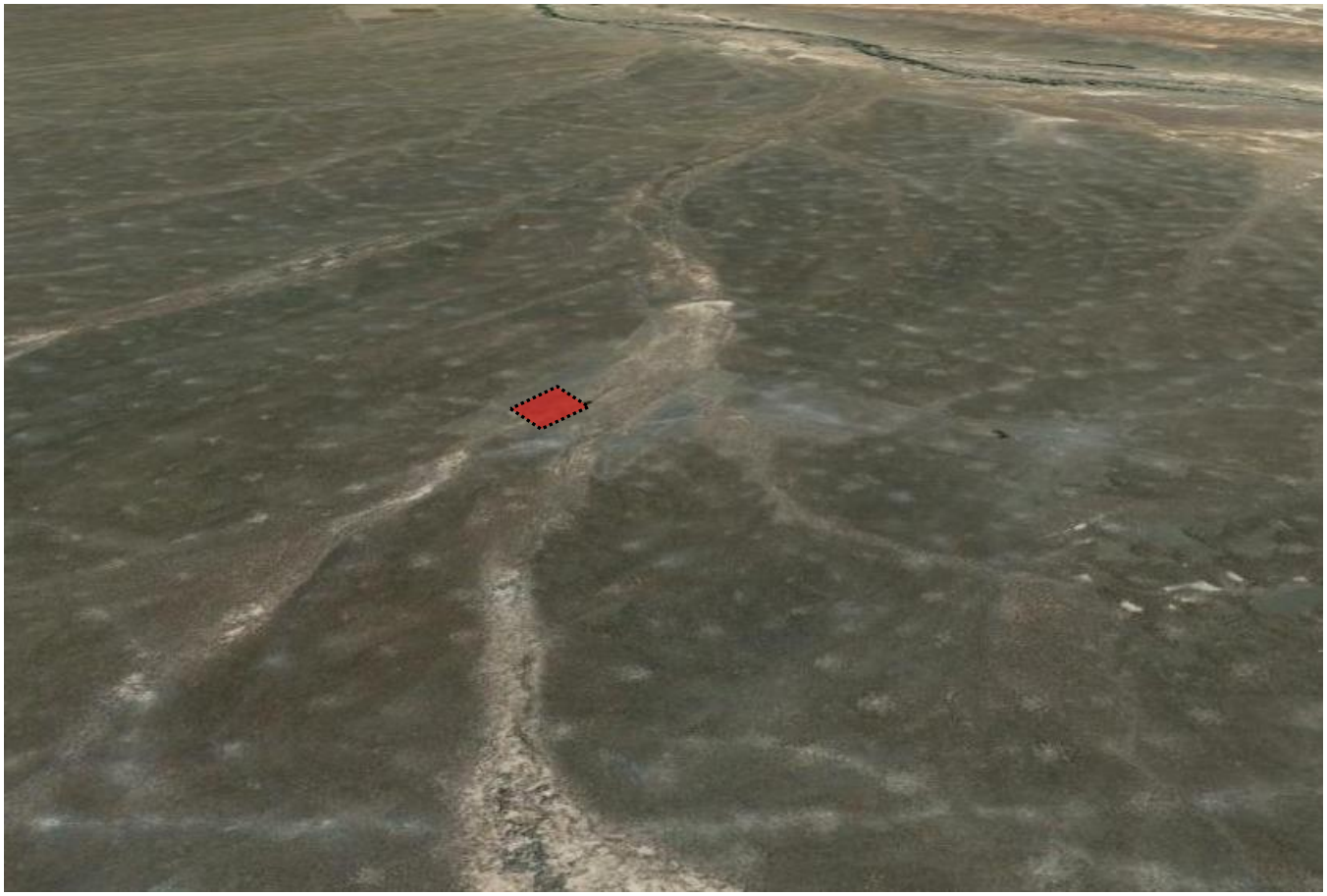
ENVIRONMENTAL PLANNING
IMPACT ASSESSMENTS
MANAGEMENT SYSTEMS

tel +27 21 887 4000
fax +27 21 883 2952
email info@withersenviro.co.za
web www.withersenviro.co.za
address P.O. Box 6118
Uniedal 7612

CIMERA – KARIN PROJECT

ECO CHECKLIST # 1

ECO SERVICES FOR THE DRILLING OF A RESEARCH BOREHOLE ON FARM ZANDFONTEIN NO. 89, CERES DISTRICT, WESTERN CAPE: PLANNING, OPERATION AND REHABILITATION PHASE.



