years	Not exceeding 5 years; typically 1-2 years	Not exceeding 10 years; usually 2-5 years	Not exceeding 30 years; usually 5 – 10 Years	Varies; usually between 20 - 30 years	Varies; usually between 20 - 30 years	Varies; usually more than 10 years	Varies; usually more than 10 years
Capital Investment	Public	Public	Public	Public	Private	Private	Private	Private
Operations & Maintenance of the assets	Private	Private	Private	Private	Private	Private	Private	Private
Commercial Risk	Public	Public	Public	Private	Private	Private	Private	Private
Risk Assumed by Private Sector	Low	Low	Low	Moderate	Moderate	High	High	High
Revenues for private paryt	Fixed Fee	Fixed Fee	Fixed Fees	Tariff/Sale related Revenues	Tariff/User fee Revenues	Tariff/ User fee Revenues	Tariff Revenues	Tariff/ User fee Revenues
Compensation to Government	N/A	N/A	N/A	Fixed fee	Fixed Fee/Concession fee	N/A	N/A	N/A

16.3. Identification of Transaction Structure

In order to identify the appropriate transaction structure for the project options, we have considered the Options Analysis, Risk Assessment and the Financial Analysis in Chapters 4, 13 and 14 respectively. In the Options Analysis, we recommend that the combined Boankra Inland Port and Eastern Railway Line projects be implemented as two separate PPP transactions. As a result, we have identified a different transaction structure for the Inland Port and Railway line respectively.

16.3.1. Boankra Inland Port

The Financial Analysis shows that the preferred option for the development of the project as a PPP is the Boankra Inland Port because of its relatively low capital investment.

As shown in the table below, the private party bears a significant proportion of the key risks for the Boankra Inland Port.

Table 16-2: Key Risks Allocation for the Boankra Inland Port

Risk	Allocated to
Project Risks	Shared
Finance Risk	Private Party
Political and Regulatory Risk	Government
Design and Construction Risk	Private Party
Operational Risk	Private Party
Demand/Revenue Risk	Private Party

These suggest that the appropriate transaction structure for the project should be a PPP option which promotes the transfer of key risks to the private party.

Based on the risk allocation and PPP features shown in Figure 16.1 and 16.2 we would recommend a Build Operate Transfer (BOT) structure because it promotes private sector efficiencies and innovations whilst allowing for a majority risk transfer to the private sector. It will ensure that the Inland Port is developed/financed and efficiently operated by the private sector.

16.3.2. Eastern Railway Line

The Eastern Railway Line Project will require substantial financial and capital investment to develop and may be challenging to fund by an investor. We recommend that if it is structured such that Government builds or provides the railway infrastructure, whilst the private party provides the rolling stock as well as the operation and maintenance functions, the Eastern Railway Line project can also be considered as a PPP.

As shown in the table below, the Government bears a significant proportion of the key risks for the Eastern Railway Line Project.

Table 16-3: Key Risks Allocation for the Standalone Eastern Railway Line

Risk	Allocated to
Project Risks	Government
Finance Risk	Government
Political and Regulatory Risk	Government
Design and Construction Risk	Government

Operational Risk	Private Party
Demand/Revenue Risk	Private Party

These suggest that the appropriate transaction structure for the project should be a PPP option which promotes the transfer of key risks to the Government.

Based on these we would recommend a Lease Contract (landlord model) where Government provides all the basic railway infrastructure whilst the private party provides the rolling stock, operation and maintenance of the Railway Line for the specified contract duration.

16.4. BOT PPP Transaction Structure – Boankra Inland Port

The main objective of the BOT option is to maximise risk transfer to the private party. This option typically delivers the most value for money if the private sector has both the appetite to accept the risk and the ability to manage it better than the Government.

Under this proposed structure, the private party will be responsible for all functions and associated risks in relation to the design, construction, operation and maintenance of the port assets whilst Government through its Implementing Authority, GPHA/GSA will be responsible for regulating the activities of the private party and ensuring they perform to the required standards.

Table 16-4 below highlights the key functions or responsibilities that each party to this project assumes as per the proposed BOT structure.

Table 16-4: Responsibility Matrix for the Boankra Inland Port under the BOT Structure

Responsibility	GPHA/GSA	(Inland Port Concessionaire)	Description
Inland Port Development/Assets			
Land	√		Land Acquisition
Inland Port Design		√	Planning and Design
Basic Infrastructure		√	Main Roads, Power Connections, Drainage Systems,
Superstructure		√	Container Freight Station, Container Yard Area, Commercial Complex, Administration Complex, Truck Parking Area
Equipment		√	Warehouse Forklifts, Reach Stackers, Container Forklifts, Weighbridge, Trailers
Inland Port Management			
Traffic Management		√	Container and Cargo Traffic Monitoring System, Control Room
Safety and Security		√	Control systems, CCTV Cameras, Patrol Teams, Tracking Devices
Administration of Inland Port, Customs and Regulation	√		Inland Port Regulations, Customs Procedures, Environmental & Safety Safeguards, Inspections Team
Tariffs/Commercial			
Inland Port Fees/ Terminal Fees		√	Cargo Handling Charges, Cargo and Container Storage, Reefer Storage
Rental and Royalties		√	

Penalties and Fines	√		

As mentioned above the private party in this scenario takes up majority of the risks for developing the Inland Port infrastructure including the revenue/demand risk. This exposure to revenue risk could lead to no interest from private bidders at all and/or a significant premium on the costs of financing, thereby raising the cost of the project to Government.

However, from our financial analysis in Chapter 14, the Inland Port project is not financially viable (i.e. viability gap) and the revenue risk may not be acceptable to private bidders considering the low traffic levels. Government as part of its obligation to the PPP agreement will be required to support the project financially with a Grant (usually a one-time payment) towards the development of the Inland Port.

Due to the risk that Government assumes in making this financial commitment to the project, the grant payment for this project would have be phased out based on the Concessionaire's ability to perform or meet certain milestones throughout the project's construction phase which will be defined and agreed on between the parties to the contract. The purpose of this measure is to minimise Government's risk as much as possible as well as enable Government to safeguard its contribution to the development of the project.

Moreover, the payment of the Grant will be made against the delivery of key output specifications or indicators that Government will specify in the contract in relation to the:

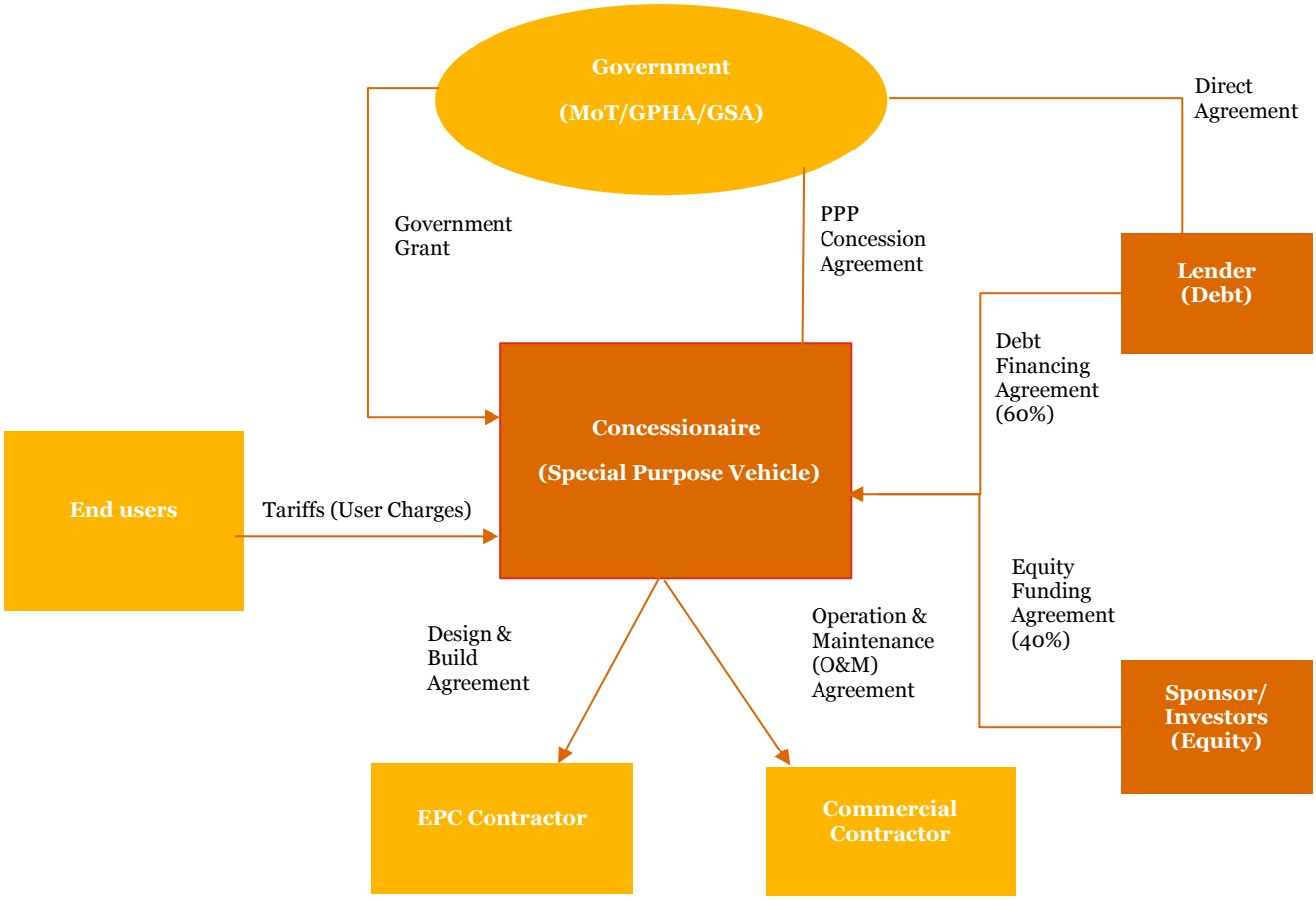
- High quality of the asset/construction;
- Quality maintenance condition of the infrastructure;
- Quality of service of operations; and
- Compliance with specified standards and regulations.

Failure on the part of the private party to meet the required output specifications or performance measures clearly defined in the PPP agreement results in penalties which will be enforced by the Implementing Authority or governing body.

The action the Implementing Authority will take to penalise the private party will be in line with the provisions in the PPP agreement and will also be commensurate with the severity of the violation.

The figure below shows the proposed transaction structure for the Boankra Inland Port using the BOT PPP structure with Government Grant.

Figure 16-2: Build Operate Transfer (BOT) PPP Structure for the Boankra Inland Port with Government Grant



16.4.1. Output based Performance Measures for the Boankra Inland Port

The grant provided by GoG will be released based on the private party's performance, namely, the achievement of indicative milestones by the Concessionaire.

Aside the key design specifications that the Concessionaire will have to accomplish particularly during the project's construction phase, there are other output based performance measures (See Chapter 11) with regards to the Inland Port's operations which the Concessionaire will have to achieve. Some of these key indicators are shown in Table 16-5.

Table 16-5: Output based Performance Indicators for Boankra Inland Port

Indicator	Definition	Proposed Benchmark for the Boankra Inland Port
Average Dwell Time in Terminal (Container/Cargo)	It measures the average time containers/cargo are expected to remain stacked at the port terminal.	2 days
Truck Turnaround Time	It measures the average time spent between the vehicle's arrival at the terminal entrance gate or port and its departure from the terminal exit gate of the Inland Port. It captures the length of time it takes for customs and clearing processes, stuffing and de-stuffing, repackaging etc. at the Inland Port.	3 hours
Container only Loading/Unloading Time	This indicator estimates the length of time it should take a container to be unloaded from the truck on to the terminal for the required procedures such as customs processing, stuffing and de-stuffing, repackaging, storage other processes before it is loaded for transport to its next point of delivery	2 hours
Cargo only Loading/Unloading Time	This parameter estimates the minimum length of time it should take a cargo to be unloaded from the truck on to the terminal for required procedures such as customs processing, stuffing and de-stuffing, repackaging and other processes before it is loaded for transport its next point of delivery.	2 hours
Customs Clearance Time	This measures the average time it takes vehicles to go through customs procedures between arrival and exit of the port.	2 hours

As part of the performance monitoring mechanism for the Inland Port, an independent monitoring and evaluation team of experts will be set up to monitor the private party's performance against the output based performance indicators. The team will:

- Regularly check progress to ensure that project milestones are met, including site visits where necessary;
- Hold regular progress meetings with the private party and consider performance reports;
- Conduct regular and random inspections of the infrastructure;
- Check that all performance conditions and clauses in the PPP agreement are acted upon;
- Develop effective mechanisms for obtaining feedback from end users and other key stakeholders;
- Review third party monitoring reports;
- Confirm the quality and safety of service being provided; and
- Maintain comprehensive documentation on performance monitoring.

16.5. Lease Contract (Landlord Model) for the Eastern Railway Line

Given that developing the Eastern Railway line requires a lot of capital investment and has significant associated risks, we have proposed a Lease Contract (landlord model) where Government provides all the basic railway infrastructure whilst the private party provides the rolling stock, operation and maintenance of the infrastructure for the specified contract duration.

Table 16-6 below highlights the key functions or responsibilities that each key party assumes as per the recommended structure.

Table 16-6: Responsibility matrix for the Eastern Railway Line under the Lease Contract Structure

Responsibility	GRDA	Concessionaire (Railway Operator)	Description
Railway Line Development/ Assets			
Land	√		Relocation and Resettlement
Railway Line Design	√		Planning and Design
Infrastructure and Equipment	√		Railway Track, Power Connections, Drainage Systems, Electrical Works, Signalling and Telecommunications Equipment
Superstructure	√		Station Buildings, Terminal Facilities, Incident Management Facilities
Rolling Stock		√	Locomotives, Wagons, Coaches, O&M Vehicles
Railway Line Management			
Traffic Management		√	Train and Track Monitoring System, Control Room
Safety and Security		√	Control Systems, CCTV Cameras,
Railway Line Regulation	√		Railway regulations, Environmental & Safety Safeguards, Inspections Team, Maintenance standards
Operations and Maintenance of Rail Facilities		√	Ticketing, Train Operations, Railway Track Maintenance, Train Maintenance,
Tariffs/Commercial			
Railway Tariffs		√	Charge per TEU of Container, Charge per ton of Commodity per Kilometre, Passenger Fares,

The private party in this agreement bears the demand and revenue risk and will be responsible for the collection of proposed tariffs based on user charges which will be agreed with the respective regulatory authority. The private party thus is remunerated from the tariffs (user charges) that is collected from end-users of the railway infrastructure and services.

The private party will have to be efficient and innovative in its operations in ensuring that it generates enough revenue from its commercial activities.

In addition to providing the Railway Line infrastructure for the project, Government is also expected to subsidise the passengers services mainly for socio-economic reasons rather than financial reasons considering the passenger service is generally unprofitable to run.

