



the denc

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Environment & Nature Conservation
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

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OFFICIAL DRAFT BASIC ASSESSMENT REPORT

PROPOSED PIVOT PROJECT ON PORTION 12 OF FARM BUFFELSVLEI 69, COLESBERG

DENC REF NR: N.C./EIA/01/PIX/UMS/COL1/2017

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Date: February 2017



EXECUTIVE SUMMARY

1. Project Description

Background and Locality

Portion 12 of Farm Buffelsvlei 69 is situated approximately 5km North-East of Colesberg, between the R717 and N1, in the Northern Cape Province (See Figure 1). The correct property number of the farm is 12/69 since amended in 1989, and not 69.

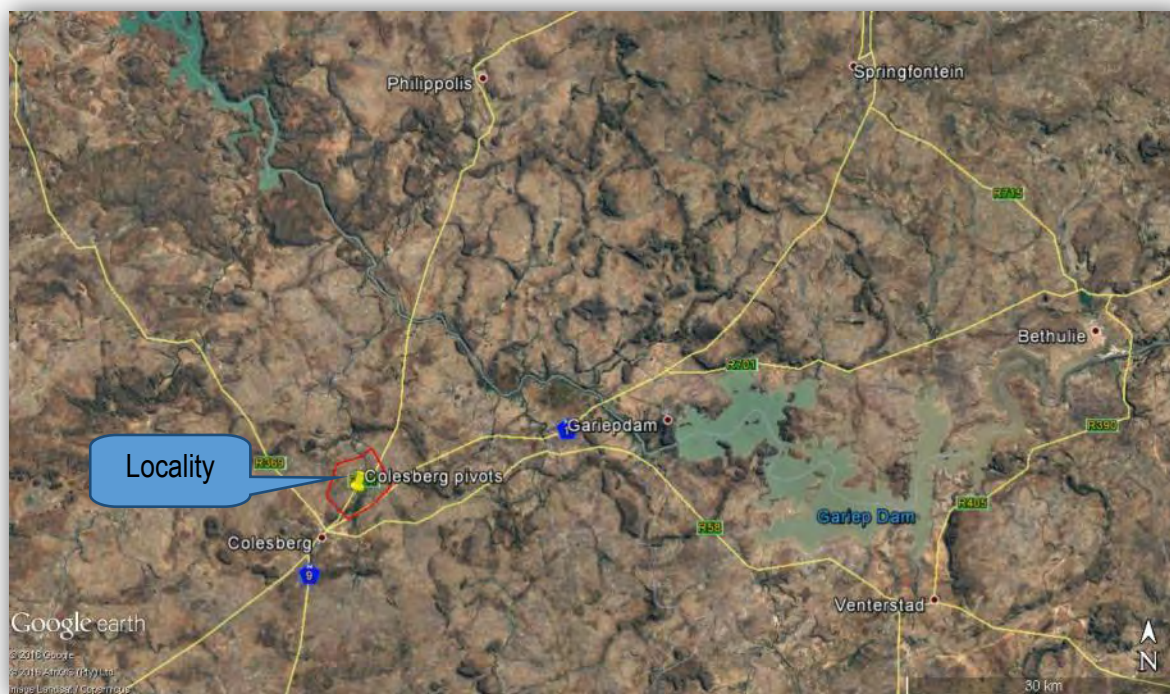


Figure 1: Locality of Portion 12 of Farm Buffelsvlei 69, Colesberg

Pieter Badenhorst Professional Services cc has been appointed by the applicant as the independent environmental practitioner to undertake the Environmental application and Environmental Impact Assessment process for the project.

Proposed Development and Agricultural Activities

The application is for the clearance of 19,9 ha of indigenous vegetation on Portion 12 of Farm Buffelsvlei 69, Colesberg, to establish a centre pivot development for the cultivation and irrigation of lucerne as seen in Figure 2. This will trigger Activity 27 of GN R983 Listing Notice 1.

Lucerne will be irrigated by using existing centre pivots from areas on the same property where planting is not anymore possible. Treated effluent water flowing through Buffelsvlei will be used for the irrigation as approved by the Water Use License (WUL) for the Municipal Waste Water Treatment Works (WWTW). The WUL indicate that 486 700m³ at 12 167,50m³/ha may be cultivated on 40ha. The crop pre-scribed is Lucerne. This crop will not allow for the cultivation of other crops during the season when lucern is not productive. Application will be made to also plant other crops during the Lucerne “off season” so that crops such as oats or maize or teff can be planted to fully utilise the available water.

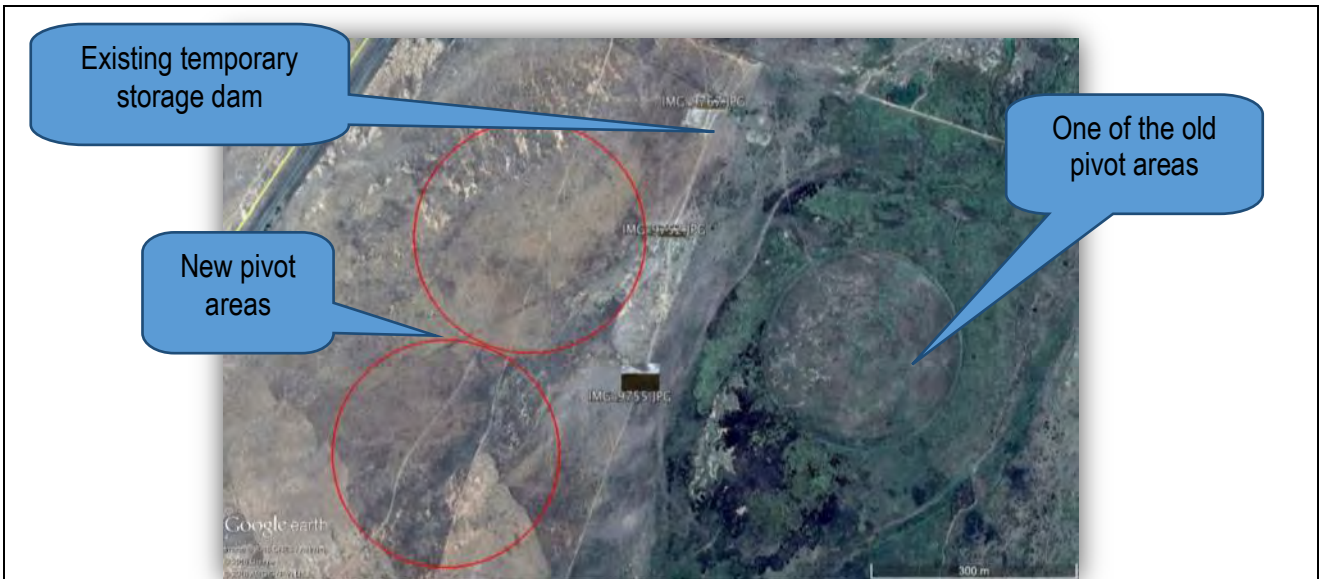


Figure 2: Proposed site for 19.9 pivot development on Portion 12 of Farm Buffelsvlei 69

The treated effluent will be pumped from the existing pumpstation (see inset with green border) via the existing pipeline (blue dotted line) as shown in Figure 3.

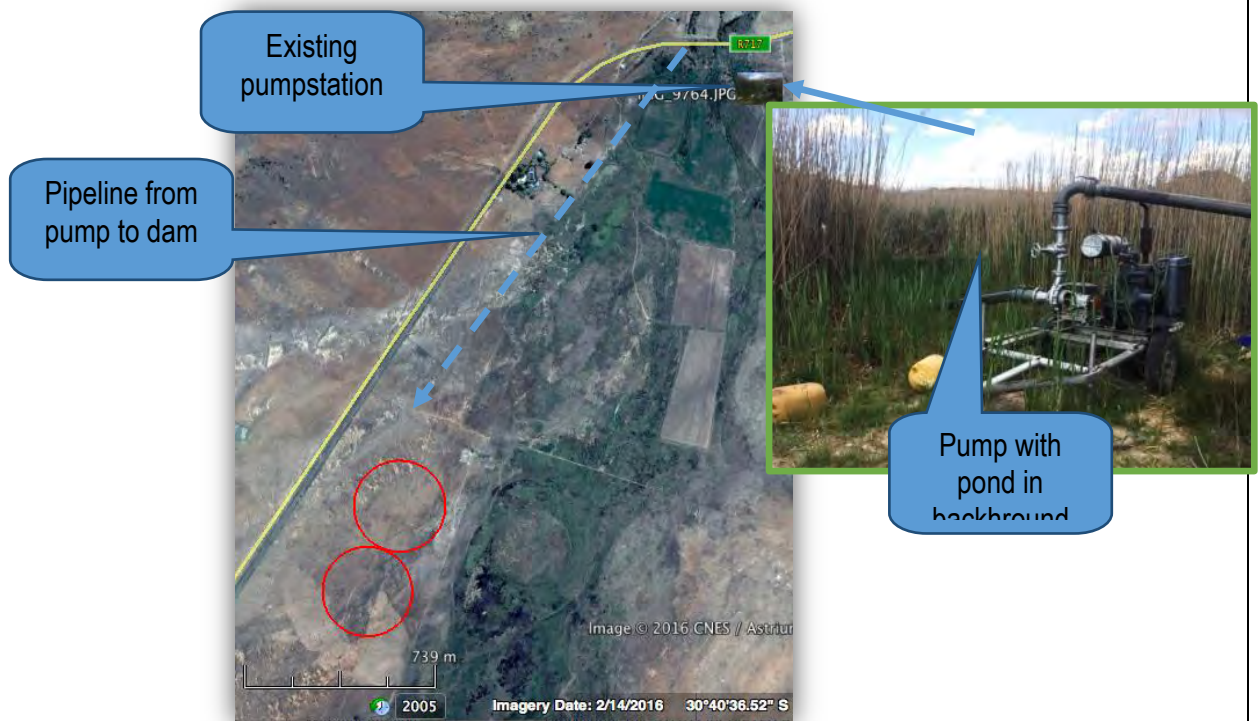


Figure 3: Existing pumpstation and line to pivots

A close-up view of the disturbed nature of the vegetation on the site is shown below in Figure 4.



Figure 4: Disturbed view of vegetation on site

Water use for proposed development

The Umsobomvu local Municipality: Colesberg WWTW received a WUL in Terms of Chapter 4 of the National Water Act, 1998 (Act No. 36 of 1998) with LICENCE NO: 13/032F/EFG/2313 under File No: 27/2/2101035/111 (the WUL can be seen in Appendix J1 of the DBAR).

The WUL 13/D32F/EFG/2313 allows for irrigation of 40ha Lucerne at 487600m³/a on Farm 69 [it should have read 12/69] which is the correct property number of the farm.

The coordinates provided in the WUL are on farm 12/69 in areas now largely not usable for agriculture cultivation.

The applicant is now proposing to re-locate the previous pivots to an area suitable for irrigation.


2. Listing Notices Applied for:

Listed activity as described in GN 734, 735 and 736	Description of project activity
<p>GN R. 983 Item 27</p> <p>The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-</p> <p>(i) the undertaking of a linear activity; or</p> <p>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p>	<p>Clearing of indigenous vegetation for the planting of 19,9 ha Lucerne on two centre pivots.</p>

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3. Alternatives

a. Site alternatives

Alternative 1 (preferred alternative)		
Description	Lat (DDMMS S)	Long (DDMMSS)
Clearance of 19.9 ha close to existing balancing dam and previously cultivated area.		
 <p>Figure 5: Clearance of 19.9 ha at the red circles.</p> <p>Alternative 1, the preferred alternative, will include the clearance of 19.9ha of indigenous vegetation for the development of centre pivots to cultivate and irrigate Lucerne.</p> <p>This is the preferred alternative for the following reasons:</p> <ul style="list-style-type: none"> • The water indicated in the WUL may only be used on this property. • The selected area has been transformed by previous grazing of livestock and no critical endangered or threatened indigenous vegetation will be impacted on. • The site is adjacent to the previously used site and existing balancing dam which makes the relocating of the infrastructure easy and financially viable. • The site, according to the Agronomist’s report in Appendix D1: Agronomist Report , page 65 is suitable for irrigation for the following reasons: <ul style="list-style-type: none"> ○ no restrictive layers of heavy clays appears in the profiles ○ the slope of the land is suitable for irrigation ○ no structural limitations of the land are present ○ chemical ratios are all in place without any access salts. • The use of the treated effluent ensures the sustainable use of the resource. 	30°40’37, 39”	25°08’13, 35”

Alternative 2		
Description	Lat (DDMMSS)	Long (DDMMSS)

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		S)
<p>Re-development of irrigation areas on previously used sites</p> 	<p>30°40'43.50 "S</p>	<p>25° 8'32.52"E</p>
<p style="text-align: center;">Figure 6: Re-development of previously irrigated sites</p> <p>This alternatives proposes the redevelopment of irrigation areas on the previously used areas to cultivate and irrigate 19.9ha Lucerne.</p> <p>This is not the proposed alternative for the following reasons:</p> <ul style="list-style-type: none"> • Soil of this area doesn't allow for viable cultivation and irrigation of crops as the soil is too wet and have been changed due to longterm flows of treated effluent. <p>The area have been transformed to rather reflect a wetland like character as a result of these flows.</p>		

b) Lay-out alternatives (in this case also technology alternative)

Alternative 1 (preferred alternative)		
Description	Lat (DDMMSS)	Long (DDMMSS)
<p>The use of centre pivot technology. This technology is the best option for optimum production of Lucerne and in addition the centre pivots are available which would prevent additional costs.</p>		
Alternative 2		

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Description		
This alternative would involve the use of flood irrigation on the same identified area as for the centre pivots. This option is not preferred since flood irrigation requires more water compared with centre pivot irrigation.		

c) Technology alternatives
See Layout Alternatives

Alternative 1 (preferred alternative)
--

d) Other alternatives (e.g. scheduling, demand, input, scale and design alternatives)

<p>No other alternatives are considered because the preferred layout and technology alternative of using centre pivots include for optimum design of the scale, system and scheduling of irrigation. Also note that following from the WUL only Lucerne crops may be cultivated.</p>

e) No-go alternative

<p>The no-go alternative will result in no clearance of vegetation and the 19.9ha will remain unchanged. The main consequence will be the non use of the treated effluent that is licenced for the cultivation of crops. Environmentally it would be high negative to not use the available water for cultivation of crops. Not undertaking the projects will therefore be high negative for:</p> <ul style="list-style-type: none"> • Sustainable use of available resources • No increased economic impact for the region, owner and workers. • Economic loss of not using available infrastructure such as balancing dam, centre pivots, pump and pump line.
--

4. Public Participation

a. Advertisement And Notice

Publication name	Colesberg Advertiser	
Date published	9 February 2017	
Site notice position	Latitude	Longitude
Site Notice 1	30°40'22.00"S	25° 8'10.42"E
Site Notice 2	30°39'39.17"S	25° 9'8.79"E
Date placed	13 February 2017	

Include proof of the placement of the relevant advertisements and notices in Appendix E1.

b. Determination Of Appropriate Measures

Provide details of the measures taken to include all potential I&APs as required by Regulation 41(2)(e) and 41(6) of GN 733.

Key stakeholders (other than organs of state) identified in terms of Regulation 41(2)(b) of GN 733

The I&AP database is included in Appendix E5: I&AP list, page 79 of the DBAR. This include for direct neighbours, the Local and District Municipalities, Department of Agriculture in De Aar (who provided the necessary authorisation for clearing and planting as required by CARA and SAHRA.)

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E-mail:	mjmaestro@gmail.com	Fax:	

Prepared by:

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(For official use only)

File Reference Number:	
Application Number:	
Date Received:	

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Basic Assessment Report in terms of the Environmental Impact Assessment Regulations, 2014, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

Kindly note that:

1. This **basic assessment report** is a standard report that may be required by a competent authority in terms of the EIA Regulations, 2014 and is meant to streamline applications. Please make sure that it is the report used by the particular competent authority for the activity that is being applied for.
2. This report format is current as of **08 December 2014**. It is the responsibility of the applicant to ascertain whether subsequent versions of the form have been published or produced by the competent authority
3. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.
4. Where applicable **tick** the boxes that are applicable in the report.
5. An incomplete report may be returned to the applicant for revision.
6. The use of “not applicable” in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.
7. This report must be handed in at offices of the relevant competent authority as determined by each authority.
8. No faxed or e-mailed reports will be accepted.
9. The signature of the EAP on the report must be an original signature.
10. The report must be compiled by an independent environmental assessment practitioner.
11. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.
12. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.
13. Should a specialist report or report on a specialised process be submitted at any stage for any part of this application, the terms of reference for such report must also be submitted.

Section A: Activity Information

Has a specialist been consulted to assist with the completion of this section?

YES	NO
-----	----

If YES, please complete the form entitled “Details of specialist and declaration of interest” for the specialist appointed and attach in Appendix I.

1. Activity Description

a) Describe the project associated with the listed activities applied for

Background and Locality

Portion 12 of Farm Buffelsvlei 69 is situated approximately 5km North-East of Colesberg, between the R717 and N1, in the Northern Cape Province (See Figure 1). The correct property number of the farm is 12/69 since amended in 1989, and not 69.



Figure 1: Locality of Portion 12 of Farm Buffelsvlei 69, Colesberg

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Proposed Development and Agricultural Activities

The application is for the clearance of 19,9 ha of indigenous vegetation on Portion 12 of Farm Buffelsvlei 69, Colesberg, to establish a centre pivot development for the cultivation and irrigation of lucerne as seen in Figure 2.

Lucerne will be irrigated by using existing centre pivots from areas on the same property where planting is not anymore possible. Treated effluent water flowing through Buffelsvlei will be used for the irrigation as approved by the Water Use License (WUL) for the Municipal Waste Water Treatment Works (WWTW). The WUL indicate that 486 700m³ at 12 167,50m³/ha may be cultivated on 40ha. The crop pre-scribed is Lucerne. This crop will not allow for the cultivation of other crops during the season when lucern is not productive. Application will be made to also plant other crops during the Lucerne “off season” so that crops such as oats or maize or teff can be planted to fully utilise the available water.

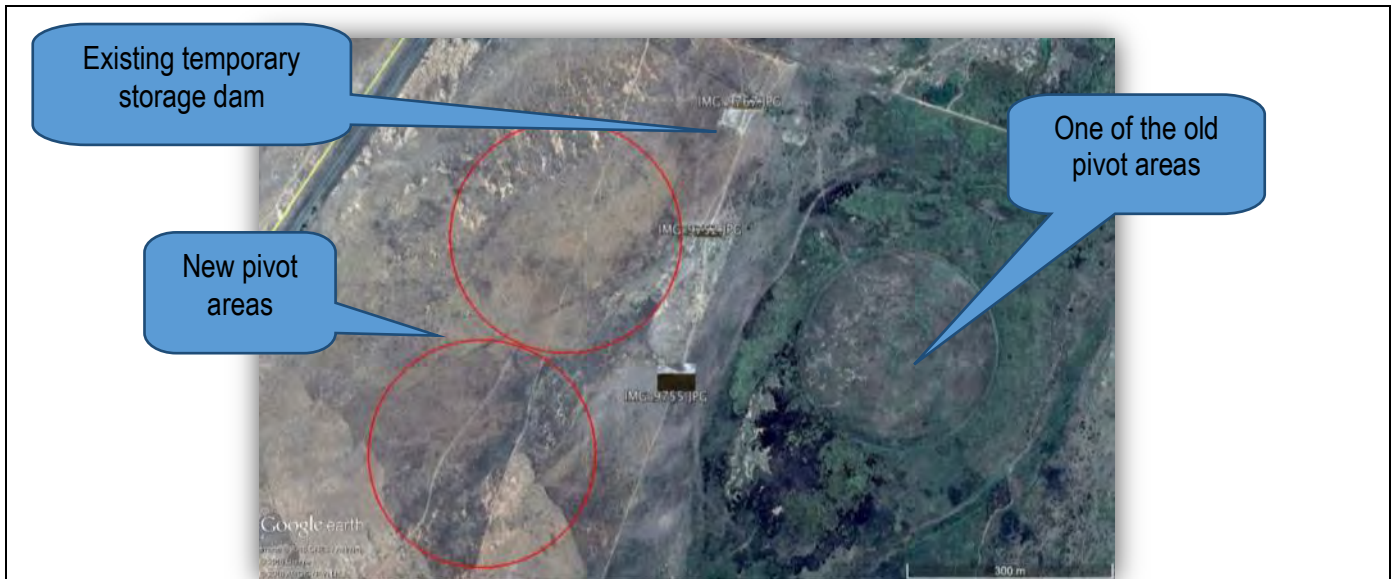


Figure 2: Proposed site for 19.9 pivot development on Portion 12 of Farm Buffelsvlei 69

The treated effluent will be pumped from the existing pumpstation (see inset with green border) via the existing pipeline (blue dotted line) as shown in Figure 3.

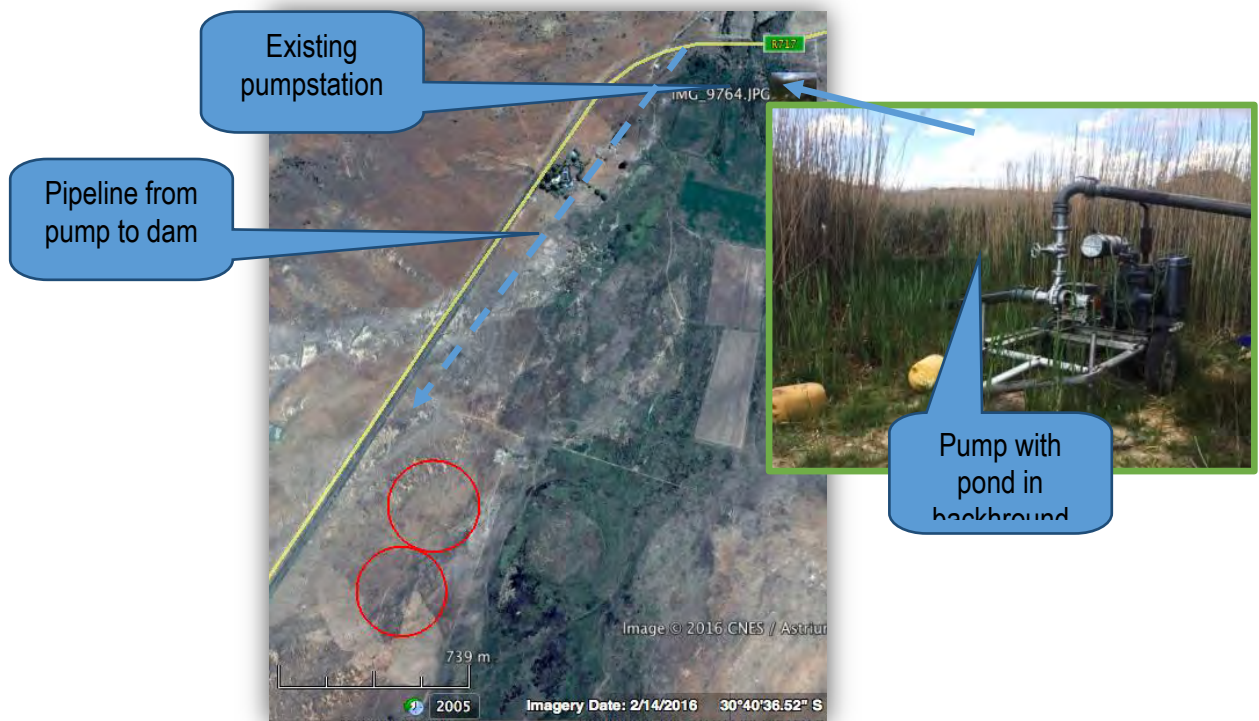


Figure 3: Existing pumpstation and line to pivots

A close-up view of the disturbed nature of the vegetation on the site is shown below in Figure 4.



Figure 4: Disturbed view of vegetation on site

Water use for proposed development

The Umsobomvu local Municipality: Colesberg WWTW received a WUL in Terms of Chapter 4 of the National Water Act, 1998 (Act No. 36 of 1998) with LICENCE NO: 13/032F/EFG/2313 under File No: 27/2/2101035/111 (the WUL can be seen in Appendix J1: Water Use License extract applicable to development, page 130). The WUL 13/D32F/EFG/2313 allows for irrigation of 40ha Lucerne at 487600m³/a on Farm 69 [it should have read 12/69] which is the correct property number of the farm.

The coordinates provided in the WUL are on farm 12/69 in areas now largely not usable for agriculture cultivation.

The applicant is now proposing to re-locate the previous pivots to an area suitable for irrigation.

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b) Provide a detailed description of the listed activities associated with the project as applied for

Listed activity as described in GN 734, 735 and 736	Description of project activity
<p>Example: GN 734 Item xx xx): The construction of a bridge where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.</p>	<p>A bridge measuring 5 m in height and 10m in length, no wider than 8 meters will be built over the Orange river</p>
<p>GN R. 983 Item 27</p> <p>The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-</p> <p>(i) the undertaking of a linear activity; or</p> <p>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p>	<p>Clearing of indigenous vegetation for the planting of 19,9 ha Lucerne on two centre pivots.</p>

2. Feasible And Reasonable Alternatives

“alternatives”, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

- (a) the property on which or location where it is proposed to undertake the activity;
- (b) the type of activity to be undertaken;
- (c) the design or layout of the activity;
- (d) the technology to be used in the activity;
- (e) the operational aspects of the activity; and
- (f) the option of not implementing the activity.


Describe alternatives that are considered in this application as required by Appendix 1 (3)(h), Regulation 2014. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity (NOT PROJECT) could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed.

The determination of whether site or activity (including different processes, etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. After receipt of this report the, competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees, minutes and seconds. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.


