Lodestone Namibia (Pty) Ltd:
Iron Ore Exploration, Dordabis

ENVIRONMENTAL IMPACT ASSESSMENT & MANAGEMENT PLAN
FOR EXPLORATION ON
EPL 7352, PHASE 1

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Disclaimer

This Environmental Report was written for the iron ore exploration project undertaken by Lodestone Namibia (Pty) Ltd.

It was compiled by Colin Christian, Environmental Scientist as environmental consultant to Lodestone Namibia (Pty) Ltd. Colin Christian and Lodestone Namibia (Pty) Ltd take no responsibility for the information contained herein if used for any other purpose or by any other party.
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ABBREVIATIONS

CCA  Colin Christian & Associates CC (Environmental Consultants)
EC   Environmental Clearance (issued by the Environmental Commissioner)
EIA  Environmental Impact Assessment
EMP  Environmental Management Plan
EPL  Exclusive Prospecting Licence
I&APs Interested and Affected Parties
IUCN International Union for Conservation of Nature
GPS  Global Positioning System
MET  Ministry of Environment & Tourism
ML   Mining Licence
MME  Ministry of Mines & Energy
PID  Public Information Document
SLR  SLR Consulting (Groundwater Specialists)
Lodestone Namibia (Pty) Ltd:  
Iron Ore Exploration, Dordabis  

ENVIRONMENTAL IMPACT ASSESSMENT & MANAGEMENT PLAN  
FOR  
ENVIRONMENTAL CLEARANCE ON:  
EPL 7352, PHASE 1  

EXECUTIVE SUMMARY

Lodestone Namibia (Pty) Ltd is the holder of EPL 7352 which has replaced their original EPL 3112. EPL 7352 covers the original area of EPL 3112 plus an extension to the north of it. That portion of EPL 7352 which coincides with the former EPL 3112 is referred to as Phase 1 Exploration area. Lodestone needs to obtain an Environmental Clearance for this Phase 1 of EPL 7352. This Environmental Impact Assessment (EIA) and Management Plan (EMP) will be submitted to MET.

Considerable drilling exploration was done for iron ore, mostly before the end of 2013. Some boreholes were also drilled in 2015 for water resources and others to serve as monitoring boreholes. That drilling focussed on an area north of the C23 tar road which became the mining licence area - ML 182.

An EIA & EMP (CCA, 2013) was completed and an Environmental Clearance Issued by MET in 2014. Then a Mining Licence (ML 182) was issued by MME in 2014, but it was limited to an area north of the C23 tar road – i.e. smaller than the area applied for.

That EIA included several specialist studies, of which four are still relevant to ongoing exploration: namely, vegetation, fauna & birds, archaeology, and a legal register that has been updated. The reports on flora and fauna covered the whole EPL3112 (now Phase 1 of EPL 7352). However the two reports on archaeology only covered portions of the Mining Licence area (ML 182) north of the C23 tar road – namely the three iron ore outcrops referred to as the “Southern Ore body”, “Northern Ore Body” and “North-eastern Ore Body”. If any new areas are targeted for drilling, then the archaeological survey will need to be extended accordingly.

Based on a site inspection it was clear that earlier drilling operations had no significant adverse impacts. The clearing of small patches of encroacher thorn trees may actually have benefitted grazing resources in this cattle producing area.
It was also clear that care had been taken to avoid damage or removal of large trees, evergreen trees and species that were uncommon in the area.

Site inspections as early as 2011 and 2012 had found a few species of alien invasive plants that were present before Lodestone did any drilling exploration. Recommendations are (again) made in this report for frequent monitoring and ongoing eradication and follow up – to prevent these aliens from spreading.

The impacts on fauna and birds were considered to be insignificant.

Lodestone proposes to continue drilling exploration in the Phase 1 portion of EPL 7352 for the purpose of extending the proven resource and for future mine planning. However, target areas for drilling have not yet been identified.

In this current EIA report, all the observed and predicted impacts were assessed according to standard, internationally recognised criteria for EIAs. No impacts of high significance were found or predicted, because all impacts of exploration in this area were considered to be preventable or reversible with careful management, and by natural revegetation. Accidental impacts on farms and property (e.g. by fire) are preventable with careful foresight and proactive management.

An EMP was compiled and included in this report. This included recommendations for the prevention of potentially serious impacts such as fire from accidental causes. Attention was also drawn to ensuring compliance with regulations – for example in dealing with hazardous substances such as oil, fuel and hydraulic fluids.

A full public participation programme had been carried out before November 2013 in regard to the EPL 3112 area, so affected farm owners have been aware of Lodestone’s activities for many years. A further Public Information Document was distributed to the affected farm owners and their near neighbours in October 2019. No responses were received. The PID was also sent to Ms Saima Angula at MET, and the relevant specialists who produced the studies mentioned above.

The evidence from past drilling exploration, predicted future impacts, and the relevant specialist reports are sufficient to conclude that drilling is not expected to have any significant long term impact on the natural or human environment. However pro-active management is needed. In addition, the archaeological survey will need to be extended to any new areas target for drilling – as mentioned above.

Subject to compliance with all legislation and the recommendations in the EIA and EMP as a minimum requirement it is recommended that an Environmental Clearance can be granted for exploration within the Phase 1 portion of EPL 7352.

**********
1 INTRODUCTION

1.1 Project Proponent & Holder of EPL 7352,

Lodestone Namibia (Pty) Ltd is the holder of Exclusive Prospecting Licence (EPL) 7352. Details of Lodestone’s company registration, directors, operations officer, and contact details are provided in the title page of this report.

1.2 Background to EPL 7352

Originally Lodestone held the EPL 3112 and mineral exploration was conducted under that EPL. Most of the exploration was done before the end of 2013. In November 2014 a Mining Licence (ML 182) was granted to Lodestone by MME for part of that EPL area (Phase 1) where drilling exploration had proved iron ore deposits.

EPL 3112 subsequently lapsed, and Lodestone applied for the new EPL 7352 – which was issued by MME on 13 May 2019. The new EPL covers the same area of EPL 3112 and also extends further north (refer to Project Location below).

1.3 The Environmental Consultants & Further Background to this EIA

Colin Christian, Environmental Scientist, was appointed by Lodestone in September 2019 to undertake the necessary environmental consulting services for an Environmental Clearance for exploration on EPL 7352. Sub-consultants for this present consultancy include, M.Fidler (communications and secretarial assistance) and K.Dierkes (mapping).

An Environmental Impact Assessment (EIA) & Environmental Management Plan (EMP), were undertaken for a Mining Licence application on EPL 3112 by Colin Christian & Associates CC (CCA, Nov 2013). The Ministry of Environment & Tourism (MET) issued an Environmental Clearance, on 23 July 2014, for Mining on a portion of EPL 3112, referred to as Phase 1.

Several Specialist Studies were carried out for the whole EPL 3112 in 2011 – 2013 as part of an EIA for mining. Of those studies, the following are also relevant to Mineral Exploration: -

- Vegetation (B. Curtis, 2011)
- Faunal Biodiversity (J.Irish, 2012)
- Archaeology (J.Kinahan, 2011 & 2012)
- Legal Register (Envirolex, 2012)

They are all included in the EIA (CCA, Nov 2013, Volume 2, Appendices).

The company Colin Christian & Associates CC closed down as the owner moved to South Africa, but he is still offering services in Namibia as Colin Christian, Environmental Scientist. Colin Christian’s CV is presented in Appendix A.

SLR Consulting Namibia (Pty) Ltd also undertook various specialist studies on groundwater independently for Lodestone (SLR, 2013). The results were integrated into the EIA and were also submitted to MET in the Appendices mentioned above.
In 2015, SLR conducted a further independent report for Lodestone on drilling and test pumping of new boreholes for water abstraction (SLR, December 2015).

As part of the EIA (CCA, Nov.2013) an extensive public participation programme was carried out in relation to EPL 3112, so Interested & Affected Parties were well aware of the exploration and mining proposals.

1.4 Terms of Reference, Approach & Methodologies

The Terms of Reference for this study were to provide an EIA and EMP and apply to MET for an Environmental Clearance for exploration on EPL 7352.

Much of the information gathered from site investigations, public participation and specialist studies for the EIA (CCA, Nov.2013) is also applicable to the major part of EPL 7352 because the area has been assessed in detail in the past. However, since EPL 7352 is technically a new licence a public information document was included in the scope of work to inform people of the new boundaries and limits of Phase 1 exploration.

An assessment of the impacts of earlier drilling exploration (up to 2013) was based on a site inspection in May 2018. Assessment of future impacts is based on standard criteria used in EIAs. These assessment criteria will be explained in Section 6, below.

1.5 Project Location

EPL 7352 is situated within the Khomas Region on the C23 tar road to Dordabis - refer to Figure 1 (yellow outline). It includes parts of four farms; Tsatsachas 87, Elisenhöhe 88, Alt Stolzenfeld 442 and Coas 457.

EPL 7352 includes the original area of former EPL 3112 (which no longer exists) but is shown for reference in Figure 2 (dotted yellow outline), and ML 182 which is also shown for reference (red outline). Together these constitute the Phase 1 exploration area.

The portion of EPL 7352 that is north of Phase 1 is not targeted for exploration at present.

The area of EPL 7352 is approximately 7269.42 hectares. Table 1 provides co-ordinates.

