SOILS AND AGRICULTURAL POTENTIAL STUDY:

SEA for the SKA Project, Northern Cape.

Report prepared for:

CSIR – Environmental Management Services
PO Box 320
Stellenbosch, 7599
South Africa

Report prepared by:

Johann Lanz – Soil Scientist

P.O. Box 6209
Stellenbosch, 7599
South Africa

Reviewed and edited by:

Anneliza Collett, Department of Agriculture, Forestry & Fisheries (DAFF) - Directorate: Land Use and Soil Management; and

Dr Andrei Rozanov, Senior Lecturer in Soil Sciences at Stellenbosch University.

20 September 2016

Table of Contents

Executive summary

This report assess the impact of the SKA development on soils, erosion and agricultural potential. These are viewed from the perspective of conserving the natural agricultural resource base in order to maintain a sufficient level of agricultural production to support the country's population. The analysis of the study area was done in terms of a desktop exercise using existing data predominantly on land capability, but supplemented by additional data.

Aridity (limited climatic moisture availability) is the major factor that limits agricultural potential across the study area. As a result, differences in soil type and soil potential have very little influence on agricultural potential. Agriculture is almost exclusively sheep farming. Patches of land that are only cultivated in particularly favourable seasons (in terms of rainfall) make up 0.20% of the surface area.

As grazing is the overwhelmingly dominant agricultural land use, the most indicative measure of agricultural potential and productivity across the study area is the grazing capacity. The study area is an area of relatively low grazing capacity (within a national context) but is an area that is suitable for successful sheep farming.

The low agricultural potential of the site limits the significance of all agricultural impacts, particularly when the loss of this land is considered from the perspective of national agricultural land resources and national agricultural production. Within this context, the only agricultural impact of the SKA project, that is of any significance, is the loss of agricultural use of the core area, where agricultural land use will be totally excluded from an area of 131,100 hectares. This is a large agricultural impact, but it is confined to an area of relatively low production. Given that this loss of agricultural land represents only 0.26% of the Northern Cape's grazing capacity, the significance of its loss is considered to only be of medium significance.

However, it is important to note that the loss of land has significant potential social and economic impacts on the local population. These impacts are addressed in more detail by other relevant studies within this SEA.

A potential mitigation measure for loss of agricultural land is to re-draw or sub-divide farm boundaries, so as to include only essential land within the SKA core area exclusion zone. This would result in a smaller surface area of land being lost to farmers and agricultural production.

The only impact of the SKA development that has the potential to affect agricultural production on neighbouring farms, outside of the core area, is increased predator pressure. However, this can be controlled and mitigated, and therefore, as long as it is effectively managed, the significance of the potential impact can be kept low.

All other impacts which include erosion, loss of topsoil, degradation of veld vegetation and soil contamination are assessed as being of low significance, provided that effective mitigation measures, as recommended in this report, are in place.

1 Scope

The scope of this report is to assess the impact of the SKA development on soils, erosion and agricultural potential, as part of the SEA for the SKA development. Agricultural impact is assessed in terms the report's focus, which is the impact on the natural resource base (land and soils) upon which agricultural production is dependent. The importance of conserving the natural agricultural resource base is viewed from a national perspective and from the need to maintain a certain level of agricultural production to support the country's population.

Beyond the focus of this study, there are important social and economic impacts that affect the local agricultural economy and population. These are dealt with in detail by separate social and economic studies included in the SEA.

2 Study methodology

The study is informed by the specialist's experience of conducting specialist agricultural assessments for various developments around the country, including many in the Northern Cape. These previous studies have involved interaction with the Department of Agriculture, Forestry and Fisheries (DAFF) to gain an understanding of what is important in terms of their mandate to conserve agricultural land for agricultural production. These studies have also involved interaction with many farmers across the Northern Cape.

The analysis of the SKA study area for this report was done in terms of a desktop exercise using existing data on land capability that covers the whole country, compiled at a scale of 1:250 000. This was supplemented by additional supporting data. Data sources are listed in the following section.

Agricultural impact is understood, for the purposes of this study, as any impact that translates into reduced agricultural production. This may occur by way of a degradation of the agricultural resource base (eg erosion), by way of a direct disturbance to agricultural activities (eg occupation of the site), or by way of the introduction of limitations to agricultural production (eg increased predation pressure).

3 Data sources

Table 1. Data sources used in study.

Data title	Source and date of publication	Data Description
Land capability	*DAFF, 2002 (original compilation date of the data)*	*Categorises all land nationally into 8 different classes of agricultural land capability. The classification is based on soil, terrain and climate parameters. Soil data originates from the land type survey that was conducted from the 1970's until 2002.*
Field crop boundaries	*DAFF, 2013*	*Delineates the boundaries of all cultivated land, based on satellite and aerial imagery.*
Agricultural Geo-Referenced Information System (AGIS)	*DAFF, undated*	*An on-line information system containing a collection of spatial data on South African agriculture, including all data from the land types survey.*
Grazing Capacity Potential	*DAFF, 2016*	*Mapped categories for grazing capacity poptential across the study area. This is not the gazetted grazing capacity under CARA but acts as a guideline until formally gazetted as a replacement of the 1993 version.*
Degraded areas	*From Land Cover dataset, 2013 - 2014*	*Delineates areas considered to be degraded, during the categorization of land cover.*
Gully erosion	*DAFF, 2009*	*Delineates the boundaries of visible gully erosion features, based on satellite and aerial imagery.*

It should be noted that although the land capability data is old, it is a measure of an inherently unchanging characteristic like geology, and so the age of the data does not affect its reliability. What is relevant is the accuracy of the data as a result of its resolution. The resolution of soil map data is the number of observation points per area that were used to compile a soil map. The more data points, the more accurate is the map. The land capability data is fairly low resolution. DAFF is currently upgrading the accuracy of the land capability data set for the entire country, but this data is not yet available.