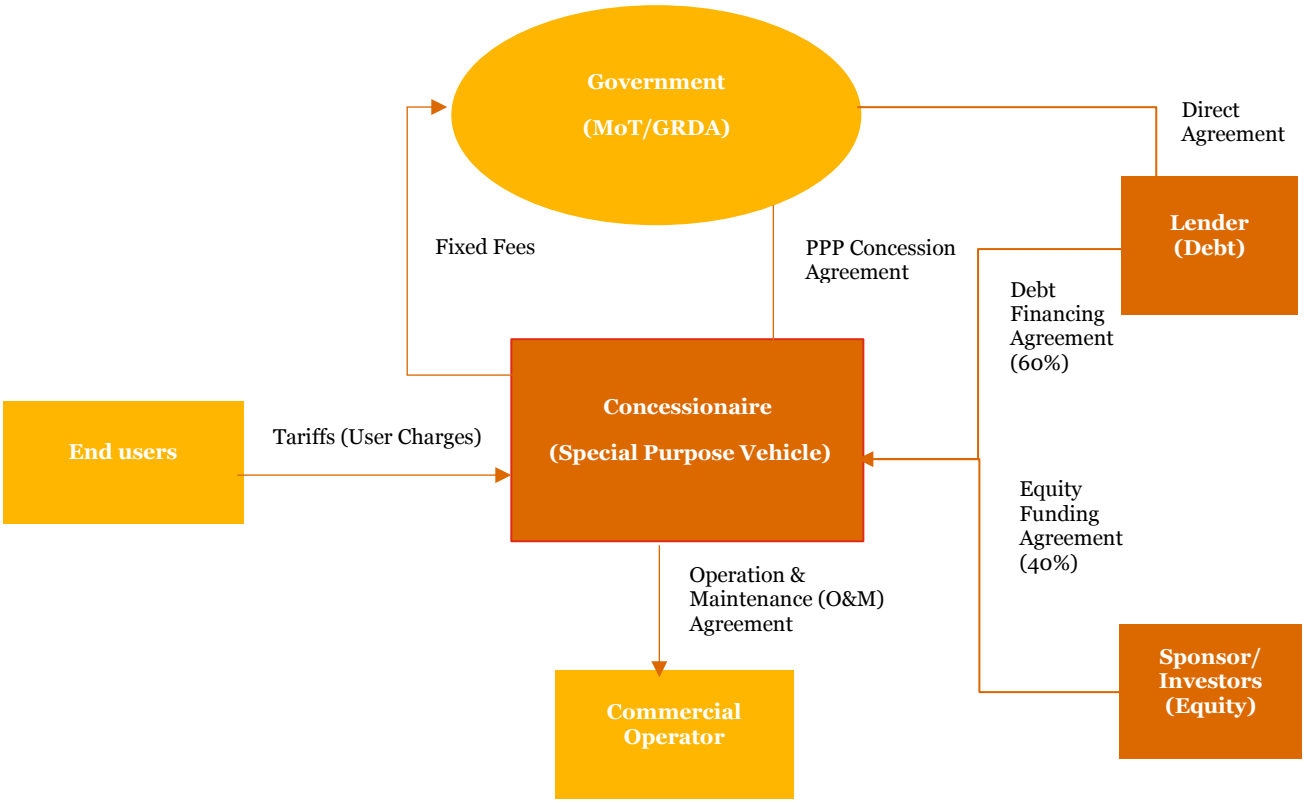
Government in so doing bears the cost for the operation of a specifically agreed level of passenger services and/or may opt to retain the right to a specific number of train paths on the infrastructure for which they will have the right to separately contract for the passenger service. This arrangement would be defined and agreed in the contract agreement between the parties.

Bearing in mind the level of financial and capital investment that Government makes in establishing the railway infrastructure, the private party as part of its obligation to the contract will be required to compensate Government over the contract period with pre-determined fixed payments as a proportion/share of revenue generated from the project. This arrangement will also form part of the contractual agreement between both parties.

Government as part of its regulatory functions throughout the lease period would monitor the activities of the private party and ensure that the maintenance of the rail infrastructure is at the agreed quality standards as would be defined in the contractual arrangement.

16.5.1. Lease Contract (Landlord Model) PPP Transaction Structure – Eastern Railway Line

Figure 16-3: Lease Contract (Landlord Model) PPP Structure for the Eastern Railway Line



16.6. Key Parties to the PPP Transactions

The transaction structures identified above for the development of both the Boankra Inland Port and the Eastern Railway Line recognise some key parties whose roles per the determined structures are highly significant for the attainment of the project objectives.

In the Options Analysis in Chapter 4, we recommend that the Boankra Inland Port and Eastern Railway Line projects should be implemented as two separate PPP transactions because it would be challenging to find a private investor with the capacity and experience in running both the Inland Port and Railway business together. Given the complementary nature of the projects, any failure on the part of the operators of the Inland Port or the Railway Line would have an impact on the other service. Therefore, it is important that GoG functions as the intermediary, ensuring that each private party meets their performance targets to allow the efficient running of the system.

The table below shows the respective parties to the PPP transaction structures and the functions they will be required to perform.

Table 16-7: Key Parties to the Transaction Structure and their Responsibilities

Key Party	Responsibility
Special Purpose Vehicle (Concessionaire)	This is the project company or private entity that is set up for the purpose of the PPP project/ contract objectives.
Government	This is the Host country/Government responsible for overseeing the project through its Implementing Agencies. (E.g. MoT, GPHA, GRDA, GSA etc.). Government will also function as an intermediary between the operator of the Inland Port and Railway Line.
Lender (Debt)	These include commercial banks, multilateral and bilateral development banks, finance institutions, and institutional investors responsible for the debt financing of the project. (E.g. AfDB, World Bank, IFC etc.)
Sponsor/Investor (Equity)	These include Industrial Sponsors, Public Sponsors, Financial Sponsors and Contractors who as shareholders to the project company raise finance (equity) for the development of the project.
EPC Contractor	This is an entity or company contracted to carry out the major design, development and construction functions of the project. (i.e. Engineering, Procurement and Construction)
Commercial Contractor	This is a company contracted to carry out specific aspects of the project related to operations and maintenance among other commercial activities.
End Users	These are the customers expected to pay (i.e. User charges/ tariffs) for the use of the infrastructure and services.

16.6.1. Potential Shareholders and Lenders to the Project

Considering the importance of assessing the market strength and capacity on identifying the potential sources of funding and expertise for the development of the project, we have summarised the entities which would potentially have interests in the development of the Inland Port and the Railway Line in the tables below.

Table 16-8: Potential Shareholders to the Project – Boankra Inland Port & Eastern Railway Line

Shareholders	Interests & Goals	Potential Concession Shareholders
Industrial Sponsors	• Manage the Concessionaire activities; • Share the investment risk; • Receive dividends on profits or other distributions (mainly subsidies); • Benefit from possible synergies with other business activities of the firm; • Provide services in its area of expertise to the Concessionaire, obtaining; and benefits from them: transportation fees or subsidies.	• Integrated Logistic Chain companies; • Oil Companies; • Mining Companies; • Railway/Inland Port Infrastructure managers; • Railway/Inland Port Operators; and • Other Infrastructure.
Public Sponsors	• Retain a relevant % of ownership of infrastructure; • Play an active role in concession management, ensuring the national interests & social welfare of its activities; • Subsidise the Concessionaire activities while contributing to its capitalization; and • Monitor concession performance.	• Host Government, State, Regional or Local Authorities (e.g. Ministries, Departments and Agencies MDAs); • Trans-border Government Consortiums; • Regional Institutions; • International Institutions; • Railway/Inland Port National or Supranational Agencies; and • Other Public Bodies.
Financial Sponsors	• Obtain profits by way of dividends or other distributions; • Control key decisions of the concessionaire; • Monitor the concession performance; and • Strengthen the capital structure of the railway concessionaire.	• IFIs and bilateral Agencies; • Commercial Banks; • Private Equity Investors; • Domestic Investors; • Infrastructure Funds; and • Other Private or Institutional Investors.
Contractors	• Obtain benefits by providing services to the concessionaire that cannot be fulfilled by the industrial sponsor, under specific contracts such as: ➢ Engineering, Procurement and Construction (EPC); ➢ Operation & Maintenance (O&M); ➢ Supply and raw materials agreements; and ➢ Insurance Policies.	• Engineering and Technical Assistance Companies; • Construction companies; • Railway/Inland Port Operators; • Equipment suppliers (rolling stock); • Railway/Inland Port Infrastructure Maintenance Companies; and • Others
Other stakeholders	• Interests closely related to the nature of each stakeholder.	• Railway/Port Authorities; • Chambers of Commerce; and • Railway/Inland Port staff.

Table 16-9: Potential Lenders to the Project - Boankra Inland Port & Eastern Railway Line

Lenders	Interests & Goals	Potential Concessionaire Lenders
Commercial Banks	• Obtain benefits from the debit interest rates and fees; and • Sometimes, provide advisory services to the Concessionaire.	• Purely Commercial Banks; • Investment Banks; • Merchant Banks; • Private Banking; and • Leasing Companies.
Public lenders	• Offer loans/grants to the Concessionaire at an attractive interest rate in order to facilitate the project development due to the strategic value for the country/region; • Monitor the concession performance; and • Have a relevant role in the Concessionaire key decisions.	• Host Governments: State, Regional or Local Authorities (e.g. Ministries, Departments and Agencies MDAs); • Regional Institutions; • International Institutions; • Railway National or Supranational Agencies; and • Other Public Bodies.
International Financial Institutions	• Offer loans at an attractive interest rate for projects in countries where commercial banks and capital markets are not willing to lend at a reasonable cost; • Ensure a legal and regulatory framework that encourages other private institutions to invest in/lend to the Concessionaire; • Monitor the railway concession performance; • Have a relevant role in the Concessionaire key decisions; • Provide financial assessment to the Concessionaire; and • Provide grants for the preliminary phases of the project.	• World Bank Group; • International Development Association (IDA); • International Finance Corporation (IFC); • International Bank for Reconstruction and Development (IBRD); • Regional Development Banks; • African Development Bank; • Asian Development Bank (ADB); • European Investment Bank (EIB);and • Islamic Development Bank (IDB).
Developmental Agencies	• Provide grants/loans at favourable rates of interest with aims linked to foreign economic policy or commercials promotion and internationalisation of businesses in the agency's home country.	• Developmental Agencies from most developed countries
Export Credit Agencies (ECAs)	• Provide political risk coverage, total coverage or loans to exporting companies operating in the ECA's home country at subsidized interest; and • Rolling stock financing provided by the ECA's home country manufacturers.	• Export Agencies from the OECD Consensus signer countries; and • Export Agencies from emerging countries.

16.6.2. Contractual Framework/Agreements

In the next phase of the project, the main transaction documents shall be drafted. This includes the concession agreement between the Implementing Authority (ie MoT, GPHA, GRDA, GSA etc) and the Concessionaire, among other agreements with the key parties to the PPP transaction

We have set out below a set of contractual framework/agreements that would be required at the procurement stage of this study.

- *PPP Concession Agreement:*
  This is the negotiated contract or agreement between the private proponent and Government or Public Authority that grants the private proponent (Concessionaire) the right to operate the project within the government's jurisdiction, subject to certain conditions.
- *Direct Agreement*
  This is an agreement between the contracting authority and the lenders to a project. It may also be an agreement creating a direct relationship between the project company (Special Purpose Vehicle) and either the contracting authority or the project's funders.
- *Debt Financing Agreement*
  This is an agreement between the SPV and financial institutions such as commercial banks, multilateral and bilateral development banks who provide financing for the project in the form of bonds or other financial instruments.
- *Equity Funding Agreement*
  This is an agreement between the SPV or Concessionaire and its shareholders who provide financing for the project.
- *Operation & Maintenance (O&M) Agreement*
  This is a contract or agreement between the SPV and another entity or firm to manage the operation and maintenance aspects of the project.
- *Design & Build Agreement*
  This is a contract or agreement between the SPV and another entity or firm to manage the design and construction phase of the project.

A PPP contract is sometimes awarded and signed before the project reaches financial close—that is, before the finance for the project is fully secured. During that period, lenders complete their due diligence process, including detailed review of the PPP agreements. Loan agreements set in place certain conditions before the SPV can access funds from the loan.

This process creates a risk that the project could be delayed or even fall through, if the winning bidders are unable to raise finance on the expected terms. Government may be under pressure to change the contract terms to meet lenders' requirements, since reopening the procurement process at this stage would cause delays and additional transaction costs for the government.

As part of the procurement process Bidders will be required to provide a bond, which may be called if the preferred bidder fails to achieve financial close within a certain period. This will encourage bidders to develop more concrete financing plans before submitting bids.

- *Bid bonds:* These are bonds required to be submitted by bidders to ensure commitment to the transaction or procurement process and to prevent the case of the winning bidder withdrawing without good cause. As part of the procurement procedure for this project, the amount and conditions for the bid bonds will be provided as part of the Project Request for Proposal documentation;

- *Performance Bonds:* There are two main scenarios where performance bonds may be used. They include where:
  - The lenders require performance bonds to be issued on behalf of a key contractor because they are not satisfied with the financial strength of that contractor;

- The contracting authority requires a performance bond to be issued in its favour by an acceptable surety to cover claims which may arise against the SPV during the construction phase when, if a default were to occur, it is likely that SPV would not be able to meet a claim. The bond and the cost will ultimately be met by the authority. This option is however not common.

The amount and conditions for performance bonds will be spelt out as part of the Project Request for Proposal documentation.

Another option to avoid the risk altogether is for Governments to require bids with financing commitments already in place (called an 'underwritten' bid). In this case, lenders must complete due diligence before the tender process is complete. However, both these options increase the cost of bidding, which may deter bidders and undermine competition.

16.7. Contractual Provisions

Due to the legal and technical complexity of PPP Projects, most PPP contracts tend be very expansive and detailed. However, there are certain requirements or contractual obligations within PPP agreements that apply to most arrangements.

The following are some of the contractual obligations or sections that will have to be defined and included as part of the provisions in the preparation of the contract for this project.

- *Interpretation:* This sets forth the definitions of important terms and provides guidance on the interpretation of the contract's provisions;
- *Description of the term of the project:* Defines the length of the contract and whether and by how much it may be extended by mutual consideration;
- *The objective of the contract:* Describes the intent of the undertaking;
- *The requirement for construction and operating bonds:* Provides security for government if the construction and/or the service delivery falls below standards;
- *Insurance requirements:* Provides security for the insurable matters within the ambit of the project;
- *Delay provisions***:** Describes what is and is not an excuse for a delay in construction or operations, and describes the remedies and penalties for such delay;
- *Force Majeure:* Describes what constitutes a force majeure event and what the consequences are of its occurrence;
- *Governmental action*: Describes what actions by government that affect the contract may give rise to a change in the terms and conditions of the contract, and how these are effected;
- *Government warranties:* Describes what warranties government is making in terms of the project;
- *Private sector warranties:* Describes the warranties that the private sector is making in terms of the project;
- *Change in the law:* Similar to Governmental action – describes what the consequences are if the law is changed;
- *Variations:* Sets forth the procedures to be followed when either party to the PPP contract wishes to change any material portion of the contract;
- *Termination:* Describes the conditions under which either party may terminate the contract, the processes to be undertaken in that regard, and the consequences to each party of a termination;
- *Indemnification:* Describes how and under which circumstances either party may be called upon to indemnify the other because of a given circumstance;
- *Intellectual property:* Describes the rights of each party to any intellectual property brought to the project or created during the project, including the steps to be taken to protect the intellectual property of third parties, such as IT software manufacturers;
- *Claims***:** Sets forth the procedures to be followed when either party has a claim against the other;
- *Financial security:* Defines the actions that either party that may give rise to a breach of any financing agreement by which project financing was obtained, and the remedies for such breach;

- *Dispute resolution:* Describes the steps to be taken by either party to resolve any dispute that may arise as to the interpretation of the PPP contract;
- *Step-in rights:* Sets forth the circumstances that may permit the private developer's lenders may "step in" to replace a failing private operator in order to protect the lenders' unique rights under the PPP contract;
- *Changes in the composition of the private sector service provider:* Describes the consequences, especially where the private sector service provider is a Special Purpose Vehicle (SPV), of a change in the ownership or key personnel thereof;
- *Partnership management:* Sets forth the mechanisms whereby the parties to the PPP contract will interact with each other going forward;
- *Compliance with all laws:* Requires each party to comply with all laws pertaining to the project, including obtaining environmental, zoning, planning and other permits;
- *Personnel:* If the PPP contract involves taking over government employees, describes the manner in which those employees are employed by the private sector service provider, including any restrictions on terminations or redundancies for operational reasons; and
- *Conditions precedent:* Describes any conditions precedent to be fulfilled by either party before the contract takes effect.

