Client
Amandi Investments Limited and Ghana Railway Development

Date
September 2021

TAKORADI PORT TO HUNI VALLEY RAIL ESIA
NON-TECHNICAL SUMMARY

RAMBOLL Bright ideas. Sustainable change.

Ghana Railway Development Authority

AMANDI

PROJECT OVERVIEW

The Takoradi Port to Huni Valley Rail Project is a 102km railway project located in the Western Region of Ghana. The Project forms part of a portion of the wider rehabilitation of the Western Railway Line, a major 340km rail rehabilitation project which aims to connect the port of Takoradi to Kumasi with a branch route to Awaso. The rail is designed to carry both freight and passenger services, up to maximum speeds of 120km/hr.

Why is the Project needed?

Upgrade

- Approximately 102km of the existing railway infrastructure between Takoradi Port to Huni Valley will be updagraded.
- To allow standard gauge rail lines to be installed and some realignments to allow for safe running of trains at higher speeds.

Economy

- Project will modernise railway line to create a sustainable and efficient mode of transport.
- Help contribute to the economy, support the development of Ghana's Integrated Aluminium Industry and ease the pressure of congestion on local roads and highways.

Access

- Serve areas of Ghana with the second and fourth largest populations, through the provision of a passenger service.
- Will support the delivery of essential cargo including cocoa, timber, cement, flour and other materials.

Who is Developing the Project?

The Project is owned by Ghana Railway Development Authority (GRDA) and construction of the Project will be managed by Amandi Investment Limited (Amandi). Once the construction works are complete, GRDA will be responsible for the operation of the railway line from Takoradi Port to Huni Valley.

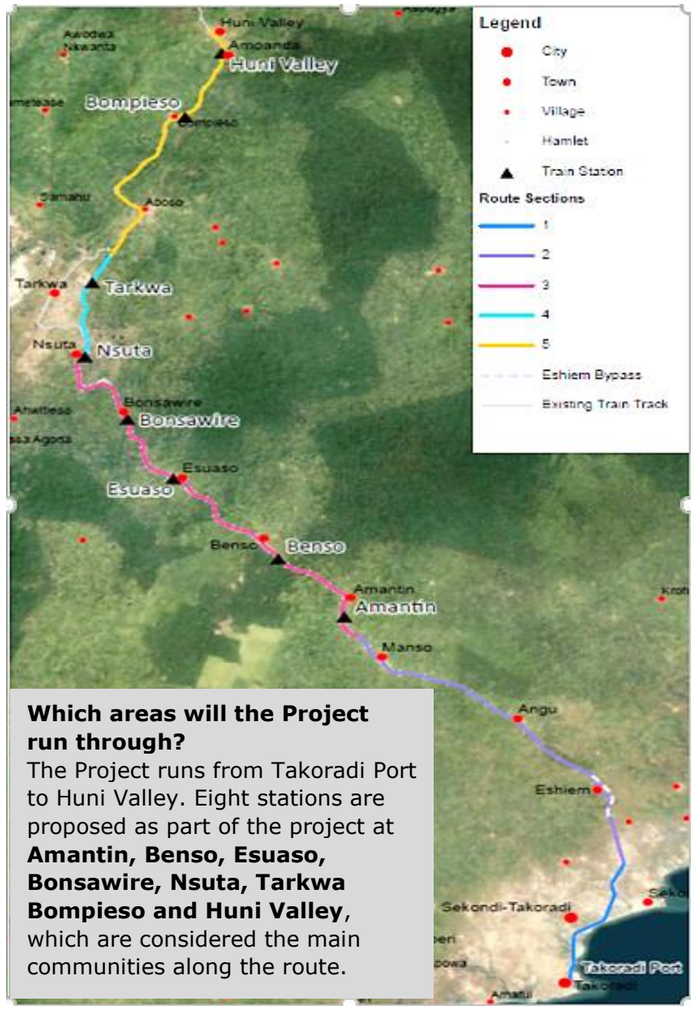
What is an Environmental and Social Impact Assessment?

The Project requires funding from international finance institutions. An Environmental and Social Impact Assessment (ESIA) Report has been prepared to support gaining access to international finance.

The purpose of an ESIA is to identify the potential for significant environmental and social (E&S) effects from the Project, and to identify appropriate mitigation to avoid or reduce any harmful E&S effects during the Project's lifecycle.

To comply with the Ghana national regulations, an Environmental Impact Statement (EIS) was undertaken for the entire Western Railway Line Infrastructure Project in 2015 on behalf of the Ministry of Transport Ghana Railway Development Authority. In June 2020, the Ghana Environmental Protection Agency (EPA) granted an environmental permit for the Western Railway Infrastructure Project which is valid until December 2021. A commercial contract agreement was signed between the Republic of Ghana (represented by the Ministry of Railways Development - Ghana Railway Development Authority) and Amandi Investment Limited for the construction of the Takoradi Port to Huni Valley portion of the Western Railway Line in June 2020. The ESIA was undertaken in alignment with international standards and guidelines and in accordance with the laws and regulations of the Republic of Ghana.

This document provides a Non-Technical Summary (NTS) of the ESIA Report and summarises the content and main findings of the ESIA process to assist non-technical stakeholders and the public in understanding the likely E&S effects associated with the proposed development. The full ESIA Report provides a more detailed description of the proposed development and the findings throughout the ESIA



Which areas will the Project run through?
The Project runs from Takoradi Port to Huni Valley. Eight stations are proposed as part of the project at **Amantin, Benso, Esuaso, Bonsawire, Nsuta, Tarkwa Bompieso and Huni Valley**, which are considered the main communities along the route.

Takoradi Port to Huni Valley Rail Project

PROJECT DESCRIPTION

The Project involves the construction of railway lines, eight stations and bypasses and upgrading of existing infrastructure.

Section 1 - Takoradi Port to Kojokrom

- Project work includes lay down of the standard gauge rails onto the existing dual gauge sleepers between Takoradi Station and Kojokrom and development of the Port rail lines.
- The existing rail runs through a mainly urban environment.
- The port rail lines require upgrade to standard gauge.
- This section also contains the light rail maintenance facility which has already been constructed close to the port and is considered to be an Associated Facility as it will provide maintenance for the fleet during operation.

Section 2 - Kojokrom to Manso

- Project work in this section includes only the offline section around Eshiem.
- The track upgrades to the remaining existing route have been funded via the government and are currently in construction with the majority of the earthworks completed; these upgrade works are not part of the funded Project but are considered to be Associated Facilities.
- The line runs through mainly forested environment, and close to the towns of Angu and Manso.

Section 3 - North of Manso to south of Nsuta

- Includes upgrade of the existing rail to a twin track standard gauge network, and the construction/upgrade of 4 stations (Amantin, Benso, Esuaso, Bonsawire).
- The line runs through a forested environment. The route includes three main offline sections: to the south of Amantin, to the south of Esuaso, and to the east of Bonsawire.

Section 4 - Nsuta to north of Tarkwa

- Requires upgrade to a twin track standard gauge network.
- The section includes the most significant route realignment.
- Works include the decommissioning of the line which currently runs through the centre of Tarkwa and relocating it to the east of Tarkwa.
- This section also includes the construction of the Nsuta and Tarkwa stations as well as the construction and initial set up of the Heavy Rail Maintenance Facility including the fuel storage area at the new Tarkwa Station.
- The route runs through a typical forest/crop matrix habitat with some settlements.

Section 5 - North of Tarkw to the Huni Valley station

- This is the last section of the track in this Project and is a single line standard gauge track.
- This stretch contains two main straightening realignments and construction of 2 stations (Bompieso and Huni Valley) and is predominantly forested.
- This section requires the re-establishment of the railway following disuse, and may include one passing loop, with the location and exact design to be determined during detailed design.

How many people will work on the Project?