4 Assumptions, limitations and confidence estimates

The study uses only existing data, which as noted above, has limited resolution. Fieldwork was not considered necessary because to improve on the accuracy and resolution of the existing land type data would require intensive fieldwork and any improved data thus

obtained would not add significantly to this assessment. The reason for this is that limited climatic moisture availability is the overwhelming agricultural limitation in the study area, and because of this soil becomes less relevant. Because moisture availability limitations totally preclude most agricultural activity across the whole study area (and therefore render agricultural potential very low), soil differences play very little role in determining agricultural potential.

Moisture availability data is much less spatially variable than soil data, and there is therefore much greater confidence estimates in terms of its influence on agricultural potential than in terms of the influence of soils. As noted below, under the study site conditions, grazing capacity data (with less spatial variation and therefore better resolution than soil data) provides the most accurate determination of agricultural potential.

The study makes the assumption that water for irrigation is not available across the site. This is based on the assumption that a long history of farming experience in an area will result in the exploitation of viable water sources if they exist.

5 Review of the environmental attributes map of the Karoo Central Astronomy Advantage Area 1 (KCAAA 1)

The agricultural landscape of the KCAAA 1 area is dominated by the aridity of the climate, which severely restricts what agriculture is possible. Almost the entire area receives an mean annual rainfall of less than 200 mm (Agricultural Research Council, Undated). One of the most important climate parameters for agriculture in a South African context is moisture availability. Moisture availability is an indicative measure of the climatic moisture that is available for plant growth in any environment. It is the ratio of rainfall to evapotranspiration and it directly determines the viability of any rain fed agriculture including grazing. Moisture availability is classified into 6 categories across the country (see Table 2). The proposed development site falls within class 6 which is the most arid and described as a very severe limitation to agriculture.

Within this environment of general aridity, small scale variations in climate across the study area and other climate parameters (such as temperature) are not very significant to determining agricultural potential and therefore influencing agricultural impact.

Table 2. The classification of moisture availability climate classes for winter rainfall areas across South Africa (Agricultural Research Council, Undated)

Climate class	**Moisture availability (Rainfall/0.40 PET)**	**Description of agricultural limitation**
C1	>34	None to slight

C2	25-34	Slight
C3	15-24	Moderate
C4	10-14	Moderate to severe
C5	6-9	Severe
C6	<6	Very severe

There are no perennial rivers within the area. Water for stock and human consumption is obtained from boreholes. There is no reliable source of water for any form of irrigation, based on the assumption that a long history of farming experience in an area will result in the exploitation of viable water sources if they exist.

Aridity (limited climatic moisture availability) is the major factor that limits agricultural potential, and differences in soil type and soil potential therefore have very little influence on agricultural potential. Even where higher potential soils occur, they cannot be utilised because of the aridity constraints and the overall agricultural potential of the land remains low.

Agriculture is almost exclusively sheep farming throughout the area. There are small patches of cultivated land that make up an extremely small proportion of the total agricultural area (see below). Patches of land that may, depending on the particular season, receive and retain sufficient soil moisture for crop growth, are used for the production of supplementary fodder crops for sheep. These are not cultivated annually, but only when the weather conditions of a season allow, that is when there is sufficient (above average) rainfall, at a suitable time of the season for optimal crop growth.

The agriculture map produced by the CSIR maps the following attributes that are relevant to agricultural land and soil resources:

- Cultivated areas
  - annual crops
  - horticulture / viticulture
  - old fields
- Land capability
- Gully erosion
- Degraded areas

Cultivation only occupies 0.28% of the surface area of the KCAAA 1 (29,470 ha of 10.6) million ha, based on crop boundaries data set). Horticulture or viticulture is almost non-existent. The field crop boundary data normally includes a category for old fields, which is land that has been cultivated in the past but has not been cultivated in recent years.

Although the CSIR map includes old fields in the legend, there is zero area covered by old fields in the field crop boundaries data set. The likely reason for this is that within the study area, as noted above, land is not cultivated on an annual basis, but only when a particular season allows. This makes it difficult to distinguish between old fields and fields still under cultivation. The annual crops category therefore covers all land that has been cultivated in the recent past, and cannot distinguish between old fields (that have been discontinued from cultivation) and those that may still be cultivated in some seasons.

Only land capability classes 7 and 8 occur in the area. The difference between these two classes is a function of terrain. Class 8 is confined to more mountainous terrain. In terms of value as agricultural land, both are extremely low and there is very little difference between them.

The usefulness of erosion data and issues relevant to erosion are discussed in section 7 below. Gully erosion and degraded areas are concentrated in the eastern part of the area, (see Figure 2) but this may well reflect a bias in the data set, such as more observation in this area, as there is no obvious reason why it should be concentrated here.

