TRANSPORT IMPACT ASSESSMENT
SOUTH WEST AMHARA IAIP & RTC FACILITIES, ETHIOPIA

Report Produced by:
WSP in collaboration with Zereu Girmay Environment Consultancy (ZGEC)

Date: December 2017
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REPORT (DRAFT)

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1 INTRODUCTION

1.1 BACKGROUND

The United Nations Office for Project Services (UNOPS) has appointed WSP, in collaboration with Zereu Girmay Environmental Consultancy (ZGEC) to undertake the required Environmental and Social Impact Assessment (ESIA) of the proposed Bure Integrated Agri Industrial Park (IAIP) and the accompanying Motta Rural Transformation Centre (RTC). The facilities will be located in the South West Amhara Region of Ethiopia.

The objective of the ESIA is to obtain environmental certification for the proposed development from the Ministry of Environment, Forestry and Climate Change (MEFCC). The ESIA is to be undertaken in line with the African Development Bank (AfDB) standards and local Ethiopian legislation.

The potential traffic impacts of the proposed Project and the need for a specialist Traffic Impact Assessment (TIA) was identified in the ESIA Scoping Report for the proposed Amhara IAIP and RTC ESIA.

1.2 SCOPE OF WORK

The TIA consist of the following two components:

— Traffic Impact Assessment: this report.

The TIA assesses the expected traffic related impacts of the proposed facilities during the operation phase only. The construction phase traffic impact was only briefly noted due to the volume of construction related traffic (material deliveries, personnel, etc.) that cannot be determined at this stage. The proposed IAIP and associated RTC are intended to be long term operational facilities (i.e. are not intended to be decommissioned in the near future). As such the potential traffic impact of the decommissioning phase was also not considered further.

The following documents were reviewed to inform the Scope of Work of the TIA, namely:

— Ethiopian Roads Authority: on-line information.

Limited requirements are stated in these documents with regards to the scope of work for a TIA for these type of developments. Therefore, the scope was informed by the requirements of the South Africa Committee of Transport Officials, South African Traffic Impact and Site Traffic Assessment Manual, TMH16, Vol. 1, Version 1, August 2012. Also refer to Section 2.3.

The scope covers inter alia the following:

— Description of the extent of the development, including location and land-use/s.
— Description of the phased development of the facility (if applicable).
— Record of liaison.
— Record of site visits.
— Description of the local and potentially affected road network, including planning and comment on the road condition, where information is available.
— Description of latent developments in the vicinity of the facility that may also have an impact on the local road network, where information is available.
— Assessment of the required site access and parking requirements.
— Assessment of expected trip generation (operational phase).
— Capacity analysis of affected local intersections (operational phase only).
— Assessment of public transport and non-motorised transport requirements.
— Recommendations and conclusions with regards to the required transportation upgrades and/or mitigating measures.
2 FINDINGS OF THE SCOPING REPORT

The Scoping report identified various traffic related potential impacts on the study area of the IAIP and RTC. These are briefly discussed below.

2.1 AIR QUALITY

- Dust and vehicle tailpipe emissions caused by vehicle movements on the access roads and the internal roads on each site during the construction and operational phases.
- Air quality may be affected due to these activities, and may impact the surrounding residential receptors.
- The Scoping report recommended an Air Quality Impact Assessment and GHG emissions monitoring and reporting studies should be undertaken in the ESIA Phase.
- The transport related air quality impacts will be assessed in the Air Quality Assessment and GHG Emissions assessment, and was therefore not assessed further in this study.

2.2 NOISE

- Noise levels are expected to increase due to increased vehicle movements on the access roads and the internal roads on each site during the construction and operational phases.
- Increased noise emissions may impact the surrounding noise sensitive receptors.
- The Scoping report recommended a Noise Impact Assessment should be undertaken in the ESIA Phase.
- The transport related noise impact will be assessed in the Noise Impact Assessment, and was therefore not assessed further in this study.

2.3 TRAFFIC

- The expected produce through-put and related vehicle volumes for deliveries and distribution to and from the IAIP and the RTC is not known. However, the interaction between community members using these routes with the increased Project traffic from the construction phase onwards, may increase the risk of traffic accidents.
- A breakdown of potential construction phase and operational phase traffic related impacts and ratings are provided in Table 2-1.

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>PROBABILITY</th>
<th>CONSEQUENCE</th>
<th>RISK LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased vehicle volumes on the local roads may impact on the safety of the community in the area, especially vulnerable non-motorised transport users (pedestrians, cyclists, etc.) (construction)</td>
<td>3</td>
<td>2</td>
<td>Medium</td>
</tr>
<tr>
<td>Increased vehicle volumes on the local roads may impact on the safety of the community in the area, especially vulnerable non-motorised transport users (pedestrians, cyclists, etc.) (operational)</td>
<td>4</td>
<td>3</td>
<td>High</td>
</tr>
</tbody>
</table>
— The Scoping report recommended that a Traffic Study should be undertaken in the ESIA Phase.
— It is recommended that investigations are made into the existing weekday traffic volumes on the access road to the IAIP and the local roads in the vicinity of the developments. The estimated vehicle volumes are to take cognisance of the produce deliveries and distribution, as well as staff trips to and from the facilities.