PREPARED FOR: UNIVERSITY OF JOHANNESBURG
DRILLING CONTRACTOR: GEOSERVE

Distribution List: nbeukes@uj.ac.za; charl@geoservesa.co.za; bircha@absamail.co.za; ernst@geoserve.co.za; michelle@witzenberg.gov.za; dcole@geoscience.org.za; hermansvn@uj.ac.za; krobey@geoscience.org.za; devlei@roggeveld.co.za; drblomerus@mweb.co.za; blomerus@ceresmed.co.za; jonathan.deal@globalcitizensalliance.org.za; sothembalodge@breede.co.za; Christi@graaff-fruit.com; aton@tiscali.co.za; hlange@breede.co.za; hermie@witzenberg.gov.za;

UNDERTAKEN BY: Aubrey Withers (Director / ECO) and Robert Laurie (ECO) of Withers Environmental Consultants (WEC)

DATE OF SITE VISIT(S): 17/07/2015 & 24/07/2015 **DATE OF ISSUE: 29/07/2015**

TABLE ON CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS

CIMERA	Centre of Excellence for Integrated Mineral and Energy Resource Analysis
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
EMP	Environmental Management Plan
KARIN	Karoo Research Initiative
OSH	Occupational Safety and Health
PPE	Personal Protective Equipment
SRU	Solid Removal Unit
UJ	University of Johannesburg
WEC	Withers Environmental Consultants

AIM	ACTION TO BE CHECKED BY ECO[1]	RESP[2]	ACTION BY	CORRECTIVE ACTION Y/N	COMMENTS
PHASE 1: PLANNING					
1.1 Actions to be undertaken prior to the commencement of drilling					
Awareness of possible impacts, hazards and the mitigation measures required	Induction of personnel to be undertaken by ECO prior to the commencement of drilling.	ECO	ECO, GEOSERVE	N	Site personnel were inducted on 17 July 2015, prior to the commencement of drilling. Refer to **Appendix A**. An information board, containing the on-site conduct rules and the induction sheet (provided by Withers Environmental Consultants) is situated at the site entrance (**Photo 1a**). The board also contains information on snake identification and on scene first aid procedures (**Photo 1b**).
	A copy of the approved Environmental Management Plan (EMP) by AGES of 18 June 2015 must be present on-site during the planning, operation and rehabilitation phases.	GEOSERVE	GEOSERVE, UJ	N	A copy of all the relevant documentation, including the approved Environmental Management Plan (EMP) by AGES of 18 June 2015, is kept on site.
Establishment of appropriate services for the duration of the drilling	Appropriate, energy saving lights should be installed at the drill site (yellow lights, which do not attract insects). Lights should be faced in a downward position. Only necessary lighting should be used at night.	GEOSERVE	GEOSERVE; ECO	N	Appropriate energy saving lights have been installed at the necessary locations. The designated smoking area has been fitted with a solar powered light (**Photo 2**).
Adequate demarcation	The site should be appropriately demarcated to a 50m X 50m fenced area, as indicated in the EMP. The materials lay down area should be established in the already disturbed area near the old agricultural fields.	GEOSERVE	GEOSERVE; UJ	N	Appropriate signage has been erected at the farm entrance **(Photo 3)**. The site has been appropriately demarcated with a security fence and safety netting (**Photo 4**). The methane burnout pit on the edge of the site has been demarcated with the appropriate safety netting (**Photo 5**).

[1] Environmental Control Officer
[2] Responsibility

AIM	ACTION TO BE CHECKED BY ECO[3]	RESP[4]	ACTION BY	CORRECTIVE ACTION Y/N	COMMENTS
PHASE 2: OPERATION					
2.1 Air quality and noise					
Prevention of air pollution	The speed of vehicles to and from the drilling site should be kept as low as possible to reduce the generation of dust. If deemed necessary by the ECO, the access road to the site should be kept moist. The number of vehicles using the access road should be kept to the bare minimum.	GEOSERVE	GEOSERVE, UJ; ECO	N	This was explained to the contractors during the environmental site induction on 17 July 2015. Appropriate signage has been erected at the farm entrance **(Photo 3)** which indicates the speed limit to be adhered to on the property.
Prevention of excessive noise	No loud music may be played on site.	GEOSERVE	GEOSERVE, UJ; ECO	N	This was explained during the environmental site induction on 17 July 2015.
	Drilling machinery must be fitted with noise mufflers and be maintained in good working order. Noise levels must to conform to OSH Act.	GEOSERVE	GEOSERVE; UJ; ECO	N	The noise levels of operating machinery are in compliance with the OSH act. Noise level measurements of drilling machinery being used on site were shown to us indicating its compliance.
2.2 Site access					
Maintenance of access roads	Existing access roads should be used. No new roads are to be made. Access roads should be maintained by GEOSERVE. Areas prone to water logging must be maintained using local road materials.	GEOSERVE	GEOSERVE, UJ; ECO	Not yet	Sections of the access road have started forming ruts (**Photo 6**) due to the use of construction vehicles (refer to **Figure 1**). Any ruts should be flattened once the drilling has been completed. Areas prone to water logging (**Photo 7**) should be regularly checked and maintained, if necessary, using local materials to prevent them from destabilising.