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a) Site alternatives

Alternative 1 (preferred alternative)		
Description	Lat (DDMMSS)	Long (DDMMSS)
<p>Clearance of 19.9 ha close to existing balancing dam and previously cultivated area.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Figure 5: Clearance of 19.9 ha at the red circles.</p> <p>Alternative 1, the preferred alternative, will include the clearance of 19.9ha of indigenous vegetation for the development of centre pivots to cultivate and irrigate Lucerne.</p> <p>This is the preferred alternative for the following reasons:</p> <ul style="list-style-type: none"> • The water indicated in the WUL may only be used on this property. • The selected area has been transformed by previous grazing of livestock and no critical endangered or threatened indigenous vegetation will be impacted on. • The site is adjacent to the previously used site and existing balancing dam which makes the relocating of the infrastructure easy and financially viable. • The site, according to the Agronomist’s report in Appendix D1: Agronomist Report , page 65 is suitable for irrigation for the following reasons: <ul style="list-style-type: none"> ○ no restrictive layers of heavy clays appears in the profiles ○ the slope of the land is suitable for irrigation ○ no structural limitations of the land are present ○ chemical ratios are all in place without any access salts. • The use of the treated effluent ensures the sustainable use of the resource. 	<p>30°40’37,39”</p>	<p>25°08’13,35”</p>

Alternative 2		
Description	Lat (DDMMSS)	Long (DDMMSS)
<p>Re-development of irrigation areas on previously used sites</p>		

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	<p>30°40'43.50"S</p>	<p>25° 8'32.52"E</p>
<p align="center">Figure 6: Re-development of previously irrigated sites</p> <p>This alternatives proposes the redevelopment of irrigation areas on the previously used areas to cultivate and irrigate 19.9ha Lucerne.</p> <p>This is not the proposed alternative for the following reasons:</p> <ul style="list-style-type: none"> • Soil of this area doesn't allow for viable cultivation and irrigation of crops as the soil is too wet and have been changed due to longterm flows of treated effluent. <p>The area have been transformed to rather reflect a wetland like character as a result of these flows.</p>		

b) Lay-out alternatives (in this case also technology alternative)

Alternative 1 (preferred alternative)		
Description	Lat (DDMMSS)	Long (DDMMSS)
The use of centre pivot technology. This technology is the best option for optimum production of Lucerne and in addition the centre pivots are available which would prevent additional costs.		
Alternative 2		
Description		

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This alternative would involve the use of flood irrigation on the same identified area as for the centre pivots. This option is not preferred since flood irrigation requires more water compared with centre pivot irrigation.		
---	--	--

c) Technology alternatives

See Layout Alternatives

Alternative 1 (preferred alternative)

d) Other alternatives (e.g. scheduling, demand, input, scale and design alternatives)

<p>No other alternatives are considered because the preferred layout and technology alternative of using centre pivots include for optimum design of the scale, system and scheduling of irrigation. Also note that following from the WUL only Lucerne crops may be cultivated.</p>
Operational Alternative 2

e) No-go alternative

<p>The no-go alternative will result in no clearance of vegetation and the 19.9ha will remain unchanged. The main consequence will be the non use of the treated effluent that is licenced for the cultivation of crops. Environmentally it would be high negative to not use the available water for cultivation of crops. Not undertaking the projects will therefore be high negative for:</p> <ul style="list-style-type: none"> • Sustainable use of available resources • No increased economic impact for the region, owner and workers. • Economic loss of not using available infrastructure such as balancing dam, centre pivots, pump and pump line.
--

Paragraphs 3 – 13 below should be completed for each alternative.

3. Physical size of the activity

a) Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

Alternative:	Size of the activity:
Alternative A1 ¹ (preferred activity alternative)	199000 m ²
Alternative A2 (if any)	199000 m ²

or, for linear activities:	
Alternative:	Length of the activity:
Alternative A1 (preferred activity alternative)	m
Alternative A2 (if any)	m
Alternative A3 (if any)	m

¹ "Alternative A.." refer to activity, process, technology or other alternatives.

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b) Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):

Alternative:

Alternative A1 (preferred activity alternative)
 Alternative A2 (if any)
 Alternative A3 (if any)

Size of the site/servitude:

199000 m ²
199000 m ²
m ²

4. Site Access

Does ready access to the site exist?

YES	NO
m	

If NO, what is the distance over which a new access road will be built

Describe the type of access road planned:

Not applicable

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site. Existing access from R 717 as shown below in Figure 7.



Figure 7: Existing access road from R717

5. Locality Map

An A3 locality map must be attached to the back of this document, as Appendix A. The scale of the locality map must be relevant to the size of the development (at least 1:50 000. For linear activities of more than 25

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kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map.). The map must indicate the following:

- an accurate indication of the project site position as well as the positions of the alternative sites, if any;
- indication of all the alternatives identified;
- closest town(s);
- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and
- locality GPS co-ordinates (Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection).

6. **Layout/Route Plan**

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as Appendix A to this document.

The site or route plans must indicate the following:

- the property boundaries and numbers of all the properties within 50 metres of the site;
- the current land use as well as the land use zoning of the site;
- the current land use as well as the land use zoning each of the properties adjoining the site or sites;
- the exact position of each listed activity applied for (including alternatives);
- servitude(s) indicating the purpose of the servitude;
- a legend; and
- a north arrow.

7. **Sensitivity map**

- The layout/route plan as indicated above must be overlain with a sensitivity map that indicates all the sensitive areas associated with the site, including, but not limited to: Appendix A3: Sensitivity Maps, page 54.
- watercourses;
- the 1:100 year flood line (where available or where it is required by DWS);
- ridges;
- cultural and historical features;
- areas with indigenous vegetation (even if it is degraded or infested with alien species); and
- critical biodiversity areas.

The sensitivity map must also cover areas within 100m of the site and must be attached in Appendix A.

8. **Site Photographs**

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under Appendix B to this report. It must be supplemented with additional photographs of relevant features on the site, if applicable.

Site photographs are shown below in Figure 8. A larger display as A3 is included in Appendix B.



Figure 8: Site photographs

9. **Facility Illustration**

A detailed illustration of the activity must be provided at a scale of at least 1:200 as Appendix C for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity.

An example of a completed centre pivot is shown below in Figure 9.1. The activity is not complex in the sense that the centre pivot will irrigate the planted crop.



Figure 9: Example of completed centre pivot with planted crop

BASIC ASSESSMENT REPORT

10. **Activity Motivation**

Motivate and explain the need and desirability of the activity (including demand for the activity):

1. Is the activity permitted in terms of the property's existing land use rights?	YES	NO	Please explain
It is an agricultural area.			
2. Will the activity be in line with the following?			
(a) Provincial Spatial Development Framework (PSDF)	YES	NO	Please explain
Not applicable because since the property is zoned agriculture the activity may take place.			
(b) Urban edge / Edge of Built environment for the area	YES	NO	Please explain
The property is a farm.			
(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).	YES	NO	Please explain
Not applicable because since the property is zoned agriculture the activity may take place.			
(d) Approved Structure Plan of the Municipality	YES	NO	Please explain
Not applicable because since the property is zoned agriculture the activity may take place.			
(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)	YES	NO	Please explain
Not applicable because since the property is zoned agriculture the activity may take place.			
(f) Any other Plans (e.g. Guide Plan)	YES	NO	Please explain
3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?	YES	NO	Please explain
Not applicable because since the property is zoned agriculture the activity may take place.			
4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate.)	YES	NO	Please explain
The land is zoned agriculture and the WUL of the Municipal WWTW has identified the land for irrigation using the treated effluent.			

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<p>5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development? (Confirmation by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)</p>	YES	NO	Please explain
<p>The only outside required infrastructure is electricity and it is available on site and was used for these pivots previously.</p>			
<p>6. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)? (Comment by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)</p>	YES	NO	Please explain
<p>Not applicable because since the property is zoned agriculture the activity may take place.</p>			
<p>7. Is this project part of a national programme to address an issue of national concern or importance?</p>	YES	NO	Please explain
<p>8. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)</p>	YES	NO	Please explain
<p>The land is zoned agriculture and the WUL of the Municipal WWTW has specifically identified the land for irrigation using the treated effluent.</p>			
<p>9. Is the development the best practicable environmental option for this land/site?</p>	YES	NO	Please explain
<p>The land has been identified for irrigation by the Municipal WWTW's WUL.</p>			
<p>10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?</p>	YES	NO	Please explain
<p>The only negative would be the removing of non sensitive vegetation. However the planting of crops using treated effluent is a sustainable option to utilise available resources. In addition the production from the irrigated crops will be higher than production from the vegetation.</p>			
<p>11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?</p>	YES	NO	Please explain
<p>The land and use has been identified in the Munisipal WWTW's WUL.</p>			
<p>12. Will any person's rights be negatively affected by the proposed activity/ies?</p>	YES	NO	Please explain
<p>13. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?</p>	YES	NO	Please explain
<p>The propert is a farm outside of town.</p>			
<p>14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?</p>	YES	NO	Please explain

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15. What will the benefits be to society in general and to the local communities?	Please explain
The project will utilise a resource – treated effluent from the Municipal WWTW's - and therefore the Municipality as a whole will operate in that effluent produced will be used productively.	
16. Any other need and desirability considerations related to the proposed activity?	Please explain
No	
17. How does the project fit into the National Development Plan for 2030?	Please explain
Not applicable because the project is by a farmer on his land to utilise treated effluent.	
18. Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.	
Section 23 of NEMA	Implementation for this proposed development
(a) promote the integration of the principles of environmental management set out in section 2 into the making of all decisions which may have a significant effect on the environment;	The needs of people, the economy of the area and the environment were considered in developing the preferred option. The requirement for the water resources was utilized to its full potential while at the same time the viability of the development was maximized.
(b) identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximizing benefits, and promoting compliance with the principles of environmental management set out in section 2;	The selected development area was chosen due to the low impact on the environment. The type of development also ensured low impacts on the environment whereas the socio-economic conditions were however not maximised directly, however the socio-economic conditions and contribution to the socio-economic conditions were secured.
(c) ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them;	The selected development option ensured minimal impacts on the natural environment.
(d) ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment;	The public and stakeholders were kept informed through distribution of information as required by the regulations.
(e) ensure the consideration of environmental attributes in management and decision making which may have a significant effect on the environment; and	Attributes such as socio economy were identified which aided the identification of the proposed development.
(f) identify and employ the modes of environmental management best suited to ensuring that a particular activity is pursued in accordance with the principles of environmental management set out in section 2.	Environmental management principles were used to identify the type of project, which in this case will contribute to the economy of the region while at the same time, have minimal negative impacts on the natural environment. In other words, the proposed development is in line with the opportunities and constraints of the land, the surrounding area, and the region's economy.

19. Please describe how the principles of environmental management as set out in section 2 of NEMA have been taken into account.

In achieving sustainable development the focus therefore should not be restricted to environmental or nature conservation factors only. It should include economic and social realities and consider social factors such as those that determine income, quality of life, social networks, and other means aimed at maintaining and improving the well-being of people. Economic factors deal with the affordability of processes, their potential to generate an income over an extended period (into future generations) and to maintain its ability to support both the environmental and social needs of an area.

In short, if people are impoverished, there will be no environment to protect; if a project is not attractive economically, it will not be launched.

One way of testing whether a project meets with the demands of sustainability in development is to establish whether a project increases environmental, social, and economic values. Sustainable development mainly has as its aim the maintenance of environmental capital. This is achieved if the project that will be established in the developmental process is likely to provide at least the same value as is likely to be destroyed by its development.

Looking at the three tiers of NEMA principles, this development should be socially, environmentally, and economically viable.

They are summarised for this project as follows:

Socially:

The development will meet the local and regions needs through securing job opportunities. In addition, the visual aspect and sense of place is in line with the surroundings, all agricultural related activities.

Economically:

The development will have a positive impact by improving the economy of local workers through securing job opportunities during operation.

Environmentally:

The development will have a negative impact on any natural vegetation and the loss of vegetation would be kept strictly to the application site.

It will, however, have many positive impacts that include:

- Will secure job opportunities for local workers during agricultural activities.
- Provide the farmer to fully utilise the land for agricultural use.

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11. Applicable legislation, policies and/or guidelines

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations, if applicable:

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
Licence In Terms Of Chapter 4 Of The National Water Act, 1998 (Act No. 36 Of 1998) (The Act)	Water Use License for irrigation of Lucerne	Department of Water and Sanitation	WUL Issued 2014-02-07
Environmental Authorisation in terms of National Environmental Management Act, as amended in December 2014	Environmental Authorisation and EIA process	Northern Cape Department of Environment and Nature Conservation	Application submitted January 2017
National Heritage Resource Act S38(1)(c)		South African Heritage Resources Agency (SAHRA)	Application will be submitted

12. Waste, effluent, emission and noise management

a) Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?

YES	NO

If YES, what estimated quantity will be produced per month?

How will the construction solid waste be disposed of (describe)?

It is farm and only vegetation will be removed which will be re-used on the farm.

Where will the construction solid waste be disposed of (describe)?

Will the activity produce solid waste during its operational phase?

YES	NO
m ³	

If YES, what estimated quantity will be produced per month?

How will the solid waste be disposed of (describe)?

Not applicable

If the solid waste will be disposed of into a municipal waste stream, indicate which registered landfill site will be used.

Not applicable

Where will the solid waste be disposed of if it does not feed into a municipal waste stream (describe)?

Not applicable

If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the NEM:WA?

YES	NO
------------	-----------

If YES, inform the competent authority and request a change to an application for scoping and EIA. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.

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Is the activity that is being applied for a solid waste handling or treatment facility?

YES	NO
-----	----

If YES, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.

b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?

YES	NO
-----	----

If YES, what estimated quantity will be produced per month?

	m ³
--	----------------

Will the activity produce any effluent that will be treated and/or disposed of on site?

YES	NO
-----	----

If YES, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Will the activity produce effluent that will be treated and/or disposed of at another facility?

YES	NO
-----	----

If YES, provide the particulars of the facility:

Facility name:			
Contact person:			
Postal address:			
Postal code:			
Telephone:	Cell:		
E-mail:	Fax:		

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

The activity itself is the optimal reuse of treated wastewater from the WWTW, therefore no additional measures are required.
--

c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere other than exhaust emissions and dust associated with construction phase activities?

YES	NO
-----	----

If YES, is it controlled by any legislation of any sphere of government?

YES	NO
-----	----

If YES, the applicant must consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If NO, describe the emissions in terms of type and concentration:

Emissions will be minimal dust and exhaust emissions from agricultural machinery to clean the area of vegetation and to establish the centre pivot.

d) Waste permit

Will any aspect of the activity produce waste that will require a waste permit in terms of the NEM:WA?

YES	NO
-----	----

If YES, please submit evidence that an application for a waste permit has been submitted to the competent authority

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e) Generation of noise

Will the activity generate noise?

YES	NO
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The noise will be normal farming activities on a farm.

If YES, is it controlled by any legislation of any sphere of government? Verander die shading

YES	NO
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Describe the noise in terms of type and level:

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13. Water Use

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es):

Municipal	Water board	Groundwater	River, stream, dam or lake	Other Treated Wastewater from Municipal WWTW	The activity will not use water
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If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month:

487 600 m ³ /a

Does the activity require a water use authorisation (general authorisation or water use license) from the Department of Water Affairs?

YES	NO
------------	-----------

If YES, please provide proof that the application has been submitted to the Department of Water Affairs.

THE WUL is shown in Appendix J1: Water Use License extract applicable to development, page 130

14. Energy Efficiency

Describe the design measures, if any, which have been taken to ensure that the activity is energy efficient:

A centre pivot system will be used which optimises electrical use for the applicable crop.
--

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

Not possible to use other sources of electricity due to the demand curve of centre pivot systems.

Section B: Site/Area/Property Description

Important notes:

- For linear activities (pipelines, etc) as well as activities that cover very large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section B and indicate the area, which is covered by each copy No. on the Site Plan.

Not a linear project.

Section B Copy No. (e.g. A):

- Paragraphs 1 - 6 below must be completed for each alternative.
- Has a specialist been consulted to assist with the completion of this section?
- It has been completed by the EAP. Onthou declaration!!!

YES	NO
-----	----

If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed and attach it in Appendix I. All specialist reports must be contained in Appendix D.

Property description/physical address:

Province	Northern Cape
District Municipality	Pixley Ka Seme District Municipality
Local Municipality	Umsobomvu Municipality
Ward Number(s)	4
Farm name and number	Farm Buffelsvlei 69
Portion number	Portion 12
SG Code	C021000000006900012

Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application including the same information as indicated above.

Current land-use zoning as per local municipality IDP/records:

Agriculture

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to, to this application.

Is a change of land-use or a consent use application required?

YES	NO
-----	----

1. Gradient Of The Site

Indicate the general gradient of the site.

Alternative S1:

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
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Alternative S2 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
------	-------------	-------------	-------------	--------------	-------------	------------------

Alternative S3 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
------	-------------	-------------	-------------	--------------	-------------	------------------

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2. Location In Landscape

Indicate the landform(s) that best describes the site:

2.1 Ridgeline 2.2 Plateau 2.3 Side slope of hill/mountain 2.10 At sea	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	2.4 Closed valley 2.5 Open valley 2.6 Plain Flat agricultural land	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	2.7 Undulating plain / low hills 2.8 Dune 2.9 Seafront	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
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3. Groundwater, Soil And Geological Stability Of The Site

Is the site(s) located on any of the following?

	Alternative S1:		Alternative S2 (if any):	
Shallow water table (less than 1.5m deep)	YES	NO	YES	NO
Dolomite, sinkhole or doline areas	YES	NO	YES	NO
Seasonally wet soils (often close to water bodies)	YES	NO	YES	NO
Unstable rocky slopes or steep slopes with loose soil	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)	YES	NO	YES	NO
Soils with high clay content (clay fraction more than 40%)	YES	NO	YES	NO
Any other unstable soil or geological feature	YES	NO	YES	NO
An area sensitive to erosion	YES	NO	YES	NO

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted.

4. Groundcover

Indicate the types of groundcover present on the site. The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Natural veld in good condition^E	Natural veld with scattered aliens^E	Natural veld with heavy alien infestation^E	Veld dominated by alien species^E	Gardens
Sport field	Cultivated land	Paved surface	Building or other structure	Bare soil

If any of the boxes marked with an "E" is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn't have the necessary expertise. The sensitive vegetation map is shown in Appendix A3: Sensitivity Maps, page 54. A list of plants indicating the non sensitivity is shown in Appendix Appendix D1: Agronomist Report, page 65

5. Surface Water

Indicate the surface water present on and or adjacent to the site and alternative sites?

Perennial River	YES	NO	UNSURE
Non-Perennial River	YES	NO	UNSURE
Permanent Wetland	YES	NO	UNSURE

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Seasonal Wetland	YES	NO	UNSURE
Artificial Wetland	YES	NO	UNSURE
Estuarine / Lagoonal wetland	YES	NO	UNSURE

If any of the boxes marked YES or UNSURE is ticked, please provide a description of the relevant watercourse.

The treated effluent from the Municipal WWTW's is flowing over the property in a small non perennial stream. It is as a result of this flow that a new area has to be identified for irrigation that lies outside the wet area where water is continuously flowing.

6. Land use character of surrounding area

Indicate land uses and/or prominent features that currently occur within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

Natural area	Dam or reservoir	Polo fields
Low density residential	Hospital/medical centre	Filling station ^H
Medium density residential	School	Landfill or waste treatment site
High density residential	Tertiary education facility	Plantation
Informal residential ^A	Church	Agriculture
Retail commercial & warehousing	Old age home	River, stream or wetland
Light industrial	Sewage treatment plant ^A	Nature conservation area
Medium industrial ^{AN}	Train station or shunting yard ^N	Mountain, koppie or ridge
Heavy industrial ^{AN}	Railway line ^N	Museum
Power station	Major road (4 lanes or more) ^N	Historical building
Office/consulting room	Airport ^N	Protected Area
Military or police base/station/compound	Harbour	Graveyard
Spoil heap or slimes dam ^A	Sport facilities	Archaeological site
Quarry, sand or borrow pit	Golf course	Other land uses (describe) – The property is located within a farming area as shown in Figure 10. The minor road R717 is nearby.

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Figure 10: 500 m radius around the site

If any of the boxes marked with an "N" are ticked, how this impact will / be impacted upon by the proposed activity? Specify and explain:

Not applicable

If any of the boxes marked with an "An" are ticked, how will this impact / be impacted upon by the proposed activity? Specify and explain:

Not applicable

If any of the boxes marked with an "H" are ticked, how will this impact / be impacted upon by the proposed activity? Specify and explain:

Not applicable

Does the proposed site (including any alternative sites) fall within any of the following:

Critical Biodiversity Area (as per provincial conservation plan)	YES	NO
Core area of a protected area?	YES	NO
Buffer area of a protected area?	YES	NO
Planned expansion area of an existing protected area?	YES	NO
Existing offset area associated with a previous Environmental Authorisation?	YES	NO
Buffer area of the SKA?	YES	NO

If the answer to any of these questions was YES, a map indicating the affected area must be included in Appendix A.

Map not required.

7. Cultural/Historical Features

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including Archaeological or paleontological sites, on or close (within 20m) to the site? If YES, explain:

It is open veld with no elements.

YES	NO
Uncertain	

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If uncertain, conduct a specialist investigation by a recognised specialist in the field (archaeology or palaeontology) to establish whether there is such a feature(s) present on or close to the site. Briefly explain the findings of the specialist:

Not required		
Will any building or structure older than 60 years be affected in any way?	YES	NO
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	YES	NO

If YES, please provide proof that this permit application has been submitted to SAHRA or the relevant provincial authority.

The necessary application will be submitted to SAHRA and their comment will be included in Appendix E3.1: Comments Received on odBAR, page 74 in the final BAR to be submitted.

8. SOCIO-ECONOMIC CHARACTER

a) Local Municipality

Please provide details on the socio-economic character of the local municipality in which the proposed site(s) are situated.

Level of unemployment²:

The overall results regarding the employment status of the actual available workforce/potential economically active group in the Umsobomvu Municipality have improved from 2001's figure of 28.83% employed versus 31.12% unemployed. In 2007 34% of people in the economically active age of the population are employed versus 25% that are unemployed. In 2011 the rate of unemployment decreased from 51.9% in 2001 to 33% in 2011. This high unemployment rate has serious repercussions on the ability of the residents of Umsobomvu to pay for their daily needs. Unemployment is more than 30% in most of the areas and people survive on subsistence farming, pension/welfare payments and labour intensive jobs.

Economic profile of local municipality²:

Umsobomvu Municipality's economical activities are dominated largely by agriculture, financial services, trade, hospitality industry, tourism and transport. The area is known as an agricultural area dedicated almost entirely to horses and merino sheep. The greater Colesberg breeds many of the country's top merinos and is also renowned for producing high-quality racehorses and many stud farms are in the area.

The status of the municipality's economy epitomizes the legacy of apartheid thought its skewed development among former white areas and townships. All communities are affected in terms of poverty and development deficit. Upliftment of the local economy has therefore been a key area of focus for the Municipality.

Umsobomvu Municipal economy is characterised by the following:

- High levels of poverty and low levels of education.
- A declining economy that is largely based on sheep farming.
- An economy that was too dependent on Spoornet in Noupoort, which has since declined because of the withdrawal of Spoornet.
- Promising growth in tourism in Colesberg Area.
- Rapid population growth in Colesberg because of the migration from other parts of the municipal area, which puts a heavy burden on the infrastructure.

By virtue of its geographic location the Municipality prides itself as a natural transportation route for people

² Taken from Umsobomvu Municipality: IDP Review 2015/2016

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travelling to destinations such as Cape Town, Port Elizabeth, Gauteng and Bloemfontein since two of the major national roads, namely N1 and N9 pass through the Municipality.

Level of education²:

According to Stats SA, the primary schools population represented 3.2% in 2011 of the total population in the Municipality. Persons having no schooling (10.68%) did never enjoy formal education, not even some primary education, implying illiteracy in most cases, these persons are limited to perform manual labour and cannot adequately participate in the society. There are 6 primary schools and 5 secondary schools in the Municipality. While the actual number of schools is generally satisfactory to standard, and acute shortage is experienced in the remote rural areas of the Municipality. In many cases only one school is serving a wide region in the rural areas. Inadequate schools in rural areas involved long walking distances by children to reach the school. According to Census 2011, when compared to 2007 Community survey above the people with no education had decreased to 10.6% in 2011. Pupils in higher education have increased to 3.95% and matriculants have also increased to 17.4%.

As noted earlier, major concerns are the high number of people with no education as well as people without Grade 12 (Matric). According to a CSIR Report, illiteracy in the Municipality is also high. The Municipality has a small tertiary educated knowledge pool. The lack of skilled professionals places a constraint on development in the Municipality. Presently there are 5 creches in the municipality and they are mostly situated in low to medium density residential areas. The formal creches are established and run by Department of Education. The high number of established creches is an indication of how the community and the Department of Education is committed to meeting the education needs of young children in the district (Pixley Ka Seme IDP, 2011-2016).

b) Socio-economic value of the activity

What is the expected capital value of the activity on completion?	R 900 000				
What is the expected yearly income that will be generated by or as a result of the activity?	R 250 000				
Will the activity contribute to service infrastructure?	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">YES</td> <td style="width: 50%; text-align: center;">NO</td> </tr> <tr> <td style="width: 50%; text-align: center;">YES</td> <td style="width: 50%; text-align: center;">NO</td> </tr> </table>	YES	NO	YES	NO
YES	NO				
YES	NO				
Is the activity a public amenity?	YES NO				
How many new employment opportunities will be created in the development and construction phase of the activity/ies? The present employment on the farm will be used and implementation of the project will ensure that all employees will be retained.	None				
What is the expected value of the employment opportunities during the development and construction phase?	R 100 000				
What percentage of this will accrue to previously disadvantaged individuals?	100%				
How many permanent new employment opportunities will be created during the operational phase of the activity?	None				
What is the expected current value of the employment opportunities during the first 10 years?	R 350 000				
What percentage of this will accrue to previously disadvantaged individuals?	100%				

9. Biodiversity

Please note: The Department may request specialist input/studies depending on the nature of the biodiversity occurring on the site and potential impact(s) of the proposed activity/ies. To assist with the identification of the biodiversity occurring on site and the ecosystem status consult <http://bgis.sanbi.org> or BGIShelp@sanbi.org. Information is also available on compact disc (cd) from the Biodiversity-GIS Unit, Ph (021) 799 8698. This information may be updated from time to time and it is the applicant/ EAP's responsibility to ensure that the

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latest version is used. A map of the relevant biodiversity information (including an indication of the habitat conditions as per (b) below) and must be provided as an overlay map to the property/site plan as Appendix D to this report.

- a) **Indicate the applicable biodiversity planning categories of all areas on site and indicate the reason(s) provided in the biodiversity plan for the selection of the specific area as part of the specific category)**

Systematic Biodiversity Planning Category				If CBA or ESA, indicate the reason(s) for its selection in biodiversity plan
Critical Biodiversity Area (CBA)	Ecological Support Area (ESA)	Other Natural Area (ONA)	No Natural Area Remaining (NNR)	The plans in Appendix A3: Sensitivity Maps, page 54 do not indicate the presence of any sensitive area. The land has been grazed and although it is to an extent still natural it is non sensitive. A list of species is shown in Appendix D1: Agronomist Report, page 65.