17. Market Sounding Plan

17. Market Sounding Plan

17.1. Introduction

The ultimate goal of the Boankra Inland Port and Eastern Railway line project is to ease congestion at the Tema port and facilitate a faster, safer and more efficient means of freight transportation to and from the northern parts of Ghana as well as the landlocked countries including Mali, Burkina Faso and Niger.

Currently, there are several different shippers and freight forwarders who carry out businesses that involves transportation along the corridor.

Considering the fact that these stakeholders would be the main users of the facilities and are currently involved in the freight transportation business in Ghana and within the West African sub region, we thought it was prudent to engage them to discuss our findings from our Traffic Demand survey and listen to their opinion and suggestions about the project.

We carried out two workshops in Tema and Kumasi on the 13 August and 20 August 2015 respectively. The key stakeholders invited to our stakeholder forums include shipping line owners, freight forwarders, regulatory authorities (including the GPHA, GSA and GRA), commercial trade associations and transport unions amongst others.

17.2. Methodology

The workshop allowed us to identify the key players in the shipping and freight transportation market in Ghana and particularly along the Eastern corridor.

At the second stage of the our market sounding assessment, with the help of the GPHA, we identified the top shipping lines operating in the Tema and conducted a series of interviews to access their thoughts on key issues such as:

- Level of interest in becoming a strategic partner for the Boankra Inland Port and Eastern Railway Line Project.
- Whether or not there is a good market and sufficient volumes for the project, based on their experience in the market.
- Level of control they expect to have in the project.
- Whether or not they would prefer the project to be structured on a standalone basis (railway line only or dry port only) or a combination of the two operating together.

Our general discussions of the feedback from the forums and the interviews have been put together in the following sections for both Tema and Kumasi.

17.3. General Feedback from the Stakeholders' Forum

The forum in Tema and in Kumasi both began with an introduction of the project concept and an update of the project status by the transaction team lead (PwC). This was followed by a presentation of the preliminary findings of the traffic studies carried out by Vision Consult.

After the presentations, the transaction team then allowed the invited stakeholders to make contributions, suggestions and ask questions about the project.

The program was aimed at engaging the key stakeholders present in order to share the key findings of the transaction team and to obtain comments and allow the contribution of ideas that would be useful to the project. The issues raised revolved around the following main topics:

- Construction and Operational Activities at the dry port and/or along the railway line;
- Transaction structuring of the project;
- Policy and Regulation;
- Social and Economic Impact Concerns; and
- Traffic Demand.

Table 17-1: Summary of General Feedback from Stakeholder Forum

No.		Key Comments
1	Construction and Operational Activities at the dry port and/or along the railway line	• Most of the stakeholders expressed the need to have customs stationed at the Inland Port but there were some concerns raised about the likely legal repercussions of implementing this. • There was another suggestion that a careful consideration be made for the Eastern railway line to be extended further north to make rail transportation more attractive to the land locked countries. • Most of the stakeholders called for the creation of an insurance facility, under the project, to promote and ensure that empty containers are well managed and returned to shipping companies. • Participants requested for fencing at pedestrian areas and built up areas to enable smooth operations especially in Kumasi City Centre.
2	Transaction structuring of the project	• Stakeholders wanted to know the type of PPP structure that is being proposed so that they position themselves for opportunities in the future. • The stakeholders at both the Tema and the Kumasi forum made it very clear that they did not see the project being successful on a standalone basis (either rail or inland port). They explained that the combined option was the best and will be the most efficient to meet their operational needs as well as attract freight traffic from the land locked countries to Ghana. However, the projects should be structured/ procured seperately
3	Policy and Regulation	• There was a general concern that the rail and port infrastructure may not be beneficial as much as expected if adequate policy instruments by the Government are not used to support its vision. • The stakeholders also raised the concern that excessive use of policy and regulation should be avoided as it may have the tendency to divert traffic to other competing countries. • During the engagement, it was revealed that the major problem with the axle load regulation is its poor enforcement and that once adequate measures are taken to properly enforce it, could lead to a modal shift of freight transportation from road to rail and protect the road infrastructure from further damage.
4	Social and Economic Impact Concerns	• Some of the stakeholders suggested that GoG should take measures to protect the Right of Way of the corridor that has been encroached upon, in order to avoid stalled progress due to litigations about land acquisition and resettlement. • It was also suggested that an assessment of the number of accidents by transit vehicles is undertaken and its impact on the supply of goods in the country noted.
5	Traffic Demand	• Most of the stakeholders generally agreed that there should be some form of collaboration with haulage companies, particularly with petroleum carriers in order for them to consider the utilisation of the rail services along the proposed

No.		Key Comments
		Eastern Railway line for the transportation of petroleum products. • Interactions with stakeholders at both the Kumasi and Tema forums revealed a strong request that agricultural export and import goods be made a major consideration in putting together the infrastructure at the proposed inland port at Boankra. According to their suggestion, this should include particularly, cooling and refrigeration facilities as well as other storage facilities and associated logistics.

17.4. Individual Stakeholder Engagement

In order to refine and reinforce the feedback from the stakeholder's forum held in Tema and Kumasi, we engaged few of the largest shipping companies in Ghana to get their thoughts, comments and contributions on the proposed project. These shipping lines include:

- Maersk Ghana Ltd;
- Delmas Shipping Ghana;
- Grimaldi Ghana Ltd;
- Hull Blyth;
- PIL Ghana Ltd; and
- Supermaritime Ghana Ltd

Key representatives of the shippers from the land locked countries were considered for further discussions but only the representatives from Niger's Shipping Council was available to talk to us.

17.4.1. Summary of Feedback from Shipping Companies and Shipping Councils from Landlocked Countries

Some of the key comments we received from our interactions with the shipping companies and the Niger Shipping Council are summarised below:

Table 17-2: Summary of Feedback from Shipping Companies

No.	Shipping Line	Summary of Key Comments
1	Maesrk Ghana Ltd	• The two projects could be combined as a project to maximise the benefits from the railway line and the Inland Port working together but it is important that the operation of the two infrastructure be given to the best companies who have the capabilities and experience in managing the two separately.
2	Delmas Shipping Ghana Ltd	• The representative from Delmas Shipping Ghana Ltd said that they will only express interest in investing in the development and operation of the Inland Port if the opportunity is attractive. They were not interested in investing in the Railway Line Project due to its high cost and lack of expertise in this area; • Furthermore, they also said that the Concession Agreements/Contracts should be split for the two Projects in order to have an efficient business. This is because it would be difficult to have one firm that has expertise in both businesses; and • In addition, they expressed concern of the high number of check points from Tema to Ouagadougou Road corridor which could

No.	Shipping Line	Summary of Key Comments
		deter Shippers in the landlocked countries from using our corridor.
3	Grimaldi Ghana Ltd	• The representative of Grimaldi Ghana explained that the neighbouring country traffic would be vital to viability of the project; • The representative also said that his company would be interested in operating the inland port and could consider investing in the railway line; • He explained that the use of disincentives on road transport will assist the modal shift from road to rail, including tariff increases and enforcing axle load enforcement along the eastern corridor; and • He also expressed concern about the fact that with the Tema Port expansion project coming on board soon, the issue of congestion at the port will no longer be a problem in the next 5-10 years unless container traffic will increase significantly over that time
4	Hull Blyth Ghana	• The Hull Blyth representative suggested that quick turnaround time for the movement of freight from Tema Port to Boankra and back is an important component of the project essential to control the issues of delay and high service costs once the infrastructure is developed; • He also mentioned that the management of empties from the inland port at Boankra back to the shipping line will be a key service we will be looking forward to; • Another key point he touched on was the fact that Hull Blyth Ghana could consider interest in the development of the inland port based on their experience as terminal operators. But this is dependent on the outcome of the feasibility studies and the spelt out role of the Government and its agencies in the ownership, operation and management of the facility; and • The Hull Blyth representative identified that for project as a package to be successful, the combined option was the favourable option as the two infrastructure could leverage on each other to support a more efficient port operation and freight transport system.
5	PIL Ghana Ltd	• PIL representatives said that the Eastern Railway Line and the Inland Port Projects should be operated as two separate businesses in order to maximise efficiency during operation; • They also said that competing projects for example the expansion of the Accra – Kumasi Road Project, expansion of Eastern Road Corridor and Tema-Akosombo- Yapei multimodal corridor is likely to take away traffic demand from the Project and could have a financial impact on the Project viability; and • Furthermore, the current traffic regime makes it easier to move transit freight from Togo and Cote D'voire to Burkinafo although the distance through Tema Port is shorter.
6	Supermaritime Ghana Ltd	• The representative of Supermaritime mentioned that he was in favour of the railway line supporting the activities at the inland port and at the Tema Port; • He also mentioned that even though the railway line and the activities of the inland port could work together to provide

No.	Shipping Line	Summary of Key Comments
		important benefits, the two should be treated as separate concessions and given to separate operators; and • He identified that the transit traffic from the land locked countries was being lost to the Ivory Coast and Togo due the relatively liberal axle load regulation there.
7	Niger Shippers' Council	• The representative at the Niger Shippers' Council identified the high cost of tariffs at the inland port and the cost of transporting freight from the Tema port to Niger; • He explained that at least a 30% reduction in transportation cost using rail would be attractive for freight hauliers moving freight to or from Niger to consider using the Eastern Railway line from Tema Port to Boankra rather than road; and • He indicated that 70% of the goods to Niger is shipped via the sea port in Benin as it is easiest to transport freight from Benin to Niger. The closest port in Benin to Niger is about 1060km from its capital Niamey. This distance is shorter than the closest ports to Niger from neighbouring countries.

17.4.2. Summary of Feedback from Ghana Community Network Services Limited (GC Net)

GC Net in collaboration with the Ghana Customs and National Security applies a tracking system that facilitates the secure transportation of South bound, Northbound, Westbound & Eastbound freight via road.

The system uses Geo-fencing technology which maps out a specific road route for freight depending on if its Southbound, Northbound, Westbound and Eastbound. Any diversion from the route alerts their systems and notifies the Customs and National Security, who will proceed to intercept the diverted goods.

GCNet together with Ghana Customs facilitate the registration of all the importers (i.e. transit traffic clients) as well as their clearing/transaction agents and the details of the containers.

Some of the key comments we received from our interactions with a representative from GC Net are summarised below:

Table 17-3: Summary of Feedback from Ghana Community Network Services Limited (GC Net)

	Summary of Key Comments
Ghana Community Network Services Limited (GC Net)	• Prior to the GC Net System which was rolled out in 2008, the frequency of diversions in road freight transport was approximately 50-60%; • The GC Net System significantly reduced this to just about 2-3% over the period of 2008 to date; • The insurance of the freight transported by road is handled by the SIC. They are the sole insurance company responsible for insuring the freight monitored by GC-Net during the road transport; • The GC-Net system can fit perfectly into the proposed Boankra Inland Port Concept. However, the key thing is for Ghana Customs to clearly define the parameters of operating the road freight transport from Tema Port to Boankra and back. (E.g. check points, bonded good system, customs systems at Boankra, etc.);

Summary of Key Comments	
	• The tracking system used for freight transported by road is approximately $50 per truck; • GC-Net handles approximately 100 freight trucks a day (i.e. for Westbound, Eastbound, Northbound and Southbound traffic combined); • Ghana Customs provides a 7-day period within which transit freight being transported outside Ghana by road (usually Northbound, Westbound or Eastbound) can remain bonded and tracked by the GC-Net systems; and • Factoring in the possibility of truck breakdown or traffic delays, this expiry period is subject to renewal/ extension once requested and authorised.

17.5. Potential Interest in the Transaction

Once a transaction structure is finalised with Government of Ghana (GoG), we will be speaking with potential developers who have expressed their interest in the project.

These potential investors include:

- Grindrod NLP Developments;
- African Rail (Gh) Ltd;
- Agility;
- AI Africainvestor; and
- Sino Hydro.

18. Social and Environmental Impact Assessment

18. Social and Environmental Impact Assessment

18.1. Introduction

This chapter reviews the impact of the proposed project on the living and non-living components of the project environment. It identifies potential environmental and social concerns associated with the project implementation. It also details measures which should be implemented to mitigate these impacts.

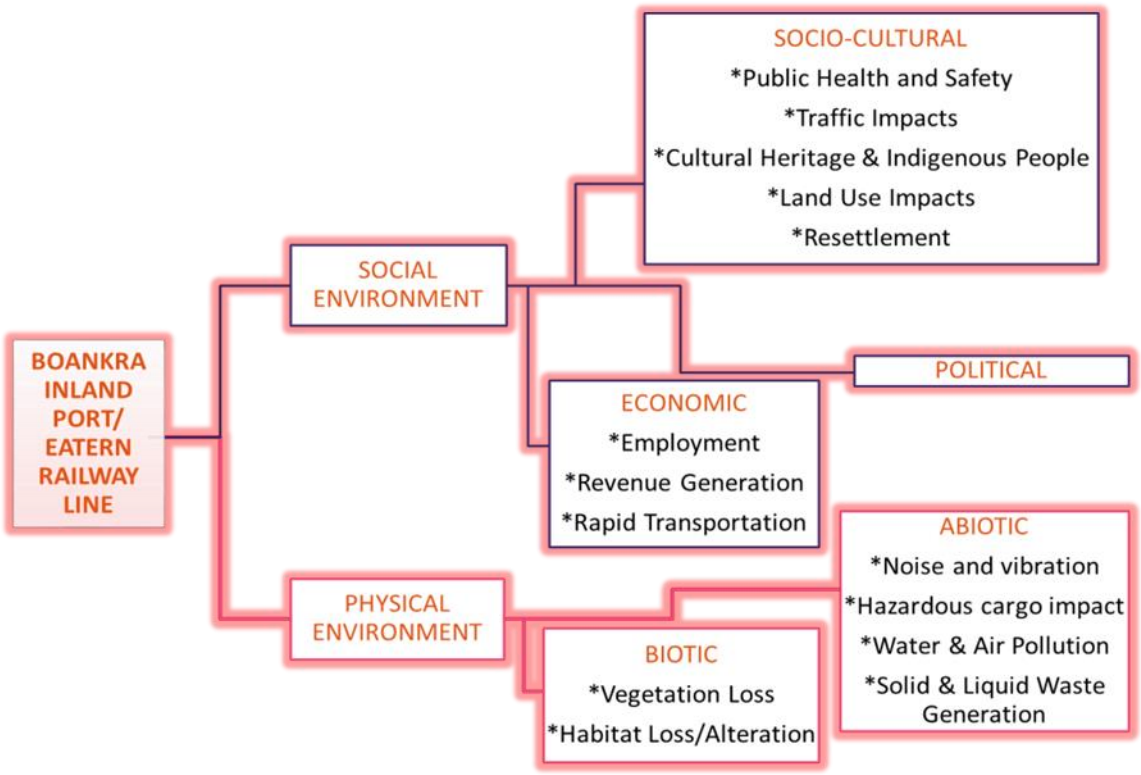
As previously discussed in chapter 2, the site and RoW for the Inland Port and Eastern Railway Line have already been identified and demarcated. Apart from the area for the Inland Port which has been secured, portions of the RoW for the railway lines have been encroached, particularly, in high density areas such as Amasaman, Nsawam and Koforidua. These encroached locations serve as residential or commercial facilities for the occupants.

18.2. Methodology for Impact Identification

The environmental and social baseline information of the project affected area was established as part of the methodology for identifying potential project impacts. The extent of baseline consideration was dependent on the nature of the affected medium and the potential extent of impact on the medium.

Two main components, the social and physical environments will be affected by the project. Changes in the physical environment could lead to alterations in the biotic and abiotic environment. Changes to the social environment could affect socio-cultural and economic characteristics of surrounding communities. The potential environmental and social impact of developing the Boankra Inland Port and Eastern Railway Line are summarised in the figure below:

Figure 18-1: Summary of Physical and Social Impacts



18.3. Potential Environmental Impacts and Mitigation Measures

Table 18.1 below summarises the environmental issues associated with the development of the Eastern Railway Line and Boankra Inland Port, including measures to reduce the impact of project activities on the natural environment.

