CEN INTEGRATED ENVIRONMENTAL MANAGEMENT UNIT

Environmental and Rural Development Spec

FINAL Environmental Impact Report for the Proposed Construction and Operation of a 55 MW Photovoltaic Solar Farm and associated infrastructure on Portion 2 of the Farm Kraan Vogel Kuil No 50, Pearston, Eastern Cape

Project Title:

FINAL Environmental Impact Report for the Proposed Construction and Operation of a 55 MW Photovoltaic Solar Farm and associated infrastructure on Portion 2 of the Farm Kraan Vogel Kuil No 50, Pearston, Eastern Cape

Project Applicant: Imveloyethu Power Company (Pty) Ltd

NEAS Reference Number: DEA/EIA/0000855/2011

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Environmental Assessment Practitioner:

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Report reviewed by: Dr Mike Cohen

Executive Summary

Introduction

CEN Integrated Environmental Management Unit was appointed by Imveloyethu Power Company (Pty) Ltd to undertake an environmental assessment (Scoping and EIA) for the proposed construction and operation of a 55 MW Photovoltaic Solar Farm and associated infrastructure on Ptn 2 of the Farm Kraan Vogel Kuil No 50 in Pearston in the Eastern Cape**.** It is proposed to construct and operate a 55 MW photovoltaic solar farm. **Please note that 55MW is the input power into the grid. The plant peak power (namely the sum of the modules power) will be ~ 65MWp**.

This environmental impact report is required in terms of the Regulations promulgated under Section 24(5) read with section 44 of the National Environment Management Act (Act 107 of 1998) as amended.

Terms of Reference

The Terms of Reference established for the proposed environmental assessment are:

- Give a comprehensive description of the environment that may be affected by the proposed development; and discuss the manner in which the associated activities may affect various components thereof
- Engage the public and relevant stakeholders throughout the EIA process and incorporate their comment into the EIR.
- Consider alternatives for the project and do a comparative assessment to determine which is most appropriate in terms of environmental sensitivity and economic feasibility
- Conduct the necessary environmental investigations and analyse specialist reports to assess impacts that were raised during the scoping phase
- Suggest sound mitigation measures to minimize predicted impacts
- Develop a draft environmental management plan

Structure of the Report

Chapter 1 of the report introduces the integrated environmental management philosophy and details the requirements of the environmental impact assessment legislation. **Chapter 2** presents a detailed description of the proposed development site. **Chapter 3** describes the affected environment of the sub-region and the site of the proposed development. **Chapter 4** describes the project proposal and puts it in line with planning principles for the area. **Chapter 5** describes the methodology used in identifying and assessing impacts and alternatives. **Chapter 6** describes project alternatives and does a comparative assessment to select the most appropriate. **Chapter 7** identifies potential significant impacts and assesses them. **Chapter 8** details the public participation process. **Chapter 9** concludes the Environmental Impact Report, and provides an environmental statement regarding the proposed development. **Chapter 10** presents a draft Environmental Management Programme. **Chapter 11** is a list of references used in this report.

