# 100MW HARMONY MOAB KHOTSONG SOLAR PHOTOVOLTAIC (PV) FACILITY, FREE STATE PROVINCE

## Basic Assessment Report

September 2022

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destea
department of
economic, small business development,
tourism and environmental affairs
FREE STATE PROVINCE

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| | |
|---|---|
| **File Reference Number:** | |
| **Application Number:** | |
| **Date Received:** | |

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 as amended 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 **13 February 2020**. 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.

14. Two (2) colour hard copies and one (1) electronic copy of the report must be submitted to the competent authority.
15. Shape files (.shp) for maps must be included in the electronic copy of the report submitted to the competent authority.

# PROJECT DETAILS

| | | |
|---|---|---|
| **Reference No.** | : | TBC |
| **Title** | : | Basic Assessment Report: 100MW Harmony Moab Khotsong Solar Photovoltaic (PV) Facility, Free State Province |
| **Authors** | : | Savannah Environmental<br>Chantelle Geyer<br>Ansoné Esterhuizen<br>Karen Jodas |
| **Specialists** | : | DPR Ecologists & Environmental Services<br>CTS Heritage<br>Pachnoda Consulting<br>ECO-Thunder |
| **Applicant** | : | Harmony Moab Khotsong Operations (Pty) Ltd |
| **Report Status** | : | Basic Assessment Report for review |
| **Date** | : | September 2022 |

**When used as a reference this report should be cited as:** Savannah Environmental (2022). Basic Assessment Report: 100MW Harmony Moab Khotsong Solar Photovoltaic (PV) Facility, Free State Province

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# SUMMARY AND OVERVIEW OF THE PROJECT

Harmony Moab Khotsong Operations (Pty) Ltd is looking to supplement its energy supply by implementing Photovoltaic (PV) generation, aiding their transition to a more sustainable and environmentally friendly energy mix.

The development of a solar photovoltaic (PV) facility with a generating capacity of up to 100MW is proposed north of the Harmony Gold Moab operations and south of the Harmony Gold Great Noligwa operations, approximately ~10km north of the town of Vierfontein within the Moqhaka Local Municipality, Fezile Dabi District Municipality, Free State Province. The solar PV development will be known as Harmony Moab Khotsong Solar PV Facility.

The PV development area includes eleven (11) farm portions, all owned by the Mine.
These include:

» Farm Anglo 593.
» Farm Hoekplaats 598.
» Farm Mispah 274.
» Portion 1 of Farm Zaaiplaats 190.
» Remaining Extent of Farm Doornkom Wes 446.
» Farm Chrystalkop 69; and
» Portions 1, 3, 4, 5, and the Remaining Extent of the Farm Zuiping 394.

The Harmony Moab Khotsong Solar PV Facility is located within the Klerksdorp Renewable Energy Development Zone (REDZ) the project is therefore subject to a Basic Assessment (BA) process, as well as a shortened timeframe of 57 days for the processing of an Application for Environmental Authorisation in accordance with the EIA Regulations, 2014 (as amended), as well as GNR 114 as formally gazetted on 16 February 2018.

The generation is intended for own use by the Mine, reducing the Mine's reliance on Eskom. The preferred site for the project is on properties which are owned by the Mine and are available for the proposed project and is therefore deemed technically feasible for such development to take place.

A project site considered to be technically suitable for the development of the solar PV facility, with a site extent of approximately 1400 hectares, was identified. A development area of ~900ha was demarcated within this project site and allows an adequate footprint for the installation of a solar PV facility with a contracted capacity of up to 100MW, while allowing for the avoidance of environmental site sensitivities.

The full extent of the project site is to be evaluated in the Basic Assessment process to identify environmental sensitivities. Site-specific studies and assessments have delineated areas of potential sensitivity within the development area (refer to **Figure 1.1.**). These have been avoided by the appropriate placement of infrastructure within the development footprint (refer to **Figure 1.2.**).

The on-site infrastructure includes:

» PV modules and mounting structures.
» Access roads, internal roads and fencing around the development area.
» Temporary and permanent laydown areas.

» Administrative building, control room, workshop, storage building, guard house, auxiliary buildings and structures, water supply infrastructure, weather station
» Peripheral boundary wall & fencing
» Inverters, transformers and up to 5 on-site facility substations and switching substations.
» Cabling between the project components, to be laid underground where practical.
» Grid connection infrastructure to be connected to the existing:
    - Vaalreefs Eleven Substation via a ~2km power line (located south-east of the facility).
    - Southvaal Plant Substation via ~0.5km power line (located north-west of the facility); and
    - Southvaal Substation via a ~4km power line (located north of the facility).

The site is accessible via the R76 south of the project site.

As of 2019, the Industrial sector was the leading electricity consumer in South Africa, with up to 56% of the total consumption (Ratshomo 2019). Mining and quarrying accounted for 10% of the industrial consumption (Chamber of Mines of South Africa, 2017). The successful development of the renewable energy project will enable Harmony Gold to make a valuable and meaningful contribution towards growing the green economy within the Free State Province and South Africa. This will assist the Free State in creating green jobs and reducing Greenhouse Gas emissions, while reducing the energy demand on the Eskom national grid.

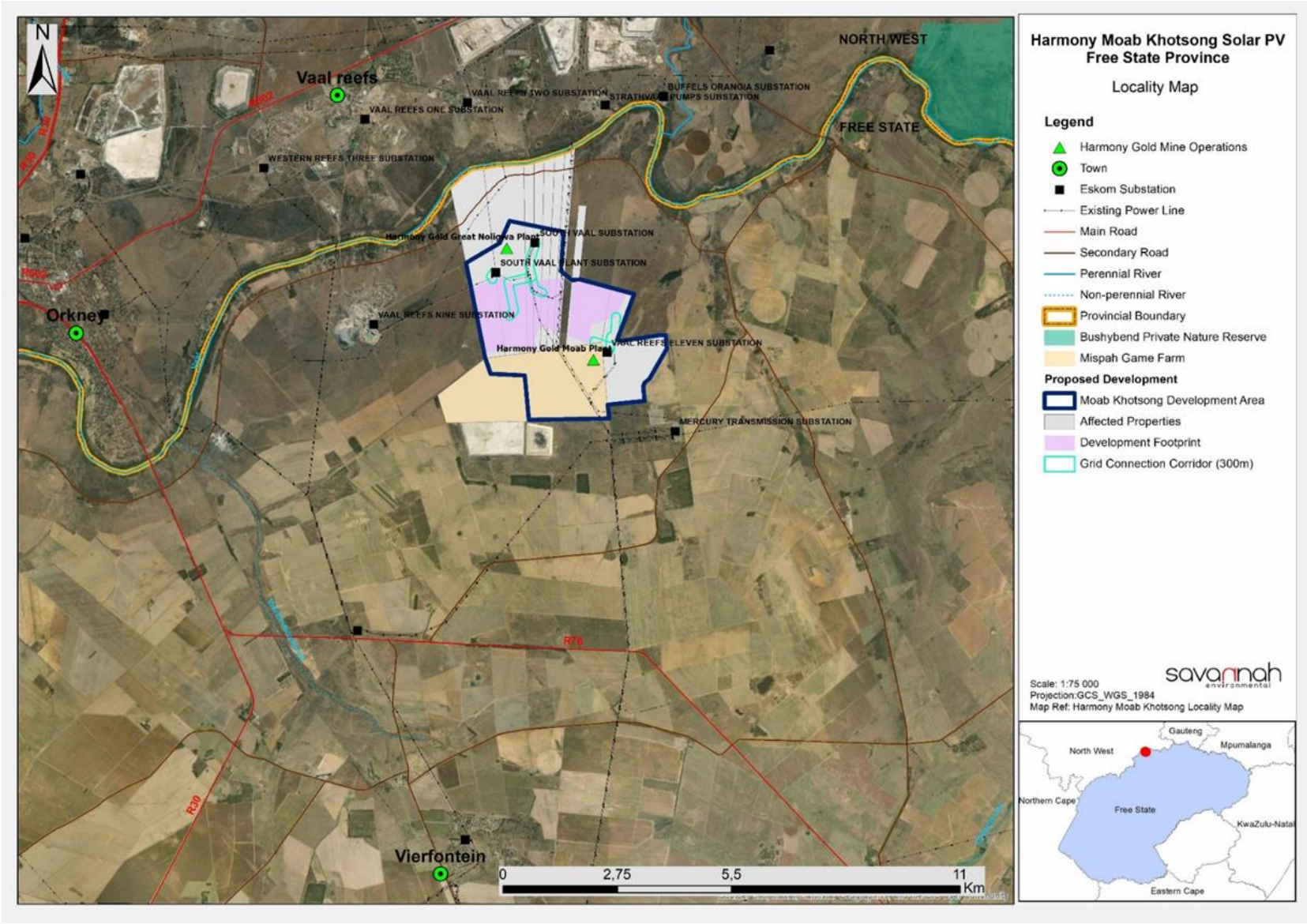


**Figure 1.1:** Locality map showing the location of the project site proposed for the development of the Harmony Moab Khotsong Solar PV Facility

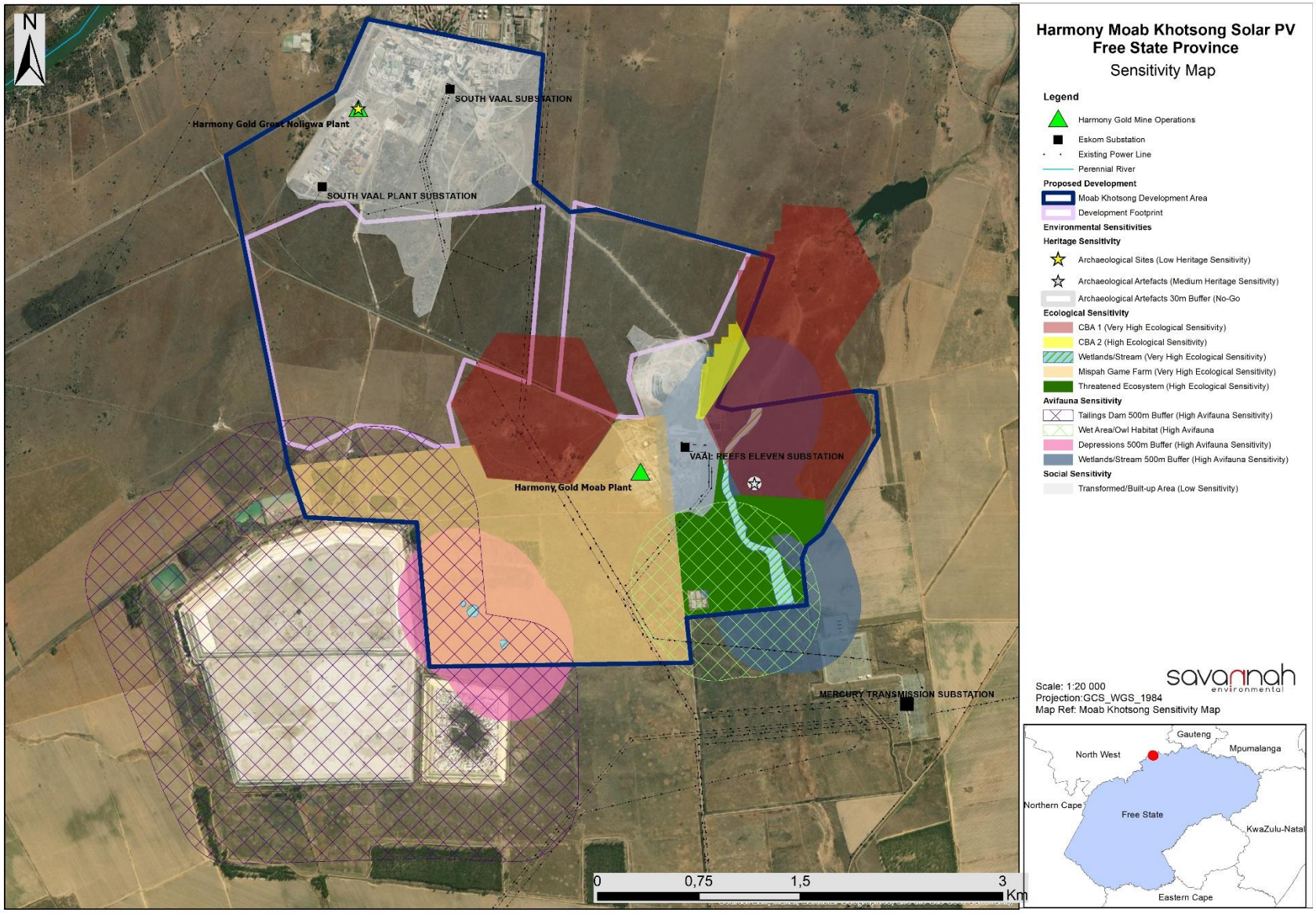


**Figure 1.2**: Environmental sensitivity map overlain with the development area and development footprint for the Harmony Moab Khotsong Solar PV Facility