The ESIA listed the following requirements for the TIA:
— Assess the volume of increased traffic that will result from the proposed IAIP and RTC sites.
— Whether the existing infrastructure will be able to handle the resultant volumes (i.e. whether design amendments to the federal highways need to be made to facilitate trucks accessing or departing the sites).
— Determine the possible impact the increased volumes will have on safety of the community in the area.
— Identification of mitigation measures in light of any significant negative impacts identified.
3 PROJECT DETAILS

3.1 TYPE & EXTENT OF THE DEVELOPMENTS

3.1.1 BURE IAIP

The proposed Bure IAIP falls under the jurisdiction of Bure Town as it is located approximately 4 km south east of the town in the South West Amhara Region. The site abuts the federal highway No. A3 which connects Addis Ababa and Bahir Dar which are approximately 400 km south and 150 km north respectively. The site is part of the industrial master plan of Bure, which renders the advantage of utilising the industrial infrastructure such as power, water, stormwater systems and road networks. The site is geographically located between 1182481.036 N to 1184267.076 N, and 288737.915 E to 292314.594 E (UTM Coordinates) in the West Gojjam Zone of South West Amhara.

The proposed Bure IAIP is a pilot facility with a site area of 260.56 hectares (ha) out of a total 1,000 ha of land that has been identified for potential use. Based on the success of the project the IAIP will be expanded within the remainder of the earmarked land. Note, this report only pertains to the assessment of the 260.56 ha pilot development. Future expansion of the IAIP will require separate environmental and social assessments to be undertaken. The growing area to be serviced by the IAIP is approximately 398,059 ha with the main farming activities in the area consisting of maize, sesame, potato, live animal (cattle, goat, sheep) dairy and meat, poultry and honey.

The predominant land uses on the site include farming (pastoral and crops) and residential activities. As per the land tenure of Ethiopia the land is owned by the government. The western and eastern portions of the site are utilised by the government for crops with the central portion being leased to private individuals for residential and farming purposes.

3.1.2 MOTTA RTC

The proposed Motta RTC site is located directly east of the town of Motta, 120 km south west of Bahir Dar, and 100 km west of the Bure IAIP. The proposed site falls under the jurisdiction of Motta town, in the Hulet Ej Enese Woreda which is located in the Misraq Gojam Zone of the South West Amhara Region. The proposed RTC is located in close proximity to the federal highway no. A3, that links Dejen with Bahir Dar. The site is geographically located between 1224437.024 N to 1224883.549 N and 378948.322 E to 379342.918 E (UTM coordinates), with an elevation of approximately 2,487 m above sea level.

3.2 PHASING OF THE DEVELOPMENT

The implementation planning of the facility is as follows:

- Commencement of construction: 2017
- Construction period: 24 months
- Commencement of operational phase: 2020
- Operational lifespan: long-term

3.3 APPROVAL OF SUBMISSIONS

This report will be subject to approval from the relevant roads authorities, and will be submitted as part of the ESIA process.
4 LIAISON & DATA COLLECTION

4.1 LIAISON

Refer to the full ESIA Report (Section 7), for the detailed Stakeholder Engagement activities.

4.2 SITE VISITS

Site visits were undertaken during August and September 2017 to assess the proposed site access, access roads and to undertake high-level traffic counts.

4.3 DATA SOURCES

The following project specific data sources were assessed:

- Preliminary Scoping Report for the proposed Amhara IAIP and RTC Environmental and Social impact Assessment, undertaken by WSP in June 2017.
- Mahindra Consulting Engineers, Amhara Design and Detailed Engineering Documents and Drawings, June 2017.
- Scoping Report for the proposed Bure IAIP and Motta RTC ESIA, undertaken by WSP, November 2017.

4.4 LATENT DEVELOPMENTS

There are no known large-scale latent developments in the vicinity of the sites, therefore no Cumulative Transport Impacts are expected on the local road networks.

- No structure plans were available for the study areas, except for a high-level plan of Bure Town.

4.5 ROAD NETWORK & MASTER PLANNING

There are no known new or additional local roads or federal highways planned in the vicinity of the sites or the study areas.
5 SITE LOCATION & SURROUNDING ROAD NETWORK

5.1 BURE IAIP

5.1.1 SITE LOCATION

The proposed Bure IAIP is located approximately 4 km south east of Bure in the South West Amhara Region. The site abuts the federal highway No. A3_5, Section 504/1, which connects Addis Ababa and Bahir Dar which are approximately 400 km south and 150 km north respectively. The site is geographically located between 1182481.036 N to 1184267.076 N, and 288737.915 E to 292314.594 E (UTM Coordinates) in the West Gojam Zone of South West Amhara.

Refer to Figure 5-1 for the locality of the development, Figure 5-2 for the proposed layout.

Figure 5-1 Bure IAIP site location

Source: GoogleMaps
Figure 5-2 Bure IAIP Layout

Source: Mahindra Consulting Engineers
5.1.2 ROAD NETWORK DESCRIPTION

The local road network primarily consist of Federal Highway No. A3_5, Section 504/1, which connects Addis Ababa and Bahir Dar which are approximately 400 km south and 150 km north respectively. The highway is a single carriageway surfaced road, with 1 lane per direction in the vicinity of the future access.

