

2. PROJECT OVERVIEW

2.1 Location and Access

The Tiris Uranium Project targets an extensive region of near-surface calcrete uranium mineralisation in a remote, extremely arid and unpopulated region of Mauritania in the Sahara Desert approximately 1,100 km northeast of Nouakchott and 500 km northeast of Zouerate. The project consists of two minable resources located approximately 230 km apart in northeastern Mauritania (Figure 2-1).

The two resource areas are the Eastern Tiris Resource Area (comprising the Hippolyte, Sadi, and Lazare resource zones), and the Western Tiris Resource Area (the Ferkik resource zone). The Eastern Tiris Resource Area site will be developed first as the primary project site.

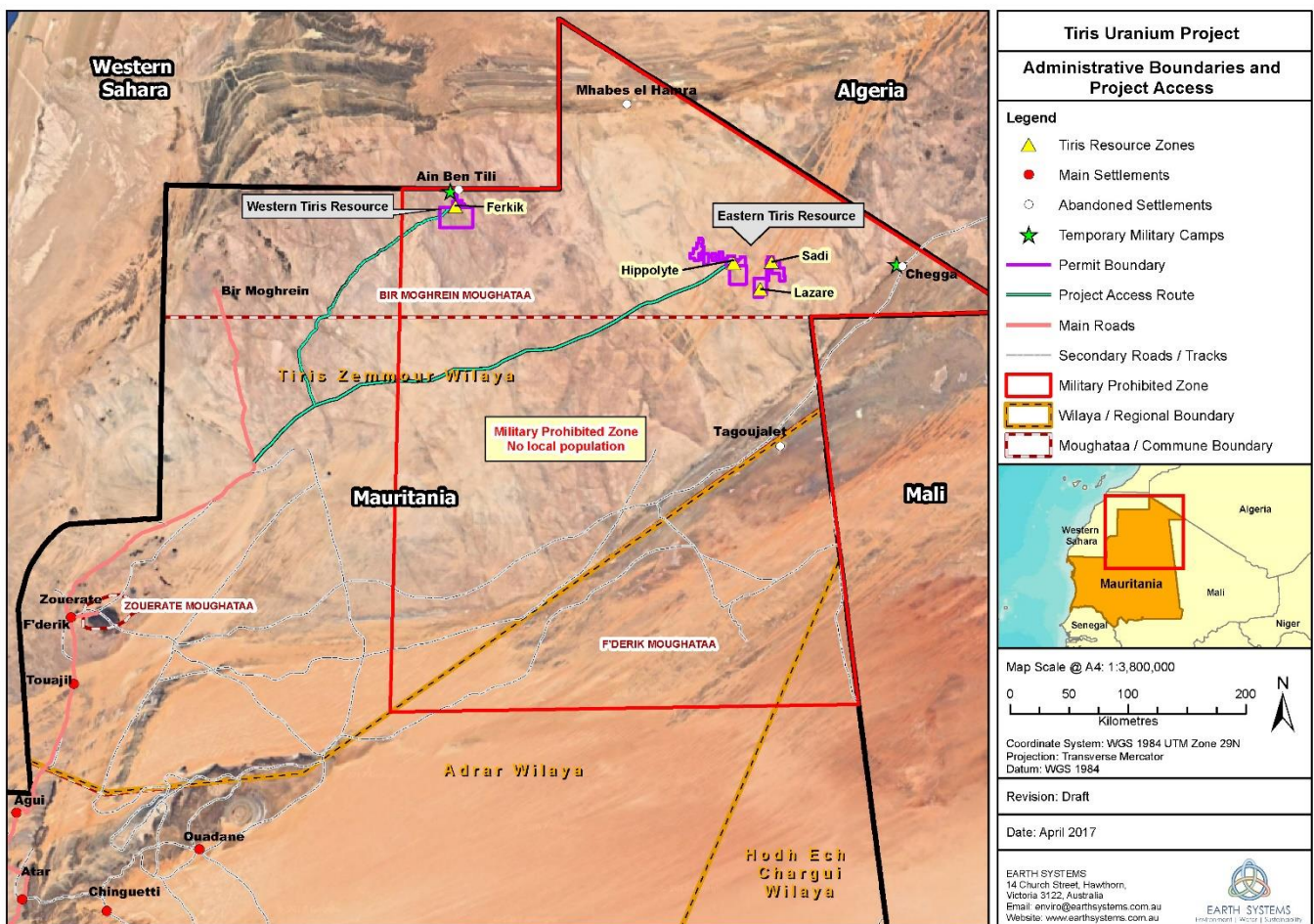


Figure 2-1: Location of the Tiris Uranium Project

The project areas are located in a military Prohibited Zone in which no local population is permitted (e.g. no settlements). Access to the Prohibited Zone requires express permission from the military commander based in Zouerate.

Overland access to the project follows a route from Zouerate for ~200 km on the N1 national route (toward Bir Moghreïn), then a route direct to Hippolyte (450 km) or Ferkik (300 km) across the desert. The routes across the

desert are unformed tracks that have been marked by Aura Energy exclusively for access to the project areas, and are not trafficked by any other users. These routes will be the principal overland access routes to the project, and will be used primarily for supplies and equipment too bulky to transport cost-effectively by air.

An airstrip will also be established near Hippolyte for exclusive project use. Staff and non-bulky supplies will be transported by air to/from Zouerate using a civilian air contractor. It is proposed that the UOC product will be transported direct to Nouakchott by aircraft under appropriate security.

Construction materials and consumables for the project will be sourced from Zouerate, Nouakchott and Nouadhibou. All bulk materials will be transported to site by road.

2.2 Resources Areas and Mining Model

The two resource areas occur on a flat desert plain with occasional small rocky outcrops, dry river beds, basins, salt pans and sand dunes, in a region largely devoid of vegetation and with very rare rainfall (<10 mm average per year in the east, <50 mm per year in the west). Recent representative photographs of the two resource areas are provided in Plate 2-1 and Plate 2-2.



Plate 2-1: Eastern Tiris Resource Area



Plate 2-2: Western Tiris Resource Area

The uranium occurs as an oxide mineral called carnotite (potassium uranium vanadate) in shallow calcrete-type sheet deposits to depths of 6 m below ground level (Plate 2-3, Plate 2-4), in a series of clustered but discontinuous zones of approximately 25–100 ha in size. The proposed project involves shallow mining of these zones in sequence starting with Zone 1 in the Hippolyte resource cluster in the Eastern Tiris Resource Area (Figure 2-2).