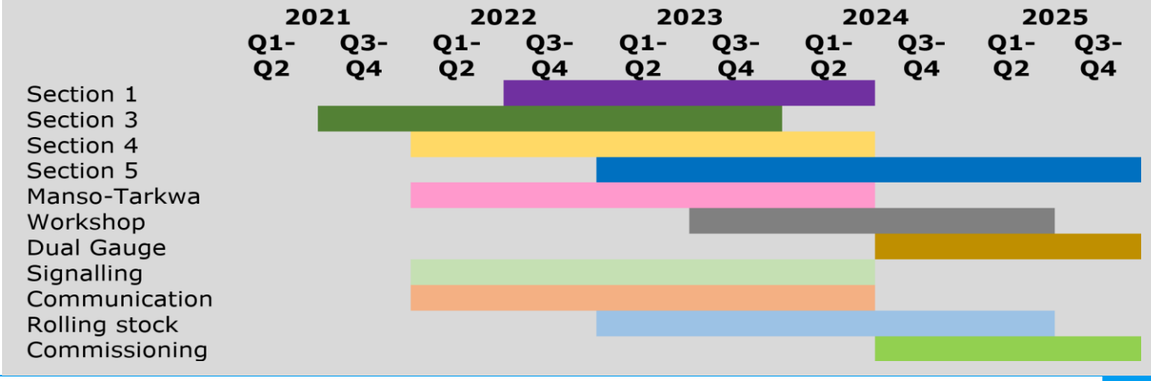
During construction, there will be around 200 employees at the start rising to 800 at peak distributed along all workfronts. An additional 60 contract staff will be required. The Workforce will include 97% local workers from the surrounding areas with only 25 expatriates expected to make up the construction workforce. The Workforce will live and work in the surrounding villages and will be collected and taken to the workfronts via a dedicated Project bus service.

What is the Area of Influence?

The Area of influence has been defined in line with international project standards and includes the railway track and realignment sections, railway infrastructure (including bridges, culverts, underpasses and level crossings), railway stations, Heavy Rail Maintenance Facility, and Associated Facilities such as the Section of rail between Kojokrom and Manso, which is already under construction. Associated Facilities are usually not part of the funded Project but are things that would not have been built, expanded or upgraded if the Project did not exist, but which are needed by the Project for construction or operation. The sections Takoradi-Kojokrom and Kojokrom-Manso are referred to in the ESIA as "Associated Facilities", although in essence are considered an integral part of the project description, and were analysed & assessed accordingly and are seen as part of the Project by the Financing Parties under the Financing Agreements.

What is the Project's timeline and current status?

Early clearance works are expected to start in November 2021 with main construction starting in March 2022. Construction of the whole project is expected to last for approximately three years, with the length of time construction in any one area ranging from a few months to around 18 months depending on the work required. Commissioning and fit out is due to commence in October 2025 through to August 2025 with handover to the operator due to be completed in September 2025.



PROJECT ALTERNATIVES

Four project routing, design and construction alternatives were considered during the design process to ensure that the preferred option would, where possible, minimise environmental and socio-economic impacts.

The assessment of alternatives (or alternatives analysis) is an important step in the management of environmental and social risks. The process is designed to look at technical, financial, environmental and social aspects of each option to ensure the most cost-effective option which minimises potentially significant impacts is selected.

Four alternatives were considered for the Project:

1. 'No Project' Alternative
2. Road Transportation Alternative
3. Routing Alternatives
4. Technological and Material Alternatives (such as fuel source, materials)

The ESIA Report provides details on the realistic and workable location and technology alternatives studied, and the reasons for the selection of the final option.

The evaluation of each Project alternative was centred around four main criteria:

- Environmental – e.g. GHG emissions and climate change effects of the Project as a result of increased rail use compare to using cars and trucks on the road.
- Socio- Economic – community safety issues and options to reduce resettlement/ relocation of people were considered.
- Technical – what can realistically be done e.g. routing options, types of sleepers and station locations were considered
- Financial – is the option workable / affordable

HOW WAS THE ESIA CONDUCTED

Baseline data have been collated from field surveys and available online data sources to identify, describe and assesses the potential environmental and social effects of the Project. Mitigation measures have been developed to manage these effects.

Typical ESIA Process is provided below

SCREENING
- Project description and categorisation
- Regulatory and lender requirements
- Sensitive receptors
- High-level impacts

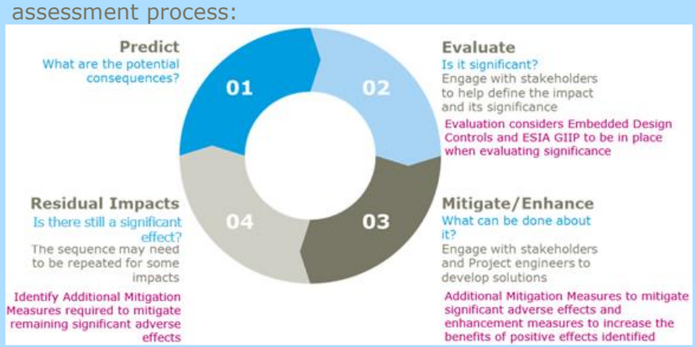
SCOPING
- Define area of influence
- Commence baseline data collection
- Develop Stakeholder Engagement Plan
- Commence specialist studies
- Collect, collate and interpret information received
- Identify potential impacts
- ESIA terms of reference
- Develop Scoping Report and associated documents

IMPACT ASSESSMENT
- Assess potential impacts
- Define impact magnitude
- Define receptor sensitivity
- Identify existing controls and embedded mitigation
- Assess likelihood of unplanned events
- Evaluate impact significance using assessment matrix
- Identify and evaluate residual, transboundary and cumulative impacts
- Develop mitigation
- Reassess effects and mitigation to reduce adverse impacts to acceptable levels and maximise benefits
- Develop ESIA Report and associated documents

MANAGEMENT PLANS
- Define mitigation and management plans
- Define monitoring requirements and implementation timeframes
- Define roles and responsibilities for implementation
- Define emergency response and disaster management
- Define grievance mechanisms
- Define reporting requirements
- Develop overarching and phase/topic-specific ESMPs

What Methodology was used for the Impact Assessment?

The following four step methodology was used for the impact assessment process:



Who has been consulted with about the Project?

The Project has engaged with various stakeholders, including local communities prior to the start of construction activities. Stakeholders were identified and grouped according to their interests and interaction with the Project.

The Project will continue to engage with the local community throughout the construction phase so that they are informed about the Project's activities and potential effects that the Project may cause. Communities will also be informed of the mitigation measures which the Project will apply to avoid, reduce, manage, compensate or offset harmful effects. A Stakeholder Engagement Plan (SEP), presented in the ESIA Report, has been developed which explains the approach the Project will follow to engage with stakeholders and communities over the life of the Project. The SEP is intended to provide an overview of activities that have been undertaken during the development of the Project and provide information on future engagement activities for the construction phase of the Project.

What are the results of the impact assessment?

The following environmental and social impacts have been scoped into the Project ESIA:

- Air Quality
- Climate Change
- Noise and Vibration
- Soils and Geology
- Water Resources
- Biodiversity and Ecosystem Services
- Socio-Economics, Employment and Livelihoods
- Community Health Safety and Security
- Cultural Heritage
- Labour and Working Conditions
- Transport
- Waste
- Major Hazards
- Cumulative Impacts

The next few pages focus on the topics that may result in Significant effects (Major or Moderate) during the construction and operation.

How will the significant effects be managed?

In identifying mitigation measures, the mitigation hierarchy has been applied:

- Avoid: designing-out impacts by adopting a design that avoids impacts;
- Reduce: assessing alternatives and, where feasible, adopting those with less or lower impacts;
- Mitigate: applying mitigation measures to manage remaining impacts; or
- Compensate or Offset: establishing fair compensatory measures to address residual effects that remain after taking all of the of the steps above.

Embedded mitigation measures are those that the project had in place before the ESIA was started and have been taken into account when determining the impact magnitude and resultant effect as these are considered to be part of the Project. Two types of embedded mitigation measure are identified: Embedded Design Control and ESIA Good International Industry Practice.

As a result of this approach, only a limited number of environmental and social effects will occur, most of which will be minor due to their short-term duration and local spatial extent.

WHAT ARE THE BENEFITS OF THE PROJECT?

Positive impacts were also assessed as part of the Project and measures have been developed to increase benefits where positive effects have been identified. The following benefits have been assessed:

Direct and indirect local employment opportunities

Unemployment levels are currently high in the Project area. During the construction phase, the Project will generate employment (this will provide much needed jobs in the Project area, which is a high priority for local Stakeholders and youth and community leaders).

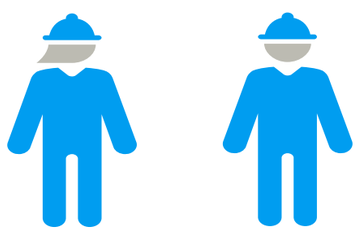
Indirect benefits include the provision of goods and services opportunities for local contractors and service providers to support construction activities. This may include materials but also local shops, restaurants, bars, and other services that will benefit from the Project construction period.

Measures to enhance benefits include:

Development of a Local Content Policy and Plan setting specific targets for local procurement and small and medium sized enterprises support within affected communities along the right-of-way.