The road is suitable to provide vehicle access and connectivity to the development, pending the provision of a suitable local access that takes cognisance of vehicle and Non-motorised transport (NMT) safety. Refer to Figure 5-3 and Figure 5-4 for images of the Federal Highway No. A3_5 at the proposed IAIP access.

Important note, the condition of the road was not assessed, therefore sections of this or other access roads to the IAIP may currently be in a poor condition, dangerous or partially impassable, for example the roadway width is reduced. The additional traffic due to the IAIP could therefore increase the road safety risks and accident potential in these areas.

Figure 5-3: Photo showing the Federal Highway No. A3_5 at the proposed IAIP entrance (south direction).

![Photo showing the Federal Highway No. A3_5 at the proposed IAIP entrance (south direction).](image1)

Source: ESIA team site investigations

Figure 5-4: Photo showing the Federal Highway No. A3_5 at the proposed IAIP entrance (north direction).

![Photo showing the Federal Highway No. A3_5 at the proposed IAIP entrance (north direction).](image2)
5.2 MOTTA RTC

5.2.1 SITE LOCATION

The proposed Motta RTC site is located directly adjacent and to the east of the town of Motta, 120 km south west of Bahir Dar, and 100 km west of the Bure IAIP. The proposed RTC is located in close proximity to the federal highway no. B_31, which links Dejen with Bahir Dar. The site is geographically located between 1224437.024 N to 1224883.549 N and 378948.322 E to 379342.918 E (UTM coordinates), with an elevation of approximately 2,487 m above sea level.

Refer to Figure 5-5 for the locality of the development and Figure 5-6 for the proposed internal layout.

Figure 5-5  Motta RTC site location

Source: GoogleMaps

Figure 5-6  Motta RTC Layout

Source: GoogleMaps
5.2.2 ROAD NETWORK DESCRIPTION

The proposed RTC is located close to federal highway no. B_31. Entrance to the RTC is to be obtained from the south-west corner of the site via a secondary road leading off the highway, and will exit the RTC at the south-east corner. Two additional entry and exit points are identified for future expansion along the northern boundary of the site.

The highway is suitable to provide vehicle access and connectivity to the development, pending the provision of a suitable and safe direct access off the highway and an upgraded access road. The access locations off the highway must take cognisance of vehicle and Non-motorised transport (NMT) safety. Note that NMT movement are very prevalent along the access road, with developments directly adjacent to it. Access must be maintained to these properties, refer to Figure 5-7 for an image of the current access road to the highway. Figure 5-8 shows the existing federal highway no. B_31 at the RTC site.

Important note, the condition of the highway was not assessed, therefore sections of this or other access roads to the RTC may currently be in a poor condition, dangerous or partially impassable, for example the roadway width is reduced. The additional traffic due to the RTC could therefore increase the road safety risks and accident potential in these areas.
Figure 5-7  
Image of current access road

Source: ESIA team site investigations

Figure 5-8  
Image federal highway no.B_31

Source: ESIA team site investigations
6 GENERAL TRAFFIC INFORMATION

6.1 DEVELOPMENT ACCESS

The vehicle accesses to the IAIP and the RTC must be designed to the relevant National standards, namely the Ethiopia Road Authority design standards. Also refer to Section 8.2.

6.2 PARKING PROVISION

All parking provision will be provided on-site, and parking on individual erven will be subject to the Development Control Regulations of the sites. The parking provision will be in-line with the zoning of each internal erf of the IAIP and RTC.

6.3 PUBLIC & NON-MOTORISED TRANSPORT ASSESSMENT

6.3.1 BURE IAIP

The town of Bure is located near the site, therefore public transport may not be required to transport workers to the site. Small scale services like minibuses may however be required to transport workers from further afield. The type and extent of the services cannot be assess at this stage, and may have to be provided in incremental stage as the number of workers on-site increases.

— A suitable public transport stop should be provided on-site, to ensure safety of passengers waiting for transport.
— Due to the location of the site close to a residential area (town), non-motorised transport may be present along the federal highway.
— An additional NMT access should be provided off the roundabout located on the north-western edge of the site. This will allow a shorter and more direct access to the site from the town, and will also decrease NMT and public transport movements along the federal highway to the main access. See Figure 6-1 for the proposed location of the NMT access, and also refer to Section 8.2. Also refer to Section 7.4 with regards to an additional vehicle access.

6.3.2 MOTTA RTC

The town of Motta Bure is located directly adjacent to the RTC, therefore public transport may not be required to transport workers to the site. Small scale services like minibuses may however transport workers. The type and extent of the services cannot be assessed at this stage, and may have to be provided in incremental stage as the number of workers on-site increases.

— A suitable public transport stop should be provided on-site, to ensure safety of passengers waiting for transport.
— Due to the location of the site directly adjacent to the town, non-motorised transport may be present along the access road and federal highway. Refer to Section 8.2.
— It is recommended that NMT facilities (sidewalks) be provided along the access road between the RTC and the federal highway.
Figure 6-1  Proposed additional vehicle and NMT access
7 TRAFFIC FLOWS & TRIP GENERATION

7.1 EXISTING TRAFFIC FLOWS

Sample traffic counts were undertaken by Mahindra along Federal Highway No. A3 near the proposed IAIP access. The traffic flow was approximately 632 veh/hr, of which 478 veh/hr was local traffic (three wheel rickshaw taxis that travel back and forth along the highway). The remaining 144 veh/hr was other traffic.