Plate 2-3: Uranium mineralisation



Plate 2-4: Uranium mineralisation

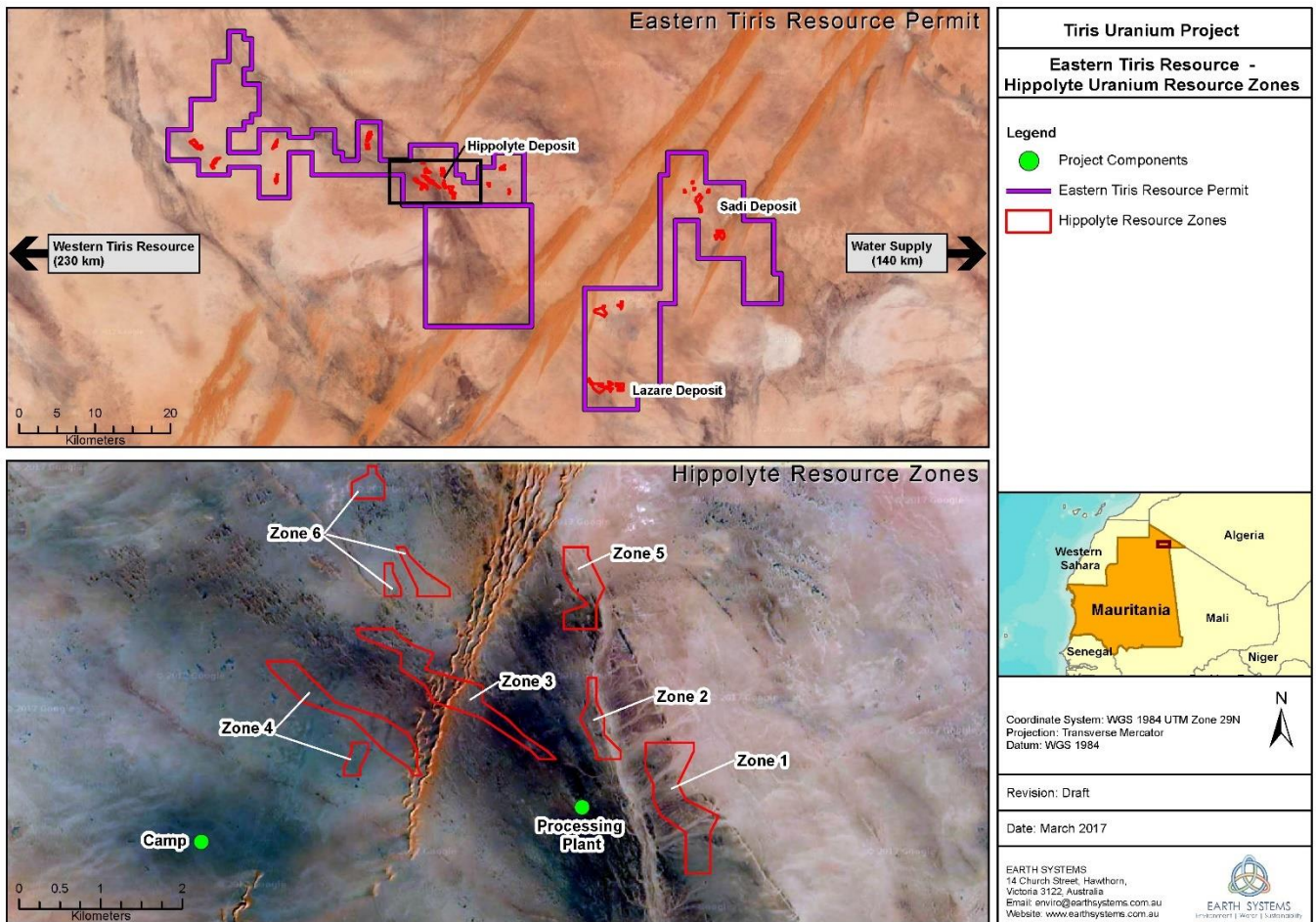


Figure 2-2: Project arrangement and resource zones in the Eastern Tiris Resource Area

2.3 Mining and Processing

The project is expected to produce approximately 10.7 million pounds (MLb; 4,900 t) of 'yellowcake' uranium oxide concentrate (UOC) over an initial life of mine of 15 years, with an average annual ore throughput of approximately 1.0 Mtpa. The mine will use shallow mining techniques to excavate ore without blasting, and beneficiate the ore by screening of fines (no crushing or grinding) and leaching using sodium carbonate. The mine will operate 12 hours per day, 7 days per week, and the processing plant will operate 24 hours per day. UOC production is expected to be ~330 t of UOC per year (average), equivalent to approximately one 200 L steel drum of UOC per day.

The proposed mining and processing steps are as follows:

- ▶ Shallow excavation of ore from surface sands using dozers and excavators (no blasting);
- ▶ Loading and haulage to run-of-mine (ROM) stockpiles;
- ▶ Wet scrubbing of ore in rotary scrubbers;
- ▶ Wet screening;
- ▶ Alkaline leaching of fines;
- ▶ Pressured filtration and precipitation of yellowcake from leachate;
- ▶ Dewatering of reject material in temporary impoundments;
- ▶ Progressive backfilling in pits with dewatered reject material.

The carnotite mineralisation occurs in unconsolidated sands and gravels that is amenable to shallow excavation using conventional earthmoving equipment (dozers, excavators) without blasting.

The mining procedure involves the following steps (see also Figure 2-3):

- ▶ Sand stripping: Overlying sand is cleared onto windrow stockpiles alongside the pit by dozer.
- ▶ Starter pit: The starter pit is created using excavators and trucks. Ore from the starter pit is stockpiled. The starter pit is sized to accommodate the tailings from the first mining cell.
- ▶ Ore mining: The exposed ore is mined by hydraulic shovel or dozer and frontend loader, and loaded into haul trucks for transport to the run-of-mine (ROM) pad.
- ▶ Backfilling: The mined-out cell is backfilled with clean, barren rejects discharged from the washing and screening plant (backhauled by truck from the processing area).
- ▶ Rehabilitation: Overburden is pushed back over the consolidated cell from the windrow stockpiles at the side of the pit.
- ▶ Next panel: Mining continues along the panel to the designed pit boundary. A new mining panel, with starter pit, commences and the cycle is repeated.

The shallow mining and progressive backfilling procedure results in a minimal environmental impact during mining, and leaves a fully rehabilitated site consistent with the surrounding environment.

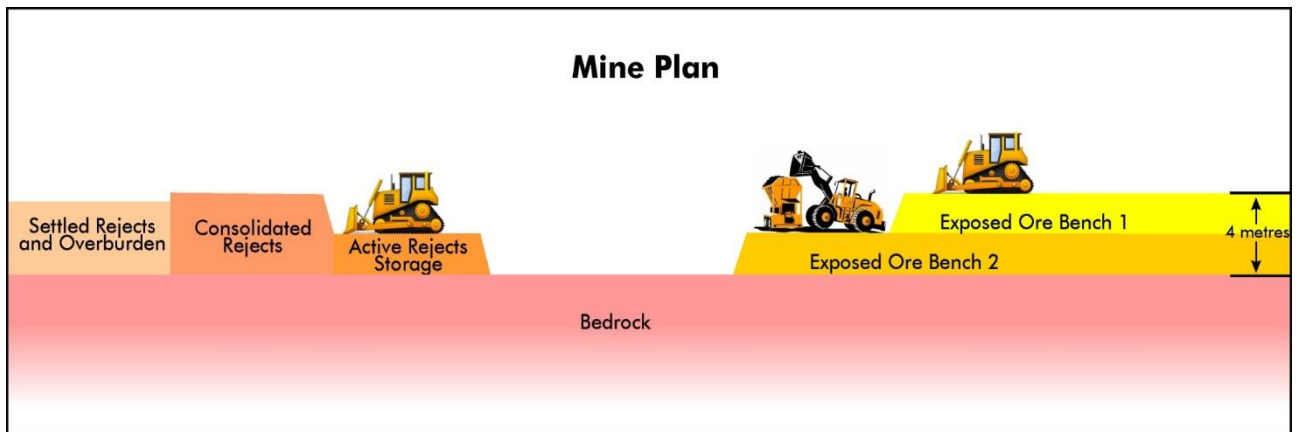


Figure 2-3: Conceptual mining process

The planned throughput of the processing plant is 1 Mtpa, equivalent to ~120 t per hour. The initial water requirement for processing is ~1 m³ per tonne of ore processed (1 GL/y), to be met by a combination of raw water supply from groundwater, and recycling and reclamation from processing and water treatment. Groundwater will be sourced from the northeastern extent of the Taoudeni Basin south of Chegga, approximately 140 km east of Hippolyte, which is thought to host a significant ancient and largely untapped groundwater reservoir. Groundwater will be transferred to site by surface pipeline.

