

2.2 IDENTIFIED POTENTIAL IMPACTS

A. PROSPECTING ACTIVITY

ACTIVITY		PHASE	DURATION	INVASIVE	EXTENT		
SUB-ACTIVITY	Identification of Impact of Activity Assessed	Description	Phase of the planned Activity	Possible Duration of the Activity	Invasive (I) or Non-invasive (N) Prospecting Methods	Area	Depth
SUMMARY OF LIST 1 ACTIVITY	Prospecting Right	Year 1-3 complete - principally involving non-invasive prospecting methods. PWP amendment for Year 4 + Year 5 for invasive trenching and bulk sampling.	Planning/Construction, Operational & Decommission Phases	5 years from 2011 of which 3-4 years are complete	Non-Invasive & Invasive	16 638,0952 Ha	< 5m
Participation in Regulation; DMR Site Visits; Consultation; Logistics	Social Inconvenience Factor	access to site	Planning & Operational Phases	± 2 - 10 days over the first 4 year period; ± 2 weeks +14 months in Years 4 & 5	Non-Invasive	prospecting right area or part thereof	surface
	Social Inconvenience Factor	Documents required by and visits to site by Authorities		± 2 - 10 days over a 5 year period	Non-Invasive	prospecting right area or part thereof	0m
	I&AP Concern: Safety	Some of the farmers feel that their safety is at risk if the exploration company is allowed access to their properties.[SEF,2008]		General	Non-Invasive	prospecting right area or part thereof	surface
	I&AP Concern: Access to site by prospectors	The landowners are concerned about how the prospecting team will access the site.[SEF, 2008]		General	Non-Invasive	prospecting right area or part thereof	surface
	I&AP Concern: Request to be kept informed of Activities on their properties	Property owners requested to be kept informed on planned activities on their properties		Duration of the Prospecting Right	Non-Invasive	Prospecting Right	surface
	Desk-top studies			off-site	off-site	N/A	Non-Invasive
Re-evaluation of Existing Data		Data Synthesis, database, map generation and development of geological model; Concept Study, economic, geological & resource models etc.	off-site	N/A	Non-Invasive	N/A	
Geological Mapping	No Impacts	A geologist and assistant/s walking over the surface noting spatial data (using GPS) of prospecting and geological significance (usually rock type, structure such as fold or faults, shear zones etc.) which are later compiled into a geological map at the office, usually but not always on a graphics computer. Grab samples are often collected.	Planning & Operational Phases	± 5 - 90 days over the 5 year period	Non-Invasive	prospecting right area or part thereof	surface

Geophysics (other)	No Impacts	A magnetic survey involves a small geophysics team of 2-3 persons walking a grid positioned by a hand-held GPS; using a portable magnetics instrument and taking readings. The data is down-loaded back at the office; processed, analysed and generally presented in a image format. The results are used in conjunction with other prospecting results to interpret geological structures.	Planning & Operational Phases	± 5 - 90 days over the 12 month period	Non-Invasive	prospecting right area or part thereof	surface
Soil sampling (loam)	Neutral Impacts	Small 10-30cm deep holes which are filled in immediately with soil. The soil sample is removed to a lab for assay or KIMs or a Niton Gun may be used in situ.	Planning & Operational Phases	± 5 - 60 days over a 2 month period	Non-Invasive	spade width	10 - 30 cm
	Actual Trenching as part of the Bulk Sampling	Trenches are dug using a Tractor Loader Backhoe (TLB). The excavation will be made from surface to below the bottom of the target horizon. These trenches will typically have vertical sides with the width related to the TLB spade width. Each trench will be mapped, sampled and surveyed prior to rehabilitation. The material removed from the trenches will be bulk sampled.		2 weeks + 14 months in Years 4 & 5	INVASIVE	± 55m x 10m	<3 - 4m
	Trench/Bulk Sample Placement and number of excavations	The optimal number & position for a borehole/bulk sample is determined from the results of previous prospecting and is based on geological and economic parameters. The "proposed" site is then checked against the access, environmental parameters and taking mitigation measures into account. A marker is then placed on site . At this point another check should be made to ensure compliance with the environmental and land-use factors (e.g. any issues that the land user may have raised). Also see "heritage" and "gravesites" below.		2 weeks + 14 months in Years 4 & 5	INVASIVE	# trenches = 6 (for purposes of BAR assessment only- this is unknown at present and variable in practice)	<3 - 4m
	Trench/Bulk Sample Footprint and	The trench/bulk sample footprint is the area where an excavation is dug. This includes the area of overburden.		2 weeks + 14 months in Years 4 & 5	INVASIVE	Bulk sample	surface

