Tasiast Mauritania Limited SA
Tasiast Gold Mine Expansion Project

*Phase 1a(ii): Supporting Infrastructure:* Construction Camp, Offices, Warehouses and Fuel Farm

Environmental Impact Notice

Final
3 June 2011
Revision Schedule

Environmental Impact Notice

Phase 1a(ii): Mine Site

14 June 2011

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<th>Details</th>
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<th>Reviewed by</th>
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The methodology adopted and the sources of information used by URS Scott Wilson in providing its services are outlined in this Report. The work described in this Report was undertaken between February 2011 and June 2011 and is based on the conditions encountered and the information available during the said period of time. The scope of this Report and the services are accordingly factually limited by these circumstances.

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<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AD</td>
<td>Anno Domini</td>
</tr>
<tr>
<td>BP</td>
<td>Before present</td>
</tr>
<tr>
<td>CIL</td>
<td>Carbon-in-Leach</td>
</tr>
<tr>
<td>CNRE</td>
<td>Centre National des Ressources en Eau</td>
</tr>
<tr>
<td>EHS</td>
<td>Environmental, Health, and Safety</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>EIN</td>
<td>Environmental Impact Notice</td>
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<tr>
<td>EMS</td>
<td>Environmental Management System</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GNI</td>
<td>Gross National Income</td>
</tr>
<tr>
<td>HFO</td>
<td>Heavy Fuel Oil</td>
</tr>
<tr>
<td>IFC</td>
<td>International Finance Corporation</td>
</tr>
<tr>
<td>IMRS</td>
<td>Institut Mauritanien de Recherches Scientifiques</td>
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<tr>
<td>IUCN</td>
<td>International Union for Conservation of Nature</td>
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<tr>
<td>MLA</td>
<td>Mining License Area</td>
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<tr>
<td>MESD</td>
<td>Delegated Ministry of Environment and Sustainable Development (Ministère Délégué auprès du Premier Ministre chargé de l’Environnement et du Développement Durable)</td>
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<td>MPEM</td>
<td>Ministry of Petroleum, Energy and Mines (Ministère de l’Énergie et des Mines)</td>
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<tr>
<td>MWS</td>
<td>Ministry of Water and Sanitation (Ministère de l’Hydraulique et de l’Assainissement)</td>
</tr>
<tr>
<td>MW</td>
<td>Mega Watt</td>
</tr>
<tr>
<td>OHS</td>
<td>Occupational Health and Safety</td>
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<tr>
<td>PCDP</td>
<td>Public Consultation and Disclosure Plan</td>
</tr>
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<td>PNBA</td>
<td>Parc National Banc D’Arguin</td>
</tr>
<tr>
<td>Ppm</td>
<td>Parts per million</td>
</tr>
<tr>
<td>RO</td>
<td>Reverse Osmosis</td>
</tr>
<tr>
<td>Tpd</td>
<td>Tonnes per day</td>
</tr>
<tr>
<td>ToR</td>
<td>Terms of Reference</td>
</tr>
<tr>
<td>TMLSA</td>
<td>Tasiast Mauritanie Limited SA</td>
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<tr>
<td>TSF</td>
<td>Tailings Storage Facility</td>
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<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
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1 Introduction

1.1 Background

The Tasiast Gold Mine (the Mine) is an existing gold mine, situated in the Inchiri Wilaya of north western Mauritania. Operations at the Mine commenced in July 2007, initially under the ownership of Rio Narcea Gold Mines and subsequently, following acquisition, under Red Back Mining Inc. On commissioning, the Mine had a predicted life of ten years, at a nominal milling rate of 3,200 tpd. Tasiast Mauritanie Limited SA (TMLSA) is the operator of the Mine.

Kinross Gold Corporation (Kinross) completed the acquisition of the Mine on September 17, 2010, as part of its combination with Red Back Mining Inc.

The Mine currently operates at a nominal milling rate of 9,000 tpd and is undertaking expansion and development activities as permitted under previous assessments (SNC Lavalin 2004, Scott Wilson, 2008a, b, c, d and 2009a, b, 2010 a). However, as a result of identifying additional gold resources through ongoing exploration within the mining licence area (MLA), TMLSA plans to expand the Mine’s operations through an Expansion Project (the Project). Refer to Figure 1 for site location.

1.2 The Project

TMLSA has completed a mine scoping study for the Project. The Project is based on a 16 year mine plan (following a three year construction period) and there is potential to further extend the mine life. Construction of the proposed infrastructure and ancillary facilities will be phased over this three year period. During this time current mining operations will continue, and the Project is expected to be fully commissioned by early 2014.

The Project proposes to expand operations at the Mine to a nominal milling rate of approximately 70,000 tpd to 80,000 tpd. To achieve this, there will be an expanded open pit, a new mill, new Carbon-in-Leach (CIL) process plant, new Tailings Storage Facility (TSF) (comprising three cells) and new waste rock dumps.

Project power demands, for both construction and operations, will be supplied through additional new power plants and a new fuel farm. An initial new power plant will be installed followed by a second, larger power plant. Existing diesel power facilities at the borefield and intermediate pump station will be expanded. In addition, a separate power plant will be developed to supply power for the proposed sea water extraction and supply system.

Increased water demands will be required for both the Projects construction and expanded operations. It is proposed that the increased water demand for construction will be met through the temporary (approximately four years) expansion of the existing borefield. To support this temporary expansion it is proposed that additional wells are developed within and adjacent to the existing borefield and a new water supply pipeline be constructed. To meet the Projects operational water demands it is proposed that a sea water extraction and supply system is developed. In addition new water treatment facilities and water storage ponds will be developed on the existing Mine site.

To improve accessibility to the Mine, it is proposed to both upgrade the existing 60 km access road and to develop a new airstrip. There will also be development of new ancillary facilities such as, but not limited to, maintenance workshops, sewage and waste management facilities, new accommodation camps, new offices and new warehouse facilities.
Kinross has commissioned URS/Scott Wilson to undertake the Environmental Impact Assessment (EIA) requirements for the Project.

1.3 Approach to Permitting

In order to achieve Project commissioning by early 2014, it is necessary to phase the construction works and commence some early preparatory works in 2011. The overall Project has therefore been divided into three phases, based on the type of works to be carried out (components), construction timing, geographical location, permitting and EIA requirements. Each phase will be subject to EIA processes and any cumulative impacts will be assessed and mitigation actions will be incorporated into and implemented via the Mine’s existing Environmental Management System (EMS) (Scott Wilson, 2010b).

A series of meetings with the Ministry of Petroleum, Energy and Mines (MPEM), the Ministry of Environment and Sustainable Development (MESD) and the Ministry of Water and Sanitation (MWS) have been held to present and discuss the proposed Project phasing. An initial meeting was held on 13 January 2011 and a subsequent meeting was held on 17 March 2011. On 24 March 2011, a meeting was held with Government where it was agreed to present the Phase 1a Environmental Impact Notice (EIN) as two assessments, namely Phase 1a(i) EIN and 1a(ii) EIN. The Phase 1a(ii) EIN ToR was presented to Government in April, and subsequently revised and resubmitted to Government in May 2011.

The Project has been divided into two distinct areas (Figure 1):

- **On-site**: within the Mine, which comprises the areas of the Mine site, access road and borefield. Existing operations are on-going in this area and the area has generally experienced a degree of disturbance. As part of permit requirements for the Mine operations, this area has previously been subject to several EIAs (SNC Lavalin 2004, Scott Wilson, 2008a, b, c, d and 2009a, b, 2010 a); and

- **Off-site**: areas outside of the Mine. These areas may or may not be disturbed and have not previously been subject to EIA for Mine related operations.

Of the three Project Phases, 1 (a(i), a(ii) and b) and 2 are located on-site, whilst Phase 3 is located off-site.

Phase 1a(ii) components are classified as Category B developments, in line with Mauritanian Decrees No. 2004-094 and No. 2007-105, and are subject to an EIN. This EIN will assess the significance of potential impacts resulting from the components of Phase 1a(ii) and is relevant to Phase 1a(ii) EIN only.

1.4 Reporting

This EIN has been prepared in accordance with the requirements of Mauritanian Legislation, in particular, the Environment Code No. 2000-045 and Decrees No. 2004-094 and No. 2007-105. It will comprise two reports, namely:

- **Terms of Reference (ToR) Report**: The ToR Report provides an overview of the proposed Phase 1a(ii), the environmental and social issues and the terms of reference for the detailed studies and approach for the EIN; and

- **EIN Report**: The EIN Report will document the assessment process in accordance with the approach set out in the ToR Report.
The Phase 1a(ii) EIN ToR was presented to Government in April, and subsequently revised and resubmitted to Government in May 2011 (Appendix 1). This document presents the EIN Report for the Phase 1a(ii) of the Project.

In addition to Mauritanian legislation, the EIN is also being undertaken to the World Bank Group’s International Finance Corporation (IFC) Performance Standards, it's supporting applicable IFC Environment Health and Safety (EHS) Guidelines and other general international industry best practice.

1.5 Report Structure

The EIN for Phase 1a(ii) is structured as follows in line with Mauritanian legislation.

- **Section 1: Introduction**: Background and Report Structure.
- **Section 2: Legislation**: a summary of Mauritanian legislation and international best practice relating to the EIN.
- **Section 3: The Project – Phase 1a(ii)**: an outline of existing operations and the proposed Phase 1a(ii) components.
- **Section 4: Baseline Conditions**: an outline of the environmental and social baseline conditions.
- **Section 5: Impact Assessment**: overall methodology and impact assessment.
- **Section 6: Analysis of Alternatives**: a summary of the alternatives considered.
- **Section 7: Consultation**: a summary of the consultation process.
- **Section 8: Timeline**: a summary program of key activities.
- **Section 9: References**: a list of all documents used as reference material.
2 Legislation

This Section presents an overview of the national administration and legal framework, and international best practice relevant to Phase 1a(ii) of the Project as of April 2011.

2.1 National

2.1.1 National Regulatory Authorities

The key Authorities relevant to Phase 1a(ii) are as follows.

- **Ministry of Petroleum, Energy and Mines (MPEM)**: responsible for regulating the mineral industry in Mauritania. Functions include preparation and implementation of mining policy and regulation, promotion of exploration and development of geological studies and maps.

- **Ministry of Environment and Sustainable Development (MESD)**: responsible for ensuring the inclusion of sustainable development in public policies and in the management of natural resources and industry.

- **Ministry of Water and Sanitation (MWS)**: responsible for the protection and integrated management of water resources, and the coordination of all activities involving the abstraction, distribution and use of water including the treatment and discharge of effluents. The National Centre of Water Resources (the Centre National des Resources en Eau or CNRE); a department of the MWS, is responsible for authorising and monitoring abstraction from the Mine’s borefield.

2.1.2 National Legislative Framework

The Mauritanian legal hierarchy comprises the constitution, international treaties and agreements, primary legislation, decrees and orders (arrêts). The legal framework in Mauritania is made up of legislative and regulatory instruments:

- Legislative instruments: comprising laws; and

- Regulatory instruments: composed of decrees, orders and rules.

A law is generally a framework of intervention within a specific sector. To be applied, each law needs regulatory instruments called implementation decrees. Ministries who have prepared the concerned law prepare decrees, which are then signed by the President.

A summary of the key Mauritanian environmental and social legislation and guidelines relating to the EIN for Phase 1a(ii) is presented in Table 2.1 below.
Table 2.1: Summary of Relevant Mauritanian Legislation and Guidelines

<table>
<thead>
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<td><strong>Mining</strong></td>
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<tr>
<td>The Mining Code</td>
<td>The Code is restricted to provision of:</td>
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<tr>
<td>Law No. 2008-011 (27 April 2008)</td>
<td>• Legal and property rights framework for mining;</td>
</tr>
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<td></td>
<td>• Measures for protection of property, services, etc;</td>
</tr>
<tr>
<td></td>
<td>• Safe and efficient working practices; and</td>
</tr>
<tr>
<td></td>
<td>• Taxes and royalties.</td>
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<td>Decree No. 2004-054 (6 July 2004)</td>
<td>Provisions relating to environmental issues in mining activities are</td>
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<td>providing for application of the</td>
<td>determined by this decree.</td>
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<td>Law for the Mining Code</td>
<td></td>
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<tr>
<td><strong>Environment</strong></td>
<td></td>
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<tr>
<td>Environment Code No. 2000-045 (26</td>
<td>Provides legislation relating to:</td>
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<tr>
<td>July 2000)</td>
<td>• Protection of natural resources;</td>
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<td></td>
<td>• Protection of environmental conditions; and</td>
</tr>
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<td></td>
<td>• Protection of sites of cultural and national interest.</td>
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<tr>
<td>Decree No. 2004-094 relating to</td>
<td>Defines the legal regime covering EIA, as provided for in Articles</td>
</tr>
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<td>(24 November 2004)</td>
<td></td>
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<tr>
<td>Decree No. 2007-105 modifying and</td>
<td>Modifications of Certain provisions of Decree No. 2004-094 of 24</td>
</tr>
<tr>
<td>supplementing certain provisions of</td>
<td>November 2004 relating to EIA including; project categorisation,</td>
</tr>
<tr>
<td>Decree No. 2004-094 (13 April</td>
<td>content; and timeline for Approval.</td>
</tr>
<tr>
<td>2007)</td>
<td></td>
</tr>
<tr>
<td>Protection of Vegetation Law No.</td>
<td>Outlines the legislation for the protection of natural resources and</td>
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<td>2000-042 (26 July 2000)</td>
<td>the import and export of vegetation.</td>
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<tr>
<td>Law No. 2000-024 concerning the</td>
<td>Outlines rules concerning management and conservation of the PNBA.</td>
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<td>Banc d'Arguin National Park</td>
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<tr>
<td>Hunting Code No. 1997-006 (20 January</td>
<td>Allows for the management of zones by individuals or organisations in</td>
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<td>1997)</td>
<td>the interests of hunting and provides a list of faunal species that are</td>
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<td></td>
<td>are protected.</td>
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<tr>
<td><strong>Water</strong></td>
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<tr>
<td>The Water Code No. 2005-030 (2</td>
<td>Defines the legal regime for continental surface and groundwater</td>
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<td>February 2005)</td>
<td>(excluding seawater).</td>
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<td>Decree No. 2007-047 regarding the</td>
<td>Allows for the creation of Strategic water resource zones. These</td>
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<td>creation of strategic water resource</td>
<td>zones provide rules on how surface and sub-surface waters can be</td>
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<td>zones</td>
<td>managed.</td>
</tr>
<tr>
<td><strong>Social</strong></td>
<td></td>
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<tr>
<td>Law No. 2004-017 concerning the</td>
<td>Defines the rights of employers and employees, including</td>
</tr>
<tr>
<td><strong>Cultural Heritage</strong></td>
<td></td>
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<tr>
<td>Framework Law No. 2005-046 on the</td>
<td>This law defines and classifies tangible cultural heritage, its</td>
</tr>
<tr>
<td>Protection of Tangible Cultural</td>
<td>protection, and the sanctions for contravention of the law.</td>
</tr>
<tr>
<td>Heritage (25 July 2005)</td>
<td></td>
</tr>
</tbody>
</table>
2.2 International

Where appropriate for the EIN due reference is to be made to international standards in order to establish a regulatory framework for the Project which is in line with national and international requirements.