<table>
<thead>
<tr>
<th>Licence Points</th>
<th>Latitude (deg, min, sec)</th>
<th>Longitude (deg, min, sec)</th>
</tr>
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<tbody>
<tr>
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<td>S 22 ° 50 ′ 38.46 ″</td>
<td>E 17 ° 31 ′ 24.53 ″</td>
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<tr>
<td>2</td>
<td>S 22 ° 51 ′ 13.16 ″</td>
<td>E 17 ° 32 ′ 41.79 ″</td>
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<td>3</td>
<td>S 22 ° 50 ′ 11.26 ″</td>
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<td>4</td>
<td>S 22 ° 49 ′ 08.58 ″</td>
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<td>5</td>
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<td>6</td>
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<td>S 22 ° 50 ′ 19.18 ″</td>
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<td>10</td>
<td>S 22 ° 50 ′ 30.32 ″</td>
<td>E 17 ° 31 ′ 06.65 ″</td>
</tr>
</tbody>
</table>
Figure 1: Location of EPL 7352 (Yellow Outline)
The dotted yellow outline was the former EPL 3112 which no longer exists. The Phase 1 area for further exploration is EPL 7352 excluding the part that is north of that old EPL 3112. The solid Red outline is the Mining Licence boundary (ML 182), where earlier mineral exploration identified three ore bodies.
2 PROJECT PROPOSAL FOR ONGOING EXPLORATION

2.1 Need and Desirability of this Exploration

The iron ore deposits include bands of high grade iron ore in the form of magnetite and haematite. Iron in these forms has some specialist applications. For example a cement plant in Namibia already uses small volumes of magnetite in the manufacturing process. Other applications include the use of magnetite as a catalyst in chemical processes.

Lodestone’s intention is ultimately to export the iron ore as a concentrate, which will provide some foreign exchange for Namibia. But first the iron ore reserves need to be further delineated and proven by drilling exploration. To date only a small portion of the available resource has been explored. This exploration is also essential to the process of mine planning for efficient extraction of ore.

2.2 Project Proposals

Lodestone completed a drilling programme for mineral exploration in 2014 - for the purpose of their Feasibility Study and Mining Licence application.

The next stage of the project will be a mining stage. In time further drilling may be needed to define further mining targets and plan further development of the mine. At this stage any potential drilling is expected to be confined to the Phase 1 area.

Drilling may include percussion and/or diamond drilling. This requires the clearing of small areas of thornbush, typically 15m – 20m diameter and access tracks wide enough for a drill rig to reach the site. Specific sites for drilling have not yet been identified.

Several tracks are already in existence that were either farm tracks or were cleared for drilling exploration.

An existing site camp, including a drill core store was cleared for previous exploration activities in 2013 – 2014 and can be used for any future drilling as well. This camp may also be used for storage of fuel, hydraulic fluids and equipment. Temporary accommodation for drilling teams may be provided at the site camp. At present a few security staff are based there in “container” accommodation.

Water for drilling purposes would be drawn from existing boreholes that were drilled and used for previous drilling in the same Phase 1 area. Small volumes of water for drinking and domestic use will be supplied from nearby boreholes.

Power for drilling will be supplied by a transportable diesel generator.

No waste shall be buried or disposed of on site. All waste will be removed to a licenced waste disposal site – such as the Windhoek Municipal facility at Kupferberg. Any liquid waste will be stored in labelled drums according to the relevant Regulations, then removed to a licenced waste disposal facility.
All recyclable materials will be separated and stored separately for removal to recycling companies. Any used oils and other hydrocarbons will also be removed to recycling companies in Windhoek.

No invasive exploration (e.g. drilling or excavation) is planned for the northward extension of EPL 7352 at this stage. If that is required at a later stage, then further EIA work would become necessary for renewal of the Environmental Clearance some years in the future.

Figure 3: Drill cores from the site showing iron minerals.
3 THE PROJECT ENVIRONMENT – PAST & PRESENT

3.1 Condition of the Project Environment before Exploration

3.1.1 Early specialist studies

The study area was investigated by various specialists and the environmental scientist, Colin Christian, between 2011 and 2013 – for the EIA.

The **EIA (CCA, Nov 2013) Volume 1 Report** provided detailed descriptions of project environments based on several specialist reports and field observations. These included vegetation, fauna, birds, archaeology, geohydrology, surface water, topography, soils, farming, and communities. The specialist reports are all contained in **Volume 2 Appendices**, which MET has on record.

The impacts of exploration are obviously far less than those of mining, so only three of the original specialist reports are considered here below. Of relevance to the impacts of exploration are vegetation, fauna and birds, and archaeology.

3.1.2 Vegetation

Curtis (2011) described the seven vegetation communities: savannah, camel-thorn groves, pan fringes, hills, quartz outcrops, ore koppies, and riverine habitats. Of woody plants and shrubs she found 36 species and listed an additional 25 species that are known to occur in the quarter degree square but were not actually found in the EPL. She also found numerous species of grasses and many other herbaceous plants, and listed yet others that are known to occur in the quarter degree square. Curtis (2019, pers comm) considered that the 2011 report was still valid and applicable to this EIA. The full report is re-printed in **Appendix B** to this report.

In brief, EPL 7352 is a high quality commercial cattle farming area. This is the main land use in the EPL area and surroundings. Some of the neighbouring farms are also being developed for wildlife resources and hunting but exploration is not expected to impact on those areas.

Farming of livestock has had a low level of impact related to grazing, fencing, provision of boreholes and watering points, access tracks etc. Various factors, both natural and human induced, have combined to encourage bush encroachment – which is a widespread problem in Namibia’s savanna ecosystems (De Klerk, 2004) and (CCA, 2010).

The main bush-encroacher species here are *Acacia mellifera* (Swarthaaak) and *Catophractes alexandrii*. As well as *Dichrostachys cinerea* (Sekelbos), and *Tarchonanthus camphoratus* (Camphor bush). These are indigenous species. The density of these woody plants does not yet preclude grasses and cattle ranching.

Minor infestations of alien invasive weeds were found before drilling exploration. Therefore, these species were present before Lodestone started work on site. E.g. Minor infestations of the alien *Datura* sp., were found in 2011 on top of the koppie known as the “Southern Ore body” and other ore outcrops (Curtis, 2011). Other species she recorded were *Caesalpinia gilliesii*, and *Prosopis* sp. Cactus species had been planted at homesteads and at some cattle posts. All cactus species in Namibia are alien and potentially invasive. (However they must not be confused with the indigenous Euphorbia species – e.g. the thorns are very different).
Photographs of typical habitats where exploration drilling may occur.

Figures 4 – 8 show some of the typical savannah and ore-koppie habitats within the Phase 1 portion of EPL 7352. These habitats are the most widespread and the most likely to be affected by drilling exploration.

Figure 4: Savannah habitats in the southern part of EPL 7352. The dominant thorn bushes are *Acacia mellifera*, and *Catophractes alexandri*. The tar road is visible through the middle.

Figure 5: The Southern Ore body (“koppie”) shows some iron ore and more diverse vegetation than the savannah habitats but none of it is unique, or particularly vulnerable to drilling activities.
Figure 6: Further savannah habitats with *Acacia mellifera* and *Catophractes alexandrii* dominant.

Figure 7: More open savannah with *Acacia mellifera* still dominant (background). Occasional evergreen trees, *Boscia albitrunca* in the foreground are important to conserve.

Figure 8: One of the northern ore bodies, with iron ore outcropping on the surface. *Catophractes alexandrii* is common with less common shrubs on the outcrop as well.
3.1.3 Fauna and Birds

Irish (2012) undertook a study of the fauna based mainly on atlas data and a short site inspection for familiarization with the habitats. He listed species found or likely to occur there:

- Invertebrates - 141 taxa, of which 5 are endemic to Namibia,
- Amphibians – 6 taxa, including 1 threatened species that may be present,
- Reptiles – 41 taxa, including 5 endemic, and 7 having some legal protected status,
- Birds – 141 species, of which 7 are endemic to Namibia and three are threatened and 133 have legal status,
- Mammals – 62 species, of which 3 are endemic, 2 threatened and 16 have legal status.

Irish (pers comm, 2019) stated that the 2012 report would still be applicable. It is reprinted in Appendix C to this Report.

However, the International Union for Conservation of Nature protection status of some of the species may have changed. He recommended updating the protection status from the IUCN website. However in my opinion that information would not alter the assessment of impacts or recommended mitigations – because the impacts of exploration on fauna are expected to be very low. However, when the EIA (CCA, 2013) for mining is updated next year, then the IUCN status should be updated in consideration of the habitat destruction caused by mining.

The faunal species, including bird species are all widespread in Namibia and are not confined to local habitats. Furthermore, fauna and birds can simply move away from disturbance and do not face significant threats caused by drilling in the habitats here present.

3.1.4 Communities

The farm owners live in widely spaced homesteads on these large farms. Most of them live close to the Schaf River – far east of the ore bodies that could be drilling targets.

A neighbouring community is the very old informal settlement at Stinkwater, situated to the south along the Schaff River. It is outside the EPL. Many of these people work on the Namib Rose Farm nearby, or some on farms but many others are unemployed.

All the people in the area are entirely dependent on groundwater. This is used for domestic supply, watering of livestock, a lodge on Coas, and the Namib Rose Farm east of the Schaf River. Refer to Figure 2 above.

In the surrounding farms very little has changed since 2013. One exception is a large new homestead that has been built on the farm Coas close to the Schaf River. It is on the border of EPL 7352 but is more than 2 km away from the ore body and therefore far from the likely target areas for mineral exploration.