Rehabilitation of Trench / Bulk Sample Footprint	<p>This takes place during the operational phase of the activity. The hole is back-filled in reverse order to which they are excavated using material removed from the excavation. It is estimated that approximately 50% of the material will be available for infill after processing. It is anticipated that the remainder, the "ore" would be removed from site and sold. The post-bulk-sample surface will therefore be indented compared to the pre-trenching surface. Subsidence is anticipated in the excavation area around, where it occurs is filled in. Where necessary the removed topsoil is returned and contoured and allowed to seed naturally. A rehabilitation check is done by the responsible person at the end of the bulk-sampling campaign and any discrepancies fixed immediately.</p>
Topsoil, Fauna & Flora and Soil Erosion	<p>Topsoil is minimal over the sub-surface pebble deposit but may reach up to 0,5m thick. The topsoil for the temporary access tracks may need to be cleared and/or levelled for TLB and truck access purposes. In these instances the topsoil (fauna and flora) is scraped off by hand shovel or bulldozer and stored at the higher edge of the site ready to be replaced and re-contoured on rehabilitation of the footprint. The area is normally left to be seeded naturally but re-seeding may be necessary. The farmer would be consulted where this applies to cultivated land. Soil erosion especially by stormwater may result in an increase in total suspended solids and total dissolved solids in local water as well as the potential to create small donga's. Erosion is managed by creating run-off channels.</p>
Large Indigenous Trees and protected trees	<p>Erring on the side of caution, large trees, especially indigenous, are detoured around and should not be destroyed. A few branches may be cut to allow access for tall vehicles.</p>
Fluids & potential water pollution	<p>These are not anticipated to be used. Where used, biodegradable fluids are preferred.</p>

Simultaneous with Bulk Sampling Programme + ± 1 week in Years 5	INVASIVE	<p>total excavation = 0,3300 Ha including Overburden & spoils = 75m2 Post rehabilitation subsidised area = 0,3300Ha Maintenance & aftercare for 2-3 years ± 1 Ha General surface rehabilitation = 1 Ha</p>	surface
2 weeks + 14 months in Years 4 & 5	INVASIVE	<p>Bulk sample & process plant footprint + access tracks where applicable</p>	surface
2 weeks + 14 months in Years 4 & 5	INVASIVE	<p>Bulk sample & process plant footprint + access tracks where applicable</p>	surface
± 12 months in Years 5	INVASIVE	<p>farm portion</p>	0 - 4m

Trenching + Bulk sampling - GENERAL

<p style="text-align: center;">Oil and Grease Hydrocarbon Storage</p>	<p>Soil, fauna, flora and possible groundwater may be damaged or contaminated by oils and grease spilled onto the land.</p> <p>Where practical, P.V.C liners should be installed under all portable machinery (carrying grease or fuel), fuel containers, lubricators, sumps etc.</p> <p>Storage of oil & grease is stored separately and should be protected from spillage. From time to time containers will be taken to recycling facilities or recognised dumping terrains.</p> <p>Spills: Machinery is usually protected and often plastic sheeting used to protect the soil however some small oil or grease spills sometimes occur. Any accidentally spilled grease and possible contaminated soil will be removed and taken to recycling facilities or recognised dumping facilities such as the nearest municipal dumping site or other approved site.</p> <p>Storage Facilities for Fluids All fuels, hydraulic fluids and grease should be stored in closed containers. Hydrocarbons should be stored in containers with an additional 10% above full available for expansion. Containers will be stored on P.V.C liners.</p>
<p style="text-align: center;">Litter, Rubbish & Waste Management</p>	<p>Domestic waste will be collected in rubbish containers and deposited in municipal rubbish collection area in the nearest towns of Carletonville, Oberholzer or Randfontein. or alternatively, at the operation-contractors base town. Other rubbish will be collected in leak-proof containers and from time to time containers will be taken to recycling facilities or recognised dumping terrains. Consideration should be given to recycling where-ever practical.</p> <p>Waste material (i.e. mineral matter removed from the trenches but excluded as it is not economically classified as "ore" is anticipated to be used directly to backfill the trenches; this may be stockpiled temporarily prior to being returned to the excavation.</p>
<p style="text-align: center;">Noise</p>	<p>Machinery is anticipated to make a low to medium-level noise common to running machinery. The movement of the manganese pebbles against one-another is also anticipated to contribute to site noise. During machinery operation; it is anticipated that noise-levels would be below accepted threshold levels.</p>