Expansion of the existing human resource management policies and procedures to specify clear contracting procedures and workers' rights in accordance with Ghana Law and International Standards and will be equally applied to Amandi and contract staff.

A fair and transparent recruitment process will also be outlined.



Long term employment and economic benefits during operation

The operational phase will result in several economic benefits including jobs associated with operating trains and stations as well as maintenance.

Stations will become a hub of economic activity, providing opportunities for vendors and traders.

The operation of the passenger trains will also enable people to become more mobile, making it more cost effective to reach the regional capital of Takoradi-Sekondi.

Travel for employment in other towns along the route will become more feasible.

knock-on effect for the wider local economy through the ease of movement of people, food items and traded goods.

Measures to enhance benefits include:

A fair and transparent recruitment process.

Developing a Stakeholder Engagement Plan to include measures for local employment and procurement of goods and services including making use of information channels accessible to communities such as posters and community announcements to provide adequate information on opportunities.

Increased rail capacity and reduction of usage of roads

It is anticipated that up to 6 passenger trains per day will be operational, therefore increasing the capacity of the rail network for commuters.

The capacity of freight movements may increase should the demand arise. This would enable transfer of freight movements from road to rail.

The increase in the network capacity will reduce dependence on the road network, and may help to reduce road congestion, or prevent an increase in congestion by enabling movement of both passengers and freight by rail.

Mitigation measures to enhance the benefits include:

Developing and implementing a Traffic Management Plan and that evaluates potential routes for the main Project related vehicle movements, such as deliveries of goods and services, worker transport, and waste removal vehicles.

WILL MY DRINKING WATER BE AFFECTED?

The Project will cross rivers and streams. These were assessed along the railway route to find out whether the Project will affect them. The ESIA report found that rivers and boreholes are primarily used for drinking and domestic purposes. There may be a need for direct abstraction of surface water and groundwater.

Photo taken upstream near Nsuta bauxite mining area and railway station

Baseline Environment

The majority of the Project lies within the Western River System and in Ankobra River Basin. Rural water supply is typically sourced from community boreholes and hand dug wells. Samples taken from rivers and streams close to the railway line were found to be impacted by various human activities. Results from the samples showed some of the samples to exceed national and international water quality limit values. The following observations were made in rivers and stream within and near the following sections of the railway line:

- Takoradi Port to Takoradi section - waterbodies were found to be mainly used for disposal of waste.
- Kojokrom to Nsuta section– waterbodies near this section were found to have high levels of human activity from artisanal mining and human use (disposal of waste, mining, bathing, washing, and low fishing). Local users commuting across the rail bridge by foot near Akyim community were observed.
- Nsuta to north of Tarkwa section - licenced mines and plantations were found to be present.
- Tarkwa to Huni Valley section- artisanal mining, with flows affected by local damming and abstractions and plantation farms were observed.

During the construction phase, water is expected to be provided via tankers from Ghana Water Company, although there may be a need for direct abstraction of surface water and groundwater. In addition, construction activities will occur in some rivers and streams along the railway line. During operation, permanent water abstraction may be required for the heavy rail maintenance facility near Tarkwa. The potential significant impacts during construction and operation are outlined in the map below.

What are the main impacts during construction of the railway line?

The following construction activities may temporarily result in moderate to major significant impacts on water resources:

- Excavation of burrow pits impacting on groundwater quantity and quality;
- Accidental spills from general construction activities as well as in-situ construction of water crossings and culverts causing pollution;
- Increased sediment run-off from general construction activities causing high turbidity in surface water
- Impacts to the quality and quantity of surface and groundwaters from dewatering and wastewater discharges
- Impacts to characteristics of waterbodies through construction of culverts and bridges across watercourse , resulting in a change in the structure of the water course.

During the operation of the railway line, the following specific effect on waterbodies will occur near Tarkwa:

- Impacts to groundwater from permanent abstractions required at the heavy rail maintenance facility near Tarkwa

What will be the main impacts during operation of the railway line?

Waterbodies may be affected by the operation of the railway line due to the following:

- Impacts to surface water from flooding due to permanent infrastructure and land take
- Impacts to surface and groundwater quality from hardstanding and industrial areas, maintenance of bridges and culverts (clearance of blockages etc), and direct discharges from effluents.
- Indirect impacts on local water supplies from groundwater abstractions or dewatering.

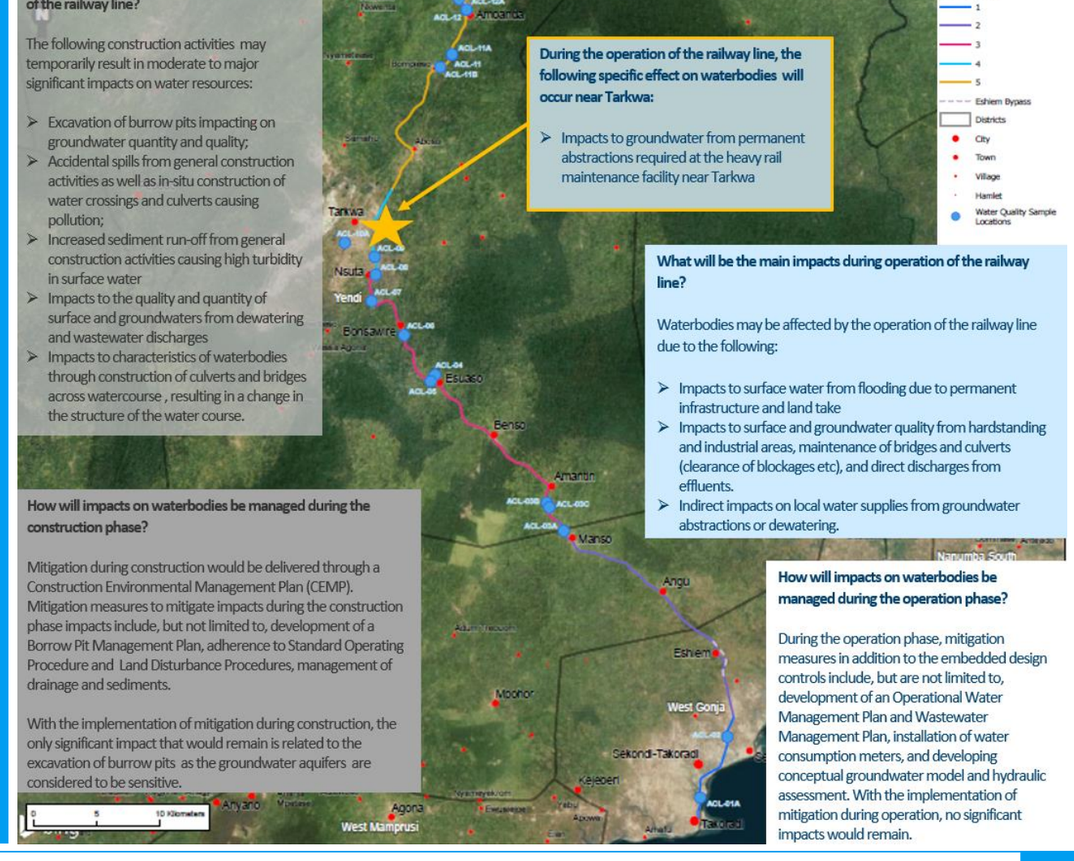
How will impacts on waterbodies be managed during the construction phase?

Mitigation during construction would be delivered through a Construction Environmental Management Plan (CEMP). Mitigation measures to mitigate impacts during the construction phase impacts include, but not limited to, development of a Borrow Pit Management Plan, adherence to Standard Operating Procedure and Land Disturbance Procedures, management of drainage and sediments.

With the implementation of mitigation during construction, the only significant impact that would remain is related to the excavation of burrow pits as the groundwater aquifers are considered to be sensitive.

How will impacts on waterbodies be managed during the operation phase?

During the operation phase, mitigation measures in addition to the embedded design controls include, but are not limited to, development of an Operational Water Management Plan and Wastewater Management Plan, installation of water consumption meters, and developing conceptual groundwater model and hydraulic assessment. With the implementation of mitigation during operation, no significant impacts would remain.



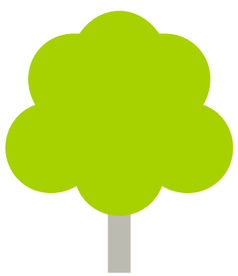
WILL THERE BE NEGATIVE IMPACTS ON AIR QUALITY?