[3] Environmental Control Officer
[4] Responsibility

AIM	ACTION TO BE CHECKED BY ECO[5]	RESP[6]	ACTION BY	CORRECTIVE ACTION Y/N	COMMENTS
2.3 Conduct of personnel					
Proper conduct of personnel must be exercised	No personnel are allowed outside of the demarcated drilling and site areas. No personnel may trespass onto other properties.	GEOSERVE	GEOSERVE, UJ; ECO	N	This was explained during the environmental site induction on 17 July 2015.
	Drilling may take place 24 hours a day, with two teams working 12 hour shifts. No drilling may occur on a Sunday. Should drilling at night become a nuisance to nearby neighbours, alternative drilling hours should be agreed to.	GEOSERVE	GEOSERVE, UJ; ECO	N	Drilling is currently taking place 24 hours a day (except Sundays), with two teams working 12 hour shifts. Drilling was halted during the site visit on 24 July 2015 as the drilling hole had been grouted with concrete ("cased off"). Core drilling through the concrete grout will take place once the grout has hardened.
Health and safety of personnel	The contractor should ensure that adequate Personal Protective Equipment (PPE) is provided to personnel (including the necessary noise protection gear).	GEOSERVE	GEOSERVE, UJ	N	Personal Protective Equipment (PPE) is provided for each staff member and stored in the construction trailer which doubles as a first aid room (**Photos 8a** and **8b**). All personnel use their PPE.
2.4 Prevention of fires					
Prevention of fires and burning	Two (2) fire extinguishers should be present on site at all times. Fire extinguishers should be checked (and recorded) annually and be in good working order.	GEOSERVE	GEOSERVE; ECO	N	More than 5 fire extinguishers are present on site at all times (fire extinguishers are present at every fire hazard potential area). All on site fire extinguishers have been serviced for 2015 (next service due in May 2016) and are properly pressurised.
	No burning of waste or cleared vegetation is allowed on site.	GEOSERVE	GEOSERVE; UJ: ECO	N	This was explained during the environmental site induction on 17 July 2015. All waste is stored in appropriate bins.

[5] Environmental Control Officer
[6] Responsibility

AIM	ACTION TO BE CHECKED BY ECO[7]	RESP[8]	ACTION BY	CORRECTIVE ACTION Y/N	COMMENTS
2.4 Prevention of fires (cont.)					
Prevention of fires and burning (cont.)	No open flames are allowed on site, including the use of fires for cooking or heating at or near the drilling site.	GEOSERVE	GEOSERVE, UJ	N	This was explained during the environmental site induction on 17 July 2015 and being adhered to.
	No smoking is allowed near the drill rig, but only in specific demarcated areas. Cigarette butts are to be disposed of in a lidded bin.	GEOSERVE	GEOSERVE, UJ; ECO	N	A designated smoking area has been allocated, away from the drilling area (**Photo 2**).
2.5 Removal of vegetation					
Prevention of excessive removal of vegetation	Removal of vegetation should be limited to the drill site only. Search and rescue of succulents must be undertaken and planted away from the drill site. Any brushwood should be stored for later site rehabilitation. No dead brushwood should be collected.	GEOSERVE	ECO to supervise with personnel of GEOSERVE	N	This was explained during the environmental site induction on 17 July 2015. Several Jessop *Drimia marginata* (**Photo 9a**) and *Gladiolus* spp. (**Photo 9b**) were located on site and transplanted by the ECO within a nursery area for later transplanting back to the site.
2.6 Water contamination and use					
Prevention of water loss and waste of water through leaks	Cement grout should be used to avoid water losses within the borehole, should the contractor encounter fractured zones.	GEOSERVE	GEOSERVE; UJ	N	No drilling was in progress on 24 July 2015 as the drill hole had been grouted with concrete to "case-off" the borehole. No water losses were noted, but a large fracture zone was encountered at about 35m. This fracture zone appeared to yield groundwater. The concrete grout has "cased-off" this fracture zone to prevent any contamination of this potential groundwater zone.