Traffic counts are not available for Federal Highway No. B_31 close to the RTC.

7.2 LATENT TRAFFIC

There are no known large-scale latent development in the vicinity of the sites that will generate additional traffic in future. Also refer to Section 4.4.

7.3 DEVELOPMENT TRAFFIC GENERATION

Mahindra calculated the expected trip generation of the site to determine the pavement structure requirements for the design life of the facilities. The method to calculate the Average Annual Daily Traffic (AADT) was as per the Ethiopian Roads Authority Manual for agri-processing and non-agri processing areas.

BURE IAIP – 5,864 AADT (VEH/DAY) FOR THE FULLY DEVELOPED SITE

- Approximately 5,891 vehicles In + Out at the access.
- During an 8-hour work day, and allowing an additional 2 hours for arrival and departure, the average vehicle volume is approximately 587 veh (In + Out) per hour. This is a high volume, and capacity issues are expected.
- The workday AM and PM peak hour vehicle volumes were estimated as 30% per peak of the AADT. The AM and PM peak volumes will therefore be approximately 1,759 veh/hr (In + Out) at the access. This is a high volume, and capacity issues are expected.
- Note that the traffic generation estimates seems excessive for the type and extent of the development due to the following reasons:
  - Land-uses such as raw material storage is not expected to attract large numbers of workers.
  - The estimates equal 25,796 persons on-site daily.
  - No provision is made for NMT trips to the site for workers or shoppers. The proximity of the IAIP to the town should generate a percentage of NMT users. All trips are stated as vehicle trips (buses, cars, etc).

Mahindra has subsequently stated that they confirm their trip generation calculations.

MOTTA RTC – 126 VEH/DAY FOR THE FULLY DEVELOPED SITE

- Approximately 126 vehicles In + Out per day at the access.
- This is a very low volume, and no traffic safety or capacity issues are expected.
### 7.4 CAPACITY ANALYSIS

**BURE IAIP**

A capacity analysis of the access intersection is necessary due to the expected high peak hour volumes to and from the site and moderate volumes along the federal highway.

It is recommended that due to the high traffic volumes at the IAIP access, the typical access configuration should be as follows, refer to Figure 7-1. The additional turning lanes on the access road to the site will improve the operation and safety of the intersection. Note, the configuration must be approved by the roads authority.

If the full trip generation is considered, this intersection configuration will not provide sufficient capacity. The provision of a large scale intersection, signalisation or grade separation may not be feasible. It is therefore recommended that a second vehicle and pedestrian access be provided to the IAIP via the adjacent road network to the north-west of the site. Refer to Figure 6-1.

**Figure 7-1** Proposed typical IAIP main access configuration

**MOTTA RTC**

A capacity analysis of the access road intersection with the Federal Highway is not necessary due to the low peak hour trip generation.
8 TRAFFIC IMPACT ASSESSMENT

8.1 IMPACT DESCRIPTION AND DEFINITION

8.1.1 IMPACT DEFINITION

Environmental impacts from planned and non-planned activities during all phases of the Project are assessed on the basis of detailed knowledge and industry experience of these activities. For the purpose of this ESIA an environmental or socio-economic impact is defined as:

“Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation’s activities or services.” (ISO 14001)

Prediction of impacts is an objective exercise to determine what is likely to happen to the environment as a consequence of the Project and its associated activities. From the potentially significant interactions identified in scoping, the impacts to the various resources/receptors are elaborated and evaluated. The diverse range of potential impacts considered in the impact assessment process typically results in a wide range of prediction methods being used, including quantitative and semi-quantitative techniques, for example noise impacts on sensitive surrounding community receptors, and qualitative techniques for assessing certain socio-economic impacts on communities.

8.1.2 DESCRIPTION OF IMPACTS

Environmental impacts arise as a result of Project activities either interacting with environmental or social receptors directly, or causing changes to the existing environment such that an indirect effect occurs.

Environmental and social impacts from a planned event are those resulting from the routine and intended construction or operations/activities associated with the IAIP and RTC facilities (e.g. regular truck movements to and from the facilities transferring produce to market). Environmental and social impacts from unplanned events occur as a result of incidents or ‘upset conditions’. Typical examples of impacts occurring from unplanned events include (but are not limited to) spills, leaks, odours and fires.

8.1.3 NATURE OF IMPACT

The nature of an impact is defined as the type of change from baseline conditions. The nature of an impact is described as being either positive (+ve) or negative (-ve).