2.4 Project Arrangement, Facilities and Equipment

Due to the relatively simple process required for beneficiation, plant and equipment requirements are modest. All processing facilities are planned to be constructed and tested offsite as containerised or truck-portable systems, to be transported to site and commissioned with minimal onsite construction works. The mining fleet is also relatively small, consisting of up to 8–12 vehicles (dozers, hydraulic shovels, frontend loaders and haul trucks).

The process plant will be comprised of relocatable process modules, which will minimise initial capital cost and permit the plant to be moved to other resources within the Tiris Resource Areas as mining progresses to minimise haulage distances. To the extent practical, the process modules will be industry-proven modules or modules that will be pre-assembled and tested before transfer to site.

These facilities are expected to be located in a small footprint area of 2–4 ha. Most modules will be self-contained and self-bunded, and thus suitable for placement in hardstand areas with minimal surface preparation. Facilities requiring external bunding or more extensive foundations will be placed on concrete slabs as required.

Process plant modules will in most cases be open air, with shade covering provided in locations where operators will spend significant amounts of time.

In addition to processing facilities, the project will include a plant workshop, heavy vehicle workshop, laboratory, plant office, warehouse, fuel storage, and sodium carbonate storage (hopper/silo).

The project arrangement will be adapted to site requirements considering the location of mining and processing activities. The initial locations of processing and accommodation facilities with respect to the first resource zones to be mined at Hippolyte are shown in Figure 2-2, and the conceptual process area configuration is shown in Figure 2-4.

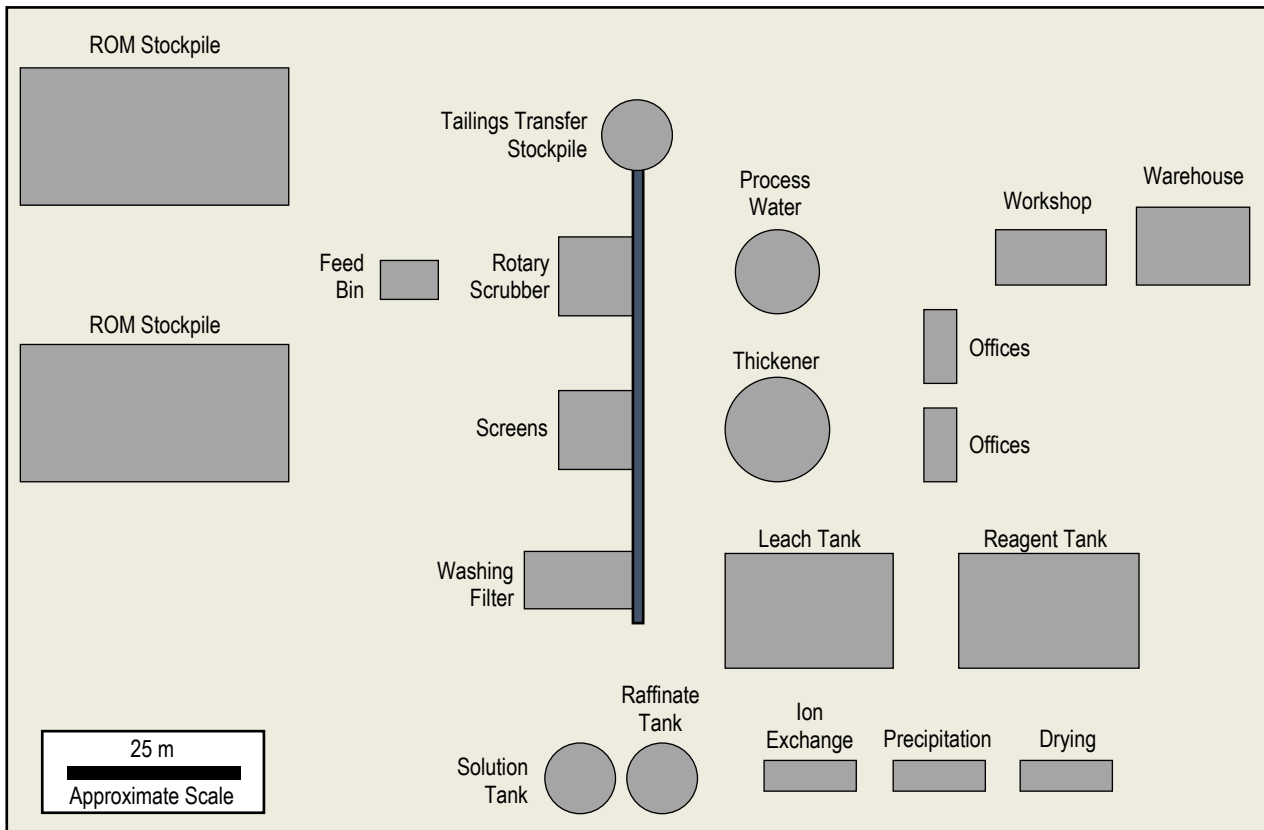


Figure 2-4: Conceptual process area configuration

2.5 Power and Fuel

The total installed power for the project will be 1 MW, which is expected to be supplied by three 1,000 kVA diesel-powered generators. The diesel-powered generators will be delivered to site in ventilated fully enclosed sound-attenuated enclosures with paralleling and control modules installed and pretested. Fuel for the generators will be fed from a tank holding 24 h supply. Three-phase 415 V power will be reticulated to switch boxes at each process module and to the accommodation camp. The use of solar or wind-generated power will be considered to reduce emissions and the cost of energy at the site.

Two weeks of diesel will be stored onsite at any time to allow operations to continue in the case of delivery problems following irregular desert storms or other transport related delays. Diesel will be stored in standard 40 kL isotainers (or equivalent) with appropriate bunding and spill/volatilisation control measures.

2.6 Workforce and Accommodation

The total workforce for the project is expected to be approximately 100 during operations. The accommodation camp will consist of accommodation for 110 mine personnel and visitors. Security, kitchen and dining facilities, recreation room and storage facilities will also be provided. Camp accommodation and support buildings will be located at least 2 km from the plant site to reduce the effects of windblown dust and noise from operations. The camp buildings will be reloadable and easy-to-erect buildings suitable for remote, hot and dusty locations.

2.7 Waste Management

Aura Energy will implement a zero-impact waste strategy for the project to ensure that the project leaves no waste legacy in the pristine desert environment. The key principles of the strategy are as follows:

- ▶ Putrescible and non-hazardous general waste will be disposed of onsite in a designated landfill under careful management (no waste will be burnt in the open or disposed of with backfill);
- ▶ Recycling will be maximised, plastics and packaging will be minimised, and loose packaging and potential sources of waste will be contained indoors to the extent practical to prevent wind-blown waste;
- ▶ A high standard of tidiness and cleanliness will be demanded throughout project facilities and active project areas, including routine daily waste sweeps and collection;
- ▶ Contaminated and hazardous waste, such as lubricants and contaminated protective equipment, will be collected and stored safely and securely onsite for removal by a licenced waste contractor;
- ▶ Sewage from the accommodation camp and mine site facilities will be pumped to an onsite sewage treatment plant for treatment; treatment effluent will be reused in processing or dust suppression, and treatment solids will be periodically removed from site by a licenced contractor.