- b) **Indicate and describe the habitat condition on site**

Habitat Condition	Percentage of habitat condition class (adding up to 100%)	Description and additional Comments and Observations (including additional insight into condition, e.g. poor land management practises, presence of quarries, grazing, harvesting regimes etc).
Natural	%	
Near Natural (includes areas with low to moderate level of alien invasive plants)	100%	The land has been grazed and although it is to an extent still natural it is not sensitive.
Degraded (includes areas heavily invaded by alien plants)	%	
Transformed (includes cultivation, dams, urban, plantation, roads, etc)	%	

- c) **Complete the table to indicate:**

- (i) the type of vegetation, including its ecosystem status, present on the site; and
- (ii) whether an aquatic ecosystem is present on site.

Terrestrial Ecosystems			Aquatic Ecosystems					
Ecosystem threat status as per the National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	Critical	Wetland (including rivers, depressions, channelled and unchanneled wetlands, flats, seeps pans, and artificial wetlands)	Estuary		Coastline			
	Endangered							
	Vulnerable							
	Least Threatened							
		YES	NO	UNSURE	YES	NO	YES	NO

Note – it was previously indicated that there is a wetland near the preferred site. Please note this wetland has been formed by the constant release of treated effluent from the Municipal WWTW. The available WUL indicate that irrigation may be done with this water and therefore an area where cultivation can be done had to be identified.

- d) Please provide a description of the vegetation type and/or aquatic ecosystem present on site, including any important biodiversity features/information identified on site (e.g. threatened species and special habitats)

Vegetation type (NKu 4 Eastern Upper Karoo) – taken from SANBI BGIS 2012)

VT 36 False Upper Karoo (54%) (Acocks 1953). LR 52 Eastern Mixed Nama Karoo (61%) (Low & Rebelo 1996).

Distribution Northern Cape, Eastern Cape and Western Cape Provinces: Between Carnarvon and Loxton in the west, De Aar, Petrusville and Venterstad in the north, Burgersdorp, Hofmeyr and Cradock in the east and the Great Escarpment and the Sneeuberge-Coetzeesberge mountain chain in the south. Altitude varies between mostly 1 000–1 700 m.

Vegetation & Landscape Features Flats and gently sloping plains (interspersed with hills and rocky areas of Upper Karoo Hardeveld in the west, Besemkaree Koppies Shrubland in the northeast and Tarkastad Montane Shrubland in the southeast), dominated by dwarf microphyllous shrubs, with 'white' grasses of the genera *Aristida* and *Eragrostis* (these become prominent especially in the early autumn months after good summer rains). The grass cover increases along a gradient from southwest to northeast.

Geology & Soils Mudstones and sandstones of the Beaufort Group (incl. both Adelaide and Tarkastad Subgroups) supporting duplex soils with prisma-cutanic and/or pedocutanic diagnostic horizons dominant (Da land type) as well as some shallow Glenrosa and Mispah soils (Fb and Fc land types). In places, less prominent Jurassic dolerites (Karoo Dolerite Suite) are also found.

Climate Rainfall mainly in autumn and summer, peaking in March. MAP ranges from about 180 mm in the west to 430 mm in the east. Incidence of frost is relatively high, but ranging widely from <30 days (in the lower-altitude Cradock area) to >80 days of frost per year (bordering the Upper Karoo Hardeveld on the Compassberg and mountains immediately to the west). Mean maximum and minimum monthly temperatures in Middelburg (Grootfontein) are 36.1°C and –7.2°C for January and July, respectively. Corresponding values are 37°C and –8°C for Victoria West and 36.6°C and –4.2°C for Hofmeyr. See also climate diagram for NKu 4 Eastern Upper Karoo.

Important Taxa Tall Shrubs: *Lycium cinereum* (d), *L. horridum*, *L. oxycarpum*. Low Shrubs: *Chrysocoma ciliata* (d), *Eriocephalus ericoides* subsp. *ericoides* (d), *E. spinescens* (d), *Pentzia globosa* (d), *P. incana* (d), *Phymaspermum parvifolium* (d), *Salsola calluna* (d), *Aptosimum procumbens*, *Felicia muricata*, *Gnidia polycephala*, *Helichrysum dregeanum*, *H. lucilioides*, *Limeum aethiopicum*, *Nenax microphylla*, *Osteospermum leptolobum*, *Plinthus karooicus*, *Pteronia glauca*, *Rosenia humilis*, *Selago geniculata*, *S. saxatilis*. Succulent Shrubs: *Euphorbia hypogaea*, *Ruschia intricata*. Herbs: *Indigofera alternans*, *Pelargonium minimum*, *Tribulus terrestris*. Geophytic Herbs: *Moraea pallida* (d), *Moraea polystachya*, *Syringodea bifucata*, *S. concolor*. Succulent Herbs: *Psilocalon coriarium*, *Tridentea jucunda*, *T. virescens*. Graminoids: *Aristida congesta* (d), *A. diffusa* (d), *Cynodon incompletus* (d), *Eragrostis bergiana* (d), *E. bicolor* (d), *E. lehmanniana* (d), *E. obtusa* (d), *Sporobolus fimbriatus* (d), *Stipagrostis ciliata* (d), *Tragus koelerioides* (d), *Aristida adscensionis*, *Chloris virgata*, *Cyperus usitatus*, *Digitaria eriantha*, *Enneapogon desvauxii*, *E. scoparius*, *Eragrostis curvula*, *Fingerhuthia africana*, *Heteropogon contortus*, *Sporobolus ludwigii*, *S. tenellus*, *Stipagrostis obtusa*, *Themeda triandra*, *Tragus berteronianus*.

Endemic Taxa Succulent Shrubs: *Chasmatophyllum rouxii*, *Hertia cluytiifolia*, *Rabiea albinota*, *Salsola tetrandra*. Tall Shrub: *Phymaspermum scoparium*. Low Shrubs: *Aspalathus acicularis* subsp. *planifolia*, *Selago*

persimilis, *S. walpersii*.

Conservation Least threatened. Target 21%. Statutorily conserved in Mountain Zebra and Karoo National Parks as well as in Oviston, Commando Drift, Rolfontein and Gariep Dam Nature Reserves. About 2% of the unit has been transformed, largely due to building of dams (Gariep, Grassridge, Killowen, Kommandodrift, Kriegerspoort, Lake Arthur, Modderpoort, Schuil Hoek, Vanderkloof, Victoria West, Wonderboom and Zoetvlei). *Medicago laciniata* is a common and widespread alien plant. Erosion is moderate (60%) and high (38%). Veld managers perceive much of the Eastern Upper Karoo to be experiencing changes in species composition requiring high-priority action (Hoffman et al. 1999).

Remarks This vegetation type has the largest mapped area of all vegetation units. The regions between Colesberg (Northern Cape) and Springfontein (Free State) fall within a broad ecotone where grassy Eastern Upper Karoo grades into Xhariep Karroid Grassland.

References Acocks (1953, 1988), Werger (1973, 1980), Van der Walt (1980), Palmer (1988, 1991a, b, c), Jooste (1989), Lloyd & Badenhorst (1995, 1996), Du Toit (1996), Low & Rebelo (1996, 1998), Hoffman et al. (1999), Pienaar et al. (2004), Brown & Bezuidenhout (2005).

Aquatic Ecosystem

East of the site, treated effluent from the Municipal WWTW flows through the farm and as a result has created an artificial wetland as shown below in Figure 11

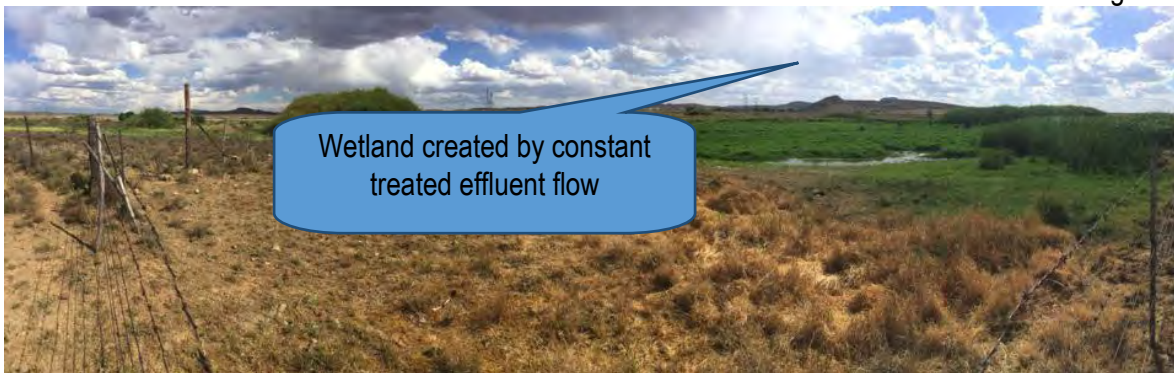


Figure 11: Wetland type habitat created by treated effluent flow

Section C: Public Participation

1. Advertisement And Notice

Publication name	Colesberg Advertiser	
Date published	9 February 2017	
Site notice position	Latitude	Longitude
Site Notice 1	30°40'22.00"S	25° 8'10.42"E
Site Notice 2	30°39'39.17"S	25° 9'8.79"E
Date placed	13 February 2017	

Include proof of the placement of the relevant advertisements and notices in Appendix E1.

2. Determination Of Appropriate Measures

Provide details of the measures taken to include all potential I&APs as required by Regulation 41(2)(e) and 41(6) of GN 733.

Key stakeholders (other than organs of state) identified in terms of Regulation 41(2)(b) of GN 733

The I&AP database is included in Appendix E5: I&AP list, page 79. This include for direct neighbours, the Local and District Municipalities, Department of Agriculture in De Aar (who provided the necessary authorisation for clearing and planting as required by CARA and SAHRA.)

Title, Name and Surname	Affiliation/ key stakeholder status	Contact details (tel number or e-mail address)

Include proof that the key stakeholder received written notification of the proposed activities as Appendix E2. This proof may include any of the following:

The I&AP database is included in Appendix E5: I&AP list, page 79. Also see section 5 below.

- e-mail delivery reports;
- registered mail receipts;
- courier waybills;
- signed acknowledgements of receipt; and/or
- or any other proof as agreed upon by the competent authority.

3. Issues Raised By Interested And Affected Parties

Summary of main issues raised by I&APs	Summary of response from EAP

A Comment/Response table will be compiled from comments received and it will be included in the fBAR in Appendix E3.2: Comments and Response Table, page 75.

4. Comments and response report

The practitioner must record all comments received from I&APs and respond to each comment before the Draft BAR is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations and be attached to the Final BAR as Appendix E3.

Please note this dBAR is distributed under the official process and should there not be any comments that require further study the fBAR will be submitted without a further public participation process.

A Comment/Response table will be compiled from comments received and it will be included in the fBAR in Appendix E3.2: Comments and Response Table, page 75.

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5. Authority Participation

Authorities and organs of state identified as key stakeholders:

Authority/Organ of State	Contact person (Title, Name and Surname)	Tel No	Fax No	e-mail	Postal address
Department of Agriculture: De Aar	Hannes Roux			hroux@ncpg.gov.za	P.O. Box 84 De Aar 7000
Department of Environment and Nature Conservation	Mahonono Isaac Gwija	0538077300	086 625 6470	mr.gwija@gmail.com	Private Bag X6120, Kimberley, 8301 Sasko Building, 90 Long Street, Kimberley, 8300
Department of Water and Sanitation	Shaun Cloete			CloeteS@dws.gov.za	Louisvale Road, Upington,
Umsobomvu Municipality	Themba Mosompha	0517530780	086 517 3145	mosomphat@umsobomvumun.co.za	Private Bag X6, Colesberg 9795
South African Heritage Resources Agency	Natasha Higgitt			nhiggitt@sahra.org.za	Submitted via the South African Heritage Resources Information System
South African National Roads Agency: Western Region	Ms Nicole Abrahams	0219574602		Nicole Abrahams (WR) [AbrahamsN@nra.co.za]	Private Bag X19, Bellville, 7535

Include proof that the Authorities and Organs of State received written notification of the proposed activities as appendix E4.
In the case of renewable energy projects, Eskom and the SKA Project Office must be included in the list of Organs of State.

6. Consultation With Other Stakeholders

Note that, for any activities (linear or other) where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that sub-regulation to the extent and in the manner as may be agreed to by the competent authority.

Proof of any such agreement must be provided, where applicable. Application for any deviation from the regulations relating to the public participation process must be submitted prior to the commencement of the public participation process.

A list of registered I&APs must be included as appendix E5.

Copies of any correspondence and minutes of any meetings held must be included in Appendix E6.

Section D: Impact Assessment

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2014 and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts.

1. Impacts That May Result From The Planning And Design, Construction, Operational, Decommissioning And Closure Phases As Well As Proposed Management Of Identified Impacts And Proposed Mitigation Measures

Provide a summary and anticipated significance of the potential direct, indirect and cumulative impacts that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed. This impact assessment must be applied to all the identified alternatives to the activities identified in Section A(2) of this report.

Activity	Impact Summary	Significance Mitigation	Pre-Proposed Mitigation And Management
ALTERNATIVE 1			
Construction	Clearing of 19.9 ha of natural vegetation	Low negative	The recommended mitigation is to limit agricultural expansion to 19.9 ha 1. Additional mitigation is that there should also be no clearing of vegetation and agricultural expansion within 32m of any watercourse
	Water supply during construction	No impact	Water is available on site. Personnel should be instructed not to waste water during the construction phase.
	Waste: Sewage/Effluent Very little sewage will be generated during construction	Low negative	Portable toilets should be provided to the construction personnel during the construction phase.
	<u>Visual impacts</u> : Construction is normally associated with visual impacts. This is typically due to the presence of construction machinery, construction materials and solid waste (litter). Given the natural setting of the site and surrounding agricultural activities, the significance of potential visual impacts associated with the construction phase can be considered low.	Low negative	Offsetting the significance is their temporary nature (i.e. only during the construction phase). Implementation of a Construction phase Environmental Management Plan (EMP) that ensures good site keeping and effective waste management will address these impacts.
	<u>Veldfires</u>	Medium negative	No cooking or other fires should be allowed by workers.
Construction	Loss of faunal habitat. The transformation of land will affect fauna on a local scale, as some fauna might	Low negative	Any reptiles (particularly tortoises) disturbed during the construction phase should be relocated to another site and not harmed in any way.

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	be indirectly affected by habitat loss during land-clearing and construction activities. However, the preferred site is located in an open area, is quite small relative to the farm, the activity is not fenced and will therefore not have any major impact on a local scale.		
	Waste – the activity is a normal land clearing exercise which does not involve mixing of concrete. Any litter must be collected and disposed as applicable for the farm.	Low negative	Any waste produced should be removed by the applicant. Waste and litter drums or bags should be available around the site. The litter must be removed as applicable for other farm waste.
	Creating unnecessary large impact areas.	Low to medium negative	Work areas must be demarcated before commencement of construction in consultation with the ECO. This will ensure that the impact areas are as small as practically possible.
Construction	<u>Socio-economics</u> Workers of the farm will retain their jobs	High positive	The activity is the mitigation. Employ local labour for construction activities
	<u>Air pollution</u> Dust (air) pollution caused by removal of vegetation and preparing area for planting can cause a nuisance.	Low negative	The activity is normal for an agricultural area. Land clearing and tilling of the land would not take long and normally do not generate much dust.
	<u>Noise impact</u> The relatively small scale of the construction activities, their temporary nature and the lack of permanent sensitive receptors the noise impacts are anticipated to be minor as few residential and business areas are present.	Low negative	All construction vehicles must be in a good working order to reduce possible noise pollution.
	Mixing of concrete and spillage of diesel/oil due to poorly maintained equipment and machinery can contaminate ground and water resources.	Medium negative	Concrete and other materials must not be mixed directly on the ground, or during rainfall events when the potential for transport to the stream is the greatest (as per the EMP). Should machinery be serviced on site oil trays must be placed under the machinery to avoid soil contamination
	Inappropriate hazardous material (like fuel, oil, concrete and cement) storage can lead to spillages and contamination of ground water.	High negative	All hazardous chemicals must be properly stored in a secure, bunded and contained area. (Follow measures described in the EMP).
<u>Worker health and safety</u> Inadequate attention to safe use of machinery or fire	Medium negative	During fire risk periods equipment should be present on site as required by the Municipal Regulations.	

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	safety awareness and fire safety equipment could result in unsafe working environment and loss of property.		
OPERATIONAL	<u>Socio-economic impacts:</u> The development of the activity will result in the securing of permanent job opportunities for local community members	Medium positive	The activity is in itself the mitigation
	Generating economic benefit on a local and regional scale	High positive	The activity is in itself the mitigation
	<u>Sustainability</u> The use of licensed treated effluent for crop generation together with available infrastructure.	High positive	The activity is the mitigation
	Nutrient enrichment Uncontrolled Intruding of nutrients for improved crops	Medium negative	Controlled nutrient dosing through the centre pivot system as required by the crop.
	Sustainable use of resources	High positive	The activity is the mitigation

Activity	Impact Summary	Significance Mitigation	Pre-Proposed Mitigation And Management
ALTERNATIVE 2			
Construction	Clearing of 19.9 ha of natural vegetation from a artificial wetland created by treated effluent	High negative	The recommended mitigation is to relocate the development to Alternative 1. Although the area is not a natural wetland, the vegetation has adapted to act as an artificial wetland to purify runoff water. Additional mitigation is that there should also be no clearing of vegetation and agricultural expansion within 32m of any watercourse
	Waste: Sewage/Effluent Very little sewage will be generated during construction	Low negative	Portable toilets should be provided to the construction personnel during the construction phase.
Construction	<u>Visual impacts:</u> Construction is normally associated with visual impacts. This is typically due to the presence of construction machinery, construction materials and solid waste (litter). Given the natural setting of the	Low negative	Offsetting the significance is their temporary nature (i.e. only during the construction phase). Implementation of a Construction phase Environmental Management Plan (EMP) that ensures good site keeping and effective waste

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Activity	Impact Summary	Significance Mitigation	Pre-Proposed Mitigation And Management
ALTERNATIVE 2			
	site and surrounding agricultural activities, the significance of potential visual impacts associated with the construction phase can be considered low.		management will address these impacts.
	<u>Veldfires</u>	Medium negative	No cooking or other fires should be allowed by workers.
	Loss of faunal habitat. The transformation of land will affect fauna on a local scale, as some fauna might be indirectly affected by habitat loss during land-clearing and construction activities. However, the preferred site is located in an open area, is quite small relative to the farm, the activity is not fenced and will therefore not have any major impact on a local scale.	Low negative	Any reptiles (particularly tortoises) disturbed during the construction phase should be relocated to another site and not harmed in any way.
	Waste – the activity is a normal land clearing exercise which does not involve mixing of concrete. Any litter must be collected and disposed as applicable for the farm.	Low negative	Any waste produced should be removed by the applicant. Waste and litter drums or bags should be available around the site. The litter must be removed as applicable for other farm waste.
	Creating unnecessary large impact areas.	Low to medium negative	Work areas must be demarcated before commencement of construction in consultation with the ECO. This will ensure that the impact areas are as small as practically possible.
	<u>Socio-economics</u> Workers of the farm will retain their jobs	High positive	The activity is the mitigation. Employ local labour for construction activities
	<u>Air pollution</u> Dust (air) pollution caused by removal of vegetation and preparing area for planting can cause a nuisance.	Low negative	The activity is normal for an agricultural area. Land clearing and tilling of the land would not take long and normally do not generate much dust.
	<u>Noise impact</u> The relatively small scale of the construction activities, their temporary nature and the lack of permanent sensitive receptors the noise impacts are anticipated to be minor as few residential and business areas are present.	Low negative	All construction vehicles must be in a good working order to reduce possible noise pollution.
	Mixing of concrete and spillage of diesel/oil due to poorly	Medium negative	Concrete and other materials must not be mixed directly on the ground,

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Activity	Impact Summary	Significance Mitigation	Pre-Proposed Mitigation And Management
ALTERNATIVE 2			
	maintained equipment and machinery can contaminate ground and water resources.		or during rainfall events when the potential for transport to the stream is the greatest (as per the EMPr). Should machinery be serviced on site oil trays must be placed under the machinery to avoid soil contamination
	Inappropriate hazardous material (like fuel, oil, concrete and cement) storage can lead to spillages and contamination of ground water.	High negative	All hazardous chemicals must be properly stored in a secure, bunded and contained area. (Follow measures described in the EMPr).
	<u>Worker health and safety</u> Inadequate attention to safe use of machinery or fire safety awareness and fire safety equipment could result in unsafe working environment and loss of property.	Medium negative	During fire risk periods equipment should be present on site as required by the Municipal Regulations.
	Cumulative impacts: Negative cumulative impacts could be poor management of the site causing litter, dust or contamination of the soil. The activity is, however, a normal small scale agricultural operation of land clearing and planting. Cumulative risks pre mitigation is low medium to low negative and with mitigation low negative.	Low negative	Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite. All waste must be removed from the site and transported to a licensed landfill site.
	Socio-economic impacts: This option is not viable because clearing of vegetation in a wetland and then planting crops is just not practical and will lead to large economic loss	Medium positive	The activity is in itself the mitigation
	Economic Failure of crops due to unsuitable land	High negative	Implement Alternative 1
	Sustainability Use of water and infrastructure on land that is not suitable..	High negative	Implement Alternative 1
	Use of Nutrients on unsuitable and wet soils	High negative	Implement Alternative 1
	Cumulative impacts:	Medium negative	Additional nutrients should be applied as prescribed to minimise the potential impact
		Medium negative	Controlled nutrient dosing through the centre pivot system as required by the crop.

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Activity	Impact Summary	Significance Mitigation	Pre-	Proposed Mitigation And Management
ALTERNATIVE 2				
	Developing on land where the soil is wet and not suitable	High negative		Implement Alternative 1

No-go option				
Activity	Impact Summary	Significance Mitigation	Pre-	Proposed Mitigation And Management
	<u>Employment</u> Potential loss of employment opportunities to locals	Low negative		implement Alternative 1
	<u>Socio economic</u> No contribution to local and Rational Economy	Medium negative		Implement Alternative 1
	<u>No loss of natural vegetation</u>	Low positive		No development requires no mitigation
	<u>Loss of faunal habitat</u>	Low positive		If the clearance of vegetation does not take place, no faunal habitat will be lost
	Financial loss to applicant due to not proceeding with cultivation of Lucerne on high potential soil	Medium negative		Implement Alternative 1
	Loss of resources such as available and licensed treated water as well as available infrastructure	Medium negative		Implement Alternative 1

A complete impact assessment in terms of Regulation 19(3) of GN 733 must be included as Appendix F.

2. Environmental impact statement

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

Alternative A (preferred alternative)

The preferred alternative through the planting and irrigating of crops using licenced and available treated effluent together with available infrastructure (centre pivots, pumpstation, pumpline and balancing dam is a highly sustainable option with little negative environmental impact. The only negative impact is the removing of vegetation which in this instance is not sensitive.

The overall positive impact is the sustainable use of resources and improved economic impact on the farm together with economic multiplier through selling of crops that will be used by other farmers for food production.

Alternative B

This option due to the wet areas and vegetation created by constant effluent treatment flows is not a practical implementable solution.

No-go alternative (compulsory)

This option is the non sustainable use of available resources – actually, a waste of a water resource which is

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presently flowing away and is not used.

This option has a high negative impact on the use of resources and economic impact that potentially could be generated by implementation of the preferred option.

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Section E. Recommendation Of Practitioner

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the environmental assessment practitioner)?

YES	NO
------------	-----------

If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment).

--

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application.

The area cleared may not be larger than the 19,9 ha identified for the centre pivots. Irrigation must be controlled and linked to the water demand of the crop. No over irrigation may take place. The applicant must consider applying for the use of other crops to be included in the WUL. All measures in the EMPr should be adhered to.
--

Is an EMPr attached?

YES	NO
------------	-----------

The EMPr must be attached as Appendix G.

The details of the EAP who compiled the BAR and the expertise of the EAP to perform the Basic Assessment process must be included as Appendix H.

If any specialist reports were used during the compilation of this BAR, please attach the declaration of interest for each specialist in Appendix I. Any other information relevant to this application and not previously included must be attached in Appendix J.