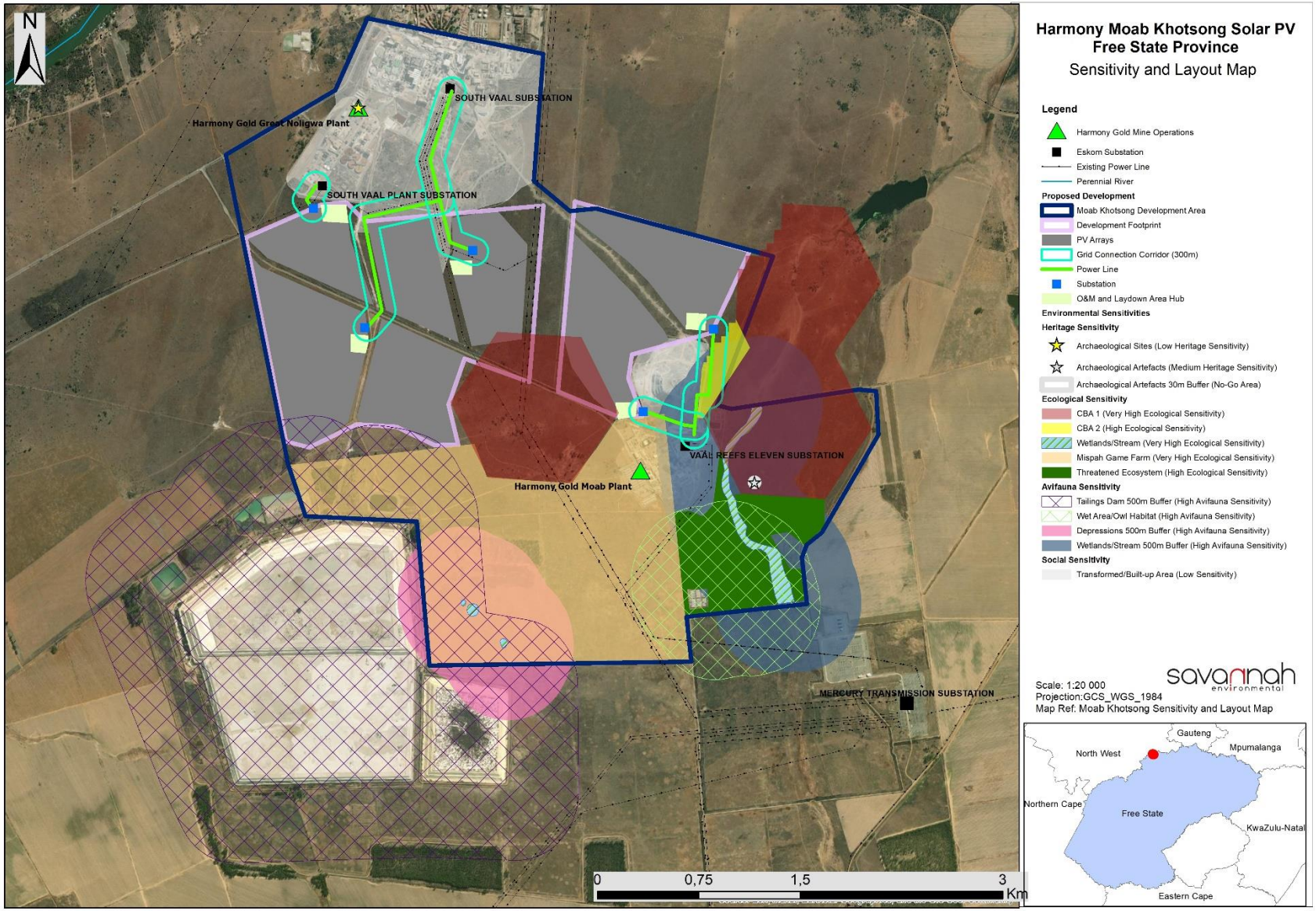


**Figure 1.3**: Environmental sensitivity map overlain with the facility layout

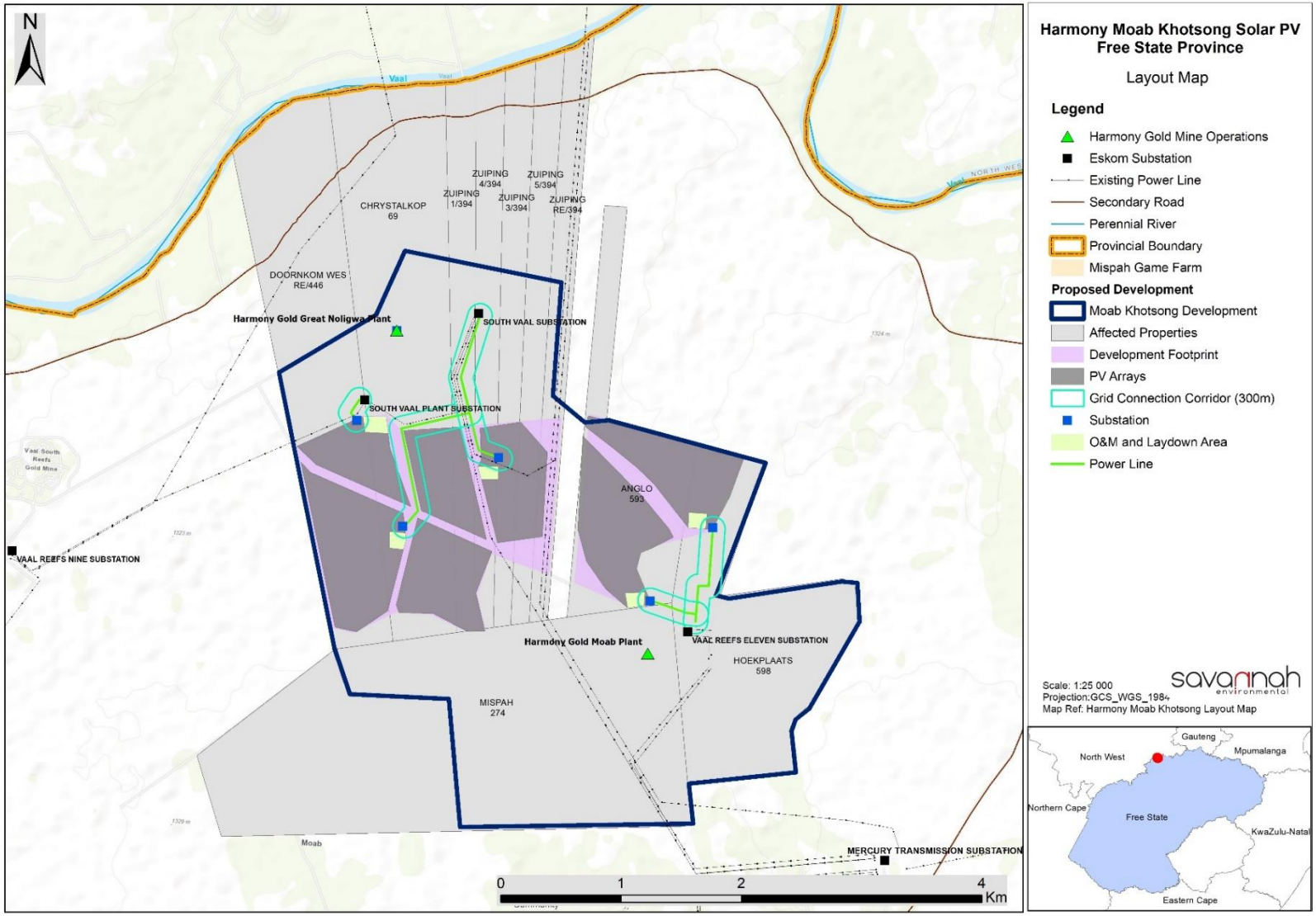


**Figure 1.**: Facility layout for the Harmony Moab Khotsong Solar PV Facility

# DEFINITIONS AND TERMINOLOGY

**Alien species:** A species that is not indigenous to the area or out of its natural distribution range.

**Alternatives:** Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

**Assessment:** The process of collecting, organising, analysing, interpreting, and communicating information which is relevant.

**Biodiversity:** The variables among living organisms from all sources, including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes they belong to.

**Commence:** The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

**Commissioning:** Commissioning commences once construction is completed. Commissioning covers all activities including testing after all components of the wind turbine are installed.

**Construction:** Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity. Construction begins with any activity which requires Environmental Authorisation.

**Cumulative impacts:** Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present, or reasonably foreseeable future activities (e.g., discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.

**Decommissioning:** To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.

**Development area:** The development area is that identified area (located within the project site) where the Harmony Moab Khotsong Solar PV Facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints, and has been assessed within this BA Report and by the respective specialists. The development area is up to ~900ha in extent.

**Development footprint:** The development footprint is the defined area where the PV panel array and other associated infrastructure for the Harmony Moab Khotsong Solar PV Facility is planned to be constructed. This is the anticipated actual footprint of the facility, and the area which would be disturbed. The exact size of the footprint is to be determined however, following initial layout optimisation, the footprint is up to ~450ha.

**Direct impacts:** Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g., noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation, or maintenance of an activity and are generally obvious and quantifiable.

**'Do nothing' alternative:** The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

**Ecosystem:** A dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

**Endangered species:** Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

**Emergency:** An undesired/ unplanned event that results in a significant environmental impact and requires the notification of the relevant statutory body, such as a local authority.

**Endemic:** An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

**Environment:** the surroundings within which humans exist and that are made up of:

i. The land, water, and atmosphere of the earth.
ii. Micro-organisms, plant, and animal life.
iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

**Environmental Authorisation (EA):** means the authorisation issued by a competent authority (Free State Department of Economic, Small Business Development, Tourism & Environmental Affairs (FSDESTEA)) of a listed activity or specified activity in terms of the National Environmental Management Act (No 107 of 1998) (NEMA) and the EIA Regulations promulgated under the NEMA.