Table 18-1: Environmental Issues and Mitigations

No.	Environmental Impacts	Description	Mitigations
1.	Vegetation Loss and Habitat Alteration	• Clearing of vegetation for Port construction will cause the loss of some flora species.	• Planting lawns and local species if trees within and at the periphery of the Inland Port will replace lost flora as well as provide a habitat for birds and other fauna species.

No.	Environmental Impacts	Description	Mitigations
2.	Air Pollution	• Construction activities would lead to the emission of exhaust gases and dust into the atmosphere thereby degrading the air quality at and around the project site.	• Exhaust emissions can be minimised by proper maintenance of machinery and the use of sulphur free fuels. • Dust can be reduced by sprinkling water and covering transported concrete materials with tarpaulins.
3.	Water Pollution	• The existing railway line crosses over thirty (30) rivers. A stream passes through the Inland Port site. • Waters resource along the railway line have been already polluted as a result of illegal mining activities. • Further impact could be triggered without proper management of chemicals and waste disposal.	Best construction practices such as providing barriers around excavated sand piles should be established control siltation of the stream. Oil and grease spillage should be avoided or limited on site. During the operational phase, trains should be serviced regularly to prevent leakage of fuel and oil from polluting ground water resources.
4.	Noise and Vibration	• Operations of the Inland Port would create cumulative noise and vibration levels which lead to discomfort for the general public within the area. • The machinery used during earthworks generate noise and cause vibrations. • Noise and vibrations from the movement of the trains and braking especially in commercial areas can be significantly high	• Construction activity such as earthworks should be scheduled for convenient hours of the day to minimise the impacts of noise on surrounding communities. • Railway engineers should consider noise and vibration reduction technologies like installation of silencers and vibration control systems for locomotive suspension.

No.	Environmental Impacts	Description	Mitigations
5.	Solid and Liquid Waste Generation	• Construction activities will generate both solid and liquid wastes such as scrap metals, torn packages of materials such as cement bags, plastic bags and wood, human waste, food waste, oil spills and slurry concrete. • Construction and operations of the project will also generate solid and liquid waste.	• Temporary refuse collection facility and containers should be provided by the contractor for collection and disposal. • Portable sanitary facilities should be provided on construction sites to be managed by a licensed sewage management company. • Waste bins should be provided on the Port premises. • Toilet facilities should be made available in passenger trains. Composting toilet tanks are recommended for effluent storage.
			• Sewerage facilities at the Inland Port should be properly constructed to avoid leakage of effluent units surrounding neater bodies. • Water quality around the Inland Port site should be tested regularly.
6.	Public Health and Safety Impact	• Hazards from the construction phase could arise from the use of machinery and equipment in constructional activities such as the loading and off-loading.	• Ensure proper working procedures, Personal Protection Equipment (PPEs) and skilled workers to man equipment. • Installation of fire protection mechanisms and ensuring that safety regulations are adhered to prevent any hazards. • Develop a Health and Safety Policy for the Inland Port and Eastern Railway Line.

No.	Environmental Impacts	Description	Mitigations
7.	Hazardous Cargo Impacts	• Some cargo may contain chemicals, fertilizer or other hazardous materials. • There could be possible damage through accidental leakages of liquids and toxic gases especially when contents are stored for longer periods.	• Port staff should also be trained to deal with hazardous spills and leakages. • Containers with hazardous materials need to be stored in confined areas with impermeable bottoms

18.4. Potential Social Impacts and Mitigation Measures

The table below explains the major potential social impacts associated with the development of the proposed project and the appropriate mitigation measures.

Table 18-2: Social Impacts with Mitigations

No.	Social Impacts	Description	Mitigations
1.	Traffic Congestion	• Construction related activities could increase traffic incidents and potential accidents due to the transport of materials and equipment on the Accra- Kumasi Highway. • Konongo-Ejisu Highway near the Inland Port may get more congested due to the influx of trucks, other commercial and private vehicles when the Inland Port becomes operational	• To reduce the impact of increasing traffic in the Inland Port vicinity, traffic calming measures such as speed humps should be installed. • Traffic impact assessments should be undertaken on surrounding roads and mitigation measures such as traffic signals, roundabouts etc. installed • Pedestrian facilities such as footpaths and zebra crossings should be constructed around the site.
2.	Land Use Impact	• The development of railway lines may have a social effect on the communities within the vicinity of the railway line. These communities include Achimota, Tema, Amasaman, Nsawam, Koforidua, Nkawkaw, Juaso, Konongo, Odona, Fumesua, etc. • Construction of the railway line will imply the demolition of structures within the right of way (houses, shops, workshops, factories, etc.).	• Resettlement and compensation plans should be developed and in line with national and international laws and policies, and in consultation with affected persons to ensure that livelihoods are restored to agreeable levels.
3.	Public Health and Safety Issues	• Occupational safety risks such as slips, trips, falls and electrocution could also occur. • These risks can result in significant consequences such as death, therefore, properly monitored operational procedures should be followed. • The influx of migrant workers as a result of infrastructure development and its resulting economic activity can also lead to the proliferation of communicable diseases.	• Personal Protection Equipment (PPE) must be provided for all workers during construction and operations. PPE must be worn at all times • These impacts can be reduced significantly by implementing safe operational procedures such as installation of fire detection and fire-fighting systems. • Public health education should be reinforced in project areas.

No.	Social Impacts	Description	Mitigations
4.	Resettlement Issues	• Without proper planning and management, involuntary resettlement may result in long-term hardship for affected people and environmental damage to the locations in which they are resettled. • Negative consequences arising from poor resettlement practices could undermine the developmental impact of the project, tarnish the reputation of the project sponsor and will be contrary to the intended purpose of improving the lives of the locals through the PPP arrangement.	• A Resettlement Action Plan (RAP) should be developed based on a functional regionalisation and context-specific approach centred on the peculiar characteristics of affected communities.

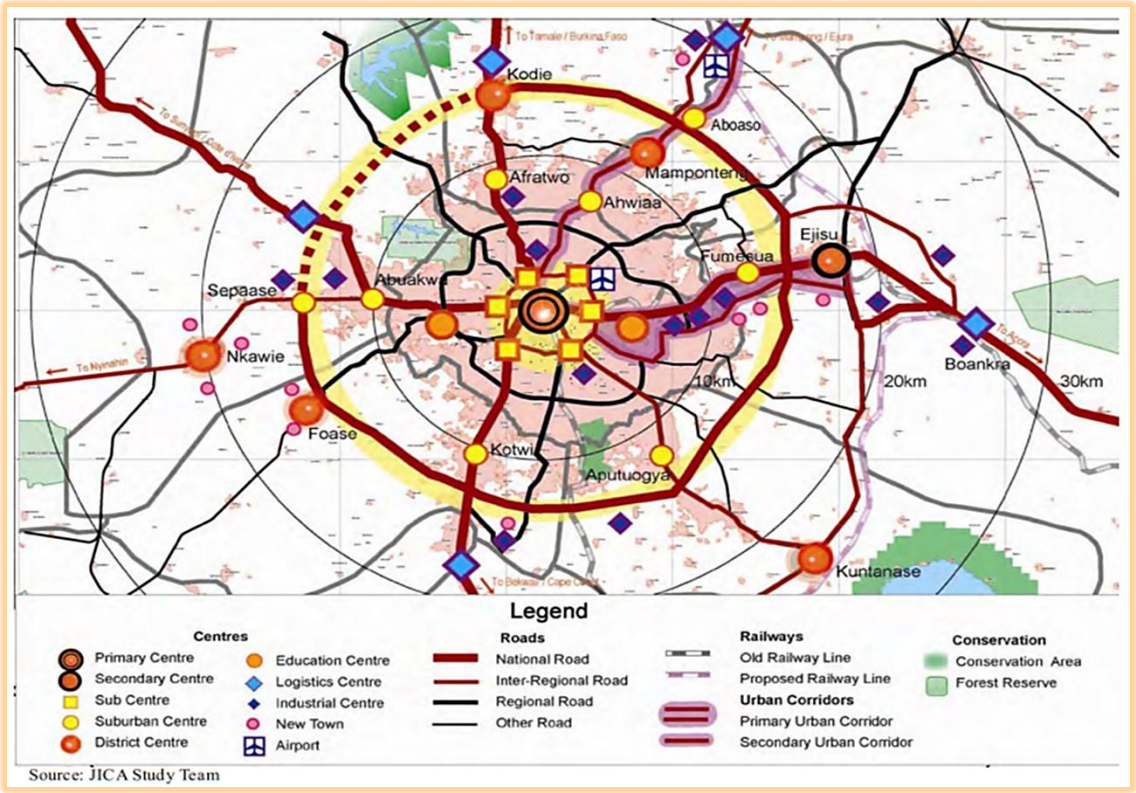
18.5. Resettlement and Social Considerations

We recommend that resettlement of encroachers be done as per a Resettlement Action Plan (RAP) taking into consideration both local and international resettlement policies (i.e. Ghana's State Lands Act 186 of 1963 and the World Bank Operational Policy OP 4.12 respectively).

The RAP does not fall within our current scope of work as previously indicated to MoT. We believe that the development of the RAP will add value to the project, particularly, it will help estimate the cost of resettlement and compensation to affected persons which will be included in the overall project cost.

- The RAP should be context specific and functionally regionalised with the following suggested scenarios.
- The Kumasi Scenario (1): Adapt and repose on existing developmental plans [e.g. The Outer Ring Road for Greater Kumasi (Refer to figure 17.2)];
- The Odawna Scenario (2): Initial minimal force and subsequent individual negotiations to reclaim RoW;
- Scenario for Less Encroached Areas (3): Lawful acquisition of Right of Way (RoW); and
- Other Scenarios (4): Locating smaller station in town and ultra-modern station at outskirt.

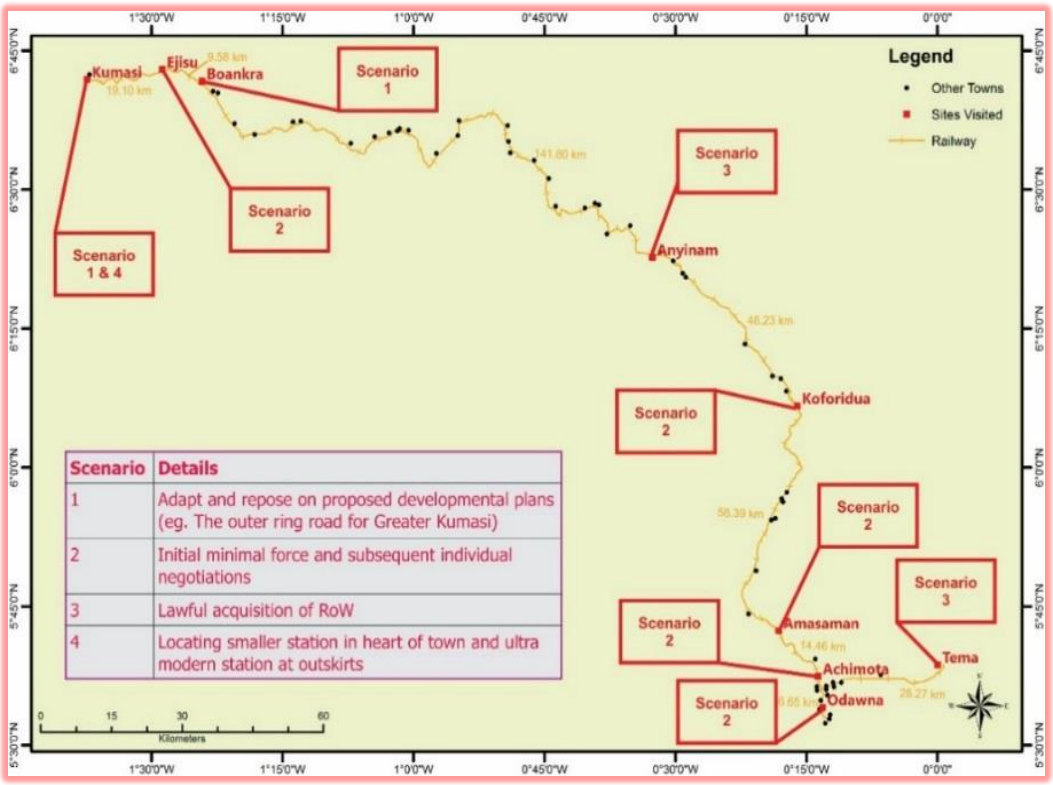
Figure 18-2: Spatial Development Framework for Greater Kumasi Conurbation



Source: JICA Study Team

Resettlement options for the project implementation took into consideration measures to reduce involuntary resettlement and minimise adverse impacts on encroachers in the RoW of the Eastern Railway Line from Tema through the Boankra Inland Port to the Kumasi Central Business District. The methodology adopted for resettlement differs from one location to the other so as to reduce the impact on the socio-economic conditions of Project Affected Persons ("PAPs") at these settlements areas as stipulated in the World Bank Involuntary Resettlement Policy. The options/strategies considered for the resettlement process are summarised in figure 19.3 below. It must be noted that two or more options may be applicable to a particular settlement.

Figure 18-3: Graphical representation of Resettlement Approaches



20. Assessment of Statutory, Institutional, Regulatory and Legal Framework for the Project

19. Assessment of Statutory, Institutional, Regulatory and Legal Framework for the Project

19.1. Introduction

This section of our report summarises our findings from our review of the existing legal and regulatory framework, foreign investment laws, environmental laws, previous arrangements, agreements and Memorandum of Understanding ("MoUs") with third parties relating to the project that may have an impact on the proposed transaction.

19.2. Constitutional Considerations

Any PPP scheme requires compliance with Articles 174 (exemption of taxation), if applicable, and 181 (Government entering into an international business transaction) of the Ghana Constitution, 1992. We have not identified any Constitutional impediments to the Project going forward, as GoG policy on PPPs is operational.

19.3. PPP Framework

The National Policy on Public Private Partnership ("the PPP Policy") adopted by Cabinet on 3 June 2011 and the Ghana Public Private Partnership Bill Draft of May, 2013, provide the framework for PPP arrangements in Ghana.

The PPP Policy is designed to provide a clear and consistent guide for all aspects of the PPP process including project identification, evaluation, selection, procurement, operation, maintenance and performance monitoring in Ghana.

The PPP Policy describes a PPP arrangement as a contract between a public entity and a private sector party with a clear agreement on shared objectives for the provision of public infrastructure and services traditionally provided by the public sector.

The Project seeks to ultimately engage private parties under a partnership agreement with GoG to finance, construct and manage the Eastern Railway Line and Boankra Inland Port, which would have ordinarily been the responsibility of GoG. This project by composition, can therefore be classified as a PPP project under the National PPP Policy

In effect, the private entities will be performing a Government service delivery function, as well as take on project associated risks for a significant period of time. In return, the private entity enjoys benefits or financial remuneration which may be derived from either end-user charges or payments made by GoG or a combination of both.

19.4. Existing Legal/Regulatory Framework

19.4.1. Legislation of Particular Relevance to the Port Sector

Ghana Ports and Harbours Authority Law, 1986 (PNDCL 160), established the Ghana Ports and Harbours Authority as a statutory corporation. It is an amalgamation of the erstwhile Ghana Cargo Handling and Ghana Ports Authority and Takoradi Lighterage Company Limited. All the assets of the above mentioned companies are vested in Authority. The Authority oversees Ghana's two ports which are the main shipping gateways into Ghana; the ports of Tema and Takoradi.