3.1.5 Archaeology

Two field studies were carried out by Kinahan (2011 and 2012) which are reprinted here in Appendix D to this report. He found five sites with archaeological material in the Southern and Northern ore bodies and conducted small excavations on three of these sites. His executive summary (Kinahan, 2012) concluded that “The tests indicated that the archaeological deposit
at these sites was shallow, unstratified, and did not warrant further investigation. The report concludes that the Lodestone Prospect does not require further archaeological assessment.”

However, Kinahan’s site inspections were limited to the ore outcrops within the area of the mining licence (ML182). The rest of the Phase 1 area for exploration has not yet been the subject of archaeological survey.

Since Lodestone has not yet identified the next drilling targets, it is difficult to commission a focussed archaeological survey. If further drilling is proposed within the northern and southern ore bodies that have been surveyed by Kinahan then no further work is required. But if exploration extends beyond that area and perhaps even beyond the existing mining licence area, then it is recommended that, as soon as drilling targets are identified, an extended survey should be commissioned to cover the new exploration targets.

Alternatively, Kinahan is willing to undertake a strategic survey of the Phase 1 portion of the EPL in order to identify the areas of potential archaeological interest.

3.2 The Impacts of Drilling Exploration between 2011 and 2013

Site visits from up till 2013, and a site inspection in 2018 established that very little adverse impact had resulted from exploration drilling. The photographs on the following pages show some of the typical impacts of exploration.

Drilling exploration for minerals was completed in 2013. In addition, twelve boreholes for water abstraction and monitoring of groundwater (planned after mining commences) were drilled in October-November 2015. Five of the boreholes were successful and were pump tested to obtain sustainable abstraction rates (SLR, December 2015).

Impacts of drilling activities were the clearing of small areas of bush – just sufficient to permit access and space for equipment – typically about 10m to 15m diameter. Most of the trees and shrubs that were removed were common species and encroacher species (refer section 3.1.2 above). These small clearings and access tracks had no significant impact on the natural environment. In fact clearing some encroacher thorn bushes had allowed grasses to establish, which evidently benefitted grazing resources over these small areas.

Care was taken to avoid cutting large trees such as *Acacia erioloba* (Camelthorn), and evergreen trees such as *Boscia albitrunca* (Witgat / Shepherds’ tree).

The site camp and drill core store was a larger area that had to be cleared – approximately 140m x 115m. Care was taken to leave the larger trees and evergreen trees there.

Drill chips had been spread around the site of each borehole, and these had been covered by grasses within 2 to 3 years. So there was no significant adverse impact on vegetation.

Tracks to drill sites have mostly been covered by grasses without intervention, but in a few cases compaction of soil by vehicles has limited the growth of grasses.

Some small infestations of alien invasive plants were found, but these species had been recorded prior to any exploration activities. Recommendations were made to Lodestone for their eradication to prevent spreading. They were mainly *Datura* species, and at a vegetable patch in the site camp, some *Melia azedarach* (Syringa) saplings were growing and were
pointed out for eradication. The staff who made the vegetable garden thought that the seed probably came in with the compost that they applied.

The drilling sites and site camp were found to be clean - free of litter and contractors’ rubbish, and no spills of diesel or other contaminants were found.

All considered, the impacts of exploration activities were minimal. Natural vegetation re-established on most of the disturbed sites without intervention. However, regular inspections for alien invasive plants and their prompt eradication will need to be ongoing – regardless of how they got there. Lodestone will need to be vigilant in this regard as delays lead to the spread of alien weeds – which tend to increase and spread exponentially. So they must be destroyed wherever they emerge and not given time to flower and set seed.

The drill sites are mostly not visible from a short distance outside each clearing, and are not visible from the C23 tar road.

Lodestone (Lategan, pers comm) reported that there have been no complaints from neighbours and relationships with neighbours are good.

While the sites appear to have been managed adequately, Lodestone has not kept records of their environmental management or any monitoring activities.

MET expects that mining companies should submit bi-annual environmental monitoring reports. Therefore, Lodestone should submit an environmental management report to MET twice per year whenever exploration operations are in progress. Internal monitoring records should be kept on a monthly basis, especially for alien invasive plants.

It is recommended that, for a very simple operation such as the current one, compliance monitoring by an independent, qualified environmental consultant, should be undertaken once per year.

Note that the impacts of small scale mining are not provided here because this report deals only with exploration. (Mining occurred from about July 2015 to March 2016, while processing and stockpiling continued until March 2017, and loading until May 2018.) Mining will be the subject of a separate report in due course.
Photographs (Figures 9 – 12) showing typical impacts of exploration drilling

**Figure 9:** One of the drilling sites where drill chips were spread around, and grasses re-established within two or three years.

**Figure 10:** Vehicle tracks have been covered by grasses. The stony soil helps to limit potential erosion that could result from soil being compacted.
Figure 11: The Site Camp, where evergreen trees were saved. The camp is currently occupied only by a few security staff, and is kept clean and tidy.

Figure 12: Borehole WW 202554 east of the site camp near powerline used for domestic supply.
4 PUBLIC & AUTHORITY CONSULTATIONS

4.1 Public Participation

A comprehensive public participation programme was conducted as part of the EIA from 2011 to 2013. This included farm owners, local communities (Stinkwater and Dordabis) and the relevant authorities, regional council, and parastatals. Public information documents were issued, and public meetings were conducted in July 2011, May & June 2013, and October 2013 at Dordabis and Stinkwater. Written submissions were also received. These were all recorded in detail in the EIA Report (CCA, Nov.2013).

Therefore Interested and Affected Parties (I&APs) and Authorities have been aware of Lodestone’s exploration project on the former EPL 3112 and proposed mining for several years. The extent covered in that public participation was the same as Phase 1 of EPL 7352.

In order to update I&APs on the new EPL 7352, and the updated Mining Licence boundaries, a Public Information Document was emailed on 16 October 2019 to the affected land owners and their neighbours – those being the parties that could conceivably be affected by exploration activities. Assistance was obtained from community leaders in communicating the contents of the PID to the Stinkwater Community – the nearby informal settlement – although they are not directly affected by exploration. The PID provided information on exploration activities to date, the impacts thereof, and invited a response if any new concerns had arisen in relation to exploration since 2013.

I&AP’s were also invited to update their contact details, and to pass on the PID to neighbours – in case of any changes in ownership or contact details. A Register of Interested & Affected Parties in regard to exploration is presented in Appendix C.

The PID is presented in Appendix E to this report. As at 28 October 2019 no responses were received.

4.2 Authority Consultation

A telephonic conversation was held with Ms Saima Angula at MET in October 2019 and she was emailed a copy of the Public Information Document on 14 October 2019.

Lodestone has previously commissioned SLR Consulting, independently, to undertake studies on groundwater and deal with permitting requirements with MAWF.

Lodestone has dealt directly with MME regarding permit requirements for exploration.
5 LEGAL & POLICY UPDATE

5.1 Introduction to the Legal Register

A Register of the Legislation & Policies that are relevant to environmental management in Namibia - for exploration and mining - was compiled by Watson (Envirolex, 2012) and included as an Appendix in the EIA (CCA, Nov. 2013).

Watson subsequently updated that Register (Envirolex, May 2018), which is presented in Appendix G to this EIA Report.

Legislation and policy that relates to the Environment in Namibia is not a discreet body of law, but exists in many different acts, regulations and ordinances which are administered by several different Government Ministries. International laws and policies to which Namibia is a signatory are also included within the ambit of “Environmental Law”. Given the broad scope of Namibian environmental legal and policy provisions, the above-mentioned Registers by Envirolex may not be fully comprehensive.

Both the above-mentioned reports relate to mining and exploration. In the following subsections a selection has been made of the legislation that is probably the most practically applicable to environmental management on this exploration project.

Please note that this selection and summary (by the environmental scientist – not a legal specialist) is not comprehensive. Envirolex’s (May 2018) report should be read in its entirety.

5.2 The Constitution of Namibia

The Constitution of Namibia, as the supreme law of the country provides a background against which all environmental law can be interpreted. For example Article 95(l)) states: -

“The State shall actively promote and maintain the welfare of the people by adopting, inter alia policies aimed at the maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future... in particular, the Government shall provide measures against the dumping or recycling of foreign nuclear and toxic waste on Namibian territory “.

Article 144: regarding International Law states : -

“Unless otherwise provided by this Constitution or Act of Parliament, the general rules of public international law and international agreements binding upon Namibia under this Constitution shall form part of the law of Namibia.”
5.3 The Environmental Management Act (Act 7 of 2007) & Regulations (GN 29 of 2012)

The Environmental Management Act provides twelve helpful Principles to guide developments in achieving sound Environmental Management. They are also necessary to interpreting the various laws under the broad scope of all the laws that have a bearing on environmental management.

Principles of Environmental Management
(ENVIRONMENTAL MANAGEMENT ACT, NO. 7 OF 2007)

3. (1) The principles set out in subsection (2) –

(a) guide the implementation of this Act and any other law relating to the protection of the environment;

(b) serve as the general framework within which environmental plans must be formulated; and

(c) serve as guidelines for any organ of state when making any decision in terms of this Act or any other law relating to the protection of the environment.