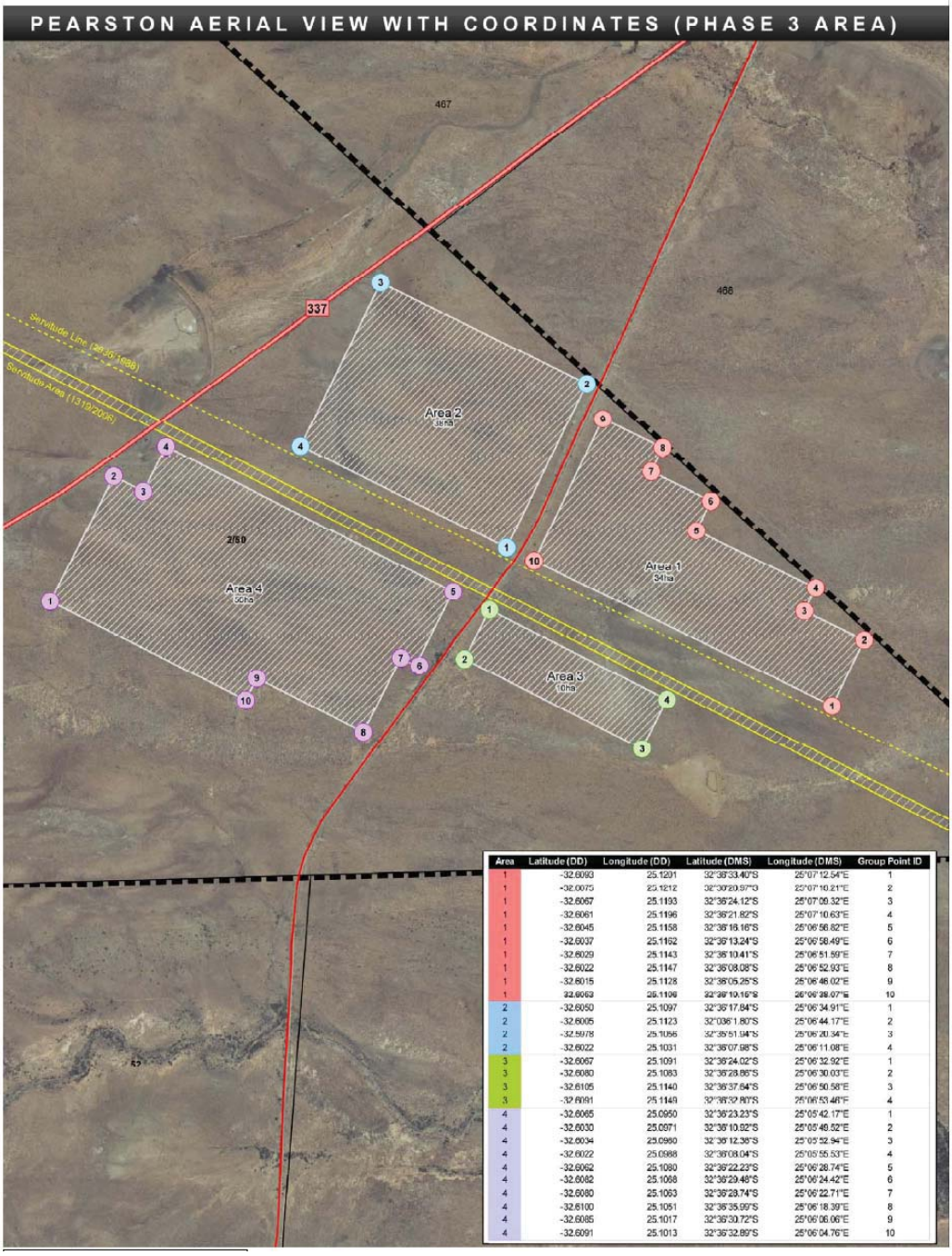
Property Description

The proposed site for development is Ptn 2 of the Farm Kraan Vogel Kuil No 50 (title deed attached as Appendix 2) in Pearston in the Eastern Cape. The site is situated approximately 2.2 km west of the village of Pearston and south of the R337 at approximate GPS co-ordinates 32°35’59.85”S 25°06’44.16”E, and is currently zoned for agricultural purposes. It is proposed to use four areas of the farm for the solar plant with a total disturbance footprint of ~8.5 ha (~6% of the total site size of 138 ha). The site has been specifically located in close proximity to the existing powerlines and access roads to avoid constructing additional infrastructure to connect to the grid.

The terrain is undulating with low stony ridges and outcrops of plinthite with shallow often gravelly soils interspersed by flats where soils are deeper. No drainage lines intercept these areas, the ground falling off to drainage lines to the south and north. The vegetation on the site is mostly low shrubs and some grass with scattered taller shrubs and small bushclumps in the more rocky areas (Jacobsen, 2011). Existing

structures in close proximity to the site include an Eskom power line, a telephone line, roads, a windmill and reservoir, and farm fences. The site is currently mostly grazed by sheep.

REZONING OF THE PORTION 2 OF THE
FARM KRAAN VOGEL KUIL, NO. 50, PEARSTON



Area	Latitude (DD)	Longitude (DD)	Latitude (DMS)	Longitude (DMS)	Group Point ID
1	-32.6093	25.1201	32°36'33.40"S	25°07'12.54"E	1
1	-32.6075	25.1212	32°36'26.97"S	25°07'16.21"E	2
1	-32.6067	25.1193	32°36'24.12"S	25°07'09.32"E	3
1	-32.6061	25.1196	32°36'21.82"S	25°07'10.63"E	4
1	-32.6045	25.1158	32°36'16.16"S	25°06'56.82"E	5
1	-32.6037	25.1162	32°36'13.24"S	25°06'58.49"E	6
1	-32.6029	25.1143	32°36'10.41"S	25°06'51.59"E	7
1	-32.6022	25.1147	32°36'08.08"S	25°06'52.93"E	8
1	-32.6015	25.1128	32°36'05.25"S	25°06'46.02"E	9
1	-32.6069	25.1106	32°36'10.16"S	25°06'38.07"E	10
2	-32.6050	25.1097	32°36'17.84"S	25°06'34.91"E	1
2	-32.6005	25.1123	32°36'1.80"S	25°06'44.17"E	2
2	-32.5978	25.1056	32°35'51.84"S	25°06'20.34"E	3
2	-32.6022	25.1031	32°36'07.98"S	25°06'11.08"E	4
3	-32.6067	25.1091	32°36'24.02"S	25°06'32.92"E	1
3	-32.6080	25.1083	32°36'28.86"S	25°06'30.03"E	2
3	-32.6105	25.1140	32°36'37.84"S	25°06'50.58"E	3
3	-32.6091	25.1149	32°36'32.80"S	25°06'53.46"E	4
4	-32.6065	25.0950	32°36'23.23"S	25°05'42.17"E	1
4	-32.6030	25.0971	32°36'10.92"S	25°05'49.52"E	2
4	-32.6034	25.0960	32°36'12.36"S	25°05'52.94"E	3
4	-32.6022	25.0988	32°36'08.04"S	25°05'55.53"E	4
4	-32.6062	25.1080	32°36'22.23"S	25°06'28.74"E	5
4	-32.6082	25.1068	32°36'29.46"S	25°06'24.42"E	6
4	-32.6080	25.1063	32°36'29.74"S	25°06'22.71"E	7
4	-32.6100	25.1051	32°36'35.99"S	25°06'18.39"E	8
4	-32.6085	25.1017	32°36'30.72"S	25°06'06.06"E	9
4	-32.6091	25.1013	32°36'32.89"S	25°06'04.76"E	10

Figure: An aerial image showing the location of the study site (white hashing) (Source: Urban Dynamics).

The development proposal

It is proposed to construct and operate a 55 MW photovoltaic solar farm. Please note that 55MW is the input power into the grid. The plant peak power (namely the sum of the modules power) will be ~ 65MWp (this peak power can change during the executive design of the plant according to market and technical evaluations that will be done). The disturbance footprint will be ~8.5 ha (6% of the total facility area of 138 ha).