Issues regarding the capacity of GPHA to enter into commercial arrangements are dealt with under its enabling statute. Section 5 of GPHA Act permits it to enter into commercial agreements, subject to certain approvals and verifications. GPHA has a fairly large measure of autonomy in its dealings with other public sector entities as well as both the local and international private sector. Broadly speaking, there are almost no legal impediments facing the GPHA in fulfilling its mandate under most forms of PPP arrangements.

Additionally, GPHA Act gives the Authority extensive borrowing powers. The Authority may charge its assets, undertakings and revenues with the repayment of any money borrowed together with interest thereon and may do all such other things necessary in connection with or incidental to such borrowing.

Furthermore, the Act gives GPHA broad regulatory powers in respect of matters within the port. This includes the ability to impose and vary tariffs, including tariffs denominated in foreign currencies. It permits GPHA to sanction entities which do not comply with its regulations, and even creates a criminal sanctions regime applicable solely to the port which are not covered by Ghana's Criminal Code.

GPHA, in sum, has almost unfettered capacity to enter into PPP arrangements relating to the Inland Port.

In respect of procurement issues, although the Public Procurement Act 2003 (Act 663) does not specifically or categorically cover procurement under PPP, compliance with its provisions will be vital for the success of any PPP initiative. For example, Sections 14 to 84 of the Public Procurement Act 2003 are of utmost importance and relevance as they outline the standard and procedures to be followed in the procurement of goods, works and services within the public sector and for tendering for any public contracts or project.

Again, here, it is important to point out that 1) given the broad powers of GPHA and 2) how much leeway there is under Ghana's Public Procurement Act for public agencies to circumvent its provisions, there is some ambiguity as to the application of the Act to some of the procurement - related activities of GPHA. Indeed, some large concession/licence arrangements are awarded without going through the procurement process at all.

19.4.2. Legislation of Particular Relevance to the Rail Sector

The main legislation to be considered in pursuing the development of a railway network in Ghana is the Railways Act 2008, Act 779 (“Act 779”). Act 779 established the Ghana Railways Development Authority (“GRDA” or “the Authority”), the body responsible for railway regulation.

The enactment of Act 779 resulted in the separation and transfer of railway infrastructure assets from Ghana Railway Company Limited ("GRCL") to GRDA and the establishment of GRDA to regulate the industry. Therefore as it stands, GRCL has no control over railway assets since those assets are now vested in the GRDA. The Authority is mandated to keep and manage the assets and may make any improvements that it considers expedient to the assets in accordance with its objects.

GRDA may sell, grant a concession, convey, lease, or otherwise dispose of the assets on terms and subject to conditions that GRDA considers desirable. Ownership of the RoW of a line of railway, and all structures, works and other enhancements on these shall at all times remain vested in the Authority.

Act779 also identifies clearly what is to be done to any liabilities incurred by GRCL or any of its predecessors to any person before the coming into force of the Act.

Such liabilities are to be assumed by GRDA subject to the right to transfer those liabilities or any portion of them to any party who has entered into a contract or other transaction with GRDA.

In addition to the above, the functions of the Authority are set out in Act 779 and gives it the right to acquire and hold movable or immovable property and as well as the power to enter into a contract or any other transaction.

We have assumed that any existing liabilities will be ring-fenced for GoG's account and will not be passed onto the Concessionaire or project company.

19.5. Legal Requirements for Operations of the Project

There are a number of legal and regulatory consideration that a prospective concessionaire or developer needs to take into account in the construction and operation of a railway line. We have summarised these below.

19.5.1. Requirement for Operating Licence

At present there are no constraints to the proposed project in respect of sector law, save for obligations as required under Act 779. The most relevant in respect of the project going forward is obtaining railway license and its renewal for which the requirements of Act 779 are as set out below.

- A license granted is for a period of five years in each instance and may be renewed under terms specified by the Authority;
- A person who desires to renew the license shall submit an application for the renewal to the Authority not later than six months before the license expires;
- The procedure for the renewal of the license is the same as that for the grant of the original license except that the fees for renewal shall be lower than that payable for an original license; and
- An operator who fails to renew the license or whose application for renewal is rejected by the Authority shall cease to operate the railway service.

Act 779 governs the construction, management or operation of a railway lines in Ghana. Further to the above, despite the grant of a licence, a railway company shall not construct a railway line without the written approval of the Authority.

Due to the nature of the project if necessary the Minister may by Legislative Instrument make Regulations for the construction, alteration, maintenance, safety or operation of railway works, road crossings, and the maintenance, safety or operation of railway works, road crossings, utility crossings, and the maintenance and operation of railway equipment.

19.5.2. Permit for Commercial Water Use

A permit would also have to be obtained from the Water Resource Commission in respect of any construction relating to a watercourse. In this project any construction in relation to watercourse would be for "commercial water use" as defined under the Water Use Regulations 2001 i.e. the abstraction and use of water for independent projects that rely on their own water production works.

In exercise of the powers conferred on the Water Resources Commission by section 35 of the Water Resources Commission Act, 1996 (Act 522) and the Water Use Regulations, a person may obtain a permit from the Commission for commercial water use. The completed application for the permit shall be accompanied by the fees and relevant information documents. On receipt of the application, the Commission shall publish a notice of the application in the mass media in a form that the Commission may determine. Prior to the Commission making a grant of a permit, it shall publish in the Gazette and in at least one national newspaper a notice;

- Stating the purpose of the application; and
- Inviting, objections from the public to be submitted to the Commission within three months from the date of the first publication.

On receipt of the completed application form the Commission shall within ten days acknowledge receipt of the application form in writing and not more than four months inform the applicant in writing of the Commission's decision.

In considering its decision the Commission shall conduct an investigation to ascertain whether the proposed use of the water will not cause irreparable damage to water resources, public health and must ensure public participation especially of the people in the area likely to be affected by the proposed use. The Commission shall hold a public hearing in respect of an application where:

- Upon a notice issued under regulation 3(1) there is adverse public reaction to the proposed use;
- The use of the water involves the dislocation, relocation, resettlement or in any manner cause the destruction of the natural water resources of the community; or
- The Commission considers that the use of the water will have an impact on the natural resources of the basin.

For the purposes of conducting a public hearing, the Commission shall collaborate with (a) the Environmental Protection Agency (b) the traditional authorities of the community and (c) the relevant Government institutions and agencies.

Where the Commission in consultation with the Environmental Protection Agency ("EPA") considers a proposed water use to constitute a use which requires an environmental impact assessment, the applicant shall attach to the application evidence that an environmental impact assessment has been approved by the EPA.

Also where in the opinion of the EPA the proposed or existing water use requires an environmental management plan, that requirement shall be one of the conditions for the grant of water use permit. The duration of the permit shall be specified in the permit and a renewal of which must be submitted to the Commission not later than ninety days before the expiration of the permit.

19.5.3. District Assembly Developmental Permit

Development permits from the various district assemblies in compliance with the Local Government Act 1993 (Act 462) would also be required for project.

19.5.4. Taxation, Import Duties and Exchange Control

With respect to financing the project, regular tax provisions of the Internal Revenue Service Act 2000 (Act 592) would apply to the private sector entity due to the nature of the PPP arrangement. Regarding foreign exchange controls for all payments, customers are required to submit any required documentation for the underlying transaction and complete applicable forms provided by banks for monitoring purposes.

There are no restrictions on payment of amortisation of loans or depreciation of direct investments. Banks must submit to the Bank of Ghana reports of all payments transactions. Apart from those items which are exempted from payment of Customs Duties, all imports attract Import Duties, Import VAT, and National Health Insurance Levy.

Other Levies such as ECOWAS Levy, Export Development and Investment Levy may be levied on some specific commodities. Import Duty is calculated on the Cost Insurance and Freight ("CIF") value of the commodity whilst Import VAT is calculated on the Duty-inclusive value of the goods.

Different rates of Duty apply to all imports but VAT is a flat rate per the Harmonised System and Customs Tariff Schedules 2012 under Section XVII, railway or tramway locomotives, rolling stock and parts thereof, railway or tramway track fixtures and fittings and parts thereof, mechanical (including electro-mechanical) traffic signalling equipment and fixtures are going to be used for a PPP project, an application can be made for tax exemption on those equipment.

19.5.5. Environmental Protection Agency ("EPA") Requirements

The EPA Act 1994, Act 490 and Ghana Environmental Assessment Regulations 1999, LI 1652 requires that undertakings likely to have significant impacts on the environment must register with the EPA and obtain environmental permits before commencement of construction and operations. The procedural steps leading to the grant of an environmental permit are described below.

19.5.5.1. Screening

On submission of the registration form, the EPA would within 25 days request the Authority must conduct a detailed Environmental Impact Assessment ("EIA") study in order to understand fully the environmental impacts of the proposal and how they would be mitigated.

19.5.5.2. Scoping /Terms of Reference

The first step in the conduct of EIA is for the Authority to undertake a scoping exercise which involves widespread consultations with interested and/or affected parties, in order to identify all key issues of focus and to develop the terms of reference for the EIA study. The Authority would be expected to prepare a scoping report with a draft Terms of Reference (ToR) for the EIA study and submit ten (10) copies of the report to EPA for review and acceptance.

19.5.5.3. Environmental Impact Assessment

Once a scoping report with the ToR is accepted by EPA, the Authority shall then commission a detailed Environmental Impact Assessment study. The Authority would be expected to submit 12 copies of a draft Environmental Impact Assessment Report (called Environmental Impact Statement) to the EPA for review.

19.5.5.4. Submission and Review of Environmental Impact Statement ("EIS")

As part of the review, copies of the EIS are placed at vantage points including the EPA library, relevant District Assembly and EPA Regional Office and the Sector Ministry responsible for the Inland Port and Eastern Railway project (i.e. MoT) and a public notice issued in the national and local newspapers about the EIS publication and its availability for public comments within 21 days. The EPA is mandated to conduct the review of the EIS and make its decision known to the Authority within 50 working days

19.5.5.5. Public Hearing

In certain cases the EPA may be required under Regulation 17 of the LI 1652 to hold public hearing on the proposed project. These are:

- Where a notice issued under regulation 16 of the LI 1652 results in serious public reaction to the commencement of the proposed undertaking;
- Where the undertaking will involve the dislocation, relocation or resettlement of communities;
- Where the Agency considers that the undertaking could have extensive and far-reaching effects on the environment.

It is important to note that where a public hearing is held the prescribed time for EPA actions and decision-making on the application may extend.

19.5.5.6. Environmental Permitting Decisions (EPD)

Upon submission of a draft EIS, the Agency would conduct a review of the report with the assistance of a Cross-Sectorial Technical Committee within 25 working days.

19.5.5.7. Processing and Permit Fees

The Authority shall be required to pay processing and permitting fees as prescribed by the Fees and Charges (Amendment) Instrument 2013 (LI 2206) before an environmental permit is issued.

19.5.6. Planning and Construction Issues

Despite the grant of a licence, a railway company shall not construct a railway line without the written approval by of the Authority for the construction of the railway line.

The Authority may grant approval to construct a railway line if it considers the location of the railway line is reasonable, taking into consideration the requirements for railway operations and services, the interests of the localities and persons that may be affected by the line or its constriction.

19.5.6.1. Powers in relation to natural or man-made obstacles

A railway company may exercise the following powers to construct or operate its railway;

- Make and construct tunnels, embankments, aqueducts, bridges, roads, conduits, drains, piers, aches, cuttings and fences across or along a railway, watercourse, canal or a road that adjoins or intersects the railway; Divert or alter a watercourse, or the course of a road, raise or lower the course in order to move the course more conveniently across or along the railway;
- Make drains and conduits into, through or under land adjoining the railway for the purpose of conveying water from or to the railway; or divert or alter the position of a water or gas pipe, sewer or drain, telegraph, telephone or electric line, wire or pole across or along the railway;
- A railway company shall limit the amount of damage and make good any damage caused either directly or indirectly in the construction of the railway line; pay compensation for any damage caused to property in the construction of a railway line.

19.5.7. Land Acquisition

There are two main issues for GRDA with regards to land use for the Eastern Corridor Railway Project and these are:

- How to relocate encroachers from railway lands within the confines of the law; and
- The acquisition of rights to land belonging to individuals and other entities; for example, as may be required for the purposes of realignment as indicated in Section 5 of this report

It is our understanding that occupants of railway lands fall into two categories, i.e. those with permission from the railway authorities by way of a lease and/or a license as opposed to those without permission. Occupiers with leases or licenses granted to them can be evicted lawfully in accordance with the terms of the lease and/or the license. To this end, the Railway Act 2008 makes provision for the following:

19.5.7.1. Acquisition of Land for Railway Purposes

Where the Authority is satisfied that:-

- It is necessary for a railway company to acquire a particular piece of land for the construction or operation of its railway line and;
- The owner of land has failed to consent to the acquisition of a particular parcel of land by agreement, despite diligent efforts made by the railway and;
- There is no reasonable prospect of the land being acquired by agreement,

The Authority may take steps to acquire the land for the use of the railway company under the State Lands Act 1962 (Act 125) and the land shall vest in the Authority but the railway company shall pay part or all of the cost of the land acquisition including the compensation payable to the owner as determined by the Authority;

19.5.7.2. Power to Enter and Inspect Land

The Authority may enter land which is earmarked or required for the construction or operation of a railway for inspection in order;

- To establish the location of the railway;
- Mark or delimit the areas of land required for the construction or operation of the railway;

- Determine the extent of the work necessary to be carried out before the acquisition of a parcel of land by agreement or by Authority;
- The Authority shall exercise the power to enter and inspect land after forty-eight hours' notice in writing has been given to the owner or occupier of the land.

19.5.7.3. Accommodation Works on New Lines of Railways

A railway company shall, during the construction of railway or as soon as practicable after the construction of a railway, construct and maintain accommodation works for the benefit of the owners or lawful occupiers of adjoining lands. The accommodation works include:

- Road crossing, bridges, culverts, drains or works that are necessary for the purpose of making good any interruption caused by the construction of the railway;
- Works which are necessary to restore to the owner or lawful occupier to quiet enjoyment of related facilities including water, electricity, telephone and other utilities from or to adjoining lands;
- This section does not authorise a railway company to construct or maintain accommodation works:-
- In a manner that prevents or obstructs the proper operation of the railway;
- Where the owners or lawful occupiers or their predecessors in title have received compensation instead of construction or maintenance of the accommodation works or;
- After a period of five years from the date on which the railway passing through the land was first opened for the public carriage of passengers or goods.

19.5.8. Land Title Advice

We have to date not sighted documentary evidence of title to the lands in question and as we understand it, the land for the Boankra Inland Port has been obtained but title to the land have not been secured.

We also understand that title to the lands required for the Eastern Railway Corridor project is owned by the State but we have not seen documentary evidence of the title. It is important to note that unregistered titles can be re-established by registration if there are no prior documents of title or where the title documents are proved to have been lost or destroyed. In these circumstances and without evidence to the contrary, we can safely assert that there is an absence of documentary title for the lands in question and for which reason we advise GRDA and GSA to redress the situation by taking the following steps:

- Identify the lands designated for the Eastern Railway Corridor (Right of Way) and owned by the Government (GoG) before the coming into force of the Lands Title Registration Law, 1986 (PNDCL 152). These lands having been acquired under the Land Registry Act, 1962 (Act 122) provides for ownership of land by way of registered instrument (i.e. a Deed). Thus, registration of the instrument in respect of these lands may facilitate proof of title to the lands;
- Following identification of the respective lands and whether or not they are situated in areas declared registration districts, GRDA and GSA would need to instruct a surveyor to prepare a site plan;
- On completion of the site plan, GRDA and GSA will have to prepare an indenture for the lands in question;
- GRDA and GSA to execute the indenture in the names of the relevant statutory bodies responsible for the projects. As we understand it, the Ghana Shippers Authority are responsible for the Boankra Inland Port whereas the Ghana Railway Development Agency are responsible for the Eastern Railway Corridor;

- Stamp the indentures at the Lands Commission and a nominal stamp duty fee paid;
- Register titles to the lands in question. Where the land is in an area declared registration districts, registration takes place at the Land Title Registry and a Land Certificate issued which constitute evidence of ownership. On the other hand, where the land is in an area not declared as registration districts, the title deeds are registered at the Lands Registry.