[7] Environmental Control Officer
[8] Responsibility

AIM	ACTION TO BE CHECKED BY ECO[9]	RESP[10]	ACTION BY	CORRECTIVE ACTION Y/N	COMMENTS
2.6 Water contamination and use (cont.)					
Prevention of water loss and waste of water through leaks	Water is a precious resource and must be used sparingly; no water may be wasted on site. Water pipes and connections should be checked regularly, and any leaking water pipes / connections should be repaired as soon as possible.	GEOSERVE	GEOSERVE; ECO	N	No wastage of water was noted on-site. Water is sourced from a nearby borehole through a PVC pipe laid out on surface to the drill site (**Photo 10**). About 3000 litres of groundwater was pumped to a Solid Removal Unit (SRU) (**Photo 11**) and into three small "reservoirs". Drilling mud (sludge) from the borehole is circulated by pumping to the SRU. Solids are sorted and removed (through centrifugal and shaking action) and sludge is dewatered and extracted in the SRU and falls into a large plastic bag (**Photo 12a**) which is temporarily stored in a trailer lined with plastic (**Photo 12b**). This sludge is to be removed from the site. The remaining cleaned water is recycled back to the borehole. The returning water is tested for its chemical constituents. The drill sludge will also be tested for any contaminants.
	Water is a precious resource and must be used sparingly.	GEOSERVE	GEOSERVE	N	
Prevention of groundwater or surface water contamination	No contaminants (soaps, detergents, lime, glues, paints, cement or fuels) may be discharged into the borehole or any drainage systems.	GEOSERVE	GEOSERVE; UJ; ECO	N	
2.7 Waste management					
Adequate disposal of solid waste	Excess drilling mud must be stored in steel storage tanks may only be disposed of at a licenced Municipal landfill sites.	GEOSERVE	GEOSERVE; ECO	N	Receipts from licenced Municipal landfill sites must be kept on site. Drilling sludge collected from the SRU is temporarily stored in a trailer lined with plastic. Drilling sludge will be collected and disposed of by Enviroserve. A certificate of proper disposal will be provided by Enviroserve and included in our next ECO Checklist.

[9] Environmental Control Officer
[10] Responsibility

AIM	ACTION TO BE CHECKED BY ECO	RESP	ACTION BY	CORRECTIVE ACTION Y/N	COMMENTS
2.7 Waste management (cont.)					
Adequate disposal of solid waste	The site should be kept neat and tidy. Any solid waste generated on site (including plastic, drilling sludge, waste cement grout etc.) must be kept in adequate waterproof containers. Solid waste must be disposed of weekly (at an approved Municipal landfill site) to prevent a build-up on site.	GEOSERVE	GEOSERVE; ECO	N	Receipts from licenced Municipal landfill sites must be kept on site. The contractor is commended on the neatness and layout of the drilling of the site. Solid waste generated on site is neatly separated and marked in adequate containers (**Photo 13**). Recyclables are sorted on site and put into separate bins.
	Sludge generated by the drilling process should be suitably stored in a leach proof container and be removed by Enviroserve, or transported to an Enviroserve depot for disposal at an appropriate licenced landfill site.	GEOSERVE	GEOSERVE; UJ; ECO	N	The sludge extracted from the borehole (via the SRU [**Photo 11**]) is stored on a trailer lined with plastic (**Photo 12b**). Drilling sludge will be collected and disposed of by Enviroserve.
Adequate storage of litter	Lidded, scavenger proof waste bins should be provided for the staff at their living camp and on the drill site and should be removed with other solid waste on a weekly basis at a licenced Municipal landfill site.	GEOSERVE	GEOSERVE, UJ; ECO	N	Solid waste generated on site is neatly separated and marked in appropriate containers (**Photo 13**).
	Designated eating areas should be provided and appropriate bins provided for litter.	GEOSERVE	GEOSERVE, UJ; ECO	N	A tent has been erected on-site which serves as a designated eating/recreational area for drilling staff (**Photo 8a**).
2.8 Prevention of erosion					
Prevention of soil erosion	Appropriate stabilisation and soil protection measures should be implemented to prevent erosion occurring, especially where the access road to the drill site crosses small streams and clayey pans.	GEOSERVE	GEOSERVE; ECO	N	Access road areas prone to water logging (**Photo 7**) should be regularly checked and maintained, if necessary, using local materials to prevent them from destabilising.