The proposed development will consist of Fixed Solar Panels; using the photovoltaic approach to generate electricity from the sun. Photovoltaic (PV devices) or "solar cells" change sunlight directly into electricity. PV, like a fuel cell, relies upon chemical reactions to generate the electricity. PV cells are small, square shaped semiconductors manufactured in thin film layers from silicon and other conductive materials. When sunlight strikes the PV cell, chemical reactions release electrons, generating electric current. The small current from individual PV cells, which are installed in modules, can power individual homes and businesses or can be plugged into the bulk electricity grid. Two HV electrical power lines (66 kV and 132 kV) traverse the site allowing the PV plant to connect directly to the bulk electricity grid which limits the construction of new infrastructures required for transmission. The proposed PV plant will be accessible via the Regional Route R337 and an internal service road.

Structures and associated infrastructure include:

- PV solar panels/modules arranged in arrays
- Poles to support PV modules – the modules supporting structure will likely be fixed to the ground by ramming the framework stakes into the soil for a depth of ~2 m, and will be ~60 cm above ground level[1]. Approximately 100 000 stakes will be rammed into the ground and it will not be necessary to cut the ground.
- HV substation cabins: the HV substation electrical building will require a foundation area of ~270 m2 and the HV substation integrated

[1] **Note: the maximum height of the entire structure (i.e. including the panel) will be ~2.2 m.**

building ~ 390m2. Considering a rough foundation depth of 0.8 m, approximately
530 m3 of soil will be cut.

- HV substation: will cover a surface area of ~ 20 500 m2. The HV substation will connect directly to the Eskom grid (132kV) by means of a in/out scheme.

- Distribution cabins: the foundation surface of a single distribution cabin will be ~ 50m2 (65 distribution cabins are proposed, with a total disturbance footprint of ~3 250m2) with a rough depth of 0.8 m. Approximately 40 m3 of soil will be cut per cabin (i.e. a total of 2 600 m3 of soil will be cut for 65 distributions cabins).

- HV pylons and transformers: the connection to the electrical grid will be realized according to an in/out scheme. Two HV pylons will be installed with a foundation footprint of ~40 m2 each and will have a foundation depth of about 4 m. The HV substation electrical infrastructures (circuit breakers, isolators, transformers, busbars, etc) will have a total foundation surface of ~1 000m2 and an average foundation depth of about 1m (i.e. ~ 1000 m3 of soil will be cut). Approximately 320 m3 of soil will be cut for the HV pylons.

- Transmission lines (<33 KV) from the substation to the on-site powerline and a possible link between proposed solar facilities on neighbouring sites,

- Primary and secondary cable paths: as far as practically possible, the plant cables will be installed along internal roads both for the DC paths linking stringboxes to inverters and the MV AC paths from the distribution cabins to the HV substation. Where it is not possible to install cables along internal roads, 1.20 m deep trenches will be excavated with constant cross sections for duct laying on a bed of sand at least 5 cm deep. Thereafter, ducts will be covered with sand up to 0.5m from the bottom of the trenches and a monitor tape will be overlaid.

- String boxes and inverters
- Transformer cabin/inverter
- Electricity distribution boxes
- Earthing systems
- Guardhouse
- Perimeter fencing
- Lighting, monitoring and CCTV
- Internal gravel roads for along the boundary of the site and between PV lines: the width of internal roads will be the same during construction and operational phases. The internal routes among the PV modules and border routes will be 4 m wide, while the internal routes around the distribution cabins will be 5.5 m wide. In both cases, the internal roads will be made by leveling the soil and cleaning it from vegetation so as not to hinder the movement of trucks and other construction machinery. Internal roads will not be asphalted.

In summary, the total footprint of foundation areas and other minor foundation surfaces (such as the foundation area required for the lamps installed along the perimeter fences, for sanitary tanks) will be ~ 6,000m^2 (i.e. 0.4% of the total facility area of 138 ha). The total footprint of the internal/perimeter roads will be ~ 7.7ha. Therefore, the total disturbance footprint will be ~ 8.5ha[2] (6% of the total facility area of 138ha). Perimeter and internal routes disturbance footprint is the same during construction and operational phase.

A schematic site layout plan is shown in the figure below.

[2] **Note that this excludes the stakes that support the panels as they are rammed into the ground (i.e. require no excavation) and have a negligible footprint**

Figure: A schematic layout plan of the proposed photovoltaic plant.

Services

Water requirements

Water demands for the construction, operation and maintenance phases will be provided by a local supplier and will be delivered on site by means of trucks. No boreholes and other natural water sources will be exploited.

Construction phase

Water may be used for wetting of cleared areas to settle dust, for construction site activities, and for drinking water for construction staff. Potable water tanks will be installed at the construction site for human consumption and sanitation purposes. The contractor will ensure safe drinkable water for the labourers.
The expected water demand is 150 m^3 per month.

Operational phase

Water will be used to remove accumulated dust from the solar panels to ensure maximum absorption and for human consumption and sanitation purposes. It is anticipated that water used to wash panels will infiltrate the sediment and recharge the groundwater supply. The anticipated water demand is 150 m^3 per month.

The total water demand for construction, operational and maintenance phases is not expected to exceed 1 800 cubic meters per year.

A letter stating that water can be supplied has been provided by the Water Services Provider has been issued by the Blue Crane Route municipality.

Electricity

Construction phase

Energy requirements will be supplied by diesel generators.

Operational and maintenance phases

Daytime electrical needs will be met by using a small percentage of the total energy produced by the PV plant (about 1% of the PV production). Night-time electrical

needs can be met in a number of ways including utilizing the energy stored during the generation hours (by means of batteries or other different kind of storage technologies), small diesel generators, or taking electricity from the distribution grid (if the latter option is followed, an electricity supply contract will be done with Eskom).

A letter has been received from Eskom stating that the power produced by the plant can be fed into the grid, and guidelines for development in close proximity to powerlines were provided.

Refuse removal

Construction phase

Companies involved in construction works will be responsible for refuse removal to a registered waste disposal site.

Operational and maintenance phases

Solid waste disposal services will not be required in operational phase since PV plants do not produce materials and waste. Any eventual waste produced by the facility will be properly disposed of by the O&M Company.