Baseline monitoring of air emissions (nitrogen oxides, sulphur oxides and dust) was undertaken at 12 locations along the railway line and showed that dust will be generated from the construction activities. However, the duration of construction activities in most areas will be a few months, except for the construction of the heavy rail maintenance facility and stations taking up to approximately 12-14months.

Baseline Environment

The use of diesel from vehicles and equipment during construction and from the use of trains during operations from the trains and the use of generators during the operational will generate nitrogen dioxide (NO_2) and sulphur oxides (SO_x). Dust will also be generated from the construction phase from both general site activities.

Baseline monitoring of air pollutants was undertaken at 12 locations (see map). NO_2 and SO_2 were monitored using diffusion tubes exposed for 14 days and a hand held MiniVol monitor was used to sample dust (PM_{10} and $PM_{2.5}$) concentrations over a 24hr period.



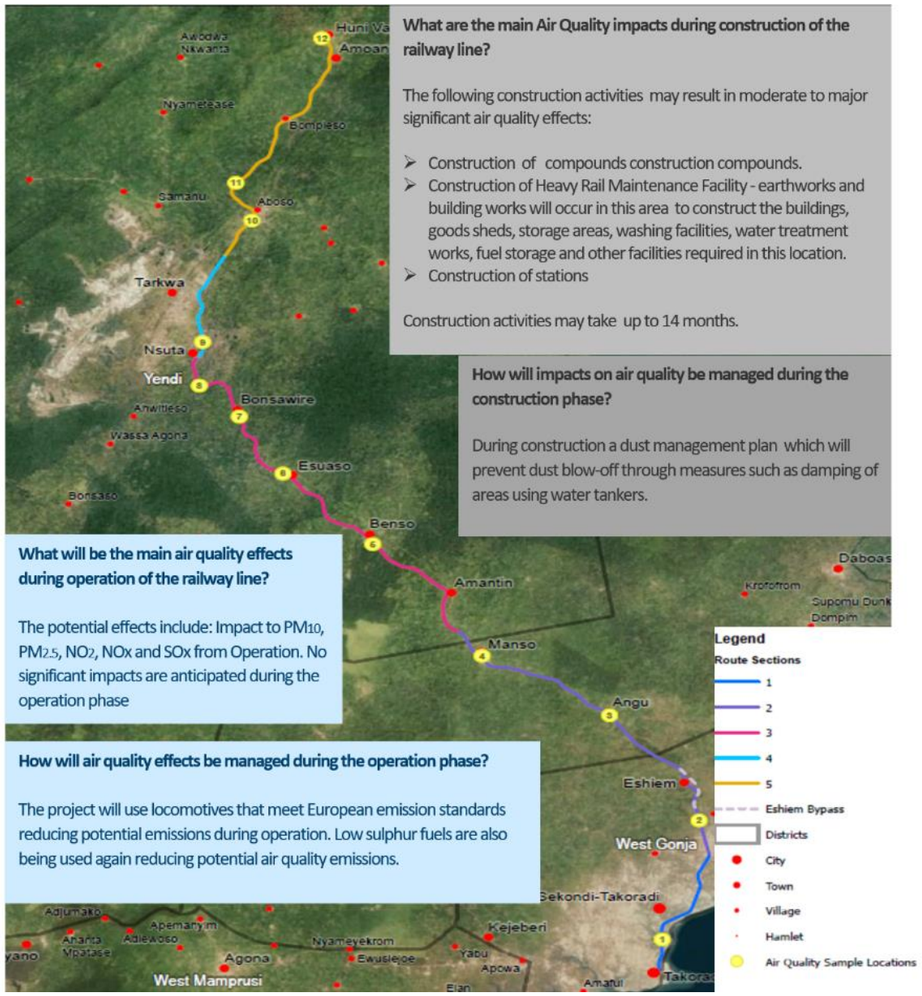
Results of Baseline survey

Pollutants that are below International Standards or Ghanaian ambient air quality standards for each site monitored is **Green**

Pollutants that are above International Standards or Ghanaian ambient air quality standards for each site monitored is **Orange**

As shown in the table below, a total of 4 sites either exceeded International Standards or Ghanaian ambient air quality standards particular particulate matter levels. The 4 locations (sites, 3,4, 5 and 9) are marked in red in the map.

Site Location (see map)	Nitrogen Oxides (NOx)	Sulphur Oxides (Sox)	Particulate Matter (PM_{10})	Particulate Matter ($PM_{2.5}$)
Location 1				
Location 2				
Location 3				
Location 4				
Location 5				
Location 6				
Location 7				
Location 8				
Location 9				
Location 10				
Location 11				
Location 12				



HOW MUCH NOISE WILL I HEAR?

Residential areas, hospitals and schools may be affected by noise from construction activities. Noise monitoring was carried out at 12 locations along the railway line.

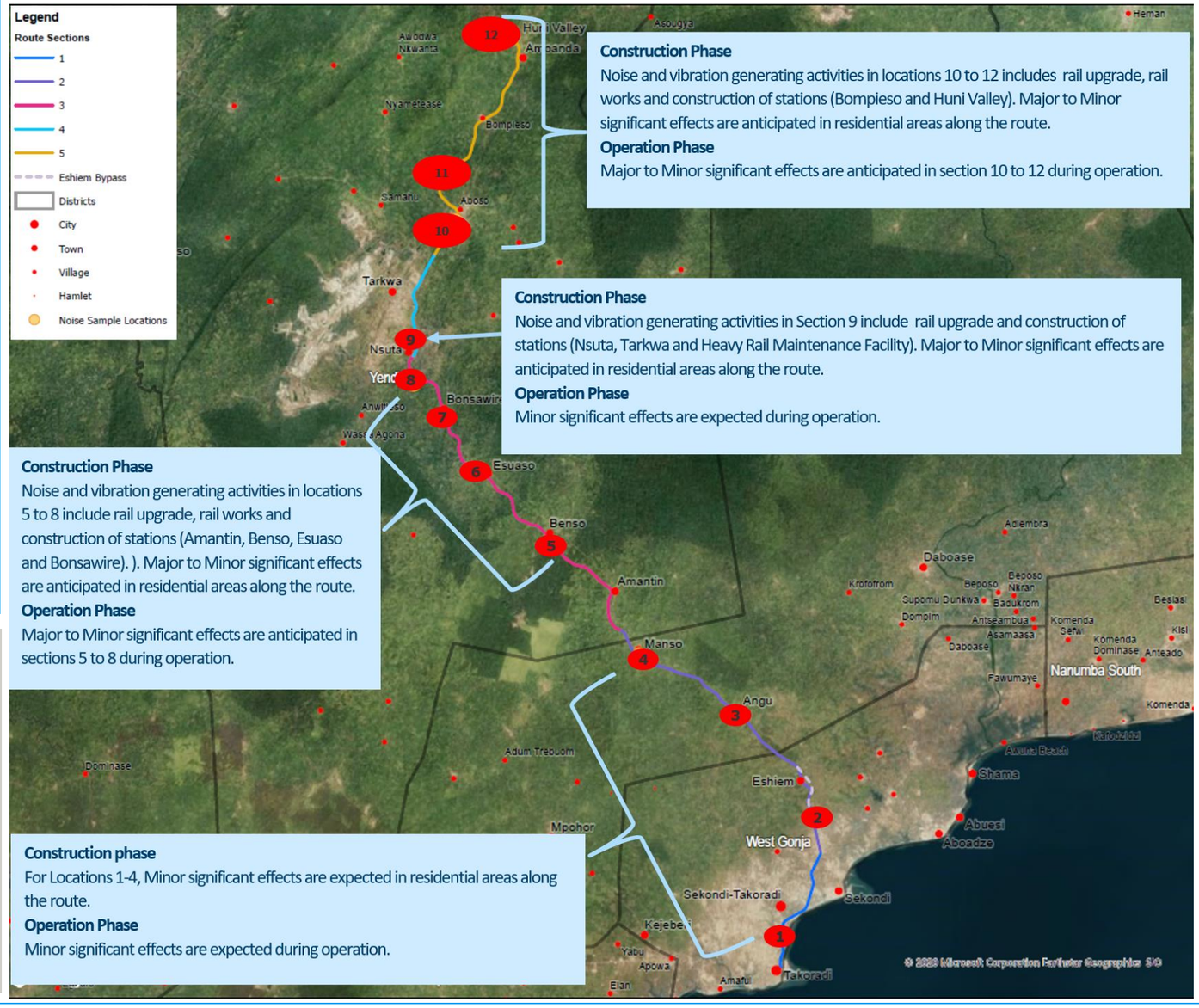
Baseline Environment

Existing sources of noise and vibration present along the railway include: human activities in settlements (e.g. markets, movement of people outdoors), vehicle movements and rail noise from trains along the existing operational railways. The southern end of the route is at Takoradi Port, an industrial area. It then passes through the urban areas, which include mixed housing and industrial areas. The route becomes more rural with a number of small settlements located along the route before it reaches the more urban areas of Nsuta and Tarkwa, passing close to existing mining operations. North of Tarkwa to Huni Valley is predominantly rural. Along most of the route significant sources of vibration in the environment baseline are uncommon and are typically only found during temporary construction or close to existing railway lines.