8.1.4 TYPE OF IMPACT

Impact type indicates the relationship of the impact to the Project activity in terms of cause and effect, as either:

- **Direct impact** resulting from the direct interaction between a project activity and the receiving environment; or
- **Indirect impact** which include secondary or induced impacts caused by a change in the Project environment (e.g. employment opportunities created by the supply chain requirements); or
- **Cumulative impact**, where a Project impact acts together with other impacts (including those from concurrent or planned future third party activities) to affect the same resources and/or receptors as the Project.
8.1.5 SCALE OF IMPACT

Impact extent relates to the geographic reach of the impact and is described as:

- **Local impact** would affect local resources or receptors and would be restricted to a single community (i.e. impacts in the footprint of Project activities and the immediate adjacent area);
- **Regional impact** would affect regional resources or receptors and would be experienced at a regional scale;
- **Trans-boundary impact** would be those that are experienced in one country as a result of activities in another.

8.1.6 DURATION OF IMPACT

Impact duration refers to the time period over which a resource or receptor will be affected, and includes:

- **Temporary** impacts would be of a very short duration, are reversible and intermittent or occasional in nature. The resource or receptor would return to the previous state when the effect ceases or after a short period of recovery;
- **Short-term** impacts would last for a short duration (2 to 5 years) and are usually limited to the construction period. The impact would cease when the effect ceases following a short period of recovery;
- **Medium-term** impacts would last for over five years but less than fifteen years (5 to 15 years). The impact would cease following rehabilitation and a period of recovery;
- **Long-term** impacts would continue for an extended period of time (e.g. beyond 15 years), or cause a more permanent change in the affected receptor or resource that endures substantially beyond the Project lifetime.

8.1.7 PROBABILITY

The **probability** of an event occurring and creating an impact on a given receptor is designated using a qualitative scale from 1 to 4, the higher values being more probable that an impact will occur, see Table 8-1 below.

**Table 8-1**  Probability rating of impact

<table>
<thead>
<tr>
<th>RATING SCALE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unlikely - very improbable, never heard of in the industry, or an event with a short duration (probably will not happen).</td>
</tr>
<tr>
<td>2</td>
<td>Low probability - incident has occurred in the industry and so therefore could occur, or an event lasting up to a day (some possibility, but low likelihood).</td>
</tr>
<tr>
<td>3</td>
<td>Medium Probability - incident has (or is) expected to occur during the project or is very likely to, or an event which may occur up to 1 month (distinct possibility).</td>
</tr>
<tr>
<td>4</td>
<td>High probability - incident is expected to happen frequently a year or is almost certain to happen, or an event which is expected to occur multiple times (most likely).</td>
</tr>
</tbody>
</table>

8.1.8 SEVERITY

The severity of an impact, on a given receptor is designated using a rating scale from 1 to 4 and defined in **Table 8-2** (Environmental Severity) and Table 8-3 (Socio-economic Severity) below, the high values denoting a more severe impact.

**Table 8-2**  Definitions of Severity used in the ESIA for Environmental Receptors
<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>ENVIRONMENTAL RECEPTORS – PHYSICAL AND BIOLOGICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Negative</strong></td>
</tr>
<tr>
<td>4 - High</td>
<td>Major, long term national, international or</td>
</tr>
<tr>
<td></td>
<td>transboundary effects.</td>
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<tr>
<td></td>
<td>Deterioration/improvements of the existing</td>
</tr>
<tr>
<td></td>
<td>habitat or ecosystem baseline conditions is</td>
</tr>
<tr>
<td></td>
<td>significant.</td>
</tr>
<tr>
<td></td>
<td>Rehabilitation is required or the baseline will</td>
</tr>
<tr>
<td></td>
<td>not recover.</td>
</tr>
<tr>
<td></td>
<td>Results in changes / reduction in the</td>
</tr>
<tr>
<td></td>
<td>abundance and biodiversity of populations which</td>
</tr>
<tr>
<td></td>
<td>may or may not recover.</td>
</tr>
<tr>
<td></td>
<td>Such impacts are a major non-compliance with</td>
</tr>
<tr>
<td></td>
<td>national and international regulatory standards</td>
</tr>
<tr>
<td></td>
<td>and may result in immediate intervention by</td>
</tr>
<tr>
<td></td>
<td>governmental bodies and stakeholders.</td>
</tr>
<tr>
<td>3 - Medium</td>
<td>Moderate, medium term deterioration / impact</td>
</tr>
<tr>
<td></td>
<td>on the ecosystem on a local / national level,</td>
</tr>
<tr>
<td></td>
<td>leading to observable and measurable changes.</td>
</tr>
<tr>
<td></td>
<td>Moderate deterioration / improvements and</td>
</tr>
<tr>
<td></td>
<td>changes / reduction in the abundance and</td>
</tr>
<tr>
<td></td>
<td>biodiversity of the area with moderate recovery</td>
</tr>
<tr>
<td></td>
<td>periods to baseline conditions.</td>
</tr>
<tr>
<td></td>
<td>Non-conformance with national and international</td>
</tr>
<tr>
<td></td>
<td>regulatory standards which may result in the</td>
</tr>
<tr>
<td></td>
<td>intervention by governmental bodies and</td>
</tr>
<tr>
<td></td>
<td>stakeholders.</td>
</tr>
<tr>
<td>2 - Low</td>
<td>An effect will be experienced but they will be</td>
</tr>
<tr>
<td></td>
<td>minor, short term and local, leading to</td>
</tr>
<tr>
<td></td>
<td>observable and measurable changes recoverable</td>
</tr>
<tr>
<td></td>
<td>within short durations.</td>
</tr>
<tr>
<td></td>
<td>Potential non-conformance with regulatory</td>
</tr>
<tr>
<td></td>
<td>standards. Unlikely to result in concerns being</td>
</tr>
<tr>
<td></td>
<td>raised by governmental bodies or stakeholders.</td>
</tr>
<tr>
<td></td>
<td>Minor deterioration of ambient environmental</td>
</tr>
<tr>
<td></td>
<td>conditions and recovery requires little or no</td>
</tr>
<tr>
<td>1 - Very Low</td>
<td>Deemed ‘imperceptible’ or indistinguishable</td>
</tr>
<tr>
<td></td>
<td>from natural background conditions.</td>
</tr>
</tbody>
</table>
### Definitions of Severity used in the ESIA for Socio-Economic Receptors