2.8 Other Infrastructure

The project will not require the building of any port facilities, as equipment and module selection requires all items to be transportable in containers. An engineered access road will not be required.

2.9 Project Schedule

The target for the commencement of construction works for the project is 2018 pending relevant government approvals. The mine will operate for approximately 15 years. Rehabilitation will be conducted on an ongoing basis, with site infrastructure deconstructed and removed from site and final earthworks completed during decommissioning. Monitoring will be conducted quarterly as required post-closure to determine the need (if any) for follow-up rehabilitation.

3. PROJECT SETTING

3.1 Physical Setting

The project areas are located on an arid desert plain largely devoid of vegetation. There is no permanent surface water, and rain is very rare (1–2 times per year in the Western Tiris Resource Area, and every 2–5 years in the Eastern Tiris Resource Area).

The geomorphology of the project region is dominated by dry lake beds and plateaus of exposed granite bedrock. The project areas are located on flat plains consisting of the following main landforms:

- ▶ Gravelly and rocky plain with a thin cover of aeolian sand (*regs*);
- ▶ Gently sloping bedrock pediments;
- ▶ Scattered granitic outcrops;
- ▶ Sand dunes (*ergs*) typically with a NE-SW alignment;
- ▶ Dry basins/lakes (*oueds*)
- ▶ Dry riverbeds (*wadis*)
- ▶ Salt flats (*sabkhas*)

Eastern Tiris Resource Area

The Eastern Tiris Resource Area is located on a flat plain at elevations of 365–395 m above sea level (masl), with a linear due system occurring in parts of the Hippolyte resource zone. The Eastern Tiris Resource Area is located in a regionally extensive shallow basin called the Oued el Foule depression.

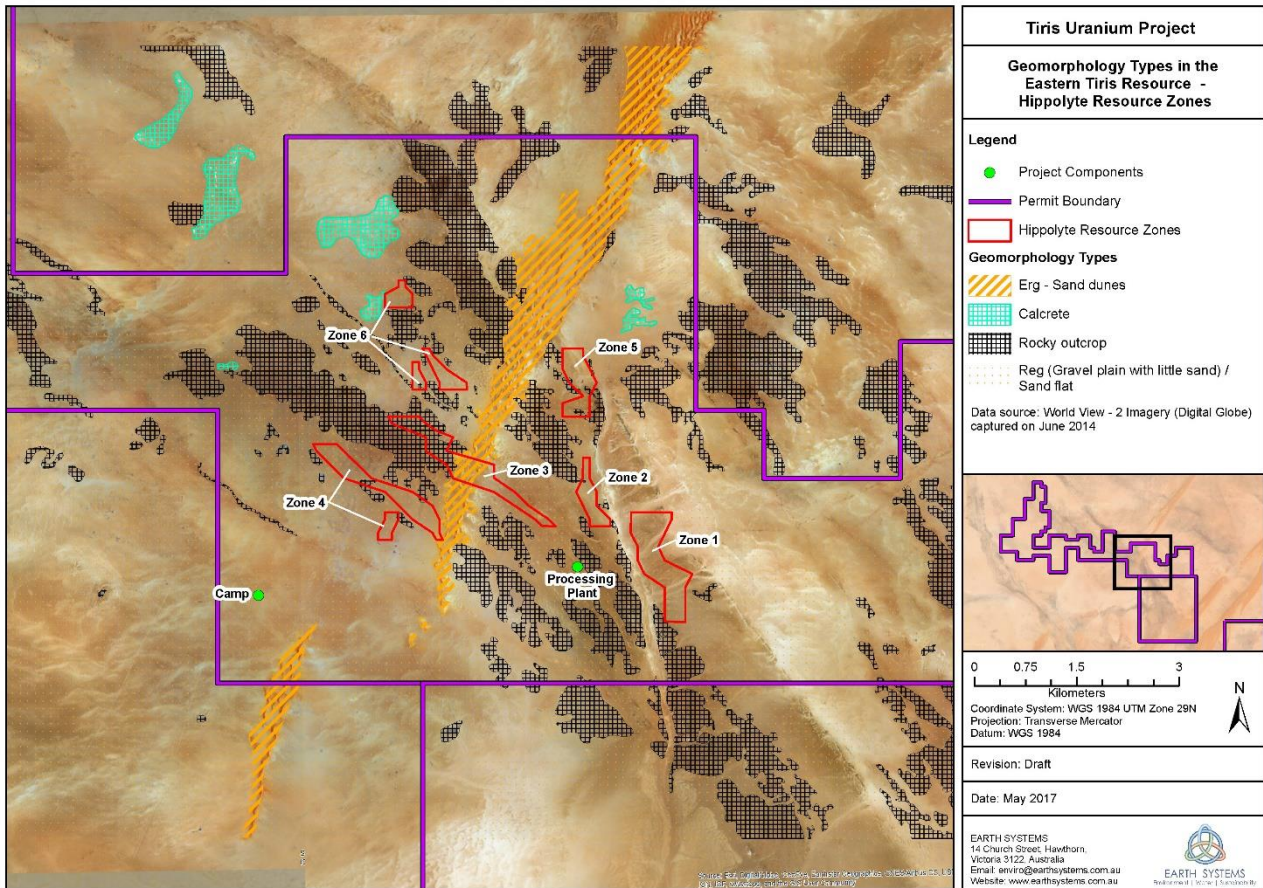


Figure 3-1: Geomorphological features of the Eastern Tiris Resource Area

Western Tiris Resource Area

Topography around the Western Tiris Resource Area is also predominantly flat with a few small, undulating rocky hills and plateaus surrounded by dry riverbeds (*wadis*) and dry basins/lakes (*oueds*). There is a major confluence of dry riverbeds to the immediate east of the Ferkik resource zone, which forms a significant depression.