Sanitation

Construction phase

Construction companies will provide chemical loos or a suitable alternative during construction phase and will ensure safe disposal of waste.

Operational and maintenance phases

Permanent sanitation facilities will be provided onsite during operational phase for personnel who operate the facility. A conservancy tank or similar technology will be

used. The storage capacity will **not** exceed the threshold specified under the Waste Act that requires a Waste Licence application (i.e. 35 m^3).

Consideration of Alternatives

The no-go alternative

The no-go alternative assumes the status quo remains – i.e. the site is used for stock grazing purposes.

According to CARA (Conservation of Agricultural Resources Act 43 of 1983) the official carrying capacity for the area is 17 ha per large stock unit. CARA seeks to provide for the conservation of natural agricultural resources by maintaining the production potential of land, combating and preventing erosion and weakening or destruction of water resources, protecting vegetation and combating weeds and invader species. According to Veld types of South Africa by J.P.H Acocks the site falls in zone no. 31 (Succulent karoo) that consists mainly of short karoo bushes, succulent plants, scrubs and grasses. The estimated area needed for the 55 MW plant is ~ 138 ha which will mean a loss of 8.1 Large Stock Units or 54 Small Stock Units. It will not be a total loss as the area can still be utilized by sheep. The solar plant will be fully compatible with veld management systems where sheep farming occurs. The intervention of the solar plant will be minimal (extracted from a letter of support for the project written by the Eastern Cape Department of Agriculture, Rural Development and Agrarian Reform – Mr A Snyman).

The Integrated Development Plan for the Blue Crane Route Municipality highlights the need for energy and the upgrading of electrical infrastructure, as well as local economic development. The proposed solar farm will contribute to meeting these needs. The town of Pearston and especially its rural surrounds, as verified by Pio (2008), are experiencing an energy supply deficit with negative consequences for local economic development (LED). The latter is one of the most important mechanisms for decreasing poverty by creating employment opportunities through the establishment of more commercial and industrial activity in municipal areas (ETU,

n.d.). The availability of constant and adequate supplies of energy is however one of the key determining factors in this case (UNIDO, 1984). It was confirmed by the Pearston Farmers Association and the Blue Crane Development Agency that not all farming operations in the area are linked to the local electricity grid, while those who enjoy this privilege are handicapped in turn by a supply of electricity that can best be described as highly irregular. The problem in this case seems to be located in the local 15 MW electricity sub-station's capacity to provide rural (and urban) consumers with a steady supply of energy in the face of demand that often exceeds 16MW. The impact of this on the local agricultural sector is fundamentally twofold:

- Firstly, since commercial farming in the Pearston area is highly dependent on electricity, particularly as far as the essential activity of irrigation in this semi-arid environment is concerned, farmers struggle to advance their operations to a level of optimal productivity; and
- Secondly, the local agricultural sector is largely stagnant in the sense that farmers without a reliable local supply of energy cannot expand their existing commercial operations.

The impact of the proposed development's potential to contribute to local energy security stands to have significant implications for LED, which is one of the identified development priorities in the most recent Integrated Development Plan of the Blue Crane Route Municipality (IDP, 2010). The general efficiency of electrified households in Pearston, as well as the few local retailers and social (government) service providers, is also affected by the local energy deficit. Some local business owners and the local branch of the South African Police Service all confirmed that the electricity supply is generally interrupted on a weekly basis for extended periods of time. The impact in this case is however overshadowed by the limitations and negative economic impacts that are experienced by the local agricultural sector. An increase in energy security brought about by the proposed development has the potential to address the negative economic consequences of the local energy deficit (de Wit, 2012).

Significant employment opportunities are expected in construction (~891 person months[3]) and operational phases (10 203 person months), with consequent skills development that can be carried over to other projects. Although not all employment opportunities created by the proposed development will benefit the local community (because the skills required are not available), the developer, as a prospective supplier of energy, is subject to numerous bidding requirements. In order to comply with the employment related bidding requirements, the developer has allocated 231 person months during the construction phase (almost 26% of the total for this phase) and 8580 person months during operational phase (almost 84% of the total for this phase) to labour from the local community of Pearston (de Wit, 2012).

The applicant proposes to supply alternative energy to local schools and provide financial aid through educational scholarships to the local community. The solar farm project is a registered project in the municipality's Integrated Development Plan and is supported by the municipality and the Blue Crane Route Development Agency.

Mucina and Rutherford (2006) classify the vegetation type as Eastern Lower Karroo which is considered to be least threatened and there are no megaconservancies that traverse the site according to the regional Subtropical Thicket Ecosystem Plan (STEP). However, the site is classified as a Broad Land Management Class 2 in the East Cape Biodiversity Conservation Plan which implies that the site is suited for limited development in non-sensitive areas, and should ideally be maintained in a near-natural state. The site is currently farmed and although substantial floral species richness still occurs, vegetation composition has been transformed from its original status and overgrazing is evident.

It is therefore believed that the site and project activity are not fatally flawed from consideration and assessment for the proposed solar farm. The 'no-go option will

[3] The concept of 'Person Months' shows the quantum of total job months over the life cycle of the project. This is calculated by considering the number of employees on the project, multiplied by the number of months that the specific employee will work over the project phase, adjusted for an activity factor which assesses the percentage of the month that the employee is expected to work (de Wit, 2012)..

however be used as a baseline throughout the assessment process against which potential impacts will be compared in an objective manner.

Site alternatives

As a starting point, the applicant considered various aspects to determine a suitable location for a solar farm in the Pearston area including, but not limited to, irradiation levels, the distance to the power grid, site accessibility, founding conditions, fire risk and current land uses. The Farm Kraan Vogel Kuil just west of Pearston met these criteria. A 10 MW solar farm has been approved north of the R337 in the north-eastern portion of the farm and an application has been submitted for a second 10 MW solar farm on commonage land directly east of and adjacent to the proposed site for this application (refer to blue stars in the figure below).