TMLSA is applying the IFC Performance Standards and applicable EHS Guidelines to the Project's impact assessment and mitigation process. The IFC is part of the World Bank Group and its standards and guidelines define both a robust approach to managing risks and impacts, and determine good international industry practice for significant project components. Where appropriate, due reference shall be made to those IFC standards and EHS Guidelines\(^1\) that are relevant to the Project.

In line the World Banks Operational Policy 4.01 on Environmental Assessment, international environmental and social development agreements to which Mauritania is a party, and human rights conventions to which Mauritania is a signatory, have also been taken into consideration.

\(^1\) The IFC Performance Standards and associated guidance are available in English, French and Arabic and can be freely downloaded from [http://www.ifc.org/ifcext/sustainability.nsf/Content/PerformanceStandards](http://www.ifc.org/ifcext/sustainability.nsf/Content/PerformanceStandards). In addition, the IFC EHS Guidelines can be freely downloaded at [http://www.ifc.org/ifcext/sustainability.nsf/Content/EHSGuidelines](http://www.ifc.org/ifcext/sustainability.nsf/Content/EHSGuidelines).
3 The Project – Phase 1a(ii)

This Section presents a description of the Project setting, the operations at the existing Mine and a detailed description of the Phase 1a(ii) Project components.

The terminology used to describe and assess the Project components are summarised in Table 3.1.

Table 3.1: Terminology for the Project

<table>
<thead>
<tr>
<th>Terminology</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Road</td>
<td>60 km existing two-lane unsealed road, which connects the main Nouakchott–Nouâdhibou road to the Mine.</td>
</tr>
<tr>
<td>Borefield</td>
<td>The borefield, located 60 km to the west of the Mine, includes 28 abstraction and 8 observation boreholes and is connected to the Mine site via two pipelines which supply the Mine’s operational and potable water requirements.</td>
</tr>
<tr>
<td>Mine site</td>
<td>The area where all mining and processing operations take place together with the associated infrastructure such as equipment, maintenance workshops, power supply, office buildings, and other supporting facilities such as, but not limited to, accommodation facilities and the airstrip.</td>
</tr>
<tr>
<td>Mine</td>
<td>The Mine site, access road and borefield.</td>
</tr>
<tr>
<td>On-site</td>
<td>Within the Mine (which comprises the areas of the Mine site, access road and borefield).</td>
</tr>
<tr>
<td>Off-site</td>
<td>Outside of the Mine.</td>
</tr>
<tr>
<td>Project</td>
<td>Expansion of the Mine’s operations, including both on-site and off-site infrastructure.</td>
</tr>
</tbody>
</table>

3.1 Project Location

Mauritania is situated in north west Africa and is bordered by Western Sahara and Algeria to the north, Mali to the east, Senegal to the south and Atlantic Ocean to the west.

The Mine is located in the Inchiri Wilaya of north western Mauritania, approximately 300 km north of Nouakchott, 250 km south east of Nouâdhibou and 65 km east of the border of the Parc National du Banc d’Arguin (PNBA) (see Figure 1).

The Mine site is accessed from the main Nouakchott–Nouâdhibou N2 highway by a 60 km two-lane unsealed access road and an airstrip is located at the Mine site.

3.2 Existing Mine Operations

The Mine comprises three overall areas; the Mine site (see photographs 3-1 to 3-7), the borefield for water supply (see photographs 3-8 and 3-9) and the access road (see photograph 3-10). These are briefly outlined below.

3.2.1 Mine Site

Currently the Mine covers an area of approximately 700 ha and the perimeter of the Mine site is being fenced for safety and security risks. The Mine site comprises a series of open pits, two TSFs (TSF 1 is being decommissioned and TSF 2 is operational), dump leach facilities, a CIL process plant, waste rock dumps and several supporting ancillary facilities. These facilities include a power plant fuelled by heavy fuel oil (HFO), workshops, laboratory, offices and a light aircraft airstrip. Workers are accommodated on-site in an accommodation camp.

Two conventional process streams are currently utilised for gold extraction. High grade ore is crushed and treated in the CIL plant while low grade ore is treated using the dump leach
facilities. Currently the Mine operates at nominal milling rate of up to 9,000 tpd and has an operating life of ten years.

The existing site layout is shown on Figure 2.

3.2.2 Mine Access

The Mine site is accessed from the main Nouakchott – Nouâdhibou road by a 60 km two-lane unsealed access road as shown on Figure 1.

An airstrip is located at the Mine site.

3.2.3 Water Supply

The current daily water requirements for operations are approximately 14,000 m³ per day. This is supplied to the Mine site via two pipelines which follow the access road, from the borefield located 60 km west of the Mine site. Water is treated by a reverse osmosis (RO) water treatment plant at the Mine site for higher quality process and operation requirements as well as domestic use. Additional supplies of bottled water are brought from Bennichab as necessary. The saline waste product from the reverse osmosis treatment plant is either used as a dust suppressant on roads within the Mine site or disposed of in the TSFs.

3.3 Project Components - Phase 1a(ii)

Phase 1a(ii) involves the development of supporting infrastructure and installations within the Mine site to enable the expansion of the Mine. In summary these comprise:

- New accommodation camp for construction period;
- New office facilities;
- New warehouse; and
- Expansion of the existing fuel farm.

See Figure 3 for the location of Phase 1a(ii) Project components within the Mine site.

3.3.1 Accommodation Facilities (Construction Camp)

Accommodation facilities for workers during construction and operation of the Project will be developed in three Phases, namely; Phase 1aii, Phase 1b and Phase 2. All accommodation will be located within the area indicated in Figure 3.

As part of Phase 1aii, a new accommodation camp for construction workers will be developed adjacent to the existing on-site accommodation camp (see Photograph 3-7). This construction camp will house construction workers during the construction phase; and may be retained during the operational phase of the Project to house workers.

Housing will be composed of single storey modular buildings. The construction camp will provide approximately 500 beds. Washrooms and toilets will also be provided and will either be for individual or collective use.

Ancillary facilities within the construction camp will include:

- Recreational facilities such as; dining rooms, prayer room, sport facilities, laundry and recreational buildings;
• Management and operation facilities such as; catering facilities, camp administration offices, workshop, maintenance facilities, fire fighting depot, electrical switchyards, emergency diesel generator, power distribution, telephone and television network; and

• Water treatment facilities such as; potable water distribution system, buffer tank and pumps, drainage and sewage systems.

The construction camp will be accessed via a service road and parking space will be provided. The construction camp will be fenced and access will be controlled by a guard and other appropriate security measures.

3.3.2 Office Facilities

It is proposed to develop the following office facilities to accommodate workers involved in the existing mine operations, the construction phase of the Project at the Mine site and also the construction of the water supply pipeline. All the offices will be single storey prefabricated structures.

Expansion of Existing Offices

Currently a small office is located inside the existing mill office complex. This will be expanded by approximately 140 m². The expanded offices will have approximately ten offices for additional mine workers, a conference room and a print room.

Mine Construction Office

A new office will be developed to the west of the proposed CIL process plant. This will be separate to the existing offices and will be used for the construction phase of the Project. The overall office block will have a footprint area of approximately 1,600 m² and will contain approximately 70 offices for over 80 people involved in the construction phase. In addition, the offices will include amenities such as conference rooms, washrooms, sewage treatment system, reception area, emergency facilities and lunch room, as required.

Mobile Office

A mobile office will be used for the Phase 1ai pipeline construction. The office will contain office spaces for approximately three to five people as well as associated amenities.

Welcome Centre

A new welcome centre will be developed to the north of the proposed construction camp and will have a footprint area of approximately 800 m². The building will be constructed as a single story modular building and will also house other amenities such as washrooms, lunch room, filing room and miscellaneous services rooms.

The welcome centre will accommodate the following departments:

• Security;
• Health and Safety;
• Human Resources/Industrial Relations; and
• Accommodation Management.
3.3.3 Warehouses

Two warehouse buildings will be developed north of the administration building, on the west side of the pit. The warehouse buildings will be used to store consumables and spare parts that will be required for the operations of the new CIL process plant. One of the warehouses will house several offices and open concept work stations for the warehouse supervisor and supply officers. The total number of offices and open work stations is expected to be approximately ten. The warehouse facilities will include a fenced lay down area to store bulk items.

The two warehouse buildings will have an approximate combined total footprint area of less than 3000 m². It is expected that the two warehouse buildings will be pre-engineered “Fold-A-Way” buildings. The warehouse buildings will have a reinforced concrete base slab, will be fully cladded and the maximum height of the buildings (excluding roof) is expected to be approximately 10 m.

3.3.4 Fuel Farm

The existing fuel farm will be expanded to provide necessary additional fuel storage for existing operations. The expanded fuel farm will include two HFO tanks of approximately 3,300 m³ capacity each and one diesel storage tank of approximately 500 m³ capacity. Bunker pumping stations and truck off-loading facilities will be included. The HFO storage tanks will be heated by a hot oil closed loop system; the heat will be generated by a diesel-fired heater.

The fuel farm will be developed to industry best practice standards; it will be bunded to contain any spillages and will include secondary containment with a geosynthetic liner or equivalent. Secondary containment will be designed for 110 % of the largest tank.
4 Baseline Conditions

This Section presents the environmental and social baseline conditions, i.e. the prevailing conditions, against which potential Phase 1a(ii) Project component impacts have been assessed. The establishment of the baseline conditions also allows identification of potentially sensitive receptors (e.g. ecosystems, local communities) and an evaluation of their level of sensitivity.

4.1 Methodology

Baseline conditions have been identified through our knowledge of the area, review of existing data, and undertaking Project specific surveys, where appropriate. All the proposed components for the Phase 1a(ii) are located within the existing Mine site and baseline conditions are therefore dominated by the current mining operations.

An overview of the Project setting is provided in Section 4.2, whilst Sections 4.3 to 4.11 provides more detail on a discipline basis.

4.2 Background

The Mine is remotely situated in the Inchiri Wilaya of north western Mauritania. The nearest industries are at Boulanouar, Akjoujt (Guelb Moghrein Copper/Gold Mine) and Bennichab (water bottling), which are 120 km north west, 150 km east south east and 130 km south east respectively (see Figure 1).

The area is of a dry, arid climate dominated by north east trade winds with a low average annual rainfall (approximately 84 mm per annum) (URS/Scott Wilson 2011a). There are no permanent watercourses in the vicinity of the Mine, however, the area is crossed by numerous wadi systems that only flow for a few days per year following heavy rainfall.

Within the vicinity of the Mine a number of isolated families have set up temporary structures. Similarly, approximately 1 km east of the borefield, a few families have set up temporary structures and market stalls at the junction of the Mine access road and the main Nouakchott-Nouâdhîbou N2 highway.

4.3 Surface and Groundwater

Average annual precipitation at the Mine site is around 84 mm. The rainfall intensity varies spatially and temporally, for example, 50% of the annual rainfall for any given location can fall within a few hours. Two high rainfall events (in September and October 2010 respectively) have occurred in the area in the past year, these events have generated exceptional floods in the region.

The potential evaporation rate for the Mine is estimated from historical records at ATAR station, located approximately 265 km to the east where average recorded monthly evaporation is approximately 320 mm/month (3840 mm per year). Peak evaporation losses of above 400 mm/month occur in the summer period between April and August. Lower evaporation, below 200 mm/month, is recorded during the winter period between November and February (Scott Wilson 2011a).

The high rate of evaporation and low rainfall means that there are no permanent watercourses but heavy rainfall can produce ephemeral floods in wadis and across open ground.
Most of the Mine area is covered by skeletal soils underlain by a shallow depth (up to 10 m) of weathered basement rock with unweathered rock below. The primary permeability of the rock is low and any groundwater flow that does occur will be primarily through fractures.

There appears to be little infiltration of rain to replenish groundwater, with monitoring boreholes at the Mine site and borefield showing no measurable response to storm events and limited response to seasonal rainfall. Recharge of groundwater is therefore assumed to be negligible. Groundwater levels generally range between depths of 30 m and in excess of 50 m in places below ground level at the Mine site (URS/SW 2011b).

The quality of groundwater at the Mine site is highly saline, indicative of fossil water and low recharge. Boreholes drilled at the Mine site yield little or no water and are unsuitable for water supply from both a yield and water quality perspective.

4.4 Air Quality

Sensitive receptors to adverse air quality at the Mine are the workers and nomadic/semi-nomadic people within the vicinity of the Mine. The nature and scale of works associated with Phase 1a(ii) do not have the potential to significantly affect ecological receptors and have not been considered in this assessment. Due to the remoteness of the Mine’s location, air quality at the Mine is not affected by surrounding industries.

Baseline levels of exposure of these receptors to airborne pollutants, at the Mine are determined by the combined contributions from both background sources of airborne pollutants and emissions from activities already undertaken at the Mine. Unconsolidated sand and dust particles may be re-suspended locally by both mining activities and by natural processes.

Atmospheric concentrations of both coarse dust particles and respirable particles (PM$_{10}$) are high as a result of the desert conditions (SNC Lavalin, 2004), particularly during windy periods. Due to the nature of the terrain e.g. loose and semi-consolidated sediments with sparse vegetation and windy conditions, it is common for sand and dust storms to occur. These storms are natural phenomena, which can be prolonged and cover vast areas.

Data on the existing operations were unavailable at the time of the preparation of this report, but a sampling programme has been initiated. Therefore these existing sources of air quality pollutants are not quantified, but are discussed below together with mitigation measures currently applied.

Respirable particles and larger particles are also generated from the existing operations at the Mine site (such as; crushing, vehicle movements, on the currently un-surfaced roads, blasting, etc). These are subject to controls as required by the Occupational Health and Safety (OHS) guidelines for the Mine.

Current sources of emissions of oxides of nitrogen, sulphur dioxide, carbon monoxide and carbon dioxide at the Mine include exhaust emissions from portable power plant, the 19 MW power plant, mobile plant, road vehicles and scheduled airstrip operations (up to two light aircraft flights per day are currently scheduled). Potential sources of odour exist at facilities for the management of waste and waste water.

The existing dump leach facility and process plant are also a potential source of emissions of cyanide gas. These facilities and emissions are subject to stringent controls to meet specific guidelines, protect the health of mine workers and the wider environment.
4.5 Noise and Vibration

As with Air Quality, the sensitive receptors closest to the Mine are the workers located at the Mine site itself. Further sensitive receptors are nomadic/semi-nomadic communities, located within the vicinity of the Mine.

Due to the Mine’s remote location noise levels are restricted to its own operations.

4.6 Soils and Land Use

The area is generally flat, and is affected by sand dune movements. Hence most of the area is covered by skeletal soils, generally comprised of hard rock overlain with sand. The soils of the Mine are predominantly sand and gravel, which are dry, extremely fragile, generally degraded, unproductive and easily eroded.