Results of Baseline survey

The noise baseline monitoring results for residential receptors at all locations exceeded both the International Standards and Ghanaian standards (see red locations on the map)and were below the standards for industrial and commercial receptors.

The highest noise levels were recorded at Location 1 (due to the industrial nature of the area) and lowest at Location 10.



Construction Phase
Noise and vibration generating activities in locations 10 to 12 includes rail upgrade, rail works and construction of stations (Bompieso and Huni Valley). Major to Minor significant effects are anticipated in residential areas along the route.
Operation Phase
Major to Minor significant effects are anticipated in section 10 to 12 during operation.

Construction Phase
Noise and vibration generating activities in Section 9 include rail upgrade and construction of stations (Nsuta, Tarkwa and Heavy Rail Maintenance Facility). Major to Minor significant effects are anticipated in residential areas along the route.
Operation Phase
Minor significant effects are expected during operation.

Construction Phase
Noise and vibration generating activities in locations 5 to 8 include rail upgrade, rail works and construction of stations (Amantin, Benso, Esuaso and Bonsawire).). Major to Minor significant effects are anticipated in residential areas along the route.
Operation Phase
Major to Minor significant effects are anticipated in sections 5 to 8 during operation.

Construction phase
For Locations 1-4, Minor significant effects are expected in residential areas along the route.
Operation Phase
Minor significant effects are expected during operation.

Mitigation Measures

Construction phase
A Noise and Vibration Mitigation Plan will be developed for the Project to minimise effects on local communities. Monitoring of community grievances/complaints for effects from Noise and vibration will also be undertaken and appropriate mitigation incorporated where excessive noise is experienced.

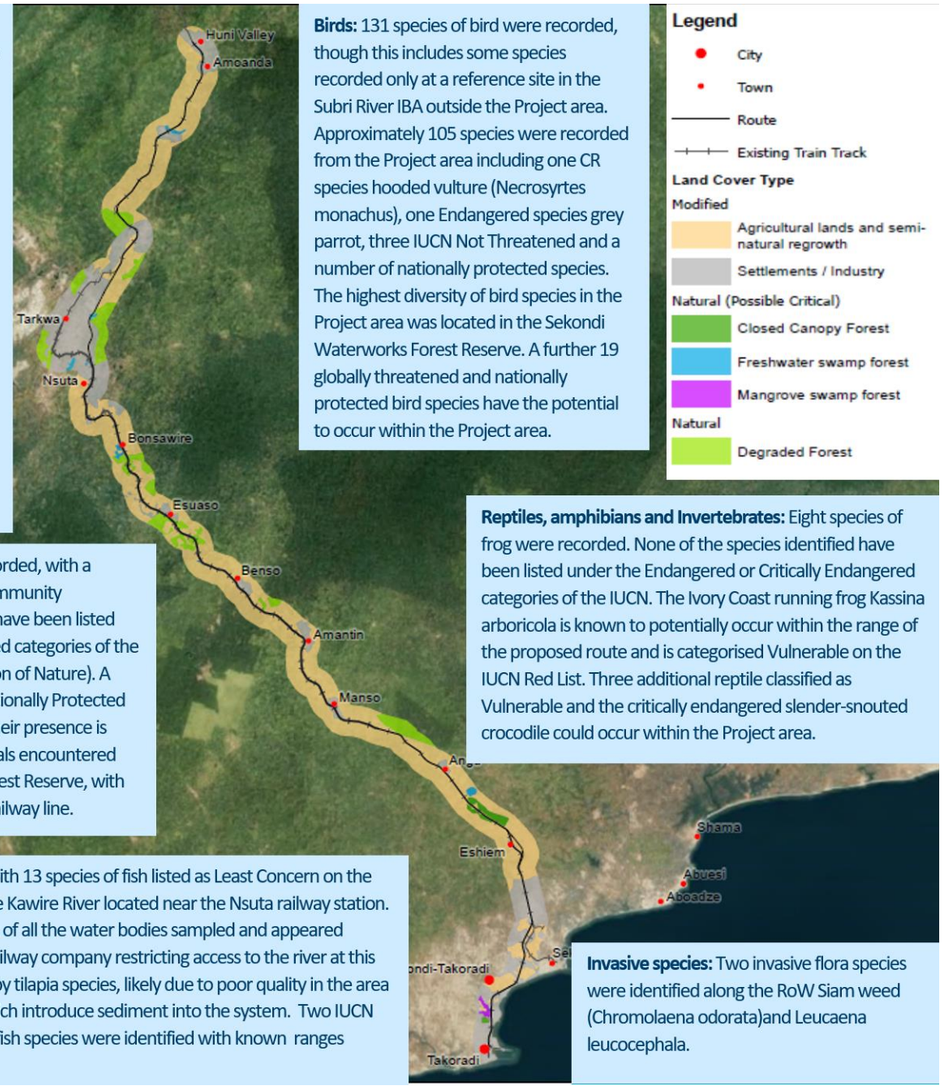
For long term construction activities (e.g. for construction of the stations and Heavy Rail Maintenance Facility), screening such as fencing, hoarding or earthbund will be installed around the site or between the sensitive receptors (e.g. houses) and construction activity locations. Mitigation also includes an evaluation of planned noisy construction activities prior to the use of construction equipment.

During the operation phase, a Noise and Vibration Plan will also be developed and community grievances will be monitored. In addition, an Operational Maintenance and Inspection will be undertaken.

WILL PLANTS AND ANIMALS BE AFFECTED?

Field surveys undertaken in Project area included habitat, plants, animals, birds, reptiles and fish surveys. Sensitive receptors were identified during the surveys that may be potentially affected by the project during construction and operational phases.

Plants: A total of 176 Species in 60 Families and 157 Genera were encountered along the proposed route. None of the species identified have been listed under the Endangered or Critically Endangered categories of the IUCN (International Union for the Conservation of Nature). The life form composition showed a dominance of the herb (30.1%) and an abundance of trees (33.5%) (in part due to coco farming in the area and secondary forests and thickets are common where farms and agricultural land are in fallow). This is likely why there are so many climber and shrub life forms present. The vegetation is considered secondary to tertiary in development. Threatened botanical species known or potentially occurring in the Project area were also encountered.



Birds: 131 species of bird were recorded, though this includes some species recorded only at a reference site in the Subri River IBA outside the Project area. Approximately 105 species were recorded from the Project area including one CR species hooded vulture (Necrosyrtes monachus), one Endangered species grey parrot, three IUCN Not Threatened and a number of nationally protected species. The highest diversity of bird species in the Project area was located in the Sekondi Waterworks Forest Reserve. A further 19 globally threatened and nationally protected bird species have the potential to occur within the Project area.

Mammals: 11 species of mammals were recorded, with a further eight reportedly present based on community consultations. None of the species identified have been listed under the Endangered or Critically Endangered categories of the IUCN (International Union for the Conservation of Nature). A number of other Threatened Species and Nationally Protected Mammal Species may be present however their presence is unconfirmed. The highest number of mammals encountered was recorded in the Sekondi Waterworks Forest Reserve, with relatively low encounters along the existing railway line.

Reptiles, amphibians and Invertebrates: Eight species of frog were recorded. None of the species identified have been listed under the Endangered or Critically Endangered categories of the IUCN. The Ivory Coast running frog Kassina arboricola is known to potentially occur within the range of the proposed route and is categorised Vulnerable on the IUCN Red List. Three additional reptile classified as Vulnerable and the critically endangered slender-snouted crocodile could occur within the Project area.

Fish: Surveys indicated low species diversity with 13 species of fish listed as Least Concern on the IUCN Red List. Fish were most abundant in the Kawire River located near the Nsuta railway station. This watercourse was the largest and deepest of all the water bodies sampled and appeared cleaner than the rest, which was due to the railway company restricting access to the river at this point. Overall, the fish catch was dominated by tilapia species, likely due to poor quality in the area as a result of community mining activities, which introduce sediment into the system. Two IUCN Threatened species and nationally protected fish species were identified with known ranges overlapping the study zone.