(2) The following are the principles of environmental management:

(a) renewable resources must be used on a sustainable basis for the benefit of present and future generations;

(b) community involvement in natural resources management and the sharing of benefits arising from the use of the resources, must be promoted and facilitated;

(c) the participation of all interested and affected parties must be promoted and decisions must take into account the interest, needs and values of interested and affected parties;

(d) equitable access to environmental resources must be promoted and the functional integrity of ecological systems must be taken into account to ensure the sustainability of the systems and to prevent harmful effects;

(e) assessments must be undertaken for activities which may have a significant effects on the environment or the use of natural resources;

(f) sustainable development must be promoted in all aspects relating to the environment;

(g) Namibia’s cultural and natural heritage including, its biological diversity, must be protected and respected for the benefit of present and future generations;

(h) the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term must be adopted to reduce the generation of waste and polluting substances at source;

(i) the reduction, re-use and recycling of waste must be promoted;

(j) a person who causes damage to the environment must pay the costs associated with rehabilitation of damage to the environment and to human health caused by pollution, including costs for measures as are reasonably required to be implemented to prevent further environmental damage;
(k) where there is sufficient evidence which establishes that there are threats of serious or irreversible damage to the environment, lack of full scientific certainty may not be used as a reason for postponing cost-effective measures to prevent environmental degradation; and

(l) damage to the environment must be prevented and activities which cause such damage must be reduced, limited or controlled.

The Environmental Management Act (2007) became effective, with Regulations in 2012 (Government Notice 29 of 2012). The Regulations deal with requirements for EIAs and Environmental Clearances as well.

Other Acts and International Laws that are of particular relevance to Mineral Exploration include:

5.4 Water Act 54 of 1956

The Act provides for the control, conservation and use of water in relation to both surface- and groundwater. Of particular relevance to this exploration project are the following.

- It is an offense to commit any act that could pollute water, including groundwater, in such a way as to render it less fit for the purposes for which it would ordinarily be used by other persons or aquatic life,
- People who carry on industrial activities are also liable for clean up costs, including any cleanup costs after closure of the activity,
- Certain general water quality standards are specified,
- Permits must be obtained for any groundwater abstraction, and all boreholes must be registered with the Directorate of Water Affairs.

5.5 Minerals (Prospecting & Mining) Act, 1992

The Act controls all mining and exploration activities in Namibia and licences are required for these activities.

The holder of a mining licence shall not erect any accessory works … without prior permission from the Mining Commissioner – including:

- a) power plant, transmission line or substation,
  b) water borehole, pipeline, drilling rig, pump station, tank or dam,
  c) workshop, store, office etc,
  d) explosives magazine,
  e) processing plant,
  f) waste disposal site,
  g) any camp or residential area.

Applications for mining licenses must contain particulars of:

- the condition and any previous damage to the environment,
- an assessment of impacts of the proposed activity on the environment, and steps to be taken to minimize or prevent any adverse impacts,
- manner in which it is intended to prevent pollution, deal with any waste, safeguard mineral resources, and
- reclaim or rehabilitate land disturbed by prospecting and mining.

In the event that a mining licence is cancelled or the mine is abandoned, the mining company (licence holder is still responsible for clean up and rehabilitation).

Any pollution has to be reported to the Minister and the licence holder must take steps to clean up at his own cost.

A new Minerals Bill is being prepared that introduces a requirement for financial guarantees for clean up and rehabilitation.

5.6 Hazardous Substances Ordinance 14 of 1974

The Act deals with the import, storage, transport and sale of scheduled substances. If Lodestone needs to be aware of what substances are scheduled, and if they deal with or transport any such substances, they must inform themselves fully and comply with the relevant requirements.

5.7 Petroleum Products and Energy Act 13 of 1990

Various regulations deal with amongst other things, the possession, usage, storage, disposal, transport, recovery and refinement of used mineral oil. For example used oil may not be discarded, containment and prevention of spills (e.g. by bunding of installations) etc is regulated.

5.8 Health & Safety Regulations

The relevant sections are contained in Chapter 5 of the regulations relating to health and safety of employees at work published under the previous Labour Act in GN 156 of 1997 (GG 1617 of 1 August 1997). This chapter provides for hazardous substances – their transport, storage, labeling, handling, exposure in the workplace, disposal etc.

Limits are placed on noise levels (85db) and noise protection.

Occupational exposure limits are listed for a variety of airborne hazardous substances, including dust – and including silica (also lead and asbestos if applicable).

Please Note: Occupation Health and Safety (OHS) is not usually considered part of EIA’s but Watson has touched on this subject as well - not comprehensively. OHS on mining and industrial projects is normally handled by specialists in that field that are independent of the environmental consultants. Therefore Colin Christian, Environmental Scientist does not provide consulting services nor take responsibility for occupational health and safety issues.

5.9 National Heritage Act 27 of 2004

The act protects “any remains of human habitation or occupation that are more than 50 years old...”. If any such artifacts are found they must not be removed or disturbed but immediately be reported to the Heritage Council. It is not permitted to destroy any archaeological sites or artifacts.
5.10 Nature Conservation Ordinance, No.4 of 1975 (as amended)

The Ordinance covers hunting and protection of wild animals and birds, and the protection of indigenous plants. Schedule 4 deals with protected species of animals and birds. Schedule 9 deals with Protected plants. Permitting requirements apply.

5.11 Forest Act, No.12 of 2001

Section 23 requires approval (licence) from the Director of Forestry in order to:
- clear more than 15ha of predominantly woody vegetation,
- remove trees within 100m of a river, stream or watercourse.

5.12 Convention on Biological Diversity, 1992

As a signatory to this Convention, Namibia is committed to conserving its endemic species to ensure that they do not become extinct in this country. This forms part of International Law that is applicable in Namibia.

5.13 Climate Change

Two international agreements deal with climate change and specifically stabilisation of greenhouse gas concentrations:
- United Nation Framework Convention on Climate Change, 1992

5.14 Other Legislation and Policies

Other legislation that may be relevant to exploration (though less likely) include:
- Explosives Act 26 of 1956 (as amended 1978)
- Petroleum Products and Energy Act 13 of 1990
- Soil Conservation Act 76 of 1969 (as amended 1978)
- Public Health Act, 36 of 1919
- Foreign Investment Act, No.27 of 1990
- Electricity Act No. 4 of 2007, including generation
- Road Traffic and Transport Act No.22 of 1999

Watson also listed a number of Namibian policies and International protocols that may be very broadly applicable.

The reader is referred to the full text of Watson’s updated report in Appendix G, since no selection or summary can be comprehensive.
In the following section, the potential impacts of the exploration activities will be assessed in accordance with internationally recognized criteria used by environmental impact assessors. These criteria are explained as follows.

A broad definition of “Environment” is applied that includes both the bio-physical and socio-economic environments.

Environmental impacts may be positive or negative impacts. On most projects there are negative impacts on some biophysical aspects, but economic benefits to somebody. But in this case, a potential positive impact (benefit) to rangelands could arise by clearing small areas of encroacher thorn bush – opening it up for grasses to thrive. (If at a later stage the exploration leads to mining then a negative impact would occur because the habitat would be destroyed. However, it often happens that exploration does not lead to mining; e.g. if the ore deposit is not economically viable. If mining does follow, then the impacts of related activities have to be re-assessed as part of the application for a mining licence. That could be some years in the future.)

So this current assessment is only for the impacts of exploration activities.

To the extent that it is practically possible, this study will seek to recommend measures to mitigate negative impacts and enhance positive impacts (benefits).

For each potential impact that is identified, a discussion of the impact is presented. Then the impact is assessed according to the criteria explained in Table 2, below.
<table>
<thead>
<tr>
<th>Table 2: Assessment Criteria Explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of impact</td>
</tr>
<tr>
<td>Extent</td>
</tr>
</tbody>
</table>
| Duration | How long the impact is expected to persist: -  
- Short term 0-5 years  
- Medium term 5-15 years  
- Long term – lifespan of the project or beyond  
- Permanent. |
| Intensity (or Severity) | - Low (natural, social and cultural functions are not significantly affected)  
- Medium (natural, social and cultural functions continue but are modified)  
- High (natural, social and cultural functions become altered to the degree that they become dysfunctional). |
| Probability | The probability of the impact actually occurring: -  
- Improbable (a low probability that the impact will occur)  
- Probable (a distinct probability that the impact will occur)  
- Highly probable (it is most likely that the impact will occur)  
- Definite (where the impact will occur regardless of any mitigation). |
| Confidence | The level of confidence that can be placed on this assessment: -  
- Low (would indicate that further investigation is required if the impact could potentially be significant)  
- Medium (further investigation may be required if the impact could be significant)  
- High (The impact is well understood, but further investigation may be required to determine the effectiveness of possible mitigation measures). |
| Significance | The Significance of the impact is determined as a synthesis of the above assessment criteria where: -  
- Low significance means that the impact would not have an effect on the decision to approve the project,  
- Medium significance – the assessed impact should have an effect on the decision unless it is effectively mitigated,  
- High significance – the decision would be influenced regardless of any mitigation, or there is no mitigation envisaged that could be effective. |
| Mitigation | What measures could be applied to reduce negative impacts or enhance positive impacts? |
| Further investigation or monitoring | A recommendation for further investigation (prior to the commencement of the activity) or monitoring (during operations), and following the cessation of project activities. |
7 ASSESSMENT OF IMPACTS OF FUTURE DRILLING EXPLORATION, & MITIGATION

7.1 Impacts on Natural Vegetation due to Clearing for Drilling

Small areas are required to be cleared at drill sites for access, laying down of equipment and drill cores etc. These are typically 15m – 20m diameter. Clearing to provide access tracks to some of the drill sites or cut lines for survey may also be needed.