Representative soil sampling has been undertaken at the Mine site (Scott Wilson, 2010b). Soils were analysed for a range of geochemical parameters, in particular those elements typically associated with gold mining activities. There is no evidence of soil contamination resulting from the mining operations.

The Mine is located in a remote area with no permanent land uses in the area other than the existing Mine itself. A relatively small number of nomadic/semi-nomadic communities are located in the vicinity of the Mine and utilise the area of periodic grazing for livestock.

The Mine area offers very limited potential for residential, tourist, recreational development or agriculture.

4.7 Ecology

Although the proposed developments are located in the existing mine site, a baseline survey has been undertaken in February 2011 to verify previous data.

4.7.1 Habitats, Vegetation and Flora

The Mine site is located within the Saharan zone, which occupies up to three-quarters of Mauritania and has low floristic diversity. Climatic and geomorphological conditions are the primary determinants of the Saharan flora and fauna, although other factors such as, overgrazing and anthropogenic pressures contribute.

The habitat present at the Mine is gravelly regs\(^2\). Baseline surveys undertaken in February 2011 determined that vegetation cover, between infrastructure, was typically low and not uniformly distributed. The plant assemblage associated with the regs habitat is dominated by groups of *Fagonia*, *Farsetia*, *Heliotropium*, *Seetzenia*, *Corchorus* and *Aristida*.

A total of 56 species of plant were recorded at the Mine site. The most recent survey coincided with the end of a period of higher than average rainfall, providing an unprecedented opportunity to identify and record the flora associated with the Mine. The most common plant species recorded were *Fagonia oliveri*, *Aerva javanica*, *Aristida* spp., *Astragalus vogelii*, *Chrozophora brochiana*, *Citrullus colocynthis*, *Corchorus depressus*, *Farsetia ramosissima*, *Hyoscyamus muticus*, *Monsonia nivea*, *Nucularia permii*, *Panicum turgidum*, *Pulicaria incisa*, *Seetzenia lanata* and *Stipagrostis pungens*.

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\(^2\)Regs are desert landform defined as broad plains covered with sand and gravel. Regs are the dominant landform in most of the Sahara.
Four woody species (trees and shrubs) were identified within the Mine site (*Acacia ehrenbergiana*, *Calotropis procera*, *Capparis decidua* and *Maerua crassifolia*), of which *Acacia ehrenbergiana* was the most widespread. Tree cover across most of the Mine was very low, being in the order of less than ten trees per km$^2$, with the exception of the area around the proposed air strip where tree cover was higher and in the order of 30 to 50 trees per km$^2$.

None of the plant species identified are considered to be rare or threatened and none have been designated by local, national or international (IUCN) standards for their nature conservation value. However, the trees *Acacia ehrenbergiana*, *Maerua crassifolia* and *Capparis decidua* are nationally protected.

### 4.7.2 Birds

The Mine site is not located within an Important Bird Area and the results of the bird surveys do not indicate that it would merit consideration as one. Mauritania supports no bird species of restricted range, although there are endemic subspecies of grey heron *Ardea cinerea monicae* and Eurasian spoonbill *Platalea leucorodia balsaci* which are primarily restricted to wetland habitats, particularly the PNBA (Shine et al. 2001). The Mine site falls within the Sahara-Sindian biome which covers much of the north and centre of the country as well as much of north Africa and supports a biome-restricted assemblage of birds.

The 2011 ornithological survey recorded the presence of 31 species of resident and migratory bird within the Mine site. The abundance of most species was low, with the exception of singing bushlark (*Mirafra cantillans*), black-crowned sparrow-lark (*Eromopterix nigriceps*), northern wheatear (*Oenanthe oenanthe leucorhoa*) and Thekla lark (*Galerida theklae*), which were more abundant. The total (all species) bird abundance was estimated at approximately 50 to 60 individuals per km$^2$.

No internationally (IUCN Red List) or nationally rare or threatened bird species were recorded, but two species were recorded that were uncommon in Mauritania. These species were bronze-winged courser (*Rhinoptilus chalcopterus*) and common quail (*Coturnix coturnix*).

### 4.7.3 Mammals

The Mine site is large and given the habitat conditions many of the mammal species that occur, or that might potentially occur, would be expected to be present at low density or otherwise be nocturnal in occurrence. Investigations into the mammal fauna associated with the Mine were undertaken in February 2011. There was negligible evidence to indicate the presences of mammals were found in association with the Mine. However, use of land within the Mine by the following species would not be unexpected based on the habitat available, given they occur within the wider mine site.

Small mammal trapping recorded the presence of a species of spiny mouse of the genus *Acomys*. Species of this genus are superficially very similar, requiring genetic and dental studies to distinguish, but based on known distributions and habitat preferences, it was considered likely that the animals that were trapped were Chudeau’s spiny mouse (*Acomys chudeaui*), a species that favours rocky areas and hot desert. This species is not threatened or rare. One sighting was made of a fennec fox (*Vulpes zerda*). The fennec is not threatened or rare.

No other wild mammal species were identified but evidence of mammal activity was found throughout the Mine. No animal holes were found in association with the ‘reg’ formations that comprise all land within the Mine.
Survey work for the West Branch Development in 2009 recorded evidence of the presence of the following species in the general vicinity of the site: Cape hare (*Lepus capensis*), gerbil (*Gerbillinae*), jerboa (*Jaculus jaculus*), golden jackal (*Canis aureus*) and feral domestic dog (*Canis lepus familiaris*). None of these species are threatened or rare.

No bat species were recorded during the baseline surveys.

### 4.7.4 Other Fauna

A limited number of direct observations of reptiles were made, these being of Moorish gecko (*Tarentola mauritanica*) and oscellated skink (*Chalcides ocellatus*). Neither of these species is rare, threatened or specialist in their habitat requirements.

No systematic invertebrate survey was undertaken and limited direct observations were made. Large numbers of the desert locust (*Schistocerca gregaria*) were observed across the Mine site, exploiting the vegetation that had developed as a result of the above average rainfall of the preceding year. The ant *Formica nigra* was also recorded as well as several additional species of invertebrate which were not identified.

The regs habitat present within the Mine site is not rare or isolated in distribution and as such it is unlikely that the site would support any invertebrate species of high nature conservation importance.

### 4.8 Socio-Economics

Mauritania’s population is estimated at approximately 3.2 million (World Bank, 2009), mainly concentrated in the capital city of Nouakchott and along the Senegal River. The nomadic culture of the Mauritanian people accounts for the widespread location of the population across tribal villages and camps. However, severe droughts have led to a decline in the traditional way of life (World Bank 2009) and migration to the industrial and urbanised towns has risen so that the urban population makes up 41% of the total population. Approximately half of the Mauritanian population rely on agriculture and livestock as their main sources of livelihood.

The Mauritanian gross domestic product (GDP) (as of 2008) is stated to be at $3,030,534,351 with the Gross National Income (GNI) per capita at $2100 (World Bank, 2009). Mauritania’s GDP is currently made up by agriculture (12.5%), industries (46.7%) and services (40.7%). Industries are mainly natural resource based, including mining of iron ore, gold and copper, fish processing and oil production. Mauritania’s coastal waters are amongst the richest fishing grounds in the world and fish account for about 45% of exports.

The mining and fishing industries also account for a large number of the Mauritanian workforce; however the geographic location of these industries means that there is limited interaction with the economic activities of the south, consisting primarily of traditional agriculture. Mauritanian labour force is currently at 1.318 million with an average annual growth of 3.1% (World Bank 2009). Unemployment rates are relatively high at 30%.

Literacy rates are at 57% with an average of 4.4% of the GDP being invested in the education system. Although education is compulsory in Mauritania, only 50% of children attend primary whilst secondary and higher education is severely limited. The Université de Nouakchott the only university in the country has an enrolment of roughly 10,000 students (A.C.A 2007).

For Mauritanian males, life expectancy at birth is 55, females have a slightly higher life expectancy of 60. The adult mortality rate is 325 per 1,000 for males and 246 per 1,000 for females. The total expenditure on health as a percentage of the country’s GDP is 4.2 %, and
general government expenditure on health accounts for 76.8% of the total expenditure on health (WHO 2006).

The Mine is based in Inchiri wilaya, a region covering 41,700 km² (SNC Lavalin, 2004). The region consists of a very low population density, with approximately 9,900 inhabitants (approximately 0.3% of the total population of Mauritania) (ONS, 2009). The regional authority has its administrative capital at Akjoujt, where the majority of Inchiri’s population live.

As stated in Section 4.2 the Mine is located in a remote area and the nearest industries are located in towns more than 100 km away. Further a number of isolated families have set up temporary structures in the vicinity of the Mine and at the junction of the access road and the main Nouakchott-Nouâdhibou N2 highway.

4.9 Archaeology and Cultural Heritage

The baseline conditions have been defined through a range of investigations. A high-level archaeological survey was carried out during the feasibility study in 2004 (Vernet & Naffé, Nouakchott University, 2004). A baseline archaeological desk and field survey of the expansion area was undertaken between January – March 2011 (Ould Mohamed Kaber, BEE/IMRS, 2011). The results of this baseline survey were reviewed in the field in May 2011.

A total of 8 cultural heritage sites were identified in the West Branch area, and a total of 47 sites were identified in the Tasiast Expansion area. These sites comprise stray finds, Neolithic burials and occupation sites (c.6000 – 2800 Before Present), Protohistoric tombs (c.2500 BP – 1000 AD) and Muslim tombs (c.700AD to present).

4.9.1 Critical cultural heritage, designated and legally protected sites

There are no specific internationally recognised or legally protected cultural heritage features or areas, or proposed critical cultural heritage features or areas, within or in the zone of influence of the Mine site (as defined in IFC Performance Standard 8). Both tangible and intangible heritage is protected under Mauritanian law. No archaeological sites identified through the investigations cited above are considered to be rare, and none have been designated according local, national or international standards in terms of their outstanding social, aesthetic, community or scientific value.

The Mine site contains a number of historic Muslim tombs which are protected by national/Islamic law and customary practice and may require management and mitigation due to mining activities as proposed in the EMS.

In the absence of published national guidelines on the criteria for assessing the significance of cultural heritage, the value of archaeological sites, monuments and artefact find spots have been judged upon the characteristics in Table 4.1.

<table>
<thead>
<tr>
<th>Significance/value</th>
<th>Key characteristics of archaeological receptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very high</td>
<td>World Heritage Sites</td>
</tr>
<tr>
<td></td>
<td>Receptors of acknowledged international importance</td>
</tr>
<tr>
<td></td>
<td>Receptors that can contribute significantly to international research objectives</td>
</tr>
<tr>
<td>High</td>
<td>Monuments &amp; sites of national quality and importance</td>
</tr>
<tr>
<td></td>
<td>Receptors that can contribute significantly to national research objectives</td>
</tr>
<tr>
<td>Medium</td>
<td>Monuments &amp; sites that contribute to regional research objectives.</td>
</tr>
<tr>
<td>Low</td>
<td>Monuments &amp; sites of local importance</td>
</tr>
<tr>
<td></td>
<td>Receptors compromised by poor preservation and/or survival or contextual associations.</td>
</tr>
</tbody>
</table>
### 4.9.2 Archaeological Background

The gravelly regs of Tasiast have been inhabited since the Middle Palaeolithic period (Aterian Culture; 29,000 – 18,000 Before Present (BP)), though no remains of this period have been identified at the Mine Site. Following a marine transgression and the deposition of ogolian dunes in the subsequent arid period, there followed a humid period in the early Neolithic (8,500-7,000 BP), characterised by the hunting of large fauna and the domestication of livestock. In the middle and late Neolithic periods (6,000BP - 2,000 BP) and the protohistoric period (end of prehistoric era to c.1000AD), the area became increasingly arid. During the historic period, it was occupied by nomadic populations which have left little trace in the archaeological record, with the exception of Muslim tombs.

### 4.9.3 Inventory of Archaeological Sites

An inventory of archaeological sites in the area has been developed from the 2011 baseline survey to inform design and mitigation proposals. The locations of sites are illustrated on Figure 4.

#### 4.9.3.1 Neolithic sites (6,000 to 2,000 BP)

Neolithic sites comprised occupation areas on ogolian dunes. In the east of the Mine site, a major site was recorded, extending over several hundred square metres (Sites 25 & 26). Finds included stone tools with evidence for manufacture on-site, pottery, ostrich eggshell and human bone. To the south of this major site are a series of smaller sites also located on top of ogolian dunes, with smaller surface scatters of lithics and pottery (Sites 27, 27b, 28, 29, 30).

In the south of the Mine site is a further cluster of occupation sites on ogolian dunes. Several have blocks of imported flint and evidence for a flint tool manufacturing industry, as well as occasional pottery and grinding stones (Sites 31, 32, 33, 34, 35, 36, 37, and 38). Human bone was noted at Site 34. Site 32 is particularly large, extending beyond the study area. A further extensive occupation site, Site 47, is located on an ogolian dune in the northwest of the Mine site, and extends across gravels to the northwest of the dune.

In addition to the occupation sites are two isolated find spots. In the northwest of the site, pottery and quernstones were found (1), and in the northeast of the site, broken quernstones were recorded (19).

The value of Neolithic occupation sites is assessed as high, as they are upstanding monuments which have the potential to contribute significantly to research and form coherent historic landscapes.

#### 4.9.3.2 Protohistoric sites (c.2,500 BP – 1,000 AD)

There are six groups of protohistoric tombs, located in the north west of the Mine site (Sites 2, 3, 4, 5), the north east (Sites 7, 8, 9, 10, 11, 12; existing airstrip area), to the east-north-east (Sites 13, 15, 16, 17), in the east (Sites 20, 21, 22, 23), in the south (West Branch Sites 3, 5
and 8) and in the south west (Sites 40, 41, 42, 43, 44). There are three isolated tombs which do not seem to form part of wider clusters (Sites 18, 39 & 45).

The tombs generally comprise a single tomb or cairn of placed rocks; there are two antenna tombs (sites West Branch Site 8 & Tasiast Expansion Site 18). In some cases, there are central tombs with smaller satellite tombs (Sites 11, 20, 21, 42). There are two areas where tomb fields are located on relatively elevated, prominent rocky ridges – these are located to the east of the proposed Construction Camp and Tasiast Village (Sites 20 – 24), and in the southwest of the site (Sites 40 – 44).

The value of such tombs is assessed as medium (single/paired/grouped tombs) or high (tomb fields), as they are upstanding monuments which have the potential to contribute significantly to research and form coherent historic landscapes.

4.9.3.3 Historic sites (c. 700 AD to present)

Historic period heritage assets have been identified within the Mine Expansion site comprising two Muslim tombs to the northeast (Sites 14 & 46), located within a cluster of earlier protohistoric tombs; two Muslim tombs in the north (Site 6), again in an area of earlier burials; and a group of Muslim tombs in the east of the site (Site 24), also located in an area of earlier burials.

These tombs comprise a single burial beneath a sub-rectangular cairn of fairly flat stones, with an un-inscribed stone grave marker at the head end of the burial.