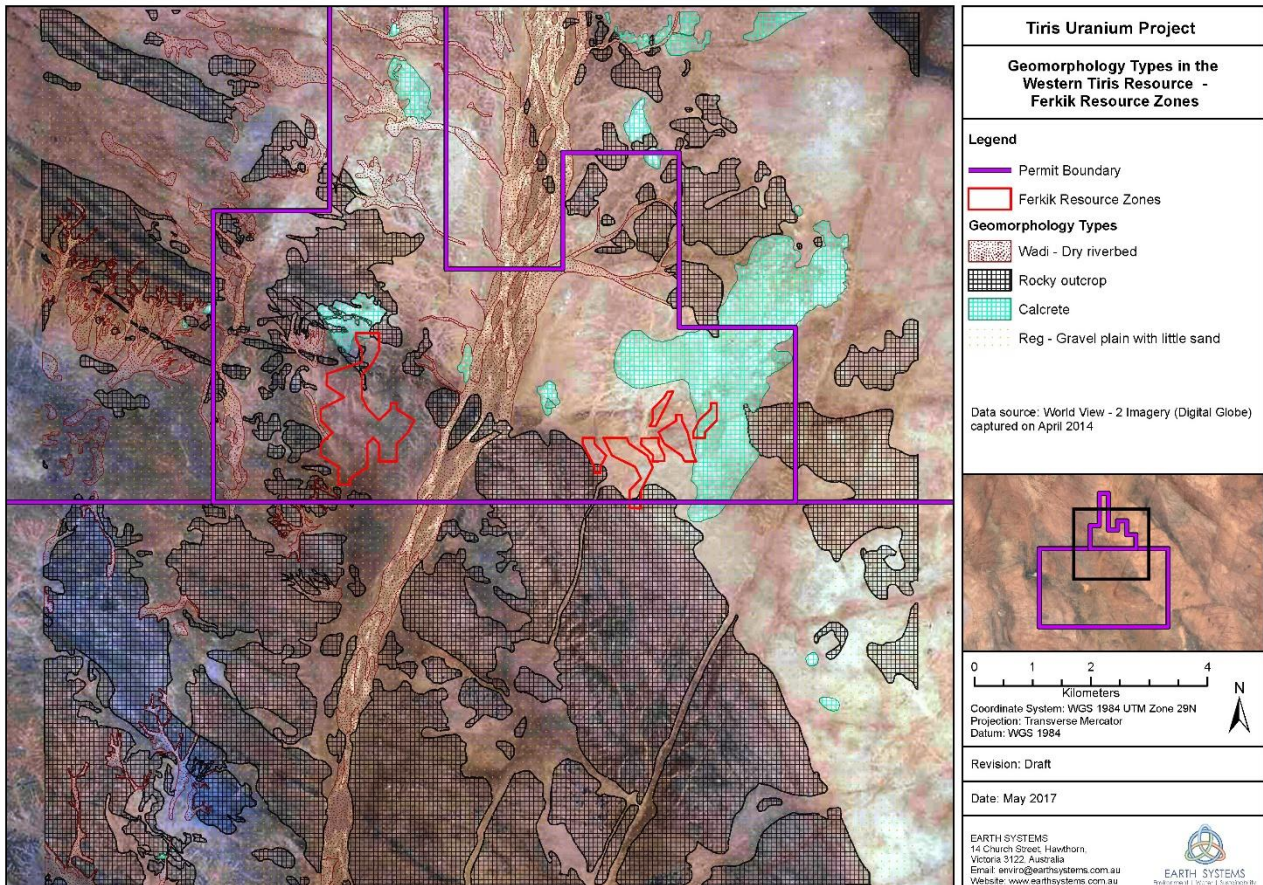


Figure 3-2: Geomorphological features of the Western Tiris Resource Area

3.2 Naturally Occurring Radioactive Material

Uranium in the environment is a form of Naturally Occurring Radioactive Material (NORM). Uranium is one of the most stable radionuclides, with a half life of 4.5 billion years (longer than the age of the Earth). This means that one atom of uranium has a 50% chance of decaying (releasing radiation) within 4.5 billion years. More than 99% of uranium on Earth is still in its original 'parent' form (uranium-238) and has not decayed.

When uranium decays, it releases ionizing radiation (radiation with sufficient energy to affect atoms and biomolecules). Because uranium-238 decays very slowly, a rock containing only uranium-238 releases very small amounts of radiation per unit mass or volume.

When uranium-238 decays, it emits radiation and becomes another element, thorium-234, which has a very short half life (and therefore higher radioactivity) of 24 days. Thorium-234 then decays to protactinium-234 (half life of ~1 min) and then uranium-235, which has a half life of 250,000 years. Other 'daughter' radionuclides of the parent uranium-238 include radon, radium, polonium, and lead-210. All of the daughter radionuclides are significantly more radioactive than uranium-238. These radionuclides are all forms of NORM when found naturally in the environment. Other NORM radionuclides include potassium-40 and naturally occurring carbon-14.

A deposit of uranium will contain mostly uranium-238 (typically >99% of radionuclides present), along with uranium-235 (~0.7%), and other daughter radionuclides in trace amounts. The radioactivity of materials in a uranium deposit is mostly (typically >90%) due the daughter radionuclides.

The uranium mineralisation targeted by the Tiris Uranium Project is a near-surface accumulation of carnotite (potassium uranium vanadate) that has formed by supergene processes (near-surface weathering, dissolution, evaporation and reprecipitation cycling). The uranium and its daughter radionuclides have been dissolved from uranium-rich granites in the area, and has accumulated in basins and depressions. These accumulations show elevated radiation levels at the surface, and this is how the economic deposits have been primarily identified.

The NORM radiation exposure rates at 1 m above the ground across the Tiris resource zones are shown in Figure 3-3, in units of millisieverts per year (mSv/y). For reference, the annual public exposure to NORM and cosmological ionising radiation is typically in the range of 1–2 mSv/y. The worldwide average annual radiation dose from natural sources is 2.4 mSv/y, but due to elevated NORM sources some areas can be as high as 6–12 mSv/y. The annual NORM radiation dose in the resource areas is predominantly in the range 0.02–1.7 mSv/y, with <1% of readings above this value (up to 23 mSv/y).