Provided that only the common encroacher species such as *Acacia mellifera*, *Catophractes alexandrii*, *Lycium bosciifolium*, and *Tarchonanthus camphoratus* etc are cleared, there would be no significant adverse impact. In fact small clearings would benefit the grass species and thus benefit grazing resources.

If, on the other hand large trees such as *Acacia erioloba* (Camelthorn) and evergreen trees such as *Boscia albitrunca* (Shepherds tree) and several other Protected species are cut down - that could have a significant negative impact on biodiversity and ecosystems. The many “special” species are widespread in the area. Hilltops (“koppies” including the ore bodies, stream courses, and fringes of pans usually have a higher density of large trees and less-common species. Care must be taken everywhere to avoid drilling close to special large trees, uncommon species, and evergreen trees.

<table>
<thead>
<tr>
<th>Table 3: Impacts on Natural Vegetation due to Clearing for Drilling</th>
</tr>
</thead>
</table>
| Nature of impact | A positive impact will result when encroacher thornbush species are cleared, opening up for space for grasses.  
A negative impact will occur to the extent that “special” tree species are removed. |
| Extent | Localised to the drill sites, any new access tracks, and cut lines for survey. |
| Duration | Long term – both the benefits and the negative impacts |
| Intensity (or Severity) | Medium |
| Probability | Highly probable in the case of benefits for grazing grasses  
Medium probability in the case of some “special” trees being cut. This is avoidable if properly managed by the surveyor who locates drill sites, and drilling teams. |
| Confidence | High |
| Significance | Low - the impact would not have an effect on the decision to approve the project |
| Mitigation | Take care when siting borehole positions. Avoid large trees, protected species and evergreen species. |
| Further investigation or monitoring | Monitoring by Lodestone staff during site selection, and clearing. |
7.2 Impacts on Natural Vegetation due to Alien Invasive Plants

A number of alien invasive plant species occurred in the EPL prior to any of Lodestone’s activities. These included *Datura* species, which are one of the most widespread in the EPL. These plants are also poisonous to animals. *Prospopis* species (Mesquite trees), *Caesalpinia gilliesii* (Bird of Paradise flower), and all Cactus species.

In addition, *Melia azedarach* (Syringa) has been accidentally introduced (probably in compost) in vegetable gardens in the camp site.

Alien invasive plants are able to outcompete indigenous species and spread exponentially. They result in loss of indigenous habitat and species. The International Union for Conservation of Nature (IUCN) recognises that alien invasive plants are one of the greatest threats to biodiversity, globally - resulting in loss of indigenous species.

Some of the aliens are also poisonous to livestock – e.g. Datura and Syringa are poisonous.

Exploration presents a risk of spreading these aliens. Mitigation requires complete eradication by grubbing them out, complete with the roots. In the case of alien invasive trees and woody species they should be cut down to about half a meter above ground and the whole stump immediately painted with a mixture of Diesel and Garlon – according to the instructions in the product packaging.

The exploration project will encourage their spread if nothing is done. However, the project can also help to eradicate these problem plant species – by vigilant monthly monitoring in all areas of the work, and immediate eradication whenever aliens are found. This must start before project activities at each site. The sites must be located (e.g. by GPS), revisited monthly, and repeatedly grubbed out. This is because seed is usually stored in the soil and sometimes takes months or years to germinate.

Photographs to assist with the identification of alien plants are presented in Appendix H.

### Table 4: Impacts on Natural Vegetation due to Alien Invasive Plants

<table>
<thead>
<tr>
<th>Nature of impact</th>
<th>Alien invasive plants will spread if nothing is done to eradicate them.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>All existing infestations and all areas of project activities.</td>
</tr>
<tr>
<td>Duration</td>
<td>Long term – if not repeatedly eradicated</td>
</tr>
<tr>
<td>Intensity (or Severity)</td>
<td>Medium</td>
</tr>
<tr>
<td>Probability</td>
<td>Highly probable</td>
</tr>
<tr>
<td>Confidence</td>
<td>High</td>
</tr>
<tr>
<td>Significance</td>
<td>Medium – mitigation is essential</td>
</tr>
<tr>
<td>Mitigation</td>
<td>Monthly monitoring and immediate eradication, regularly repeated until they no longer re-emerge. This may take years!</td>
</tr>
<tr>
<td>Further investigation or monitoring</td>
<td>Monitoring by Lodestone staff before, during and after all operations.</td>
</tr>
</tbody>
</table>

7.3 Impacts of Fire

Fire may be started accidentally by people working on drilling teams. Careless use of matches or cigarettes, sparks from welding or other activities can be the cause. Extensive veld fires can
result, with loss of grazing capacity in the short term, potential loss of livestock and wildlife, damage to large old trees, and potential risk to farm buildings, vehicles etc.

Thus fire can have economic impacts for farm owners as well.

Therefore fires shall not be made for any purpose other than in a contained place in the site camp. No burning of cleared vegetation, or litter shall be permitted.

Portable fire fighting equipment must always be on hand at each work station to ensure that an immediate response to fire is always available if activities such as welding have to be done on site. Clearing of the drilling sites will help to prevent fires. All reasonable precautions must be taken to anticipate risks and prevent accidental fire. Team leaders / foremen must regularly remind staff to be vigilant in this regard.

### Table 5: Impacts of Fire

<table>
<thead>
<tr>
<th>Nature of impact</th>
<th>Destruction of habitat, loss of animals or even human life and property.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>Depending on conditions of the veld and weather, fires can affect hundreds of hectares</td>
</tr>
<tr>
<td>Duration</td>
<td>Short term for grazing resources, but potentially long terms for large trees and buildings etc.</td>
</tr>
<tr>
<td>Intensity (or Severity)</td>
<td>Low to High</td>
</tr>
<tr>
<td>Probability</td>
<td>Medium – reduced to Low with mitigation</td>
</tr>
<tr>
<td>Confidence</td>
<td>High</td>
</tr>
<tr>
<td>Significance</td>
<td>Medium – mitigation is essential</td>
</tr>
<tr>
<td>Mitigation</td>
<td>No burning of waste. All reasonable measures to prevent accidental fire – not limited to these recommendations. Fire fighting equipment at all work stations. Awareness training and regular reminders to all site personnel.</td>
</tr>
<tr>
<td>Further investigation or monitoring</td>
<td>Monitoring by Lodestone staff to ensure compliance with mitigation measures, fire fighting equipment at hand etc.</td>
</tr>
</tbody>
</table>

#### 7.4 Impacts on Fauna (Mammals, Reptiles, Amphibians & Invertebrates)

Secondary impacts on faunal populations as a result of changes in the vegetation are unlikely – except in the case of fire, as mentioned above. That would have a short term impact on vegetation and deprive any fauna of their food source or hunting habitat.

Hunting is subject to the Nature Conservation Ordinances and will not be permitted on this project.

Direct impacts on individual animals can result from open boreholes, rubbish and litter.

Large animals or humans can break legs if drill holes are not capped to prevent this. Small animals, reptiles or amphibians can fall into unprotected drill holes.

Fatalities can also result from rubbish such as wire, bottles or cans, or anything that can trap animals, large or small.

Plastic bags are sometimes eaten by livestock or wildlife. Plastic can get lodged in the guts of animals causing fatalities.
Animal burrows must also be avoided. Some rare animals such as aardvark are known to occur in the EPL. Other burrowing animals include ground squirrels and warthogs.

Mitigation is to prevent hunting, poaching and remove all forms of litter and rubbish. All boreholes must be effectively capped.

| Table 6: Impacts on Fauna (Mammals, Reptiles, Amphibians & Invertebrates) |
|-----------------------------|--------------------------------------------------------------------------------------------------|
| Nature of impact            | Injury or fatalities to humans, animals and invertebrates.                                      |
| Extent                      | All work stations and open boreholes.                                                           |
| Duration                    | Long term – but preventable                                                                    |
| Intensity (or Severity)     | Medium                                                                                            |
| Probability                 | Highly probable                                                                                  |
| Confidence                  | Medium                                                                                            |
| Significance                | Medium – mitigation is essential and easy to achieve                                            |
| Mitigation                  | Cap all boreholes, remove all rubbish and litter. Avoid sites with animal burrows as far as possible. |
| Further investigation or monitoring | Monitoring by Lodestone staff during and on completion of drilling.                             |

7.5 Impacts on Birds

Birds, being highly mobile will move away from disturbance. The same precautions must be taken regarding fire, and rubbish as for fauna (above).

The main concern with birds is the potential for the nesting sites of certain species of large birds to be disturbed. A few species of large raptors, such as Lappet-faced Vultures are known to nest in large trees and return to the same nest year after year to breed. Any activities there may prevent them from breeding successfully. Several large raptors are endangered species – so it is important to avoid any activities in the vicinity of all large trees that have raptors nests in them.

<table>
<thead>
<tr>
<th>Table 7: Impacts on Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of impact</td>
</tr>
<tr>
<td>Extent</td>
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<tr>
<td>Duration</td>
</tr>
<tr>
<td>Intensity (or Severity)</td>
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<td>Probability</td>
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<tr>
<td>Significance</td>
</tr>
<tr>
<td>Mitigation</td>
</tr>
<tr>
<td>Further investigation or monitoring</td>
</tr>
</tbody>
</table>
7.6 Impacts on Soil

Soils can be adversely affected in three ways: by compaction, loss of topsoil, or contamination.