**Environmental Assessment Practitioner (EAP):** An individual responsible for the planning, management and coordinating of EMPRs plan or any other appropriate environmental instruments introduced by legislation.

**Environmental Control Officer (ECO):** An individual appointed by the Owner prior to the commencement of any authorised activities, responsible for monitoring, reviewing, and verifying compliance by the EPC Contractor with the environmental specifications of the EMPr and conditions of the EA.

**Environmental impact:** An action or series of actions that have an effect on the environment.

**Environmental management:** Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment

**Environmental Management Programme (EMPr):** An operational plan that organises and co-ordinates mitigation, rehabilitation, and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

**Habitat:** The place in which a species or ecological community occurs naturally.

**Heritage:** That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

**Hazardous waste:** Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical, or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

**Indigenous Vegetation:** Defined in NEMA as: vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien plant infestation OR Land where the topsoil has not been lawfully disturbed during the preceding ten years.

**Incident:** An unplanned occurrence that has caused, or has the potential to cause, environmental damage.

**Indirect impacts:** Indirect or induced changes that may occur because of the activity (e.g., the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place because of the activity.

**Interested and affected party (I&AP):** Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.

**Method statement:** A written submission to the ECO and the site manager (or engineer) by the EPC Contractor in collaboration with his/her EO.

**No-go areas:** Areas of environmental sensitivity that should not be impacted on or utilised during the development of a project as identified in any environmental reports.

**Photovoltaic effect:** Electricity can be generated using photovoltaic panels (semiconductors), which are comprised of individual photovoltaic cells that absorb solar energy to produce electricity. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as the Photovoltaic Effect.

**Pollution:** A change in the environment caused by substances (radio-active or other waves, noise, odours, dust, or heat emitted from any activity, including the storage or treatment or waste or substances.

**Pre-construction:** The period prior to the commencement of construction, this may include activities which do not require Environmental Authorisation (e.g., geotechnical surveys).

**Project site:** The project site is that identified area within which the development area and development footprint are located. It is the broader geographic area assessed as part of the BA process, within which direct effects of the proposed project may occur. The project site is ~1400ha in extent.

**Project description:** A description of the proposed project that includes technical details of the siting, operation

**Renewable Energy Development Zones (REDZ):** Geographical areas where wind and solar PV development can occur in concentrated zones, creating priority areas for investment in the electricity grid and thereby increasing South Africa's green energy map by enabling higher levels of renewable power penetration.

**Residual impacts:** Predicted effects of a project on the environment after proposed mitigation measures have been adopted; in other words, the predicted actual effects of the project.

**Significant impact:** An impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment

# DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), the applicant has appointed Savannah Environmental (Pty) Ltd as the independent environmental consultant responsible for managing the Application for EA and supporting Basic Assessment process; inclusive of comprehensive, independent specialist studies. The application for EA and Basic Assessment process will be managed in accordance with the requirements of NEMA, the 2014 EIA Regulations (GNR 326), and all other relevant applicable legislation.

Neither Savannah Environmental nor any of its specialists are subsidiaries or are affiliated to the applicant. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed facility. Savannah Environmental is a leading provider of integrated environmental and social consulting, advisory and management services with considerable experience in the fields of environmental assessment and management. The company is wholly woman-owned (51% black woman-owned) and is rated as a Level 2 Broad-based Black Economic Empowerment (B-BBEE) Contributor. Savannah Environmental's team have been actively involved in undertaking environmental studies since 2006, for a wide variety of projects throughout South Africa, including those associated with electricity generation and infrastructure development.

The Savannah Environmental team for this project includes:

- **Chantelle Geyer** was the junior EAP on this project and the GIS Practitioner, she holds a BSc degree in Environmental Science, and a BSc Honours degree in Environmental Geology degree from the North-West University in Potchefstroom, South Africa. She is a Junior Environmental Consultant and specialises in basic assessments, environmental impact assessments, GIS-mapping, public participation administration, and environmental management programmes.
- **Ansoné Esterhuizen**, holds a Bachelor of Arts in Environmental Management and is currently completing her BSc Honours in Environmental Management. She has over 4 years of experience in conducting Environmental Impacts Assessments, public participation, and Environmental Management Programme for a wide range of projects including renewable energy projects. She is responsible for overall compilation of the report, this includes engaging specialist, reviewing specialists reports and incorporating specialist studies into the Environmental Impact Assessment report and its associated Environmental Management.
- **Karen Jodas** is Director at Savannah Environmental (Pty) Ltd and the project manager for the Harmony Gold projects, she holds a Master of Science Degree and is registered as a Professional Natural Scientist (400106/99) with the South African Council for Natural Scientific Professions (SACNASP). She has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation and transmission projects through her involvement in related EIA processes over the past 25 years. She has successfully managed and undertaken EIA processes for infrastructure development projects throughout South Africa.
- **Nicolene Venter,** is a Board Member of IAPSA (International Association for Public Participation South Africa). She holds a Higher Secretarial Diploma and has over 21 years of experience in public participation, stakeholder engagement, awareness creation processes and facilitation of various meetings (focus group, public meetings, workshops, etc.). She is responsible for project management of public participation processes for a wide range of environmental projects across South Africa and neighbouring countries.

Curricula vitae (CVs) detailing Savannah Environmental team's expertise and relevant experience are provided in **Appendix J1**.

# BASIC ASSESSMENT REPORT FOR REVIEW

This Basic Assessment Report has been prepared by Savannah Environmental to assess the potential environmental impacts associated with the project. This process is being undertaken in support of an application for EA from the Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA) in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA).

The 30-day period for review is from 26 September 2022 to 26 October 2022. The report is available for public review at (http://www.savannahsa.com/public-documents/energy-generation/). All comments received and recorded during the 30-day review and comment period will been included, considered, and addressed within the final BA Report to be submitted to the Competent Authority for consideration.

Comments should be submitted in writing on or before 26 October 2022 to the contact person below.

| Please submit your comments by **26 October 2022** to: |
|---|
| **Nicolene Venter** of **Savannah Environmental**<br>PO Box 148, Sunninghill, 2157<br>Tel: 011-656-3237<br>Mobile: 060 978 8396<br>Fax: 086-684-0547<br>Email: publicprocess@savannahsa.com |

Comments can be made as written submission via fax, post, or email.

# 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 K.

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Based on: Normal

## 1. PROJECT DESCRIPTION

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

Harmony Moab Khotsong Operations (Pty) Ltd is looking to supplement its energy supply by implementing Photovoltaic (PV) generation, aiding their transition to a more sustainable and environmentally friendly energy mix.

The development of a solar photovoltaic (PV) facility with a generating capacity of 100MW is proposed on a site located north of the Harmony Gold Moab and south of the Harmony Gold Great Noligwa operations, approximately ~10km north of the town of Vierfontein within the Moqhaka Local Municipality, Fezile Dabi District Municipality, Free State Province. The solar PV development will be known as Harmony Moab Khotsong Solar PV Facility.

The PV development area includes eleven (11) farm portions, all owned by the Mine.[1]
These include:

- Farm Anglo 593.
- Farm Hoekplaats 598.
- Farm Mispah 274.
- Portion 1 of Farm Zaaiplaats 190.
- Remaining Extent of Farm Doornkom Wes 446.
- Farm Chrystalkop 69; and
- Portions 1, 3, 4, 5, and the Remaining Extent of the Farm Zuiping 394.

The Harmony Moab Khotsong Solar PV Facility is located within the Klerksdorp Renewable Energy Development Zone (REDZ)[2] the project is therefore subject to a Basic Assessment (BA) process, as well as a shortened timeframe of 57 days for the processing of an Application for Environmental Authorisation in accordance with the EIA Regulations, 2014 (as amended), as well as GNR 114 as formally gazetted on 16 February 2018.

[1] Portion 2 of Farm Zuiping 394 not owned by Harmony and thus was purposely not included as there is no planned construction occurring on this property

[2] Renewable Energy Development Zones (REDZ) are geographical areas where wind and solar PV development can occur in concentrated zones, creating priority areas for investment in the electricity grid and thereby increasing South Africa's green energy map by enabling higher levels of renewable power penetration.

The generation is intended for own use by the Mine, reducing the Mine's reliance on Eskom. The preferred site for the project is on properties which are owned by the Mine and are available for the proposed project and is therefore deemed technically feasible for such development to take place. The project site is near both the Harmony Gold Moab and Great Noligwa Plants.

A project site[3] is considered to be technically suitable for the development of the solar PV facility, with an extent of approximately 1400ha, was identified. A development area[4] of ~900ha was demarcated within this project site and allows an adequate footprint[5] for the installation of a solar PV facility with a contracted capacity of up to 100MW, while allowing for the avoidance of environmental site sensitivities. See **Figure 2** for the locality of the proposed development.

The full extent of the project site is to be evaluated in the Basic Assessment process to identify environmental sensitivities. Site-specific studies and assessments have delineated areas of potential sensitivity within the development area (refer to **Figure 1.2**.). These have been avoided by the appropriate placement of infrastructure within the development footprint (refer to Figure 1.3).

The infrastructure associated with the 100MW solar PV facility will include:

» PV modules and mounting structures.
» Access roads, internal roads and fencing around the development area
» Temporary and permanent laydown areas
» Administrative building, control room, workshop, storage building, guard house, auxiliary buildings and structures, water supply infrastructure, weather station
» Peripheral boundary wall & fencing
» Inverters, transformers and up to 5 on-site facility substations and switching substations
» Cabling between the project components, to be laid underground where practical
» Grid connection infrastructure to be connected to the existing:
  - Vaalreefs Eleven Substation via a ~2km power line (located south-east of the facility).
  - Southvaal Plant Substation via a ~0.5km power line (located north-west of the facility); and
  - Southvaal Substation via a ~4km power line (located north of the facility).

The nearest towns in relation to the proposed development site are Orkney, Klerksdorp, Stilfontein, Viljoenskroon and Potchefstroom. The site is located approximately 2.7km south of the Vaal River, which also serves as the provincial boarder separating the Free State and the Northwest Province. Most of the site is located within the Vaal River Mining Area, the site is accessible via the Vermaasdrift road originating from the R76 south of the project site, and via the Stokkiesdraai road originating from the R30 west of the project site.

As of 2019, the Industrial sector was the leading electricity consumer in South Africa, with up to 56 percent of the total consumption (Ratshomo 2019). Mining and quarrying accounted for 10% of the industrial consumption (Chamber of Mines of South Africa, 2017). The successful development of the renewable energy project will enable Harmony Gold to make a valuable and meaningful contribution towards

[3] The project site is that identified area within which the development area and development footprint are located. It is the broader geographic area assessed as part of the BA process, within which direct effects of the proposed project may occur. The project site is ~1400ha in extent.
[4] The development area is that identified area where the 100MW PV facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints. The development area is ~900ha in extent.
[5] The development footprint is the defined area (located within the development area) where the PV panel array and other associated infrastructure for the Harmony Moab Khotsong Solar PV facility is planned to be constructed. This is the actual footprint of the facility, and the area which would be disturbed.

growing the green economy within the Free State Province and South Africa. This will assist the Free State in creating green jobs and reducing Greenhouse Gas emissions, while reducing the energy demand on the Eskom national grid.