The selected farm was scanned and aspects such as hydrology, sensitive vegetation and other habitats, and proximity to existing infrastructure were used to determine the selected areas for PV panels (i.e. Area 1 to 4 as shown in the figure below). The selected blocks are adjacent to existing powerlines and are close by to the approved 10 MW solar plant north of the R337 and the proposed plant east of the site, providing opportunities of shared infrastructure and increased efficiency. Drainage features (blue lines in the figure below) were also avoided. This information was used to create the first layout alternative that was presented in the Scoping Report.

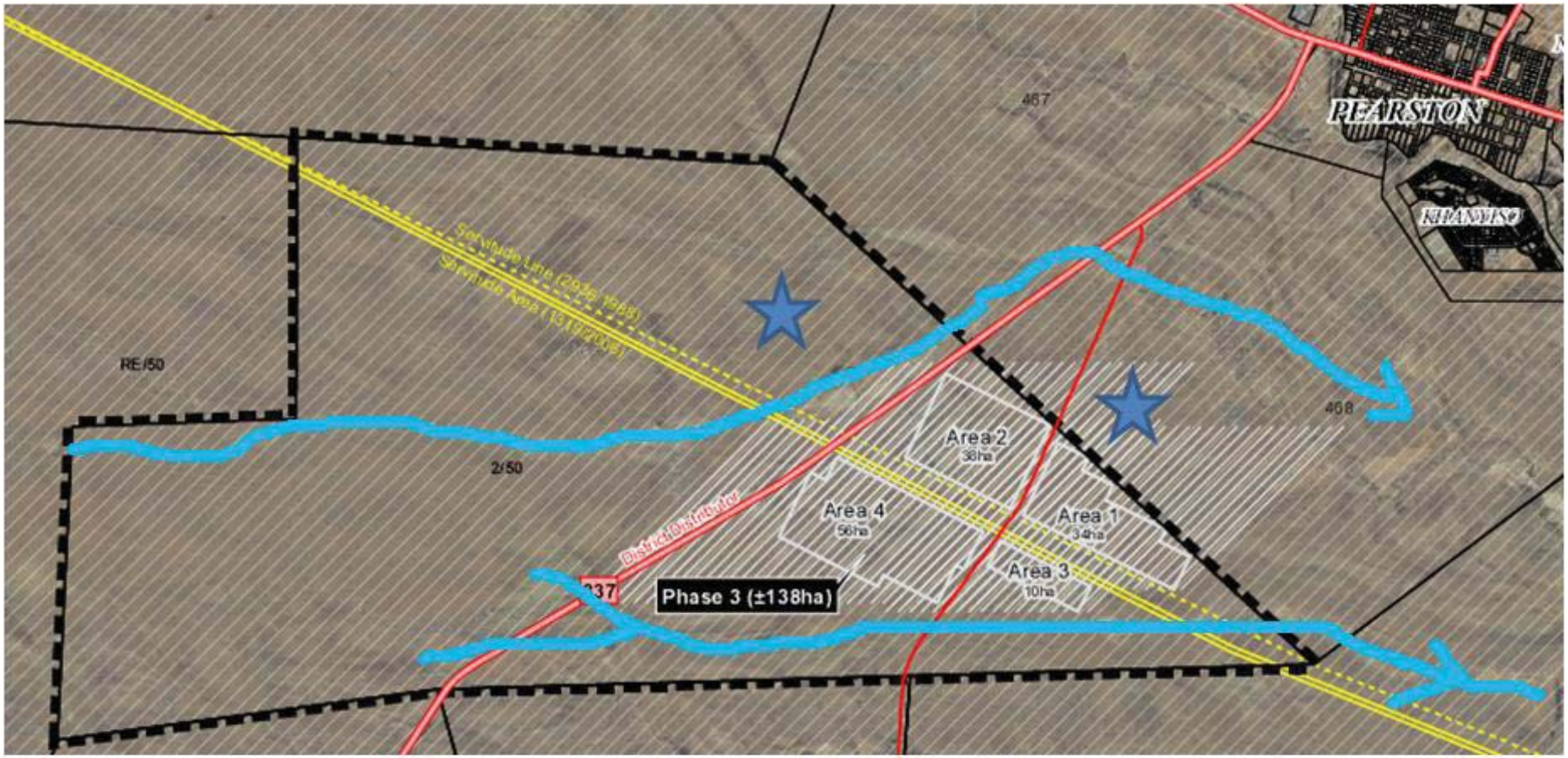


Figure: Site alternative selection.

Recommendations from specialist reports were used to create the final and preferred site layout (refer to the site sensitivity map shown in the figure below):

An ecological specialist report was done of the selected area. The vegetation has been overgrazed which has changed species composition from its original state. However, the area still exhibits substantial floral species richness, and a single occurrence of a threatened species, *Duvalia parviflora*, was recorded. The location of this species, and others that were not found in large numbers in the area (e.g. *Aloe longistyla, Astroloba foliolosa, Haworthia nigra, Duvalia* sp. cf *parviflora, Adromischus subdistichus, Aloe claviflora*) was demarcated using a hand-held GPS and indicated on a map to the applicant to be protected with a 10 m buffer around each recording. The agricultural specialist (report attached as Appendix 3) recommended that no panels or other development occur within 100 m of the drainage line that occurs south of Area 3 and 4.

A Level 1 Archaeological Impact Assessment was done for the selected area and the specialist concluded that it is of low cultural sensitivity and that development can proceed as planned. The archaeological specialist noted panels must be constructed within 20 metres of the concentration of Later Stone Age stone tools (GPS reading: 32.36.019S; 25.06.379E) (refer to Appendix 5).