Within this eastern area, there is some correlation to soil type. Gully erosion is most prevalent on soil type PL1, which is to be expected as this soil type would have greater erodibility than most (but not all) of the other soil types. However this pattern does not extend across the study area, and outside of the eastern area where gully erosion data is concentrated, there are other areas of PL1 soil type where no gully erosion is indicated. It should also be noted that soil type PL1 is absent from the SKA core and spiral arms of Phase 1, except for two very small patches.

What is important about the existence of gully erosion is that it shows the potential for serious erosion to occur in this environment.

6 Description of the natural agricultural resource base of the SEA study area (core plus spiral arms)

The agricultural landscape of the SEA area is very similar to that described above. There is however an even lower percentage of cultivated land (0.20%) and no horticulture or viticulture within the SEA area.

As grazing is the overwhelmingly dominant agricultural land use, the most indicative measure of agricultural potential and productivity across the study area is the grazing capacity potential, illustrated in Figure 1. The study area is an area of relatively low grazing capacity (within a national context) but is an area that is suitable for successful sheep farming.

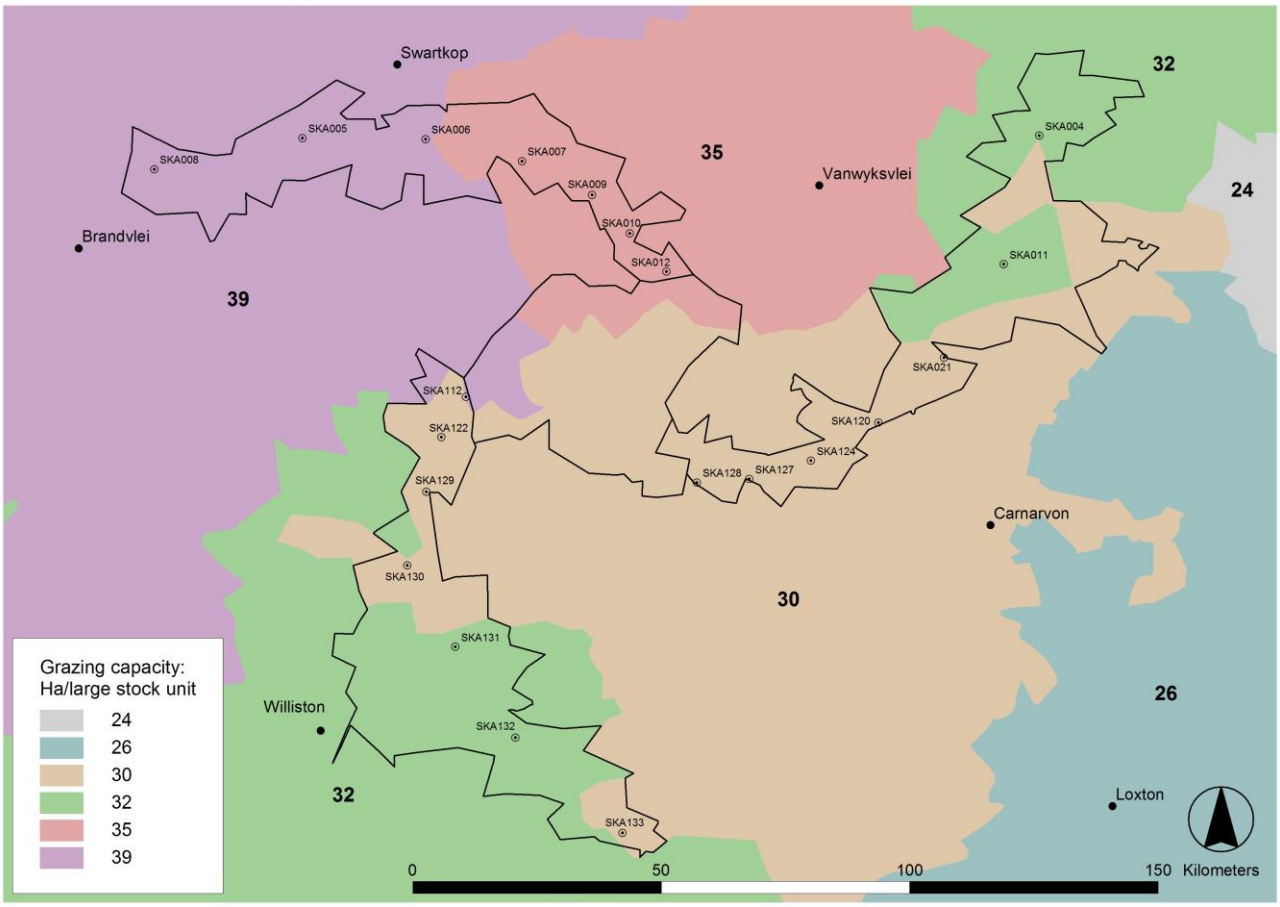

Figure 1. *Grazing capacity potential across the study area (2016 grazing capacity data supplied by DAFF).*

Although, as has been noted above, soil types are not really relevant to an assessment of the impacts of the SKA project, a map of soil types across the study area is included in Figure 2 for completeness. This figure is based on the generalized soil patterns data from AGIS. Six of the 15 soil types that occur across South Africa are represented in the study area. These are soil types common to the arid parts of the country. A description of each of these types is given in Table 3.