4.10 Landscape and Visual

4.10.1 Landscape

Due to the Mines remote location, it forms the major land use in the immediate vicinity along with; isolated temporary/semi-permanent settlements of nomads and periodic grazing of livestock.

The Mine site does not lie within an area of protected landscape and the key characteristics of the landscape within and surrounding the Mine are presented in Table 4.2 below.

<table>
<thead>
<tr>
<th>Table 4.2: Key Landscape Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key Landscape Characteristics</strong></td>
</tr>
<tr>
<td>A national scale landscape, occupying approximately 75% of Mauritania and forming part of the wider Sahara Desert</td>
</tr>
<tr>
<td>Isolated, sand dominated landscape of undulating topography.</td>
</tr>
<tr>
<td>Limited vegetation cover and land use but sufficient in some areas for sporadic grazing.</td>
</tr>
<tr>
<td>Inhabitation largely confined to small numbers of local nomads occupying temporary/semi-permanent structures and the community of workers at the mine.</td>
</tr>
<tr>
<td>Mining is locally a significant element of the landscape but of a scale which is dwarfed by the landscape context.</td>
</tr>
</tbody>
</table>

The landscape surrounding the mine site is open desert typical of the Saharan context and the majority of Mauritania. It has no distinctive landscape features which are unique and is unremarkable apart from the presence of the existing Mine. As a result the landscape context is considered to be of low quality.

4.10.2 Visual

Photograph 4-1 and 4-2 (taken in February 2011) illustrate the context of the Mine and are considered to provide a typical range of views of the Mine.
Categories of views include:

- Intermittently inhabited properties occupied by nomadic/semi-nomadic peoples;
- Tracks within the desert used primarily by nomadic peoples and workers at the Mine; and
- The Mine access road and worker locations around the Mine.

Existing screening from locations in the wider landscape is largely derived from the landform of the sand dunes and rocky ridgelines. Views of the existing Mine are obtained in close proximity from a small number of extremely isolated locations, primarily accessed by those within the Mine site.

4.11 Traffic

The Mine is accessed from the main Nouakchott – Nouâdhibou N2 highway by a 60 km two-lane unsealed access road. The access road to the Mine was previously a track which linked nomadic people to the highway and was predominantly used to deliver water to drop off points in the region. Following the Mine’s commissioning the track was upgraded to an unsealed access road which is regularly maintained.

Currently the unsealed access road is used by Mine vehicles and water delivery vehicles which supply water for local semi-nomadic/nomadic people. There are approximately 5-10 vehicle movements per hour along the unsealed access road during the day. Within the Mine site a network of internal Mine roads exists for Mine traffic only. These roads are speed restricted and regularly maintained.
5 Impact Assessment

Section 5.1 presents the methodology and terminology used to assess the environmental and social impacts of Phase 1a(ii) Project components. Methodologies adopted for the assessment of specific environmental and social disciplines are discussed in Sections 5.2 to 5.10.

5.1 Methodology

5.1.1 Background

The overall methodology adopted for undertaking this EIN is based on the requirements of Mauritanian legislation as set out in Decree No. 2004-094 and its amendment No. 2007-105, together with the Guide for Undertaking an Environmental Impact Notice in the Mining Sector (November 2006). With regard to terminology used in the EIN, specific technical terms are explained in the appropriate section of the text. However, in the interests of clarity and consistency, a number of generic Project terms are defined in Table 3.1. A listing of abbreviations used in the EIN is also presented at the front of this report.

It also takes into consideration international best practice and, in particular, IFC Performance Standards and relevant International Protocols, Agreements and Treaties applicable to Mauritania (see Section 2).

5.1.2 Identification and Assessment of Impacts

Potential impacts have been identified from a critical analysis of the proposed components for Phase 1a(ii) in relation to their environmental and social setting. The assessment drew on secondary data; primary data from specialist baseline surveys commissioned for this EIN; and on the experience of the URS/Scott Wilson team. The results are presented in Sections 5.2 to 5.10. Terminology to assess impacts is presented in Table 5.1 and Table 5.2.

The significance of an impact is considered to reflect the relationship between two factors:

- The magnitude of the impact (i.e. the actual change taking place to the environment); and
- The sensitivity of the affected resource or receptor.

Within this EIN, the following generic matrix (see Table 5.1) is used has been applied to define the level of and significance of impacts.

Table 5.1: Level and Significance of Impacts

<table>
<thead>
<tr>
<th>Receptor Sensitivity</th>
<th>Impact Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>High</td>
<td>High / Moderate</td>
</tr>
<tr>
<td>High / Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Low</td>
<td>Moderate / Low</td>
</tr>
<tr>
<td></td>
<td>Low / Negligible</td>
</tr>
</tbody>
</table>
The residual impact, i.e. the impact remaining after mitigation, has been assessed using the terminology presented in Table 5.2.

<table>
<thead>
<tr>
<th>Nature of predicted impacts</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral</td>
<td>No overall environmental impact.</td>
<td></td>
</tr>
<tr>
<td>Adverse</td>
<td>Negative environmental impact.</td>
<td></td>
</tr>
<tr>
<td>Beneficial</td>
<td>Positive environmental impact.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Significance of predicted impacts</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>An impact that is capable of causing sufficient change in the environment to affect the status, potential productivity or usage of the environment</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>An impact that is capable of causing change in the environment but does not fundamentally affect the status, potential productivity or usage of the Environment</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>An impact which is either too small to be measured or, even if quantifiable, does not give rise to any material change in the environment</td>
<td></td>
</tr>
<tr>
<td>Negligible</td>
<td>No effect, not significant. Irrespective of other effects.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration of predicted impacts</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Short term</td>
<td>An impact that persists for 36 months or less (i.e. during construction period).</td>
<td></td>
</tr>
<tr>
<td>Medium term</td>
<td>An impact that persists for between 36 months and 16 years (i.e. during operations).</td>
<td></td>
</tr>
<tr>
<td>Long term</td>
<td>An impact that persists for longer than 16 years (i.e. Post Closure).</td>
<td></td>
</tr>
</tbody>
</table>

Where possible, the rating of impact significance, nature and duration will have been based upon relevant quantitative criteria (e.g. EHS Emission Guideline values), together with the use of value judgements and expert interpretations to establish to what extent an impact is environmentally significant. In addition, performance against environmental quality standards or pollution control thresholds and compatibility with environmental policies is taken into account where appropriate.

5.2 Surface Water and Groundwater

5.2.1 Potential Impacts

5.2.1.1 Surface Water

The potential impact of the proposed works on surface water mainly relate to changes in surface water runoff as a result of changes in land use. For example, expansion of the construction camp and offices may affect the direction of surface water flow when it occurs.

Infiltration is low so the effect of increased areas of hard standing on runoff volumes is not anticipated to be significant.

5.2.1.2 Groundwater

The expanded fuel farm is not expected to have a significant impact on groundwater due to the fact that pollution prevention measures are adopted, in accordance with good practice.
5.2.2 Mitigation Measures

5.2.2.1 Surface Water

The new areas of development will be constructed away from main wadi channels so as to minimise disruption of surface water runoff. Flood risk assessments are proposed and will assist in identifying those areas where water may flow and accumulate following rainfall.

5.2.2.2 Groundwater

Pollution prevention measures at the Mine site, for example bunding and emergency spill procedures, will be put in place to prevent accidental spills and leaks from being released into the environment as a result of the proposed developments at the Mine.

5.2.3 Summary

A summary of the potential residual impacts of the proposed Phase 1a(ii) with respect to surface water and groundwater are presented in Table 5.3.

<table>
<thead>
<tr>
<th>Location</th>
<th>Source of Impact</th>
<th>Mitigation Measure</th>
<th>Project Phase(^2)</th>
<th>Nature(^3)</th>
<th>Duration(^3)</th>
<th>Significance(^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mine site</td>
<td>Surface Water Runoff diversion</td>
<td>Flood risk assessment</td>
<td>C O</td>
<td>Neutral</td>
<td>Medium Term</td>
<td>Negligible</td>
</tr>
<tr>
<td>Groundwater or surface water pollution</td>
<td>Pollution prevention measures</td>
<td>C O</td>
<td>Neutral</td>
<td>Medium Term</td>
<td>Negligible</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)Following implementation of proposed Mitigation Measures

\(^2\)Project Phase: C = Construction, O = Operation, D = Decommissioning and Closure

\(^3\) Duration and significance refer to the predicted impact after the implementation of proposed mitigation measures and is based on the ratings provided in Table 5.2.

5.3 Air Quality

5.3.1 Potential Impacts

The potential air quality impacts on sensitive receptors due to Phase 1a(ii), relate to both nuisance and health impacts. In addition, the Phase 1a(ii) project components temporarily introduce some additional sources of emissions with the potential to impact upon existing receptors.

At the Mine site there is the potential to locally increase the airborne concentration of particulate matter (dust and PM\(_{10}\)), in the short term, as a result of dust generation from:

- Ground preparation of the fuel farm, construction camp, office and warehouse facilities; and
- Aggregate and construction material handling and temporary stockpiling.

The new construction camp represents an additional area within the Mine site that would be sensitive to emissions generated by activities elsewhere within the Mine site.
5.3.2 Mitigation Measures

Workers at the Mine are currently protected by controls and measures defined in the OHS guidelines for the Mine. These controls and measures will be applied to Phase 1a(ii) works and will provide all workers at the Mine with a consistent level of protection from the potential impact of airborne pollutants.

The proposed activities only have the potential to result in changes in measureable concentrations of air pollutants at locations close (within 100 m) to the source of the emission. Additional impacts would be infrequent and limited to the time period of the works. Dust controls that are already employed at the Mine, including use of water to damp down materials if necessary, the minimisation of drop heights and speed limits on haul routes are capable of delivering the required level of mitigation.

The use of well maintained vehicles, mobile plant and portable power plant would ensure that exhaust emissions of nitrogen dioxide, sulphur dioxide are negligible adverse impacts over the short term.

The Phase 1a(ii) element of the new construction camp will generate additional waste and waste water. Ancillary facilities will be developed to manage these wastes in a manner that will minimise the potential for odour impacts at the construction camp. In subsequent Phases of the Project, enhanced waste management facilities would service this camp.

5.3.3 Summary

A summary of the potential residual impacts of the proposed Phase 1a(ii) with respect to air quality are presented in Table 5.4.

<table>
<thead>
<tr>
<th>Location</th>
<th>Source of Impact</th>
<th>Mitigation Measure</th>
<th>Project Phase</th>
<th>Nature</th>
<th>Duration</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mine site</td>
<td>Site preparation works</td>
<td>Dust controls as per EMS.</td>
<td>C O</td>
<td>Neutral</td>
<td>Short Term</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

1 Following implementation of proposed Mitigation Measures
2 Project Phase: C = Construction, O = Operation, D = Decommissioning and Closure
3 Duration and significance refer to the predicted impact after the implementation of proposed mitigation measures and is based on the ratings provided in Table 5.2.

5.4 Noise and Vibration

5.4.1 Noise Criteria

ICF EHS Environmental Guidelines\(^3\) provide guidance on acceptable noise levels to residential and other sensitive receptors and have been used as a guide to assess potential impacts from Phase 1a(ii) activities. Table 5.5 presents these noise levels.

---

\(^3\) The source for these guideline noise levels is International Finance Corporation, Environmental, Health and Safety Guidelines (2007)
Table 5.5: IFC Noise Level Guidelines

<table>
<thead>
<tr>
<th>Receptor</th>
<th>One Hour $L_{A\text{eq}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daytime (07:00 to 22:00)</td>
</tr>
<tr>
<td>Residential; Institutional; Educational</td>
<td>55</td>
</tr>
<tr>
<td>Industrial; Commercial</td>
<td>70</td>
</tr>
</tbody>
</table>


The daytime limit of 55 dB $L_{A\text{eq},1h}$ is a free-field level. The night-time limit of 45 dB $L_{A\text{eq},1h}$ is a façade level, meaning the noise level at the wall of a property (e.g. just outside a bedroom window). A façade noise level of 45 dB $L_{A\text{eq}}$ is equivalent to an internal noise level of approximately 30 dB $L_{A\text{eq}}$, assuming small open areas to the building. This would ensure no disturbance to sleep.

The Mine operates 24 hours per day and workers will be resting and sleeping during daytime and night-time. Therefore the 45 dB $L_{A\text{eq}}$ limit applies for daytime and night-time at the construction camp.

An external free-field noise level of 70 dB(A) would allow for a good internal noise climate to office accommodation, assuming a reasonable façade construction. Thus, the daytime and night-time noise limit of 70 dB $L_{A\text{eq}}$ for commercial receptors is applicable for offices on the Mine site.

Due to the large distances between any significant sources of vibration (e.g. blasting, crushing equipment) and any sensitive receptors, no calculations of likely vibration levels have been carried out. Ground borne vibration for both construction and operation are thus scoped out of the assessment.

5.4.1.1 Impact Prediction – Construction Noise

Typical construction noise levels have been predicted for a number of distances from typical construction activities for this type of development using the methodology given in BS 5228 ‘Control of noise on construction and open sites’. Sound power levels for each piece of equipment have been sourced from BS 5228 ‘Control of noise on construction and open sites’ and are given in Table 1 of Appendix 2.

Specific details of construction works were not available at the time of preparation of this report and therefore representative construction activities have been assumed using experience of similar projects/constructions.

5.4.1.2 Impact Prediction – Operational Noise

No quantitative data relating to operational equipment schedule and associated acoustic emission levels are available. However, a robust assessment of the operation of the Phase 1a(ii) infrastructure is possible, based on the proposed operations, the distances to sensitive receptors and the existing noise climate.
5.4.2 Potential Impacts

5.4.2.1 Construction

Based on the methodology described in Section 4.5, Table 1 in Appendix 2 shows the predicted noise level for different construction activities at various distances from the activity. These predicted levels assume that there is direct line-of-sight between the noise source and receptor.

For most of the construction period, noise levels will be significantly lower than those given in the table, with high noise levels for short periods only. It should be noted that construction noise impacts are only temporary by their very nature. There is no reason why, with appropriate phasing and employment of best practicable means, these impacts cannot be mitigated to an acceptable level if required.

The detailed assessments for the various construction elements for Phase 1a(ii) are provided in Appendix 2. The significance of the noise impacts caused by the construction of the warehouses, offices, and construction camp are assessed as negligible for both residential and office accommodation. The significance of the noise impacts caused by the construction of the fuel farm is assessed as negligible/low.

5.4.2.2 Operational Noise

The existing noise climate across the Mine site is dominated by noise from the ongoing excavation and processing activities. However, noise levels at the construction camp resulting from these mining operations (blasting, excavation, processing) are negligible.

The significance of operational noise impacts arising from Phase 1a(ii) Project components is assessed as negligible for both residential and office accommodation. The detailed assessments for the various operational elements are provided in Appendix 2.