It is important to note that since PNDCL 152, registration of title to land is compulsory in all areas declared registration districts. However, it is permissible to continue registration of instruments under the 1962 Act (Act 122) in respect of lands situated in areas not declared as registration districts.

The MoT is further advised to identify lands required for the combined project that are currently not owned by GoG. These additional lands can be compulsorily acquired by GoG invoking powers under the State Lands Act, 1962 (Act 125) as amended and the Land (Statutory Wayleaves) Act, 1963 (Act 186). These provisions grants compulsory purchase of lands for public purpose and by definition the Boankra Inland Port and the Eastern Railway Corridor are for public purpose. However, prompt payment of fair and adequate compensation would have to be made to the land owners. The procedure for compulsory acquisition is as follows:

a. The Lands Commission co-ordinates the acquisition process and together with the Land Valuation Board they handle the operational aspects of the process;
b. Lands Commission prepares an Executive Instrument and forwards it to the Minister.

The most important part of the acquisition process is the serving of the notices of the compulsory acquisitions. Copies of the Executive Instrument will have to be served thus:

i. Personally on any person having interest in the land; or
ii. Left with any person in occupation of the land; and
iii. Served on the traditional authority of the area of acquisition which shall request the chief to notify the people of the areas concerned; and
iv. Affix it at a convenient place on the land; and
v. Publish on three consecutive occasions in a newspaper in circulating in the district where the land is situated and in such other manner as the Minister may direct.

It is only after the instrument has been published in the gazette and the relevant local newspapers that the affected land owners can submit claims for compensation to the Land Valuation Board.

In conclusion, it is important to note that there are three main ways by which to obtain documentary evidence of title to the lands in question. In areas not declared for registration of lands (i.e. unregistered land), the title deeds has to be registered at the Land Registry, for areas declared registration districts, the Land Certificate has to be registered at the Lands Title Registry and for compulsory land acquisitions, the Lands Commission would see to the registration.

The system of registration of Land Certificates as advised above gives complete security against adverse claims and an investor desiring to deal with the lands are afforded direct and up-to-date information as to ownership of the lands in question and the encumbrances affecting it by means of personal and official search. Whereas with unregistered land, the title deeds does not give such watertight security but under the system of deeds registration, priority of registration of title deeds takes precedence over same that is unregistered.

19.6. Ownership and Availability Issues -Review of Status of the 'Right of Way', any Land Claims

In order to ascertain the ownership of the RoW, an investigation was undertaken. We present our findings as follows:

- On the issue of ownership, our research indicates that the current RoW belongs to GRDA. However we have not yet been privy to actual land title certificates in this regard. We are advised that, although the Authority is the true and lawful owner of the land, the title is vested in GoG;
- The Authority further informs us that certain bodies had lawfully been granted portions of the 'RoW' on which they have subsequently developed structures. Leases have been granted to that effect. In the event that the land is required for the construction of the Eastern Corridor Railway line, and the leases are terminated prematurely, such occupiers must be served with adequate notice and adequate compensation paid, and
- We note that there is severe infringement along the corridor by unlawful parties. The issue as regards resettlement of encroachers is whether or not the Authority has made efforts to displace unlawful encroachers in the past. This issue is particularly important as per the provisions of the Limitation Act, 1972 (NRCD 54). The Limitation Act sets out clearly when an action for the recovery of Land is barred. It provides that no action shall be brought for the recovery of any land after the expiration of twelve (12) years. The twelve year period is calculated from the date from which the right of action accrued to the person bringing it or through other persons from whom the claims emanates.

Where the Authority can demonstrate by proof that it has consistently taken steps to notify unlawful encroachers of its interest in the land, then the Authority may not be barred by the Limitation Decree to take recovery action for the land in dispute.

In the event that the Authority had not taken such steps, the land in question can be acquired for public purpose for which compensation would have to be paid by proof of legal interest in land. Since, encroaches cannot establish legal interest in the land no compensation would be payable to them.

In addition, under The Land (Statutory Wayleaves) Act 1963, (Act 186) Section 2(1) (b):

"A statutory way leave may be created in respect of any of the works, that is to say "any other structure or works for the purpose of, or in connection with any public utility service;" Section 2(3) of Act 186 states that:

"In this section the expression "public utility service" means any service provided by the Republic, any local authority or statutory corporation, for supplying sewerage, transport or telecommunications facilities or facilities connected with the operation of any port, railway, tramway or airport."

From our discussions with GSA and GRDA, we understand there may be some legal issues to be dealt with in order for the proposed transaction to proceed. This is particularly the case with the Eastern Railway Line. We have summarised these issues below and have provided some initial advice on how GoG may proceed in resolving these matters.

19.6.1. Boankra Inland Port

We understand that an Executive Instrument (E.I) has not been acquired for the creation of an Inland Port at Boankra. However, the process has been initiated by GSA and an application has been sent to the Ministry of Lands and Natural Resources for onward submission to the Attorney General's Department. We have requested for evidence of the E.I from GSA for our review.

Additionally, we understand that the acquired land has been fully paid for and the farmers whose crops were destroyed during construction have also been fully compensated. We will follow up with GSA to obtain documentary evidence of this as this will be a key matter of interest for the prospective private sector partners in the project.

Previous discussions held with GSA revealed that, GSA started a procurement process to engage a private operator to develop the project. However, the procurement process was truncated in April 2013 in order to pursue the project adopting the National PPP Policy and this information has been communicated to the six shortlisted developers/operators.

19.6.2. Eastern Railway Line

Our discussions with GRDA indicate that, since 2007, MoT and subsequently GRDA, have received unsolicited proposals from prospective developers for the rehabilitation of the Eastern Railway Line, running from Tema through to Kumasi. However, we understand that to date, GRDA has not engaged in any formal bid process to invite tenders from prospective developers or concessionaires.

GRDA has provided us with copies of various documents that it received from five prospective developers over the last few years. These prospective developers include:

1. African Rail (Gh) Ltd ("African Rail")
2. ACIUSA
3. China National Machinery Import and Export Corporation
4. Grindrod NLP Developments
5. The Vitala Group

We understand that out of the five apparently interested parties above, GRDA entered into a MoU with African Rail only and has not progressed discussions with any of the others. We have reviewed available correspondence between MoT, GRDA and African Rail, as well as draft agreements between GRDA and African Rail in order to assess their implications for the current proposed PPP transaction.

19.6.3. Overview of previous Arrangements with African Rail

We have reviewed the following draft agreements between GRDA and African Rail for the Eastern Railway Line project:

1. MoU dated 12 December, 2008;
2. Draft Concession Agreement, neither dated nor signed by both parties.

There are two important legal issues that we have considered with the two documents above

1. Legal Effect of the MoU
2. The Validity of the Draft Concession Agreement

19.6.3.1. Legal Effect of the MoU

A "MoU" between GRDA and Baneservice A.S and African Rail A.S was signed and dated 12 September 2008. However, the MoU elapsed after six (6) months.

Our findings indicate that, basic elements of contract such as offer and acceptance for the project, consideration pertaining to the project and an intention to create legally binding relations are absent from the MoU.

According to the MoU, African Rail A.S. has the first option and right of first refusal in the selection for the execution of only the Eastern Railway Line Project, on the basis that they have financed Feasibility Studies for the project.

19.6.4. The Validity of the Draft Concession Agreement

We have reviewed the draft concession agreement between African Rail and GoG, represented by MoT and GRDA. This agreement was intended for the financing, construction and operation of the railway line linking Tema, Accra, Nsawam, Koforidua and Kumasi. The agreement has neither been signed by both parties nor dated. As a result, in our view, it is not legally binding.

Our review identified that the following Clauses were absent from the draft concession agreement:

- Clause 51(Authority Events of Default),
- Clause 53 (Non-default Termination, and Clause 54 (Consequences of Termination)

Most importantly, the agreement should go through the PPP process and must be approved by Parliament to render it valid.

As it stands now, we are of the view that the Draft Concession Agreement is not valid nor is it binding on GoG, since Parliamentary approval has not been received.

19.6.5. African Rail's Point of View

Based on correspondence between African Rail and MoT and GRDA that we have reviewed, it is clear that African Rail believes that it has the right to undertake the Eastern Railway Line Project, and is on that basis opposed to MoT's currently ongoing process to seek a private partner for the project in line with the provisions of the National PPP Policy.

Specifically, based on two letters from African Rail dated 12 August 2013 and 11 February 2014, addressed to the Honourable Minister of Transport and the Chief Director of MoT respectively, African Rail states that it is waiting for execution of the draft Concession Agreement that it has negotiated with GRDA, pursuant to sole source approval from the Public Procurement Authority ("PPA") for its proposal to undertake "the modernisation of the Eastern Corridor Railway".

African Rail's letter of 12 August 2013 sets out a chronology of events relating to its interest in the Eastern Railway Line project, including sole source approval being issued by PPA on 4 November 2008, Executive approvals issued by HE The President of the Republic of Ghana on 13 November 2008 for the draft Concession Agreement to be forwarded to Parliament for its consideration.

This Executive approval was in response to a Joint Cabinet Memorandum dated 6 November 2008, submitted to the Office of the President by the Ministries of Harbours and Railways and Finance and Economic Planning.

The scope of the Eastern Railway Line project per the MoU of 12 September 2008 is defined as "the railway line from Tema/Accra to Koforidua with future extension to Kumasi". This scope seems however to have been expanded in the course of discussions between African Rail and the various Ministries, and Agencies, as the Executive approval of 13 November 2008 refers to the scope of the project as including:

- Tema – Accra
- Accra – Nsawam
- Nsawam – Kotoku
- Kotoku – Koforidua
- Koforidua – Anyinam
- Anyinam – Konongo
- Konongo – Ejisu – Boankra – Kumasi

The same Cabinet Memorandum states that the scope also includes the development of inland container terminals at Nsawam and Koforidua.

We have indeed seen a copy of a letter from PPA dated 4 November 2008, addressed to the then Honourable Minister of Harbours & Railways, granting approval *"for the sole sourcing of procurement of African Rail AS of Norway to for the expansion and modernisation of the following areas of the Eastern Corridor at a total cost of US$750 million":*

- Tema – Accra
- Accra – Nsawam
- Nsawam – Kotoku
- Kotoku – Koforidua
- Koforidua – Anyinam
- Anyinam – Konongo
- Konongo – Ejisu – Boankra – Kumasi

PPA's approval was apparently pursuant to a request from the Ministry of Harbours & Railways dated 27 October 2008 to which we have not yet been privy.

The PPA letter did however state clearly that the approval must be submitted for Parliamentary approval.

Further correspondence that we have seen relating to African Rail's claim includes the following:

1. A Request for Cabinet Approval dated 20 July 2010, submitted jointly by the Honourable Minister for Transport and the Honourable Minister for Finance and Economic Planning, requesting Cabinet approval for a loan agreement between GoG and Goldman Sachs International of US$500 million for the modernisation of the Eastern Railway Corridor and the Rehabilitation of the Western Railway Line. The request states amongst others that:

    - Cabinet is being requested to consider a recommendation for the modernisation of the Eastern Railway Corridor (Accra – Team – Koforidua)
    - As a short to medium term programme (1 – 5 years), it is proposed to rehabilitate and modernise the existing lines, i.e. Western, Eastern and Central Lines

- The modernisation of the Eastern Corridor would be undertaken in phases as follows:
  - Phase 1: Accra – Tema – Nsawam
  - Phase2: Nsawam – Koforidua
  - Phase 3: Koforidua – Kumasi

- Phases 1 and 2, estimated to cost US$1.4 billion, would be partially financed with a commercial loan from Goldman Sachs International. The first tranche of US$500 million (US$250 million of which would be allocated to the Western Railway Line) would be borrowed by GoG while the second tranche of US$900 million would be borrowed by African Rail AS and its partners, who would also raise the balance of US$250 million required for Phases 1 and 2, as well as a further US$2.8 billion to finance Phase 3 of the project;

- African Rail AS, as the contractor that arranged the Goldman Sachs US$500 million financing, had also expressed an interest to undertake the Eastern Corridor project; and

- MoT recommended that African Rail AS be sole sourced to undertake the modernisation of the Eastern Corridor project in accordance with the Public procurement Act, 2003 (Act 663).

2. A letter dated 22 July 2010 from the Office of the President to the Honourable Minister for Finance and Economic Planning, the subject matter of which is Executive Approval for the Goldman Sachs International loan agreement for US$500 million for the modernisation of the Easter Railway Corridor and Rehabilitation of the Western Railway Line. The letter confirmed that HE the President had granted Executive approval for the loan agreement, together with an exemption from taxes and duties on project equipment and expatriate project staff, and requested that the agreement, together with the exemption from taxes be submitted to Parliament for its consideration.

3. A letter dated 6 August 2010 from the Office of the President addressed to the Honourable Minister for Finance and Economic Planning and the Honourable Minister for Transport stating that at its eighteenth meeting held on 30 July 2010, Cabinet considered the Joint Cabinet Memorandum submitted by the two Ministers relating to the Goldman Sachs International loan agreement for US$500 million for the modernisation of the Easter Railway Corridor and Rehabilitation of the Western Railway Line. Cabinet had ratified the Executive approval of the memorandum.

19.6.6. Advice on the African Rail Claim

There are two issues with respect to the African Rail clam to which we draw your attention:

- African Rail would be deemed a foreign company under the laws of the Republic of Ghana because its mother company, African Rail A.S. with 75% shareholding, is incorporated in Norway. Thus, any international business transaction between African Rail and GoG would be subject to mandatory Parliamentary approval by virtue of Article 181 of the Constitution of Ghana, 1992.
- In the event of an arbitration claim over this dispute, African Rail's choice of an arbitration claim is more likely than not to be the international forum.

19.6.7. Foreign Investment Context

Foreign investment law is governed by the provisions of the Ghana Investment Promotion Centre ("GIPC") Act 2013 (Act 865). Act 865 provides guarantees and protection under international investment law including prohibition against discrimination and expropriation to all enterprises.

All enterprises in the country with foreign participation are required to register with the GIPC. Under Act 865, companies registered with GIPC are also expected to renew their registration every two years.

Ghana is also a member of the Multilateral Investment Guarantee Agency ("MIGA"), which membership guarantees political insurance risk for foreign direct investment projects within Ghana.

MIGA's status as a member of the World Bank Group and its relationship with shareholder Governments provides additional leverage in protecting investments and helps resolve disputes at the first sign of trouble to potential investment disputes before they reach claim status.

In the event of dispute between a foreign investor and GoG, Section.29 of Act 865 provides that, the dispute be settled amicably by discussions, failing which the aggrieved party may submit the dispute to arbitration:

- Within the framework of any bilateral or multilateral agreement on investment protection to which GoG and the country of which the investor is a national are parties;
- In accordance with any other national or international machinery for the settlement of investment dispute agreed to by the parties;
- Where there is disagreement between the investor and GoG as to the method of disputes settlement to be adopted, the choice of the investor shall prevail.

19.6.7.1. Ownership Considerations

On conducting a search we discovered that African Rail (GH) Ltd is a registered Ghanaian company with two shareholders. The shareholders are:

1. African Rail A.S. of Norway with (315,000 shares) i.e. 75% share
2. Ernest Dua-Asante with (105,000) i.e. 25% share.

There are two directors and they are:

1. Ernest Dua-Asante
2. Pine Robert Halle.

Since the majority of the shares are controlled by the Norwegian registered company (i.e. African Rail A.S.) the investment would be deemed by international investment law as that of a Norwegian investor. In our opinion, an international arbitral tribunal would be the preferred choice of forum for African Rail to settle any investment dispute with GoG.