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>SOCIO ECONOMIC RECEPTORS</th>
<th>NEGATIVE</th>
<th>POSITIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - High</td>
<td>Highly significant, loss or major damage with medium to long term effect on cultural and/or natural resources of national and regional importance which are essential for communities' livelihood.</td>
<td>Highly significant negative impacts on the national and international community (regional, i.e. neighbouring countries). Those affected will be able to adapt to changes with some difficulty/ease, and will only be able to maintain pre-impact livelihoods with a degree of support.</td>
<td>Retention of all cultural and heritage resources of value on site. Highly significant positive impacts on the national and international community (regional, i.e. neighbouring countries). Those affected will be able to adapt to changes with some difficulty/ease, and will only be able to maintain pre-impact livelihoods with a degree of support.</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>Immediate intervention by governmental bodies requiring rapid implementation of response measures. National and International media and community concerns and ongoing long term complaints.</td>
<td>Project meeting and exceeding Government policies and plans. National and International media and community support.</td>
</tr>
<tr>
<td>3 - Medium</td>
<td>Moderate damage to archaeological, cultural or key natural resources of local or national importance. Moderate negative impacts on the regional or national population. Vulnerable groups significantly affected. Changes affecting livelihoods, amenity values, convenience and quality of life of study population. National and potentially international media and community concerns and ongoing long term complaints.</td>
<td>Retention of cultural heritage resources (of value) where possible and appropriate recording of resources that cannot be retained. Moderate positive impacts on the regional or national population. Vulnerable groups significantly affected. Changes affecting livelihoods, amenity values, convenience and quality of life of study population; National media and community support.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>An effect will be experienced but they will be Minor, short term effects recoverable within short durations. Unlikely to result in concerns being raised by governmental bodies or stakeholders. Measurable negative impacts that are intermittent or effect a small minority of the local population and / or vulnerable groups. May result in concerns from local communities.</td>
<td>An effect will be experienced but they will be Minor, short term effects of short durations. Meets governmental and stakeholder requirements. Measurable positive impacts that are intermittent or effect a small minority of the local population and / or vulnerable groups.</td>
</tr>
<tr>
<td>1 - Very Low</td>
<td>Deemed ‘imperceptible’ or indistinguishable from natural background conditions. No public interest.</td>
<td></td>
<td>Deemed ‘imperceptible’ or indistinguishable to current social norms and variations. No public interest.</td>
</tr>
</tbody>
</table>

#### 8.1.9 EVALUATION OF SIGNIFICANCE OF IMPACT

Based on the above methodology, the impacts resulting from the project are classified within this ESIA as either positive or negative with a specific severity rating.
All environmental and social impacts have been identified based on the information summarised in this ESIA and their significance is assessed and classified by combining the probability and severity scores as shown in Table 8-4, which relates to negative impacts, or Table 8-5 which relates to positive impacts below.

In assessing whether an impact is significant, reference has been made, where appropriate, to criteria on which the evaluation is based. These may include legislative requirements, policy guidance or accepted practice and past experience.

### Table 8-4  Significance Matrix Negative Impacts

<table>
<thead>
<tr>
<th>SIGNIFICANCE</th>
<th>PROBABILITY RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very low</td>
</tr>
<tr>
<td>Very low</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>

### Table 8-5  Significance Matrix Positive Impacts

<table>
<thead>
<tr>
<th>SIGNIFICANCE</th>
<th>PROBABILITY RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very low</td>
</tr>
<tr>
<td>Very low</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>

### 8.1.10 CATEGORIES OF IMPACT SIGNIFICANCE

The different significance categories reflected by the colour scheme used in the above matrix and within this ESIA reflect the following:

- **Negligible** - no additional action is required and the impact is already reduced to as low as reasonably practicable (ALARP);
- **Minor** - where the level of risk is broadly acceptable and generic control measures are already assumed in a design process but, where appropriate, require continuous improvement.
• **Moderate** - where the level of risk is tolerable but control measures are required to reduce the risk as far as is practicable (i.e. tolerable if as low as reasonably practicable (ALARP)).

• **Major** - changes to the project are required which requires a re-assessment of applicable mitigation and/or reconsideration of alternatives and options by the project design team.

### 8.2 TRAFFIC IMPACT ASSESSMENT PER FACILITY

The scoping report identified the following construction and operational phase traffic impacts:

— The expected produce throughput and related vehicle volumes for deliveries and distribution to and from the IAIP and the RTC is not known. However, the interaction between community members using these routes with the increased Project traffic from the construction phase onwards, may increase the risk of traffic accidents.