NAME OF EAP

SIGNATURE OF EAP

DATE

Section F: Appendixes

The following appendixes must be attached:

Appendix A: Maps

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Specialist reports (including terms of reference)

Appendix E: Public Participation

Appendix F: Impact Assessment

Appendix G: Environmental Management Programme (EMPr)

Appendix H: Details of EAP and expertise

Appendix I: Specialist's declaration of interest

Appendix J: Additional Information

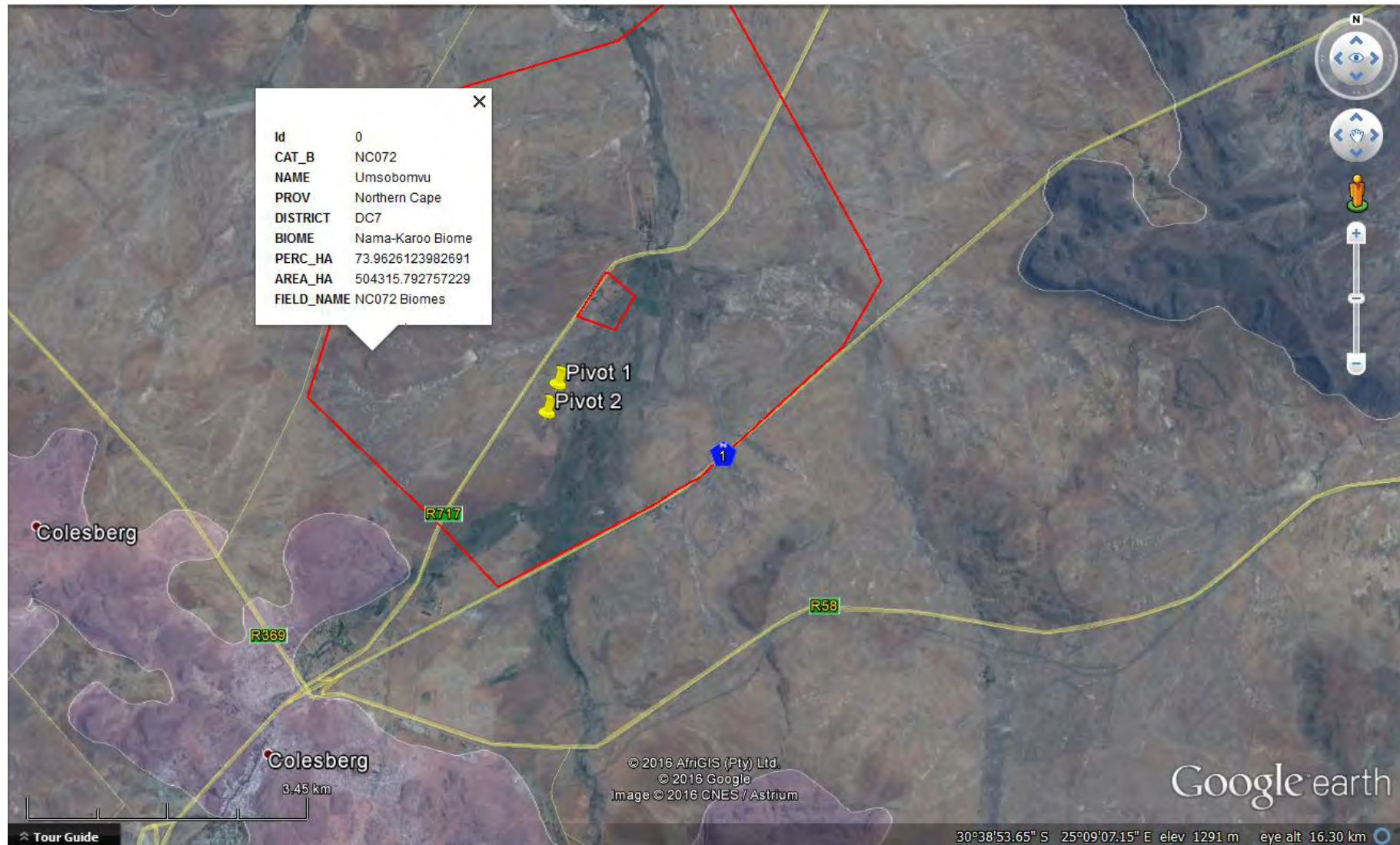
Appendix A: Maps
Appendix A1: A3 Locality Map



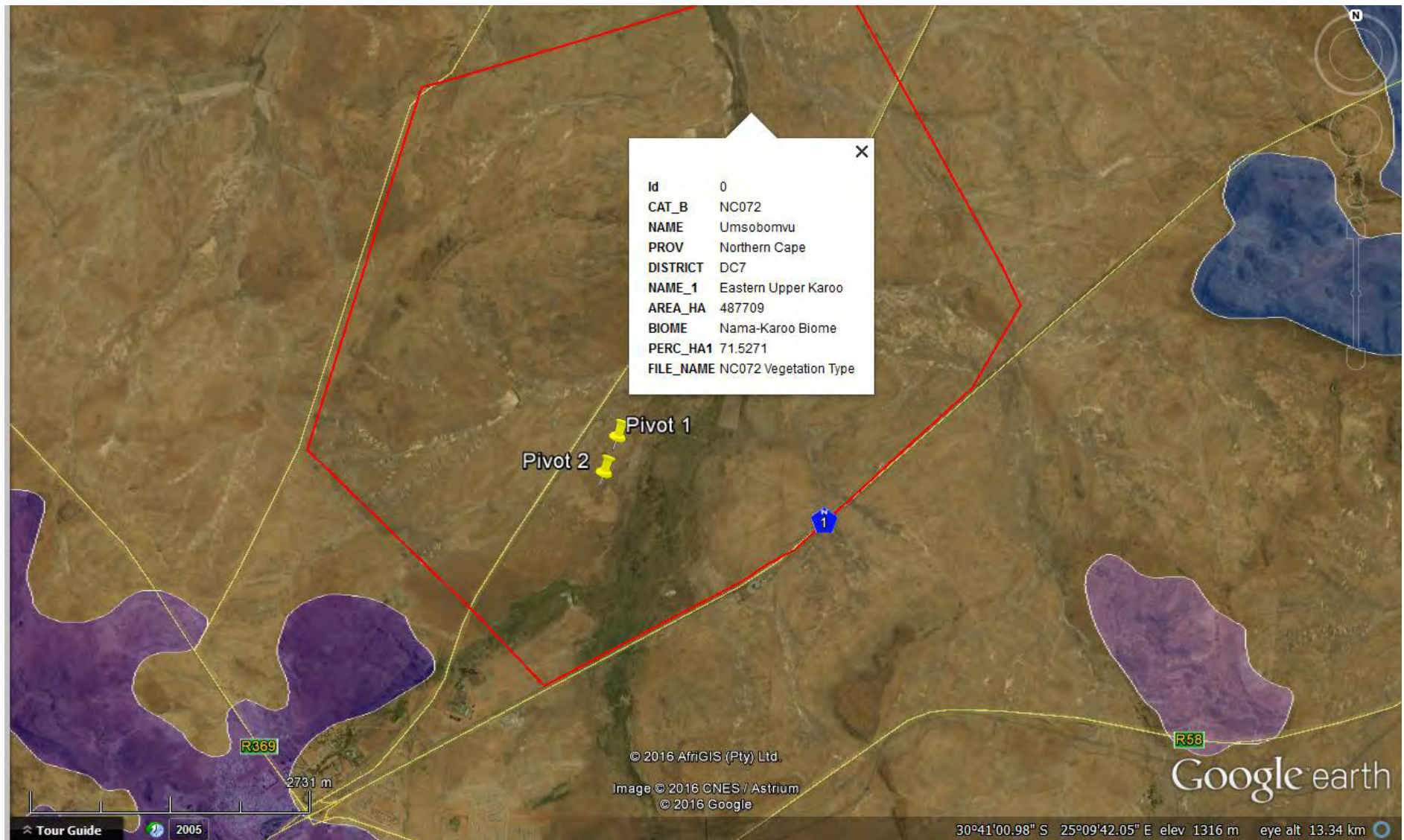
Appendix A2: Layout Plan



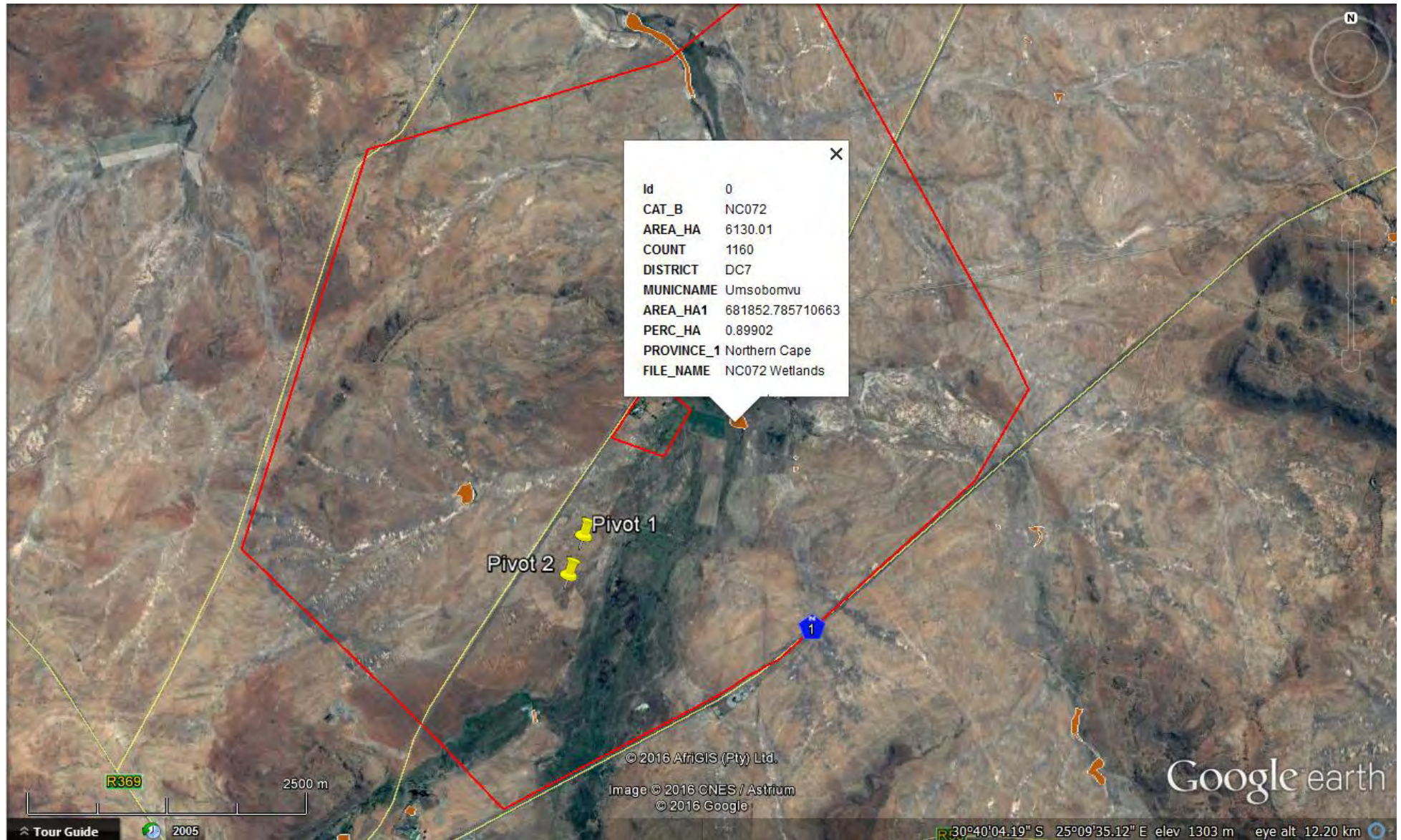
Appendix A3: Sensitivity Maps



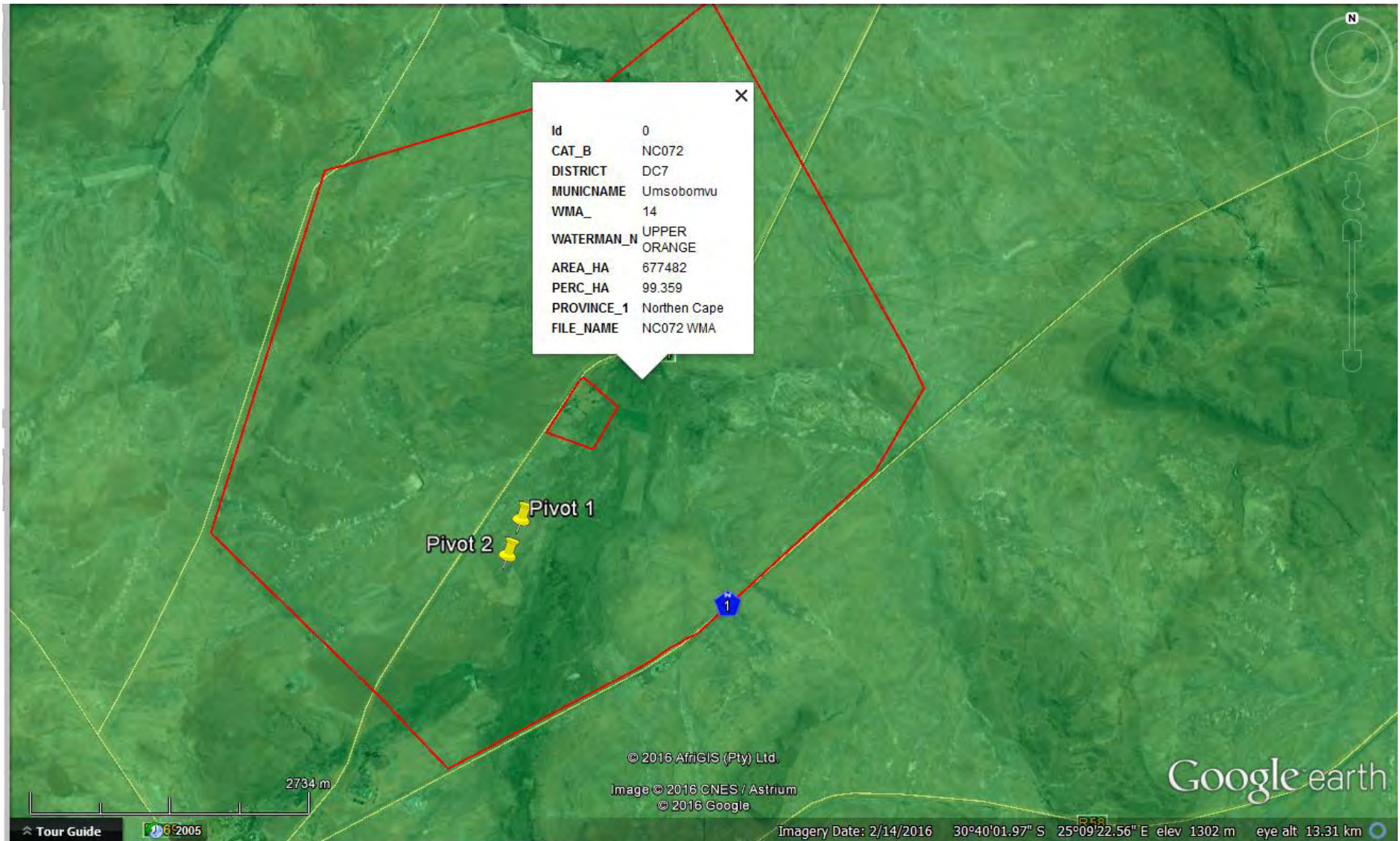
BASIC ASSESSMENT REPORT



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Appendix B: Photographs

IMAGE NUMBER	IMAGE	DESCRIPTION
 <p>OVERVIEW MAP OF WHERE PHOTOGRAPHS WERE TAKEN</p>		



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IMAGE NUMBER	IMAGE	DESCRIPTION
IMG 9753		Current state of vegetation where pivot will be developed

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IMAGE NUMBER	IMAGE	DESCRIPTION
IMG 9754	 A wide-angle photograph showing a vast, flat landscape covered in dry, yellowish-brown grass. In the far distance, a small, rounded hill or mesa is visible against a blue sky with scattered white clouds. The horizon is low, and the overall scene is arid.	Panorama view of site where pivot will be developed
IMG 9755	 A photograph of a pivot irrigation system in operation. The central pivot point is visible in the middle ground, with long, straight lines of wheels and pipes extending across the dark, greenish-brown field. The sky is filled with large, dramatic white and grey clouds, suggesting an overcast day.	Centre pivot infrastructure to be used

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IMAGE NUMBER	IMAGE	DESCRIPTION
IMG 9757		Wetland like habitat created by treated wastewater runoff through current pivot site
IMG 9759		Wetland like habitat created by treated wastewater runoff through current pivot site

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IMAGE NUMBER	IMAGE	DESCRIPTION
IMG 9764		Pump and pipeline established for pumping of water to proposed site

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IMAGE NUMBER	IMAGE	DESCRIPTION
IMG 9765	 A photograph showing a rectangular pond or basin filled with water, surrounded by tall, dense reeds. In the center of the pond, there is a floating device consisting of a yellow buoy and a white spherical float. The background shows a grassy embankment under a blue sky with scattered white clouds.	Treated Wastewater to be used for irrigation of proposed site

Appendix C: Facility illustration(s)

Not applicable

Appendix D: Specialist reports (including terms of reference)

Appendix D1: Agronomist Report



28/09/2016

ATTENTION: Mr. TINUS VAN WYK

REPORT ON PROPOSED IRRIGATION LAND

PERSONAL INFORMATION OF AvV NAUDE (AGRONOMIST)

Registration no. By SACNASP=400031/04 Agricultural Science.

Since 1986 I have been working as an Agronomist for NITROPHOSKA (14 years), SASAOL NITRO (10 years) and OMNIA for the last 6 years where I am mainly responsible for the followings irrigation areas; FISHRIVER, SUNDAYSRIVER, GAMTOOSVALLEY and GARIEPRIVER from Colesberg up to ALIWAL NORTH.

Information regarding my visit to the planned irrigation area at BUFFELSVLEI in COLESBERG district.

The size of the planned land is 20 ha. After a second visit to the farm BUFFELSVLEI and after we received the soil analyses back we decide to fit the centre pivot in between prophiles 5 and 11. I will therefor include only prophiles 5 to 11 in my report

The Topography of the planned land is even without any erroation. The slope is slightly from SOUTH SOUTH WEST to NORTH NORTH EAST at 10-15 degrees.

No earth moving is necessary because of the even lay of the planned land without any erroation.

VEGETATION consists mainly of a mixed dwarf shrub/grass layer with a few Acacia karroo (soetdoring) towards the lower lying area. Dominant shrub species are Lycium cinereum (kriedoring), Osteospermum Sinuatum (Geelbitou), Osteospermum Scariosum (Sagtebitou), Pentia Globosa (Vaalkaroo), Hermania Cernua Coccocarpa (Moederskappie), Eberlanzia Ferox (Doringvygie), Chrysocoma Ciliata (Bitterbos). Amongst the shruh varieties, are spread over the whole area grasses existing mainly of the following; Aristida Adscensionis (Steekgras), Sporobolus Fimbriatus (Fynsaadgras), Tricholaena Monachne (Blousaadgras), Eragrostis Bicolor (Fynvleigras), Eragrostis Obtusa (Douvatgras), Panicum

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Coloratum(Kleinbuffelsgras), Hyparrhenia Hirta(Dekgras), Miscanthum Capensis(Ruigtegras), Cynodon Dactylon(Kweek), none of the above mentioned shrubs and grasses are of the scarce varieties.

Method of investigation:

Prophile holes were dug before hand to the depth of 1.5 m. The characteristics of the prophiles are as follow. The soil layers in all the prophile holes were more or less the same consisting of an A horizon light brown in colour on top of a B horizon darker redish brown in colour. Both the A and B horizons lies on top of a soft CARBONATE layer (crumble structure) in all the prophile holes. There were no differences between the colour and different ratios between the A and the B horizons of the different prophiles.

INFORMATION OF THE PLANNED LAND:

The actual depth varied from 1.2m and deeper. No Dorbank , Hard Rock or hard pan Carbonate layer were noticed in all the profiles. The C horizons consists of a soft Carbonate layer (crumble structure) without signs of wettness. The fact that we found roots in the soft Carbonate layer accentuates the crumble structure. The C horizons in all the prophiles where deeper than 1.2m.

The soil constists off:

An Orthic A horizon from 15-20 cm deep, light brown in colour and a Neocarbonte B horizon DARKER REDISH BROWN in colour without LUVIC characteristics.

The B horizon stretches from 15 cm to deaper than 1.2m. The B horizon in all the prophiles lies on a soft Carbonate (crumble) layer, without signs of wettness.

The colour of the B horizon is dark redish brown. No watercontaining layers where noticed in the profile. That accentuates the crumble structure of the C horizon.

According to the TAXONOMICAL CLASSIFICATION OF 1991 the planned land is classified as a Mimosa soil , therefor soil serie 2211. The dark brownredish colour of the B horizon is an indication that the soil is of the ADDO family.

TEXTURE OF THE LAND IS AS FOLLOWS PER SOIL ANALYSIS:

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	SAND %	SILT%	CLAY%	TEXTURE
5A	61	26	13	Sandy/loam
5B	68	17	15	Sandy/loam
6A	70	15	15	Sandy/loam
6B	64	27	9	Sandy/loam
7A	47	36	17	Loam
7B	61	16	23	Sandy/loam
8A	61	26	13	Sandy/loam
8B	40	23	37	Clay/loam
9A	62	27	11	Sandy/loam
9B	31	30	39	Clay/loam
10A	67	24	9	Sandy/loam
10B	80	17	3	Loamy/sand
11A	80	15	5	Loamy/sand
11B	67	20	13	Sandy/loam

I noticed that the clay % in the B horizon increased a little bit with depth. Heavy prismatic clay structures were **not** noticed anywhere. **No** stones were noticed in the A or B horizon.

Waterfiltration is immediate because of the sand % of the top soil. Infiltration to the B horizon is quickly. No compaction layers were noticed anywhere that could have an negative influence on the infiltration rate. In spite of good rain no water layers were noticed anywhere that could be an indication of drainage problems. Roots of existing plants such as the Karoo and Krie bushes were found as deep as more than 1.2 meters, even in the soft carbonate C horizon. The fact that no hard stone layers or hard lime banks are present accentuates the fact of good soil drainage. By improving the organic content of the A horizon by incorporating plant rests to the top soil the waterholding capacity of the soil can be improved dramatically. No compaction layers were noticed in any of the 6 (six) profiles.

A chemical analysis of the 6 (six) profiles is attached. The A of each profile represent the top 30 cm. and the B the lower 30-60 cm. It shows all relevant ratios. Ignore analyses of profiles 3+4 because they were too shallow.

According to the FSSA the following ratios are important for irrigation purposes.

	EC (ms/m)	Ca/Mg	Mg/K	Ca+Mg/K	SAR
--	-----------	-------	------	---------	-----

BASIC ASSESSMENT REPORT

Norm		1.5-4.5	3-4	10-20	Less 1
5A	36.5	1.9	4.4	13	0.02
5B		2.2	9.7	31	0.03
6A	48.1	9.4	1.9	20	0.01
6B	86.5	7.7	7.9	69	0.01
7A	50.3	2.1	4.9	15	0.02
7B	34.4	0.7	25.8	43	0.38
8A	37.2	1.2	5.8	13	0.07
8B	55.3	0.8	17.8	33	0.21
9A	33.9	1.5	4.6	11	0.02
9B	49.2	0.9	17.2	33	0.1
10A	38.3	7.6	2.4	20	0.01
10B	33.6	4.5	13.9	77	0.04
11A	25.2	3.1	5.6	23	0.01
11B	26.7	1.3	26.6	61	0.05

The very low SAR values of all the profile holes indicate that SALINITY and BRAK are definitely not a problem. The ratios of the lower lying 30-60cm. soil are higher than the acceptable norms, but it is not a negative because it is due to high CALCIUM coming from the soft CARBONATE layer.

My recommendation for the planned Lucern planting is the following:

At planting 200 kg. MAXIPHOS+Zn (16 N+36 P+12 S)
This can be repeated after 2 (two) years if necessary.

Summary

This 20 ha of land is according to my opinion extremely suitable for irrigation because of the following facts:

- (a) no restrictive layers of heavy clays appears in the profiles
- (b) the slope of the land
- (c) no structural limitations of the land were present
- (d) chemical ratios are all in place without any access salts.

Yours sincerely

AvV NAUDE
AGRONOMIST

Appendix E: Public Participation
Appendix E1: Advertisement and Notices

Appendix E1.1: Advertisement Text

<p>PUBLIC PARTICIPATION PROCESS/PUBLIEKE DEELNAME PROSES</p> <p>OFFICIAL PUBLIC PARTICIPATION</p> <p>Proposed Pivot Project on Portion 12 of Farm Buffelsvlei 69.</p> <p>Notice is hereby given of a public participation process in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), and the Environmental Impact Assessment Regulations, Amended November 2014.</p> <hr/> <p>DENC Application Ref nr. NC/EIA/01/PI/UMS/COL1/2017</p> <p>This application is for the proposed centre pivot development of 19.9ha on Portion 12 of Farm Buffelsvlei 69, outside of Colesberg. 19,9 ha Lucerne will be irrigated by using existing centre pivots from areas on the same property where planting is not anymore possible. Treated effluent water flowing through Buffelsvlei will be used for the irrigation as approved by the Water Use License for the Waste Water Treatment Works.</p> <p>The notification and registration period for I&AP's as well as commenting period will be from Monday 13 February 2017 until Wednesday 15 March 2017.</p> <p>As per the listed activities below the proposed development initiated a Basic Assessment Process.</p> <p>The following National Environmental Management Act (NEMA) listed activities are triggered:</p> <p>Listing Notice 1: R983 Activity 27.</p> <p>Date of this notice: 9 February 2017</p>	
<p>Details of EAP/OBP</p> <p>Helene Botha</p> <p>Pieter Badenhorst Professional Services;</p> <p>P O Box 1058, Wellington, 7654</p> <p>Cell: 076 800 4959;</p> <p>Fax: 0866721916;</p> <p>E-mail: heleneb@iafrica.com</p> <p>Website: www.pbpscon.co.za</p>	<p>In order to ensure that you are identified as an interested and/or affected party (I&AP) please submit your name, contact information and interest in the matter as well as any comment to the EAP before 17:00 on 15 March 2017. Om te verseker dat u geïdentifiseer word as 'n belanghebbende en geïffekteerde party, stuur asseblief u naam, kontak besonderhede, gekose metode van korrespondensie en belangstelling in die saak sowel as kommentaar aan die OBP, voor 17:00 op 17 March 2017.</p>

Appendix E1.2: Proof of Advertisement

Appendix E1.3: Site Notice Locality



BASIC ASSESSMENT REPORT

Appendix E1.4: Text & Proof of Site Notice

PUBLIC PARTICIPATION PROCESS/PUBLIEKE DEELNAME PROSES

OFFICIAL PUBLIC PARTICIPATION

Proposed Pivot Project on Portion 12 of Farm Buffelsvlei 69.

Notice is hereby given of a public participation process in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), and the Environmental Impact Assessment Regulations, Amended November 2014.

DENC Application Ref nr. NC/EIA/01/PI/UMS/COL1/2017

This application is for the proposed centre pivot development of 19.9ha on Portion 12 of Farm Buffelsvlei 69, outside of Colesberg. 19,9 ha Lucerne will be irrigated by using existing centre pivots from areas on the same property where planting is not anymore possible. Treated effluent water flowing through Buffelsvlei will be used for the irrigation as approved by the Water Use License for the Waste Water Treatment Works.

The notification and registration period for I&AP's as well as commenting period will be from Monday 13 February 2017 until Wednesday 15 March 2017.

As per the listed activities below the proposed development initiated a Basic Assessment Process.

The following National Environmental Management Act (NEMA) listed activities are triggered:

Listing Notice 1: R983 Activity 27.

Date of this notice: 9 February 2017

Details of EAP/OBP

Helene Botha

Pieter Badenhorst Professional Services;

P O Box 1058, Wellington, 7654

Cell: 076 800 4959;

Fax: 0866721916;

E-mail: heleneb@iafrica.com

Website: www.pbpscon.co.za

In order to ensure that you are identified as an interested and/or affected party (I&AP) please submit your name, contact information and interest in the matter as well as any comment to the EAP before 17:00 on 15 March 2017. Om te verseker dat u geïdentifiseer word as 'n belanghebbende en geïffekteerde party, stuur asseblief u naam, kontak besonderhede, gekose metode van korrespondensie en belangstelling in die saak sowel as kommentaar aan die OBP, voor 17:00 op 17 March 2017.