Although there is no Bilateral Investment Treaty ("BIT") between Norway and the Republic of Ghana they both are signatories to the Convention on the Settlement of Investment Disputes between States and Nationals of Other States (the ICSID Convention) and 1958 New York Convention (Enforcement of Foreign Arbitral Awards) and as such any adverse findings against the Republic of Ghana would be binding.

In spite of the above, it is important to note that the MOU dated 12 September 2008 between GoG and Baneservice A.S and African Rail A.S elapsed after six months.

Although, the parties signed the MOU, it did not have any legal effect relating to the project as the basic elements of contract i.e. offer and acceptance for the project, consideration pertaining to the project and an intention to create legally binding relations are absent.

The MoU recognises the following under the section expressing the intentions and understanding of the parties at 2(d):

"African Rail, for having financed the Feasibility Studies, shall have the first option and right of first refusal in the selection for the execution of the project."

Also, the MOU recognises the following under the section setting out the conditions, the parties agreed at (1):

"A detailed legal document, which shall incorporate the above understanding, shall subsequently be signed prior to the commencement of the Feasibility Studies for the project."

It is important to note from the above sections of the MOU that:

- Feasibility studies had not commenced and
- The MoU recognised that detailed legal documents must be signed before the financing of the Feasibility Studies which in turn grants African Rail the first option and the right of first refusal in the selection for the execution of the project.

To the extent that the detailed legal documents as referred to in the MoU were not signed, the financing of any Feasibility Study by African Rail could not have taken place. In our opinion, African Rail could not have been granted first right of refusal in the selection and therefore no legal rights have accrued to African Rail in this regard.

In spite of the above, we anticipate African Rail may institute an International Arbitration Proceeding under Section 29 GIPC Act 2013.

In our view, in the event that African Rail succeeds in these proceedings an award should be limited to any expenses they have incurred up until the stage advertising and/or notification to African Rail of the decision to go for a PPP scheme by GoG and/or the Ministry of Transport (MoT) as regards the Eastern Corridor Railway Project.

Based on our findings as summarised above, and given the current proposed PPP transaction, our advice with respect to African Rail is as follows:

- To obtain from within the procurement chain of MoT the relevant documentation upon which African Rail was granted single- source procurement for the project to enable us evaluate the lawfulness of the grant. Where it is established that the procurement was lawfully granted, that would not dispense with the mandatory requirement of Parliamentary approval.
- African Rail does not have strong legal grounds for suing MoT. This advice is based on grounds that the MoU has expired and was not renewed and also the draft Concession Agreement was not fully executed by both parties.
- Notwithstanding the above it is possible to attempt to amicably resolve any dispute that may emerge in accordance with Section 33(1), GIPC Act 2013 (Act 865). The other option is to attempt to resolve any dispute by inviting African Rail to participate in the process of selecting a concessionaire for the PPP project.
- Should it choose to take legal action, African Rail has a choice of commencing proceedings within Ghana or in the international arena, the choice of which is granted to African Rail under the GIPC Act 2013 (Act 865). In the event that proceedings are brought in Ghana it is likely that the MoU and the Concession Agreement would not be deemed legally binding as a contract cannot be inferred from the contents of the MoU or from the unexecuted Concession Agreement.
- However, since the conduct of the parties is likely to be taken into account in international arbitration to determine whether a contract existed between the parties, African Rail is likely to seek protection from international investment arbitration law and practice. In its determination, an international arbitral tribunal may consider whether or not African Rail had acquired legitimate expectations due to the provisions of the Public Procurement Act 2003 (Act 663) at the stage where it was awarded the single-source procurement status.
- The investor's legitimate expectation is based on Ghana's legal and regulatory framework of which the international investor is entitled to rely on. A reversal of assurances/conduct by the MoT/GRDA (organs of State) that has led to legitimate expectations of African Rail will violate the international investment law principle of fair and equitable treatment.

- It is important to note that there is a conflict between Ghana national law and international investment law. It is a provision of the Constitution of the Republic of Ghana that an international business transaction involving the state must be approved by Parliament. However, under international investment law and practice, where the provisions of the national Public Procurement Act 2003 (Act 663) are not adhered to, an international arbitral tribunal may invoke the international investment law principle of legitimate expectations to protect the investor's investment.
- In international investment arbitration law and practice, there is no established precedence to guide arbitrators but there is increasing awareness that arbitral awards tend to favour international investor's claims against States. In spite of the appearance of favourable treatment of international investors, African Rail may not succeed in an international arbitration claim as they may not meet the threshold for the invocation of the doctrine of legitimate expectations before any international arbitral tribunal.

20. Human Resource Due Diligence

20. Human Resource Due Diligence

20.1. Introduction

In this chapter, we have undertaken a review of the Human Resources of GRCL who are currently assigned to work on the Eastern Railway Line.

The objective of the Human Resource review is to gain an understanding of the current staff numbers, qualifications and experience of GRCL personnel that are assigned to Eastern Railway Line. The review was aimed at enabling us to assess which existing staff of GRCL assigned to the Eastern Railway Line may be redeployed or retrained with the view of working with a prospective Concessionaire when the projected is implemented. The outcome of the review will also serve as basis for possible redundancies, benefit packages etc. for those that cannot be redeployed or retained.

As part of this preliminary assessment, we reviewed and analysed GRCL's staff database and had discussions with the Head of Human Resources & Administration and his Assistant, Heads of Department and the Accra Area Manager.

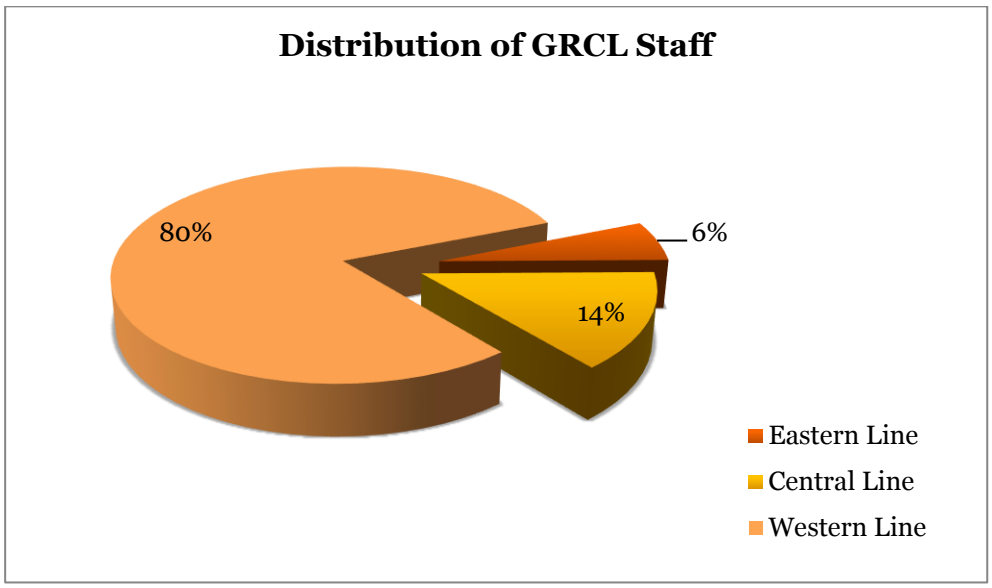
20.2. Overview Findings from Our Review

20.2.1. Total Staff Distribution within Ghana Railway Company Limited

Our review of the staff database showed that GRCL has total staff strength of 1,618 as at 1 January 2016, made up of staff deployed on the Eastern Railway Line of 93, Central Line of 224, and Western

Railway Line of 1,301 and is shown in the chart below.

Figure 20-1: Distribution of GRCL Staff



20.2.2. Age, Education and Tenure of GRCL Staff

Demographics have significant implications for human resource planning and the possibility of any redeployment, training and or redundancies. Our review of the database indicates an average staff age of 50 years and an average tenure of 25 years.

An extension of the age analysis is employee retirements. Our analyses indicate that, at the GRCL level, about 40% of employees will be retiring within the next 5 years and by 2026, about 72% of the present employees would have retired or be due for retirement.

With respect to highest level of education, less than 1% of the 1,618 GRCL employees have pursued university education, 34% have secondary/technical education and about 65% have none or up to Middle School Leaving Certificate ("MSLC") /Basic Education Certificate ("BECE").

20.3. Overview of Staff Assigned to Eastern Railway Line

20.3.1. Employee Age and Tenure

Our review of GRCL's HR database revealed that all 93 staff assigned to the Eastern Line are males, with an average age of 51 years and an average of 25 years length of service.

The following table summarises the age distribution of staff assigned to the Eastern Railway Line.

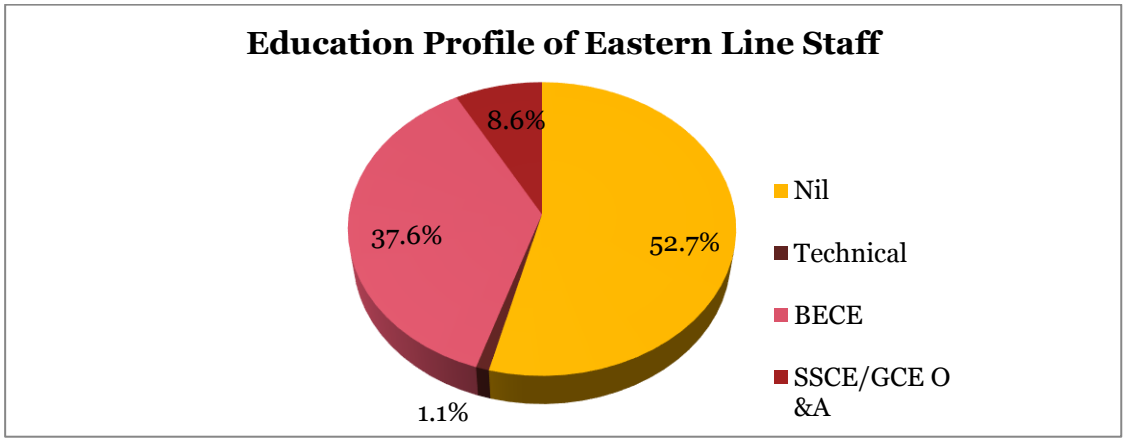
Table 20-1: Age Distribution of Employees on the Eastern Railway Line

Item	30 and below	31-40	41-45	46-50	51-55	56 and above	Total
Frequency	0	7	7	19	36	24	93
Percentage%	0	7.5	7.5	20.4	38.7	25.8	100

Source: GRCL HR Database

The chart below shows the distribution of the educational background of the present staff assigned to the Eastern Railway Line.

Figure 20-2: Education Profile of Eastern Railway Line Staff



The chart above indicates that more than 53% of the staff assigned to the Eastern Railway Line have up to basic/secondary education qualifications; 38% either have BECE or MSLC qualifications, whereas 9% have Senior High education (SSCE or GCE O/A Levels).

20.4. Implications of Our Findings for HR Management

20.4.1. Aging Workforce

The aging workforce analysis as presented above reveals that GRCL in general and the Eastern Railway Line in particular has an aging workforce.

In the corporate setting, a direct consequence of an aging workforce is retirement, as employees will have to go on compulsory retirement at age 60. As people retire, this results in loss of critical institutional knowledge and experience especially where there is poor succession planning and knowledge management. Direct financial cost to the organisation in this respect is staff replacement cost and retirement packages.

Further, our findings suggest strong employee loyalty to GRCL as can be seen in long years of service (an average of 25 years). A critical financial implication which potential investors should be aware of as part of any exit strategy is benefit packages e.g. redundancy packages, end of service benefits etc.

In relation to the above, it is important to note that, our review of the GRCL Employee Condition of Service document and Collective Agreement revealed that redundancy packages are linked to tenure with the company.

High HR/administrative cost is another impact of an aging workforce. This result mostly from higher medical cost as a result of age-related ailments, higher absenteeism due to sickness and high replacement cost i.e. pay outs to outgoing staff, recruitment, and training of newly recruited staff among others.

20.4.2. Poor Education Profile and Lack of Critical Skills

Another critical finding from our reviews as noted above is that, more than 53% of the Eastern Railway Line staff have no formal education, 38% have BECE or MSLC education whereas 9% had Senior High Education (SSCE or GCE O/A Levels). Our discussions with management also indicates that at present, there are only 2 Mechanical /Electrical Engineers who will be retiring within the next 5 years. Reasons assigned to this situation are high turnover rate and the fact that since 1986, the company has not recruited engineers.

The impact of a poorly educated workforce on organisational performance cannot be overemphasised: it has direct impact on performance, trainability and often requires higher investment in training.

20.4.3. Poor Training Culture

We understand from our discussions with Heads of Department that training has not been a priority for several years primarily due to budgetary constraints. We understand that, apart from selected maintenance staff who have been given on-the-job training on the Accra - Tema line, there has been no training for staff for many nears.

Currently the skills possessed by the staff, particularly, technicians, electricians and mechanics, are not up to date because all GRCL trains are very old except the 2 trains that run the Accra-Tema route. This suggests there would have to be significant investments in training current staff if they are redeployed as employees on the Eastern Railway Line.

20.4.4. Performance Management

Our findings show that the performance management culture of the organisation is very poor. There is a passive approach attached to the performance management process i.e. objective setting and appraisal. This has resulted in a lack of performance improvement by employees. This must be addressed in the new organisation.

20.4.5. Estimated cost of exit programmes (i.e. Redundancies, golden handshakes)

As part of our work, we reviewed GRCL's Conditions of Service for Senior Officers (2012) and the Collective Bargaining Agreement (CBA) between GRCL, Railway Workers Union and Railway Enginemen's Union of Ghana (2012). These documents provided details of entitlements due to staff in case of any redundancies.

Articles 18 (4) and 24 (4) of the Conditions of Service for GRLC's Senior Officers and the CBA respectively provide that *the Company shall pay Severance Award to employees severed from services as follows:*

a) Less than five (5) years of service
Ten (10) weeks' pay for each completed year and proportionately for a part thereof.

b) 5-10 years of service
Fourteen (14) weeks' pay for each completed year and proportionately for a part thereof.

c) 11 years and above
Twenty-four (24) weeks' pay for each completed year and proportionately for a part thereof.

Further, Section 65 of the Labour Law 2003, Act 651 provides on Redundancy that,

(1) When an employer contemplates the introduction of major changes in production, programme, organisation, structure or technology of an undertaking that are likely to entail terminations of employment of workers in the undertaking, the employer shall:

(a) Provide in writing to the Chief Labour Officer and the trade union concerned, not later than three months before the contemplated changes, all relevant information including the reasons for any termination, the number and categories of workers likely to be affected and the period within which any termination is to be carried out; and

(b) Consult the trade union concerned on measures to be taken to avert or minimise the termination as well as measures to mitigate the adverse effects of any terminations on the workers concerned such as finding alternative employment.

(2) Without prejudice to subsection (1), where an undertaking is closed down or undergoes an arrangement or amalgamation and the close down, arrangement or amalgamation causes:

(a) severance of the legal relationship of worker and employer as it existed immediately before the close down, arrangement or amalgamation; and

(b) as a result of and in addition to the severance that worker becomes unemployed or suffers any diminution in the terms and conditions of employment, ***the worker is entitled to be paid by the undertaking at which that worker was immediately employed prior to the close down, arrangement or amalgamation, compensation, in this section referred to as "redundancy pay".***

(3) In determining whether a worker has suffered any diminution in his or her terms and conditions of employment, account shall be taken of the past services and accumulated benefits, if any, of the worker in respect of the employment with the undertaking before the changes were carried out.

(4) The amount of redundancy pay and the terms and conditions of payment are matters which are subject to negotiation between the employer or a representative of the employer on the one hand and the worker or the trade union concerned on the other.

(5) Any dispute that concerns the redundancy pay and the terms and conditions of payment may be referred to the Commission by the aggrieved party for settlement, and the decision of the Commission shall subject to any other law be final.