Invasive species: Two invasive flora species were identified along the RoW Siam weed (Chromolaena odorata)and Leucaena leucocephala.

What are the main effects on plants and animals during construction of the railway line?

Construction activities may result in moderate to major significant effects on plants and animals as follows:

- Habitat Loss Impacts Subri River and Sekondi Waterworks Forest Reserves.
- Loss and Fragmentation (division into small parts) of possible Critical Habitat for an endangered plant herb species *Aframomum atewae*.
- Aquatic Habitat Loss and Fragmentation.
- Death of animals.
- Habitat degradation (making habitats less suitable for animals and plants) due to use of fuels and dust generation.
- Water quality and quantity impacts to groundwater dependent ecosystems.
- Water quality and quantity impacts to individual watercourses.

What are the main effects on plants and animals during the operation of the railway line?

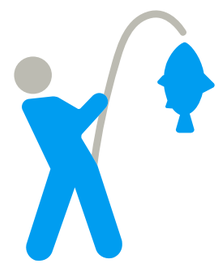
Construction activities may result in moderate to major significant effects on plants and animals as follows:

- Accidental death of animals.
- Degradation of aquatic habitats and disturbance to aquatic fauna, including Barrier Effects (obstacles to species movement).

How will the effects be managed?

A biodiversity Management Plan will be developed sets out the procedure for clearing vegetation and is designed to minimise loss of habitats and species. The construction workforce will be trained in how to recognise and avoid impacts to sensitive habitats where these are present. Temporarily disturbed habitats will be rehabilitated following construction, and planting schemes will include threatened species as appropriate. The Biodiversity management Plan also includes a procedure for managing Invasive species.

Mitigation measures during the operation phase, include avoiding maintenance requiring vegetation clearance during sensitive seasons. Clearance will follow a prescribed Vegetation Clearance Procedure and a thorough survey by an Ecological Specialist will be undertaken.



HOW WILL CURRENT LAND USE AND LIVELIHOODS BE AFFECTED?

The system of land use and ownership was discussed during the focus groups undertaken for the baseline survey. Land acquisition of the Project will result in a width of approximately 60m along the route, that will intersect farmland and businesses along the route.

Baseline Environment

The western region is a producer of cocoa, rubber, cassava, coconut and oil palm. In addition, the recent discovery of oil has led to off-shore commercial oil drilling. Lands in the Project area are typically family-owned. To acquire land, a person must see his family head and make known his intention to acquire land. Land related conflicts are quite frequent in the community and often result from disputes over boundaries. The community elders usually resolve these issues.
Sharecropping is used in some areas which involves the landowner sharing the land with a tenant farmer. The dormancy of the railway has led to land being cultivated for farming and mined and used for timber processing and industry.

Results of Baseline survey

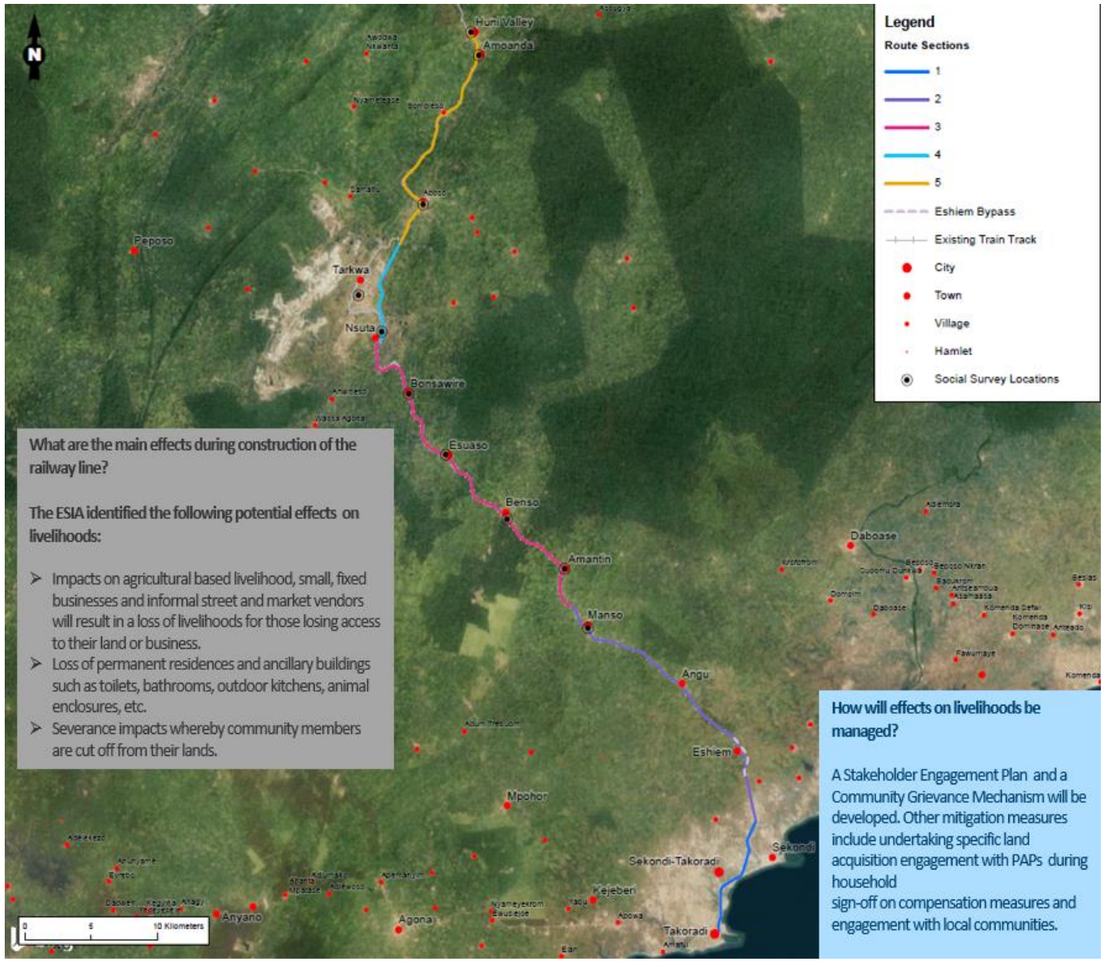
The following key issues were reported by participants in relation to land ownership during the focus group meetings:

- Lands are typically not owned by individuals in the community, as many of the lands are family owned and as such no single individual can claim to have control over land.
- There may be some squatters farming around the Project Right-of-Way, because such people believe the lands around the rails do not belong to the chief.

The following key issues were reported by participants in relation to land use during the focus group meetings:

- The main commercial agricultural crops are: cocoa, oil palm, plantain, rubber, cassava.
- The main crops grown in the communities for household consumption or sale are: cassava, maize, pepper, tomatoes, plantain, pineapple, okra and crops are typically given to the women to sell.
- The main animals kept in the communities are goats, sheep, chickens, rabbits, pigs, and these are principally kept for household consumption – hunting and fishing are not widely undertaken.

As identified in the RAP census and socio-economic survey of affected people, 1,373 Project Affected Households (PAHs) will be affected by either physical and / or economic displacement between Kojokrom and Huni Valley. Benso, Esuaso and Bonsawire are the most impacted communities in terms of number of assets with 231, 189 and 143 assets respectively impacted by land acquisition. Assets include homes, commercial buildings, vendors and traders. Tenants were also considered. A Resettlement Action Plan has been developed to address physical and economic displacement resulting from the Project.



WHAT ABOUT COMMMUNITY HEALTH AND SAFETY?

The railway will be developed in areas that are located close to houses, cultivated land and areas that are used frequently by pedestrians. Focus Group meetings were held with health care workers to find out what the main heath concerns are in the community.

Baseline Environment

Community Health:
Access to health care facilities
Those who can access local health facilities consider some local health services to have limited services. The local health services tend to lack equipment, staff, emergency vehicles and have limited medical supplies.
Malaria
Malaria is a key issue in the Western Region, especially in children under five, and pregnant women. Treated mosquito nets are not widely used and health facilities in the Western Region may not have laboratory services or rapid testing kits to help in malaria diagnosis. Over the past five years, there has been a decrease in malaria cases due to use of better case management practices and methods.
HIV
HIV occurrence amongst both men and women is high in the Western region compared to the national average.
Other medical issues
Other medical concerns include upper respiratory tract infections, diarrhoea, high blood pressure, diabetes, menstrual disorders, sexually transmitted diseases (STDs) such as gonorrhoea and accidents occurring at work such as mining sites.