According to the soil groups classification of Fey (2010), the most dominant soil types of the study area are calcic and lithic soil groups with lesser occurrence of duplex and oxidic groups.

Table 3. Generalised soil patterns, as shown in Figure 2.

Label	**Description**
AR2	Red and yellow, well drained sandy soils with high base status.

FL	Soils with negligible to weak profile development, usually occurring on deep alluvial deposits
LP2	Soils with minimal development, usually shallow, on hard or weathering rock, with or without intermittent diverse soils. Lime generally present in part or most of the landscape
PL1	Soils with a marked clay accumulation, strongly structured and a reddish colour. Prismacutanic and/or pedocutanic diagnostic horizons dominant
R	Rock with limited soils
SC	Strongly saline soils generally occurring in relatively deep deposits in low lying arid areas

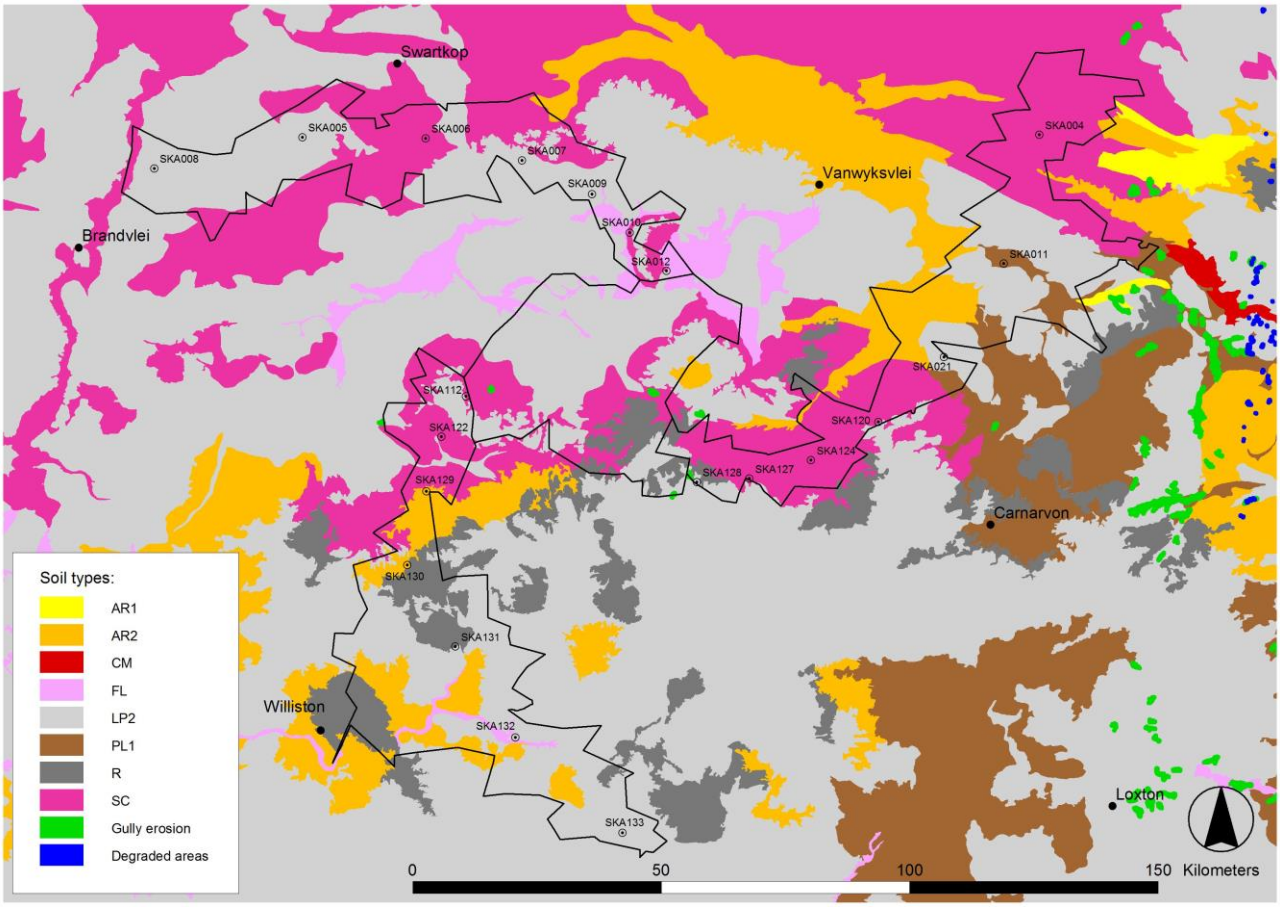

Figure 2. *Soil types across the study area according to the generalized soil patterns of AGIS and as described in Table 3. Gully erosion and degraded areas are also shown in relation to the soil types.*

7 Assessment of potential impacts

The following have been identified as the potential impacts of the SKA development on agricultural land and soil resources.

The relatively low agricultural potential of the site limits the significance of all agricultural

impacts, particularly when such a loss is considered from the perspective of national agricultural land resources and national agricultural production. However the loss of land has significant potential impacts on the local agricultural economy. These are considered in more detail in the SEA report on agricultural economy.