**Table 1** below provides the details of the project, including the main infrastructure components and services that will be required during the project life cycle.

**Table 1:** Details of the proposed Harmony Moab Khotsong Solar PV Facility and associated infrastructure

| Component | Description / Dimensions |
|---|---|
| District Municipality | Fezile Dabi District Municipality |
| Local Municipality | Moqhaka Local Municipality |
| Ward Number (s) | Ward 22 |
| Nearest town(s) | Vierfontein (10km south) |
| Farm name(s) and number(s) of properties affected by the Solar Facility<br>Portion number(s) of properties affected by the Solar Facility<br>SG 21 Digit Code (s) | » Farm Anglo 593 (F03600000000059300000)<br>» Farm Hoekplaats 598 (F03600000000059800000)<br>» Farm Mispah 274 (F03600000000027400000)<br>» Portion 1 of Farm Zaaiplaats 190 (F036000000000019000001)<br>» Remaining Extent of Farm Doornkom Wes 446 (F03600000000044600000)<br>» Farm Chrystalkop 69 (F03600000000006900000)<br>» Portion 1 of Farm Zuiping 394 (F03600000000039400001)<br>» Portion 3 of Farm Zuiping 394 (F03600000000039400003)<br>» Portion 4 of Farm Zuiping 394 (F03600000000039400004)<br>» Portion 5 of Farm Zuiping 394 (F03600000000039400005)<br>» Remaining Extent of Farm Zuiping 394 (F03600000000039400000) |
| Current zoning | Mining and Agriculture |
| Site Coordinates (centre of development area) | 26°58'41.67"S, 26°47'4.78"E |
| Total extent of the Affected Properties, also referred to as the project site | ~1400ha |
| Total extent of the Development area | Up to ~900ha |
| Total extent of the Development footprint | Up to ~450ha |
| Contracted capacity of the facility | Up to 100MW |
| PV panels | Height: up to 4m from ground level (installed). |
| On-site Facility Substations and switching substations | » Located within the development footprint.<br>» Approximately 200m² in extent.<br>» The substations will connect to the existing Southvaal Plant, Vaalreefs, and Southvaal substations via new power lines. |
| Access gravel roads and internal roads | » Access to the proposed development area is provided by a secondary road that extends from the R76 road south of the proposed Harmony Moab Khotsong Solar PV Facility.<br>» A main gravel access road up to 8m in width and 200m in length will be constructed to provide direct access to the development area.<br>» A network of 6m wide (with a total length of 200m) gravel internal access roads will be constructed to provide access to the various components of the facility. |

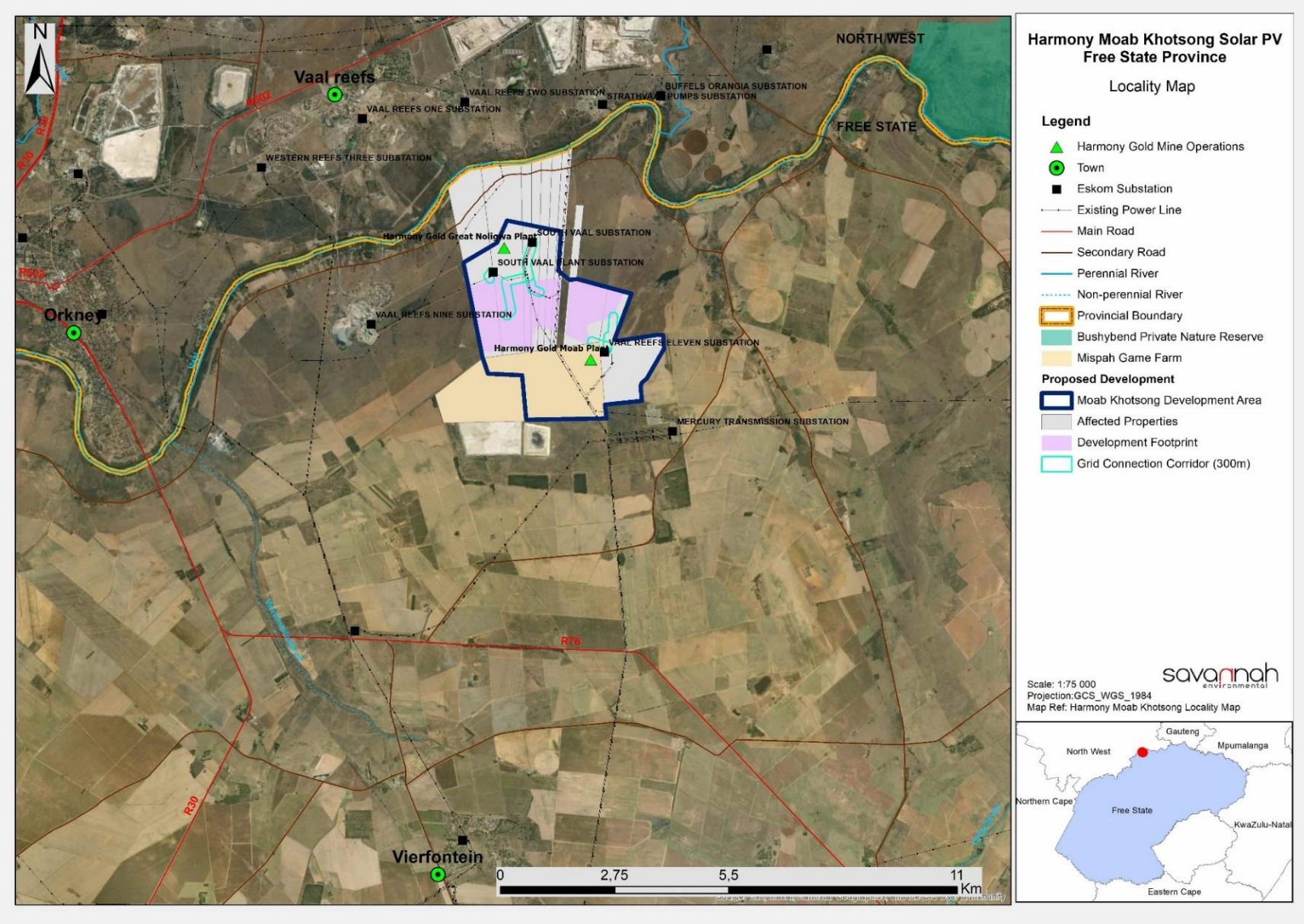


**Figure 2:** Locality map illustrating the location of the development area under investigation for the development of the 100MW Harmony Moab Khotsong Solar PV Facility

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

| Activity No(s): | Provide the relevant Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended | Describe the portion of the proposed project to which the applicable listed activity relates. |
|---|---|---|
| 11 (i) | The development of facilities or infrastructure for the transmission and distribution of electricity –<br>(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275kV or more. | ***Electrical infrastructure is required to connect the PV facility to the existing Vaalreefs Eleven, Southvaal, and Southvaal Plant Substations and will consist of 5 on-site substations and power line of more than 33kV and less than 275kV. The site falls outside of an urban area.*** |
| 12(ii)(a)(c) | The development of –<br>(ii) infrastructure or structures with a physical footprint of 100 square meters or more, where such development occurs –<br><br>(a) within a watercourse; or<br>(c) if no development setback exists, within 32 meters of a watercourse, measured from the edge of a watercourse. | ***Wetlands have been identified within the development area. The layout of the PV facility was designed to avoid these features. The construction of the grid connection solution requires infrastructure within a physical footprint >100m² located within 32 metres of a watercourse.*** |
| 14 | The development and related operation of facilities and infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. | ***The development of the project will require the construction and operation of facilities and infrastructure for the storage and handling of a dangerous good (combustible and flammable liquids, such as oils, lubricants, solvents) associated with the transformers and substation/s where such storage will occur inside containers with a combined capacity exceeding 80 cubic meters but not exceeding 500 cubic meters.*** |
| 19 | The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles, or rock of more than 10 cubic metres from a watercourse; | ***Wetlands have been identified within the development area. The layout of the PV facility was designed to avoid these features. The construction of the grid connection solution requires infrastructure within a physical footprint >100m² located within 32 metres of a watercourse.*** |
| 28 | Residential, mixed, retail, commercial, industrial, or institutional developments where such land was used for agriculture, game farming, equestrian purposes, or afforestation on or after 01 April 1998 and where such development:<br>(i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or<br>(ii) will occur outside an urban area, where the total land to be | ***The development is currently located on land, which is zoned for Agricultural use, although owed by a mining company.*** |

| | | |
|---|---|---|
| | developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial, or institutional purposes. | |
| **Activity No(s):** | **Provide the relevant Activity(ies) as set out in Listing Notice 2 of the EIA Regulations, 2014 as amended** | **Describe the portion of the proposed project to which the applicable listed activity relates.** |
| 1 | The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more | ***The project is a solar PV facility and will make use of solar energy as a renewable energy resource. The project will have a contracted capacity of up to 100MW$_{AC}$.***<br><br>***The project area falls within the Klerksdorp REDZ.*** |
| 15 | The clearance of an area of 20 hectares or more of indigenous vegetation. | ***The clearance of an area >20ha of indigenous vegetation will be required for the development of the PV facility and associated infrastructure.***<br><br>***The project area falls within the Klerksdorp REDZ.*** |
| **Activity No(s):** | **Provide the relevant Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended** | **Describe the portion of the proposed project to which the applicable listed activity relates.** |
| 4(b)(i) (gg) | The development of a road wider than 4 metres with a reserve of less than 13.5 metres.<br><br>b. Free State<br>i. Outside urban areas:<br>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.<br><br>(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas. | ***The development of Harmony Moab Khotsong Solar PV Facility will require the construction of a main gravel access road and internal gravel roads. The site is located in the Free State Province outside of an urban area and adjacent to the Mispah Game Farm, which classified as a Nature reserve in the South African Protected Areas Dataset (SAPAD).***<br><br>**The site in question is predominately listed as an Ecological Support Area 1 and 2 (ESA) which functions in support of the Vaal River which is situated approximately 1 km to the north of the site.**<br><br>***A CBA1 area is located in the center of the development area. The layout of the development footprint of the PV facility was designed to as far as possible avoid this CBA1 area.*** |

| | | |
|---|---|---|
| 10(b)(i) (gg)(hh) | The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.<br><br>b. Free State<br>i. Outside urban areas:<br><br>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.<br><br>(gg) Areas within 10 kilometres from national parks or would heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve; or<br><br>(hh) Areas within a watercourse or wetlands; or within 100 metres from the edge of a watercourse or wetland. | ***The development of the project will require the construction and operation of facilities and infrastructure for the storage and handling of a dangerous good (combustible and flammable liquids, such as oils, lubricants, solvents) associated with the on-site substation where such storage will occur inside containers with a combined capacity exceeding 30 cubic meters.***<br><br>***The site is located in the Free State Province, outside an urban area, and adjacent to the Mispah Game Farm, which classified as a Nature reserve in the South African Protected Areas Dataset (SAPAD).***<br><br>**The site in question is predominately listed as an Ecological Support Area 1 and 2 (ESA) which functions in support of the Vaal River which is situated approximately 1 km to the north of the site.**<br><br>***A CBA1 area is located in the center of the development area. The layout of the development footprint of the PV facility was designed to as far as possible avoid this CBA1 area.*** |
| 12 (b) (i) | The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.<br><br>b. Free State<br>i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; | ***An area in excess of 300m² of indigenous vegetation would be required to be cleared.***<br><br>**The site in question is predominately listed as an Ecological Support Area 1 and 2 (ESA) which functions in support of the Vaal River which is situated approximately 1 km to the north of the site.**<br><br>***A CBA1 area is located in the center of the development area. The layout of the development footprint of the PV facility was designed to as far as possible avoid this CBA1 area.*** |
| 14(ii)((a)(c)(b)(i) (hh) | The development of –<br>(ii) infrastructure or structures with a physical footprint of 10 square meters or more, where such development occurs –<br><br>(a) within a watercourse; or | **The development of the Harmony Moab Khotsong Solar PV Facility will require the establishment of infrastructure (including power lines, and internal access roads) with a physical footprint exceeding 10m². The grid connection infrastructure is located within 32m of a watercourse.** |