Operational Phase

<p style="text-align: center;">2 weeks + 14 months in Years 4 & 5</p>	<p style="text-align: center;">INVASIVE</p>	<p style="text-align: center;">Bulk sample & process plant footprint + access tracks where applicable</p>	<p style="text-align: center;">surface</p>
<p style="text-align: center;">2 weeks + 14 months in Years 4 & 5</p>	<p style="text-align: center;">INVASIVE</p>	<p style="text-align: center;">Prospecting area</p>	<p style="text-align: center;">surface</p>
<p style="text-align: center;">Intermittent 2 weeks + 14 months in Years 4 & 5</p>	<p style="text-align: center;">INVASIVE</p>	<p style="text-align: center;">Proximity to workings</p>	<p style="text-align: center;">surface</p>

Dust	Visual observation. Caused by vehicles and during bulk sampling and trenching procedures. During TLB and truck operation; anticipated to be below accepted threshold levels
Access Roads	N/A The existing public roads, the R500, R41 and N14 will be used to traverse and exit the prospecting right area.
Temporary Access Track	Existing roads, farm roads, farm tracks and firebreaks are used where-ever possible. Short tracks may be required to access the site. The existing track/fire-break would be re-enforced with gravel to protect the surface erosion from trucks. Truck movement is anticipated to be around a maximum of 5 trucks per day. Generally these are not cleared and the same track is used for the duration of the activity period. See "topsoil" for further information on circumstances where tracks need to be cleared. Also see "trees". Temporary access tracks are usually only rehabilitated at the end of the activity as the access is used for the duration of the activity. As this is an existing track it will remain after the duration of the prospecting activity.
Short-term Temporary Offices	Temporary containers or similar such as prefabricated or caravans of similar size will be placed on a levelled footprint. These would also be used for storage and equipment storage. Workshops are anticipated to be principally offsite at the offices of contractors and/or machinery and plant rental companies. (see topsoil above).
Short-term Temporary Accommodation	Temporary fly-camps (short-term prospecting accommodation & ablution facilities such as containers, caravans or tents). Commonly off-site or use of rented existing farm facilities on site. At the end of sampling the containers (or similar) will be removed from site.
Short-term Temporary Ablution Facilities	Serviced chemical toilets are typically used. The faecal matter is taken off-site and processed by the toilet service provider at its facilities.
Short-term Temporary Sample Processing Plant	A dry screening plant will be built on site (the equipment/plant may be rented). Screens to separate ore into different size fractions. The resulting material is transported to existing plants off-site where it is processed further - this may include Dense Medium Separator (DMS) to dispose of impurities. Once bulk sampling is completed, the temporary plant is dismantled and removed from site.

Intermittent 2 weeks + 14 months in Years 4 & 5	INVASIVE	5 - 50m diameter from working vehicles and machinery.	surface
N/A	INVASIVE	N/A	N/A
Intermittent 2 weeks + 14 months in Years 4 & 5	INVASIVE	Existing tracks An allocation of ± 600 m2 made for Financial Quantum Calculation	surface
2 weeks + 14 months in Years 4 & 5	INVASIVE	Steel buildings and structures = 50m2 Housing&/or offices = 60m2	N/A
Anticipated to be off-site except for a night guard	INVASIVE	N/A	surface
2 weeks + 14 months in Years 4 & 5	INVASIVE	N/A	surface
Intermittent 2 weeks + 14 months in Years 4 & 5	INVASIVE	Processing plant = 625m3	N/A