5.4.3 Mitigation Measures

5.4.3.1 Construction

Best Practicable Means should be followed to reduce noise impacts upon the nearest noise sensitive receptors. Best practicable means should include the following:

- All construction plant and equipment should comply with European Union, or comparable, noise emission limits;
- All vehicles and mechanical plant used for the purpose of the works should be fitted with effective exhaust silencers and should be maintained in good efficient working order;
- Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum; and
- Plant and equipment such as flat bed lorries, skips and chutes should be lined with noise attenuating materials. Materials should be handled with care and be placed, not dropped. Materials should be delivered during normal working hours.

All ancillary plant such as generators, compressors and pumps should be position so as to cause minimum noise disturbance, i.e. furthest from receptors or behind close boarded noise barriers. If necessary, acoustic enclosures should be provided and/or acoustic shielding;
Localised noise barriers could be provided to screen specific noise sources used on the construction sites.

5.4.3.2 Operation

No specific measures for noise mitigation are required to ensure negligible effects at offices and the construction camp. However, the following techniques and good site management practices should be employed to minimise operational noise levels:

- As appropriate, workers are required to wear Personal Protective Equipment;
- Optimisation of internal traffic routing to maximize distances to sensitive receptors and to minimise need for reversing (reducing noise from reversing alarms);
- Proper use of plant with respect to minimising noise emissions and regular maintenance;
- Selection of inherently quiet plant where appropriate;
- Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum;
- All ancillary plant such as generators, compressors and pumps should be positioned so as to cause minimal noise disturbance; and
- Proper design of foundations to crushers and other significant vibration sources.

5.4.4 Summary

A summary of the potential residual impacts of the proposed Phase 1a(ii) with respect to noise and vibration is presented in Table 5.6.

Table 5.6: Summary of potential residual impacts1 – Noise and Vibration

<table>
<thead>
<tr>
<th>Location</th>
<th>Source of Impact</th>
<th>Mitigation Measure</th>
<th>Project Phase2</th>
<th>Nature3</th>
<th>Duration4</th>
<th>Significance5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mine site</td>
<td>Construction Noise</td>
<td>Best Practicable Means</td>
<td>C</td>
<td>Adverse</td>
<td>Short Term</td>
<td>Low/Negligible</td>
</tr>
<tr>
<td>Mine site</td>
<td>Operational Noise</td>
<td>Control techniques and Site Management Practices</td>
<td>O</td>
<td>Adverse</td>
<td>Medium Term</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

1Following implementation of proposed Mitigation Measures

2Project Phase: C = Construction, O = Operation, D = Decommissioning and Closure

3Duration and significance refer to the predicted impact after the implementation of proposed mitigation measures and is based on the ratings provided in Table 5.2.

5.5 Soil and Land Use

5.5.1 Potential Impacts

Phase 1a(ii) Project components are all located within the footprint of areas which have experienced a degree of disturbance from the existing mining activities and previous exploration works.

5.5.1.1 Soil

The main impacts on soils during construction and operation of Phase 1a(ii) are:
• Disturbance of soils caused by construction of infrastructure.
• Risk of erosion of soils caused by wind, resulting from construction of infrastructure.
• Potential soil contamination caused by any spillage and leaking of oils, chemicals and hazardous liquids outside of bunded areas or equipment.
• Loss of soils due to concrete coverage (e.g. for warehouse, office and accommodation foundations) and therefore potential loss of habitat.

5.5.1.2 Land Use

All Phase 1a(ii) Project components are located within the Mine site. A perimeter fence is being constructed around the Mine site and therefore there will be no change in land use from the proposed Phase 1a(ii) infrastructure.

5.5.2 Mitigation Measures

5.5.2.1 Soil

Disturbance of soil will be restricted by undertaking Phase 1a(ii) activities in areas which have previously been disturbed.

The low rainfall in the area results in an insignificant risk of erosion of soils and its redistribution on surrounding land.

Processes for cleaning up spills will be dealt with in accordance with the emergency response plan (Scott Wilson, 2010a). Spill kits will be available and workers will be trained to undertake clean up routines including disposal of contaminated materials. Routine monitoring and maintenance will take place to reduce the risks of spills and accidents.

5.5.2.2 Land Use

Phase 1a(ii) Project components will not alter the current land use within the Mine site. In addition, components will be located in areas which have been previously disturbed by Mine activities. The impacts will therefore be negligible during both construction and operational phases.

5.5.3 Summary

A summary of the potential residual impacts of the proposed Phase 1a(ii) with respect to soil and land use is presented in Table 5.7.

Table 5.7: Summary of potential residual impacts – Soil and Land Use
5.6 Ecology

5.6.1 Potential Impacts

Potential Phase 1a(ii) impacts on the ecological resources are:

- Habitat loss (land-take): this is a direct impact arising from Phase 1a(ii). The significance of this is related to the area lost, the proportion of the total area and the ecology and nature conservation value of that habitat.

- Habitat fragmentation: land-take can sever habitats, leaving areas too small to support viable populations, and create physical barriers to the movement of animals and plant propagules between areas cut off by the Project. Fragmentation can lead to reduced genetic diversity and can increase the likelihood of local populations being lost.

- Indirect effects: these impacts may affect habitats outside the boundary of the construction site. They may arise from disturbance (visual, noise or vibration), dust deposition, pollution incidents and changes in site hydrology or the flow and/or quality of watercourses.

- Cumulative impacts: these are considered in two ways; firstly, the cumulative effect of the Project on the collective resource of particular habitats or species in the study area, or part of it; secondly, the cumulative impact of the Project in conjunction with other development projects expected to occur near the Project over a similar time period.

The main sources of impacts on flora and fauna as a result of Phase 1a(ii) are likely to relate to:

During construction:

- Clearance of vegetation and loss of habitat;
- Soil erosion and dust impacts on vegetation;
- Noise and dust disturbance to wildlife; and
- Involvement of wildlife in accidents with vehicles.

During operations:

- Ongoing soil erosion and dust impacts on vegetation;
- Ongoing disturbance to wildlife due to noise and dust; and
- Involvement of wildlife in accidents with vehicles.

Given the above considerations, the significance of the predicted impact resulting from:

- Clearance of habitats and vegetation, including protected trees, is assessed as moderate, adverse and medium term;
• Localised dust generation as a result of soil disturbance during construction works; and
• Disturbance and accidents to flora and fauna is assessed as low adverse and is therefore not significant.

5.6.2 Mitigation Measures

The mitigation requirements for Phase 1a(ii) are relatively modest and due to the relatively small scale of the proposed activities and the degree of existing disturbance within the Mine site. The mitigation measures detailed below have been developed with reference to, and to ensure the compliance of the Project with, IFC Performance Standard 6 as well as national legislation.

Prior to site clearance works an ecologist should undertake a walkover or drive through of the relevant land areas (depending on size of the relevant land areas) to check for the presence of any newly established ecological constraints requiring mitigation as part of good practice e.g. active mammal dens. The ecologist would provide advice on the appropriate course of action should any issues be identified.

During construction and operation dust control (Section 5.3.2) and traffic (Section 5.10.2) mitigation measures will be applied to mitigate the impacts of dust and traffic accidents on flora and fauna respectively.

The need for habitat compensation is not anticipated, however in the unlikely event of unavoidable loss of protected tree species (*Acacia ehrenbergiana*, *Capparis decidua* and *Maeria crassifolia*) pilot tests on tree planting should be undertaken on native species including the three protected species. At closure, a strategy will be implemented (via an updated Rehabilitation and Closure Plan) to optimise conditions for the passive re-establishment of vegetation and subsequently native wildlife. To ensure that invasive alien plant species are not introduced, as required by IFC Performance Standard 6, no plantings of non-native flora will be undertaken anywhere within the Mine.

5.6.3 Summary

A summary of the potential residual impacts of the proposed Phase 1a(ii) with respect to ecology are presented in Table 5.8.

<table>
<thead>
<tr>
<th>Location</th>
<th>Source of Impact</th>
<th>Mitigation Measure</th>
<th>Project Phase</th>
<th>Nature</th>
<th>Duration</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mine site</td>
<td>Habitat loss</td>
<td>Habitat compensation</td>
<td>C</td>
<td>Adverse</td>
<td>Medium term</td>
<td>Low</td>
</tr>
</tbody>
</table>

1 Following implementation of proposed Mitigation Measures
2 Project Phase: C = Construction, O = Operation, D = Decommissioning and Closure
3 Duration and significance refer to the predicted impact after the implementation of proposed mitigation measures and is based on the ratings provided in Table 5.2.
5.7 Socio-Economics

5.7.1 Potential Impacts

5.7.1.1 Socio-economic Impacts

The Mine currently employs approximately 1,200 workers and it is anticipated that the construction of Phase 1a(ii) components will require recruitment of additional workers. Recruitment exercises will support TMLSA’s Mauritanisation Plan, which includes general capacity building and training of local workers. Additional accommodation facilities are to be developed as part of Phase 1a(ii) and this will ensure that all workers are provided with adequate living, recreational, religious and catering facilities.

The perimeter fence is being installed around the Mine site for safety and security of the local community. Phase 1a(ii) Project components are located on-site and therefore there will be no loss of land use for the local community.

The development of Phase 1a(ii) will contribute to the socio-economic benefits of the Mine at the national and local level and will generate direct and indirect benefits such as additional employment and purchase of goods and services to support the Mine from within Mauritania.

5.7.1.2 Community Health and Safety Impacts

Health and safety impacts during construction, operation and after closure can relate to both impacts on workers (OHS) and impacts on the wider local community. OHS is not covered within this EIN and has not been documented within this EIN Report.

Health and safety impacts on the wider local communities (i.e. injuries or health impairments) may arise as a result of:

- Increased traffic in accessing the Mine which may increase the incidence of accidents (community and livestock) as a consequence. This could include delivery of fuel to the Mine site or accidents involving vehicles, machinery or plant; or
- Potential transmission of communicable diseases, such as respiratory and sexually transmitted infections, as a result of influx of project labour.

5.7.2 Mitigation Measures

Given that Phase 1a(ii) is an expansion of existing Mine operations and that the Mine has a positive impact on the socio-economic environment of the region. No mitigation measures are required, however best practice measures and enhancement measures, such as education, will be implemented.

The risks associated with Phase 1a(ii) to the health and safety of local communities do not differ significantly from those associated with the existing Mine operations and will be mitigated both by design and within the framework of existing and planned management systems, such as the EMS.

5.7.3 Summary

A summary of the potential residual impacts of the proposed Phase 1a(ii) with respect to socio-economics is presented in Table 5.9.

Table 5.9: Summary of potential residual impacts – Socio-Economic
<table>
<thead>
<tr>
<th>Location</th>
<th>Source of Impact</th>
<th>Mitigation Measure</th>
<th>Project Phase</th>
<th>Nature</th>
<th>Duration</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mine site</td>
<td>Contribution to local and national economy</td>
<td>No mitigation measures required, an enhancement measure is to monitor benefit footprint</td>
<td>C O</td>
<td>Beneficial</td>
<td>Medium term</td>
<td>High</td>
</tr>
<tr>
<td>Increased employment and training and skill set building</td>
<td>No mitigation measures required</td>
<td>C O</td>
<td>Beneficial</td>
<td>Medium term</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Traffic related Accidents</td>
<td>No mitigation measures required, however provide education programmes regarding traffic safety</td>
<td>C O</td>
<td>Adverse</td>
<td>Medium Term</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Potential transmission of diseases</td>
<td>No mitigation measures required, however provide education and access to mine clinic</td>
<td>C O</td>
<td>Adverse</td>
<td>Medium Term</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

1 Following implementation of proposed Mitigation Measures
2 Project Phase: C = Construction, O = Operation, D = Decommissioning and Closure
3 Duration and significance refer to the predicted impact after the implementation of proposed mitigation measures and is based on the ratings provided in Table 5.2.

5.8 Archaeology and Cultural Heritage

5.8.1 Potential Impacts

Some of the relevant infrastructure (fuel farm, new operations office) coincides with the footprint of the existing Mine infrastructure and is screened out as the scope for impacts on heritage is negated by the existing site context. A number of other Project elements are in areas where no archaeological sites are identified in the inventory (proposed new construction camp, new warehouse facilities and new office facilities).

Where feasible and appropriate, the design of on-site infrastructure will aim to avoid impacting archaeological sites identified during baseline surveys, with the overall aim of safeguarding the cultural heritage resource. Where the project involves adverse impacts on physical cultural resources, appropriate measures for avoiding or mitigating these impacts will be applied.

5.8.1.1 Assessment of the Magnitude of Impact

The magnitude of an archaeological impact has been judged on a five-point scale (see Table 5.10).

<table>
<thead>
<tr>
<th>Factors in the Assessment of Magnitude of Impacts (archaeology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
</tr>
</tbody>
</table>
5.8.1.2 Potential Impacts on Cultural Heritage

The Project’s potential adverse impacts on the cultural heritage resource are:

- Total or partial loss of sites;
- Illicit removal of archaeological artefacts from within the site or the surrounding area;
- Damage by vehicle tracking.

During construction, the main sources of impacts on cultural heritage as a result of the Project are likely to relate to:

- Destruction of archaeological sites and their settings (groundworks, terracing/levelling, excavation, utilities diversion and drainage, mineral extraction, borrow pits, rubble and waste dumping);
- Potential illicit removal of archaeological artefacts from within the Mine site or the surrounding zone of influence; and,
- Vehicle tracking damage.

During operation and closure, sites will remain vulnerable to illicit removal of archaeological artefacts and to accidental vehicle damage.

The northern edge of the proposed construction camp is located approximately 300m west of a series of Protohistoric and Muslim tombs located on a prominent rocky ridge (Sites 20, 21, 22, 23 & 24). Direct construction impacts are not anticipated. However, the proximity of the proposed camp to the tombs increases the likelihood of potential illicit removal of artefacts, interference with archaeological sites, and accidental vehicle damage.

The duration of the predicted impacts will be long term. Archaeological sites are a finite and irreplaceable resource, so any physical impacts are permanent, lasting beyond the closure and restoration of the Mine site. Following mitigation, the significance of the predicted impact resulting from the destruction of archaeological sites and monuments is assessed as low to negligible adverse.

5.8.2 Mitigation Measures

5.8.2.1 General Cultural Heritage Mitigation Options

There are a number of mitigation methods for archaeological receptors.

- Preservation in situ: design scheme to avoid impacts on remains. Preservation in place is always the preferred option (IFC Performance Standard 8, paragraph 7).
- Replacement by record: record remains prior to removal.
- Relocation: move site, where feasible or appropriate, to another location.
• Protection: protect sites with permanent fencing (post & mesh) with an entrance gate for monitoring, maintenance and inspection, and signage indicating the legal protection afforded to the site and providing interpretative information.

• Avoid impacts during works: temporary flagging of sites, installing signage and fixing traffic routes to avoid vehicle rutting.

• Reduce the risk of illegal looting of archaeological objects: workers information campaign, Chance Find Procedures, record vulnerable sites before/during mine development.

All fieldwork will be undertaken either by or supervised by a Ministry of Culture approved archaeological specialist or IMRS workers.