| | | |
|---|---|---|
| | (c) if no development setback exists, within 32 meters of a watercourse, measured from the edge of a watercourse.<br><br>b. Free State<br>i. Outside urban areas:<br>(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.<br><br>(hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere or reserve. | ***The site is located in the Free State Province, outside an urban area, and adjacent to the Mispah Game Farm, which classified as a Nature reserve in the South African Protected Areas Dataset (SAPAD).***<br><br>***Wetlands have been identified within the development area. The layout of the PV facility was designed to avoid these features. The construction of the grid connection solution requires infrastructure within a physical footprint >100m² located within 32 metres of a watercourse.***<br><br>**The site in question is predominately listed as an Ecological Support Area 1 and 2 (ESA) which functions in support of the Vaal River which is situated approximately 1 km to the north of the site.**<br><br>***A CBA1 area is located in the center of the development area. The layout of the development footprint of the PV facility was designed to as far as possible avoid this CBA1 area.*** |

## 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) of GN 326, Regulation 2014 as amended. 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.

The identification of alternatives should be in line with the Integrated Environmental Assessment Guideline Series 11, published by the DEA in 2004. Should the alternatives include different locations and lay-outs, the co-ordinates of the different alternatives must be provided. 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.

### a) Site alternatives

the property on which or location where it is proposed to undertake the activity

| **Alternative 1 (preferred alternative)** | | |
|---|---|---|
| Description | Lat (DDMMSS) | Long (DDMMSS) |
| The placement of a Solar PV Facility is dependent on several factors, including land suitability; climatic conditions (solar irradiation levels); topography; location of the study area; availability of grid connection infrastructure; extent of the study area; latitude of the site; and the need and desirability of the project. From a regional site selection perspective, the Free State region is considered to be favourable for the development of a Solar PV Facility as it is ranked number 3 amongst South Africa's provinces in terms of its estimated solar power generation potential. From a local level perspective, the project site has specifically been identified by Harmony Gold Mining (Pty) Ltd as | 26°58'31.63"S | 26°47'8.15"E |

| | | |
|---|---|---|
| being highly desirable for the development of a Solar PV Facility based on the following characteristics:<br><br>» **Solar resource:** The economic viability of a Solar PV Facility is directly dependent on the annual direct solar irradiation values of the area within which it will operate. The Global Horizontal Irradiation (GHI) for the study area is in the region of approximately 1900 - 2050 kWh/m$^2$/annum. This is considered feasible for the development of a Solar PV Facility. Based on the solar resource available, no alternative locations are considered.<br><br>» **Topography:** The topography of the study area is described as slightly undulating plains with an even (flat) slopes. The proposed development site itself is located at an average elevation of 1 310m above sea level and has an even slope to the north. The preferred site is located at an above mean sea level (amsl) of approximately 1308m at the highest elevation and at an amsl of 1296m at the lowest elevation.<br><br>» **Site extent:** The project site (i.e., the affected properties) is up to ~1400ha in extent, which is sufficient for the installation of a facility with a contracted capacity of up to 100MW and allowing for avoidance of environmental site sensitivities. The development area and footprint are up to ~900ha and 450ha in extent, respectively. The project site is sufficient for the proposed project and therefore eliminates the need to consider alternative locations.<br><br>» **Site access:** Access to the proposed development area is provided by a secondary road that extends from the R76 to the Harmony Moab Plant. A network of internal access roads will be constructed to provide access to the various components of the facility. Sufficient access is therefore available for the delivery of equipment and project components during construction and to access the site during operation. Based on the sufficient access available for the project, no alternative locations are considered.<br><br>» **Land suitability:** Land use activities within the broader region are predominantly described as agricultural, with the mining activities and the Harmony Gold Moab and Great Noligwa Plants prominently visible within the study area. The proposed project will not conflict with the current land use or any future mine expansions. Sites that facilitate easy construction conditions (i.e., relatively flat topography, lack of major rock outcrops etc.) are favoured during the site selection process | | |

| | | |
|---|---|---|
| for a Solar PV Facility, and the proposed project area fits this criterion.<br><br>» **Geographic location:** The development area is close to the Harmony Gold Moab and Great Noligwa Plants, two of Harmony Gold's operations.<br><br>» **Latitude of the site:** At higher latitudes, the angle of irradiation is smaller, causing energy to be spread over a large area of the surface, resulting in cooler temperatures. At lower latitudes (i.e., between 20° and 30°), the sun is higher in the sky, causing energy to be spread over a small area of the surface, resulting in warmer temperatures. The project site is located at a latitude of 26°58'31.63"S, 26°47'8.15"E which means that it receives high amounts of solar energy, making it suitable for the development of a Solar PV Energy Facility.<br><br>» **Access to the Electricity Grid –** A key factor in the siting of any power generation project is the availability of a viable grid connections. Following confirmation of sufficient available land for the development of the Solar PV Facility, the developer considered the possible grid connection points to evacuate the generated power from the PV facility to Harmony Gold Moab and Great Noligwa Plants respectively.<br><br>» **Environmental screening and consideration of sensitive environmental features:** Following the confirmation of the project site as being technically feasible for the development of a Solar PV Facility, specialist investigations of the development area were undertaken, during which sensitive features were identified. The sensitivity spatial data compiled by the specialist team for the development area and the broader area was provided to Harmony Moab Khotsong Operations (Pty) Ltd prior to the lodging of the application for the EA. Through the integration of the specialist sensitivity data obtained, Harmony Moab Khotsong Operations (Pty) Ltd developed a layout that avoids areas and features of high environmental sensitivity.<br><br>As the overall purpose of the facility is to generate power for use by the Harmony Gold Moab and Great Noligwa Plants, Harmony Moab Khotsong Operations (Pty) Ltd has identified a 900ha site (comprising the Farm Anglo 593, Farm Hoekplaats 598, Farm Mispah 274, Portion 1 of Farm Zaaiplaats 190,, Remaining Extent of Farm Doornkom Wes 446, Farm Chrystalkop 69, as well as Portions 1, 3, 4, 5, and the Remaining Extent of the Farm Zuiping 394) as the most feasible option for the development of the | | |

| | | |
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| facility. This decision was based on land availability for the development of a Solar PV Facility; the proximity to Harmony Gold's Moab and Great Noligwa Plant operations (the exclusive offtakers of the generated power); and the distance from viable grid connection points.<br><br>Based on the above site-specific attributes and considerations, the development area was identified by Harmony Moab Khotsong Operations (Pty) Ltd as being the most technically feasible and viable site within the broader area for further investigation in support of an application for EA. | | |
| **Alternative 2** | | |
| Taking into consideration the solar resource, grid access, land suitability, landowner support, access to road infrastructure, the current land use of the project site and development area, the Harmony Moab Khotsong Solar PV Facility project site was identified by the developer as being the most technically feasible and viable project site within the broader area for further investigation in support of an application for authorisation. As a result, no property alternatives are proposed as part of this Basic Assessment process. | Lat (DDMMSS) | Long (DDMMSS) |
| | | |
| **Alternative 3** | | |
| Description | Lat (DDMMSS) | Long (DDMMSS) |
| | | |

**b) The type of activity to be undertaken.**
**In the case of linear activities:**

| **Alternative:** | **Latitude (S):** | **Longitude (E):** |
|---|---|---|
| Alternative S1 (preferred) | | |
| **This comprises 5 power lines, including:** | | |
| **Southvaal Plant Substation Power Line:** | | |
| • Starting point of the activity | 26°58'12.24"S | 26°46'25.05"E |
| • Middle/Additional point of the activity | 26°58'14.86"S | 26°46'23.57"E |
| • End point of the activity | 26°58'17.55"S | 26°46'24.92"E |
| **Southvaal Substation Power Line 1:** | | |
| • Starting point of the activity | 26°57'47.66"S | 26°46'59.92"E |
| • Middle/Additional point of the activity | 26°58'6.53"S | 26°46'56.20"E |
| • End point of the activity | 26°58'25.60"S | 26°47'8.89"E |
| **Southvaal Substation Power Line 2:** | | |
| • Starting point of the activity | 26°58'13.69"S | 26°46'58.33"E |
| • Middle/Additional point of the activity | 26°58'19.84"S | 26°46'38.67"E |
| • End point of the activity | 26°58'45.38"S | 26°46'41.40"E |

**Vaalreefs Eleven Substation Power Line 1:**

| | | |
|---|---|---|
| • Starting point of the activity | 26°59'6.18"S | 26°48'10.19"E |
| • Middle/Additional point of the activity | 26°58'54.56"S | 26°48'13.61"E |
| • End point of the activity | 26°58'40.55"S | 26°48'13.92"E |

**Vaalreefs Eleven Substation Power Line 2:**

| | | |
|---|---|---|
| • Starting point of the activity | 26°59'4.23"S | 26°48'10.01"E |
| • Middle/Additional point of the activity | 26°59'3.07"S | 26°48'4.04"E |
| • End point of the activity | 26°59'1.03"S | 26°47'56.09"E |

Alternative S2 (if any)

| | | |
|---|---|---|
| • Starting point of the activity | | |
| • Middle/Additional point of the activity | | |
| • End point of the activity | | |

Alternative S3 (if any)

| | | |
|---|---|---|
| • Starting point of the activity | | |
| • Middle/Additional point of the activity | | |
| • End point of the activity | | |

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

In the case of an area being under application, please provide the co-ordinates of the corners of the site as indicated on the lay-out map provided in Appendix A of this form.

The Grid connection infrastructure proposed for the site was determined the most feasible based on the environmental sensitivities and the proximity to the Vaalreefs Eleven, Southvaal, and Southvaal Plant Substations respectively.

Grid connection infrastructure to be connected to the existing:
» Vaalreefs Eleven Substation via a ~2km power line (located south-east of the facility).
» Southvaal Plant Substation via ~0.5km power line (located north-west of the facility); and
» Southvaal Substation via a ~4km power line (located north of the facility).

The power lines are being assessed within 300m wide corridors.