It is important to note the following exceptions as presented in Clause 66 of the Act 651. The provisions of this Part do not apply to the following categories of workers:

(a) workers engaged under a contract of employment for specified period of time or specified work;

(b) worker serving a period of probation or qualifying period of employment of reasonable duration determined in advance; and

(c) Workers engaged on a casual basis.

Based on the above provisions, estimated the cost for any redundancy programmes which might become necessary as part of any takeovers.

Specifically, the key factors we considered in computing the entitlements of employees assigned to the Eastern Railway Line in case of any redundancy, were:

- Grade of each staff;
- Tenure i.e. number of years each employee has been with GRCL;
- Present salaries; and
- The entitlement as defined in the Conditions of Service and CBA documents.

It should be noted that any outstanding or earned leave days of employees will also be taken into account at the time of any redundancy programme.

The retrenchment could be undertaken by GRCL or can be outsourced to competent Human Resource ("HR") Consultants.

If the retrenchment activity is undertaken by GRCL in 2016, the retrenchment programme will cost approximately US$ 1.9 million. If the retrenchment activity is undertaken by a HR Consultant on behalf of GRCL in 2016, the retrenchment programme will cost approximately US$ 2.0 million

21. Institutional Setup within Government for Contract Oversight and Monitoring

21. Institutional Setup within Government for Contract Oversight and Monitoring

21.1. Introduction

In this chapter, we have discussed with the Ministry of Transport (MoT), together with the key institutions responsible for monitoring and evaluating the delivery of the project's objectives have been discussed. We have also discussed the oversight roles of the various institutions involved.

The following institutions will play key roles in developing the Inland Port and Eastern Railway Line:

21.2. Ministry of Transport (MoT)

The MoT has oversight responsibility of the three major sector Agencies involved in the project: Ghana Ports and Harbours Authority (GPHA), Ghana Railway Development Authority (GRDA) and Ghana Shippers Authority (GSA).

The Ministry monitors and evaluates the operational performance of the various sector agencies whilst ensuring adherence to international standards and best practices.

21.3. Ministry of Finance (MoF)

The Public Investment Division (PID) of MoF oversees the PPP implementation process. PID will facilitate the effective implementation of the project.

Under the Financial Administration Regulations of 2004:

- MoF is the shareholder of all GoG interests; and
- Financial support in the form of Government grants may be required for this project to fund any viability gap. In that case, the MoF will be required to make such payments to the private party. Thus, MoF may be required to become another party on the project agreement as part of direct negotiations and agreement with the private party and potential investors or financiers.

21.4. Ghana Ports and Harbours Authority (GPHA)

Under the GPHA Act 1986, GPHA performs the following roles:

- Provides facilities for the efficient and proper operation of ports;
- Maintains, extends and enlarges port facilities as the authority considers fit;
- Regulates the use of the port and corresponding facilities;
- Maintains and deepens as necessary the approaches to and the navigable waters within and outside the limits of a port;
- Maintains lighthouses and beacons and any other navigational service and aids as appear to be necessary;
- Provides facilities for the transportation, storage, warehousing, loading, unloading and sorting of goods passing through a port, and operates road haulage services for hire or reward; and
- Carries on the business of stevedoring, master porterage and lighterage services.

21.5. Ghana Railway Development Authority (GRDA)

Under the Railway Act 2008, Act 779 GRDA is responsible for:

- Granting licenses, concessions, and leases which are necessary for the operation of the railway and its services;
- Setting and enforcing safety and security standards for the construction and operation of the railway;
- Regulating and monitoring the activities of licensees, concessionaires and operators of the railway;
- Initiating conducting, promoting and encouraging studies necessary for the growth and development of railways including the development of master plans in accordance with the schedule to this act and set standards;
- Ensuring collaboration with other public, private or international agencies necessary for the performance of its functions; and
- Advising the Government on general railway matters.

21.6. Ghana Shippers Authority (GSA)

Under the Ghana Shippers Authority Act 1998, Act 562, GSA is responsible for:

- Seeking optimum deregulation and liberalisation of shipping services in Ghana;
- Ensuring payment of competitive freight rates and other port and ancillary charges through effective monitoring and negotiation;
- Improving upon the quality of services through appropriate interaction and intensive training of shippers; and
- Assisting in the provision of up-to-date infrastructure to meet current developments and technological changes in the shipping industry.

22. Tendering and Procurement

22. Tendering and Procurement

22.1. Introduction

At the end of the full feasibility stage, the scope of the project would have been agreed upon by the MoT and its agencies. The next stage in the process would be the tendering and procurement stage to identify a suitable investor to undertake the project on a PPP basis. In this chapter, we have described the next stage of the project which is the tendering and procurement of the PPP project. The tendering and procurement of the project will be an open, transparent and competitive process aimed at securing a highly competent operator and the best deal for Ghana.

The process we have identified is split into the tasks shown in the figure below:

Figure 22-1: Procurement Process

22.2. Design Bid Process and Evaluation Criteria

The first step is to design a process that maximises competition and outlines a clear set of criteria to promote a fair evaluation throughout the process. We will take the following key considerations into account as part of the bid process design:

- A clear set of tender instructions will encourage high quality bids, both in terms of competitive pricing and value enhancing proposals which meet the objectives of Government.
- From our experience, Government agencies tend to be under pressure to select and award projects, which doesn't allow sufficient time for bid preparation and adversely affects the quality of bids. We would strongly suggest that the process should give adequate time for project due diligence and bid preparation to ensure high quality submissions.
- We would support the MoT in formulating comprehensive evaluation criteria to provide a fair and consistent approach for the ranking of bidders possessing required capabilities and strengths.

22.3. Develop Bid Documents and Draft Concession Agreement

We will develop bid documentation in collaboration with the MoT, which contain clear and unambiguous instructions on the transaction process and what bidders are expected to do. We will prepare the following bid documents:

- **Expression of Interest (EoI)** - This will be in the form of a flier or publication on local and international media which will provide a brief description of the project. It will allow interested parties to provide details of their relevant experience and capabilities to demonstrate their ability to deliver the project.
- **Request for Proposal (RFP)** - Shortlisted bidders will be formally invited to submit technical and financial bids. We will prepare a request for proposals which will comprise instructions to bidders, technical output specifications etc.

- **Draft Concession Agreement** – We will prepare a Draft Concession Agreement for shortlisted bidders to outline the terms of the contract. As the name suggests, the document is a draft and is subject to negotiation with the private party. The table below outlines the key legal documents which will be included in the draft.

22.4. Competitive Bidding and Evaluation

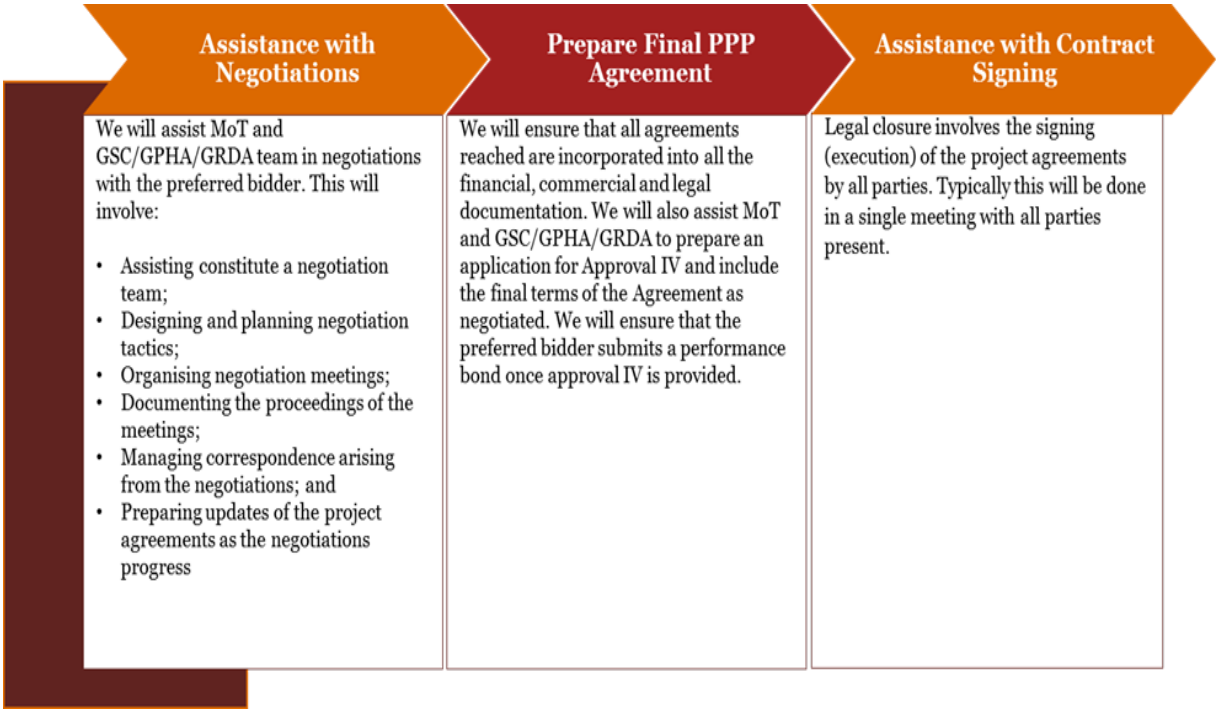
We will propose forming an Evaluation Committee to review and evaluate the bids based on the agreed evaluation criteria. The composition of the committee is the decision of the MoT, however, we recommend that it should comprise Government stakeholders and technical, legal and financial advisers. We will collate the results of the Evaluation Committee and prepare an Evaluation Report and present to the Steering Committee. The MoT and GSC/GPHA/GRDA in consultation with other relevant interested Governmental bodies and PwC will select a preferred bidder with whom to proceed with detailed contractual negotiations. The deliverables for this stage are as follows:

- Procurement documents;
- Draft legal documents; and
- Draft Approval Note for the purposes of seeking Approval IIIA and IIIB.

22.5. Negotiations and Contract Signing

The main objective of this stage is to ensure that financial close is reached with the project lenders and that all the Conditions Precedent (CPs) in the negotiated project agreements and lending agreements are satisfied. The details of the process is shown in the figure below:

Figure 22-2: Negotiations, Contract Signing and Preparing Close-Out Report Process



22.6. Procurement Timeline

The figure below shows the timeline of the procurement which highlights the different stages up until the negotiations and contract awarding stage.

Table 22-1: Procurement Process Timeline

TASK	Dec-16		Jan-17		Feb-17		Mar-17		Apr-17	
Procurement Documents and Draft PPP Agreement										
Finalise Bid Documents (i.e. EoI, RFP including draft legal agreement)		■	■							
Draft Approval Note for seeking Approval IIIA from MoF-PID				■						
Issue RFP including draft Legal Agreement				■						
Submit Detailed Proposals by Investors/Developers/Operators				■	■	■	■			
Evaluation of Proposals and selection of a preferred bidder								■	■	
Draft Approval Note to approve the Winner Bidder - (Approval IIIB) from MoF-PID										■

23. Implementation Plan

23. Implementation Plan

23.1. Introduction

This chapter focuses on the construction scheduling for the inland port and railway line as well as the related operational functions. It also encompasses the other preparatory activities that precede the construction work including approval from the respective authorities and the assembly of the required resources.

The implementation plans for the construction of the Boankra Inland Port and Eastern Railway Line are illustrated in the tables 23-1 and 23-2 below.

Table 23-1: Proposed Implementation Plan for the Eastern Railway Line

	Construction Period (0-5) years	Duration (Months)	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
No	**TASK**																					
D-1	**General Initial Mobilisation and Preparatory Activities**																					
1	Finalise Detailed Engineering Designs Preparations and Project Work Plan	6																				
2	Procure and Mobilise Technical Personnel and Equipment to Site	3																				
3	Complete Resettlement and land acquisition activities	6																				
4	Finalise EPA Permits, other approvals and associated Social Assessment Issues	2																				
D-2	**Construction Work**																					
1	Set up of temporary construction facilities for accommodation, equipment and other construction materials.	3																				
2	Clear Corridor and construct Subgrade (i.e. earthworks)	24																				
3	Construct Bridge and Culvert	18																				
4	Laying of Ballast	14																				
5	Laying of Sleepers	16																				
6	Laying of Main Line Rails, Station Line Rails, Sidings and Track Switches	20																				
7	Continuously welded tracks	12																				
8	Construct Station Buildings	15																				
9	Installation of Telecommunication and Signalling Equipment	15																				
9	Testing, quality and safety checks along the railway line and all its supporting facilities.	2																				
D-3	**Final Preparations and Commissioning of the Railway Line**																					
1	Recruitment of new technical, non-technical and administrative staff	3																				
2	Commissioning of the Eastern Railway Line	1																				

Table 23-2: Proposed Implementation Plan for Boankra Inland Port

	Construction Period (0-2) years	Duration (Months)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
No	**TASK**																									
D-1	**General Initial Mobilisation and Preparatory Activities**																									
1	Finalise Civil Design Layouts	3	■	■	■																					
2	Obtain Environmental and Construction Permits prior to construction	1				■																				
3	Clear Land	1					■																			
4	Fencing of the Site	3						■	■	■																
D-2	**Construction Work**																									
1	Set up of temporary construction facilities for equipment and other construction materials.	3						■	■	■																
2	Extend Water to selected locations within the site	3							■	■	■															
3	Extend Electricity to the Site	3							■	■	■															
4	Install Telecommunication Equipment	2								■	■															
5	Construct Service Roads and Drains	15						■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
6	Construct Buildings and Structural Facilities (i.e. Warehouses, Administration Block etc)	15							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
7	Construct Railway Sidings and Marshalling Yards	9															■	■	■	■	■	■	■	■		
9	Installation and Safety Testing of Crane, Container Forklifts, Reach Stackers , Empty Container Handlers and Gantry Equipment etc.	6																	■	■	■	■	■	■		
D-3	**Final Preparations and Commissioning of the Inland Port Terminal**																									
1	Recruitment of new technical, non-technical(unskilled) and administrative staff	3																					■	■	■	
2	Commissioning of Inland Port Operations	1																								■

24. Next Steps

24. Next Steps

24.1. Introduction

The activities we need to carry out after the issuance of this feasibility report and a corresponding work plan are highlighted in this section.

24.2. Outstanding Activities

We will complete the following activities in accordance with our agreement with MoT:

- Prequalify potential bidders;
- Draft bidding documents;
- Release RFP to pre-qualified bidders;
- Undertake competitive bidding and evaluation
- Assist in selection of winning bidder;
- Assist in negotiation/signing of the PPP contract; and
- Facilitate the financial closure process.

24.3. Work Plan

Our work plan for the outstanding activities highlighted above is shown in Table 24-1 below:

Table 24-1: Work Plan

TASK	Dec-16		Jan-17		Feb-17		Mar-17		Apr-17		May-17		Jun-17	
Draft Approval Note for seeking Approval II from MoF-PID	■													
Procurement Documents and Draft PPP Agreement														
Prequalify Bidders (ie Request for Expression of Interest, Request for Proposal etc)	■	■												
Finalise Bid Documents (i.e. EoI, RFP including draft legal agreement)		■	■											
Draft Approval Note for seeking Approval IIIA from MoF-PID				■										
Issue RFP including draft Legal Agreement				■										
Submit Detailed Proposals by Investors/Developers/Operators				■	■	■	■							
Evaluation of Proposals and selection of a preferred bidder								■	■					
Draft Approval Note to approve the Winner Bidder -(Approval IIIB) from MoF-PID										■				
Negotiations, Final Agreement and Contract Signing														
Assist MoT in Negotiations											■	■		
Prepare Final Legal/Concession Documents									■	■	■	■		
Draft Approval Note for seeking Approval IV from Cabinet and then Parliament													■	
Assist MoT in Contract Signing/Commercial Close														■
Assist with Financial Close											■	■	■	■