Appendix E2: Proof of key stakeholder received written notification of the proposed activities

Appendix E3: Comments And Response Report

Appendix E3.1: Comments Received on odBAR

WILL BE INCLUDED IN FBAR

Appendix E3.2: Comments and Response Table

WILL BE INCLUDED IN FBAR

Appendix E4: Proof of Notices

Appendix E4.1: Proof of Notices for odBAR

WILL BE INCLUDED IN FBAR

Appendix E4.2: Notification letters sent to I&APs for OdbAR

WILL BE INCLUDED IN FBAR

Appendix E4.3: Notification letter sent to authorities for dBAR

WILL BE INCLUDED IN FBAR

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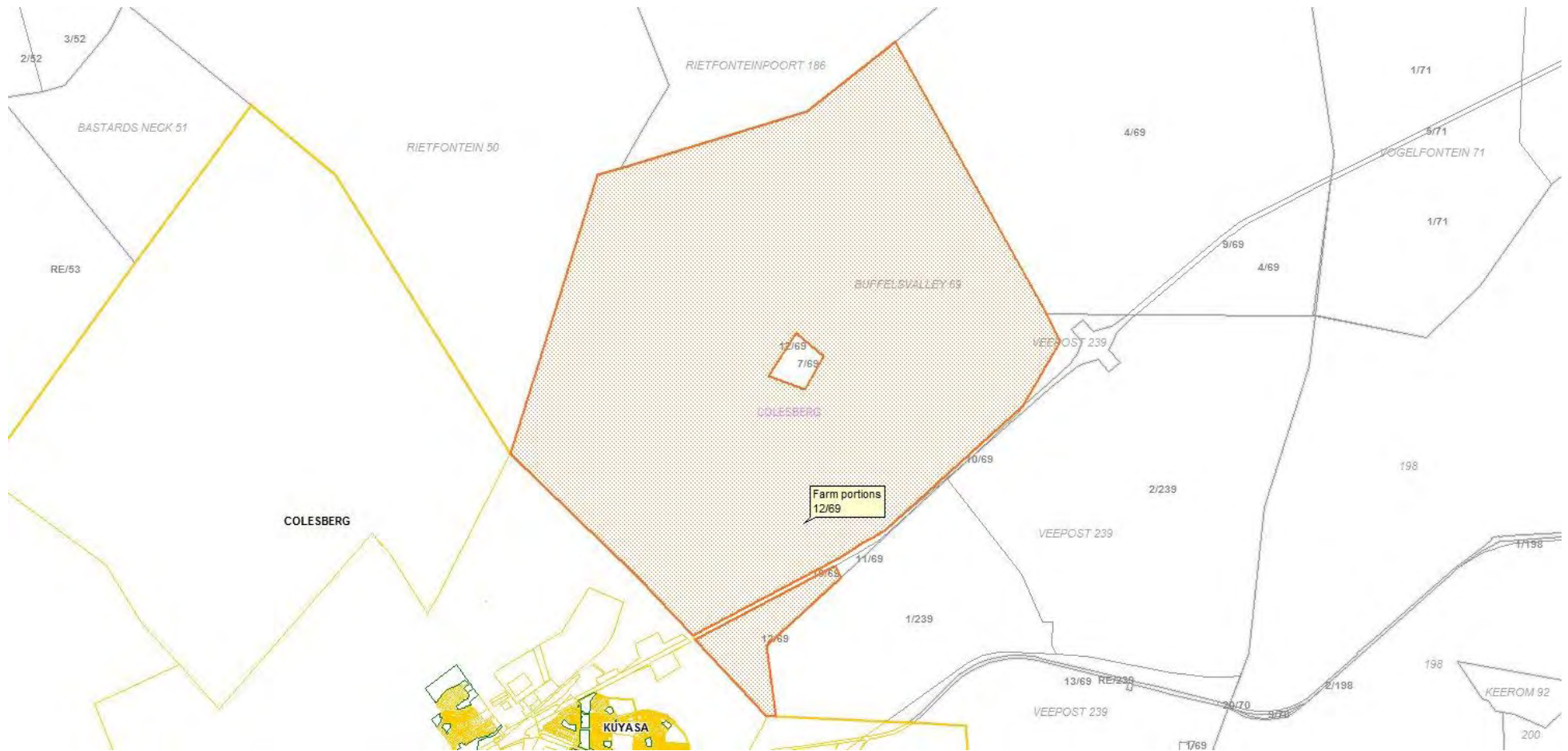
Appendix E5: I&AP list

	Surname	Initials	Representing	Tel	Fax	Email	P.O. Box	Town	Code	Reg
Applicant and neighbouring properties										
1	Van Wyk	M.J.	Portion 12 of Farm 69				P.O. Box 73	Colesberg	9795	
2	Iceburg Trading 509cc	A&G Dohne	Portion 7 of Farm 69				Posbus 211	Colesberg	9795	
3	Toverberg Trust	A.S. Kruger	Farm Rietfontein 50, Farm Rietfonteinpoort 186				Posbus 168	Colesberg	9795	
4	MM Steyn Trust		Portion 4 of Farm 69			karin.dejager@uct.ac.za				
5	Kleyn Jan Hendrik Frauenfelder		Portion 2 of Farm 239				P O Box 129	Colesberg	9795	
6	South African National Roads Agency Ltd		Portion 10 of Farm 69	0219574602		AbrahamsN@nra.co.za	Private Bag X19,	Bellville,	7535	
7	Ms. N Corns		Dept Of Transport, Roads & Public Works	(053) 839 2109	(053) 839 2117	ncorns@ncpg.gov.za	P. O. BOX 3132,	Kimberley	8300	
8	Umsobomvu Municipality Themba Mosompha		Erven 1223, Erven RE/675	0517530780	086 517 3145	mosomphat@umsobomvumun.co.za	Private Bag X6	Colesberg	9795	
Authorities										
9	Hannes Roux		Department of Agriculture: De Aar			hroux@ncpg.gov.za	P.O.Box 84,.	De Aar,	7000	
10	Mahonono Isaac Gwija		Department of Environment and Nature Conservation	0538077300	086 625 6470	mr.gwija@gmail.com	Private Bag X6120, Sasko Building, 90 Long Street,	Kimberley,	8301	

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							Kimberley, 8300			
11	Shaun Cloete		Department of Water Affairs			CloeteS@dws.gov.za	Louisvale Road,	Upington,		
12	Municipal Manager and Ward Councillor		Umsobomvu Municipality				Private Bag X6,	Colesberg	9795	
13	Natasha Higgitt		South African Heritage Resources Agency				Submitted via the South African Heritage Resources Information System			
14	Ms Nicole Abrahams		South African National Roads Agency: Western Region	0219574602		AbrahamsN@nra.co.za	Private Bag X19,	Bellville,	7535	

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Appendix E6: Correspondence And Minutes Of Any Meetings

WILL BE INCLUDED IN FBAR

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Appendix F: Impact Assessment

Activity	Impact Summary	Significance Pre-Mitigation	Proposed Mitigation And Management	Duration	Spatial	Likelihood Of Potential Impacts	Significance Post-Mitigation
ALTERNATIVE 1 (PREFERRED ALTERNATIVE)							
<i>Direct impacts:</i>							
Construction	Clearing of 19.9 ha of natural vegetation	Low negative	The recommended mitigation is to limit agricultural expansion to 19.9 ha 1. Additional mitigation is that there should also be no clearing of vegetation and agricultural expansion within 32m of any watercourse	Long-term	Site	Definite	Low negative
	Water supply during construction	No impact	Water is available on site. Personnel should be instructed not to waste water during the construction phase.	Short term	Local	Definite	No impact
	Waste: Sewage/Effluent Very little sewage will be generated during construction	Low negative	Portable toilets should be provided to the construction personnel during the construction phase.	Short term	Site	Probable	Low negative
	<u>Visual impacts:</u> Construction is normally associated with visual impacts. This is typically due to the presence of construction machinery, construction materials and solid waste (litter). Given the natural setting of the site and surrounding agricultural activities, the	Low negative	Offsetting the significance is their temporary nature (i.e. only during the construction phase). Implementation of a Construction phase Environmental Management Plan (EMP) that ensures good site keeping and effective waste management will address these impacts.	Short term	Site	Possible	Low negative

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Activity	Impact Summary	Significance Pre-Mitigation	Proposed Mitigation And Management	Duration	Spatial	Likelihood Of Potential Impacts	Significance Post-Mitigation
	significance of potential visual impacts associated with the construction phase can be considered low.						
	<u>Veldfires</u>	Medium negative	No cooking or other fires should be allowed by workers.	Short term	Local	Probable	Low negative
Indirect impacts:							
Construction	Loss of faunal habitat. The transformation of land will affect fauna on a local scale, as some fauna might be indirectly affected by habitat loss during land-clearing and construction activities. However, the preferred site is located in an open area, is quite small relative to the farm, the activity is not fenced and will therefore not have any major impact on a local scale.	Low negative	Any reptiles (particularly tortoises) disturbed during the construction phase should be relocated to another site and not harmed in any way.	Long term	Site	Probable	Low negative
	Waste – the activity is a normal land clearing exercise which does	Low negative	Any waste produced should be removed by the applicant. Waste and litter drums or	Short term	Local	Probable	Low negative

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Activity	Impact Summary	Significance Pre-Mitigation	Proposed Mitigation And Management	Duration	Spatial	Likelihood Of Potential Impacts	Significance Post-Mitigation
	not involve mixing of concrete. Any litter must be collected and disposed as applicable for the farm.		bags should be available around the site. The litter must be removed as applicable for other farm waste.				
	Creating unnecessary large impact areas.	Low to medium negative	Work areas must be demarcated before commencement of construction in consultation with the ECO. This will ensure that the impact areas are as small as practically possible.	Short term	Site	Possible	Low negative
Construction	<u>Socio-economics</u> Workers of the farm will retain their jobs	High positive	The activity is the mitigation. Employ local labour for construction activities	Short term	Local	Medium	High Positive
	<u>Air pollution</u> Dust (air) pollution caused by removal of vegetation and preparing area for planting can cause a nuisance.	Low negative	The activity is normal for an agricultural area. Land clearing and tilling of the land would not take long and normally do not generate much dust.	Short term	Site	Low	Low negative
	<u>Noise impact</u> The relatively small scale of the construction activities, their temporary nature and the lack of permanent sensitive receptors the noise impacts are anticipated to be minor as few residential and business areas are present.	Low negative	All construction vehicles must be in a good working order to reduce possible noise pollution.	Short term	Site	Medium	Low negative

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Activity	Impact Summary	Significance Pre-Mitigation	Proposed Mitigation And Management	Duration	Spatial	Likelihood Of Potential Impacts	Significance Post-Mitigation
	Mixing of concrete and spillage of diesel/oil due to poorly maintained equipment and machinery can contaminate ground and water resources.	Medium negative	Concrete and other materials must not be mixed directly on the ground, or during rainfall events when the potential for transport to the stream is the greatest (as per the EMPr). Should machinery be serviced on site oil trays must be placed under the machinery to avoid soil contamination	Short term	Site	Possible	Low negative
	Inappropriate hazardous material (like fuel, oil, concrete and cement) storage can lead to spillages and contamination of ground water.	High negative	All hazardous chemicals must be properly stored in a secure, bunded and contained area. (Follow measures described in the EMPr).	Short term	Site	Possible	Low negative
	<u>Worker health and safety</u> Inadequate attention to safe use of machinery or fire safety awareness and fire safety equipment could result in unsafe working environment and loss of property.	Medium negative	During fire risk periods equipment should be present on site as required by the Municipal Regulations.	Short term	Site	Possible	Low negative
<p>Cumulative impacts: Negative cumulative impacts could be poor management of the site causing litter, dust or contamination of the soil. The activity is, however, a normal small scale agricultural operation of land clearing and planting. Cumulative risks pre mitigation is low medium to low negative and with mitigation low negative.</p>							

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Activity	Impact Summary	Significance Pre-Mitigation	Proposed Mitigation And Management	Duration	Spatial	Likelihood Of Potential Impacts	Significance Post-Mitigation
OPERATIONAL	<i>Direct impacts & indirect impacts:</i>						
	<u>Socio-economic impacts:</u> The development of the activity will result in the securing of permanent job opportunities for local community members	Medium positive	The activity is in itself the mitigation	Long term	Local	Possible	Medium positive
	Generating economic benefit on a local and regional scale	High positive	The activity is in itself the mitigation	Long term	Reginal	Definite	High positive
	<u>Sustainability</u> The use of licensed treated effluent for crop generation together with available infrastructure.	High positive	The activity is the mitigation	Long term	Site	Definite	High positive
	Nutrient enrichment Uncontrolled Intrucing of nutrients for improved crops	Medium negative	Controlled nutrient dosing through the centre pivot system as required by the crop.	Long term	site	Probable	Medium positive
	<i>Cumulative impacts:</i>						
	Sustainable use of resources	High positive	The activity is the mitigation	Long term	Site	Definite	High positive

Activity	Impact Summary	Significance Pre-Mitigation	Proposed Mitigation And Management	Duration	Spatial	Likelihood Of Potential Impacts	Significance Post-Mitigation
ALTERNATIVE 2							
Construction	<i>Direct impacts:</i>						
	Clearing of 19.9 ha of natural vegetation	High negative	The recommended mitigation is to relocate the development to	Long-term	Local	Definite	High positive

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Activity	Impact Summary	Significance Pre-Mitigation	Proposed Mitigation And Management	Duration	Spatial	Likelihood Of Potential Impacts	Significance Post-Mitigation
	from a artificial wetland created by treated effluent		Alternative 1. Although the area is not a natural wetland, the vegetation has adapted to act as an artificial wetland to purify runoff water. Additional mitigation is that there should also be no clearing of vegetation and agricultural expansion within 32m of any watercourse				
	Waste: Sewage/Effluent Very little sewage will be generated during construction	Low negative	Portable toilets should be provided to the construction personnel during the construction phase.	Short term	Site	Probable	Low negative
Construction	<u>Visual impacts:</u> Construction is normally associated with visual impacts. This is typically due to the presence of construction machinery, construction materials and solid waste (litter). Given the natural setting of the site and surrounding agricultural activities, the significance of potential visual impacts associated with the construction phase can be considered low.	Low negative	Offsetting the significance is their temporary nature (i.e. only during the construction phase). Implementation of a Construction phase Environmental Management Plan (EMP) that ensures good site keeping and effective waste management will address these impacts.	Short term	Site	Possible	Low negative
	<u>Veldfires</u>	Medium negative	No cooking or other fires	Short term	Local	Probable	Low negative

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Activity	Impact Summary	Significance Pre-Mitigation	Proposed Mitigation And Management	Duration	Spatial	Likelihood Of Potential Impacts	Significance Post-Mitigation
			should be allowed by workers.				
	Indirect impacts:						
	Loss of faunal habitat. The transformation of land will affect fauna on a local scale, as some fauna might be indirectly affected by habitat loss during land-clearing and construction activities. However, the preferred site is located in an open area, is quite small relative to the farm, the activity is not fenced and will therefore not have any major impact on a local scale.	Low negative	Any reptiles (particularly tortoises) disturbed during the construction phase should be relocated to another site and not harmed in any way.	Long term	Site	Probable	Low negative
	Waste – the activity is a normal land clearing exercise which does not involve mixing of concrete. Any litter must be collected and disposed as applicable for the farm.	Low negative	Any waste produced should be removed by the applicant. Waste and litter drums or bags should be available around the site. The litter must be removed as applicable for other farm waste.	Short term	Local	Probable	Low negative

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Activity	Impact Summary	Significance Pre-Mitigation	Proposed Mitigation And Management	Duration	Spatial	Likelihood Of Potential Impacts	Significance Post-Mitigation
	Creating unnecessary large impact areas.	Low to medium negative	Work areas must be demarcated before commencement of construction in consultation with the ECO. This will ensure that the impacts areas are as small as practically possible.	Short term	Site	Possible	Low negative
	<u>Socio-economics</u> Workers of the farm will retain their jobs	High positive	The activity is the mitigation. Employ local labour for construction activities	Short term	Local	Medium	High Positive
	<u>Air pollution</u> Dust (air) pollution caused by removal of vegetation and preparing area for planting can cause a nuisance.	Low negative	The activity is normal for an agricultural area. Land clearing and tilling of the land would not take long and normally do not generate much dust.	Short term	Site	Low	Low negative
	<u>Noise impact</u> The relatively small scale of the construction activities, their temporary nature and the lack of permanent sensitive receptors the noise impacts are anticipated to be minor as few residential and business areas are present.	Low negative	All construction vehicles must be in a good working order to reduce possible noise pollution.	Short term	Site	Medium	Low negative
	Mixing of concrete and spillage of diesel/oil due to poorly maintained equipment and machinery can contaminate ground and water resources.	Medium negative	Concrete and other materials must not be mixed directly on the ground, or during rainfall events when the potential for transport to the stream is the greatest (as per the EMPr). Should machinery be serviced on site oil trays must be placed	Short term	Site	Possible	Low negative

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Activity	Impact Summary	Significance Pre-Mitigation	Proposed Mitigation And Management	Duration	Spatial	Likelihood Of Potential Impacts	Significance Post-Mitigation
			under the machinery to avoid soil contamination				
	Inappropriate hazardous material (like fuel, oil, concrete and cement) storage can lead to spillages and contamination of ground water.	High negative	All hazardous chemicals must be properly stored in a secure, banded and contained area. (Follow measures described in the EMPr).	Short term	Site	Possible	Low negative
	<u>Worker health and safety</u> Inadequate attention to safe use of machinery or fire safety awareness and fire safety equipment could result in unsafe working environment and loss of property.	Medium negative	During fire risk periods equipment should be present on site as required by the Municipal Regulations.	Short term	Site	Possible	Low negative
	Cumulative impacts: Negative cumulative impacts could be poor management of the site causing litter, dust or contamination of the soil. The activity is, however, a normal small scale agricultural operation of land clearing and planting. Cumulative risks pre mitigation is low medium to low	Low negative	Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite. All waste must be removed from the site and transported to a licensed landfill site.	Short term	Site	Possible	Low negative

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Activity	Impact Summary	Significance Pre-Mitigation	Proposed Mitigation And Management	Duration	Spatial	Likelihood Of Potential Impacts	Significance Post-Mitigation
	negative and with mitigation low negative.						
Direct impacts & indirect impacts:							
	Socio-economic impacts: This option is not viable because clearing of vegetation in a wetland and then planting crops is just not practical and will lead to large economic loss	Medium positive	The activity is in itself the mitigation	Long term	Local	Possible	Medium positive
	Economic Failure of crops due to unsuitable land	High negative	Implement Alternative 1	Long term	Local	Definite	High positive
	Sustainability Use of water and infrastructure on land that is not suitable..	High negative	Implement Alternative 1	Long term	Site	Definite	High positive
	Use of Nutrients on unsuitable and wet soils	High negative	Implement Alternative 1	Long term	Local	Definite	High positive
	Cumulative impacts:	Medium negative	Additional nutrients should be applied as prescribed to minimise the potential impact	Long term	Region	Possible	Low negative
		Medium negative	Controlled nutrient dosing through the centre pivot system as required by the crop.	Long term	site	Probable	Medium positive
	Developing on land where the soil is wet and not suitable	High negative	Implement Alternative 1	Long term	Site	Definite	High positive

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No-go option							
Activity	Impact Summary	Significance Pre-Mitigation	Proposed Mitigation And Management	Duration	Spatial	Likelihood Of Potential Impacts	Significance Post-Mitigation
	<u>Employment</u> Potential loss of employment opportunities to locals	Low negative	implement Alternative 1	Long term	Local	Definite	Medium positive
	<u>Socio economic</u> No contribution to local and Rational Economy	Medium negative	Implement Alternative 1	Long term	Local	Definite	Medium positive
	<u>No loss of natural vegetation</u>	Low positive	No development requires no mitigation	Long term	Site	Probable	Low positive
	<u>Loss of faunal habitat</u>	Low positive	If the clearance of vegetation does not take place, no faunal habitat will be lost	Long term	Site	Probable	Low positive
	Financial loss to applicant due to not proceeding with cultivation of Lucerne on high potential soil	Medium negative	Implement Alternative 1	Long term	Region	Highly probable	High positive
	Loss of resources such as available and licensed treated water as well as available infrastructure	Medium negative	Implement Alternative 1	Long term	Region	Highly probable	High positive

Appendix G: Environmental Management Programme (EMPr)

CONSTRUCTION, OPERATIONAL AND MAINTENANCE MANAGEMENT PLAN
FOR

**PROPOSED PIVOT PROJECT ON PORTION 12
OF FARM BUFFELSVLEI 69, COLESBERG**

DENC REF NR: N.C./EIA/01/PIX/UMS/COL1/2017

Prepared by:

Helene Botha and Pieter Badenhorst
Pieter Badenhorst Professional Services cc
P. O. Box 1058
Wellington
7654

Date: February 2017



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List of abbreviations

DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
EA	Environmental authorisation
ECO	Environmental Control Officer as per the environmental authorisation
EMP	Environmental Management Programme
EO	Environmental officer as appointed by the client or contractor
RE/Engineer	Resident Engineer overseeing the construction activity
EMP	Maintenance Management Plan

Alien species - Plants and animals which do not arrive naturally in an area - they are brought in by humans. Alien plants often force indigenous species out of the area. Rookrans is a good example of alien species in the Cape.

Alternative - A possible course of action, in place of another, that would meet the same purpose and need defined by the development proposal. Alternatives considered in the EIA process can include location and/or routing alternatives, layout alternatives, process and/or design alternatives, scheduling alternatives or input alternatives.

Aspect - Element of an organisation's activities, products or services that can interact with the environment.

Auditing - A systematic, documented, periodic and objective evaluation of how well the environmental management programme is performing with the aim of helping to safeguard the environment by facilitating management control which would include meeting regulatory requirements. Results of the audit help the organisation to improve its environmental policies and management systems.

Biodiversity - The rich variety of plants and animals that live in their own environment. Fynbos is a good example of rich biodiversity in the Cape.

Built environment - Physical surroundings created by human activity, e.g. buildings, houses, roads, bridges and harbours.

Conservation - Protecting, using and saving resources wisely, especially the biodiversity found in an area.

Construction site, working area or Site - means any area within the boundaries of the property(ies) where construction is taking place.

Contamination - Polluting or making something impure.

Corrective (or remedial) action - Response required to address an environmental problem that is in conflict with the requirements of the EMP. The need for corrective action may be determined through monitoring, audits or management review.

Definitions

Degradation - The lowering of the quality of the environment through human activities, e.g. river degradation, soil degradation.

Ecology - The scientific study of the relationship between living things (animals, plants and humans) and their environment.

Ecosystem - The relationship and interaction between plants, animals and the non-living environment.

Environment - Our surroundings, including living and non-living elements, e.g. land, soil, plants, animals, air, water and humans. The environment also refers to our social and economic surroundings, and our effect on our surroundings.

Environmental Impact Assessment (EIA) - An Environmental Impact Assessment (EIA) refers to the process of identifying, predicting and assessing the potential positive and negative social, economic and biophysical impacts of a proposed development. The EIA includes an evaluation of alternatives; recommendations for appropriate management actions for minimising or avoiding negative impacts and for enhancing positive impacts; as well as proposed monitoring measures.

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Environmental Management System (EMS) - Environmental Management Systems (EMS) provide guidance on how to manage the environmental impacts of activities, products and services. They detail the organisational structure, responsibilities, practices, procedures, processes and resources for environmental management. The ISO14001 EMS standard has been developed by the International Standards Organisation.

Environmental policy - Statement of intent and principles in relation to overall environmental performance, providing a framework for the setting of objectives and targets.

For the purposes of this Specification the following definitions shall apply (please note some definitions may not apply to this EMP):

Fynbos - Low-growing and evergreen vegetation found only in the south Western Cape. Fynbos is known for its rich biodiversity.

Habitat - The physical environment that is home to plants and animals in an area, and where they live, feed and reproduce.

Hazardous waste - Waste, even in small amounts, that can cause damage to plants, animals, their habitat and the well-being of human beings, e.g. waste from factories, detergents, pesticides, hydrocarbons, etc.

Impact - A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.

Indigenous species - Plants and animals that are naturally found in an area.

Infrastructure - The network of facilities and services that are needed for economic activities, e.g. roads, electricity, water, sewerage.

Integrated - Mixing or combining all useful information and factors into a joint or unified whole.

Integrated Environmental Management (IEM) - A way of managing the environment by including environmental factors in all stages of development. This includes thinking about physical, social, cultural and economic factors and consulting with all the people affected by the proposed developments. Also called "IEM".

Land use - The use of land for human activities, e.g. residential, commercial, industrial use.

Mitigation - Measures designed to avoid, reduce or remedy adverse impacts

Natural environment - Our physical surroundings, including plants and animals, when they are unspoiled by human activities.

No-Go area - means any area where no access is allowed.

Over-utilisation - Over-using resources - this affects their future use and the environment.

Policy - A set of aims, guidelines and procedures to help you make decisions and manage an organisation or structure. Policies are based on people's values and goals. See Integrated Metropolitan Environmental Policy.

Process - Development usually happens through a process - a number of planned steps or stages.

Proponent - Developer, Entity which applies for environmental approval and is ultimately accountable for compliance to conditions stipulated in the Environmental authorisation (EA) and requirements of the EMP.

Recycling - Collecting, cleaning and re-using materials.

Refuse - refers to all solid waste, including construction debris (cement bags, wrapping materials), waste and surplus food, food packaging, organic waste etc.

Resources - Parts of our natural environment that we use and protect, e.g. land, forests, water, wildlife, and minerals.

Scoping Report - A report presenting the findings of the scoping phase of the EIA. This report is primarily aimed at reaching closure on the issues and alternatives to be addressed in the EIA (in the case of a full EIA process).

See Integrated Environmental Management.

Stakeholders - A subgroup of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term includes the proponent, authorities and all interested and affected parties.

Storm water management - Strategies implemented to control the surface flow of storm water such that erosion, sedimentation and pollution of surface and ground water resources in the immediate and surrounding environments are mitigated. This is specifically important during the construction and decommissioning phases of a project.

Sustainability - Being able to meet the needs of present and future resources.

Sustainable development - Development that is planned to meet the needs of present and future generations, e.g. the need for basic environmental, social and economic services. Sustainable development includes using and maintaining resources responsibly.

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Waste Management – Classifying, recycling, treatment and disposal of waste generated during construction and decommissioning activities.

Wetlands - An area of land with water mostly at or near the surface, resulting in a waterlogged habitat containing characteristic vegetation species and soil types e.g. vleis, swamps.

Zoning - The control of land use by only allowing specific type development in fixed areas or zones.

1 Introduction

Background and Locality

Portion 12 of Farm Buffelsvlei 69 is situated approximately 5km North-East of Colesberg, between the R717 and N1, in the Northern Cape Province (See Figure 1). The correct property number of the farm is 12/69 since amended in 1989, and not 69.



Figure 1: Locality of Portion 12 of Farm Buffelsvlei 69, Colesberg

Pieter Badenhorst Professional Services cc has been appointed by the applicant as the independent environmental practitioner to undertake the Environmental application and Environmental Impact Assessment process for the project.

Proposed Development and Agricultural Activities

The application is for the clearance of 19,9 ha of indigenous vegetation on Portion 12 of Farm Buffelsvlei 69, Colesberg, to establish a centre pivot development for the cultivation and irrigation of lucerne as seen in Figure 2.