5.8.2.2 Specific Cultural Heritage Mitigation Options

**Discovery of a previously unknown site/accidental discovery**

No culturally significant archaeological or historical sites, remains or objects (including graves) accidentally discovered during prospection, groundworks, excavation or construction shall be disturbed until properly investigated. Chance Find Procedures, which identify what measures should be taken in the event that physical cultural resources are encountered, will be prepared and implemented as part of the EMS. The EMP will also contain recommendations regarding staff training and capacity development.

**Sites in the vicinity of the proposed construction camp**

The proposed mitigation for the tombs to the east of the proposed construction camp is as follows:

(1) In the short term, sites will be flagged prior to the start of any works in order to avoid accidental damage or vehicle tracking. An IMRS-approved archaeologist will identify the site perimeter(s), measuring and mapping the areas to be flagged. This will be followed by physical flagging using wooded stakes.

(2) In the medium to long term, permanent perimeter fencing will be constructed to protect the sites. This fencing should be installed at the beginning of the construction stage. Should it not be possible to adapt the final detailed design to avoid any impacts, sites will be subject to excavation and recording (replacement by record).

**Sites threatened by potential looting**

Several Neolithic sites with extensive surface artefact scatters are threatened by looting (Sites 27, 28, 29, 30, 31, 33, 25, 26, 32, 34, 35, 36, 37 and 38).

The extent and impact of illegal looting will be limited through a workers information campaign, the enforcement of a Mine site workers environmental code of conduct, and the strict application of Chance Finds Procedures, which will all refer to national legislation and the 1970 UNESCO Convention on Cultural Property. Sites judged to be particularly vulnerable will be recorded prior to and in the course of mine development (surface artefact collection, targeted excavation).

**Sites threatened by vehicle damage**

All inventoried sites are vulnerable to vehicle damage; in particular the Neolithic surface scatters on the old dunes and the tombs in the regs. Damage may involve crushing of artefacts, creation of ruts, soil displacement and increased erosion. Vehicles will adhere to controlled routes identified by signage and vulnerable sites will be flagged.
5.8.3 Summary

A summary of the potential residual impacts of the proposed Phase 1a(ii) with respect to archaeology and cultural heritage are presented in Table 5.11.

Table 5.11: Summary of potential residual impacts1 – Archaeology and Cultural Heritage

<table>
<thead>
<tr>
<th>Location</th>
<th>Source of Impact</th>
<th>Mitigation Measure</th>
<th>Project Phase2</th>
<th>Nature3</th>
<th>Duration3</th>
<th>Significance4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mine site</td>
<td>Construction camp, ancillary facilities, utilities etc.</td>
<td>Preservation by design; Chance Find Procedures.</td>
<td>C O</td>
<td>Adverse</td>
<td>Long term</td>
<td>Low to negligible</td>
</tr>
<tr>
<td>Looting/degradation of surface scatters and tombs</td>
<td>Workers information campaign, workers code of conduct, Chance Finds Procedures. EMS. Vulnerable sites to be recorded before/during development. Protection of sites (permanent perimeter fencing).</td>
<td>C O Adverse Long term Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crushing of sites/artefact scatters by vehicles</td>
<td>Controlled routes, signage, and flag sites. Protection of sites (permanent perimeter fencing).</td>
<td>C O Adverse Long term Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1Following implementation of proposed Mitigation Measures
2Project Phase: C = Construction, O = Operation, D = Decommissioning and Closure
3Duration and significance refer to the predicted impact after the implementation of proposed mitigation measures and is based on the ratings provided in Table 5.2.

5.9 Landscape and Visual

5.9.1 Potential Impacts

5.9.1.1 Landscape

It is considered that Phase 1a(ii) Project components will be similar in nature to that currently experienced on-site, and therefore they will not introduce a new land use to the Mine.

Currently in the immediate vicinity of the Mine; the mining operations, perimeter fence and industrial buildings all exert an existing adverse influence on landscape character. Although the Mine facilities detract from the landscape context, and introduce an industrialised character into the desert landscape, the effect is localised and are an insignificant area/percentage of the overall landscape context. In addition it is considered that the existing Mine has a high capacity to accommodate Phase 1a(ii) Project components.

Potential landscape effects applicable to Phase 1a(ii) are therefore considered to be low. The development would not entail removal of characteristic landscape elements and is a relatively
minor addition to infrastructure currently present. Overall it is assessed that the development would have a negligible/insignificant effect on the baseline landscape character.

5.9.1.2 Visual

Potential visual impacts arising from Phase 1a(ii) include:

- Change in the nature of views and increased visibility of new buildings/extended buildings and other infrastructure;
- During the construction period, potential for visual impact arising from temporary use of equipment which add to intrusion within a view; and
- Visual impact arising from the height, scale and nature of the buildings and the degree to which this would change the nature of the view.

A perimeter fence is currently being installed around the Mine site and this will act to restrict the proximity of views and therefore reduce magnitude in comparison with the existing baseline situation.

The extent to which Phase 1a(ii) will give rise to additional visual impact during operation to that identified in the baseline visual assessment is considered in Table 5.12 in relation to the representative viewpoint categories.

The effects are described for each viewpoint category during the operation of the Mine and post closure. For each viewpoint category, the landscape and visual impact assessment therefore identifies the period of impact during operations and the long-term impact of the site assuming the buildings are removed. Potential visual impacts are outlined in Table 5.12 below.

**Table 5.12: Potential Visual Impacts**

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Potential Visual Impact</th>
</tr>
</thead>
</table>
| Intermittently inhabited properties occupied by nomadic peoples | The existing Mine is a prominent element of the view in an otherwise undeveloped desert landscape.  
  - Construction and Operation - increased infrastructure will be viewed prominently but will not change the overall nature of the view or add significantly to visual impact. The impact on the baseline environment is low.  
  - Post closure - the infrastructure will be removed and the Phase 1a(ii) areas of the Mine will revert to desert. The impact is considered to be negligible. |
| Tracks within the desert used primarily by nomadic peoples and workers at the Mine | The existing Mine is a prominent element of the view in an otherwise undeveloped desert landscape. However existing screening from locations in the wider landscape results in views of the existing Mine only being seen in close proximity from a small number of extremely isolated locations, primarily accessed by those within the Mine site.  
  - Construction and Operation - The impact on the baseline environment is negligible.  
  - Post closure - the infrastructure will be removed and the Phase 1a(ii) areas of the Mine will revert to desert. The impact is considered to be negligible. |
| The access road and worker locations around the Mine | Those presently accommodated on the Mine are not considered significant receptors of impacts as they will utilise the buildings and access road. The increased infrastructure will be viewed prominently but would not change the overall nature of the view. The impact on the baseline environment is low. |
Visual impacts have been assessed during construction, operation and post closure when the buildings/infrastructure of Phase 1a(ii) has been removed. The significance of visual impact for temporary residential location used by nomads would be low. For other locations, outside of the perimeter fence, accessed by nomads, the significance of visual impacts would be negligible (i.e. the development would cause a perceptible deterioration in the existing view). For mine workers using the vicinity of the Mine, visual impact is assessed as insignificant.

5.9.2 Mitigation Measures

The nature of Phase 1a(ii) Project components and the location of the Mine in a remote desert location are such that no specific mitigation measures are proposed for landscape or visual impacts.

5.9.3 Summary

A summary of the potential impacts of the proposed Phase 1a(ii) with respect to landscape and visual are presented in Table 5.13.

Table 5.13: Summary of potential residual impacts\(^1\) – Landscape and Visual

<table>
<thead>
<tr>
<th>Location</th>
<th>Source of Impact</th>
<th>Mitigation Measure</th>
<th>Project Phase(^2)</th>
<th>Nature(^3)</th>
<th>Duration(^3)</th>
<th>Significance(^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mine site</td>
<td>Change in landscape</td>
<td>No mitigation measure required</td>
<td>C O</td>
<td>Neutral</td>
<td>Medium term</td>
<td>Negligible</td>
</tr>
<tr>
<td></td>
<td>Visual impact of additional infrastructure and equipment</td>
<td></td>
<td>C O</td>
<td>Adverse</td>
<td>Medium term</td>
<td>Low</td>
</tr>
</tbody>
</table>

\(^1\)Following implementation of proposed Mitigation Measures

\(^2\)Project Phase: C = Construction, O = Operation, D = Decommissioning and Closure

\(^3\)Duration and significance refer to the predicted impact after the implementation of proposed mitigation measures and is based on the ratings provided in Table 5.2.

5.10 Traffic

5.10.1 Potential Impacts

Potential impacts on traffic involve, increasing traffic volumes and vehicle movements associated with Phase 1a(ii).

During construction of Phase 1a(ii), there will be a slight increase in vehicle movements outside of the existing Mine footprint for the delivery of materials. The majority of these materials will be transferred with routine deliveries. Existing Mine plant and vehicles will be used as far as practical during construction, therefore increased traffic within the Mine footprint will be negligible.

During operation of Phase 1a(ii), there will be an increase in vehicle movements associated with the construction of subsequent Project Phases and their operation.

During construction and operation there is a minor risk of accidents at the junction of the access road and the Nouakchott – Nouâdhibou N2 highway, along the access road or within the Mine site.
5.10.2 Mitigation Measures

The vehicles required for the construction and operation of the Phase 1a(ii) development are currently on-site, therefore the potential impacts on traffic are considered to be negligible. Specific mitigation measures for traffic are therefore not proposed; however the existing best practice on-site will be extended to include Phase 1a(ii). For example, Mine workers, and where relevant contractors, will undergo driver training to reduce the risk of accidents along the access road and on internal roads within the Mine Site, and plant will only be operated by specially trained drivers. Delivery drivers will be given instructions on entering and leaving the mine site and will be required to stay on the road.

All roads within the Mine site and along the access road will be clearly marked and sign posted to ensure that vehicles only operate on designated roads. In addition a safe speed limit has been set for the access road and within the Mine site.

5.10.3 Summary

A summary of the potential impacts of the proposed Phase 1a(ii) following the implementation of mitigation measures with respect to traffic is presented in Table 5.14.

Table 5.14: Summary of potential residual impacts1 – Traffic

<table>
<thead>
<tr>
<th>Location</th>
<th>Source of Impact</th>
<th>Mitigation Measure</th>
<th>Project Phase</th>
<th>Nature</th>
<th>Duration</th>
<th>Significance</th>
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<tr>
<td>Mine Site</td>
<td>Increased traffic</td>
<td>The enforcement of driver training and speed limits along all roads. Also ensure that all roads are clearly sign posted.</td>
<td>C O</td>
<td>Adverse</td>
<td>Short term</td>
<td>Low</td>
</tr>
<tr>
<td>Traffic accidents</td>
<td></td>
<td></td>
<td>C O</td>
<td>Adverse</td>
<td>Short term</td>
<td>Low</td>
</tr>
</tbody>
</table>

1Following implementation of proposed Mitigation Measures

2Project Phase: C = Construction, O = Operation, D = Decommissioning and Closure

3Duration and significance refer to the predicted impact after the implementation of proposed mitigation measures and is based on the ratings provided in Table 5.2.
6 Analysis of Alternatives

6.1 Introduction
This Section presents a description of the alternatives considered for the Project and Phase 1a(ii). The “zero option” considers that the Project would not take place and that operations at the Mine would continue as present. The “project components” option considers the alternative for design and location of Phase 1a(ii) Project components.

6.2 The Zero Option
The zero option signifies that the Project, and hence Phase 1a(ii), would not take place and that existing operations at the Mine would continue as present.

The Mine expansion activities will allow the existing operations to expand and maximise the efficiency and productivity. The zero option has therefore been discounted as it does not maximise recovery from ore and reduces the revenue generated by the Mine. In turn the benefits of increased employment opportunities, infrastructure development and contribution to the national economy would not be realised.

6.3 Phase 1a(ii) Project Components
Alternative areas for development of the Phase 1a(ii) components outside of the existing Mine site boundary have been discounted to avoid new land take. Within the boundary, alternatives have considered development of various locations, however, where practicable certain facilities are being located adjacent to existing facilities to minimise additional impacts.
7 Consultation

Public consultation has been undertaken for the operating mine, during the compilation of previous EIAs (SNC Lavalin 2004, Scott Wilson, 2008a, b, c, d and 2009a, b, 2010 a). It is also an ongoing process of the existing operations.

Consultation with stakeholders regarding the Project will be ongoing, and the process is outlined in the Project Public Consultation and Disclosure Plan (PCDP).

As outlined in Section 1.3 numerous meetings have been held with Government regarding the EIA process. The ToR for Phase 1a(ii) EIN was presented to Government in April, and subsequently revised and resubmitted to Government in May 2011.
8 Timeline

The construction of Phase 1a(ii) Project components will commence once the EIN has been approved and the permit has been issued by the MPEM. This will be an approximate 8 month construction period as summarised in Figure 5.

The Project will have a 16 year life and there is potential to further extend the mine life. It is expected the Project will be fully commissioned by early 2014.

Following the operational period, the Project will enter its closure phase where operations and infrastructure will be decommissioned in accordance with the agreed Closure and Rehabilitation Plan, as required by Decree No. 2004-054. Once the closure phase is completed TMLSA will submit an application to Government for release of the Financial Guarantee.

Each Phase of the Project will be subject to EIA processes and any cumulative impacts will be assessed and mitigation actions will be incorporated into and implemented via the Mine’s existing EMS (Scott Wilson, 2010b). As required by Mauritanian legislation, annual environmental audits will be submitted to the Government after the first year of construction for the duration of the Project.
References


British Standard, 2009. BS 5228 Control of noise on construction and open sites.


Scott Wilson, 2010b. Framework Environmental Management System, Specific plans and procedures include Environmental Programme SGDE01 and Environmental Monitoring Plan SGDE04.


Phase 1a(ii) Environmental Impact Notice - Photographs
Photograph 3-1: Existing open pit

Photograph 3-2: Mining within existing open pit
Photograph 3-3: Existing CIL Process Plant

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- Protohistoric Tombs (c.2500 Before Present - c.1000 BP)
- Neolithic Occupation Sites (c.6000 - 2800 BP)
- Neolithic Burials (c.6000 - 2800 BP)
- Stray Find
- Existing Mine Site Layout
- Fenceline

ARCHEOLOGY BASELINE SURVEY

FIGURE 4
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Appendix 1 – Phase 1a(ii) Environmental Impact Notice
Terms of Reference Report
Tasiast Mauritania Limited SA
Tasiast Gold Mine Expansion Project

**Phase 1a(ii): Supporting Infrastructure:** Fuel Farm Expansion, Accommodation Camp, Offices and Warehouses

**Environmental Impact Notice**
**Terms of Reference**

Final Report 5 May 2011
Revision Schedule

Terms of Reference Phase 1a(ii) EIN
5 May 2011

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Limitations

The conclusions and recommendations contained in this Report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by URS Scott Wilson has not been independently verified by URS Scott Wilson, unless otherwise stated in the Report.