#### 8.2.1 BURE IAIP

A breakdown of the construction, operational and decommissioning phase traffic related impacts and ratings are provided in Table 8-6.

<table>
<thead>
<tr>
<th>IMPACT DESCRIPTION</th>
<th>WITHOUT MITIGATION</th>
<th>WITH MITIGATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Probability</td>
<td>Severity</td>
</tr>
<tr>
<td>Construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased vehicle/vehicle &amp; vehicle/NMT accident risks on the local road network</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased vehicle/vehicle &amp; vehicle/NMT accident risks on the local road network</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Decommissioning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased vehicle/vehicle &amp; vehicle/NMT accident risks on the local road network</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

**MITIGATION MEASURES - CONSTRUCTION**

It is not possible to determine the construction traffic volumes or types at this stage. However, it should be noted that the volumes are expected to be less than the operational phase, and that the impact will be for a shorter period, namely the construction phase of 2 years.

It is recommended that due to the higher traffic volumes to and from the IAIP during operation, and the single access, that the access configuration should include the following, also refer to Figure 7-1:

— Access with 2 lanes In and 2 lanes Out.
— Main road with short (80 m) right-turn In lane
— Main road with short (80 m) left-turn In lane
— Additional road signage & markings along the main road at all the accesses
— Street lighting along the main road along the full length of the property frontage
The additional turning lanes on the main will improve the operation and safety of the intersection. Note, the configuration must be approved by the roads authority.

It is recommended that a second vehicle and pedestrian access be provided to the IAIP via the adjacent road network to the north-west of the site.

These upgrades should be implemented for the construction phase to ensure safe access to all construction vehicles, and the future operation phase traffic.

**MITIGATION MEASURES - OPERATION**

The mitigation measures (intersection upgrades, etc.) will be in place from the Construction phase. It is also recommended that the trip generation of the IAIP be monitored annually during the operational phase to ensure that the access intersections operate safely and with sufficient capacity and acceptable levels of service. Note that through traffic on the access road must also not be obstructed. If the intersection performance deteriorates to unacceptable levels in future, additional intersection upgrades should be implemented.

**MITIGATION MEASURES - DECOMMISSIONING**

None – the mitigation measures (intersection upgrades, etc.) will be in place from the Construction and Operation phase.

### 8.2.2 MOTTA RTC

The very low traffic volumes to and from the RTC does not justify additional turning lanes at the access intersections, therefore no intersection upgrades are recommended.

**MITIGATION MEASURES – CONSTRUCTION, OPERATION & DECOMMISSIONING**

The required road signs, road markings and street lighting should be implemented at the accesses to ensure good intersection operation and safety.

It is also recommended that the trip generation of the RTC be monitored annually to ensure that the access intersections operate safely and with sufficient capacity and acceptable levels of service. Note that through traffic on the access road must also not be obstructed. If the intersection performance deteriorates to unacceptable levels in future, additional intersection upgrades should be implemented.
9 CONCLUSIONS & RECOMMENDATIONS

Based on this report, the following key conclusions are relevant:

— The proposed Bure IAIP and Motta RTC will have traffic and safety impacts on the local road networks and residents within in each study area.

— The condition of the main roads to the IAIP and RTC was not assessed, therefore sections of this or other access roads may be in a poor condition, dangerous or partially impassable, for example the roadway width is reduced. The additional traffic due to the IAIP and RTC could therefore increase the road safety risks and accident potential along these sections outside the study area.

— There are no known large-scale latent developments in the vicinity of this development, therefore no Cumulative Transport Impacts are expected on the local road network.

— All parking provision will be provided on-site, and parking on individual erven will be subject to the Development Control Regulations of the sites. The parking provision will be in-line with the zoning of each internal erf of the IAIP and RTC.

— Bure IAIP - There are residential areas in the vicinity of the IAIP. Public transport may still be required due to the large number of workers that will be employed on the IAIP. The type and extent of the services cannot be assess at this stage, and may have to be provided in incremental stage as the number of workers on-site increases.
  o A suitable public transport stop should be provided on-site, to ensure safety of passengers waiting for transport.
  o Due to the location of the site, non-motorised transport will be present along the federal highway to the site.
  o An additional NMT access should be provided off the roundabout located on the north-western edge of the site. This will allow a shorter and more direct access to the site from the town, and will also decrease NMT and public transport movements along the federal highway to the main access. See Figure 6-1 for the proposed location of the NMT access, and also refer to Section 8.2.

— Motta RTC – Located directly adjacent to residential areas of the town of Motta. Public transport may therefore not be required to transport workers to the site.
  o A suitable public transport stop should be provided on-site, to ensure safety of passengers waiting for transport.
  o Due to the location of the site directly adjacent to the town, non-motorised transport is present along the access road and federal highway.
  o It is recommended that NMT facilities (sidewalks) be provided along the access road between the RTC and the federal highway.

— Construction phase traffic at the IAIP and RTC was not assessed, as the vehicle volumes cannot be determined. The impact will also only be short-term (2 years).