AIM	ACTION TO BE CHECKED BY ECO	RESP	ACTION BY	CORRECTIVE ACTION Y/N	COMMENTS
2.9 Sanitation provision					
Implementation of proper sanitation	One (1) portable chemical toilet should be provided for every fifteen (15) workers. Toilet paper should be provided by the contractor.	GEOSERVE	GEOSERVE; ECO	N	A mobile toilet unit (from Fancy Flush) is situated adjacent to the site (**Photo 14**). The unit contains two toilets (adequate for the amount of on-site personnel during a shift).
	Portable chemical toilets should be emptied once per week by the appropriate contractor.	GEOSERVE	GEOSERVE; ECO	N	Service receipts must be kept on site
	Portable chemical toilets should be placed in a suitable location, on even ground, be appropriately secured to prevent being blown over and may not be closer than 100m from a drainage line.	GEOSERVE	GEOSERVE; ECO	N	The mobile toilet is parked on level ground, and is also secured by plastic tyre chocks (**Photo 14**).
2.10 Vehicle and machinery management					
Prevention of fuel, oil and / or lubricant spills / leaks.	No vehicles may be extensively repaired on site. Vehicle and machinery maintenance should be undertaken in a maintenance yard of a farm homestead.	GEOSERVE	GEOSERVE, UJ	N	This was explained during the environmental site induction on 17 July 2015.
	Vehicle and machinery should be checked, serviced and maintained daily to prevent fuel, oil and / or lubricant spills / leaks. Immediate action should be taken by the contractor should any machinery or vehicle be seen to be leaking fuel or oils, by placing a drip tray beneath the leak. Any spills / leaks should be reported to the ECO. Contaminated soil must be picked up in the appropriate manner and stored in a watertight bin for removal to the hazardous waste site at Vissershok, Cape Town.	GEOSERVE	GEOSERVE, UJ; ECO	N	Receipts of dumping contaminated soils at Vissershok hazardous landfill site must be kept on site. A spill kit is present on site (**Photo 15**), which will be used in the event of a fuel, oil or lubricant spill. Any contaminated soil will be rehabilitated with Terrasweep and Terrafix and removed from site to Vissershok. Drip trays are present beneath all mechanical equipment (**Photos 10** and **16**) and stored chemicals (**Photo 17**).

AIM	ACTION TO BE CHECKED BY ECO	RESP	ACTION BY	CORRECTIVE ACTION Y/N	COMMENTS
2.10 Vehicle and machinery management (cont.)					
Prevention of fuel, oil and / or lubricant spills / leaks.	Oil must be stored in a bunded area with an impermeable base, which is capable of containing 110% of the volume of oil to be stored. The mobile diesel bowser must be in good working order and its pipes and pump must be leak free.	GEOSERVE	GEOSERVE; ECO	N	A mobile oil storage unit which is parked on level ground (lined with plastic) and secured with tyre chocks is used (**Photo 18**).
	Necessary servicing / major repairs of vehicles or machinery must be done at a nearby town. If this is not possible, on site repairs must be overseen by the contractor with the use of a fuel/oil spill kit and the use of drip trays. All fuel / oil contaminated parts must be stored for appropriate disposal in a leak proof container. Used oils must be stored in an appropriate container for disposal or recycling.	GEOSERVE	GEOSERVE, UJ; ECO	N	This was explained during the environmental site induction on 17 July 2015. No servicing or major repairs of vehicles are envisaged on site during the drilling period.
Drilling lubricants	Biodegradable polymers should be used for lubricating and cooling of drill bits and strings. Petroleum free, water based fluids should be used during the drilling process. The use of bentonite clay may also be used as a drilling mud.	GEOSERVE	GEOSERVE; UJ	N	Biodegradable organic polymers are currently used during drilling. The chemical sheets of such organic polymers are on site. The use of such polymers will not cause any pollution of groundwater. Bentonite clay will not be used.