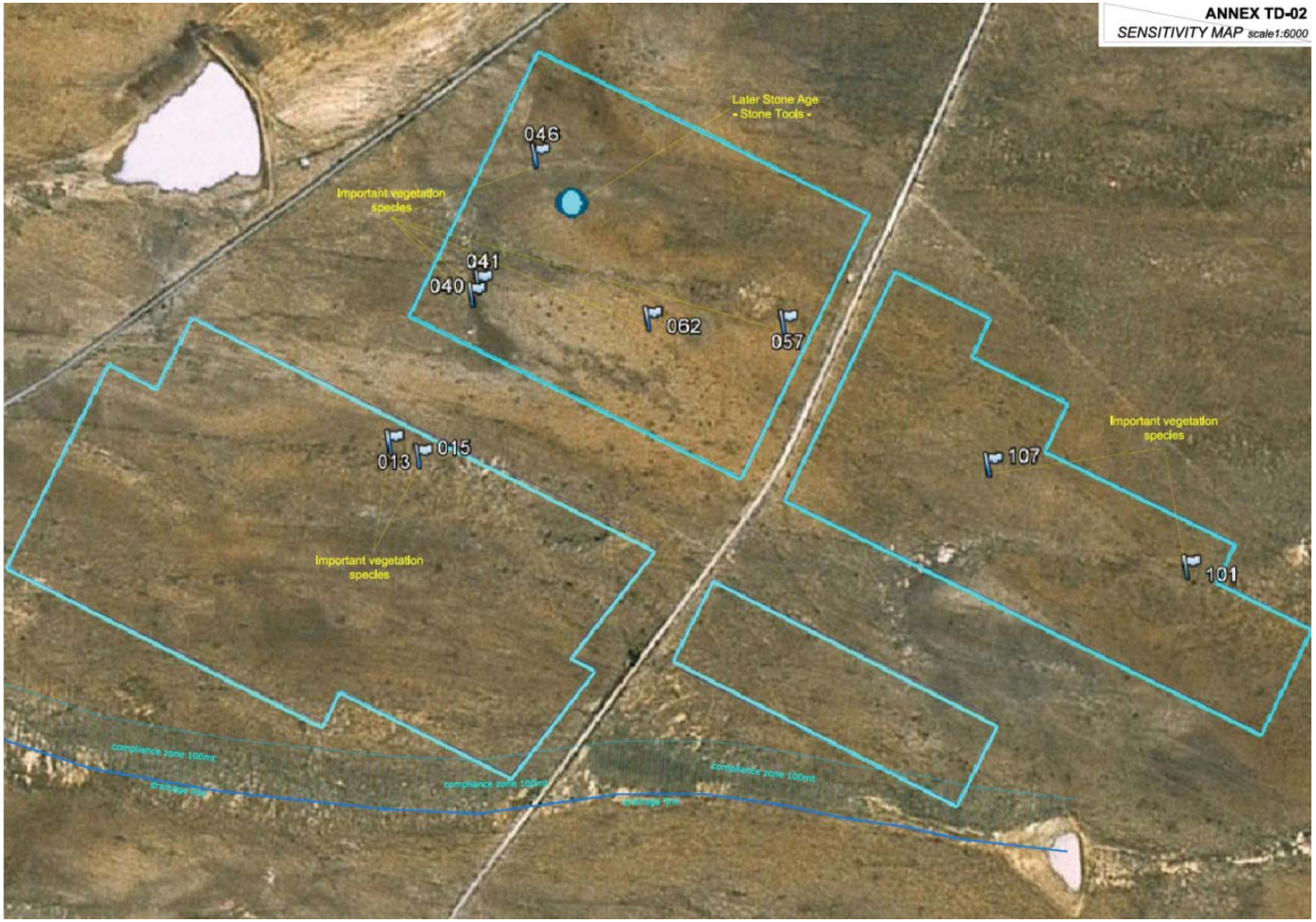


Figure: Site sensitivity map.

Activity Alternatives

The current land use activity is agriculture (specifically grazing), while the proposed activity is for the establishment of a PV Solar Farm. The local Municipality is the provider of electricity within Blue Crane Route. The formal supply of electricity ranges from a full connection and prepaid system to a ready board system. The majority of consumers have access to either electricity or paraffin as a source of power and heat while street lighting is provided to all urban neighbourhoods except for high mast lighting in Aeroville, Old Location, New Brighton and Francesvale (Somerset East Urban Area). A major capital outlay is however envisaged to upgrade both urban and rural networks. The overhead line from Somerset East to Pearston and other areas is currently running at full capacity. A new transformer is to be installed as an emergency measure. Electricity has been included in the infrastructure analysis because of the importance of this basic service in the lives of all individuals, especially in this area. The Blue Crane Route Municipality has a good infrastructure base but upgrading is needed for effective service delivery. A need for energy provision and infrastructure upgraded is therefore evident.

Of the entire Blue Crane Route population a mere 35% of the economically active population is employed and over 40% is not economically active. This puts a great amount of pressure on the employed population to support those that are not employed or economically active and creates a large dependency ratio on the employed percentage. The unemployment rate in the area is approximately 24% (SDF 2006). The photovoltaic plant will create a number of job opportunities for local staff in both construction and operational phases. There will be a training programme for locals interested in skilled work such as maintenance work. Furthermore, local businesses will also benefit from the proposed development since materials will be purchased locally where available. The BCRM SDF and IDP have highlighted the need for local economic development initiatives.