— Operational phase traffic impacts:
  o **Bure IAIP** - It is recommended that due to the higher traffic volumes to and from the IAIP and the single vehicle access, that the configuration of the access should have multiple lanes and turning lanes on the main. This will assist to improve safety and operation of the access. The required road signs, road markings and street lighting should also be implemented at the access.
  o It is recommended that the trip generation of the IAIP be monitored annually to ensure that the access intersections operate safely and with sufficient capacity and acceptable levels of service. Note that through traffic on the access road must also not be obstructed. If the intersection performance deteriorates to unacceptable levels in future, additional intersection upgrades should be implemented.
o It is recommended that a second vehicle and pedestrian access be provided to the IAIP via the adjacent road network to the north-west of the site.

o **Motta RTC** - The very low traffic volumes to and from the RTC does not justify additional turning lanes at the access intersections, and no intersection upgrades are recommended. Mitigation measures in the form of the required road signs, road markings and street lighting should be implemented at the accesses to ensure good intersection operation and safety.

o It is recommended that the trip generation of the RTC be monitored annually to ensure that the access intersections operate safely and with sufficient capacity and acceptable levels of service. Note that through traffic on the access road must also not be obstructed. If the intersection performance deteriorates to unacceptable levels in future, additional intersection upgrades should be implemented.
10 BIBLIOGRAPHY

- WSP, Preliminary Scoping Report for the proposed Amhara IAIP and RTC Environmental and Social impact Assessment, June 2017.
- Ethiopian Roads Authority: www.era.gov.et
APPENDIX

A

IMPACT SIGNIFICANCE MATRIX
## APPENDIX

### IMPACT SIGNIFICANCE MATRIX

#### CONSTRUCTION

<table>
<thead>
<tr>
<th>Impact number</th>
<th>Receptor</th>
<th>Description</th>
<th>Stage</th>
<th>Character</th>
<th>Ease of Mitigation</th>
<th>Pre-Mitigation</th>
<th>Mitigation Measure</th>
<th>Post-Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact 1:</td>
<td>Local road network</td>
<td>Increased vehicle/vehicle &amp; vehicle/NMT accident risks</td>
<td>Construction</td>
<td>Negative</td>
<td>Low</td>
<td>Probability: 2</td>
<td>Severity: 2</td>
<td>Significance: 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Impact number</th>
<th>Receptor</th>
<th>Description</th>
<th>Stage</th>
<th>Character</th>
<th>Ease of Mitigation</th>
<th>Pre-Mitigation</th>
<th>Mitigation Measure</th>
<th>Post-Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact 1:</td>
<td>Local road network</td>
<td>Increased vehicle/vehicle &amp; vehicle/NMT accident risks</td>
<td>Operational</td>
<td>Negative</td>
<td>Low</td>
<td>Probability: 2</td>
<td>Severity: 3</td>
<td>Significance: 6</td>
</tr>
</tbody>
</table>

Mitigation: Upgraded primary access intersection geometry, road signage & markings and street lighting

#### OPERATION

<table>
<thead>
<tr>
<th>Impact number</th>
<th>Receptor</th>
<th>Description</th>
<th>Stage</th>
<th>Character</th>
<th>Ease of Mitigation</th>
<th>Pre-Mitigation</th>
<th>Mitigation Measure</th>
<th>Post-Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact 1:</td>
<td>Local road network</td>
<td>Increased vehicle/vehicle &amp; vehicle/NMT accident risks</td>
<td>Operational</td>
<td>Negative</td>
<td>Low</td>
<td>Probability: 2</td>
<td>Severity: 3</td>
<td>Significance: 6</td>
</tr>
</tbody>
</table>

Mitigation: Mitigation in-place from construction phase: Upgraded primary access intersection geometry, road signage & markings and street lighting

#### DECOMMISSIONING

<table>
<thead>
<tr>
<th>Impact number</th>
<th>Receptor</th>
<th>Description</th>
<th>Stage</th>
<th>Character</th>
<th>Ease of Mitigation</th>
<th>Pre-Mitigation</th>
<th>Mitigation Measure</th>
<th>Post-Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact 1:</td>
<td>Local road network</td>
<td>Increased vehicle/vehicle &amp; vehicle/NMT accident risks</td>
<td>Construction</td>
<td>Negative</td>
<td>Moderate</td>
<td>Probability: 2</td>
<td>Severity: 2</td>
<td>Significance: 4</td>
</tr>
</tbody>
</table>

Mitigation: Mitigation in-place from construction/operation phase

<table>
<thead>
<tr>
<th>Impact number</th>
<th>Receptor</th>
<th>Description</th>
<th>Stage</th>
<th>Character</th>
<th>Ease of Mitigation</th>
<th>Pre-Mitigation</th>
<th>Mitigation Measure</th>
<th>Post-Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact 1:</td>
<td>Local road network</td>
<td>Increased vehicle/vehicle &amp; vehicle/NMT accident risks</td>
<td>Construction</td>
<td>Negative</td>
<td>Moderate</td>
<td>Probability: 2</td>
<td>Severity: 3</td>
<td>Significance: 6</td>
</tr>
</tbody>
</table>

Mitigation: Mitigation in-place from construction phase: Upgraded primary access intersection geometry, road signage & markings and street lighting