	Fires	Discouraged but where used practical fire-prevention methods must be used. Cooking is typically done off-site or on gas or suitable alternative.		Intermittent 2 weeks + 14 months in Years 4 & 5	INVASIVE	N/A	surface
	Potable Water for staff	Potable water is brought onto site from a source for domestic consumption.		Intermittent in Year 4 & 5	INVASIVE	N/A	N/A
	Visual Impact	The bulk sample machinery, trucks and its entourage is not out of place in this environment where there are other existing, similar, but larger (sand) operations within a 5km radius. Will be visible from the N14 and R42/R500		2 weeks + 14 months in Years 4 & 5	INVASIVE	1 to 9 Ha	surface
	I&AP Concern: Visual Appearance	The effect of adits/trenches/open pits etc. to the safety of visitors		2 weeks + 14 months in Years 4 & 5	INVASIVE	Bulk sample area	surface
	I&AP Concern: Other: contractors on site, number of employees, waste material, sewerage, fires, access to property and roads, sludge dams, safety precautions, fencing.	See above		2 weeks + 14 months in Years 4 & 5	INVASIVE	Bulk sample area	surface
Trenching + Bulk sampling - GENERAL	Water for bulk-sampling & the processing plant	<p>Water is not used for the trenching or bulk sampling. At this point of planning water is not anticipated to be required for the dry screening process but may become necessary at a later stage; if this is required then a small water sump would be created and the water recycled similarly to the invasive prospecting process.</p> <p>Typical amounts of water used are relatively low, in the region of 2-5000 litres per trench provided water can be recycled. Water is generally drawn from a commercial source or nearby open water source. Rarely, borehole water is used. Typically the water is pumped into a temporary dam/container or water bowser and transported to the site as required. For environmental and practical reasons water is recycled using sump technology where-ever possible.</p> <p>If needed a water spray bowser would be brought in to keep down dust levels.</p> <p>The relatively low water-use is not anticipated to impact the other land-users or water requirements or significantly affected the needs of the natural environment.</p>	Planning & Operational Phases	N/A unless deemed necessary, then, ± 12 months in Years 5	INVASIVE	N/A	N/A
	Closure Reports & processing by Competent Authorities	This process Field checks of site condition, consultation and DMR visits. Involves Desk-top work to compile and submit required documents.		Decommission Phase	off-site 1-2 days onsight at termination of right	Non-Invasive	prospecting right area or part thereof

I&AP Concern: Nil		Decommission Phase				
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B. ENVIRONMENTAL ASSESSMENT RELATED TO RELEVANT ANTICIPATED ENVIRONMENTAL ATTRIBUTES

ENVIRONMENTAL ATTRIBUTE GROUP	Environmental Attribute	Description	PHASE	INVASIVE	EXTENT	
			Phase of the planned Activity		Area	Depth
	Watercourses / Pans	<p>Specific to the bulk sample area: no surface watercourses are shown. The presence of a sinkhole suggests sub-surface dolomitic water may be present close to the bulk sample area.</p> <p>In the focus area: a large pan, De Pan on the farm De Pan as well as a series of small pans/dams on the north-western boundary of the prospecting right, for the purposes of this document these are called "The Sand-Mine Dam".</p> <p>Out of the focus area: The Wonderfonteinspruit and MooiRiviersloop to the south. A number of smaller pans are dotted around.</p>	Operational Phase	INVASIVE	As marked on the plan Note: not on bulk sample area	surface
	Wetlands	<p>Small, very localised wetland associated with "The Sand Mine Dam" which has prolific birdlife and is unofficially used by locals for fishing.</p> <p>No anticipated impacts of the activity on this environmental aspect as the area can be avoided by any invasive prospecting methods/technologies. If, at a later stage, this becomes a challenge - then the necessary environmental permits and authorisations will be sought.</p>	Operational Phase	INVASIVE	As marked on the plan Note: not on bulk sample area	surface
	Ground-water	<p>Trenching and bulk sampling operations are anticipated to reach the maximum depth of bedrock (dolomite) within 3 to 4m which is above the water-table. Ground-water flows through tunnels formed in weaknesses within the dolomite rock.</p> <p>Prospecting is therefore not expected to impact on the groundwater. SEF details that the groundwater water table has been depressed to depths of 300m and 500m are mentioned. The farmer on Wildfontein abstracts borehole water from between 80m and 100m.</p> <p>This operation is too small and according to the PWP and WRE does not involve the significant use of -, pumping out of -, or redistribution of groundwater.</p>	Operational Phase	INVASIVE	As marked on the plan Note: not on bulk sample area	Below 400m