Impacts are identical for the construction and operational phases, although construction activities will impact a slightly larger surface area (for construction camps, lay down areas, etc).

Areas that are impacted by construction, and that will not be part of the operational footprint, will require rehabilitation after the construction phase.

7.1 Loss of agricultural land use

Loss of land is the most important of the agricultural impacts.

Loss of agricultural land use will only be significant in the core area where agricultural land use is totally excluded. Outside of the core area the impact will be in terms of very small areas (21 plots of 1 hectare each) that are very widely distributed (total area of spiral arms = 510,280 ha) and so the proportion of effected land will be extremely small (0.004% of the surface area) and therefore insignificant in terms of loss or fragmentation of agricultural land resources. It is only the 1 hectare plots that will be excluded from grazing, as grazing will be able to continue in all cable servitudes.

The loss in the core area amounts to 131,100 hectares of sheep grazing land. To indicate its significance in terms of national resources, this can be characterised as a proportion of the total sheep grazing of the Northern Cape. To determine this, a weighted average grazing capacity for the core farm area was calculated from the data presented in Figure 1 and calculated to be 32.2 hectares per large stock unit. A dorper sheep plus lamb is equal to 0.26 LSU. If the Northern Cape has a total of approximately 6 million sheep (DAFF, 2015), then the 131,100 hectares at a grazing capacity of 32.2 ha/LSU represents 0.26% of the total Northern Cape carrying capacity for sheep.

However, when viewed from the perspective of the local agricultural economy and the towns of Williston and Carnarvon supported by this, the loss of such a large area has significant potential impacts. These are considered in more detail in the SEA report on agricultural economy. As an example, this report investigates the impact of the loss of production from the SKA area on the economic viability of the two abattoirs in these towns, concluding that it will be significant.

The core area also forms part of the certified Karoo Lamb production area and its loss will have a more significant impact at such a regional level than at the level of national agricultural production.

It is also important to note that the loss of farms in the core area has a high potential social impact on affected land owners, particularly those living on the farms and particularly those whose families may have lived on these farms for generations. Such people are likely to be strongly opposed to losing their farms.

It should be noted that once the land within the core area is rezoned and excluded from agricultural use, any other impacts on that land (eg erosion) are no longer relevant as a direct agricultural impact. They are only relevant as terrestrial ecology impacts and through that, relevant from a conservation of agricultural resources perspective.

7.1.1 Mitigation

The proposed areas excluded from agricultural use by the SKA development are based on existing farm boundaries. This is for practical and legal purposes of land ownership. However there are no biophysical reasons for the land under SKA management to follow existing farm boundaries. A potential mitigation measure, to reduce the loss of agricultural production land, is to re-draw farm boundaries or to sub-divide so as to include only essential land within the SKA exclusion zone. The boundary of the exclusion zone would therefore be determined, not by arbitrary farm boundaries, but by the location of SKA infrastructure and its required buffers. It is highly likely that a smaller surface area of land would be required than the currently proposed 131,100 hectares. All parts of farms not within the newly proclaimed exclusion area could then remain under current ownership and continue to be used for agricultural production.

This mitigation measure has the additional advantage of reducing the burden of land management for which the SKA project is responsible by reducing the surface area under its ownership and management. It therefore offers a win-win scenario to both affected land owners and the SKA project. It would require administrative and political will to affect changes to existing farm boundaries.

7.1.2 Significance

Given that the loss of agricultural land represents only 0.26% of the Northern Cape's grazing capacity the significance of its loss, as an agricultural impact (ie. translating into reduced agricultural production), when regarded from a national agricultural resource perspective, is not considered to be high. However the loss of land has significant potential

impacts on the local agricultural economy.

7.2 Erosion

The environment of the study area has a high erosion risk, due to its aridity. Any reduction in vegetation cover, due to a number of reasons, including incorrect veld management, can significantly increase the erosion risk.

The mapping of erosion attributes from existing data bases, as an erosion risk assessment of the site is not particularly useful. This is because the erosion susceptibility data on AGIS is predominantly a function of large scale slope. However, in practical terms erosion risk is dependent on extremely localised topography and the very specific nature of the construction and or disturbance of the surface at a particular point. These factors are not mappable at any manageable scale, but they, far more than any other factor, determine the erosion risk at each point. Although there is a link between soil type and erosion risk, mapping soil types as an erosion risk assessment carries the danger of obscuring the real on-the-ground risk. The important fact is that erosion risk is high across the entire study area and it can occur anywhere as a result of localised factors, regardless of an area's status in terms of soil type or mapped susceptibility to erosion.

As is evidenced from gully erosion data discussed above, there is potential for serious erosion to occur under the study site conditions.

7.2.1 Mitigation

Erosion risk needs to be managed everywhere across the site, regardless of status in terms of susceptibility to erosion.

Recommended mitigation is to implement an effective system of storm water run-off control using bunds or berms (raised, low walls of soil) and ditches to direct run-off water, where it is required. The packing of stones to break flow can also be used where appropriate. Farmers in the Karoo routinely apply these measures to roads and other spots that are an erosion risk. It is advisable that whoever is implementing the erosion control measures for the project (engineers, environmental control officer), consults with local farmers concerning effective erosion control in this specific environment.