Lucerne will be irrigated by using existing centre pivots from areas on the same property where planting is not anymore possible. Treated effluent water flowing through Buffelsvlei will be used for the irrigation as approved by the Water Use License (WUL) for the Municipal Waste Water Treatment Works (WWTW). The WUL indicate that 486 700m³ at 12 167,50m³/ha may be cultivated on 40ha. The crop pre-scribed is Lucerne. This crop will not allow for the cultivation of other crops during the season when lucern is not productive. Application will be made to also plant other crops during the Lucerne "off season" so that crops such as oats or maize or teff can be planted to fully utilise the available water.



Figure 2: Proposed site for 19.9 pivot development on Portion 12 of Farm Buffelsvlei 69

The treated effluent will be pumped from the existing pumpstation (see inset with green border) via the existing pipeline (blue dotted line) as shown in Figure 3.

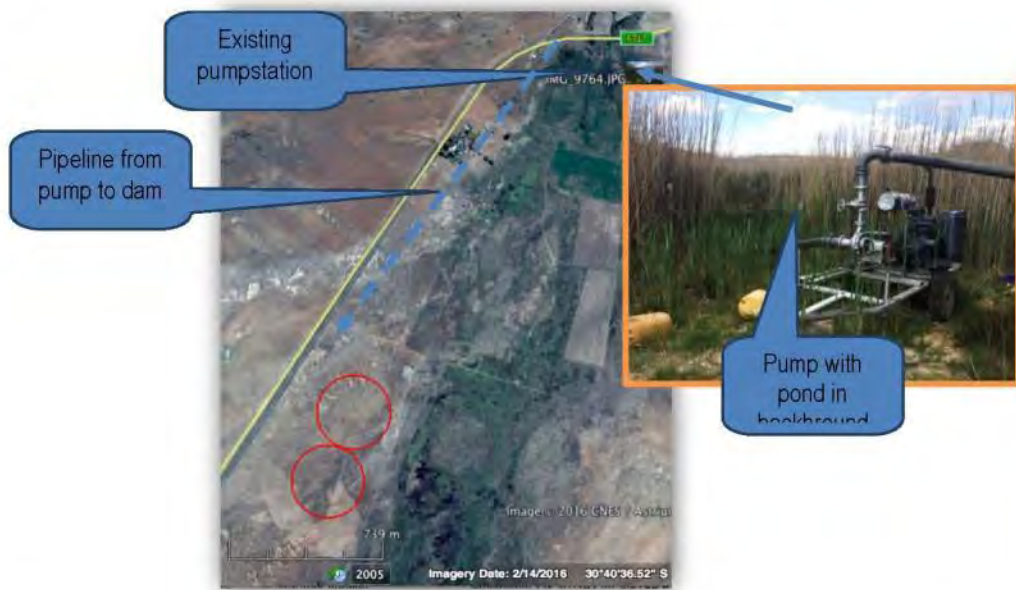


Figure 3: Existing pump station and line to pivots

A close-up view of the disturbed nature of the vegetation on the site is shown below in Figure 4.

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Construction & Operational Management Plan

August 2016



Figure 4: Disturbed view of vegetation on site

2 Environmental issues

The main environmental issue is the protection of vegetation. The EMP requirements must be strictly adhered to.

2.1 Water use for proposed development

The Umsobomvu local Municipality: Colesberg WWTW received a WUL in Terms of Chapter 4 of the National Water Act, 1998 (Act No. 36 of 1998) with LICENCE NO: 13/032F/EFG/2313 under File No: 27/2/2101035/111.

The WUL 13/032F/EFG/2313 allows for irrigation of 40ha Lucerne at 487600m³/a on Farm 69 [it should have read 12/69] which is the correct property number of the farm.

The coordinates provided in the WUL are on farm 12/69 in areas now largely not usable for agriculture cultivation.

The applicant is now proposing to re-locate the previous pivots to an area suitable for irrigation.

2.2 Vegetation type (NKu 4 Eastern Upper Karoo)

VT 36 False Upper Karoo (54%) (Acocks 1953). LR 52 Eastern Mixed Nama Karoo (61%) (Low & Rebelo 1996).

Distribution Northern Cape, Eastern Cape and Western Cape Provinces: Between Carnarvon and Loxton in the west, De Aar, Petrusville and Venterstad in the north, Burgersdorp, Hofmeyr and Cradock in the east and the Great Escarpment and the Sneeuberge-Coetzeeberge mountain chain in the south. Altitude varies between mostly 1 000–1 700 m.

Vegetation & Landscape Features Flats and gently sloping plains (interspersed with hills and rocky areas of Upper Karoo Hardeveld in the west, Besemkaree Koppies Shrubland in the northeast and Tarkastad Montane Shrubland in the southeast), dominated by dwarf microphyllous shrubs, with 'white' grasses of the genera *Aristida* and *Eragrostis* (these become prominent especially in the early autumn months after good summer rains). The grass cover increases along a gradient from southwest to northeast.

Geology & Soils Mudstones and sandstones of the Beaufort Group (incl. both Adelaide and Tarkastad Subgroups) supporting duplex soils with prisma-cutanic and/or pedocutanic diagnostic horizons dominant (Da land type) as well as some shallow Glenrosa and Mispah soils (Fb and Fc land types). In places, less prominent Jurassic dolerites (Karoo Dolerite Suite) are also found.

Climate Rainfall mainly in autumn and summer, peaking in March. MAP ranges from about 180 mm in the west to 430 mm in the east. Incidence of frost is relatively high, but ranging widely from <30 days (in the lower-altitude Cradock area) to >80 days of frost per year (bordering the Upper Karoo Hardeveld on the Compassberg and mountains immediately to the west). Mean maximum and minimum monthly temperatures in Middelburg (Grootfontein) are 36.1°C and –7.2°C for January and July, respectively. Corresponding values are 37°C and –8°C for Victoria West and 36.6°C and –4.2°C for Hofmeyr. See also climate diagram for NKu 4 Eastern Upper Karoo.

Important Taxa Tall Shrubs: *Lycium cinereum* (d), *L. horridum*, *L. oxycarpum*. Low Shrubs: *Chrysocoma ciliata* (d), *Eriocephalus ericoides* subsp. *ericoides* (d), *E. spinescens* (d), *Pentzia globosa* (d), *P. incana* (d), *Phymaspermum parvifolium* (d), *Salsola calluna* (d), *Aptosimum procumbens*, *Felicia muricata*, *Gnidia polycephala*, *Helichrysum dregeanum*, *H. lucilioides*, *Limeum aethiopicum*, *Nenax microphylla*, *Osteospermum leptolobum*, *Plinthus karooicus*, *Pteronia glauca*, *Rosenia humilis*, *Selago geniculata*, *S. saxatilis*. Succulent Shrubs: *Euphorbia hypogaea*, *Ruschia intricata*. Herbs: *Indigofera alternans*, *Pelargonium minimum*, *Tribulus*

terrestris. Geophytic Herbs: *Moraea pallida* (d), *Moraea polystachya*, *Syringodea bifucata*, *S. concolor*. Succulent Herbs: *Psilocaulon coriarium*, *Tridentea jucunda*, *T. virescens*. Graminoids: *Aristida congesta* (d), *A. diffusa* (d), *Cynodon incompletus* (d), *Eragrostis bergiana* (d), *E. bicolor* (d), *E. lehmanniana* (d), *E. obtusa* (d), *Sporobolus fimbriatus* (d), *Stipagrostis ciliata* (d), *Tragus koelerioides* (d), *Aristida adscensionis*, *Chloris virgata*, *Cyperus usitatus*, *Digitaria eriantha*, *Enneapogon desvauxii*, *E. scoparius*, *Eragrostis curvula*, *Fingerhuthia africana*, *Heteropogon contortus*, *Sporobolus ludwigii*, *S. tenellus*, *Stipagrostis obtusa*, *Themeda triandra*, *Tragus berteronianus*.

Endemic Taxa Succulent Shrubs: *Chasmatophyllum rouxii*, *Hertia cluytiifolia*, *Rabiea albinota*, *Salsola tetrandra*. Tall Shrub: *Phymaspermum scoparium*. Low Shrubs: *Aspalathus acicularis* subsp. *planifolia*, *Selago persimilis*, *S. walpersii*.

Conservation Least threatened. Target 21%. Statutorily conserved in Mountain Zebra and Karoo National Parks as well as in Oviston, Commando Drift, Rolfontein and Gariep Dam Nature Reserves. About 2% of the unit has been transformed, largely due to building of dams (Gariep, Grassridge, Killowen, Kommandodrift, Kriegerspoort, Lake Arthur, Modderpoort, Schuil Hoek, Vanderkloof, Victoria West, Wonderboom and Zoetmei). *Medicago laciniata* is a common and widespread alien plant. Erosion is moderate (60%) and high (38%). Veld managers perceive much of the Eastern Upper Karoo to be experiencing changes in species composition requiring high-priority action (Hoffman et al. 1999).

Remarks This vegetation type has the largest mapped area of all vegetation units. The regions between Colesberg (Northern Cape) and Springfontein (Free State) fall within a broad ecotone where grassy Eastern Upper Karoo grades into Xhariep Karroid Grassland.

References Acocks (1953, 1988), Werger (1973, 1980), Van der Walt (1980), Palmer (1988, 1991a, b, c), Jooste (1989), Lloyd & Badenhorst (1995, 1996), Du Toit (1996), Low & Rebelo (1996, 1998), Hoffman et al. (1999), Pienaar et al. (2004), Brown & Bezuidenhout (2005).

2.3 Aquatic Ecosystem

East of the site, treated effluent from the Municipal WWTW flows through the farm and as a result has created an artificial wetland as shown below in Figure 5.



Figure 5

Figure 5: Wetland type habitat created by treated effluent flow

3 Management Programme – Construction

Please note that the EMP must be included in any tender documentation and all sub-contractors on the site must be made aware of this EMP and they must at all times adhere to the procedures specified.

Only those sections applicable to the specific construction activity are relevant and to be implemented.

3.1 Contractual obligations

- 1) The Contractor shall acknowledge receipt of copies of the EMP and confirm in writing that he has familiarised himself with the contents thereof;
- 2) The Contractor shall comply with all environmental obligations imposed by the RE/ECO.
- 3) The Contractor shall co-operate fully with the RE/ECO and use his best endeavours to ensure that the objectives of the EMP are fulfilled in the course of the Contractor's execution of the works or the relevant part thereof.
- 4) The Contractor shall erect an information board containing background information for the construction activity and listing the relevant contact details for complaint.
- 5) The Contractor must ensure that all workers are given environmental awareness training on the requirements of the EMP. This must form part of the Contractor's contract agreement. The RE/ECO must be informed in writing of implementation.
- 6) Deliveries will only be allowed between 8.00am and 5pm.
- 7) Preference must be given to local labour.
- 8) Workers (except security guards) may not be housed on site.

3.2 Penalties

Penalties will be instituted for non-compliance. The penalty is over and above the cost of rectifying the problem and/or damage. Penalties will vary on a sliding scale from R 1 000 to R 20 000 for non-serious to serious issues as determined by the RE/ECO.

These penalties must be paid into a separate account to be administered by the developer. The RE/ECO will decide how the penalties, if any, are to be spent.

3.3 Methodology statement

A methodology statement must be compiled by the contractor(s) before any construction or activity may commence. The statement must include a site establishment plan indicating all relevant areas. The RE/ECO must approve the methodology statement.

The activity indicated in the following list will as a minimum require a statement. The contractor must identify any other statements that will be required as part of the project implementation.

Blasting

- Details of all methods and logistics associated with blasting.

Camp establishment

- Layout and preparation of the construction camp.
- Method of installing fences required for "no go" areas, working areas and construction camp areas.

- Preparation of the working area.

Cement /concrete batching

- Location, layout and preparation of cement/ concrete batching facilities including the methods employed for the mixing of concrete including the management of runoff water from such areas.

Contaminated water

- Contaminated water management plan, including the containment of runoff and polluted water.

Dust

- Dust control.

Earthworks

- Method for the control of erosion during bulk earthwork operations.
- Method of undertaking earthworks, including hand excavation and spoil management.

Emergency

- Emergency construction method statements.

Environmental awareness course

- Logistics for the environmental awareness course for all the Contractors employees.
- Logistics for the environmental awareness course for the Contractors management staff.

Erosion control

- Method of erosion control, including erosion of spoil material.

Fire, hazardous and poisonous substances

- Handling and storage of hazardous wastes.
- Emergency spillage procedures and compounds to be used.
- Emergency procedures for fire.
- Use of herbicides, pesticides and other poisonous substances.
- Methods for the disposal of hazardous building materials including asbestos, fibre claddings, refrigerants and coolants.

Fuels and fuel spills

- Methods of refuelling vehicles.
- Details of methods for fuel spill and clean up operations.
- Refuelling of construction vehicles in high flow areas [or in the 1 in 50 year floodplain].
- Method of refuelling dredger during dredging operations.

Solid waste management

- Solid waste control and removal of waste from Site.
- Methods for the disposal of vegetation cuttings, tree trunks, building materials or rubble generated by construction.

Sources of materials

- Details of materials imported to the site (where applicable).

Sensitive environments

- Proposed construction methods within any sensitive environments. In this case sensitive vegetation area to be marked as no-go areas.

Traffic

- Traffic safety measure for entry/ exit onto/ off public roads.

Vegetation clearing

- Method of vegetation clearing during site establishment.

Wash areas

- Location, layout, preparation and operation of all wash areas, including vehicle wash, workshop washing and paint washing and clearing.

3.4 Environmental awareness training

- 1) All the Contractors employees and Sub-Contractors employees and any suppliers employees that spend more than 1 day a week or four days in a month on site, must attend an Environmental Awareness Training course presented by the Contractor the first of which shall be held within one week of the Commencement Date. Subsequent courses shall be held as and when required.
- 2) The Engineer/ECO will provide the Contractor with the course content for the environmental awareness-training course, and the Contractor shall communicate this information to his employees on the site, to any new employees coming onto site, to his subcontractors and to his suppliers.
- 3) The Contractor shall supply the Engineer/ECO with a monthly report indicating the number of employees that will be present on site during the following month and any changes in this number that may occur during the month.
- 4) The Contractor shall submit a Method Statement detailing the logistics of the environmental awareness-training course.

3.5 Demarcation and protection

- 1) The property must be fenced prior to start of construction to determine the construction/work area. Proper access control must be implemented to ensure that only authorised people obtain access to the site.
- 2) No-Go, which include sensitive areas such as wetlands or any other sensitive areas, must be clearly demarcated prior to commencing of demolition and/or earthworks/building operations.
- 3) The contractor must ensure that fencing and/or demarcations are maintained for the duration of the project.
- 4) Although not limited to, No-Go areas include the sensitive vegetation.
- 5) No work outside of the property boundary will be allowed.
- 6) Special features shall be marked on a site layout plan prior to any works commencing on site. These areas may be designated "No go" areas.
- 7) Outcrops, rock faces, trees and natural vegetation or any other natural or special features inside and outside the Site, shall not be defaced, painted for benchmarks for survey or any other purposes or

otherwise damaged in any way without the prior approval of the Engineer/ECO. These features shall be demarcated as "no go" areas and shall be fenced or similarly protected, as determined by the Engineer/ECO.

3.6 Contractor's camp

- 1) The Contractor's camp, offices, and storage facilities shall not be located within an environmentally sensitive area. The camp's position must be approved by RE/ECO.
- 2) The camp must be fenced as agreed with the RE/ECO.
- 3) Water from the kitchens, showers, sinks etc., shall be discharged in a manner approved by the RE/ECO.
- 4) The contractor must ensure that all temporary structures, equipment, materials, and facilities used or created on-site during the construction phase are removed and appropriately disposed of.
- 5) No littering by the contractor's employees shall be tolerated under any circumstances, anywhere in the demarcated area for construction.

3.6.1 Site of construction camp

- 1) Choice of site for the Contractor's camp requires the ECO's permission and must take into account location of local residents and / or ecologically sensitive areas, including flood zones and slip / unstable zones. A site plan must be submitted to the ECO and project manager for approval.
- 2) The construction camp may not be situated within the 1:100 year flood line or on slopes greater than 1:3.
- 3) The size of the construction camp should be minimized (especially where natural vegetation or grassland has had to be cleared for its construction).
- 4) The Contractor must attend to drainage of the camp site to avoid standing water and / or sheet erosion.
- 5) Suitable control measures over the Contractor's yard, plant and material storage to mitigate any visual impact of the construction activity must be implemented.
- 6) No development, or activity of any sort associated with camp, is allowed below the 1:100 year flood line of any water system.

3.6.2 Storage of materials (including hazardous materials) at site camp

- 1) Choice of location for storage areas must take into account prevailing winds, distances to water bodies, general on site topography and water erosion potential of the soil.
- 2) Storage areas must be designated, demarcated and fenced.
- 3) Storage areas should be secure so as to minimize the risk of crime. They should also be safe from access by unauthorised persons.
- 4) Fire prevention facilities must be present at all storage facilities.
- 5) Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s). These pollution prevention measures for storage should include a bund wall high enough to contain at least 110% of any stored volume, and this should be sited away from drainage lines in a site with the approval of the ECO.

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- 6) These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources.
- 7) Clear signage must be placed at all storage areas containing hazardous substances / materials. Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.
- 8) A Waste Disposal Contractor must be employed to remove waste oil. These wastes should only be disposed of at a licensed landfill sites designed to handle hazardous wastes. A disposal certificate must be obtained from the Waste Disposal Contractor.
- 9) The Contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training.
- 10) All excess cement and concrete mixes are to be contained on the construction site prior to disposal off site.
- 11) Any spillage, which may occur, shall be investigated and immediate action must be taken. This must also be reported to the ECO and DEA, as well as local authorities if so required.

3.6.3 Drainage of construction camp

- 1) Run-off from the camp site must not discharge into neighbours' properties.

3.6.4 End of construction

- 1) Once construction has been completed on site and all excess material has been removed, the storage area shall be rehabilitated. If the area was badly damaged, reseeded shall be done.
- 2) Such areas shall be rehabilitated to their natural state. Any spilled concrete shall be removed and soil compacted during construction shall be ripped, levelled and re-vegetated.

3.7 Cement mixing/batching plant

- 1) The cement mixing or batching plant area(s) must be indicated on the Site Establishment Plan.
- 2) All wastewater resulting from batching of concrete shall be disposed of via the wastewater management system where available.
- 3) The cement/ concrete batching works shall be kept neat and clean at all times. No batching activities shall occur on unprotected substratum of any kind.
- 4) All runoff from batching areas shall be strictly controlled, and cement-contaminated water shall be collected, stored and disposed of at a site approved by the Engineer/ECO. Dagma boards, mixing trays and impermeable sumps shall be used at all mixing and supply points. Contaminated water shall be disposed at a waste disposal site approved by the Engineer/ECO.
- 5) Contaminated water storage facilities shall not be allowed to overflow and appropriate protection from rain and flooding shall be implemented.
- 6) Contaminated water treatment on Site shall require a method statement approved by Engineer/ECO.
- 7) Unused cement bags are to be stored so as not to be effected by rain or runoff events.
- 8) Used bags shall be stored in weatherproof containers to prevent wind-blown cement dust and water contamination. Used bags shall be disposed of on a regular basis via the solid waste management system, and shall not be used for any other purpose.

- 9) Concrete transportation shall not result in spillage.
- 10) Cleaning of equipment and flushing of mixers shall not result in pollution of the surrounding environment: Care shall be taken to collect contaminated wash water from cleaning activities and dispose of it in a manner approved by the Engineer/ECO. To prevent spillage onto roads, ready mix trucks shall rinse off the delivery shoot into a suitable sump prior to leaving Site.
- 11) Suitable screening and containment shall be in place to prevent wind-blown contamination associated with bulk cement silos, loading and batching.
- 12) With respect to exposed aggregate finishes, the Contractor shall collect all contaminated water & fines and store it in sumps for disposal at an approved waste site.
- 13) All visible remains of excess concrete shall be physically removed on completion of the plaster or concrete pour section and disposed off. Washing the remains into the ground is not acceptable. All excess aggregate shall also be removed. Any mixed cement (for building or plastering) at the work area must be placed on boards or container to prevent spillage or contamination of the soil.
- 14) During cement delivery boards or other protection material must be used to prevent spilling on the ground.
- 15) No mixed concrete/dagga may be placed or stored on bare surfaces. Dagga boards must be use at all times to prevent contamination of surfaces.

3.8 Surface and groundwater pollution

- 1) The Contractor shall take all reasonable steps to prevent pollution of surface and groundwater as a result of his activities. Such pollution could result from release (accidental or otherwise) of chemicals, oils, fuels, paint, and sewage, water from excavations, construction water, water carrying soil particles or waste products.
- 2) Cement or concrete mixing must take place in such a way as to prevent any cement water runoff. All pieces of cement or related material are to be stored and dumped at the approved Municipal site.
- 3) Bulk cement silos and storage areas must be properly lined/screened/contained to prevent windblown cement dust or pollution of water during rain events.
- 4) On completion, storm water catchpits must be closed with geotextile (biddim) or similar material to prevent sand or other contaminants from entering the system.
- 5) Ready-mix trucks are not permitted to clean chutes at the work site.
- 6) Adequate plastic or concrete lined cleaning pits are to be installed to facilitate washing of all cement and painting equipment. A functional, non-leaking, water point must be installed at each pit. The top 75% of the water in the pit may be disposed down the sewerage system, with approval from the Engineer. The remaining water and sludge must be disposed of at a Municipal approved site or removed by a chemical contractor.
- 7) The Contractor shall provide water and/or washing facilities at the construction camp for personnel.
- 8) In the event of any pollution entering any water body, the Contractor shall inform the RE/ECO immediately.
- 9) The contractor will be responsible for any clean up costs involved should pollution, erosion or sedimentation have taken place.

3.9 Air and noise pollution

3.14.1 Air Pollution

During the construction phase, and due to the nature of the project, a small amount of smoke (from machines) and dust could be generated. Dust pollution may have an impact on the operational workers

Mitigation

In order to minimize the effect of dust pollution, the construction area should be kept wet as far as possible and the workers must wear the necessary safety clothing. The applicant is referred to section 19 of the National Water Act no. 36 of 1998 with regard to the prevention of, and remedies for, the effects of pollution. In terms of this section of the Act, the person who owns controls, occupies or uses the land in question is responsible for taking measures to prevent pollution of water resources and property.

3.14.2 Noise Pollution

During the construction phase there may be minimal and sporadic incidents of air and noise pollution due to the construction activities such as dust and noise as a result of earthworks. Due to the fact that the area is situated within an agricultural environment, the impact is not expected to be severe.

Mitigation

The contractor should make adequate provision to prevent or minimize the possible effects of air and noise pollution. Should the noise from the construction work be found to cause problems, (which is not anticipated to be the case) work hours in these areas may be restricted between 06:00 and 20:00, or as otherwise agreed between the parties involved. Strict measures should therefore be enforced, especially in terms of the contract specifications, to prevent any negative impacts in this regard.

3.10 Fire management

- 1) No open fires or naked flames for heating or cooking shall be allowed on Site. Stoves and other electrical equipment shall only be permitted in the Contractor's camp and never be left unattended.
- 2) The Contractor shall take all reasonable and active steps to avoid increasing the risk of fire through their activities on Site. No fires may be lit except at places approved by the Engineer/ECO.
- 3) The Contractor shall ensure that the basic fire-fighting equipment is to the satisfaction of the Municipal Fire Chief (where applicable).

3.11 Water management

- 1) The Contractor shall provide water for drinking and construction purposes until such time as it is available from the local system (boreholes/dam/portable etc). Water from the local system (boreholes/dam/portable etc) must be used carefully and sparingly with the view of not wasting water.
- 2) Taps are to be attached to secure supports and leaking taps and hosepipes are to be repaired immediately.
- 3) Watering as dust suppression must be undertaken as a last resort. It is preferable that sand stockpiles be covered rather than watered.
- 4) Personnel should be instructed not to waste water during the construction phase.

3.12 Conditions set out in WULA

- 1) All conditions in the WULA should be adhered to

3.13 Noise control

- 1) Working hours will be restricted to daily normal working hours.
- 2) All noise and sounds generated by plant or machinery must adhere to SABS 0103 specifications for the maximum permissible noise levels for residential areas.
- 3) All plant and machinery are to be fitted with adequate silencers.
- 4) No sound amplification equipment such as sirens, loud hailers or hooters may be used on site, after normal working hours, except in emergencies.
- 5) The acceptable noise level according to SABS 10103 Code of Practice is 45dBA in rural district during the day and 35dBA at night. The applicant must comply/adhere to this requirement.

3.14 Erosion control

The Contractor shall take all reasonable precautions to prevent soil erosion resulting from a diversion, restriction or increase in the flow of storm water or water resulting from its operations and activities, to the satisfaction of the RE/ECO/EO. Possible measures that can be considered include the following:

- 1) Brushcut packing
- 2) Mulch or chip cover
- 3) Straw stabilising (at the rate of one bale/m² and rotated into the top 100mm of the
- 4) completed earthworks)
- 5) Watering
- 6) Planting / sodding
- 7) Hand seeding sowing
- 8) Hydroseeding
- 9) Soil binders and anti erosion compounds
- 10) Mechanical cover or packing structures
 - a) Gabions & mattresses
 - b) Geofabric
 - c) Hessian cover
 - d) Armourflex
 - e) Log / pole fencing
 - f) Retaining walls
- 11) The Contractor shall take reasonable measures to control the erosive effects of storm water runoff.
- 12) The Contractor shall use silt screens to prevent overland flowing water from causing erosion.

- 13) The use of straw bales as filters, which are placed across the flow of overland storm water flows, shall be used as an erosion protection measure.
- 14) The ploughing-in of straw offers limited protection against storm water runoff induced erosion and shall be used as an erosion protection measure.
- 15) The Contractor shall be liable for any damage to downstream property caused by the diversion of overland storm water flows.

3.15 Dust control

DUST - generated by works

- 1) Sand stockpiles are to be covered with hessian, shade cloth or DPC plastic.
- 2) Stockpiles are to be located in sheltered areas and the usable/cut face orientated away from the direction of the prevailing wind for that season.
- 3) Excavating, handling or transporting erodable materials in high wind or when dust plumes visible shall be avoided.
- 4) If high winds prevail the Engineer shall decide whether water dampening measures or cessation of activities is required, and if necessary they shall have the authority to temporarily stop certain of the works until wind conditions become more favourable.