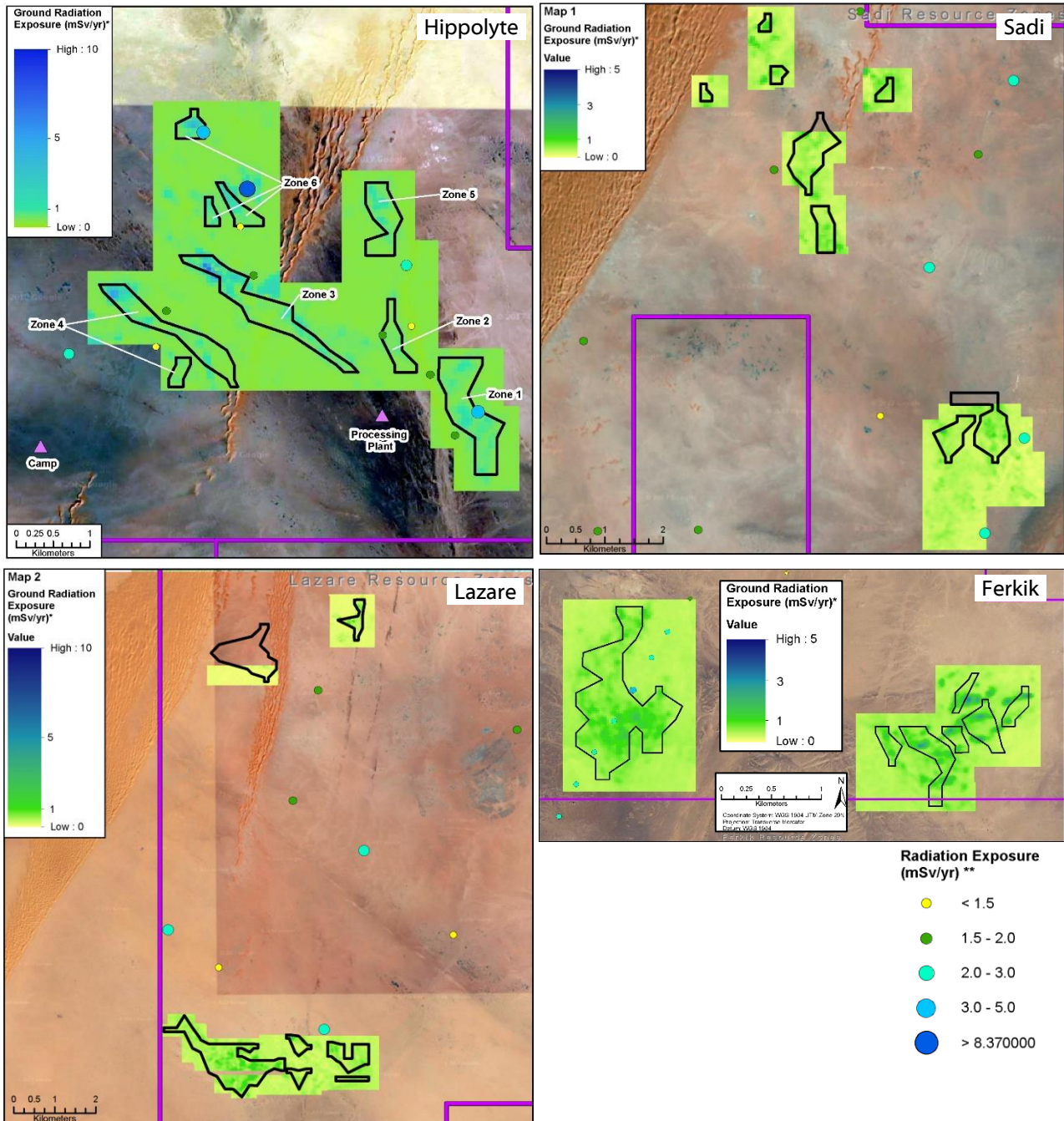


Figure 3-3: NORM radiation exposure rates in the Tiris Resource Areas

3.3 Biological Setting

The project areas occur within an uninhabited area of the hyper-arid Northern Africa ecoregion. Species richness and endemism are very low, although there are several species of flora and fauna that have adapted to the dry and hot conditions.

Vegetation is largely limited to dry riverbeds (*wadi*) and shallow depressions (*daya*) that may contain water following rainfall. Flora diversity and abundance vary significantly between the Eastern Tiris Resource Area (Hippolyte, Sadi, Lazare) and the Western Tiris Resource Area (Ferkik), from hyper-arid desert gravel plains and

sand dunes with almost no vegetation in the east, to sparse transient grass and shrubland cover in the west. The baseline survey reported that the transient vegetation observed in the region of the Ferkik resource zones emerged following a significant rainfall event approximately 3 years ago.

Eastern Tiris Resource Area

The Eastern Tiris Resource Area is extremely dry and largely devoid of vegetation due to the lack of sufficient and consistent rainfall. The remnant vegetation identified consists of species that have adapted to the dry and sandy environment of the Sahara Desert, including the lack of topsoil and water, and are generally found in depressions and in close proximity to rocky outcrops.

Regs (gravel plains) occupy large areas of the Sadi, Hippolyte and Lazar resource zones. Most of these areas are barren (Plate 3-1), but occasional sparse vegetation communities can be found consisting of non-perennial shrubs typically occurring in rare depressions but not found in vicinity of resource zones (Plate 3-2). This assemblage is generally in very poor condition. Vegetation communities occur in slightly denser cover in association with rocky outcrops.



Plate 3-1: Typical barren landscape of the Eastern Tiris Resource Area



Plate 3-2: Example of sparse vegetation found in some regs in the Eastern Tiris Resource Area

Vegetation communities associated with sand dunes are very limited. Sebkhass (salt flats) were found to be largely devoid of vegetation except for occasional clumps of *Tamarix sp.* and rare halophytes in the less salty marginal areas.

Suitable habitat for birds and mammals (e.g. herbaceous or woody vegetation) is absent in the Eastern Tiris Resource Area and surrounds.

A map of habitat in the primary project site (Hippolyte) based on the field survey in January 2017 is provided in Figure 3-4.

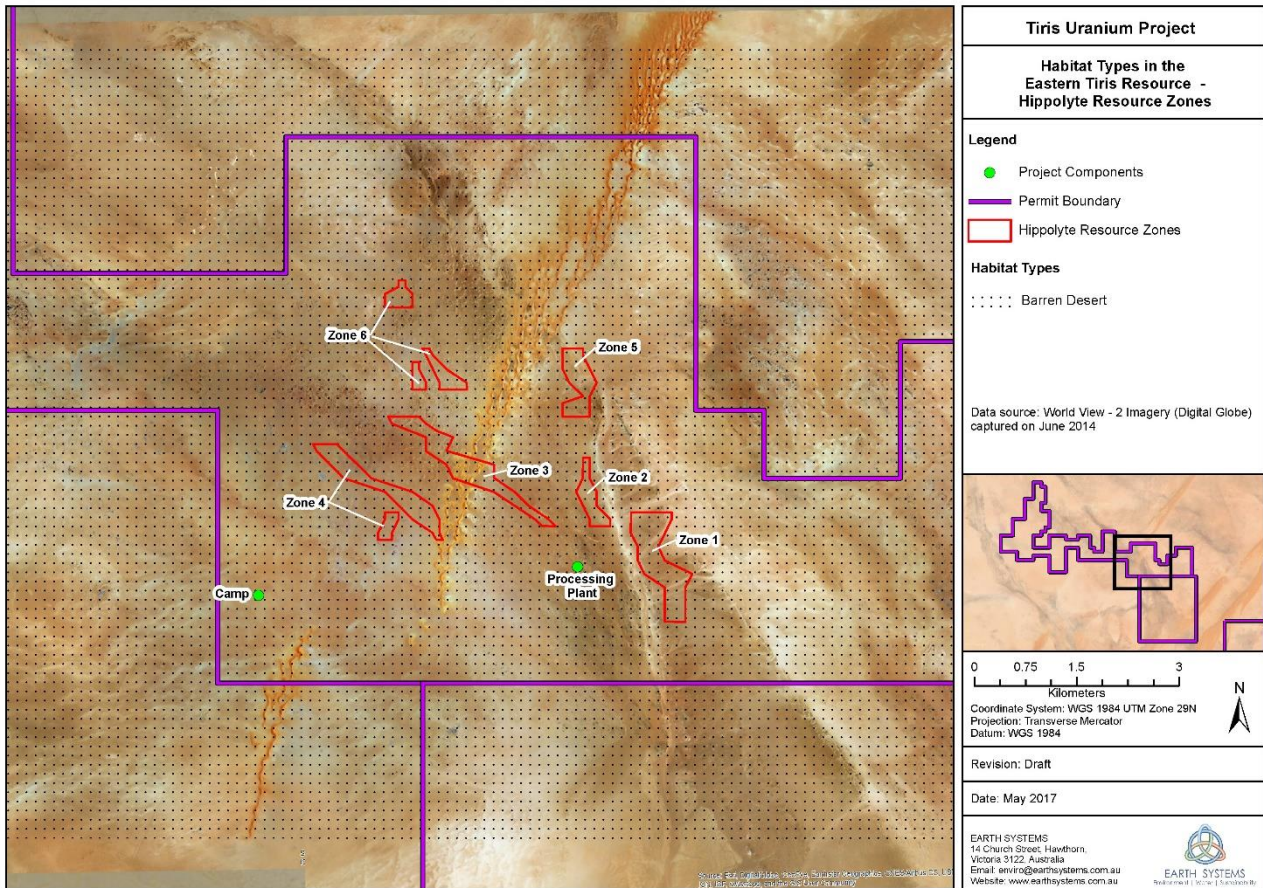


Figure 3-4: Mapped habitat distribution in the Eastern Tiris Resource Area (January 2017)

An Important Bird and Biodiversity Area (IBA) of international importance is located near Chegga, approximately 160 km east of the Eastern Tiris Resource Area. It was reported that a few birds that inhabit the IBA may be seen flying over the area, but are highly unlikely to reside in or use the project areas.