All points arising from any constructional surface disturbance, that can potentially lead to accumulation of run-off, must be identified and appropriate control measures must be put in place at that point. The storm water system must effectively collect and safely disseminate any run-off water from all hardened surfaces and it must prevent any potential

down slope erosion. It must be appropriate for the potential volume of accumulated run-off and for the steepness of the slope at the particular point and down slope of it. Implementation of the system will need to be monitored by an environmental control officer, but the actual engineering design will be the responsibility of engineers involved in the construction, including the road construction.

Roads are likely to pose the most serious erosion risk. Appropriate storm water management measures, that are routinely part of the engineering of any road construction, must be in place for all roads in the development.

Because areas of reduced vegetation cover pose a high erosion risk, it is essential to rehabilitate vegetation cover in such areas and to put erosion control mechanisms in place in them until vegetation cover is adequate to effectively control erosion.

7.2.2 Monitoring

Monitoring is essential, as the proof of the effectiveness of erosion control measures will be their prevention of erosion, rather than any compliance to design specifications. A regular monitoring and record keeping system for erosion will need to be adhered to by an environmental control officer or equivalent, during construction and thereafter. This will involve visual checks for any signs of erosion adjacent to all roads and at all construction sites. Checking will be more important during the rainy season and should be done after any high rainfall event. Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there.

7.2.3 Significance

Without mitigation, there is potential for erosion to cause serious degradation of the soil resource. However erosion is relatively simple and cost efficient to manage. Therefore, as long as it is effectively managed, the significance of erosion as a potential impact is low.

7.3 Loss of topsoil

Loss of topsoil can result from poor topsoil management (burial, erosion, etc) during construction related soil profile disturbance (levelling, excavations, road surfacing etc.). It will result in a decrease in the soil's capability for supporting vegetation.

7.3.1 Mitigation

If an activity will mechanically disturb the soil below surface in any way, then any available topsoil (at least 5-10cm depth, but more if it is present) should first be stripped from the

entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. Topsoil should also be stripped from areas which will not be rehabilitated after the construction phase, so that there is more topsoil available for rehabilitation. Topsoil is a critical resource for disturbed land rehabilitation and the more that is available, the better. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.

Also, any subsurface spoils from excavations must be disposed of where they will not bury the topsoil of agricultural land, or other land required to support vegetation.

7.3.2 Monitoring

Monitoring must be done by an environmental control officer or equivalent during the construction phase. A record must be kept of all areas where construction will mechanically disturb the soil below surface in any way (GPS coordinates of each area). The date and depth of topsoil stripping, and then the date and depth of topsoil re-spreading must be recorded for each of these areas. Areas should be photographed thereafter on an annual basis to record vegetation re-establishment.

7.3.3 Significance

The significance of this impact is limited by the fact that the footprint of disturbance that may result in loss of topsoil is an extremely small proportion of the total land surface, and will therefore have minimal impact on the carrying capacity of the land. It is also relatively simple to control and mitigate. The impact is therefore considered to be of low significance.

7.4 Degradation of veld vegetation

Degradation of veld vegetation can occur beyond the direct footprint of the development due to vehicle trampling and dust deposition.

7.4.1 Mitigation

Recommended mitigation is to control vehicle access on approved roads only. All drivers on site must be informed of this.

Control dust generation during construction activities by implementing standard construction site dust control measures of damping down with water where excessive dust generation occurs.

7.4.2 Monitoring

During construction, an environmental control officer or equivalent must, on a monthly

basis, record the occurrence or not of any vehicle tracks outside of approved traffic areas. Any contraventions must be dealt with.

7.4.3 Significance

The significance of this impact is limited by the fact that the footprint of disturbance that may result in degradation of veld vegetation is an extremely small proportion of the total land surface, and will therefore have minimal impact on the carrying capacity of the land. It is also relatively simple to control and mitigate. The impact is therefore considered to be of low significance.

7.5 Predator pressure

Predator control within the core area is likely to be much less than would occur on commercial farms in the area, and is therefore likely to lead to an increase in predators in that area. This has the potential to increase predator pressure on the neighbouring farms.

7.5.1 Mitigation

Ensure that the core area is secured by jackal proof fencing. Jackal proof fencing can take two different forms. It can comprise closed fencing (which is like chicken wire but with larger holes), as opposed to the single horizontal strands of a normal fence. The closed fencing should be a minimum of 1 meter high and it should be completely secured at ground level. Jackal proofing can also take the form of electrified fences. Both forms have advantages and disadvantages and associated costs. Both require on-gong management. It is advisable that consultation is done with local farmers to inform the choice, design and management of the fences.

7.5.2 Monitoring

The integrity of the jackal proof fencing must be monitored regularly and any problems must be repaired immediately. This requires on-going management. A system should also be in place whereby neighbouring farmers can easily report problems, which will be followed up by the SKA project.

7.5.3 Significance

Increased predator pressure has the potential to impact significantly on neighbouring farming operations. As long as it is actively and effectively managed, the significance of the potential impact can be kept low.

7.6 Soil contamination

The storage and use of substances such as diesel on site has the potential to contaminate soils if spillage occurs.

7.6.1 Mitigation

Have a protocol in place for managing any spillages and leakages that occur. This must include standard cleaning up and appropriate disposal operations as stipulated in the project's waste management program. Clean up must be monitored and completion approved by the environmental control officer.