AIM	ACTION TO BE CHECKED BY ECO	RESP	ACTION BY	CORRECTIVE ACTION Y/N	COMMENTS
2.10 Vehicle and machinery management (cont.)					
Parking of vehicles and mechanical machinery	Parking areas for the storage of the diesel bowser and the drill machine must be prepared with a plastic liner on top of the soil. The liner should be covered with a thin layer of sand or shaley gravel. Such soil covering is to be removed from site and dumped at an appropriate landfill site when drilling has been completed.	GEOSERVE	GEOSERVE; ECO	N	A mobile oil storage unit which is parked on level ground (lined with plastic) and secured with tyre chocks is used (**Photo 18**).
2.11 Mixing and use of cement					
Prevention of soil contamination by cement	Cement grout or concrete may only be mixed at a suitable mixing location (flat, away from drainage lines) and should be localised to such a location.	GEOSERVE	GEOSERVE; ECO	N	Cement mixing is limited and has been localised close to the drill hole. No drilling was in progress on 24 July 2015 as the drill hole had been concrete grouted.
	A protective lining (board and / or plastic sheet) should be placed on exposed soils to mix cement.	GEOSERVE	GEOSERVE; ECO	N	
2.12 Fauna and flora protection					
Prevention of harm to fauna	Vehicles should be prevented from speeding to ensure snakes, tortoises and / or other animals are not run over. Any animals encountered on site should not be trapped, snared or killed. Snakes should only be removed off site by a suitably qualified snake handler.	GEOSERVE	GEOSERVE, UJ; ECO	N	This was explained during the environmental site induction on 17 July 2015. Appropriate signage has been erected at the farm entrance **(Photo 3)** which indicates the speed limit to be adhered to on the property.
Prevention of damaging or removing flora	No plants may be damaged or removed without the permission of the ECO. Vehicles must remain on existing roads and may not drive off roads over plants.	GEOSERVE	GEOSERVE; UJ; ECO	N	This was explained during the environmental site induction on 17 July 2015.

AIM	ACTION TO BE CHECKED BY ECO	RESP	ACTION BY	CORRECTIVE ACTION Y/N	COMMENTS
2.13 Archaeological and Paleontological management					
Prevention of degradation to any heritage significant material	All works must be halted if any archaeological and / or paleontological remains are found, and must be reported to a Heritage specialist. No personnel may tamper with such finds.	GEOSERVE	GEOSERVE, UJ	N	The area around the drill site revealed no archaeological material. Archaeological hand tools from the area were shown to the staff and they were informed during the environmental site induction on 17 July 2015 not to pick up or remove such material if noted near the site.
PHASE 3: SITE REHABILITATION					
3.1 Borehole closure					
Ensuring adequate standards are maintained	The contractor should ensure that the borehole is closed (with a lockable steel cap) according to the standards of the Department of Water and Sanitation (DWS), should it need to be used again. If the borehole is not to be used again, it should be closed according to industry standards.	GEOSERVE	GEOSERVE, UJ; ECO	N	This will be done by Geoserve once drilling has been completed, and checked by the ECO during the final site visit (for the final audit report).
3.2 Rehabilitation of drill site and access roads					
Rehabilitation of disturbed areas and damaged access roads	Any disturbed areas must be rehabilitated by scarifying the surface, replanting recued plants; scattering any locally collected seeds (by the ECO). Once rehabilitation has been completed, the area should be lightly sprayed with freshwater if the soils are dry. Any available brushwood (or straw) should be spread over the rehabilitated areas.	GEOSERVE	GEOSERVE	N	Cuttings of various succulent species found around the site were taken and planted in an appropriate on-site location by the ECO (**Photo 19a**) for later use in rehabilitation. Seeds from surrounding indigenous Tankwa Karoo Succulent Karoo vegetation unit were collected and will be stored for use in the rehabilitation of the drill site. Various bulbs were rescued from the site (e.g Karoo Slangkop. *Ornithoglossum undulatum* [**Photo 19b**]).
	Any deterioration of roads and tracks used during the drilling phase should be rehabilitated as soon as possible, to the satisfaction of the property owner and ECO.	GEOSERVE	GEOSERVE	N	Sections of the access road have started forming ruts (**Photo 6**) due to the use of construction vehicles (refer to **Figure 1**). Any ruts should be flattened once the drilling has been completed. Access road areas prone to water logging (**Photo 7**) should be regularly checked and maintained, if necessary, using local materials to prevent them from destabilising.