Very few fauna species were identified in the Eastern Tiris Resource Area, although domestic animals such as camels and goats are known to visit Chegga due to the presence of a permanent water source.

A number of reptile species and arthropods were identified in the area, but there is no evidence of other fauna.

Western Tiris Resource Area

Large areas of the Western Tiris Resource Area are covered by a sparse desert savannah flora assemblage dominated by *Acacia sp.* and *Panicum sp.* communities (*Acacio-Panicion*) (Plate 3-3, Plate 3-4). The Ferkik resource zones occur in areas of the sparsest grass cover.

Vegetation is primarily found in association with *oueds* (dry lakes), consisting of sparse *Acacia tortilis*, shrubs such as *Hammada scoparia*, *Salvia aegyptiaca*, *Caroxylon imbricatum*, *Nucularia perrinii* or *Anvillea garcinii*, and non-perennial grasses. Savannah is characterised by grassland and herbaceous plains without trees, generally with less than 15% of groundcover. Shrub savannah is characterised by plains of scattered trees containing *Acacia tortilis* at densities of less than 5% of groundcover.



Plate 3-3: Desert savannah in the Western Tiris Resource Area



Plate 3-4: Desert savannah with Acacio-Panicion vegetation in oueds in the Western Tiris Resource Area

A map of habitat in the Western Tiris Resource Area based on the field survey in January 2017 is provided in Figure 3-4.

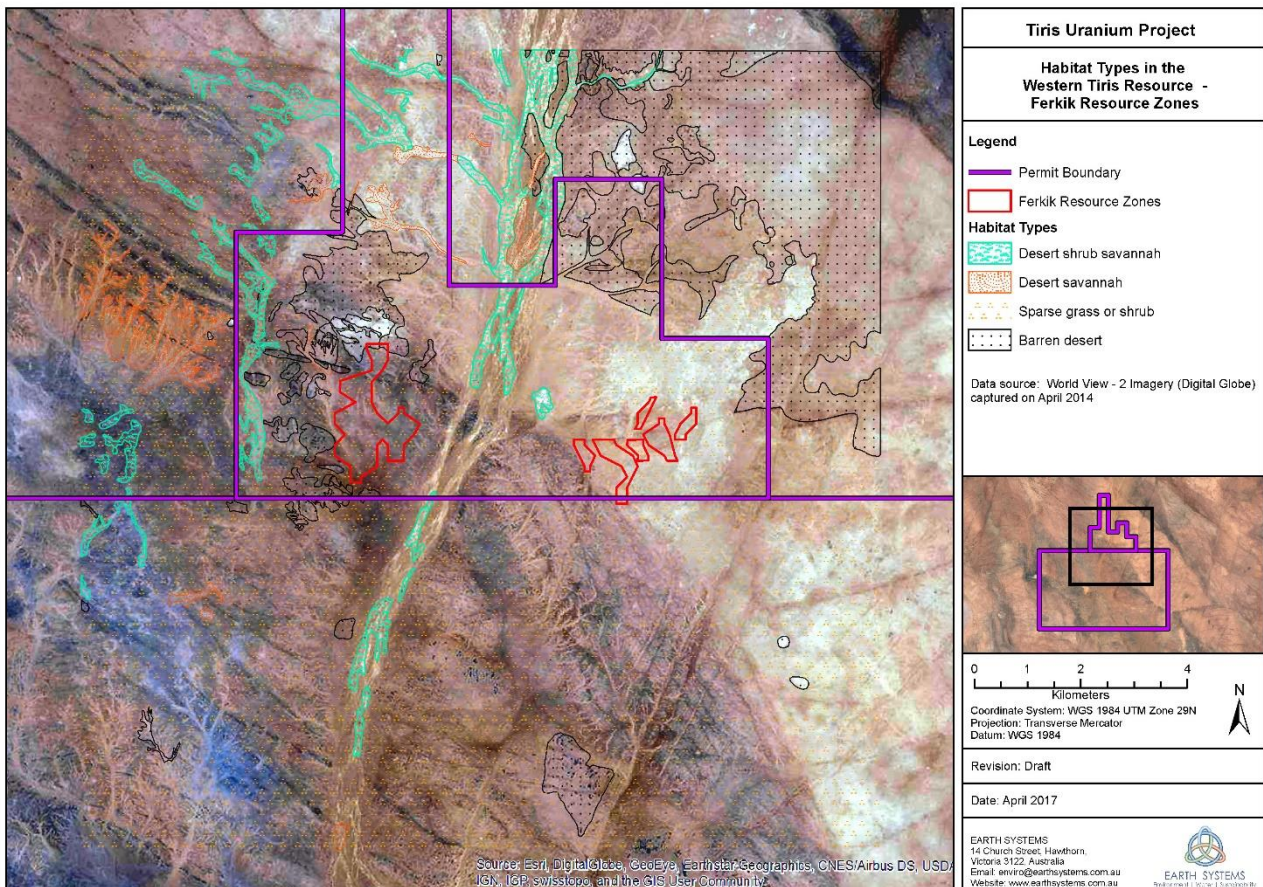


Figure 3-5: Mapped habitat distribution in the Eastern Tiris Resource Area (January 2017)

The Western Tiris Resource Area was found to host a variety of fauna, including various small mammals (golden jackal, fennec fox, African sand fox, sand cat, Arabian hare, desert hedgehog, and honey badger), rodents, reptiles (snakes, lizards), arthropods and birds (including three IUCN Threatened species). The abundance of birds is known to be seasonal.

3.4 Social Setting

People and Settlements

The project areas are located in an unpopulated region of the Sahara Desert in a designated military Prohibited Zone in which local population is prohibited under the direct authority of the military commander of the Second Military Region based in Zouerate.

The Prohibited Zone has been enforced due to smuggling activity across the border with Algeria, Mali and Western Sahara. In practice, the military commander allows nomadic groups from Western Sahara to cross into the Prohibited Zone in the general vicinity of the Western Tiris Resource Area, which hosts sufficient though sparse vegetation for camel grazing. The military maintain a small and sporadic military presence at Ain Ben Tili (15 km north of the Western Tiris Resource Area) and at Chegga (140 km east of the Eastern Tiris Resource Area).

The Prohibited Zone extends from ~150 km west and ~350 km south of the Western Tiris Resource Area to the borders of Western Sahara, Algeria and Mali. There are no settlements within this zone, although there are a number of abandoned settlements regionally (including Ain Ben Tili).

The nearest notable settlements to the project areas are Bir Moghrein (200 km west of the Western Tiris Resource Area), and Zouerate (~500 km southwest of the Western Tiris Resource Area). Bir Moghrein is the administrative centre of the Bir Moghrein Moughataa ('department') in which the project is located.