7.6.2 Monitoring

An environmental control officer or equivalent must regularly monitor all storage facilities on site for leakages.

7.6.3 Significance

The significance of this impact is limited by the fact that the footprint of disturbance that may result in contamination of soil is an extremely small proportion of the total land surface, and will therefore have minimal impact on the carrying capacity of the land. Furthermore, in the climatic environment of the site, the spreading of contamination is extremely limited. Diesel storage would also already be present on many of the farms in the study area. Contamination is relatively simple to control and mitigate. The impact is therefore considered to be of low significance.

8 Four tier sensitivity map

The agricultural sensitivity of the environment is not high, because if its low agricultural potential, but grazing and associated agricultural production are still impacted by impacts to the land. The only feature that is distinguishably higher than anything else, in terms of production potential, is areas of cultivated land. The proposed agricultural sensitivity categories are described in Table 4, and their distribution in the study area is indicated in Figure 3.

It should be noted that agricultural sensitivity is rated in this report in terms the report's focus. That is impacts on the natural resource base (land and soils) upon which agricultural production is dependent. The importance of conserving the natural agricultural resource base is viewed from a national perspective and from the need to maintain a certain level of agricultural production to support the country's population.

Agricultural sensitivity in the context of this report does not consider social and economic impacts on the local farming population. Those aspects are considered in detail in other specialist reports included in the SEA.

Table 4. Agricultural sensitivity categories for the study area.

Sensitivity class	Features	Interpretation
Very high	None exist within the study area	
High	Crop cultivation	Avoid where possible because it will lead to some disturbance and loss of existing or potential agricultural production.
Medium	Grazing land	Impact on grazing will lower agricultural production.
Low	None exist within the study area	No agricultural impact.

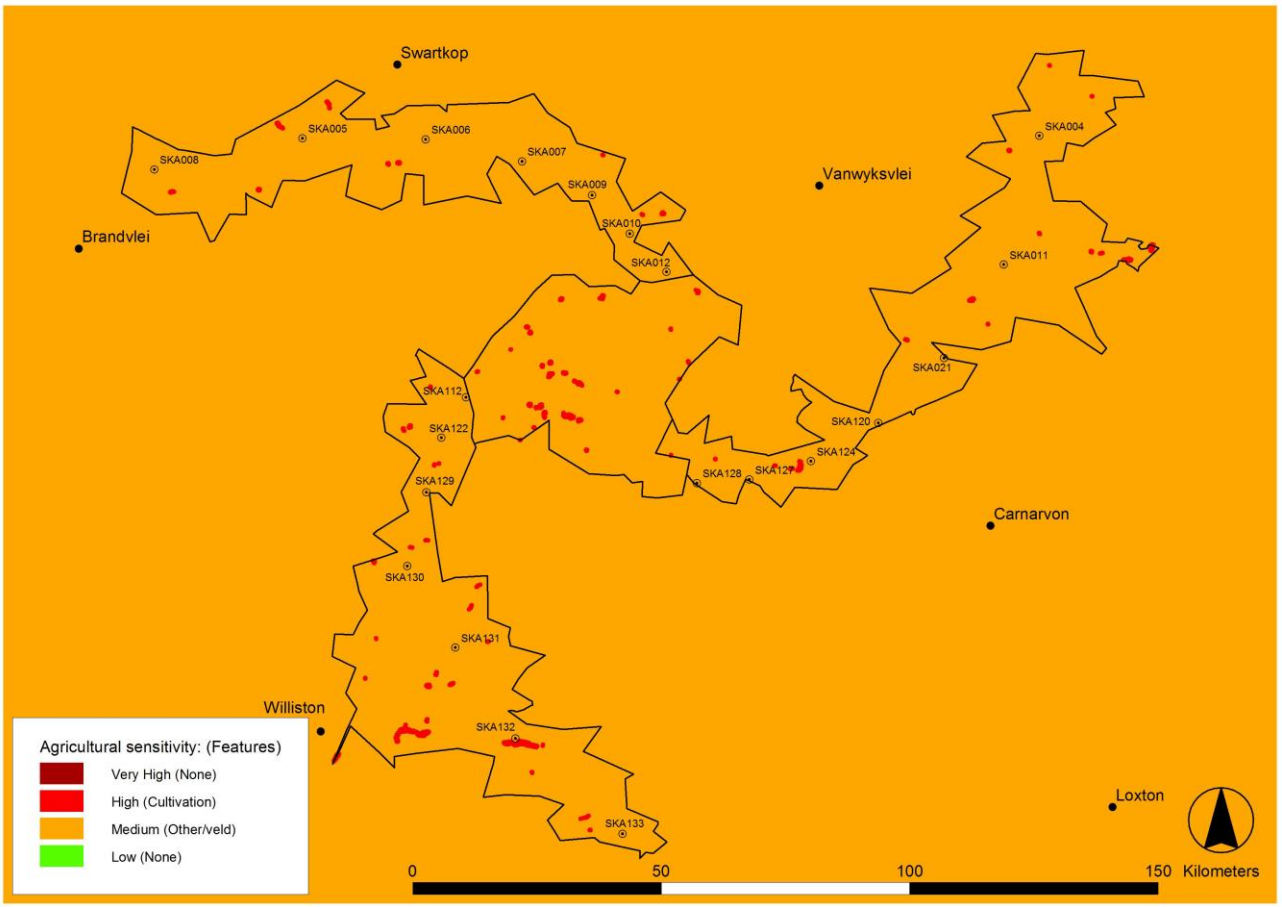

Figure 3. *Agricultural sensitivity categories for the study area.*

9 Applicable legislation and permit requirements

9.1 Agricultural legislation

The information contained in this section, specifically the recommendations for the SKA project in terms of compliance with relevant agricultural legislation, was supplied by Anneliza Collett of DAFF in a telephonic meeting with the report author, following correspondence to clarify the required information. The meeting took place on 26 January 2016. Follow up correspondence also took place after the meeting.