AIM	ACTION TO BE CHECKED BY ECO	RESP	ACTION BY	CORRECTIVE ACTION Y/N	COMMENTS
3.3 Cleaning of drill site					
Ensuring the site is left cleaned	The site should be cleaned in order for it to be reinstated to its original condition. All evidence of oil / diesel spills must be removed in the appropriate manner and such contaminated soils must be dumped at the Vissershok hazardous waste site near Cape Town.	GEOSERVE	GEOSERVE, UJ; ECO	N	This will be undertaken by Geoserve once drilling has been completed, and checked by the ECO during the final site visit (for the final audit report).
	No waste materials of the drilling process, including any personal belongings of site personnel, tools; bits of machinery; or litter may not be left on site. All such extraneous waste material must be removed to the appropriate licenced landfill site.	GEOSERVE	GEOSERVE, UJ; ECO	N	
Ensure that the homestead where staff have stayed is left neat and clean	All waste, including any personal belongings of site personnel, tools; bits of machinery; or litter may not be left on site. All such extraneous waste material must be removed to the appropriate licenced landfill site.	GEOSERVE	GEOSERVE, UJ; ECO	N	

Appendix A: ECO Environmental Education Attendance list

WITHERS
ENVIRONMENTALCONSULTANTS

ENVIRONMENTAL PLANNING
IMPACT ASSESSMENTS
MANAGEMENT SYSTEMS

tel +27 21 887 4000
fax +27 21 883 2952
email info@withersenviro.co.za
web www.withersenviro.co.za
address P.O. Box 6118
Uniedal 7612

CIMERA – KARIN PROJECT

ECO ENVIRONMENTAL EDUCATION ATTENDANCE LIST FOR THE DRILLING OF A RESEARCH BOREHOLE ON FARM ZANDFONTEIN NO. 89, CERES DISTRICT, WESTERN CAPE: PLANNING, OPERATION AND REHABILITATION PHASE.

Date:

	NAME	SIGNATURE
1	NICHOLAS MOGRIDGE	
2	T.B. CROUS	
3	A. Birch	
4	W - Rozalanavho	
5	G. Mathabatha	George
6	M.B. MEFOLOVHOHWE	
7	T.P. TSHIFHANGO	
8	P. MABUSELA	
9	C. Mulaudzi	
10	J.P. KHUMALO	
11	T.S. MASILELA	
12	J.Z. Thabethe	
13	G.M. Mathabatha	George
14	JOHNSON MUIQWA	
15	THOMAS MAKHANYA	
16	Godfrey Lunuli	
17		
18		
19		
20		
21		
22		
23		
24		
25		

Appendix B: Photo Sheet

Photo 1a

Photo 1b

Photos 1a and 1b: An information board, containing the on-site conduct rules, the induction sheet (provided by Withers Environmental Consultants), snake identification and on scene first aid procedures is placed at the site entrance.

Photo 2: The designated smoking area has been fitted with a solar powered light.

Photo 3: Appropriate signage has been erected at the farm entrance which indicates the speed limit to be adhered to on the property.

Photo 4: The site has been appropriately demarcated with a security fence and safety netting. The core storage and logging area in the foreground is separated from the drilling area.

Photo 5: The methane burnout pit is placed on the edge and separated from the drill site and has been demarcated with the appropriate safety netting.

Photo 6: Sections of the access road on Farm Zandfontein have started forming ruts due to the use of construction vehicles. These ruts will need to be flattened once the drilling has been completed.

Photo 7: Areas prone to water logging should be regularly checked and maintained, if necessary, using local materials to prevent them from destabilising.

Photos 8a and 8b: Personal Protective Equipment (PPE) is kept in the mobile first aid room (black arrow).

Photos 9a and 9b: Several Jessop *Drimia marginata* (top) and *Gladiolus* spp. (right) were located on site and transplanted by the ECO within a "nursery area" for later transplanting back to the site.

Photo 10: Water for drilling is sourced from a nearby non-equipped borehole. A temporary submersible pump and generator pumps groundwater to the drill site through a PVC pipe laid out on surface.

Photo 11: Sludge and drilling water from the core drill hole is circulated by pumping it to the Solid Removal Unit (SRU). The sludge and any larger particles are separated from the drill water which is re-circulated to the drill hole.

Photos 12a and 12b: Sludge is extracted in the SRU and falls into a large plastic bag (left) which is temporarily stored in a trailer lined with plastic (top). The sludge is to be removed from site.

Photo 13: The contractor is commended on the neatness of the site. Solid waste generated on site is neatly separated and marked in wheely bins. Recyclables are sorted on site and put into separate bins.

Photo 14: A mobile toilet unit is parked adjacent to the site. The mobile toilet is located on even ground, secured by plastic tyre chock blocks.

Photo 15: A petro-chemical spill kit is present on site which will be used in the event of a fuel, oil or lubricant spill. Any contaminated soil will be rehabilitated with Terrasweep and Terrafix and removed from site to Vissershok.