**c) Lay-out alternatives**

| **Alternative 1 (preferred alternative)** | | |
|---|---|---|
| Description | Lat (DDMMSS) | Long (DDMMSS) |
| The full extent of the affected properties (including the Farm Anglo 593, Farm Hoekplaats 598, Farm Mispah 274, Portion 1 of Farm Zaaiplaats 190, Remaining Extent of Farm Doornkom Wes 446, Farm Chrystalkop 69, as well as Portions 1, 3, 4, 5, and the Remaining Extent of the Farm Zuiping 394) is ~ 1400ha in extent, which is sufficient for the installation of a Solar PV Facility with a contracted capacity of 100MW, while allowing for the avoidance of environmental site sensitivities. A development area of ~900ha has been identified within the affected properties, within which the solar PV facility and its associated infrastructure will be located. The location of the development footprint was informed by the findings of the specialist investigations undertaken during the BA process.<br><br>Areas to be avoided by the project were identified, specifically relating to ecological, heritage and/or aquatic features. The identified sensitivities were utilised as a tool by Harmony Moab Khotsong Operations (Pty) Ltd, to identify and locate the development footprint within the project site and development area. This was undertaken with the aim of avoiding possible sensitive areas within the development footprint as far as possible, to limit impacts associated with the project.<br><br>The environmental sensitivity identification process has informed the layout design for the PV facility, avoiding sensitive areas as far as possible, and thereby ensuring that the layout plan taken forward for consideration during the BA process is the most optimal from an environmental perspective. No layout alternatives are therefore considered further in this BA. | N/A | N/A |
| **Alternative 2** | | |
| Description | Lat (DDMMSS) | Long (DDMMSS) |
| | | |
| **Alternative 3** | | |
| Description | Lat (DDMMSS) | Long (DDMMSS) |
| | | |

**d) Technology alternatives**

| **Alternative 1 (preferred alternative)** |
|---|
| Since the development area is unsuitable for wind generation, solar energy has been identified by Harmony Moab Khotsong Operations (Pty) Ltd as the preferred technology for implementation within the development area. Few technology options are available for solar facilities, and the use of those that are considered are usually differentiated by weather and temperature conditions that prevail in the area, so that optimality is obtained by the final site selection. Solar energy is considered the most suitable renewable energy technology for this area, based on-site location, ambient conditions, and |

| |
|---|
| energy resource availability. Solar PV was therefore determined as the most suitable option for further assessment, and no other technology alternatives are being assessed for the project.<br><br>Several solar PV technology alternatives are available, including *inter alia*:<br><br>» Bifacial PV panels.<br>» Monofacial PV panels.<br>» Fixed mounted PV systems (static / fixed-tilt panels).<br>» Single-axis tracking or double-axis tracking systems (with solar panels that rotate around a defined axis to follow the sun's movement).<br>» Monocrystalline modules, polycrystalline modules, or thin film modules.<br><br>The primary difference between PV technologies available relate to the extent and height of the facility; however, the potential for environmental impacts remains similar in magnitude. Fixed mounted PV systems can occupy a smaller extent and have a lower height when compared to tracking PV systems, which require both a larger extent of land, and are taller in height. However, both options are considered acceptable for implementation from an environmental perspective. Bifacial solar PV panels offer many advantages over Monofacial PV panels, as power can be produced on both sides of the module, increasing total energy generation. Monocrystalline polycrystalline or thin film modules differ mainly in their cost and efficiency values, but do not represent a fundamentally different panel design type from an environmental perspective. The preference will, therefore, be determined on technical considerations and the site conditions.<br><br>The PV panels are designed to operate continuously for more than 30 years, mostly unattended and with low maintenance. The impacts associated with the construction, operation, and decommissioning of the facility are anticipated to be the same irrespective of the PV panel selected for implementation.<br><br>The preferred technology option will be informed by efficiency as well as environmental impact and constraints (such as sensitive biophysical features). The PV panels proposed, will comprise solar panels which once installed, will stand less than 5m above ground level. |
| **Alternative 2** |
| [redacted] |
| **Alternative 3** |
| [redacted] |

**e) other alternatives (e.g., scheduling, demand, input, scale, and design alternatives)**

| **Alternative 1 (preferred alternative)** |
|---|
| No alternative is applicable |
| **Alternative 2** |
| [redacted] |
| **Alternative 3** |
| [redacted] |

**f) No-go alternative**

The 'do-nothing' alternative is the option of not constructing the Harmony Moab Khotsong Solar PV facility at the identified site in the Free State.

Should this alternative be selected, there would be no environmental impacts or benefits as a result of construction and operation activities associated with the solar PV facility for the Harmony Gold Moab and Great Noligwa Plants.

The 'do-nothing' alternative will therefore likely result in minimising the cumulative impact on the land, although the current land use activities on the project site (mining and agriculture) will continue. The socio-economic benefits associated with the implementation of the project would not be realised.

This alternative is assessed in detail in **Section D (2).**

**g) Conclusion**

Before the initiation of the project for the Harmony Moab Khotsong PV facility a pre-feasibility study was done to determine the high-level environmental sensitivities. An area of approximately 1400ha was evaluated between the Harmony Gold Moab and Great Noligwa Plants, from this a feasible project site of 900ha was determined for evaluation by specialists.

The specialist assessments highlighted and ground truthed environmental sensitivities within the project site and a development area of approximately 900ha was put forward to the developer for the location and design of a project development footprint. The development of the Harmony Moab Khotsong Solar PV Facility with a capacity of up to 100MW would require the clearance of up to 450ha for the placement of the solar PV panel array and associated infrastructure, it was however established that the majority of the development footprint (450ha).

The Applicant considers the preferred development area within the study area as being highly favourable and suitable for the establishment of a solar PV facility. The PV facility will be located within close proximity of the Harmony Gold Moab and Great Noligwa Mines. Furthermore, with the site being near the existing Mine Substations, this ensures that the power lines will be relatively short, saving on costs and further reducing cumulative environmental impacts associated with power line infrastructure. The characteristics considered were identified by the developer as the main aspects that play a role in the opportunities and limitations for the development of a Solar PV facility.

**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 1[6] (preferred activity alternative) | 450ha – development footprint area for the PV facility |
| Alternative 2 (if any) | |
| Alternative 3 (if any) | |

or, for linear activities:

| **Alternative:** | **Length of the activity:** |
|---|---|
| Alternative 1 (preferred activity alternative) | ~up to 2km – length of the Vaalreefs Eleven Substation grid line (linear component). |
| | ~up to 0,5km – length of the Vaalreefs Eleven Substation grid line two (linear component). |
| | ~up to 0.5km – length of the Southvaal Plant Substation grid line (linear component). |
| | ~up to 1.5km – length of the Southvaal Substation grid line (linear component). |
| | ~up to 2.5km – length of the Southvaal Substation grid line two (linear component). |
| Alternative 2 (if any) | |
| Alternative 3 (if any) | |

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

| **Alternative:** | **Size of the site/servitude:** |
|---|---|
| Alternative 1 (preferred activity alternative) | |
| Alternative 2 (if any) | |
| Alternative 3 (if any) | |

[6] "Alternative .." refer to activity, process, technology or other alternatives.

**4. SITE ACCESS**

| | |
|---|---|
| Does ready access to the site exist?<br>**[Access to the proposed development area is provided by a secondary road]** | [redacted] **NO** |
| If NO, what is the distance over which a new access road will be built | 200m |

Describe the type of access road planned:

The nearest towns in relation to the proposed development site are Orkney, Klerksdorp, Stilfontein, Viljoenskroon and Potchefstroom. The site is located approximately 2.7km south of the Vaal River, which also serves as the provincial boarder separating the Free State and the Northwest Province. Most of the site is located within the Vaal River Mining Area, the site is accessible via the Vermaasdrift road originating from the R76 south of the project site, and via the Stokkiesdraai road originating from the R30 west of the project site.

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.

**1. 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 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.

A locality map has been included as part of this report as **Appendix A1**.

**2. 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.

A layout plan has been included as part of this report within **Appendix A3**.

**3. 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:

» 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.

A map of the layout overlain with the environmental sensitivities has been included as part of this report within **Appendix A4**.

**5. 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.

Refer to **Appendix B** for the site photographs.

**6. 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.

A facility illustration has been included as part of this report within **Appendix C**.

## 7. ACTIVITY MOTIVATION

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

| | | | |
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| **1. Is the activity permitted in terms of the property's existing land use rights?** | | **NO** | Please explain |
| The proposed project is located between the Harmony Gold Moab and Great Noligwa Plants (owned and operated by Harmony Gold) and is proposed to be developed on properties owned by Harmony Moab Khotsong Operations (Pty). The proposed site is currently zoned as mining and agriculture. Therefore, the site will be required to be rezoned for the specified use, as may be required by the municipality. | | | |
| **2. Will the activity be in line with the following?** | | | |
| **(a) Provincial Spatial Development Framework (PSDF)** | **YES** | | Please explain |
| The Free State PSDF is a provincial spatial and strategic planning policy that responds to and complies with, in particular, the National Development Plan (NDP) Vision 2030 and the National Spatial Development Perspective (NSDP). This framework promotes a developmental state in accordance with the principles of global sustainability as is stated by, among others, the South African Constitution, and the enabling legislation. The FS PSDF is based on six growth and development pillars, each of which has its own set of drivers with long-term programmes. Pillar 1 highlights the job creation, economic and sustainable growth by expanding and maintaining basic road infrastructures and through the implementation of alternative electricity infrastructure.<br><br>The proposed project will create temporary employment opportunities during the construction phase, and no permanent employment opportunities during the operational phase. The proposed project is a renewable energy facility that will provide power to Harmony Gold Moab and Great Noligwa operations, resulting in a reduction of pressure from Harmony Gold Mining's operations on the Eskom national grid. Therefore, the proposed project is in line with the Free State PSDF. | | | |
| **(b) Urban edge / Edge of Built environment for the area** | **YES** | NO | Please explain |
| The proposed project site is located just outside the urban areas ~10km north of Vierfontein. The site falls outside the urban edge and is located between the Harmony Gold Moab and Great Noligwa Plants mining boundaries. | | | |

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| **(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** | | Please explain |

The project will create direct job opportunities that will stimulate the local economy and produce power through harnessing the solar resource from the project site and is therefore considered an example of sustainable development. As such, the project aligns with the vision of the Moqhaka Local Municipality: "*strives to be a Municipality that creates an enabling environment for socio economic growth and sustainable development.*" and with the mission**:**

"*To maintain and enhance quality of life by providing effective, efficient quality and affordable services equitably and facilitating sustainable socio-economic growth through active community participation.*"

The project will therefore not compromise the integrity of the IDP.

The Municipality's vision and mission are translated into the following six municipal key performance areas:

- KPA1: Basic Service Delivery
- KPA 2: Good Governance and Public Participation
- KPA 3: Local Economic Development
- KPA 4: Municipal Financial Viability and Management
- KPA 5: Municipal Transformation and Institutional Development
- KPA 6: Social and Community Development.

The Moqhaka Local Municipality recognizes the need to meet the energy requirements of its residents in a dynamic changing sector. The LM understands the benefits of renewable energy development as playing the following factors to the region:

- Savings on the current and already substantial Eskom Bill as the Project's tariff is lower than the Eskom tariff and the escalation rate is fixed per year at its applicable CPI rates during the life cycle of the Project.
- Potential to attract foreign investments and subsequently achieve economic growth.
- Additional revenue stream due to the innervational technology, which has the potential to enable the selling of excess power to Eskom or another off-taker.
- Refinancing the current Eskom debt for immediate relief.
- Financial investment into the municipality jurisdiction that will boost the economic cycle of the community.
- New upcoming industrialization activity attraction.
- Job creation, skills development, and Small Medium Micro Enterprises (SMME) development; and
- Transforming the energy sector in SA and Africa as per its current timeline.