Physical & Biological Environmental Aspects

Sink holes	<p>Sinkholes and the sudden collapse thereof are a common feature in the area. Both the commercial farmer on the proposed bulk sample site and other interested and affected parties in the area were concerned about the use of groundwater for prospecting because of (i) the availability of groundwater, and (ii) the potential of sink-holes forming.</p> <p>The site visit as well as consultations with interested and affected parties confirmed the presence of sink holes in the dolomites which may form in this area and care should be exercised not to exacerbate this situation as well as for safety reasons during bulk sampling and processing. If necessary, the rock strength investigations of the underlying dolomite-rock should be done. It is noted that this is a regularly ploughed /ripped cultivated field and farm machinery is routinely used. At the same time, the site visit revealed a sink-hole in this or the adjacent field so this safety precaution is real and must be emphasised</p>	Operational Phase		INVASIVE	All areas underlain by dolomite including the site of the proposed bulk sample	surface & sub-surface
Biodiversity	<p>The coverage is predominantly comprised of areas that "no longer remain natural" with some remaining natural areas which are used for grazing. The Gauteng Conservation Pan 3.3 marks the area surrounding certain pans and dams as Critical Biodiversity areas (irreplaceable) and buffer zones supporting those areas. SEF identifies small pockets of remaining threatened vegetation types (see the Environmental Base Plan for detailed information),</p> <p>No anticipated significant impacts of the activity on this environmental aspect is anticipated as the pans are avoided and in addition, the area impacted by any invasive prospecting methods/technologies will be small compared to the overall coverage of the vulnerable vegetated area/s. The vegetation will most likely recover from any invasive prospecting planned.</p>	Operational Phase		INVASIVE	Prospecting area	surface
Protected Fauna & Flora in terms of NEMBA (2007)	<p>List as per Baseline Study. No anticipated impacts of the activity on this environmental aspect as invasive prospecting can be planned to avoid any known areas. Also the area of each impact is relatively small so as not to cause permanent damage to all of the species should it be inadvertently damaged.</p>	Operational Phase		INVASIVE	Prospecting area	surface

Protected areas - National Parks, etc.	Nil on the planned bulk sample area. Nil on the Focus Area. For the granted prospecting right, part of The Abe Bailey Nature Reserve overlaps part of the right. In terms of NEMA, commercial prospecting is not legal within the reserve. No prospecting is planned on the surface within the reserve boundary.	Operational Phase		N/A	As marked on the plan Note: not on bulk sample area	surface
I&AP Concern: Groundwater	I&AP's are concerned about the impact of prospecting on the groundwater resources. The impact on groundwater resources is expected to be minimal as water is not planned to be abstracted from groundwater at this stage; if water is abstracted it will be of relatively low volumes compared to that required for mining or farming.[SEF, 2008]	Operational Phase		Addressed above	Addressed above	<400m
I&AP Concern: Sinkholes	I&AP's are concerned about the formation of sinkholes due to prospecting. While the formation of sinkholes is not anticipated due to water abstraction for prospecting; the formation of sinkholes must be considered when planning and operating during prospecting operations.[SEF, 2008]	Operational Phase		Addressed above	Addressed above	surface & sub-surface
I&AP Concern: Nil						
Prospecting on an existing area of commercial farming cultivated land and controlled grazing of specialised cattle.	Operations will directly impact the commercial farming of the land owner. Trenching, bulk sampling and associated structures are planned straddling land that is presently used as a cultivated field for maize and controlled camps for specialised cattle. A land user and compensation agreement is being negotiated with the land owner; followed by consultation. At the time of preparation of the amended EMPlan, the land owner was only available to set up a meeting at the end of September 2015 (Shango Solutions, September 2015). This is an important consultation and will form part of this report either included here or as a separate report.	Planning, Operational & Decommission Phases		INVASIVE	Wildfontein 52 IQ portion 7 1 to 9 Ha	surface
Prospecting on an existing area traversed by Eskom powerlines	The servitude for three Eskom power lines intersect the proposed bulk sample area (see 1.2). Consultation (by Shango Solutions on behalf of the prospecting right holder, WRE, 19 January 2015) with Eskom determined that Eskom allows mining within 6m of powerlines (Shango Solutions). The trench positions will be planned to comply.. Consultation so ongoing.	Planning, Operational & Decommission Phases		INVASIVE	Wildfontein 52 IQ portion 7 1 to 9 Ha	surface