Other populations in the project region are as follows:

- ▶ A small military outpost at Ain Ben Tili, which is a fort on the trading route between southern Mauritania and Western Sahara/Morocco located approximately 15 km north of the Western Tiris Resource Area. The fort has a small military presence, with no permanent local civil inhabitants.
- ▶ A small settlement is located across the border in Western Sahara, within 20 km of the Western Tiris Resource Area, within a few km of the Ain Ben Tili fort.
- ▶ The village of Hasilouka, approximately 80 km west of the Western Tiris Resource Area, is the closest inhabited village to the project area and is mostly composed of merchants from Western Sahara. Since the artisanal mining boom there has been immigration into the Hasilouka area and the current population is unknown.

The region between Bir Moghrein and the Western Tiris Resource Area is within the normal range of nomadic groups in the region and is frequented by a small number of nomads on a seasonal basis to seek pastures for grazing of livestock. These are Western Sahrawi herdsman who have government authorisation to pass through the military zone and mainly frequent the area west of the Western Tiris Resource Area (Figure 3-6).

The nearest nomadic groups to the project areas that were identified in the region during initial consultations were a small nomadic group (6 adults and 6 children) camped within 20 km of the Ferkik deposit (within the permit area), and a second small group reported by the military to be located approximately 130 km southwest of the Western Tiris Resource Area.

No nomadic groups were identified in the broader region surrounding the Eastern Tiris Resource Area, and the area is not in the normal range of nomadic families. The military outpost at Chegga, a fort and historic caravan stop on the trading route between eastern Mauritania and Mali, is occasionally occupied by the military on a

temporary basis and is also reportedly used by occasional travelling caravans or nomadic groups who make a stop to replenish their water reserves at Chegga's permanent watering hole.

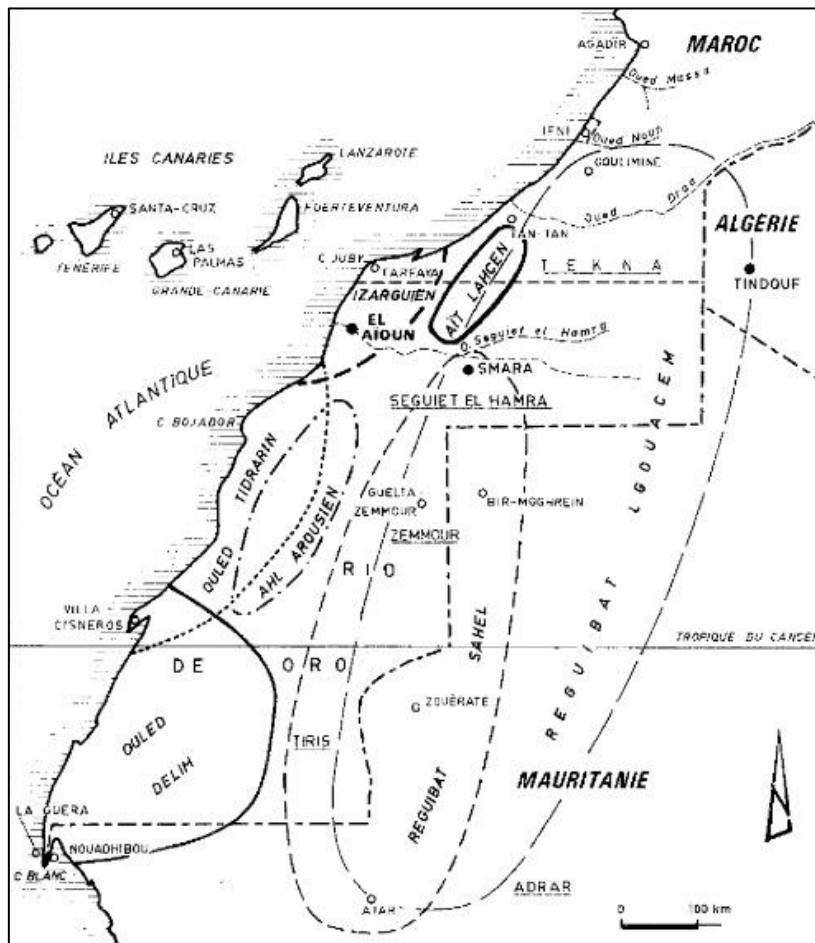


Figure 3-6: Ranges of nomadic groups in northern Mauritania (Barbier, 1982)

Archaeology and Cultural Heritage

The project region is known to have been of archaeological significance, although there have been no specific studies of archaeological values in the vicinity of the project areas. Human occupation in the project areas dates back to at least the Upper Neolithic (4200–2800 BCE).

Three types of archaeological sites are known to occur in the area:

- ▶ **Upper Neolithic Sites:** Sites from the Holocene Epoch (4200–2800 BCE) consisting of fragments of scattered pottery and the remains of grinding materials (Plate 3-5).
- ▶ **Prehistoric (Neolithic) Tombs:** Tombs from the prehistoric period of the Holocene Epoch (2000–1000 BCE) are common in the project areas, consisting of small mounds, usually covered with stones and found on higher ground such as hillsides (Plate 3-6).
- ▶ **Muslim Cemeteries:** Cemeteries with multiple grave sites occur in both resource areas (Plate 3-7, Plate 3-8).



Plate 3-5: Upper Neolithic pottery fragments



Plate 3-6: Prehistoric tomb



Plate 3-7: Muslim cemetery



Plate 3-8: Muslim cemetery

Five additional sites of cultural heritage significance occur in the broader area surrounding the project:

- ▶ 3 military forts, in Bir Moghreïn, Ain Ben Tili and Chegga, dating from the colonial period 1900–1960 CE;
- ▶ 2 permanent water sources in Chegga.

4. LEGISLATIVE COMMITMENTS AND GUIDELINES

4.1 Corporate Commitments

Aura Energy is committed to achieving and demonstrating the highest standards of environmental and social performance to the extent feasible. Aura Energy will support a Sustainable Management Framework that ensures:

- ▶ The health and well-being of our workforce;
- ▶ The provision of economic benefit to communities in which we operate;
- ▶ We manage the sustainable use of our natural resources; and
- ▶ The return of value for our stakeholders and shareholders.

In line with the below policies, Company-wide management processes will be developed to set out, review and continuously improve the environmental and social performance of Aura Energy activities in Mauritania.

Sustainability

Aura is committed to supporting a Sustainable Management Framework. Strategies are in place to meet our Sustainability objectives and commitments by:

- ▶ Promoting a strong safety and healthy work environment and culture across all areas of the business;
- ▶ Never compromising on the safety and well-being of our personnel;
- ▶ Delivering superior value and returns to shareholders;
- ▶ Dealing ethically, fairly and equitably with stakeholders;
- ▶ Ensuring the safe storage, handling and transport of our materials and products;
- ▶ Preventing or minimising impact on the environment by promoting efficient use of natural resources;
- ▶ Developing company-wide strategies for exploration and development of mineral endowments;
- ▶ Encouraging innovation to increase efficiency in discovery, extraction and processing of our mineral resources;
- ▶ Meeting or exceeding our Statutory requirements, commitments and obligations; and
- ▶ Achieving continuous improvement in the management of our risks and opportunities.

Health and Safety

At Aura we believe safety is integral to great business. Our commitment to achieving strong health and safety performance. A safe workplace and the wellbeing of employees, contractors and visitors is fundamental to our success. To achieve these aims the Company:

- ▶ Recognises that everyone's involvement in health and safety is essential;
- ▶ Ensures leadership is the key driver of a strong safety culture;
- ▶ Continually seeks to improve safety management systems and risk management practices;
- ▶ Rigorously identifies and control risks;
- ▶ Is actively involved in the continued improvement in practices and procedures;