For the mining sector the major challenges include the over-dependence of the local economies on mining. Linked to these key sectors is the need to consider youth development. The key issues pertaining to both the province and the MLM include:

- African youths are the majority in the Free State, and they are also the most disadvantaged. Consequently, all attempts at intervening on behalf of youths should mainly target the African youth.
- There is an inherent lack of skills particularly amongst the African and Coloured youths, which leads to high unemployment amongst these groups.
- Youths are both perpetrators and victims of wrong social behaviours. They are at risk of being exposed to risky sexual behaviour, HIV & AIDS, and being head of a household.

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| **(d) Approved Structure Plan of the Municipality** | **YES** | | Please explain |

There are several renewable energy projects that are proposed in the Moqhaka Local Municipality under the Department of Mineral Resources and Energy (DMRE's) Renewable Energy Independent Power Producers Procurement Programme (REIPPPP). However, the proposed Harmony Moab Khotsong Solar PV Facility will be developed to supply the generated power to Harmony Gold Moab and Great Noligwa Plants as a way of reducing total carbon emissions and diversifying the electricity supply to its Harmony Gold Moab and Great Noligwa Plant's operations.

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| **(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?)** | | **NO** | Please explain |

The objectives of the Moqhaka Local Municipality EMF include:

» Support informed and integrated decision-making by making significant and detailed information about an area available before activity proposals are generated.
» Contribute to environmentally sustainable development by anticipating potential impacts and by providing early warnings in respect of thresholds, limits, and cumulative impacts, and by identifying already existing impacts to be addressed.
» Support the undertaking of environmental impact assessments in the area by indicating the scope of potential impacts and information needs that may be necessary for environmental impact assessments

Ultimately, an EMF is a decision support tool, which ensures that the competent authority has sufficient information to guide EIA authorization decisions within a specific geographical area. An EMF must be adopted by the relevant MEC and published in the Government Gazette.

What is clear is that the legal mandate for EMF is vested with the EIA authorities and not directly with the local municipality responsible for land use management in the area. Therefore, efforts should be made to ensure integration of processes and co-operative management between the environmental authorities and the Moqhaka Local Municipality.

Qualified specialists have conducted comprehensive environmental studies to determine the potential environmental impacts and mitigation methods associated with the development of the Harmony Khotsong Moab Solar PV facility. These studies were analysed by environmental practitioners and the findings will be provided to the local, district and national authorities prior to releasing the final BA report.

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| The project will therefore not compromise the integrity of the EMF. | | | |
| **(f) Any other Plans (e.g., Guide Plan)** | | **NO** | Please explain |
| N/A | | | |
| **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** | | Please explain |
| The main purpose of the development is to generate electricity from a renewable resource, which will be supplied to Harmony Gold Moab and Great Noligwa operations respectively. The project is not specifically considered within the approved municipal SDF. However, the municipality identified basic service delivery such as electricity, job creation and economic growth as priorities within the SDF and IDP both locally and within the district municipality. The proposed development will assist in achieving these objectives. | | | |
| **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** | | Please explain |
| The proposed development will benefit the local community through job creation, skills development opportunities, and training which will, in turn, assist in reducing the poverty levels that the area is currently facing, and indirectly strengthen the electricity supply for the area. The solar facility will generate power for the Mine's own use, reducing the Mine's reliance on the Eskom power supply/network.<br><br>The project will also assist the government in achieving the goal of adding new capacity from renewable energy as part of the electricity generation technology mix by 2030. In addition, the project will assist in the reduction of the need to mine non-renewable resources such as coal for conventional power generation. | | | |
| **5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater to the development? (Confirmation by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)** | **YES** | | Please explain |
| The Moqhaka Local Municipality will be engaged prior to commencement of the development. | | | |

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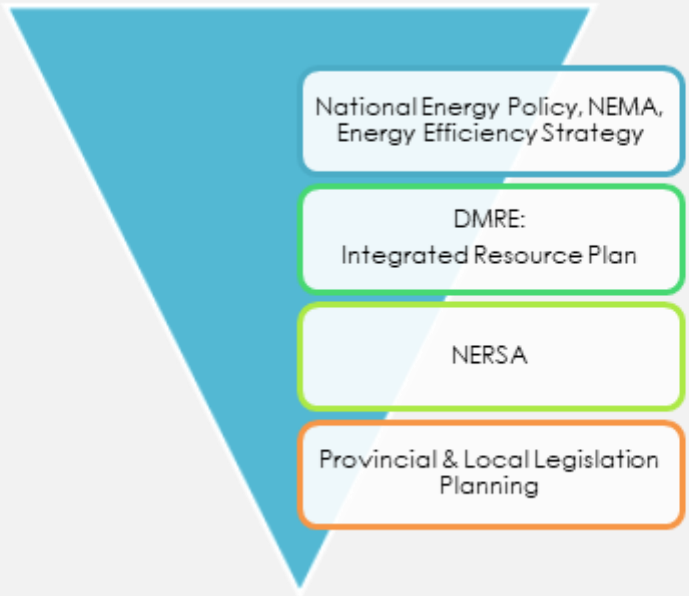
| **6. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)? (Comment by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)** | | **NO** | Please explain |
| The proposed project is to be developed by a private developer (i.e., Harmony Gold). It, therefore, does not fall within, nor does it have any implications for the infrastructure planning of the municipality. | | | |
| **7. Is this project part of a national programme to address an issue of national concern or importance?** | **YES** | | Please explain |
| The need to expand electricity generation capacity in South Africa is based on national policy and informed by on-going strategic planning undertaken by the Department of Mineral Resources and Energy (DMRE). The hierarchy of policy and planning documentation that support the development of renewable energy projects such as a solar energy facility is illustrated below.<br>  <br><br>The South African energy industry is evolving rapidly, with regular changes to legislation and industry role-players. The regulatory hierarchy for an energy generation project of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels. As solar energy developments are a multi-sectoral issue (encompassing economic, spatial, biophysical, and cultural dimensions) various statutory bodies are likely to be involved in the approval process of a solar energy project and the related statutory environmental assessment process.<br><br>The energy action plan announced by Ramaphosa on 25 July 2022 is multi-faceted. It is aimed at ensuring energy security in South Africa by making improvements to Eskom, the country's state-owned public utility, curbing loadshedding and transforming the energy framework. A role is envisaged for South Africans to be part of the solution.<br><br>In the plan the following aims were set out | | | |

- » *A complete scrapping of licensing requirements for private energy projects* that feed into the electricity grid. Until August 2021, all energy generation facilities of more than 1MW required a licence. Then, the cap was lifted to 100MW – which led to more than 80 private sector electricity projects with a combined planned capacity of over 6 000MW.
- » Over the next three months, *Eskom will start to buy electricity from existing independent power producers*.
- » *Eskom will import power from Botswana and Zambia*, which have more electricity capacity than they require.
- » Government departments will now take a "*pragmatic approach*" *to the requirements to use locally manufactured inputs* for green energy projects.
- » The amount of new generation capacity procured through *Bid Window 6 for wind and solar power will be doubled from 2 600 MW to 5 200 MW*. Further bid windows will be released "on an expedited basis".
- » *Special legislation will be tabled* in Parliament soon to address the legal and regulatory obstacles to new generation capacity "for a limited period". Ramaphosa says it currently takes almost 1 000 days to get a project from design to operation due to all the necessary regulatory approvals and red tape.
- » *Eskom has been given the go-ahead to increase its budget* over the next 12 months for critical maintenance.
- » Businesses and households will be encouraged to install rooftop solar and to connect this to grid.
- » To incentivise greater uptake of rooftop solar, Eskom will develop rules and a pricing structure – known as a feed-in tariff – for all commercial and residential installations on its network.
- » Eskom will be constructing its first solar and battery storage projects at Komati, Majuba, Lethabo and several other power stations. These will result in over 500MW being added to the system.
- » A National Energy Crisis Committee, which is chaired by the director-general in the Presidency has been established and brings together all the departments and entities involved in the provision of electricity. Ramaphosa said the ministers on the committee will report to him directly on a regular basis.

Harmony Moab Khotsong Solar PV Facility is proposed in specific response to the requirement for diversification of the country's energy mix to include renewable energy such as solar PV as detailed in the IRP 2019. The Harmony Moab Khotsong Solar PV Facility will be developed to supply the generated power to Harmony Gold Moab and Great Noligwa Plants as a way of reducing total carbon emissions and diversifying the electricity supply to its Harmony Gold Moab and Great Noligwa Plant's operations.

The above-mentioned energy plans have been extensively researched and are updated on an on-going basis to take into consideration changing scenarios, new information, developments in new technologies, and to reflect updated demands and requirements for energy production within the South African context. These plans form the basis of South Africa's energy generation sector and dictate national priorities for energy production.

Within a policy framework, the development of renewable energy in South Africa is supported by the White Paper on Renewable Energy (November 2003). In order to meet the long-term goal of sustainable renewable energy industry, a goal of 17.8GW of renewables by 2030 has been set by the DMRE within the Integrated Resource Plan (IRP) 2019. This energy will be produced mainly from wind, solar, biomass, and small-scale hydro (with wind and solar comprising the bulk of the power generation capacity). This amounts to ~42% of all new power generation being derived from renewable energy forms by 2030. This is however dependent on the assumed learning rates and associated cost reductions for renewable options.

Power generated at the proposed Harmony Moab Khotsong Solar PV Facility will be evacuated to Harmony Gold Moab and Great Noligwa operations respectively. This will reduce Harmony Gold's direct dependency on the supply of energy from the national grid.

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| **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.)** | **YES** | | Please explain |

The site for the development of the Harmony Moab Khotsong Solar PV Facility is situated on land owned by Harmony Moab Khotsong Operations (Pty) Ltd, the exclusive offtake of the power to be generated by the facility. The location of the facility includes benefits such as that the project site is located between the Harmony Gold Moab and Great Noligwa Plants, and that the various points of connection, i.e., the Vaalreefs Eleven Substation via a 2km power line (located south-east of the facility), the Southvaal Plant Substation via an up to 0.5km power line (located north-west of the facility), and the Southvaal Substation via a 4km power line (located north of the facility).

The proposed Harmony Moab Khotsong Solar PV Facility will be developed to supply the generated power to Harmony Gold Moab and Great Noligwa Plants as a way of reducing total carbon emissions and diversifying the electricity supply to its Harmony Gold Moab and Great Noligwa Plant's operations.

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| **9. Is the development the best practicable environmental option for this land/site?** | **YES** | | Please explain |

Sections of the proposed site have been transformed and altered through historical anthropogenic activities. This facility will be contributing to a positive and sustainable function for the site in the long-term, as it will no longer be available for mining activities as well as for other transformation activities taking place on-site as fencing will be placed around the facility, decreasing accessibility. The PV facility will also reduce the Harmony Gold's dependency on non-renewable power sources for the operation of the Harmony Gold Moab and Great Noligwa operations, as well as produce "clean" energy that will not have a detrimental effect on the broader environment.

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| **10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?** | **YES** | | Please explain |

The negative impacts associated with the proposed activity include localised impacts on vegetation, soils, and land use and are expected to be limited to the development footprint and are not considered to be of high significance (refer to **Section D**). All impacts can be managed and mitigated to acceptable levels, as outlined in the Environmental Management Programme.