Compaction of vehicle tracks:

Vehicles compact soil on tracks making it difficult for grass to grow. These two factors in turn often result in increased runoff along vehicle tracks causing rill erosion. In the areas where exploration occurred previously soils were stony, which helps to mitigate this impact naturally. In similar conditions grass can be expected to grow on most of the tracks without intervention.

Further precautions are to avoid making tracks that run directly down slopes. Tracks that run along the contours or obliquely to the contours will be less likely to erode, even if grass does not grow there.

In places where grass does not re-establish two years after use, the bare patches along tracks should be ripped up, and a layer of small stones added.

Topsoil at excavations:

If any test pits are made where there is soil cover, there is potential for topsoil to be washed away making it difficult to rehabilitate the affected area. Topsoil refers to the top layer that contains organic matter. This is often visible as a different colour to the sub-soil beneath it. If there is no visible difference in colour, then the top 150mm should be deemed to be topsoil.

Topsoil contains organic matter that retains nutrients and moisture, increasing cohesion of soil particles. It is important for plants grasses to germinate and get established, and it often contains plant seeds. Therefore it is essential to manage the topsoil as follows.

Topsoil must be stripped and stockpiled separately from subsoil. On completion, the subsoil must be replaced first followed by the topsoil – spread evenly on top. This has been a standard requirement on civil engineering projects for decades and must be implemented.

The impacts of soil contamination are dealt with in the following section.

<table>
<thead>
<tr>
<th>Table 8: Impacts on Soils: compaction and loss of topsoil</th>
</tr>
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<tbody>
<tr>
<td>Nature of impact</td>
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<tr>
<td>Extent</td>
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<tr>
<td>Duration</td>
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<tr>
<td>Intensity (or Severity)</td>
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<td>Mitigation</td>
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<tr>
<td>Further investigation or monitoring</td>
</tr>
</tbody>
</table>
7.7 Hydrocarbons & Other Hazardous Substances – Soils and Groundwater

Spills of diesel, hydraulic fluids, lubrication fluids, or other chemicals can contaminate soil making it toxic to plants. Diesel, for example, is well known for being toxic to plants and its presence in the soil will prevent growth.

If large spills occurred these substances can percolate down and contaminate groundwater, or runoff into pans. Hydrocarbons are toxic to humans and animals and may make groundwater unsuitable for human or even animal use.

Machines and vehicles must not be serviced on site and oils and fuels shall not be allowed to be run into the soil anywhere. Drilling rigs and generators often drip oils and must be provided with large drip trays. Used oil shall not be discarded but shall be contained in suitable containers and returned to authorized / permitted facilities for recycling.

Storage of hydrocarbons (e.g. diesel fuel) and other hazardous substances is regulated. Bunding of fuel tanks in a manner such that all spills are contained, is a legal requirement if fuels are stored on site. In the event of portable tankers, drip trays shall be used to prevent spills when refueling machines such as generators and drill rigs.

In the event of spills, contaminated soil has to be excavated and removed to a hazardous waste site.

In addition, background data on water quality was determined by SLR previously, and in the event of any groundwater contamination, it may be necessary to test groundwater samples and determine whether it was contaminated.

It must be emphasized that all people and livestock in the study area are dependent on groundwater as the only available source. Therefore it is essential to ensure that this vital resource is never placed at risk of contamination. Furthermore, the Environmental Management Act endorses the “polluter pays principal” – in terms of which the party responsible for any pollution will be required to bear the cost of any remediation that is required. This is applicable to Lodestone and all contractors and sub-contractors – all of whom must take responsibility to prevent contamination or will be required to bear the costs of remediation.

Lodestone must include training of their own personnel, and contracts with all contractors must include requirements for legal compliance with all Regulations.

<table>
<thead>
<tr>
<th>Table 9: Impacts of Hydrocarbons &amp; other Hazardous Substances on Soils &amp; Groundwater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of impact:</td>
</tr>
<tr>
<td>Extent:</td>
</tr>
<tr>
<td>Duration:</td>
</tr>
<tr>
<td>Intensity (or Severity):</td>
</tr>
<tr>
<td>Probability:</td>
</tr>
<tr>
<td>Confidence:</td>
</tr>
<tr>
<td>Significance:</td>
</tr>
<tr>
<td>Mitigation:</td>
</tr>
<tr>
<td>Further investigation or monitoring:</td>
</tr>
</tbody>
</table>
7.8 Impacts of Groundwater Abstraction

Groundwater will be abstracted from existing boreholes for domestic use and for drilling purposes. Lodestone commissioned SLR Consulting to undertake pump testing on several boreholes and the results were presented in a report by SLR (December 2015). Recommended limits to abstraction rates were provided for each borehole (Table 5 of that report).

Lodestone is in possession of a permit from MAWF for abstraction from five boreholes subject to a combined abstraction limit of 219 000m³ per year. Over-abstraction can result in boreholes drying up and is expressly forbidden in terms of the Permit. MAWF requires that records of volumes abstracted and water levels must be kept monthly and submitted quarterly to MAWF.

Table 10: Impacts of Groundwater Abstraction

<table>
<thead>
<tr>
<th>Nature of impact</th>
<th>Pumping in excess of sustainable yield can cause boreholes to dry up. This may affect neighbour’s boreholes in some cases.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>The zone of influence of any over-pumped borehole.</td>
</tr>
<tr>
<td>Duration</td>
<td>Unknown.</td>
</tr>
<tr>
<td>Intensity (or Severity)</td>
<td>Unknown.</td>
</tr>
<tr>
<td>Probability</td>
<td>Low - if SLR’s recommended abstraction rates are not exceeded.</td>
</tr>
<tr>
<td>Confidence</td>
<td>High – SLR have done pump tests</td>
</tr>
<tr>
<td>Significance</td>
<td>Low – provided compliance with MAWF Permit</td>
</tr>
<tr>
<td>Mitigation</td>
<td>Compliance with the MAWF Permit and SLR’s (Dec, 2015) recommended limits of sustainable yields for each borehole.</td>
</tr>
<tr>
<td>Further investigation or monitoring</td>
<td>Monitoring of water levels and volumes abstracted – and submission of quarterly returns to MAWF.</td>
</tr>
</tbody>
</table>

7.9 Impacts Related to a Temporary Site Camp

The site camp is currently occupied only by security staff. No problems have been reported.

Temporary residential camps can lead to various problems. Allegations are sometimes made which may include:

- Security issues for neighbouring farmers,
- Poaching of livestock,
- Hunting or snaring wildlife,
- Increased risk of HIV/AIDS to neighbouring workers resident on farms or communities,
- Sanitation issues,
- Litter and waste disposal issues.

Residential site camps are best avoided. If at all possible it is best for drilling teams to live at home (e.g. Windhoek) and be transported out daily to site.

If there is good reason to house people on site then strict controls need to be implemented and enforced though means such as:
• A Code of Ethics as part of each person’s conditions of employment,
• Restrictions to the work areas and designated access routes during working hours,
• Restriction to the site camp at night and all non-working hours unless for approved work purposes or with express permission. (Obviously there may be exclusions such as medical emergencies),

Penalties, especially of the first three above, must be severe enough to deter infringement – for example, offenders should face suspension from the project. Subject to Labour Law and appropriate procedures, Lodestone should have the right to order that offending persons be suspended from working on their site – if they are not compliant with the above restrictions.

Other environmental issues that must be managed at the site camp include:

• Provision of portable chemical toilets that are managed, serviced and cleaned as the responsibility of the contractor,
• No littering,
• No burning of waste,
• No wasting of water.

<table>
<thead>
<tr>
<th>Table 11: Impacts of Temporary Site Camp for Drilling Teams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of impact</td>
</tr>
<tr>
<td>Extent</td>
</tr>
<tr>
<td>Duration</td>
</tr>
<tr>
<td>Intensity (or Severity)</td>
</tr>
<tr>
<td>Probability</td>
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<tr>
<td>Confidence</td>
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<tr>
<td>Significance</td>
</tr>
<tr>
<td>Mitigation</td>
</tr>
<tr>
<td>Further investigation or monitoring</td>
</tr>
</tbody>
</table>

7.10 Potential Economic Benefits

The economic benefits of drilling *per se* will be the incomes earned by employees of the drilling contractor and profits made by the owners of that company. These benefits would be short term and relatively insignificant to Namibia.

However, in the event that drilling proves viable ore deposits and leads to mining, then the benefits of mining to Namibia should prove highly significant in the long term. It is not possible to assess these secondary benefits at the exploration stage. However they would include employment, mining revenue, foreign exchange earnings and significant secondary benefits for support industries and services.
7.11 Impacts of Noise, Dust, Visual impacts

Consideration has been given to potential impacts of other issues such as noise, dust and visual impacts, but none of these is considered to be significant for drilling in this particular environment. These minor impacts are discussed as follows:

- If percussion drilling is used, dust emissions would be high but distances to homesteads mitigate against any significant impacts as the ore bodies are more than 1000 metres away from homesteads. Much of the drilling is expected to be diamond drilling which is a wet process and not very dusty.

- Noise will also be substantially mitigated by those distances (more than 1000 metres), and wildlife will simply move away if they are bothered by the noise.