Dust – generated by roads and vehicle movement

- 1) Vehicle speeds shall not exceed 40km/h along gravel roads or 20km/h on unconsolidated or non-vegetated areas. Dust plumes created by vehicle movement are to be monitored.
- 2) If access roads are generating dust beyond acceptable levels dust suppression measures must be initiated. These include, but are not limited to the following:
 - 3) Reduction of travelling speeds along the road.
 - 4) Restriction of vehicle or plant usage.
 - 5) Application of chemical soil binders.
 - 6) Application of a suitable sacrificial road surfacing.
- 7) If water is to be used for dust suppression, then only the critical areas should be watered. The use of water carts or hand watering is preferable. Overhead sprayers shall not be permitted in windy conditions, as the evaporation loss is too high. Watering is to be supervised to prevent unnecessary water wastage, and runoff into potentially sensitive areas. Preferable watering times are early morning and late afternoon/ evening. Water restrictions are to be observed if in place.

3.16 Waste management

- 1) A waste minimisation approach must be followed. This requires recycling wherever possible. All waste therefore to be suitably contained and removed regularly from site in accordance with the municipal waste management procedures. Other examples could include the use of rubble as fill, minimisation of waste concrete and the use of brush cuttings for mulching on rehabilitated areas.
- 2) The Contractor shall be responsible for the establishment of a refuse control and removal system that prevents the spread of refuse within and beyond the construction sites.

- 3) The Contractor shall ensure that all refuse is deposited in refuse bins, which he shall supply and arrange to be emptied on a weekly basis. Refuse bins shall be of such a design that the refuse cannot be blown out and that animals or birds are not attracted to the waste and spread it around. Refuse bins shall be water tight, wind-proof and scavenger-proof and shall be appropriately placed throughout the site. Refuse must also be protected from rain, which may cause pollutants to leach out. Refuse bins shall be appropriately placed throughout the Site and shall be conspicuous (e.g. painted bright yellow).
- 4) Refuse shall be disposed of at an approved waste site (site and method to be agreed with Local Authority). Refuse shall not be burnt or buried on or near the Site.
- 5) The Contractor shall provide labourers to clean up the Contractor's camp and Site on a weekly basis.
- 6) The Contractor shall also clean the Contractor's camp and Site of all structures, equipment, residual litter and building materials at the end of the contract.

3.17 Toilets

- 1) The Contractor shall be responsible for providing all sanitary arrangements for construction and supervisory staff on the site. A minimum of one chemical toilet shall be provided per 15 persons. Toilets provided by the Contractor must be easily accessible and within a practical distance from the workers. Toilets shall be located within areas of low environmental importance. The toilets shall be of a neat construction and shall be provided with doors and locks and shall be secured to prevent them blowing over. Toilets shall be placed outside areas susceptible to flooding.
- 2) The Contractor shall keep the toilets in a clean, neat and hygienic condition. The Contractor shall supply toilet paper at all toilets.
- 3) The Contractor shall be responsible for the cleaning, maintenance, servicing and emptying of the toilets on a regular basis (by chemical contractor). No waste to be dumped in the bush or stream. The Contractor shall ensure that the toilets are emptied before the builders' or other holidays and the waste be stored and disposed of at an appropriate place off site. The Contractor shall ensure that no spillage occurs when chemical toilets are cleaned and emptied. The Contractor shall supply a contingency plan for spills from toilets.
- 4) Performing ablutions in any other area is strictly prohibited.
- 5) The location for construction camps and toilets must be approved by the ECO.

3.18 Fuel and chemical management

- 1) Fuel may be stored on site providing the following is strictly adhered to:
- 2) All necessary approvals with respect to fuel storage and dispensing shall be obtained from the appropriate authorities.
- 3) The Municipal Fire Chief (or as applicable) must be informed and consulted i.t.o Fire Regulations.
- 4) The Contractor shall ensure that all liquid fuels and oils are stored in tanks with lids, which are kept firmly shut and under lock and key at all times.
- 5) The Contractor shall stand any equipment that may leak, and does not have to be transported regularly, on watertight drip trays to catch any pollutants. The drip trays shall be of a size that the equipment can be placed inside it. Drip trays shall be cleaned regularly and shall not be allowed to overflow.
- 6) All hazardous material (e.g., oils, Petrol or diesel) used on site must be disposed of at an approved hazardous waste facility or with the services of a licensed waste transportation company. All

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certificates of disposal and weigh bridge slips need to be signed by all relevant officials and kept as records on the premises.

- 7) The contractor will be responsible for the cleaning up of any spill and associated costs.
- 8) Areas for storage of fuels and other flammable materials shall comply with standard fire safety regulations and may require the approval of the Municipal Fire Chief (in urban areas) or RE/ECO/ management.
- 9) Temporary above ground storage tanks may be permitted at the discretion of the Municipal Fire Chief based on the merit of the situation, provided that the following requirements are complied with:
 - a. Written application together with a plan and authority from the Municipality shall be forwarded to the Municipal Fire Chief (in urban areas) or RE/ECO/ management at least fourteen (14) days prior to the installation being erected on site. Written permission shall be obtained from the chief fire officer for the erection of the installation.
 - b. The drawn plan shall be acceptable to the Municipal Fire Chief (in urban areas) or RE/ECO/ management and to contain the following information:
 - (i) the scale
 - (ii) the name and address of the premises,
 - (iii) the number and the quantity of the tanks,
 - (iv) the position of the tanks in relation to the boundary, other flammable or combustible materials, etc,
 - (v) the size and construction materials used for the bund
 - (vi) the product to be kept in the tank, and
 - (vii) any other information relevant to the situation.

Location

- The fuel storage area shall be located at one of the following locations: {provide a list of acceptable locations for the fuel storage area}.
- The Engineer/ECO/ management shall be advised of the area that the Contractor intends using for the storage of fuel.
- The location of the fuel storage area will determined by the Municipal Fire Chief (in urban areas) and be approved by the Engineer/ECO/EO/ management.
- The tank shall be erected at least 3,5 meters from buildings, boundaries and any other combustible or flammable materials.

Signs/good practice/safety precautions

- Symbolic safety signs depicting "No Smoking", "No Naked Lights" and "Danger" conforming to the requirement of SABS 1186 are to be prominently displayed in and around the fuel storage area. The volume capacity of the tank shall be displayed.
- No smoking shall be allowed in the vicinity of the stores.
- The capacity of the tank shall be clearly displayed and the product contained within the tank clearly identified using the emergency information system detailed in SABS 0232 part 1.
- There shall be adequate fire-fighting equipment at the fuel storage and dispensing area or areas.
- Fuel shall be kept under lock and key at all times.

Tanks

- The storage tank shall be removed on completion of the works.
- The storage tank shall be on the premises only for as long as the contract last.
- All such tanks to be designed and constructed in accordance with a recognised code.
- The rated capacity of tanks shall provide sufficient capacity to permit expansion of the product contained therein by the rise in temperature during storage.

Bunds/storage areas

- Tanks shall be situated in a bunded area the volume of which shall be at least 150% of the volume of the largest tank. The floor of bund shall be smooth and impermeable constructed of concrete or plastic sheeting with impermeable joints with a layer of sand over to prevent perishing. The bund walls shall be of concrete or formed of well-packed earth with the impermeable lining extending to the crest. The floor of the bund shall be sloped towards an oil trap or sump to enable any spilled fuel and/or fuel-soaked water to be removed.
- A bacterial hydrocarbon digestion agent that is effective in water approved by the Engineer/ECO/EO/ management shall be installed in the sump.
- The tanks and bunded areas shall be covered by a roofed structure to prevent the bunded area from filling with rainwater. This structure shall be constructed in such a way, and to the approval of the Engineer/ECO/EO/ management, to ensure that it is wind resistant.
- Any water that collects in the bund shall not be allowed to stand and shall be removed within one day and taken off Site to a disposal site approved by the Engineer/ECO/EO/ management, and the bacterial hydrocarbon digestion agent shall be replenished.

Empty containers

- Only empty and externally clean tanks may be stored on the bare ground. All empty and externally dirty tanks shall be sealed and stored on an area where the ground has been protected.

Filling/dispensing methods

- Any electrical or petrol-driven pump shall be equipped and positioned so as not to cause any danger of ignition of the product.
- If fuel is dispensed from 200 litre drums, the proper dispensing equipment shall be used. The drum shall not be tipped in order to dispense fuel. The dispensing mechanism of the fuel storage tank shall be stored in a waterproof container when not in use.
- Adequate precautions shall be provided to prevent spillage during the filling of any tank and during the dispensing of the contents.

Method statements

- A method statement is required for the filling of and dispensing from storage tanks.

3.19 Litter and oil traps

Refuse screens and oil traps shall be installed at runoff concentration points from large parking facilities, wash bays, stormwater outlets, inlets to detention ponds, workshop forecourt drainage points, ablution and eating areas. These facilities shall be serviced and monitored at the discretion of the Engineer/ECO/ management.

3.20 Contaminated water

General

1. The Engineer/ECO/EO/ management's approval will be required prior to the discharge of contaminated water to the Municipal sewer system.
2. The Contractor shall prevent discharge of any pollutants, such as cements, concrete, lime, chemicals and fuels into any water sources.
3. Water from kitchens, showers, laboratories, sinks etc. shall be discharged into a conservancy tank for removal from the site.
4. Runoff from fuel depots/workshops/truck washing areas and concrete swills shall be directed into a conservancy tank and disposed off at a site approved by the Engineer/ECO/ management and Local Authority.
5. The contaminated water, contaminated run-off, or effluent released into a water body requires analysis in terms of the National Water Act. Contaminated water must not be released into the environment without authorisation from the relevant authority.

Washing areas

1. Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas, which include groundwater, are not polluted.
2. A Method Statement shall be required for all wash areas where hydrocarbon and hazardous materials, and pollutants are expected to be used. This includes, but is not limited to, vehicle washing, workshop wash bays, paint wash and cleaning.
3. Wash areas for domestic use shall ensure that the Engineer/ECO/ management sanctions the disposal of contaminated "grey" water.

3.21 Vehicles and access roads

- 1) The movement of any vehicles and/ or personnel outside of the designated working areas shall not be permitted without the written authorisation of the Engineer/ECO/ management.
- 2) Should the Contractor not exercise sufficient control to restrict all work to the area within the marker boundaries, then these on instruction of the Engineer/ECO/EO/ management shall be replaced by fencing the additional cost of which shall be borne by the Contractor.
- 3) Dust control measures such as dampening with water shall be implemented where necessary, as indicated by the Engineer/ECO/ management.
- 4) Access and haul roads shall be maintained by the Contractor.
- 5) Maintenance includes adequate drainage and side drains, dust control and restriction of edge use.
- 6) All temporary access routes shall be rehabilitated at the end of the contract to the satisfaction of the Engineer/ECO/ management.
- 7) All public roads shall be kept clear of mud and sand. Mud and sand that has been deposited through construction activities shall be cleared regularly.
- 8) Traffic safety measures, to the satisfaction of the Engineer/ECO/ management, shall be considered in determining entry / exit onto public roads.

- 9) All users of haul roads shall not exceed 45 km/h (cars)/ 15 km/h (trucks) (note that the standard spec places a site speed limit of 45 km/h for all vehicles)
- 10) Appropriate traffic warning signs shall be erected and maintained.
- 11) Trained and equipped flagmen shall be used where the access road intersects with any public roads.
- 12) Attention shall be paid to minimising disruption of the flow of traffic and reducing the danger to other road users and pedestrians.
- 13) Method statements are required for the following -
 - a) Traffic safety measures with regard to entry and exit on public roads and the control of construction traffic.
 - b) Proposed route for new access roads, tracks, or haul roads; the proposed construction of new roads, and the method of upgrading existing roads; and the proposed methods of rehabilitation on completion.

3.22 Stockpiling of materials

The Contractor shall temporarily stockpile topsoil materials in such a way that the spread of materials is minimised, and thus the impact on the natural vegetation. The stockpiles must be placed within areas demarcated for this purpose. The RE/ECO/EO/ management shall approve stockpile areas.

3.23 Heritage remains

Should any heritage remains be exposed during excavations, these must immediately be reported to the North West Provincial Heritage Resources Authority as well as Local Municipality. Heritage remains uncovered or disturbed during earthworks must not be disturbed further until the necessary approval has been obtained from the North West Provincial Heritage Resources Authority.

For this project, no heritage sites are visible at the site and it is highly unlikely that any remains will be found during construction.

3.24 Contingency planning

In the event of a spill or leak of product into the ground and/or water courses (e.g. that of hazardous substances used for the construction phase), such incidents must be reported (within 14 days) to all the relevant authorities including the Directorate: Pollution Management in accordance with Section 30(10) of the National Environmental Management Act No. 107 of 1998 (NEMA) and Section 20 (3) of the National Water Act No.36 of 1998 (NWA), that pertains to the control of emergency incidents and the remediation of the affected area. All necessary documentation must be completed and submitted within the prescribed timeframes. An incident log must be maintained by the Resident Engineer/ECO.

Containment, clean-up, and remediation must commence immediately.

3.25 Energy Efficiency & Waste Minimization Measures

The following design measures will be considered for energy and water saving measures:

- Household waste to be separated and re-cycled (glass, paper, green/garden waste)

- The use of energy saving bulbs in all structures, alternatively use low voltage or compact fluorescent lights are to be used in this project.

3.26 Environmental Control Officer or Resident Engineer

An Environmental Control Officer (ECO) or resident engineer (RE) or environmental officer (EO) will implement environmental control of the development. The RE/ECO duties will be as follows:

- Ensure implementation and monitoring of the EMP.
- Make changes to the EMP as required.
- Visit the site at least twice a week.
- Maintain a photographic record of the work and environmental issues.

In most of the actions the Management as Managers for the Mbiza Berries Pty Ltd reserve will form part of decision making.

3.27 Documentation control

The RE/ECO will maintain a file containing the following:

- 1) Copy of the EMP
- 2) Methodology statement(s) by the contractor(s)
- 3) Site establishment plan
- 4) Letter from contractor(s) indicating that he has familiarised himself with the contents of the EMP.
- 5) Letter from contractor(s) on environmental awareness training
- 6) The applicant must ensure that complaints received by the surrounding farms are documented.
- 7) The applicant/owner should maintain a copy of the following documents on-site:
 - Operational Plan,
 - Emergency response and remedial action plan;
 - Environmental Management Plan (EMP) and other documents related to the operation on file
- 8) Tracking table (see Appendix B)

4 Management Programme – Operational and Maintenance

4.1 Rehabilitation

Botanical:

- All alien species should be strongly discouraged from establishing in any disturbed areas.
- A second mitigation measure would be to remove any natural vegetation from the construction zone prior to construction of the interventions. This material should be stockpiled and later mulched and used in rehabilitation of any areas not required for the interventions which may be disturbed during construction.

4.2 Water use

- 7) All water use activities for the purpose of irrigation of the crops should be done within the limits set by the Water Use License.
- 8) All conditions of the Water Use License should be adhered to.

4.3 Waste management

- 1) A waste minimisation approach must be followed. This requires recycling wherever possible. All waste therefore to be suitably contained and removed regularly from site in accordance with the municipal waste management procedures. Other examples could include the use of rubble as fill, minimisation of waste concrete and the use of brush cuttings for mulching on rehabilitated areas.
- 2) The Contractor/Project Manager shall be responsible for the establishment of a refuse control and removal system that prevents the spread of refuse within and beyond the construction sites.
- 3) The Contractor/Project Manager shall ensure that all refuse is deposited in refuse bins, which he shall supply and arrange to be emptied on a weekly basis. Refuse bins shall be of such a design that the refuse cannot be blown out and that animals or birds are not attracted to the waste and spread it around. Refuse bins shall be water tight, wind-proof and scavenger-proof and shall be appropriately placed throughout the site. Refuse must also be protected from rain, which may cause pollutants to leach out. Refuse bins shall be appropriately placed throughout the Site and shall be conspicuous (e.g. painted bright yellow).
- 4) Refuse shall be disposed of at an approved waste site (site and method to be agreed with Local Authority). Refuse shall not be burnt or buried on or near the Site.
- 5) The Contractor/Project Manager shall provide labourers to clean up the Contractor/ Project Manager's camp and Site on a weekly basis.
- 6) The Contractor/ /Project Manager shall also clean the Contractor/Project Manager's camp and Site of all structures, equipment, residual litter and building materials at the end of the contract.

4.4 Toilets

- 6) The Contractor/Project Manager shall be responsible for providing all sanitary arrangements for construction and supervisory staff on the site. A minimum of one chemical toilet shall be provided per 15 persons. Toilets provided by the Contractor/Project Manager must be easily accessible and within a practical distance from the workers. Toilets shall be located within areas of low environmental importance. The toilets shall be of a neat

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- construction and shall be provided with doors and locks and shall be secured to prevent them blowing over. Toilets shall be placed outside areas susceptible to flooding.
- 7) The Contractor/Project Manager shall keep the toilets in a clean, neat and hygienic condition. The Contractor/Project Manager shall supply toilet paper at all toilets.
 - 8) The Contractor/Project Manager shall be responsible for the cleaning, maintenance, servicing and emptying of the toilets on a regular basis (by chemical Contractor). No waste to be dumped in the bush or stream. The Contractor/Project Manager shall ensure that the toilets are emptied before the builders' or other holidays and the waste be stored and disposed of at an appropriate place off site. The Contractor/Project Manager shall ensure that no spillage occurs when chemical toilets are cleaned and emptied. The Contractor/Project Manager shall supply a contingency plan for spills from toilets.
 - 9) Performing ablutions in any other area is strictly prohibited.
 - 10) The location for construction camps and toilets must be approved by the ECO.

4.5 Fuel and chemical management

- 5) Fuel may be stored on site providing the following is strictly adhered to:
- 6) All necessary approvals with respect to fuel storage and dispensing shall be obtained from the appropriate authorities.
- 7) The Municipal Fire Chief (or as applicable) must be informed and consulted in terms of Fire Regulations.
- 8) The Contractor/Project Manager shall ensure that all liquid fuels and oils are stored in tanks with lids, which are kept firmly shut and under lock and key at all times.
- 7) The Contractor/Project Manager shall stand any equipment that may leak, and does not have to be transported regularly, on watertight drip trays to catch any pollutants. The drip trays shall be of a size that the equipment can be placed inside it. Drip trays shall be cleaned regularly and shall not be allowed to overflow.
- 8) All hazardous material (e.g., oils, Petrol or diesel) used on site must be disposed of at an approved hazardous waste facility or with the services of a licensed waste transportation company. All certificates of disposal and weigh bridge slips need to be signed by all relevant officials and kept as records on the premises.
- 10) The Contractor/Project Manager will be responsible for the cleaning up of any spill and associated costs.
- 11) Areas for storage of fuels and other flammable materials shall comply with standard fire safety regulations and may require the approval of the Municipal Fire Chief (in urban areas) or RE/ECO/management.
- 12) Temporary above ground storage tanks may be permitted at the discretion of the Municipal Fire Chief based on the merit of the situation, provided that the following requirements are complied with:
 - c. Written application together with a plan and authority from the Municipality shall be forwarded to the Municipal Fire Chief (in urban areas) or RE/ECO/ management at least fourteen (14) days prior to the installation being erected on site. Written permission shall be obtained from the chief fire officer for the erection of the installation.
 - d. The drawn plan shall be acceptable to the Municipal Fire Chief (in urban areas) or RE/ECO/ management and to contain the following information:
 - (vii) the scale
 - (ix) the name and address of the premises,
 - (x) the number and the quantity of the tanks,
 - (xi) the position of the tanks in relation to the boundary, other flammable or combustible materials, etc,
 - (xii) the size and construction materials used for the bund

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- (xiii) the product to be kept in the tank, and
- (xiv) any other information relevant to the situation.

Location

- The fuel storage area shall be located at one of the following locations: {provide a list of acceptable locations for the fuel storage area}.
- The Engineer/ECO/management shall be advised of the area that the Contractor/Project Manager intends using for the storage of fuel.
- The location of the fuel storage area will be determined by the Municipal Fire Chief (in urban areas) and be approved by the ECO/EO/Management.
- The tank shall be erected at least 3,5 meters from buildings, boundaries and any other combustible or flammable materials.

Signs/good practice/safety precautions

- Symbolic safety signs depicting "No Smoking", "No Naked Lights" and "Danger" conforming to the requirement of SABS 1186 are to be prominently displayed in and around the fuel storage area. The volume capacity of the tank shall be displayed.
- No smoking shall be allowed in the vicinity of the stores.
- The capacity of the tank shall be clearly displayed and the product contained within the tank clearly identified using the emergency information system detailed in SABS 0232 part 1.
- There shall be adequate fire-fighting equipment at the fuel storage and dispensing area or areas.
- Fuel shall be kept under lock and key at all times.

Tanks

- The storage tank shall be removed on completion of the works.
- The storage tank shall be on the premises only for as long as the contract last.
- All such tanks to be designed and constructed in accordance with a recognised code.
- The rated capacity of tanks shall provide sufficient capacity to permit expansion of the product contained therein by the rise in temperature during storage.

Bunds/storage areas

- Tanks shall be situated in a bunded area the volume of which shall be at least 150% of the volume of the largest tank. The floor of bund shall be smooth and impermeable constructed of concrete or plastic sheeting with impermeable joints with a layer of sand over to prevent perishing. The bund walls shall be of concrete or formed of well-packed earth with the impermeable lining extending to the crest. The floor of the bund shall be sloped towards an oil trap or sump to enable any spilled fuel and/or fuel-soaked water to be removed.
- A bacterial hydrocarbon digestion agent that is effective in water approved by the Engineer/ECO/EO/management shall be installed in the sump.
- The tanks and bunded areas shall be covered by a roofed structure to prevent the bunded area from filling with rainwater. This structure shall be constructed in such a way, and to the approval of the Engineer/ECO/EO/management, to ensure that it is wind resistant.
- Any water that collects in the bund shall not be allowed to stand and shall be removed within one day and taken off Site to a disposal site approved by the Engineer/ECO/EO/management, and the bacterial hydrocarbon digestion agent shall be replenished.

Empty containers

- Only empty and externally clean tanks may be stored on the bare ground. All empty and externally dirty tanks shall be sealed and stored on an area where the ground has been protected.

Filling/dispensing methods

- Any electrical or petrol-driven pump shall be equipped and positioned so as not to cause any danger of ignition of the product.
- If fuel is dispensed from 200 litre drums, the proper dispensing equipment shall be used. The drum shall not be tipped in order to dispense fuel. The dispensing mechanism of the fuel storage tank shall be stored in a waterproof container when not in use.
- Adequate precautions shall be provided to prevent spillage during the filling of any tank and during the dispensing of the contents.

Method statements

- A method statement is required for the filling of and dispensing from storage tanks.

4.6 Litter and oil traps

Refuse screens and oil traps shall be installed at runoff concentration points from large parking facilities, wash bays, stormwater outlets, inlets to detention ponds, workshop forecourt drainage points, ablution and eating areas. These facilities shall be serviced and monitored at the discretion of the Engineer/ECO/ management.

4.7 Fire management

- 4) No open fires or naked flames for heating or cooking shall be allowed on Site. Stoves and other electrical equipment shall only be permitted in the Contractor/Project Manager/Project Manager's camp and never be left unattended.
- 5) The Contractor/Project Manager shall take all reasonable and active steps to avoid increasing the risk of fire through their activities on Site. No fires may be lit except at places approved by the Engineer/ECO.
- 6) The Contractor/Project Manager shall ensure that the basic fire-fighting equipment is to the satisfaction of the Municipal Fire Chief (where applicable).
- 7) The Contractor/Project Manager shall supply all living quarters, site offices, kitchen areas, workshop areas, materials, stores and any other areas identified by the Engineer/ECO with tested and approved fire fighting equipment.
- 8) Fire and "hot work" shall be restricted to a site approved by the Engineer/ECO.
- 9) A braai facility may be considered at the discretion of the Engineer/ECO/management. The area shall be away from flammable stores. All events shall be under management supervision and a fire extinguisher shall be immediately available. "Low smoke" fuels shall be used. Smoke free zoning regulations shall be considered.
- 10) Cooking shall be restricted to bottled gas facilities under strict control and supervision. The sensitivity of the surrounding land uses and occurrence of natural indigenous vegetation must be considered when assessing the risk of fires.
- 11) The Contractor/Project Manager shall take precautions when working with welding or grinding equipment near potential sources of combustion. Such precautions include having a suitable, tested and approved fire extinguisher immediately at hand and the use of welding curtains.
- 12) The Contractor/Project Manager shall identify the authorities responsible for fighting fires in the area and shall liaise with them regarding procedures should a fire start. The Contractor/Project Manager shall ensure that his staff are aware of the fire danger at all times and are aware of the procedure to be followed in the event of a fire. The Contractor/Project Manager shall also ensure that all the necessary telephone numbers etc. are

posted at conspicuous and relevant locations in the event of an emergency. The Contractor/Project Manager shall advise the relevant authority of a fire as soon as one starts and shall not wait until he can no longer control it.

- 13) Should a Contractor/Project Manager be found responsible for the outbreak of a fire, he shall be liable for any associated costs.

4.8 Water management

- 5) The Contractor/Project Manager shall provide water for drinking and construction purposes until such time as it is available from the local system (boreholes/dam/portable etc). Water from the local system (boreholes/dam/portable etc) must be used carefully and sparingly with the view of not wasting water.
- 6) Taps are to be attached to secure supports and leaking taps and hosepipes are to be repaired immediately.
- 7) Watering as dust suppression must be undertaken as a last resort. It is preferable that sand stockpiles be covered rather than watered.
- 8) Any abstraction from natural water sources such as a stream or groundwater will require a Method Statement for approval by the RE/ECO/ management.

4.9 Noise control

- 1) Limit the use of heavy vehicle machinery and construction activities associated with high level noise to 06h00 to 20h00 from Mondays to Saturdays, particularly to where residential areas or sensitive institutions are situated close to the site.
- 2) All noise and sounds generated by plant or machinery must adhere to SABS 0103 specifications for the maximum permissible noise levels for residential areas.
- 3) All plant and machinery are to be fitted with adequate silencers.
- 4) No sound amplification equipment such as sirens, loud hailers or hooters may be used on site, after normal working hours, except in emergencies.
- 5) If work is to be undertaken outside of normal work hours, permission must be obtained from the Local Authority. Prior to commencing any such activity the Contractor/Project Manager is also to advise the potentially affected neighbouring residents. Dates, times and the nature of the work to be undertaken are to be provided. Notification could include letter-drops.
- 6) The acceptable noise level according to SABS 10103 Code of Practice is 45dBA in rural district during the day and 35dBA at night. The applicant must comply/adhere to this requirement.

4.10 Surface and groundwater pollution

- 10) The Contractor/Project Manager shall take all reasonable steps to prevent pollution of surface and groundwater as a result of his activities. Such pollution could result from release (accidental or otherwise) of chemicals, oils, fuels, paint, and sewage, water from excavations, construction water, water carrying soil particles or waste products.
- 11) Cement or concrete mixing must take place in such a way as to prevent any cement water runoff. All pieces of cement or related material are to be stored and dumped at the approved Municipal site.
- 12) Bulk cement silos and storage areas must be properly lined/screened/contained to prevent windblown cement dust or pollution of water during rain events.