Socio-economic Environmental Aspects	known Socio-Economic / Land use concerns - Game & Hunting	If Game on the farms. Need to manage access in conjunction with the surface owners – this includes the sport of hunting where it occurs.	Operational Phase		INVASIVE	No known areas; I&AP's did not note any specific occurrences	surface
	Support of local business	On a small scale, a community-conscious right holder will endeavour to use local businesses where possible and may employ a few unskilled labour. Labour may also under go training and up skilling. Rental agreements etc. are often undertaken with the land user for accommodation or use of equipment, etc. Local hardware and grocery stores are usually used and even transport companies or entrepreneurial outfits.	Operational Phase		N/A	N/A	-
	Ubuntu	While it is understood that prospecting is capital intensive and is expense based not income based; on a small scale, a community-conscious right holder will endeavour to assist communities in small ways such as career advice to learners, talks on scientific and social concerns, small contributions to community requirements such as computers, paper, monetary contributions, assisting the poor, etc. When working in an area the right holder often has the opportunity to informally ascertain community needs from the community itself.	Operational Phase		N/A	N/A	-
	I&AP Concern: Loss of agricultural land with high potential - Loss of Income	I&AP's are concerned about the loss of high potential agricultural land. Any land disturbed by invasive prospecting will be rehabilitated. Compensation must be agreed with surface owners/land users where agricultural land is damaged.[SEF, 2008]	Operational Phase		INVASIVE	Damaged areas in agricultural land	surface
	I&AP Concern: Topsoil Damage	I&AP's are concerned about the damage to topsoil. Any land disturbed by invasive prospecting will be rehabilitated. Compensation must be agreed with surface owners/land users where agricultural land is damaged.[SEF, 2008]	Operational Phase		INVASIVE	Damaged areas in agricultural land	surface
	I&AP Concern: Lowering of property values	This is an issue that has been raised by I&AP's. Past experience indicates that property values would not be affected however it is not possible to determine the impact on property values at this stage (SEF). At this point, property purchase by the prospector is not anticipated.[SEF, 2008]	Operational Phase		N/A	Prospecting right area	surface
	Cultural Environmental Aspects	Known Cultural concerns	No known cultural concerns	Operational Phase		INVASIVE	N/A
I&AP Concern: Nil			Operational Phase				

Heritage Environmental Aspects	Farm Graveyards / gravesites	Small gravesites may occur on farms. Invasive prospecting will avoid all gravesites. No gravesites are known to occur in the area of the invasive trenching and bulk-sampling site.	Operational Phase		INVASIVE	Do occur but exact positions unknown at this stage but should be well marked.	surface
	known Heritage sites	No known heritage sites. SAHRA classifies the area as having potential palaeontological significance due to the underlying geological dolomite formation. Specific to this EMPlan Amendment for Bulk Sampling. It is not expected that heritage artefacts would be found on the bulk-sample area as the area is flat, has no caves and is either completely cultivated or the land is composed of small camps used for controlled grazing of specialised cattle breeds and is extensively worked and grazed. ESKOM powerlines also cut through. There are no anticipated impacts of the activity on this environmental aspect as the invasive prospecting is planned on a distinct area which is previously disturbed and the likelihood of heritage remaining is very low. SAHRA has been contacted to determine if they require a Heritage Assessment. It is noted that the area is > 5Ha; but the excavation area is < 5ha.	Operational Phase		INVASIVE	No known occurrences	surface
	I&AP Concern: Damage to geological outcrops	I&AP's are concerned about the impact of prospecting on the geological outcrops. No protected geological outcrops occur in the area where invasive prospecting is planned.[SEF, 2008]	Operational Phase		INVASIVE	prospecting right area or part thereof. It is thought that this is related to Black Reef outcrops in the southern portion of the right	surface
C. OTHER - ASPECTS RAISED BY INTERESTED AND AFFECTED PARTIES THAT DON'T FALL INTO TABLE A OR TABLE B							
Other I&AP Concerns	I&AP Concern: Nil						