- The large numbers of small thorn trees mitigates against visual impacts from distances of even 50 m away outside the clearings.

Therefore none of these potential issues is considered to be significant and does not require further assessment for exploration.

7.12 Impacts on Archaeological Sites

The two Archaeological Reports by Kinahan (2011 and 2012) were mentioned in Section 3.1.5 above. Although he found archaeological material and excavated three of them, he concluded that they did not warrant further archaeological assessment.

However, it is emphasized that his survey was limited to the northern and southern ore bodies (see Figure 2, page 4). The rest of the EPL 7352 has not been investigated by an archaeologist. Therefore, if any new exploration targets are identified and proposed for drilling that lie outside the northern and southern ore bodies, then those areas must first be subjected to archaeological survey.

Alternatively, Kinahan is willing to undertake a strategic survey of the Phase 1 portion of the EPL in order to identify the areas of potential archaeological interest to determine whether any sites exist that may be deserving of mitigation measures.

7.13 Occupational Health & Safety Issues

As mentioned in Section 5.8 above, the project will have to comply with all health and safety Regulations in terms of the Labour Act. For example, these include but are not limited to noise, dust, eye and head protection for all personnel working near drill rigs in operation.

This EIA does not deal with Health & Safety issues. Therefore it is recommended that Lodestone employ a specialist in that field to draw up a Health & Safety Plan and recommend a compliance monitoring programme.
8 CONCLUSIONS & RECOMMENDATIONS

Section 1: Introduction:

The former EPL 3112 that was cancelled and was superceded by EPL 7352 with an extension northward. The proposed Phase 1 exploration area is the same as the former EPL 3112 area.

The original EIA & EMP (CCA, November 2013) for the same affected area related to mining as well. Some of the specialist baseline studies for that EIA are relevant to this Report.

Section 2: Project Proposal for Ongoing Exploration

Further mineral exploration is needed to extend the potential resources and further the process of extended mine planning in due course.

Drilling exploration is proposed. Excavation of small test pits may also be needed for bulk sampling.

Section 3: The Project Environment – Past & Present

The specialist studies for vegetation, fauna and birds covered the same area and remain valid for exploration in Phase 1. However, the specialist study for archaeology was limited to the northern and southern ore bodies and if exploration targets are identified further afield, the archaeological survey will need to be extended to cover new target areas.

The project environment has not changed significantly since the early studies in 2011 and 2012. An exception is a small area on the Southern Ore body where overburden has been excavated to 2 or 3 meters to provide magnetite to local industry. However, drilling exploration itself and related tracks and minor clearing has had very little impact on the environment. In fact clearing small patches of encroacher thorn bush has probably benefited grasses and grazing resources, as well as creating a greater diversity of habitats for the diverse faunal species to utilise.

Photographs and descriptions have been provided of the typical habitats that may be affected by drilling activities.

Attention has been drawn to the threat posed by alien invasive plants that were mostly present before exploration activities started. The most common of those is Datura sp. Only one species, Syringa, has been introduced in the vegetable gardens in the site camp. Total eradication of Syringa is achievable since it has not yet spread. All alien species will require repeated monitoring and eradication.

No issues with neighbouring farmers or communities have been reported to the author or to Lodestone (Lategan, pers comm).

Section 4: Public and Authority Consultations

An extensive public participation programme was done between 2011 and 2013 for the same area as Phase 1 of EPL 7352. In addition a Public Information Document was distributed in October 2019 to explain the situation of the new EPL. No responses were received.
The PID was also sent to MET. Lodestone is in possession of the required permit for groundwater abstraction from MAWF – which places limits on abstraction.

**Section 5: Legal & Policy Update**

Watson compiled a Legal Register of applicable laws and policies for the original EIA (Envirolex, 2012) and he updated that Report (Envirolex, 2018). Both reports are applicable to exploration and mining, but some of the listed legislation will not be directly relevant to exploration.

**Section 6: Assessment Criteria**

The standard criteria used to assess the impacts of exploration activities were explained – the nature of impact, extent, duration, severity, probability of occurrence, and significance for a decision about approval of the project.

**Section 7: Assessment of Environmental Impacts**

The potential impacts of exploration were assessed using the above criteria. Mitigation measures were recommended wherever practicable. Recommendations were also made for monitoring by Lodestone and independent consultants.

None of the predicted impacts were highly significant. All of them can be mitigated with proactive planning, communication and enforcement by Lodestone and all site staff / contractors.

Recommendations for mitigation have been made throughout the report, especially Section 7.

**Section 8: Conclusions & Recommendations**

It is concluded that exploration activities have had very little impact on the bio-physical or socio-economic environment previously and are not expected to have very significant impacts in the future. Minor impacts have largely self-rehabilitated (e.g. grass cover). One important impact that needs to be monitored and managed (ongoing) is the eradication of alien invasive weeds.

An Environmental Management Plan (EMP – Section 9) has been compiled, which presents the recommendations in the form of Environmental Specifications that can be included in contracts with exploration companies and enforced on site. The EMP includes a description of the Roles & Responsibilities of parties that can have an influence on the environmental impacts and their mitigation.

Subject to compliance with legislation and the recommendations in the EIA and EMP, it is recommended that an Environmental Clearance can be granted for exploration within the Phase 1 portion of EPL 7352.

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Lodestone Namibia (Pty) Ltd:

ENVIRONMENTAL MANAGEMENT PLAN
FOR EXPLORATION ON EPL 7352, PHASE 1

9 ENVIRONMENTAL MANAGEMENT PLAN

9.1 Introduction to EMP

This Environmental Management Plan (EMP) takes the recommendations for mitigation of impacts contained in the Environmental Impact Assessment (EIA) - Section 7, above, and presents them in the form of Environmental Specifications that must be included in Contracts with exploration / drilling companies and enforced on site.

The Environmental Specifications are arranged, for ease of reference, according to the aspects of the environment that may be affected – vegetation, fauna, soils etc.

These Specifications need to be considered throughout the planning stage and enforced during the operations, rehabilitation, and post-completion stages.

The EIA, Section 7 explains the impacts that are likely to occur if activities are not adequately managed. It is important that all parties on site have an understanding of those impacts and the reasons for the Environmental Specifications. Understanding encourages co-operation and compliance. Therefore training and awareness programmes are needed.

9.2 Roles & Responsibilities

9.2.1 Lodestone Directors & Chief Operations Officer & Staff

The Directors of Lodestone Namibia (Pty) Ltd carry ultimate responsibility for compliance with the Environmental Management Plan and other recommendations in the EIA. Lodestone and their staff shall ensure that:

- They and all staff are familiar with the EIA and EMP,
- All exploration activities are planned and implemented with the EMP in mind,
- The EMP is included in Contracts of contractors and subcontractors,
- Appropriate training is provided so that site staff know what is required of them and the reasons for it,
- A competent member of staff is designated with monitoring and enforcement of the Specifications on a daily basis and compiling a monthly report on compliance,
- In conjunction with monitoring and reporting, a photographic record is maintained of any issues of non-compliance where appropriate (this is useful also for training),
- Financial provision is made for implementation, internal monitoring and management on site,
- Environmental Compliance Reports are compiled and submitted to MET normally twice per year, and to the Environmental Scientist,
Monitor monthly for alien invasive plants and ensure that they are eradicated timeously and repeatedly. Infestations shall be recorded with a GPS to help ensure that a comprehensive approach is taken to follow up work,
Commission independent monitoring by a qualified Environmental Scientist at least once per year,
Ensure compliance with all legislation.

9.2.2 The Environmental Scientist as Consultant

The Environmental Scientist was appointed as Consultant to compile this EIA and EMP. It is also necessary to appoint an Environmental Scientist to:

- Discuss and make recommendations to Lodestone should any issues arise that have not been anticipated and update the EMP if necessary,
- Undertake periodic independent compliance monitoring and report to Lodestone and to MET,
- Conduct training - as commissioned by Lodestone - when needed,
- Include a photographic record in reports where possible,
- Monitor for alien invasive plants.

9.2.3 Contractors, Sub-contractors, Transport drivers and all Site Personnel

All Contractors, Sub-contractors, and all site personnel, shall:

- Comply with the Environmental Specifications,
- Comply with all legislation,
- Be familiar with the EIA – Section 7 - and understand the reasons for the Specifications,
- Designate a competent member of staff who shall have the responsibility of monitoring and enforcing compliance on behalf of the contractor,
- Discuss, with Lodestone’s management, any difficulties in achieving compliance so that solutions can be sought.

9.2.4 Communication between all Parties

Environmental Management requires a joint effort by all parties. Communication is therefore very important. Therefore all parties shall:

- Maintain open communication about environmental issues at all times,
- Report and discuss any non-compliance, in order to improve management of the environmental impacts,
- Monitoring and enforcement should not be a negative “policing” approach but should encourage awareness and understanding of the need for environmental management,
- All parties should see themselves as part of the environmental management team.
9.3 Environmental Specifications

Note: Headings are used only for ease of reference and do not form part of the specification.

9.3.1 Natural Vegetation

- Siting of boreholes, access tracks, clearing of natural vegetation shall be planned such that large tree species, uncommon tree species and evergreen tree species are not damaged or removed. For example Acacia erioloba (Cameeldoring), Boscia albitrunca (Shepherd's tree/Witgat), and all protected species.