Agriculture

According to the Department of Agriculture the proposed site consists of non-arable low potential grazing land. The Department of Agriculture has determined the grazing capacity for this area as 26-30 ha/AU. The proposed solar farm will occupy ~138 ha;

therefore a loss of grazing capacity for ~ 5 animal units is expected if the solar farm is approved. According to CARA (Conservation of Agricultural Resources Act 43 of 1983) the official carrying capacity for the area is 17 ha per large stock unit which will mean a loss of 8.1 Large Stock Units or 54 Small Stock Units.

The number of employment opportunities and/or economic potential for the municipal area that will accrue from agriculture in this instance is substantially less than for the proposed PV Solar Farm. From an economic and social upliftment perspective, the solar farm is therefore the preferred activity.

Other forms of alternative energy

HydroPower

There are no rivers or basins in the study area that are exploitable for hydropower generation.

Wind Power

In a PV plant the only variable is the weather (i.e. sunny and cloudy days), a variable that can be statistically quantified with acceptable margins of error. However, energy generation of a wind power farm is influenced by more variables and including landscape features and is less easy to predict. Statistically speaking, a site is suitable for energy generation from wind power if the annual average wind speed on site is about 6 m/s. According to a wind detection by an extrapolation knot close to the study site (SA3050_03_25.102E_32.606S_7.4_5) the average wind speed is 2.6 m/s which is too low for a wind farm.

Technology Alternatives

The applicant would like to apply for authorisation of a photovoltaic plant which includes a number of technologies (e.g. monocrystalline, polycrystalline, thin film). In the Draft EIR, polycrystalline technology was suggested as the preferred alternative, however the current trend in South Africa is to use thin film technology because of

the temperature conditions. The final technology selected at detailed design phase is also dependent on the investor's preference. Irrespective of the technology used, the disturbance footprint on the ground that was assessed in the Draft EIA will be the same. If thin film technology is used, more panels may be installed to reach the same injected power into the grid when using polycrystalline technology. This will not significantly change the disturbance footprint on the ground, but the total surface of the solar modules could be increased up to 20%. The plant perimeter will be the same and areas designated for protection in this EIA will be unaffected. The maximum power input into the grid will remain at 55 MW. Therefore the significance of impacts assessed in this Final EIA is the same irrespective of which technology is used (as long as it is photovoltaic).

Fixed versus tracking systems

To maximise power output, the PV array needs to capture as much solar radiation as possible. To capture the maximum amount of irradiance, the array needs to be pointing towards the sun, thus maximizing effective area and giving the direct beam radiation an incidence angle as close as possible to 0°. This can be accomplished by different technologies with varying degrees of efficiency: fixed mounting systems (with optimized tilt and azimuth angle), single-axis tracking systems (with optimized tilt), and dual-axis tracking systems.

The dual-axis system is the more complex tracking technology however it captures the most solar irradiance. Solar tracking systems use motors and/or hydraulic devices to position the modules. The control of these systems can be done by means of software that calculates the astronomical position of the sun from well-known algorithms. Another type of control system uses reference sensors to find the position of the sun in the sky.

Despite the advantages due to higher energy efficiency of the solar tracking systems, these systems are highly complex which often leads to greater maintenance problems and thus a lower reliability and greater overall costs (due to maintenance, actual costs of the system and electricity consumption for handling). Solar tracking

systems also often require more space occupied by the plant for the same power installed. Therefore, the fixed systems technology has been selected in this preliminary design phase. However, the use of solar tracking systems is not excluded altogether and it may be decided at a later stage to use these.

Listed Activities

The Minister of Environmental Affairs and Tourism has in terms of sections 24 and 24D of the National Environmental Management Amendment Act (Act No. 107 of 1998), listed the activities that require an environmental assessment.

In terms of the Environmental Impact Assessment Regulations, 2010, made under section 24(5) of the Act and published in Government Notice R.543 in Government Gazette 33306 of 10 December 2010 the following activities are subject to an assessment.

No. R. 544	**10 December 2010 – Listing 1**
Activity number	**Activity description**
11	The construction of: (i) Buildings exceeding 50 m^2 in size (ii) Infrastructure or structures covering 50 m^2 or more 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.
No. R. 545	**10 December 2010 – Listing 2**
Activity number	**Activity Description**
1	The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more
8	The construction of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex.
15	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more
No. R. 546	**10 December 2010 – Listing 3**

Activity number	Activity description
4	The construction of a road wider than 4 metres with a reserve less than 13,5 metres (a) In the Eastern Cape (ii) outside urban areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans
13	The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation (a) Critical biodiversity areas and ecological support areas as identified in systematic biodiversity plans adopted by the competent authority
14	The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation (a) In the Eastern Cape (i) all areas outside urban areas
16	The construction of: (iii) buildings with a footprint exceeding 10 square metres in size; or (iv) infrastructure covering 10 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse (a) In the Eastern Cape (ii) outside urban areas (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans

Methodology

The specific methodology adopted in identifying and assessing impacts and project alternatives is described in Chapter 5. The methodology was designed to meet the

requirements of the EIA Regulations (2006 and 2010) and Guidelines published in support of the regulations.

Public Participation

Public participation was done in accordance with Chapter 6 (Regulations 54) of the EIA Regulations (2010) and Guideline 4 published in assistance of interpretation of these regulations.

Identification of Interested and Affected Parties

Advertisements were placed in *The Herald* and *Die Burger* on 22 November 2011. Two notice boards were placed on and nearby the proposed site. Background Information Documents were distributed to all neighbouring property owners and other identified stakeholders.

A copy of the Draft Scoping Report was made available to interested and affected parties for review and comment. No comment was received. A letter from DEA authorizing the Scoping Report and Plan of Study for EIA was given on 5 July 2012.

The same process was followed with the Draft EIR. Stakeholder comments received have been incorporated in this Final EIR.

Below is a “comments and response sheet” including all issues raised by Interested and Affected Parties, as well as the response by the Environmental Assessment Practitioner.