Any change of land use of demarcated agricultural land, to land uses other than agriculture, requires approval in terms of the Subdivision of Agricultural Land Act, Act 70 of 1970. The SKA core area (currently zoned and demarcated as agricultural land) will be purchased by the project, used for scientific, astronomical purposes and all agricultural activity will be totally excluded from it. This would normally require approval in terms of Act 70. However, NRF can get exclusion from such approval because it is a statutory body, provided that the land has been registered in the title deed with the NRF as the land owner.. There is no formal application requirement for such exclusion. It will need to be done by way of a letter from DST to DAFF, motivating for the exclusion, and providing this agricultural report as the background information on agricultural impact that DAFF will require.

For the 1 hectare antennae plots as well as for roads and power lines outside of the core area, where the farmer remains the land owner and a servitude is registered against the title deed, a formal application will need to be made in terms of Act 70, and the land stays subjected to the provisions of Act 70. There is an official application form available for this purpose, which is provided in Appendix 1.

Even once the land is re-zoned it is still regarded as agricultural land and subjected to the provisions of Act 70. Act 70 is only not applicable once it has been formally excluded from the provisions of the Act. An area can be rezoned back to agricultural and therefore rezoning is not seen as an exclusion from the provisions of Act 70. In addition, the Conservation of Agricultural Resources Act (CARA) also remains applicable to the land.

9.2 Legislation associated with borrow pits

The SKA project had planned to apply for sterilization from mining, so that the site is protected from any potential future mining applications. In terms of mining legislation, all mineral resources, regardless of land ownership, are state owned and an application can

be submitted to the state to extract those minerals on any land on which an application for sterilization of mining has not been approved. The state, and not the land owner, approves the application, hence the need to protect infrastructure developments such as SKA, from such an approval.

However, the SKA project also requires gravel borrow pits for construction purposes, and borrow pits are controlled under mining legislation. Authorisation for a borrow must take the form of a mining permit or a mining licence, the same as for any other mineral resource. If the borrow pit is less than 5 hectares in extent, then a mining permit is applicable. This is a less onerous application process than for a mining license, which applies to areas greater than 5 hectares. Both mining permits and mining licenses need to be applied for in terms of two different acts, so it requires a double application. There is approval required in terms of the National Environmental Management Act (No 107 of 1998), and in terms of the Mineral and Petroleum Resources Development Act (No 49 of 2008). For both approvals, the competent authority is the Department of Mineral Resources.

There is therefore a potential conflict between the need for sterilisation from mining and the need for mining authorisation for borrow pits. Clarity will need to be sought in terms of the administrative and legal aspects of this conflict and in terms of the approval processes that are required for these in the case of the applicant being a statutory body.

10 Conclusions

Agricultural impact is assessed in this report in terms of the report's focus, which is the impact on the natural resource base (land and soils) upon which agricultural production is dependent. The importance of conserving the natural agricultural resource base is viewed from a national perspective and from the need to maintain a certain level of agricultural production to support the country's population. Within this context, the only agricultural impact of the SKA project, that is of any significance, is the loss of agricultural land in the core area, where agricultural land use will be totally excluded. This loss of agricultural land represents only 0.26% of the Northern Cape's grazing capacity, but in terms of the local economy is more significant. Overall for the purposes of this assessment, the loss of grazing land is considered to be of medium significance.

However, it is important to note that the loss of land has more significant potential social and economic impacts on the local population. These impacts are addressed in more detail by other relevant studies within this SEA.

A potential mitigation measure, to reduce the loss of agricultural production land, is to re-draw farm boundaries or to sub-divide so as to include only essential land within the SKA core area exclusion zone. The boundary of the exclusion zone would therefore be determined, not by arbitrary farm boundaries, but by the location of SKA infrastructure and its required buffers. It is highly likely that this mitigation measure would result in a smaller surface area of land than the currently proposed 131,100 hectares being lost to farmers and agricultural production.

The only impact that has the potential to affect agricultural production on neighbouring farms, outside of the core area, is increased predator pressure. However, this can be controlled and mitigated, and therefore, as long as it is effectively managed, the significance of the potential impact can be kept low.

All other impacts which include erosion, loss of topsoil, degradation of veld vegetation and soil contamination are assessed as being of low significance, provided that effective mitigation measures are in place.

11 References

Agricultural Research Council. Undated. AGIS Agricultural Geo-Referenced Information System available at http://www.agis.agric.za/.

DAFF. 2015. Livestock numbers per province. Available at http://www.daff.gov.za/daffweb3/Resource-Centre

Fey, M. 2010. Soils of South Africa. Cambridge University Press, Cape Town.