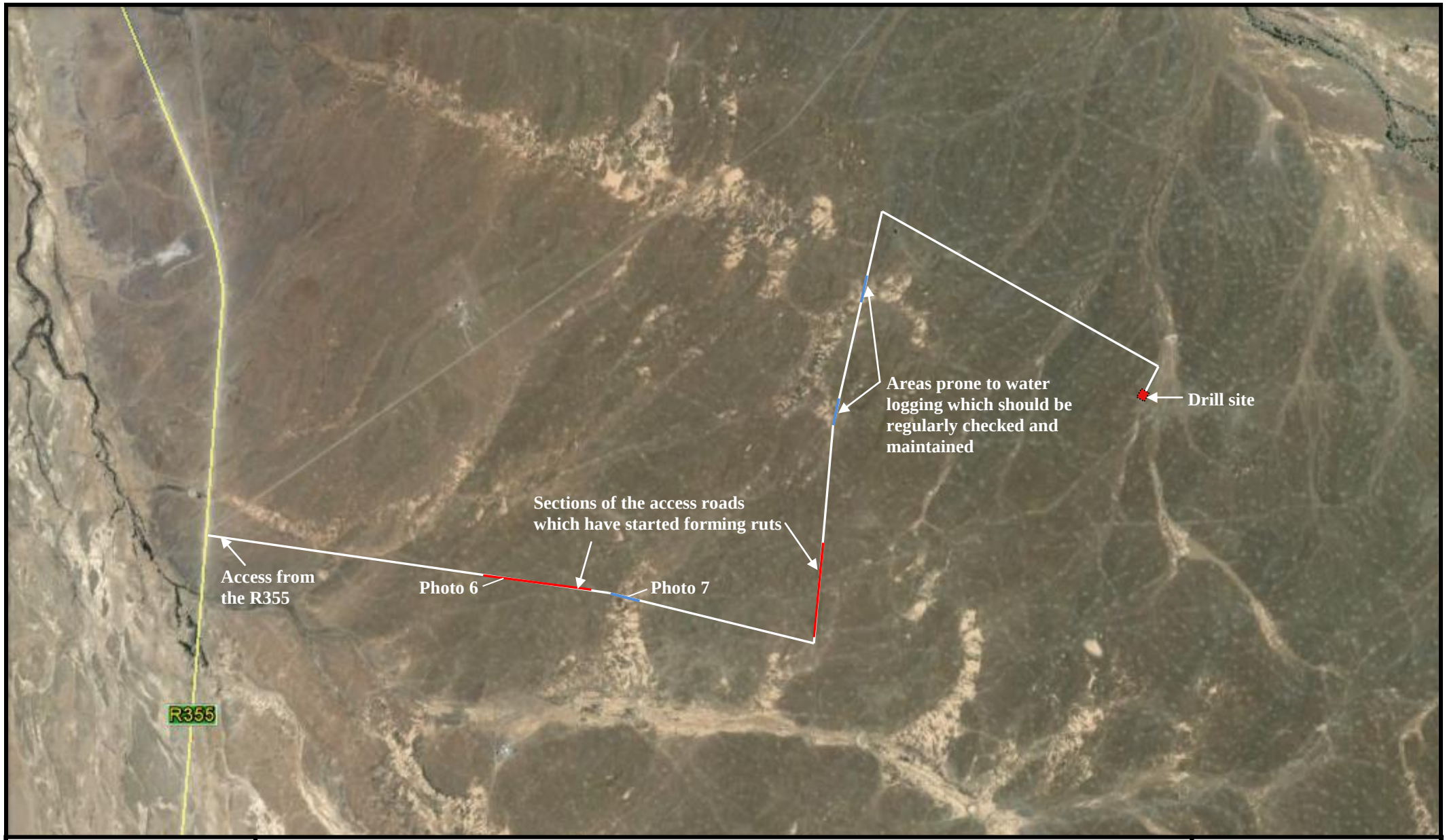
Photo 16: A drip tray is present beneath the generator in the southwestern corner of the site.

Photo 17: A drip tray is present beneath the stored chemicals.

Photo 18: A mobile diesel bowser is parked on level ground (lined with plastic) and secured with tyre chocks.

Photo 19a: Cuttings of various succulent species found around the site were planted in an appropriate on-site location by the ECO for later use in rehabilitation.

Photos 19b: Various bulbs were relocated from the drill site to a "nursery" area for later transplanting during rehabilitation, e.g. Karoo Slangkop *Ornithoglossum undulatum*.



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LOCATION OF AREAS PRONE TO WATER LOGGING AND RUTS FORMING ALONG THE ACCESS ROADS

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(GOOGLE EARTH © 2015 [adapted by Withers Environmental Consultants])

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Figure 1