Infrastructure and Services:
Sanitation
Most households use improved sanitation systems (e.g., cesspits) and the rest use unimproved pit latrine without slab and open defecation in the Western region.
Electricity
Most households in the Western Region have access to grid electricity and amongst Project Affected People, the main use of electricity is for lighting. Less than 1% have no access to any form of power.
Water
Most households in the Western Region have access to improved water sources. Water is sourced via public tap/stand-pipe, sachet water or a tube-well / bore hole. Only 4.1% of people in the Western region have to travel for more than 30 minutes to access water.

Disability:
Nationally, the percentage of people with functional difficulties (such as from seeing, hearing, walking, self-care, communication or remembering) was estimated at 9.3% of women and 7.1% of men. Within the Western region there are small numbers of disabled people living in the community, including those with visual, mobility, learning and hearing impairments. Amongst heads of households, only 3% had some form of disability.

What are the main effects during construction of the railway line?

Construction activities may result in moderate to major significant effects as follows:

- Injury to community members from site trespass or interaction with construction activities.
- Transmission of communicable diseases and STDs from Project workers to local communities.
- Increased transmission of malaria.
- Increased use of local health care services.
- Increased levels of gender-based violence, sexual exploitation and abuse.

No Significant effects are anticipated during the operational phase.

How will effects on community health and safety be managed?

Before any construction in an area takes place, the Project shall engage with the local people and ensure all risks from the works are considered.

Other mitigation measures include, developing a Community Grievance Mechanism and a Community Health, Safety and Security Management Plan.

All the local workforce will be given an induction and Project training. All contracted Project workers with mosquito nets and developing a Worker Code of Conduct to guide behaviour as part of the HR Management Plan.

IS THE PROJECT CREATING OPPORTUNITIES FOR LOCAL EMPLOYMENT AND WHAT ARE THE WORKING CONDITIONS LIKE?

The ESIA indicated that unemployment levels are currently high in the Project area.

Baseline Environment

Economic Activities:
The main economic activities in the Western Region are farming, small scale mining/community mining, trading. Other economic activities include ventures such as masonry, carpentry and farming. Key economic issues noted include:

- Lack of funds to buy seedlings and implements such as tools and pesticides, fluctuating market prices, changes in rainfall patterns, and longer drought seasons affecting harvest, pests, and high prices of fertilizers.
- No banks in all communities and access to bank accounts, or formal savings accounts is limited with no funds to develop lands.
- Opportunities to develop trade and supply partnerships with industries that need raw materials, as lands are available for mass cultivation but there are no funds to develop these lands.

Labour and Working Conditions:
Nationally, the minimum age for admission of a child to employment is 15 years. Despite these legal provisions, it is common to see children engaged in some form of child labour in the Western Region. In Ghana, there are issues with labour and working conditions through forced labour and people trafficking. Exploitation includes domestic and foreign victims, including children. Ghana does not have any national occupational health and safety policy.

Human Rights:
Nationally there is a concern for human rights from international governments and non-government organisations. Areas of concern include law enforcement, government officials and policies, freedom of speech and women's rights.

Baseline Survey Results

The census survey conducted in August / September 2020 identified that out of the total affected 23% of the adult and youth population were not in work. Education attainment and limited opportunities are key barriers to obtaining employment. Literacy levels for women are lower than that for men. Average literacy levels for the Project Affected People was 68.8%. The data also show that 8% of Project Affected People have never gone to school, while a further 12.6% have not progressed further than partially completing senior secondary school.

What are the main effects during construction of the railway line?

Construction activities may result in moderate to major significant effects is as follows:

- Direct and indirect local employment opportunities will be a positive impact.
- There will, however, be a loss of employment at the conclusion of the construction phase.
- Influx and changes to demographics.
- Workers exposed to poor and unfair working practices.
- Workers exposed to unsafe or unhealthy working conditions.
- Use of forced or child labour.

During the operation phase, the following significant effects are anticipated:

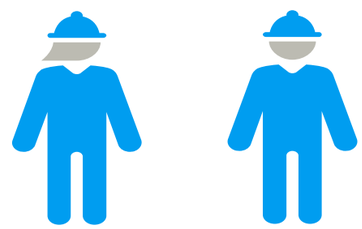
- Long term employment and economic benefits are anticipated.
- Workers exposed to unsafe or unhealthy working conditions.

How will effects on local employment, labour and working conditions and human rights be managed?

The Project will develop a Local Content Policy. This sets specific targets for employing local staff and using local small and medium- sized enterprises within affected communities along the right of way. A fair and transparent recruitment process will be outlined as part of the Recruitment Management Plan. Other mitigation measures include providing all Project workers with a clear contract of employment before starting their work on the Project which will be updated whenever there are changes to employment terms and condition. There is also a Stakeholder Engagement Plan and Project Worker Grievance Mechanism. An Occupational Health and Safety Management Plan shall identify adequate training and awareness for all employees will be developed.

During the operation of the rail mitigation the Project HR Plan being made available to all Project Workers as part of their induction and in accessible locations. All Project workers will be provided with a clear contract of employment prior to starting their work on the Project. The rail operator will also develop a Project Worker Grievance Mechanism and Occupational Health and Safety Management Plan.

The Human Rights Assessment concluded that implementation of the mitigation measures in the ESIA are relevant for and effective in managing human rights works.



WILL CULTURAL HERITAGE BE AFFECTED?

Cultural Heritage visits were undertaken in July 2020 and June 2021 which identified several cemeteries including one in Angu Township, Manso, Esuaso and Benso.

General Cultrual Heritage

- The physical and human geography along the proposed route varies from city / densely populated urban communities to rural communities, productive farms and forest.
- The Western Region includes historic forts, castles and beaches with villages and small towns with rich cultural heritage.
- Sekondi was the site of a 17th century Dutch Fort Orange and the English Fort Sekondi. The railway was constructed in 1901 and is a historic feature, making it the oldest rail route in Ghana.
- Ghana's first Deepwater seaport was built in Takoradi in 1928.
- Nzulezu, an ancient village built over 500 years ago and overlooking Lake Tadane, is also located in Western Region and is one of the few stilted settlements remaining in the world. It was declared a UNESCO World Heritage Site in 2000.
- Tarkwa is the centre of the Western Region mining industry, where mining has been in operation since the late 19th century. Some mining companies allow visitors and are a tourism attraction in the area.

Tangible Cultrual Heritage

- Records of any archaeological finds during the construction of the original track are not known.
- There have been no recent excavations related to the Project and therefore there have not been any recent archaeological / cultural heritage finds.
- Site visits undertaken in July 2020 identified several cemeteries including one in Angu Township, Manso, Esuaso and Benso. Community leaders in Esuaso were particularly concerned about the impact of the Project on their cemetery, and field studies confirm that the cemetery will be directly impacted.

Intangible Cultural Heritage

- The Asafo still remains an important institution within affected communities along the route including, Huni Valley, Benso, Bonsawire, Nsuta and Amoanda.
- Asafo units and the Asafo still have a role to play and perform during rituals and festivals as well as during emergency situations in the community.
- Some festivals still stake place in the Project area.
- Taboo days are common throughout the Project area.
- Rivers are closely associated with rituals, sacred sites and taboos.
- Sacred sites include the Huni, Dituo, Twena, Baasin and Atta rivers, which cross the rail track in Huni Valley. In many communities, it is taboo for women to cross certain rivers, particularly while menstruating or when pregnant.
- Sacred sites and rivers / streams near the railway include the Huni, Dituo, Twena, Baasin and Atta rivers in Huni Valley, the Huni, Esukokoo and Esuoben Bansa in Amoanda, and a sacred river in Bonsawire. There is also a shrine near the rail line in Amoanda.

What are the main impacts during construction of the railway line?

Construction activities may result in moderate to major significant effects as follows:

- Disturbance to Esuaso cemetery.
- Loss and / or Disturbance Intangible Cultural Heritage.
- Disturbance to Archaeological or other Historic Sites.

Once the Project is operational, there will not be any direct impacts associated with the Project to cultural heritage.

How will impacts on cultural heritage be managed?

Mitigation measures, including embedded design controls, during the construction phase include implementation of a Cultural Heritage Management procedure.

A Cultural Heritage Management Procedure will be implemented to address impacts to Esuaso cemetery, and all actions will be fully agreed with the Esuaso community.

A Chance Finds Procedure will be implemented in the event any cultural heritage is found or disturbed during construction activities.