- 13) On completion, storm water catch pits must be closed with geotextile (biddim) or similar material to prevent sand or other contaminants from entering the system.
- 14) Ready-mix trucks are not permitted to clean chutes at the work site.
- 15) Adequate plastic or concrete lined cleaning pits are to be installed to facilitate washing of all cement and painting equipment. A functional, non-leaking, water point must be installed at each pit. The top 75% of the water in the pit may be disposed down the sewerage system, with approval from the Engineer. The remaining water and sludge must be disposed of at a Municipal approved site or removed by a chemical Contractor/Project Manager
- 16) The Contractor/Project Manager shall provide water and/or washing facilities at the construction camp for personnel.
- 17) In the event of any pollution entering any water body, the Contractor/Project Manager shall inform the RE/ECO immediately.
- 18) The Contractor/Project Manager will be responsible for any clean up costs involved should pollution, erosion or sedimentation have taken place.

4.11 Contingency planning

In the event of a spill or leak of product into the ground and/or water courses (e.g. that of hazardous substances used for the construction phase), such incidents must be reported (within 14 days) to all the relevant authorities including the Directorate: Pollution Management in accordance with Section 30(10) of the National Environmental Management Act No. 107 of 1998 (NEMA) and Section 20 (3) of the National Water Act No.36 of 1998 (NWA), that pertains to the control of emergency incidents and the remediation of the affected area. All necessary documentation must be completed and submitted within the prescribed timeframes. An incident log must be maintained by the Resident Engineer/ECO.

Containment, clean-up, and remediation must commence immediately.

BASIC ASSESSMENT REPORT

Construction & Operational Management Plan

August 2016

Appendix A: Environmental authorisation

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Construction & Operational

February 2016

Appendix C: Mitigation measures as per the Environmental Authorisation

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Appendix H: Details of EAP and expertise
WILL BE INCLUDED IN FBAR

Appendix I: Specialist's declaration of interest
WILL BE INCLUDED IN FBAR

Appendix J: Additional Information

Appendix J1: Water Use License extract applicable to development



water affairs

Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X313, Pretoria, 0001, Sedibeng Building, 185 Francis Baard Street, Pretoria Tel: (012) 336-7500
Fax: (012) 326-4472/ (012) 326-2715

**LICENCE IN TERMS OF CHAPTER 4 OF THE
NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998) (THE ACT)**

I, **Trevor Balzer**, in my capacity as Director-General (Acting) in the Department of Water Affairs and acting under authority of the powers delegated to me by the Minister of Water and Environmental Affairs, hereby authorise the following water uses in respect of this licence.

SIGNED: *Trevor Balzer*

DATE: *7/02/2014*

LICENCE NO: 13/D32F/EFG/2313
File No: 27/2/D1035/1/1

1. Licensee: **Umsobomvu Local Municipality: Colesberg Waste Water Treatment Works (WWTWs)**
Postal address: Private Bag X6
Colesberg
9795

2. Water Uses

- 2.1 Section 21(e) of the Act: Engaging in a controlled activity, subject to the conditions set out in Appendices I and II
- 2.2 Section 21(f) of the Act: Discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit subject to the conditions set out in Appendices I and III.
- 2.3 Section 21(g) of the Act: Disposing of waste in a manner which may detrimentally impact on a water resource, subject to the conditions as set out in Appendices I and III.

3. Properties in respect of which this licence is issued

- 3.1 Remaining Extent of ERF Colesberg 675
- 3.2 Portion 0 of ERF Colesberg 1178
- 3.3 Remaining Extent of the Farm Buffelsvalley 69

4. Registered owner of the Properties

Umsobomvu Local Municipality

B10563

FB

BASIC ASSESSMENT REPORT

LICENCE NO: 13/D32F/EPG/2313
File No: 27/2/2/D1035/1/1

5. Licence and Review Period

This licence is valid for a period of twenty (20) years from the date of issuance and it may be reviewed every five (5) years thereafter.

6. Definitions

Any terms, words and expressions as defined in the National Water Act, 1998 (Act 36 of 1998) shall bear the same meaning when used in this licence.

"The Regional Head" means the Regional Director: Free State, Department of Water Affairs, Private Bag X 528, Bloemfontein, 9300.

7. Description of the Activity

This licence authorises Umsombomvu Local Municipality for the upgrading of Colesberg WWTWs. The activity entails irrigation of 42.7ha of agricultural crops with 504 260 m³/a (five hundred and four thousand two hundred and sixty cubic metres per annum) of treated wastewater from the upgraded Colesberg WWTWs, discharging of 371 000 m³/a of waste water into a water resource and disposing of 876 000 m³/a of waste into maturation pond and 504 260 m³/a of waste water into an irrigation pond.

This activity also entails disposing of wet sewage sludge into two sludge ponds with a combined capacity of ponds being 10 000 m³. The activity is located in quaternary catchment D34F which falls within Upper Orange Water Management Area at the geographical point S 30°41'46.0" ; E 25°07'17.4"



BASIC ASSESSMENT REPORT

LICENCE NO: 13/D32F/EF/2313
File No: 27/2/2/D1035/1/1

APPENDIX II

Section 21(e) of the Act: Engaging in a controlled activity; irrigation of land with waste or water containing waste

1. QUANTITY OF WATER CONTAINING WASTE FOR IRRIGATION

- 1.1 The Licensee is authorised the engaging in a controlled activity by irrigating land with a maximum quantity of five hundred and four thousand two hundred and sixty cubic metres per annum (504 260 m³/a) of water containing waste.
- 1.2 The quantity of wastewater authorised to be irrigated in terms of this licence may not be exceeded.

2. CROP TYPE AND AREA IRRIGATED

- 2.1 The Licensee is authorised to irrigate 42.7 ha of Lucerne and Oats with treated wastewater as indicated in Table 1.

Table 1: Irrigation volumes at specific geographical points

Activities	Purpose	Properties	Total Water (m ³ /a)	Area and/or capacity	Co-ordinate
Section 21(e)	Irrigation of Lucerne with wastewater from treatment works.	Buffels Valley 69	487 600	40 ha	S 30°40'22.69" E 25°09'09.49"
Section 21(e)	Irrigation of Oats with wastewater from treatment works.	ERF 1178 of Colesberg	16 660	2.7 ha	S 30°42'10.88" E 25°06'44.52"

3. QUALITY OF WATER CONTAINING WASTE

- 3.1 The quality of water containing waste disposed through irrigation in terms of this licence may not exceed the limits as indicated in Table 4 of condition 3 in Appendix III of this licence.

4. MONITORING

4.1 Quantity of wastewater to be monitored

- 4.1.1 The quantity of water containing waste which is used for irrigation shall be metered and recorded daily.
- 4.1.2 Monitoring for the quantity of water containing waste for irrigation shall be done at the point where the effluent is piped into the irrigation pond.
- 4.1.3 Monitoring point/s shall not be changed without prior notification to and a written approval by the Regional head.
- 4.1.4 Flow metering, recording and integrating devices shall be maintained in a sound state of repair and calibrated by a competent person at intervals of not more than two years. Calibration certificates shall be available for inspection by the Regional Head or his/her representative upon request.

BASIC ASSESSMENT REPORT

Appendix J2: Soil Potential and Plough certificate

Vormnommer 337176



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Kliënt	THINUS VAN WYK	Landdrosdistrik	COLESBERG
Verteenwoordiger	VISSER NAUDE 0824129534	Landboukundige	Adriaan Naudé 0825783134
Monster Datum	2016/08/22	Verslag Datum	2016/09/23

ROETINE GRONDONTLEDING

Plaasnaam	BUFFELSVLEI	BUFFELSVLEI	BUFFELSVLEI	BUFFELSVLEI
Landnommer	3A	4A	5A	5B
Lab nommer	16172	16173	16174	16175
Gewas	Mielies	Mielies	Mielies	Mielies
Hektaar	1.0	1.0	1.0	1.0
Monsterdiepte	Bo-grond	Bo-grond	Bo-grond	Bo-grond
Kleur	H Br	H Br	H Br	H Br
Brutodigtheid (kg·m ⁻³)	1205	1255	1190	1205
pH (KCl)	4.9	5.2	5.4	5.5
Uitruilbare suur	NVT	NVT	NVT	NVT
Suurversadiging (%)	NVT	NVT	NVT	NVT
S (mg·kg ⁻¹)	4	6	4	6
P (mg·kg ⁻¹)	4	2	22	9
P (Olsen) (mg·kg ⁻¹)	-	-	-	-
K (mg·kg ⁻¹)	182	115	342	252
K(% van EKUK)	5	2	7	3
Ca (mg·kg ⁻¹)	1020	1540	1460	2770
Ca(% van EKUK)	59	59	61	67
Mg (mg·kg ⁻¹)	370	607	467	759
Mg(% van EKUK)	35	38	32	30
Na (mg·kg ⁻¹)	11	35	9	21
Na(% van EKUK)	1	1	0	0
EKUK (cmol _c ·kg ⁻¹) Bereken	8.6	13.1	12.0	20.8
Ca / Mg	1.7	1.5	1.9	2.2
Mg / K	6.5	16.9	4.4	9.7
(Ca + Mg) / K	17	43	13	31
Elektriese geleiding (mS·m ⁻¹)	NVT	NVT	NVT	NVT

Die interpretasie van hierdie analise is na gelang van algemene norme en plek/gewas-spesifieke interpretasie word aanbeveel.
 Hierdie laboratorium is ISO/IEC 17025:2005 geakkrediteer deur SANAS (Toets laboratorium No T0466) vir die kwantifisering van Ca, Mg, Na en K in grond.

VRYWARING: Alhoewel groot sorg geneem word deur Omnia Kunsmis, 'n afdeling van Omnia Groep (Edms) Bpk ("Omnia") en Omnia se werknemers in die voorbereiding van die verslag, sal Omnia onder geen omstandighede aanspreeklik gehou kan word vir enige eis van watter aard ookal, vir skade of verlies wat gelei word, as gevolg van enige skuldorsaak, hetsy dit direk of indirek veroorsaak word deur enige persoon wat die inligting gebruik, of wat op grond van die inhoud van die verslag optree tot hulle nadeel.

Ekstraksiemetodes P - Bray I \ Olsen (pH >= 7.3) Katione - NH₄OAc

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Monster Datum	2016/08/22	Verslag Datum	2016/09/23

NIE-ROETINE GRONDONTLEDING

Plaasnaam	BUFFELSVLEI	BUFFELSVLEI	BUFFELSVLEI	BUFFELSVLEI
Landnommer	3A	4A	5A	5B
Lab nommer	16172	16173	16174	16175
Gewas	Mielies	Mielies	Mielies	Mielies
Hektaar	1.0	1.0	1.0	1.0
Monsterdiepte	Bo-grond	Bo-grond	Bo-grond	Bo-grond
Tot-N (mg·kg ⁻¹)	-	-	-	-
N (%)	-	-	-	-
NO ₃ -N (mg·kg ⁻¹)	-	-	-	-
NH ₄ -N (mg·kg ⁻¹)	-	-	-	-
Sand (%)	58	54	61	68
Slik (%)	29	31	26	17
Klei (%)	13	15	13	15
Volumetriese klipfraksie (%)	-	-	-	-
Elektriese geleiding (mS·m ⁻¹)	24.30	22.00	36.50	-
Organiese C (% m/m)	-	-	-	-
Organiese Materiaal (% m/m)	-	-	-	-
Cl (mg·kg ⁻¹)	-	-	-	-
Zn (mg·kg ⁻¹)	0.2	0.1	0.3	0.2
Mn (mg·kg ⁻¹)	9.38	4.76	7.04	3.64
Fe (mg·kg ⁻¹)	16.0	13.0	20.0	9.9
Cu (mg·kg ⁻¹)	1.0	0.9	1.2	1.4
B (mg·kg ⁻¹)	0.06	0.08	0.10	0.10
P (Truog) (mg·kg ⁻¹)	-	-	-	-
FSI	-	-	-	-
Ni (mg·kg ⁻¹)	0.60	0.70	0.80	0.80
Si (mg·kg ⁻¹)	-	-	-	-

Die interpretasie van hierdie analise is na gelang van algemene norme en plek, gewas-spesifieke interpretasie word aanbeveel.

Hierdie laboratorium neem deel aan die gehalteversekeringskema van ALASA en voldoen aan hierdie assosiasie se standaarde. Hierdie laboratorium is ISO 9001:2000 geertifiseer.

VRYWARING: Alhoewel groot sorg geneem word deur Omnia Kunsmis, 'n afdeling van Omnia Groep (Edims) Bpk ("Omnia") en Omnia se werknemers in die voorbereiding van die verslag, sal Omnia onder geen omstandighede aanspreeklik gehou kan word vir enige eis van watter aard ookal, vir skade of verlies wat gelet word, as gevolg van enige skuldoorsaak, hetsy dit direk of indirek veroorsaak word deur enige persoon wat die inligting gebruik, of wat op grond van die inhoud van die verslag optree tot hulle nadeel.

Ekstraksiemetodes	Tot-N - 0.1N K ₂ SO ₄	Cl - 0.1N KNO ₃	Organiese C - Walkley-Black metode
	Fe, Mn, Zn, Cu, Ni - DTPA	B - Warm waterekstrak	P - Truog

BASIC ASSESSMENT REPORT

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Monster Datum	2016/08/22	Verslag Datum	2016/09/23

ROETINE GRONDONTLEDING

Plaasnaam	BUFFELSVLEI	BUFFELSVLEI	BUFFELSVLEI	BUFFELSVLEI
Landnommer	6A	6B	7A	7B
Lab nommer	16176	16178	16179	16180
Gewas	Mielies	Mielies	Mielies	Mielies
Hektaar	1.0	1.0	1.0	1.0
Monsterdiepte	Bo-grond	Bo-grond	Bo-grond	Bo-grond
Kleur	H Br	H Br	H Br	Or Br
Brutodigtheid (kg·m ⁻³)	1060	1055	1095	1125
pH (KCl)	6.7	7.3	5.6	6.1
Uitruilbare suur	NVT	NVT	NVT	NVT
Suurversadiging (%)	NVT	NVT	NVT	NVT
S (mg·kg ⁻¹)	6	8	8	27
P (mg·kg ⁻¹)	14	13	42	3
P (Olsen) (mg·kg ⁻¹)	-	-	-	-
K (mg·kg ⁻¹)	595	157	195	195
K(% van EKUK)	5	1	6	2
Ca (mg·kg ⁻¹)	5370	4910	1010	1740
Ca(% van EKUK)	86	87	63	37
Mg (mg·kg ⁻¹)	350	387	299	1570
Mg(% van EKUK)	9	11	30	55
Na (mg·kg ⁻¹)	7	9	10	286
Na(% van EKUK)	0	0	1	5
EKUK (cmol _c ·kg ⁻¹) Bereken	31.3	28.2	8.0	23.3
Ca / Mg	9.4	7.7	2.1	0.7
Mg / K	1.9	7.9	4.9	25.8
(Ca + Mg) / K	20	69	15	43
Elektriese geleiding (mS·m ⁻¹)	NVT	-	NVT	NVT

Die interpretasie van hierdie analise is na gelang van algemene norme en plek-gewas-spesifieke interpretasie word aanbeveel.

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Ekstraksiemetodes P - Bray I \ Olsen (pH >= 7.3) Katione - NH₄OAc

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Kliënt	THINUS VAN WYK	Landdrosdistrik	COLESBERG
Verteenwoordiger	VISSER NAUDE 0824129534	Landboukundige	Adriaan Naudé 0825783134
Monster Datum	2016/08/22	Verslag Datum	2016/09/23

NIE-ROETINE GRONDONTLEDING

Plaasnaam	BUFFELSVLEI	BUFFELSVLEI	BUFFELSVLEI	BUFFELSVLEI
Landnommer	6A	6B	7A	7B
Lab nommer	16176	16178	16179	16180
Gewas	Mielies	Mielies	Mielies	Mielies
Hektaar	1.0	1.0	1.0	1.0
Monsterdiepte	Bo-grond	Bo-grond	Bo-grond	Bo-grond
Tot-N (mg·kg ⁻¹)	-	-	-	-
N (%)	-	-	-	-
NO ₃ -N (mg·kg ⁻¹)	-	-	-	-
NH ₄ -N (mg·kg ⁻¹)	-	-	-	-
Sand (%)	70	64	47	61
Slik (%)	15	27	36	16
Klei (%)	15	9	17	23
Volumetriese klipfraksie (%)	-	-	-	-
Elektriese geleiding (mS·m ⁻¹)	48.10	86.50	50.30	34.40
Organiese C (% m/m)	-	-	-	-
Organiese Materiaal (% m/m)	-	-	-	-
Cl (mg·kg ⁻¹)	-	-	-	-
Zn (mg·kg ⁻¹)	0.9	0.4	0.9	0.1
Mn (mg·kg ⁻¹)	2.48	2.29	9.80	1.83
Fe (mg·kg ⁻¹)	5.4	4.5	43.0	8.2
Cu (mg·kg ⁻¹)	1.1	0.9	1.0	0.8
B (mg·kg ⁻¹)	0.15	0.14	0.08	0.51
P (Truog) (mg·kg ⁻¹)	-	-	-	-
FSI	-	-	-	-
Ni (mg·kg ⁻¹)	0.60	0.40	0.70	0.20
Si (mg·kg ⁻¹)	-	-	-	-

Die interpretasie van hierdie analise is na gelang van algemene norme en plek/gewas-spesifieke interpretasie word aanbeveel.

Hierdie laboratorium neem deel aan die gehalteversekeringskema van ALASA en voldoen aan hierdie assosiasie se standaarde. Hierdie laboratorium is ISO 9001:2000 gesertifiseer.

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Ekstraksiemetodes	Tot-N - 0.1N K ₂ SO ₄ Fe, Mn, Zn, Cu, Ni - DTPA	Cl - 0.1N KNO ₃ B - Warm waterekstrak	Organiese C - Walkley-Black metode P - Truog
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BASIC ASSESSMENT REPORT

Vormnommer 337176



LABORATORIUM ONTLEDINGSVERSLAG

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Kliënt	THINUS VAN WYK	Landdrosdistrik	COLESBERG
Verteenwoordiger	VISSER NAUDE 0824129534	Landboukundige	Adriaan Naudé 0825783134
Monster Datum	2016/08/22	Verslag Datum	2016/09/23

ROETINE GRONDONTLEDING

Plaasnaam	BUFFELSVLEI	BUFFELSVLEI	BUFFELSVLEI	BUFFELSVLEI
Landnommer	8A	8B	9A	9B
Lab nommer	16181	16182	16183	16184
Gewas	Mielies	Mielies	Mielies	Mielies
Hektaar	1.0	1.0	1.0	1.0
Monsterdiepte	Bo-grond	Bo-grond	Bo-grond	Bo-grond
Kleur	H Br	H Br	H Br	Or Br
Brutodigtheid (kg·m ⁻³)	1190	1210	1200	1145
pH (KCl)	5.0	5.2	5.1	5.5
Uitruilbare suur	NVT	NVT	NVT	NVT
Suurversadiging (%)	NVT	NVT	NVT	NVT
S (mg·kg ⁻¹)	5	4	9	9
P (mg·kg ⁻¹)	13	3	17	3
P (Olse)	-	-	-	-
K (mg·kg ⁻¹)	203	231	288	279
K(% van EKUK)	7	3	8	3
Ca (mg·kg ⁻¹)	754	1770	986	2310
Ca(% van EKUK)	51	43	54	46
Mg (mg·kg ⁻¹)	368	1280	413	1500
Mg(% van EKUK)	41	51	37	49
Na (mg·kg ⁻¹)	28	152	11	76
Na(% van EKUK)	2	3	1	1
EKUK (cmol _c ·kg ⁻¹) Bereken	7.4	20.6	9.1	24.9
Ca / Mg	1.2	0.8	1.5	0.9
Mg / K	5.8	17.8	4.6	17.2
(Ca + Mg) / K	13	33	11	33
Elektriese geleiding (mS·m ⁻¹)	NVT	NVT	NVT	NVT

Die interpretasie van hierdie analise is na gelang van algemene norme en plek/gewas-spesifieke interpretasie word aanbeveel

Hierdie laboratorium is ISO/IEC 17025:2005 geakkrediteer deur SANAS (Toets laboratorium No T0466) vir die kwantifisering van Ca, Mg, Na en K in grond.

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Ekstraksiemetodes P - Bray | \ Olsen(pH >= 7.3) Katione - NH₄OAc

BASIC ASSESSMENT REPORT

Vormnommer 337176



**LABORATORIUM
ONTLEDINGSVERSLAG**

**the science of growing • wetenskap vir groei*

Kliënt	THINUS VAN WYK	Landdrostdistrik	COLESBERG
Verteenwoordiger	VISSER NAUDE 0824129534	Landboukundige	Adriaan Naudè 0825783134
Monster Datum	2016/08/22	Verslag Datum	2016/09/23

NIE-ROETINE GRONDONTLEDING

Plaasnaam	BUFFELSVLEI	BUFFELSVLEI	BUFFELSVLEI	BUFFELSVLEI
Landnommer	8A	8B	9A	9B
Lab nommer	16181	16182	16183	16184
Gewas	Mielies	Mielies	Mielies	Mielies
Hektaar	1.0	1.0	1.0	1.0
Monsterdiepte	Bo-grond	Bo-grond	Bo-grond	Bo-grond
Tot-N (mg·kg ⁻¹)	-	-	-	-
N (%)	-	-	-	-
NO ₃ -N (mg·kg ⁻¹)	-	-	-	-
NH ₄ -N (mg·kg ⁻¹)	-	-	-	-
Sand (%)	61	40	62	31
Slik (%)	26	23	27	30
Klei (%)	13	37	11	39
Volumetriese klipfraksie (%)	-	-	-	-
Elektriese geleiding (mS·m ⁻¹)	37.20	55.30	33.90	49.20
Organiese C (% m/m)	-	-	-	-
Organiese Materiaal (% m/m)	-	-	-	-
Cl (mg·kg ⁻¹)	-	-	-	-
Zn (mg·kg ⁻¹)	0.1	0.2	0.2	0.2
Mn (mg·kg ⁻¹)	8.76	8.70	7.41	5.85
Fe (mg·kg ⁻¹)	26.0	11.0	14.0	11.0
Cu (mg·kg ⁻¹)	0.7	1.1	0.8	1.5
B (mg·kg ⁻¹)	0.09	0.18	0.14	0.23
P (Truog) (mg·kg ⁻¹)	-	-	-	-
FSI	-	-	-	-
Ni (mg·kg ⁻¹)	0.60	0.60	0.60	0.70
Si (mg·kg ⁻¹)	-	-	-	-

Die interpretasie van hierdie analise is na gelang van algemene norme en plek/gewas-spesifieke interpretasie word aanbeveel.

Hierdie laboratorium neem deel aan die gehalteversekeringskema van ALASA en voldoen aan hierdie assosiasie se standarde. Hierdie laboratorium is ISO 9001:2000 gesertifiseer.

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Ekstraksiemetodes	Tot-N - 0.1N K ₂ SO ₄	Cl - 0.1N KNO ₃	Organiese C - Walkley-Black metode
	Fe, Mn, Zn, Cu, Ni - DTPA	B - Warm waterekstrak	P - Truog

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Monster Datum	2016/08/22	Verslag Datum	2016/09/23

ROETINE GRONDONTLEDING

Plaasnaam	BUFFELSVLEI	BUFFELSVLEI	BUFFELSVLEI	BUFFELSVLEI
Landnommer	10A	10B	11A	11B
Lab nommer	16185	16186	16187	16189
Gewas	Mielies	Mielies	Mielies	Mielies
Hektaar	1.0	1.0	1.0	1.0
Monsterdiepte	Bo-grond	Bo-grond	Bo-grond	Bo-grond
Kleur	H Br	H Br	Or Br	Or Br
Brutodigtheid (kg·m ⁻³)	1255	1165	1250	1265
pH (KCl)	6.2	7.1	6.0	5.9
Uitruilbare suur	NVT	NVT	NVT	NVT
Suurversadiging (%)	NVT	NVT	NVT	NVT
S (mg·kg ⁻¹)	7	9	5	3
P (mg·kg ⁻¹)	11	1	25	2
P (Olsen) (mg·kg ⁻¹)	-	-	-	-
K (mg·kg ⁻¹)	394	164	223	146
K(% van EKUK)	5	1	4	2
Ca (mg·kg ⁻¹)	3620	5260	1940	2570
Ca(% van EKUK)	84	80	72	55
Mg (mg·kg ⁻¹)	289	710	387	1210
Mg(% van EKUK)	11	18	24	43
Na (mg·kg ⁻¹)	6	36	7	37
Na(% van EKUK)	0	0	0	1
EKUK (cmol _c ·kg ⁻¹) Bereken	21.5	32.7	13.5	23.3
Ca / Mg	7.8	4.5	3.1	1.3
Mg / K	2.4	13.9	5.6	26.6
(Ca + Mg) / K	20	77	23	61
Elektriese geleiding (mS·m ⁻¹)	NVT	-	NVT	NVT

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Lab nommer	16185	16186	16187	16189
Gewas	Mielies	Mielies	Mielies	Mielies
Hektaar	1.0	1.0	1.0	1.0
Monsterdiepte	Bo-grond	Bo-grond	Bo-grond	Bo-grond
Tot-N (mg·kg ⁻¹)	-	-	-	-
N (%)	-	-	-	-
NO ₃ -N (mg·kg ⁻¹)	-	-	-	-
NH ₄ -N (mg·kg ⁻¹)	-	-	-	-
Sand (%)	67	80	80	67
Slik (%)	24	17	15	20
Klei (%)	9	3	5	13
Volumetriese klipfraksie (%)	-	-	-	-
Elektriese geleiding (mS·m ⁻¹)	38.30	33.60	25.20	26.70
Organiese C (% m/m)	-	-	-	-
Organiese Materiaal (% m/m)	-	-	-	-
Cl (mg·kg ⁻¹)	-	-	-	-
Zn (mg·kg ⁻¹)	0.2	0.3	0.4	0.3
Mn (mg·kg ⁻¹)	1.59	1.46	4.29	4.28
Fe (mg·kg ⁻¹)	15.0	3.9	19.0	8.3
Cu (mg·kg ⁻¹)	1.0	0.7	0.6	1.2
B (mg·kg ⁻¹)	0.10	0.12	0.05	0.11
P (Truog) (mg·kg ⁻¹)	-	-	-	-
FSI	-	-	-	-
Ni (mg·kg ⁻¹)	0.60	0.40	0.40	0.70
Si (mg·kg ⁻¹)	-	-	-	-

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