The methodology adopted and the sources of information used by URS Scott Wilson in providing its services are outlined in this Report. The work described in this Report was undertaken between December 2010 and March 2011 and is based on the conditions encountered and the information available during the said period of time. The scope of this Report and the services are accordingly factually limited by these circumstances.

Where assessments of works or costs identified in this Report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

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Certain statements made in the Report that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are based on reasonable assumptions as of the date of the Report, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. URS Scott Wilson specifically does not guarantee or warrant any estimate or projections contained in this Report.

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List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>CIL</td>
<td>Carbon-in-Leach</td>
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<td>EHS</td>
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<td>International Finance Corporation</td>
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<td>Tailings Storage Facility</td>
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Introduction

1. Background

The Tasiast Gold Mine (the Mine) is an existing gold mine, situated in the Inchiri Wilaya of northwestern Mauritania. Operations commenced in July 2007, initially under the ownership of Rio Narcea Gold Mines in July 2007 and subsequently following acquisition by Red Back Mining Inc.. On commissioning the Mine had a predicted life of ten years, at a nominal milling rate of 3,200 tpd.

Kinross completed the acquisition of the Tasiast mine on September 17, 2010, as part of its combination with Red Back Mining.

As a result of identifying additional gold resources through ongoing exploration within the mining licence area (MLA), TMLSA plans to expand the Mine’s operations through an Expansion Project (the Project).

Refer to Figure 1 for site location.

1.2 The Project

TMLSA has completed a mine scoping study for the Project. The Project is based on a 16 year mine plan (following a three year construction period) and there is potential to further extend the mine life. The Project is anticipated to have a three-year construction period, whilst current mining operations are ongoing, and is expected to be fully commissioned by early 2014. Construction of the proposed infrastructure and ancillary facilities will be phased over this three year period.

The Project proposes to expand operations at the Mine to a nominal milling rate of approximately 70,000 tpd to 80,000 tpd. To achieve this, there will be an expanded open pit, a new mill, new Carbon-in-Leach (CIL) process plant, new Tailings Storage Facility (TSF) (comprising three cells) and new waste rock dumps.

Project power demands, for both construction and operations, will be supplied through additional new power plants and a new fuel farm. An initial new power plant will be installed followed by a second, larger power plant. Existing diesel power facilities at the borefield and intermediate pump station will be expanded. In addition, a separate power plant will be developed to supply power for the proposed sea water extraction and supply system..

Increased water demands will be required for the Project construction and expanded operations. It is proposed that the increased water demand for construction will be met through the temporary (approximately four years) expansion of the borefield. To support this temporary expansion it is proposed that additional wells are developed within and adjacent to the existing borefield and a new water supply pipeline be constructed. To meet the Projects operational water demands it is proposed that a sea water extraction and supply system is developed. In addition new water treatment facilities and water storage ponds will be developed on the existing Mine site.

To improve accessibility to the Mine, it is proposed to both upgrade the existing 60 km access road and to develop a new airstrip. There will also be development of new ancillary facilities such as but not limited to, new accommodation camps, sewage and waste management facilities, new maintenance workshops, new offices and new warehouse facilities.

Kinross has commissioned URS/Scott Wilson to undertake the Environmental Impact Assessment (EIA) requirements for the Project.
1.3 Approach to Permitting

In order to achieve Project commissioning by early 2014, it is necessary to phase the construction works and commence some early preparatory works in 2011. The overall Project has therefore been divided into three Phases, based on the type of works to be carried out (components), construction timing, geographical location, and permitting and environmental assessment requirements. Each Phase will be subject to EIA processes and any cumulative impacts will be assessed and mitigation actions will be incorporated into and implemented via the Mine’s existing Environmental Management System (EMS) (Scott Wilson, 2010b).

The Project has also been divided into two distinct areas:

- **On-site**: within the Mine, which comprises the areas of the Mine site, access road and borefield. Existing operations are on-going in this area and the area has experienced a degree of disturbance. As part of permit requirements for the Mine operations, this area has previously been subject to several EIAs (SNC Lavalin, 2004; Scott Wilson, 2008a,b,c,d, 2009a,b, 2010a); and

- **Off-site**: areas outside of the Mine. These areas may or may not be disturbed and have not previously been subject to EIA for Mine related operations.

The proposed Project components for Phase 1a(ii) permitting requirements and geographical areas are summarised in Table 1-1 below.

### Table 1-1: Phase 1a(ii) Project Components

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Location</th>
<th>Overview</th>
</tr>
</thead>
</table>
| Phase 1a(ii)  | On-site   | - New warehouse and office facilities  
|               |           | - New accommodation camp  
|               |           | - Expansion of fuel farm |

Phase 1a(ii) components are classified as Category B developments in line with Mauritanian Decrees No. 2004-094 and No. 2007-105. As such this phase is subject to an Environmental Impact Notice (EIN). The EIN will assess the significance of potential impacts resulting from the components of Phase 1a(ii). This Report is relevant to Phase 1a(ii) EIN, only.

To introduce the Project and the phased approach to permitting, an initial meeting with Ministries was held in Nouakchott on 13 January 2011. This meeting involved TMLSA - Kinross, URS/Scott Wilson, the Ministry of Petroleum, Energy and Mines (MPEM), the Ministry of Environment and Sustainable Development (MESD) and the Ministry of Water and Sanitation (MWS). During this meeting, a Project Coordination Committee (PCC) was proposed to support the Phased approach to permitting. The PCC is expected to be formed of key Ministry officials and members from TMLSA - Kinross and URS/Scott Wilson.

1.4 Reporting

The EIN will be prepared and structured in accordance with the requirements of Mauritanian Legislation, in particular, the Environment Code No. 2000-045 and Decrees No. 2004-094 and No. 2007-105. It will comprise two reports, namely:
• **Terms of Reference (ToR) Report:** The ToR Report provides an overview of the proposed Phase 1a(ii), the environmental issues and the terms of reference for the detailed studies and approach for the EIN; and

• **EIN Report:** The EIN Report will document the assessment process in accordance with the approach set out in the ToR Report.

This Report presents the ToR for Phase 1a(ii) EIN.

In addition to Mauritanian legislation, the EIN is also being undertaken to the World Bank Group's International Finance Corporation (IFC) Performance Standards, it's supporting applicable IFC Environment Health and Safety (EHS) Guidelines and other general international industry best practice.
2 The Project

2.1 Existing Operations

The Mine is situated in the Inchiri Wilaya of north western Mauritania, approximately 300 km north of Nouakchott, 250 km southeast of Nouâdhibou and 65 km east of Parc National Banc D’Arguin (PNBA) (see Figure 1). Water is supplied to the Mine via two pipelines from the borefield located 60 km to the west of the Mine. Access to the Mine from the main Nouakchott–Nouâdhibou N2 highway is via a 60 km two-lane unsealed road (see Figure 2).

Currently the Mine covers an area of approximately 700 ha. It comprises a series of open pits, two TSFs (TSF 1 being decommissioned and TSF 2 is operational), dump leach facilities, a CIL process plant, waste rock dumps and several supporting ancillary facilities. These facilities include a power plant fuelled by HFO, workshops, laboratory, offices and a light aircraft air strip. Employees are accommodated on-site in a mine camp.

Two conventional process streams are currently utilised for gold extraction. High grade ore is crushed and treated in the CIL plant while low grade ore is treated using the dump leach facilities. Currently the Mine operates at nominal milling rate of up to 9,000 tpd and has an operating life of ten years.

2.2 Project Terminology

The Project comprises all the components required for the expansion of Mine operations to achieve a nominal milling rate of approximately 70,000 to 80,000 tpd.

The terminology to be used to assess the Project is summarised in Table 2-1.

<table>
<thead>
<tr>
<th>Terminology</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Road</td>
<td>60 km existing two-lane unsealed road, which connects the main Nouakchott–Nouâdhibou road to the Mine.</td>
</tr>
<tr>
<td>Borefield</td>
<td>The borefield, located 60 km to the west of the Mine, includes 28 abstraction and 8 observation boreholes and is connected to the Mine site via two pipelines which supplies the Mines operational and potable water requirements.</td>
</tr>
<tr>
<td>Mine site</td>
<td>The area where all mining and processing operations take place together with the associated infrastructure such as equipment, maintenance workshops, power supply, office buildings, and other supporting facilities such as but not limited to, accommodation facilities and the air strip.</td>
</tr>
<tr>
<td>Mine</td>
<td>The Mine site, access road and borefield.</td>
</tr>
<tr>
<td>On-site</td>
<td>Within the Mine (which comprises the areas of the Mine site, access road and borefield).</td>
</tr>
<tr>
<td>Off-site</td>
<td>Outside of the Mine.</td>
</tr>
<tr>
<td>Project</td>
<td>Expansion of the Mine’s operations and on-site and off-site infrastructure.</td>
</tr>
</tbody>
</table>
2.3 Phase 1a(ii) Project Components

Phase 1a(ii) involves the development of supporting infrastructure and preliminary upgrade of “on-site” ancillary infrastructure to enable the expansion of the Mine and comprises (See Figure 2):

- **Expanding existing fuel farm**: it is proposed to increase the capacity of the existing HFO fuel farm facilities and distribution system. The expanded fuel farm will supply fuel to the construction equipment and post-construction will supply the proposed new HFO power plant (Phase 1b);

- **Initial new accommodation camp**: to provide accommodation for initial contract workers, it is proposed to construct a new accommodation camp away from the existing accommodation camp. The initial new accommodation camp is less than 3,000m² and would comprise approximately 500 beds for Mine and contract workers. The initial new accommodation camp will include ancillary facilities such as waste water treatment facilities;

- **Four new office facilities (less than 3,000m² each)**: new office facilities which will be located within the Mine site; and

- **New warehouse facilities (less than 3,000m²)**: new warehouse facilities which will be located within the Mine site.
3 Environmental and Social Setting

3.1 Introduction

This Section presents a brief overview of the current environmental and social conditions of the Inchiri Wilaya, in which the existing Mine (including the Phase 1a(ii) Project components) is located. These conditions will be described in more detail in the EIN and used as the baseline against which potential impacts will be assessed and monitored.

3.2 Environmental Setting

The Mine is located in an arid region. Data derived from the Akjoujt meteorological station, located 150 km southeast of the Project, for the period between 1995 and 2005, indicate that the average annual rainfall is 84mm (Service de la Météorologie, 2009). Prevailing winds are from the north and east, with westerly winds during July and August. Average temperatures for Akjoujt are between 22.3°C (minimum) and 36.3°C (maximum) (Service de la Météorologie, 2009).

The Project is located within the “Aouéouat” sector, and is entirely composed of crystalline and metamorphic rocks from the Precambrian period characterized by their low permeability. The rocky substrata are composed of slightly fractured Archean rocks on which there is a thin layer of sand and laterite (Scott Wilson 2010a). The arid climate and underlying geology of the region give rise to a topography characterised by sand dunes, plains and rocky outcrops. The soils in the Project area are characterized by gravely soils, and dry, sandy desert soils.

There are no permanent watercourses in the vicinity of the Mine. However, the Project area is crossed by a number of Wadi systems that only flow for a few days per year following heavy rainfall, notably Khatt Ataoui, Khatt el Khleijane and Echrak Wadis (Scott Wilson 2010a). The Khatt Ataoui Wadi is located approximately 6 km west of the Mine site (Scott Wilson 2010a). The Khatt el Khleijane Wadi is located south of the borefield and Echrak Wadi is located north of the borefield. The Mine site is located in an area of Precambrian base rock with a low permeability and aquifer potential. A number of hydrogeological exploration campaigns were undertaken at the Mine site, which determined that groundwater is located between 40 and 60 m below the surface (Scott Wilson 2010a). However water quality analysis indicates that this water is highly saline with high concentrations of chloride, sulphate and heavy metals making it generally unsuitable for industrial or potable use.

Mauritanian vegetation is essentially distributed according to climatic and geomorphological conditions. The Mine is located in the Saharan zone, the predominant ecological area in Mauritania, where flora is very scarce and is mainly colonised by Zygophyllum album, along with Maerua crassifolia (atil) and Asistida pungens (sbot). Acacias are also present along many of the Wadis. There are no forests in the area. Jackals, fennec foxes and zorille foxes have been recorded as being present in the vicinity. Although vegetation is sparse, previous surveys have identified the presence of three nationally protected tree species, on site.

3.3 Socio-Economic Setting

The Mine is remotely situated approximately 300 km north of Nouakchott, 250 km southeast of Nouâdhibou and 65 km east of PNBA (see Figure 1). There are no formal settlements in the vicinity the Mine. The nearest industries are in the towns of Boulanour, Akjoujt and Bennichab, which are located approximately 100 km northwest, east southeast and southeast from the Mine respectively. Bennichab has a water bottling operation, whilst the Guelb Moghrein Copper/Gold mine is located near Akjoujt.
A number of isolated families have set up temporary structures and inhabit the area surrounding the Mine. Similarly, approximately 1 km east of the borefield, a few families have set up temporary structures and market stalls at the junction of the Mine access road and the main Nouakchott-Nouâdhibou road.

The nomadic way of life is a feature of Mauritanian culture, whilst this way of life is in decline there are a number of nomadic people located within the vicinity of the Mine.

3.4 Archaeology Setting

The Mine site contains a few historic Muslim tombs which are protected by national/Islamic law and customary practice. None of the archaeological sites identified are considered to be rare, and none have been designated according local, national or international standards in terms of their outstanding social, aesthetic, community or scientific value.
4 Environmental Scope of Work

4.1 Approach to Assessment

An assessment of the environmental and social impacts associated with the Phase 1a(ii) will be undertaken as part of the EIN. This assessment will address potential impacts from construction, operation and closure. Potential receptors of impacts will be identified from baseline data, with an assessment of the significance of potential impacts on these receptors.

Extensive baseline data, including both primary and secondary data, was gathered for the initial permitting (SNC Lavlin, 2004) and has been updated through additional EIAs (Scott Wilson, 2008a,b,c,d, 2009a,b, 2010a). This information will be updated where necessary, and supplemented by the commissioning of additional baseline studies.

This ToR report has been developed based on these existing data URS/Scott Wilson’s extensive knowledge of the area and a scoping visit undertaken in December 2010. This information will be further supported by validation baseline surveys. The following baseline surveys have been undertaken (February 2011) for Phase 1a(ii) EIN:

- Archaeology; and
- Ecology.

The findings of the baseline studies will be incorporated into the Phase 1a(ii) EIN.

As noted in Section 1.4, this assessment will be undertaken in line with the relevant Mauritanian legislation and World Bank Group’s IFC Performance Standards; it’s supporting applicable IFC EHS Guidelines and other general international industry best practice. As such the approach will include:

- Gathering of available environmental and social baseline data;
- Analysis of the proposed development and alternatives with regard to potential impacts and risks during construction, operation and closure;
- Identification of environmental mitigation strategy;
- Prediction and assessment of impacts of the mitigated Project in terms of their magnitude, significance and duration; and
- Collation of the above information into the EIN report.