SUMMARY OF OTHER ENVIRONMENTAL AND SOCIAL EFFECTS

Through the ESIA process, other relevant E&S topics were assessed and identified the potential for significant residual effects to be minor following application of mitigation measures detailed in the ESIA because of the Project. These are summarised below.

Air Quality

- Increased dust and particulate emissions during construction.
- NO_2 and SO_2 Emissions from combustion Plant during construction.
- Impact to PM_{10} and $PM_{2.5}$ from operations.
- Impact to NO_2, SO_2, NO_x and SO_x from operations.

Greenhouse Gases and Climate Change

- GHG emissions due to on-site emissions from diesel and fuel usage (total over 3 year construction period), land use conversion within the permanent Right of Way during construction.
- GHG emissions due to increase in the number of passenger trains movements per day during operational phase.
- Heatwaves and higher temperatures could result in site personnel welfare impacts including heat stress and unsafe working conditions.
- Extreme rainfall could pose a safety risk
- Heatwaves and drought conditions could increase dust generation and fire risk.
- Storm surges could lead to flooding within the vicinity of the site.

Noise and Vibration

- Noise effects from Operational Activities from sections 1, 2 & 4 and route.

Soils, Geology, topography and landscape

- Soil degradation construction Activities, including temporary construction.
- Impacts to landscape due to construction and operation.
- Prevention of future extraction of any mineral resources.
- Soil degradation from spills during operation.

Surface water and Groundwater

- Impacts to surface waters from flow diversions during construction.
- Impacts to surface water and groundwater from abstractions during construction.
- Impacts to surface water from flooding during operation.

Waste

Generation of waste during construction, operational and decommissioning phases.

Biodiversity and Ecosystem Services

- Terrestrial habitat loss and fragmentation for the Subri River Reserve during construction.
- Loss and Fragmentation of Possible Critical Habitat for Endangered Fauna Species during construction.
- Loss and Fragmentation of Non-Critical Natural Habitat during construction
- Loss and Fragmentation of Non-Critical Natural Habitat and Associated Impact on Non-Critical Flora and Fauna during construction.
- Introduction and Spread of Alien Invasive Species during construction and operation.
- Indirect impacts on the degradation of Terrestrial Habitats and Disturbance to Terrestrial Fauna including Barrier Effects.

Community Health, Safety and Security

- Increased levels of physical violence in local communities during construction.
- Increased levels of violence in local communities, including gender-based violence, sexual exploitation and abuse during operational.

Socio-economics

- Community grievance over unmet expectations during construction. Influx and changes to demographics during operation.

Ecosystem Services

- Impacts to groundwater and surface waters.
- Impacts on crops
- Impacts on fuelwood
- Impacts on sand, natural gravel and ballast.
- Impacts on sacred sites.

Traffic and Transport

- Increase Pressure on Existing Transport Network due to Construction Traffic. Increased rail capacity during operation (Positive Impact)

Cumulative Impacts

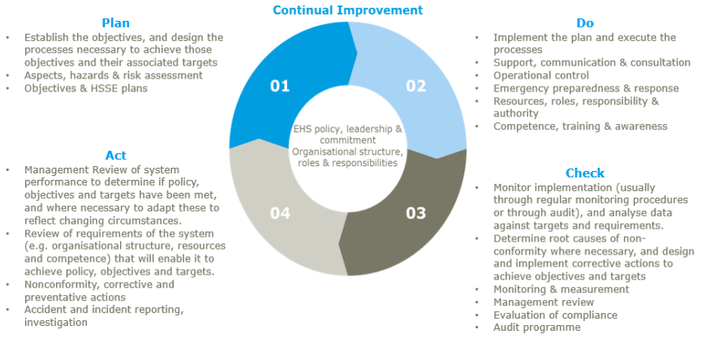
- Noise cumulative impacts from Construction Works.
- Quantity and quality of groundwater aquifers cumulative impacts.
- Cumulative impacts on biodiversity
- Community, Health, Safety and Security cumulative impacts.
- Cultural heritage cumulative impacts.

MANAGEMENT OF ENVIRONMENTAL AND SOCIAL EFFECTS

An Environmental and Social Management Plan (ESMP) has been developed. It identifies all the design and good practise construction measures already considered in the design. It also includes any additional mitigation measures, enhancement measures and monitoring measures identified as part of the ESIA. It focuses on environmental and social management actions for the construction phase and high-level requirements for the operational phase. The construction phase ESMP will apply to both Amandi's own staff and its contractors and will ensure that contractors comply the standards and requirements in the ESMP.

How will Environmental and Social Effects be Managed?

An Environmental and Social Management System (ESMS) will be developed to manage E&S risks during the construction phase of the Project, with an outline of measures which need to be carried forward into operations and implemented by the GRDA.



Plan, Do, Check, Act Cycle of Continuous Improvement

Is there Environmental and Social Monitoring?

Monitoring is an important part of the ESMS. In accordance with the Conditions of the Environmental Permit monitoring of the following shall be undertaken during construction and Quarterly reports submitted to the EPA:
Air quality and dust, Noise and vibration, Waste management, Erosion and flooding, Water quality, Accidents and Traffic Issues.

Who will be responsible for managing E&S effects during construction?

Amandi has developed an environmental and social policy framework that supports for measures and interventions to be undertaken to safeguard the Project environment.

Amandi will develop a detailed Construction Environmental and Social Management Plan (CESMP) and associated documents – topic specific plans, procedures and processes – to support delivery of the commitments made in the ESMP.

How will grievances be managed?

The management of grievances ensures that any grievances associated with the Project activities are addressed in good faith through a transparent process throughout the Project lifecycle.

The Project will develop a Community Grievance Mechanism to provide a process for receiving grievances from communities, individuals, NGOs, and local government and managing them in an efficient and transparent manner. As part of this plan a Community Grievance Register will be used to record and track the completion of community grievances. This will be implemented throughout engagement on the Resettlement Action Plan and entitlements. Communities will be made aware of the mechanism for registering complaints and feedback relating to land acquisition, entitlements and any other impacts.

WILL THE TAKORADI PORT TO HUNI VALLEY RAIL PROJECT COMBINED WITH OTHER PROJECTS RESULT IN INCREASE OR ADDITIONAL IMPACTS?

The ESIA also considers the potential effects that are likely to occur where one impact interacts with another impact from another activity either within the project or from another project occurring at the same time. These types of effect are known as 'cumulative effects'. Impacts from these projects may not be significant when considered alone but may have the potential to cause significant cumulative effect when the projects are considered together.

Approach to determining Cumulative Impacts

1. Determine spatial and temporal boundaries, e.g. the Project Area of Influence
2. Identify receptors in consultation with affected communities and stakeholders, and identify all developments and external natural and social stressors affecting the receptors
3. Determine the present condition (baseline) of receptors
4. Assessment of the contribution of the Project under evaluation to the predicted cumulative impacts
5. Evaluation of the significance of predicted cumulative impacts to the viability or sustainability of the affected receptors
6. Design and implementation of mitigation measures to manage the Project's contribution to the cumulative impacts and risks

The cumulative impact assessment has considered proposed developments and activities that have the potential to have a significant effect on sensitive human, heritage and environmental values and/or raise concerns from Affected Communities.

What are the main cumulative effects during construction and operation of the railway line?

The following construction activities may temporarily result in moderate to major significant cumulative effects :

- Physical and Economic Displacement due to construction of Phase 4 (Expansion of the Trans-ECOWAS Line).
- Cumulative impacts on the quantity and quality of groundwater aquifers (Project and Phases 1 and 2 (Western Line) during construction.
- Direct and Indirect Local Employment Opportunities (Positive cumulative impact) during construction.
- Long Term Employment and Economic Benefits during Operation (Positive).

How will cumulative effects be managed?

Mitigation measures includes, in addition to the design controls, but not limited to, undertaking stakeholder engagement and implementation of a grievance mechanism. In addition, the Resettlement Action Aplan implementation team will consider displacement from wider Ghana Railway Masterplan when conducting specific land acquisition engagement with project Affected People.

HOW CAN I PROVIDE FEEDBACK ON THE PROJECT?

Persons interested in the Project are welcome to contact the Developer to ask questions/provide comments. Alternatively, communications can also be addressed to the Project's Community Liaison Officer as shown below.

Feedback

Feedback on the Project may be submitted via:


telephone at +357- 220 -53845


online at https://amandi.com/


email RailwayCommunityOfficer@amandi.com


post to 40 Themistockli Dervi, Floor 1, 1066 Nicosia, Cyprus


in person to Community Liaison Officer (CLO) - Mr. Dennis Nana Acheampong