Table: Comments and Response Sheet

I&AP	Comment	EAP response
K Moolman	Request to be registered	Registered and will be kept updated of the process
L. Mongoato (Director: Land Use and Soil Management)	This serves as a notice of receipt and confirms that your application has been captured in our electronic AgriLand tracking and management system. Reference number issued	Reference number noted. Will be kept updated of the process
B. Smith	Request to be registered and am in favour of the development	Registered and will be kept updated of the process
M. Kane	Request to be registered and am in favour of the development	Registered and will be kept updated of the process
G. Mintoor	Request to be registered and am in favour of the development	Registered and will be kept updated of the process
J. Martin	Request to be registered and am in favour of the development	Registered and will be kept updated of the process
Comments on Scoping Report		
DEDEAT	No objection provided an EIR and EMP are submitted and conditions are adhered to	Noted
DWA	A letter was submitted with the following queries: • Concern over the proximity of the solar plant to the watercourse • Any development that will take place within a watercourse will need an authorisation from DWA in terms of Section 21 of the NWA • A wetland specialist should be appointed to determine and delineate	• As per recommendations of the agricultural specialist study, a setback distance of 100 m has been instated around the river that occurs on the northern side of the site • No structures or infrastructure will be constructed within the river or its banks, and there is no need to

	wetlands in the area • The Water Quality Unit requires details on the development proposal and site conditions (full list provided in letter)	remove riparian vegetation • There are no wetlands within the area proposed for development • Details are included in this EIA.
Comments on Draft EIA		
John Geeringh (Eskom)	• Provided general requirements for works at or near Eskom infrastructure	• These have been forwarded to the applicant and considered in the development proposal

Summary of Predicted Impacts

The Table below summarises the list of impacts that were assessed in Chapter 7 of the full report.

Environmental Component	No-go Alternative	Preferred Alternative: Impact Significance without Mitigation Measures		Preferred Alternative: Impact Significance with Mitigation Measures	
Biodiversity	Moderate - (vegetation on site has been transformed by agricultural activities and species composition has been altered as a result). Fencing limits free movement of fauna. Power lines are not fitted with avian avoidance devices, and together with the surrounding roads, this poses a risk to avifauna	High (total site sterilization can be assumed in construction phase, apart from areas designated for protection)	-	Moderate (threatened floral species on the Red Data list have been protected in the preferred layout plan. Indigenous vegetation will be retained for replanting between and beneath structures and infrastructure which represents a relatively large portion of the site (~130 ha). Vegetation that cannot be replanted on site will be relocated to a suitable site)	-

Environmental Component	No-go Alternative	Preferred Alternative: Impact Significance without Mitigation Measures		Preferred Alternative: Impact Significance with Mitigation Measures	
Soils	Moderate -. Soils are currently eroded	Moderate	-	Low. It is assumed that mitigation measures will be effective in minimizing the chances of erosion, compaction and contamination.	-
Noise	No impact	Low	-	Low	-
Surface and Ground Water	Low -: there is currently limited impact on surface water	Moderate	-	Low (with proper stormwater management, and implementation of mitigation measures to prevent erosion and contamination).	-
Air Pollution (dust)	No impact	Moderate	-	Low	-
Visual impact	No impact	Moderate	-	Moderate	-
Waste Management	No impact	Moderate	-	Low. Proper management of waste during construction phase will reduce impacts.	-
Archaeological impacts	No impact	Low	-	Low	-

Environmental Component	No-go Alternative	Preferred Alternative: Impact Significance without Mitigation Measures		Preferred Alternative: Impact Significance with Mitigation Measures	
Traffic impacts	No impact	High	-	Moderate	-
Loss of agricultural land	No impact	N/A		Low	-
Socio-Economic Impacts:					
Construction phase:					
Employment creation	No impact	Moderate	+	N/A	+
Skills development and transfer	No impact	Very high	+	N/A	+
Operational phase:					
Employment creation	No impact	High	+	N/A	+
Contribution to local energy security	No impact	High	+	N/A	
Skills development and transfer	No impact	High	+	N/A	
Social investment in local communities	No impact	High	+	N/A	

Cumulative impacts

This application is one of 3 solar farms planned for the area. Cumulatively, these will contribute to the socio-economic growth of Pearston and improve the electricity supply (which has benefits for LED). The plant also has the obvious benefits of being part of the move to generating clean energy in the Eastern Cape, and will assist in reducing climate change impacts associated with traditional coal-fired power stations.

Decommissioning impacts

It is proposed to operate the plant for ~25 years, after which the module will have reached its lifespan and can be dismantled. An alternative to dismantling the facility would be to update the PV facility by replacing the old modules with new high efficiency modules or by using new technologies for energy generation that will likely be developed in the plant's lifespan.

The plant can be dismantled with relative ease, and because of the non-invasive nature of the technology (once the plant is established and the site is rehabilitated), the site is likely to recover (with some rehabilitation interventions) in a short time. During site dismantling, all infrastructure and equipment other than the connection structures to the electricity grid that will be owned by Eskom will be removed. Module mounting structures are rammed into the ground and are removed easily, where after they can be recycled. The PV modules will be fully recycled according to the decommissioning plans taken by the module manufacturers (e.g. the PV-CYCLE PLAN). Similarly, electrical equipment (LV-MV panels, inverters, transformers, cables, etc) will be recycled. The distribution cabins will be removed and disassembled. These can be re-used in another plant or sent to a recycling facility.

Once the facility has been removed, areas that were disturbed will be rehabilitated as per the specifics and methods given in the Construction Environmental Management Programme (see Chapter 10). Assuming successful site rehabilitation during construction phase, most of the site (~94%) should be in a fair state at the end of 25 years. Significant impacts during decommissioning are not expected.