The EIN process is iterative and will be undertaken in tandem with the Project design.
4.2 Report Structure

The EIN report will be prepared in line with Annex II of Decree No. 2007 – 105 and will document the assessment process in accordance with the approach set out in the ToR report. The proposed EIN contents are as follows:

1. Executive summary
2. Legislation, legal and institutional framework
3. Description of the project
4. Baseline conditions
5. Impacts assessment
6. Analysis of alternatives
7. Public Consultation
8. Timeline
9. References
5 Environmental Impacts

As the Project components being assessed in this EIN for Phase 1a(ii) are all within the Mine and do not result in any amendments to operational activities, the potential for significant environmental or social impacts is anticipated to be limited.

A summary of the potential sources of environmental and social impacts relating to the Phase 1a(ii) are listed in Table 5-1 below.

The EIN will further assess these sources, their impacts and propose mitigation where appropriate using standard methods of assessment and terminology.

It is intended that all environmental parameters are documented in the EIN but only potentially significant impacts arising from the proposed Project will be examined in detail.

Table 5-1: Phase 1a(ii) Potential Environmental and Social Impacts

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Potential Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td>Dust generation cause by construction vehicles, foundation laying, drilling and blasting.</td>
</tr>
<tr>
<td></td>
<td>Production of CO₂, NO₂ and SO₂ from vehicles during construction.</td>
</tr>
<tr>
<td>Noise and Vibration</td>
<td>Noise and vibration from vehicles and plant during construction.</td>
</tr>
<tr>
<td>Soils and Land Use</td>
<td>Soil erosion cause by stripping areas for the office and workshop facilities.</td>
</tr>
<tr>
<td></td>
<td>Soil contamination from oils and hazardous chemicals in areas for the office and workshop facilities.</td>
</tr>
<tr>
<td>Water Resources and Quality</td>
<td>Contamination of groundwater cause by spillage of oils and hazardous chemicals during construction.</td>
</tr>
<tr>
<td>Flora and Fauna</td>
<td>Clearance of vegetation and loss of habitat for areas for the office and workshop facilities.</td>
</tr>
<tr>
<td>Socio-Economic</td>
<td>Direct and indirect contribution to Mauritania’s economy.</td>
</tr>
<tr>
<td>Archaeology and Cultural Heritage</td>
<td>Damage or loss of archaeological sites for areas for the office and workshop facilities.</td>
</tr>
<tr>
<td>Waste Management</td>
<td>Increased waste production (domestic and hazardous) due to construction activities.</td>
</tr>
<tr>
<td>Health and Safety</td>
<td>Effects on health due to increased noise, dust and vibration during construction activities.</td>
</tr>
<tr>
<td></td>
<td>Accidents with vehicles due to increased traffic during construction.</td>
</tr>
</tbody>
</table>
6 Consultation

Previous and ongoing consultation has been undertaken for the Mine in general and reported in previous EIAs (SNC Lavalin, 2004; Scott Wilson, 2010a).

Consultation shall be undertaken as part of the Project. The process was initiated in January 2011 when introductory meetings were undertaken with the MPEM, MESD and MWS (see Section 1.3).

In addition, to facilitate open and transparent communications regarding the Project, a PCC has been proposed to ensure that information exchange regarding permitting is transparent and timely. The Project permitting professionals will also engage and collaborate with Ministries and other key stakeholders throughout the process.

A site visit was carried out to inspect the areas proposed for construction of the Phase1a(ii) components, between 21-23 April 2011 by representatives of MESD and MPEM.
7 References


Figures
TASIAST GOLD MINE  EXPANSION PROJECT

SITE LOCATION PLAN

FIGURE 1

Parc National Banc d'Arguin
Tasiast Borefield
Tasiast Gold Mine
Mine Site Access Road
Railroad
Nouakchott
Nouadhibou N2 Highway
Parc National Banc d'Arguin

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Scott Wilson Ltd

KINROSS 2011
1:1,000,000 Scale Mapping:
University of Texas Libraries 2010
Railroads and Roads:
© OpenStreetMap contributors, CC-BY-SA
Parc National Banc d'Arguin:
Ministry of the environment and sustainable development

NOTES
- Tasiast Borefield
- Tasiast Gold Mine
- Mine Site Access Road
- Railroad
- Nouakchott
- Nouadhibou N2 Highway
- Parc National Banc d'Arguin

02.03.11

FIGURE 1
Appendix 2 – Noise Impact Assessment
### Noise Impact Assessment

Table 1 below outlines potential levels of noise impacts for pieces of equipment which would be utilised in construction and operation.

Sound power levels for each piece of equipment have been sourced from BS 5228 ‘Control of noise on construction and open sites’.

#### Table 1: Control of noise on construction and open sites

<table>
<thead>
<tr>
<th>Construction Activity</th>
<th>Plant</th>
<th>Sound Power Level LW dB(A)</th>
<th>No. of Plant</th>
<th>Overall LW dB(A)</th>
<th>On-time (% of hour)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Clearance</td>
<td>Chainsaw</td>
<td>114</td>
<td>1</td>
<td>114</td>
<td>10</td>
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</tr>
<tr>
<td></td>
<td>Dozer</td>
<td>108</td>
<td>1</td>
<td>108</td>
<td>50</td>
<td>BS 5228 Table C.2 ave no.’s 10-13</td>
</tr>
<tr>
<td></td>
<td>Dumper</td>
<td>111</td>
<td>1</td>
<td>111</td>
<td>50</td>
<td>BS 5228 Table C.2 ave no.’s 30-31</td>
</tr>
<tr>
<td></td>
<td>Scraper</td>
<td>110</td>
<td>1</td>
<td>110</td>
<td>50</td>
<td>BS 5228 Table D.9 no. 14</td>
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<td></td>
<td>Loading lorries</td>
<td>106</td>
<td>1</td>
<td>106</td>
<td>83</td>
<td>BS 5228 Table C.2 ave no.’s 26-28</td>
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<tr>
<td>Earthworks</td>
<td>Excavator (tracked)</td>
<td>110</td>
<td>1</td>
<td>110</td>
<td>83</td>
<td>BS 5228 Table D.3 ave no.’s 34-40</td>
</tr>
<tr>
<td></td>
<td>Dumper</td>
<td>111</td>
<td>1</td>
<td>111</td>
<td>50</td>
<td>BS 5228 Table C.2 ave no.’s 30-31</td>
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<tr>
<td></td>
<td>Dozer</td>
<td>108</td>
<td>1</td>
<td>108</td>
<td>50</td>
<td>BS 5228 Table C.2 ave no.’s 10-13</td>
</tr>
<tr>
<td></td>
<td>Lorries/hr</td>
<td>105</td>
<td>6</td>
<td>113</td>
<td>83</td>
<td>BS 5228 Table D.7 ave no.’s 121-122</td>
</tr>
<tr>
<td>Excavations and foundations</td>
<td>Excavator (tracked)</td>
<td>110</td>
<td>1</td>
<td>110</td>
<td>83</td>
<td>BS 5228 Table D.3 ave no.’s 34-40</td>
</tr>
<tr>
<td></td>
<td>Loader (tracked)</td>
<td>112</td>
<td>1</td>
<td>112</td>
<td>50</td>
<td>BS 5228 Table D.3 ave no.’s 7-21</td>
</tr>
<tr>
<td></td>
<td>Lorry</td>
<td>105</td>
<td>1</td>
<td>105</td>
<td>50</td>
<td>BS 5228 Table D.7 ave no.’s 121-122</td>
</tr>
<tr>
<td></td>
<td>Cement mixer truck</td>
<td>105</td>
<td>1</td>
<td>105</td>
<td>50</td>
<td>BS 5228 Table C.4 ave no.’s 18 &amp; 20</td>
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<tr>
<td></td>
<td>Concrete pump</td>
<td>107</td>
<td>1</td>
<td>107</td>
<td>50</td>
<td>BS 5228 Table D.6 ave no.’s 34 &amp; 36</td>
</tr>
<tr>
<td></td>
<td>Compressor</td>
<td>104</td>
<td>3</td>
<td>109</td>
<td>83</td>
<td>BS 5228 Table D.7 ave no.’s 18-22</td>
</tr>
<tr>
<td></td>
<td>Poker vibrator</td>
<td>98</td>
<td>3</td>
<td>104</td>
<td>83</td>
<td>BS 5228 Table D.6 no. 40</td>
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<tr>
<td>Slab Construction</td>
<td>Cement mixer truck</td>
<td>105</td>
<td>1</td>
<td>105</td>
<td>50</td>
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<tr>
<td></td>
<td>Concrete pump</td>
<td>107</td>
<td>1</td>
<td>107</td>
<td>50</td>
<td>BS 5228 Table D.6 ave no.’s 34 &amp; 36</td>
</tr>
<tr>
<td></td>
<td>Compressor</td>
<td>104</td>
<td>3</td>
<td>109</td>
<td>83</td>
<td>BS 5228 Table D.7 ave no.’s 18-22</td>
</tr>
<tr>
<td>Construction Activity</td>
<td>Plant</td>
<td>Sound Power Level LW dB(A)</td>
<td>No. of Plant</td>
<td>Overall LW dB(A)</td>
<td>On-time (% of hour)</td>
<td>Reference</td>
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<td>BS 5228 Table C.4 no. 38</td>
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<tr>
<td>Steelwork Construction</td>
<td>Poker vibrator</td>
<td>98</td>
<td>3</td>
<td>104</td>
<td>83</td>
<td>BS 5228 Table D.6 no. 40</td>
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<tr>
<td></td>
<td>Crane</td>
<td>106</td>
<td>1</td>
<td>106</td>
<td>50</td>
<td>BS 5228 Table D.6 no. 54</td>
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<tr>
<td></td>
<td>Generator</td>
<td>102</td>
<td>1</td>
<td>102</td>
<td>50</td>
<td>BS 5228 Table D.6 no. 54</td>
</tr>
<tr>
<td></td>
<td>Electric drills</td>
<td>104</td>
<td>2</td>
<td>107</td>
<td>33</td>
<td>BS 5228 Table C.1 no. 18</td>
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<td></td>
<td>Metal cutter</td>
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<td>2</td>
<td>110</td>
<td>33</td>
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<td>Electric bolter</td>
<td>104</td>
<td>2</td>
<td>107</td>
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<tr>
<td></td>
<td>Lorries/hr</td>
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<td>6</td>
<td>113</td>
<td>50</td>
<td>BS 5228 Table D.7 ave no.'s 121-122</td>
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<td>BS 5228 Table C.4 no. 85</td>
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<tr>
<td>Finishing and Fitting</td>
<td>Generator</td>
<td>94</td>
<td>6</td>
<td>102</td>
<td>33</td>
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<tr>
<td></td>
<td>Welding plant</td>
<td>102</td>
<td>1</td>
<td>102</td>
<td>33</td>
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<tr>
<td></td>
<td>Electric drills</td>
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<td>Scott Wilson Internal</td>
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CONSTRUCTION NOISE ASSESSMENT

New Warehouse and Office Facilities

The new warehouse facilities are to be located approximately 600 m to the north of the access road and 245 m from the new office facilities. Noise levels at these offices, if occupied before the warehousing facilities are built, are likely to experience external noise levels in the region of 56-64 dB $L_{Aeq,1}$, resulting in internal noise levels of between 26-34 dB $L_{Aeq}$, meeting the BS 8233 internal noise levels criteria for offices. As external noise levels are below the 70 dB $L_{Aeq}$ limit for offices, the significance of the impact is assessed as negligible.

Accommodation Camp

The boundary of the new accommodation camp is located within 100 m of the existing accommodation camp and as a result construction of the new camp may significantly impact upon the existing camp. The noisiest activities are likely to arise from excavation works, including earthworks, with predicted noise levels 65-75 dB $L_{Aeq,1h}$. Assuming the facades of the existing buildings will provide an attenuation of 30 dB, internal noise levels during construction of the new camp will be in the region of 35-45 dB $L_{Aeq}$. This exceeds the WHO guideline criteria of 30 dB for rooms to be used for resting and sleeping. As the external noise level exceeds the 45 dB $L_{Aeq}$ limit, the significance of the impact is assessed as high.

It is recommended that the nearest new accommodation buildings to the existing camp be constructed first so that these can then provide acoustic shielding to the existing camp as the works commence. It is recommended that during construction of closest buildings that site hoarding be provided to provide some shielding from noise. With the use of noise barriers, or by phasing the construction of the new camp to use the new buildings to provide shielding, providing approximately 10 dB(A) reduction, internal noise levels with closed windows will be less than 35 dB $L_{Aeq}$. Although external noise levels are still predicted to exceed the 45 dB $L_{Aeq}$ limit if acoustic shielding is provided, internal noise levels are within WHO guidelines, assuming closed windows, and therefore the significance of the impact is assessed as low.

Fuel Farm Upgrade

Construction activities associated with the upgrade of the fuel farm are assumed to be earthworks, excavation, slab and steelwork construction. The nearest residential areas to the location of the Fuel Farm are located approximately 1415 m away, therefore unmitigated noise levels from these construction activities are predicted to be in the region of 48 dB $L_{Aeq,1h}$. This results in internal noise levels of 18 dB $L_{Aeq}$ from these works, which fall below the WHO criteria for rooms to be used for resting and sleeping. Although external noise levels are predicted to exceed the 45 dB $L_{Aeq}$ limit, internal noise levels are within WHO guidelines, therefore the significance of the impact is assessed as low.
OPERATIONAL NOISE ASSESSMENT

Fuel Farm Upgrade

The nearest sensitive receptor to the fuel farm is the proposed new operations office at a distance of 205 m. Noise levels in this area are dominated by the existing processing facility and, considering the nature of the fuel farm operations, the significance of the noise effect is assessed as negligible.

The nearest residential accommodation (at the existing accommodation camp) is located approximately 1415 m from the fuel farm. Considering the nature of the fuel farm operations, noise from the existing processing facility and this large distance, the significance of the noise effect is assessed as negligible.

New Accommodation Camp

The boundary of the new accommodation camp is located within 100 m of the existing accommodation camp. Operational noise levels from the new accommodation camp are expected to be comparable to those from the existing camp and the significance of the noise effect at the existing camp is assessed as negligible.

New Office Facilities

Noise emission from the new office facilities will be negligible. The nearest sensitive receptor is any office accommodation in the new warehouse facility at a distance of approximately 245 metres. Resultant noise levels at these warehouse offices will be significantly less than the 70 dB $L_{Aeq}$ limit. The significance of the effect is assessed as negligible.

Resultant noise levels at the accommodation camp, at a distance of approximately 4.2 km will be significantly less than the 45 dB $L_{Aeq}$ limit. The significance of the effect is assessed as negligible.

New Warehouse Facilities

Noise emission from the new warehouse facilities is likely to be low. The nearest sensitive receptor is the proposed new office accommodation at a distance of approximately 245 m. Resultant noise levels at these offices will be significantly less than the 70 dB $L_{Aeq}$ limit. The significance of the effect is assessed as negligible.

Resultant noise levels at the accommodation camp, at a distance of approximately 4.2 km will be significantly less than the 45 dB $L_{Aeq}$ limit. The significance of the effect is assessed as negligible.