- Only common small tree species shall be removed, especially the encroacher species such as Acacia mellifera (Swarthaak), Catophractes alexandri, Lycium bosciifolium, and Tarchonthus camphoratus.

- Particular care shall be taken to avoid the larger tree species and unusual trees on hilltops, river/stream courses, and pan margins.

9.3.2 Alien Invasive Plants

- Alien invasive plants are a threat to natural vegetation and must be eradicated. The alien invasive species known to occur in EPL 7352 include:
  - Datura (two species of shrubs),
  - Prosopis (Mesquite tree),
  - Melia azedarach (Syringa Tree) – found only in the site camp vegetable garden,
  - Caesalpinia gilliesii (Bird of Paradise Flower – woody shrub),
  - All Cactus species are aliens as well but some have been planted (e.g. prickly pear). Cactuses must not be confused with Euphorbias which are indigenous and must be left undamaged.

Photographs to assist with identification of a few alien plants are presented in Appendix H.

- Alien invasive plants must be eradicated before exploration activities – to prevent spreading, as well as during and after activities. Monthly inspections and follow up weeding is recommended. They must be removed before they flower and make seed.

- Datura species can be grubbed out by hoeing, ensuring that the entire root is removed.

- The woody species – Prosopis, Melia and Caesalpinia gilliesii shall be cut down 30 – 50cm above ground and a mixture of Garlon and Diesel applied immediately to the whole stump.

- It is recommended that a record be kept of GPS co-ordinates of all alien plants to assist in ongoing monitoring and eradication. A GPS will make it easy to revisit sites where aliens have been found and eradication has been done.

9.3.3 Fire

- Fire is a significant threat to people, wildlife, grazing resources, property, vehicles, etc. It can arise from wedling or other activities that generate sparks, careless use of cigarettes or matches, or use of fire.
- No fires shall be made on site for any reason. No burning of cleared vegetation or waste, or anything else shall be permitted.

- Clearing of the drilling sites to prevent fires is essential.

- Broken glass or bottles can act as a magnifying glass that can start a fire. Therefore no glass objects shall be left lying around.

- Portable fire fighting equipment must always be on hand at each work station to ensure that an immediate response to fire is always available if activities such as welding have to be done on site.

- All reasonable precautions must be taken to anticipate risks and prevent accidental fire. Team leaders / foremen must regularly remind staff to be vigilant in this regard.

9.3.4 Fauna (Mammals, Reptiles, Amphibians & Invertebrates) and Birds

- Hunting, poaching and snaring of animals or birds is strictly prohibited on this project. Anyone suspected of involvement in such activities may also face prosecution under the Nature Conservation Ordinance.

- Theft of livestock is also a criminal offence and is prohibited.

- Subject to labour legislation Lodestone shall reserve the right to order that any person facing legitimate changes of misconduct may be suspended from the project.

- Boreholes shall be capped immediately on completion to prevent fauna of all sizes from falling into them and risking injury or death.

- No litter, or rubbish shall be left on site at any time. Wire, bottles, cans can trap or cause injury to animals. Plastic is sometimes eaten by livestock - with fatal results. Therefore all rubbish shall be removed daily.

- Sites with animal burrows shall be avoided.

9.3.5 Birds – Nests of large birds

- No activities shall be carried out within 100m of the nests of large raptors. Some species (such as Lappet faced vultures) return to use the same next year after year and disturbance may result in breeding failure. Nests are usually made in large trees. Therefore all large trees in the vicinity of proposed drilling locations shall be inspected for large nests – and avoided. Several species of raptors are of conservation concern.

9.3.6 Soil

- Compaction of soil by vehicles can prevent grass growing and lead to soil erosion along the track. As a precaution, tracks shall not be made directly up-and-down slopes but rather obliquely to the contours.

- In places where grass does not re-establish after the first summer rainfall season, bare sections of tracks shall be ripped to a depth of 150 mm to enable grass to grow.
- In the event of any test pits or other excavation being required, topsoil (the top 150mm) shall be stripped and stockpiled separately from subsoil. On completion, the subsoil shall be replaced first, then the topsoil spread evenly on top. This is essential to achieve effective and rapid grass cover and prevent soil erosion.

9.3.7 Hydrocarbons and Other Hazardous Substances

- Hydrocarbons such as fuels, oils, hydraulic fluids as well as any other hazardous substances are strictly controlled by law and shall not be disposed of or leaked to the environment at all.

- All exploration contractors and sub-contractors shall be familiar with:
  - the Hazardous Substances Ordinance 14 of 1974, and

- These laws govern the transport, storage, disposal, recycling and other aspects of managing these Petroleum and hazardous substances.

- Lodestone staff, and all Contractors and Subcontractors shall be familiar with the relevant legislation and ensure compliance in all respects.

- All fuel tanks shall be bunded sufficient to contain all spills.

- Drip trays shall be used when fuel is being transferred to vehicles or machines.

- Vehicles and machines shall not be serviced on site.

- In the event of any repairs on site every precaution shall be taken to ensure that no hydrocarbons or other hazardous substances can leak into the soil or water.

- In the event of any spills, the party responsible shall bear all the costs of cleanup to achieve compliance with the legislation. This may be in addition to facing prosecution under the relevant legislation.

- Final disposal or recycling of such substances shall be at a licenced facility.

9.3.8 Solid Waste & Litter

- Littering shall not be permitted as it is unsightly and may cause fatalities to animals. For example plastic bags are sometimes eaten. Other rubbish can trap small creatures.

- No wire, bottles, cans or any rubbish shall be left lying around any site at any time.

- All waste shall be discarded to suitable bins with lids that are wind- and animal-proof. Waste shall be removed regularly to a licenced waste disposal facility.
9.3.9 **Groundwater**

- All boreholes to be used for abstraction of water shall be licenced with MAWF. All conditions in the licence shall be met – including limits of abstraction, recording volumes of abstraction and water levels. MAWF requires monthly recording and quarterly reports to be submitted to them.

9.3.10 **Site Camp**

- No exploration staff shall be housed within the EPL unless a very good reason can justify the necessity to do so.
- If any residents are permitted they shall stay in the site camp under strict supervision and shall not be permitted to leave the site camp except on official duties.
- All temporary residents shall be required to sign a Code of Ethics including the restriction to the camp, no visiting of neighbours, no consumption of alcohol or other mind-altering substances.
- No fires shall be permitted, except in designated safe places for cooking.
- Chemical toilets shall be provided and maintained in clean hygienic condition.
- No littering shall be permitted.
- No noise shall be made, especially at night.
- Water shall be used with care and not wasted.
- Any person found to be in breach of these conditions shall face suspension from the project.

9.3.11 **Occupational Health & Safety**

- Lodestone and all Contractors and sub-contractors shall at all times ensure compliance with all Health and Safety Regulations to protect all staff from threats to their health and safety. For example, under the Labour Act, things like dust, noise, head and eye protection must be worn, but the requirements are not limited to these.
- Lodestone shall commission a suitably qualified Health and Safety consultant to compile a comprehensive Health and Safety Plan. This is not provided in this EMP.

9.4 **Environmental Compliance Monitoring**

- Lodestone shall establish a regular monitoring programme on a monthly basis while exploration activities are in progress, or more frequently if the nature of the activity or any non-compliance indicate that more frequent inspections are necessary. These
monthly inspections shall be conducted by Lodestone’s own staff and a brief written report shall be compiled after each inspection.

- MET requires the submission of monitoring reports twice per year. It is recommended that an independent, suitably qualified environmental consultant shall be appointed to undertake site inspections and reports. The appointed consultant shall also be supplied with Lodestone’s internal monitoring reports and their bi-annual reports to MET.
10 REFERENCES


Envirolex (2018) Updated Environmental Legal Register: Lodestone Namibia (Pty) Ltd.: Proposed Dordabis Iron Mine, Phase 1 Mining Licence No.182 and EPL 3112:


11 ACKNOWLEDGEMENTS

We would like to acknowledge all interested and affected parties who have read the Public Information Document, many of whom have also participated at an earlier stage of the project.

We appreciate the kind assistance of Nicky Tobias, Reinholdt van Wyk and Christa Hansen in communicating the Public Information Document to members of the Stinkwater community.

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Appendix A

Curriculum Vitae of
Environmental Scientist
Appendix B

Specialist Report on Vegetation
(Barbara Curtis, 2011)
Appendix C

Specialist Report on Fauna and Birds
- Mammals, Reptiles, Amphibians, Invertebrates & Birds
  (John Irish, 2012)
Appendix D

Two Specialist Archaeological Reports

(John Kinahan, 2011 and 2012)
Appendix E

Public Information Document for EPL 7352

10 October 2019
Appendix F

List of
Interested & Affected Parties
Appendix G

Legal & Policy Register

by Peter Watson, Envirolex, May 2018
Appendix H

Photographs for Identification of Alien Invasive Plants
Alien invasive plants: Syringa (*Melia azedarach*)

Syringa (*Melia azedarach*) leaves

Syringa (*Melia azedarach*) Several small saplings found only in the vegetable gardens in the site camp

Syringa grows into a large tree. It bears fine lilac flowers and orange/brown berries. All parts of the tree are poisonous if eaten.
Alien invasive plants: *Datura* species

*Datura* weeds (outlined in yellow). Two species are present in the study area, which are very similar

*For practical purposes it is not important to distinguish between the different species of Datura. The flowers look the same but the spikes on the pods are different. They must both be eradicated. Both species are soft shrubby plants, usually less than 1 metre high.*