Sections of the proposed site have been transformed and altered through historical anthropogenic activities. This facility will be contributing to a positive and sustainable function for the site in the long-term. The PV facility will also reduce the Harmony Gold's dependency on non-renewable power sources for the operation of Harmony Gold Moab and Great Noligwa operations, as well as produce "clean" energy that will not have a detrimental effect on the broader environment.

Positive impacts associated with the facility include i) the diversifying of the power use for Harmony Gold Moab and Great Noligwa Plant's operations ii) generation of electricity from a renewable resource also reduces reliance (although limited) on conventional power sources; iii) local economic upliftment and minimal job creation iv) and the reduction of Harmony Gold's carbon footprint. These positive impacts will extend beyond the boundary of the site and are expected to outweigh the negative impacts.

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| **11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?** | | **NO** | Please explain |

Several solar PV facilities have been authorised within the broader area. However, mining is the predominant land use within the area, most of the towns and residential areas surrounding the development are focused on mining related activities. The Vierfontein area has adequate available land for further expansion of solar PV developments, it is highly unlikely that the focus will shift from mining on a large scale in such a way that a precedent would be set.

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| **12. Will any person's rights be negatively affected by the proposed activity/ies?** | YES | **NO** | Please explain |

The proposed project will take place on mine owned land located between Harmony Gold's Moab and Great Noligwa Plants. The eleven affected properties are owned by Harmony Moab Khotsong Operations (Pty) Ltd. The Harmony Gold Moab and Great Noligwa Plants are intended to be the exclusive users/off takers of the power to be generated. No infrastructure will extend beyond the boundaries of the eleven affected properties. Therefore, no rights of any person will be negatively affected.

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| **13. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?** | **YES** | | Please explain |

The project site is located outside the urban edge, close to the urban area of Vierfontein (~10km south of the project site). Therefore, the proposed project will not compromise the urban edge as defined by the local municipality.

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| **14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?** | | **NO** | Please explain |

The project will not be registered as a SIP.

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| **15. What will the benefits be to society in general and to the local communities?** | Please explain |

Job opportunities, although limited, will be created during the construction and operation of the proposed facility. In addition, local and regional economic benefits would be realised through the additional revenue generated as a result of the proposed project (through direct and indirect job opportunities, local spend, local procurement, etc.).

The primary benefit to society, in general, will be a reduction in the use of non-renewable resources for the generation of power, contributing to a sustainable environment and development. The solar facility will generate power for the Mine's own use, reducing the Mine's reliance on the Eskom power supply/network.

The project will also assist the government in achieving the goal of adding new capacity from renewable energy as part of the electricity generation technology mix by 2030. In addition, the project will assist in the reduction of the need to mine non-renewable resources such as coal for conventional power generation.

| **16. Any other need and desirability considerations related to the proposed activity?** | Please explain |
|---|---|

The uptake of renewable energy sources in the mining sector has been a slow-moving transition – which can largely be attributed to the cost involved in establishing a solar/wind power plant, the added costs associated with storing that energy, regulatory challenges, and a limited track record in the industry.

Pressure from government and investors to improve environmental footprints by reducing carbon emissions is now one of the top five agenda items in business development, and incorporating renewable energy is an easy way to achieve this. In August 2021 with the aim to bolster energy security, President Cyril Ramaphosa announced that the licence threshold for independent power producers would be lifted from 1 MW to 100 MW, opening the door for companies to build their own generation facilities without the need to obtain a generation license from the National Energy Regulator of South Africa (NERSA).

Reliable and cost-effective energy, sourced and generated through private or internal arrangements eliminates the possibility of unexpected power outages and unreliable grid power from government-owned entities such as Eskom. The additional energy supply helps reduce the burden on such entities and reduces the need for energy management alternatives such as load shedding.

In terms of value creation through sustainability it is estimated that the Harmony Gold suite of solar PV projects (of which the Harmony Moab Khotsong Solar PV Facility is one, with others planned in the Welkom area) will offset the liabilities of anticipated costs pending Scope 2 carbon taxes, against the backdrop of deregulation of the energy sector in South Africa, represents a big step forward for mining and private power industries in South Africa.

The construction of the solar energy plants will be a watershed moment for Harmony, as not only will these transactions help deliver on the Mine's environmental and social obligations and undertakings, but they will also de-risk the business and deliver many socio-economic benefits, including ensuring that investors and other stakeholders continue to derive value and positive returns in a global climate of energy uncertainty.

It is anticipated that this emission profile will decline over time, in line with Harmony Gold production profile, as well as when the renewable energy mix increases in the national electricity grid. However, a number of active decarbonisation measures are currently under way ahead of that amelioration.

Due to the Company's emissions profile, one of the most powerful levers it can pull is the deployment of renewable energy, with three upcoming solar photovoltaic (PV) projects (of which Harmony Moab Khotsong Solar PV is a part) and wind energy projects to enable rapid decarbonisation of these specific operations.

Phase 3 targets for emissions that occur during third-party processing of the company's concentrate are also being established, with electricity remaining the primary focus of this operation due to its emissions dominance.

The placement of a PV facility is strongly dependent on several factors including climatic conditions (solar resource), topography, the location of the site, land availability and suitability, the extent of the site and the need and desirability for the project. From a local level perspective, the project site and development area have specifically been identified by the proponent as being highly desirable from a technical perspective for the development of a PV facility due to the following site characteristics:

- Proximity to the Harmony Gold Moab Plant Mine and Harmony Gold Great Noligwa Plant Mine: The development area is located between the Harmony Gold Moab and Great Noligwa Plant Mines, which will be the exclusive user of the generated power and is therefore preferred for development of the proposed PV Facility. Furthermore, there are existing available infrastructure that are considered as possiblly forming part of the grid connection points in order to be able to evacuate the generated power from the PV facility to the Harmony Gold Moab Plant and Harmony Gold Great Noligwa Plant Mines.

- Land suitability and land use activities – The properties included in the project site were identified considering the feasible solar resource and are deemed technically feasible by the project developer for such development to take place. The project site is currently owned by the Harmony Gold and has an extent of 1400ha, which was considered by the developer as sufficient for the development of a 100MW Solar PV facility. An exact development footprint within the development area for the placement of infrastructure was identified in the impact phase of the basic assessment.

- The broader project site is currently used for activities associated with mining and agricultural activities (crop production and grazing). The area identified for the PV facility although on mining land will not impact on the mining activities. The development of the solar PV facility on this property will ensure the continuation of an economically viable land use and will support the long-term operation of the mine. Sites that facilitate easy construction conditions (i.e., relatively flat topography, lack of major rock outcrops etc.) are favoured during the site selection process for a solar PV facility, and the proposed development area fits this criterion.

- Proximity to Towns with a Need for Socio-Economic Upliftment: The proposed project is located near Vierfontein in the Free State. As per the Integrated Development Planning, these districts still experience high levels of unemployment, poverty, and inequality mainly amongst the youth, women, and people with disabilities. With the development of the Harmony Moab Khotsong Solar PV Facility, secondary social benefits can be expected in terms of additional spend in the nearby towns due to the increased demand for goods and services. Considering the above, it is clear that a need for employment opportunities and skills development is present within the area.

Taking into consideration the solar resource, proximity to the mine, land availability and suitability, geographical and topographical location, access to road infrastructure and proximity to towns with a

need for socio-economic upliftment, the development of the Harmony Moab Khotsong Solar PV Facility within the proposed project site is considered to be desirable.

| **17. How does the project fit into the National Development Plan for 2030?** | Please explain |
|---|---|

By 2030, South Africa aims to reduce carbon emissions, promote economic development, and increase the Gross Domestic Product (GDP). This project will fit into this vision since it aims to contribute towards electricity supply through renewable energy sources. This Solar PV Energy Facility with which the activities are associated will assist in reducing the country's carbon footprint, as it will be generating renewable energy, and will facilitate the infrastructure growth in the area through employment and increasing infrastructure.

**18. Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.**

The general objectives of Integrated Environmental Management have been taken into account for this BA Report by means of identifying, predicting, and evaluating the actual and potential impacts on the environment, socio-economic conditions, and cultural heritage component. The risks, consequences, alternatives as well as options for mitigation of activities have also been considered with a view to minimise negative impacts, maximise benefits and promote compliance with the principles of environmental management.

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

The principle of environmental management as set out in section 2 of NEMA states that:

» Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural, and social interests equitably.
» Development must be sustainable socially (people), environmentally (planet) and economically (prosperity).
» Sustainable development requires the consideration of all the relevant factors.

From a project perspective, the development can be considered sustainable as it makes use of a renewable energy resource, does not result in any significant impacts during its construction, and does not emit any pollution during the operational phase.

These principles of sustainable development are further taken into account by including measures within the Environmental Management Programme (EMPr) to mitigate impacts that may occur, thereby further reducing the environmental impacts. The EMPr provides mitigation measures in terms of disturbance to vegetation, loss of wetlands and land capability, pollution, and degradation to the environment, waste, and stormwater management.

## 8. 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:

| Legislation | Applicable Requirements | Administering Authority | Compliance Requirements |
|---|---|---|---|
| **National Legislation** | | | |
| Constitution of the Republic of South Africa (No. 108 of 1996) | In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that:<br><br>"*Everyone has the right –*<br>» *To an environment that is not harmful to their health or well-being, and*<br>» *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:*<br>∗ *Prevent pollution and ecological degradation,*<br>∗ *Promote conservation, and*<br>*Secure ecologically sustainable development and use of natural resources, while promoting justifiable economic and social development*." | Applicable to all authorities | The Constitution has no permitting requirements. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the "right to an environment clause" includes the notion that justifiable economic and social development should be promoted, through using natural resources and ecologically sustainable development. |
| National Environmental Management Act (Act No 107 of 1998) | In terms of the Duty of Care Provision in section 28(1), Harmony Gold must ensure that reasonable measures are taken throughout the lifecycle of this project, to ensure that any pollution or degradation of the environment associated with it is avoided, stopped, or minimised. | Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (FSDESTEA) – competent authority | The listed activities triggered by the Solar PV Facility have been identified and assessed as part of the BA process currently underway for the project. |

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| | In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and the cumulative effect of a variety of impacts.<br><br>Considering the capacity of the proposed solar PV facility (i.e., contracted capacity of 14MW) and the triggering of Activity 1 of Listing Notice 1 (GN R.983), a Basic Assessment process is required in support of the application for EA. | | |
| National Environmental Management Act (Act No 107 of 1998) | In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA, every person who causes, has caused or may cause significant pollution or environmental degradation must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.<br><br>Under NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts. | FSDESTEA | While no permitting or licensing requirements arise directly by virtue of the proposed project through this section, it finds application through the consideration of potential cumulative, direct, and indirect impacts. It will continue to apply throughout the lifecycle of the project. |
| Environment Conservation Act (Act No 73 of 1989) (ECA) | The Noise Control Regulations in terms of Section 25 of the ECA are applicable for noise control in the Free State Province. | FSDESTEA | Noise impacts are expected to be associated with the project's construction phase. Considering the project area's location in relation to residential areas and provided that appropriate mitigation measures are implemented, construction noise is unlikely to present a significant intrusion |

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| | | | to the local community. There is therefore no requirement for a noise permit in terms of this legislation. |
| National Water Act (Act No 36 of 1998) | A water use listed under Section 21 of the NWA must be licensed with the Regional DHSWS, unless it is listed in Schedule 1 of the NWA (i.e., is an existing lawful use); is permissible under a General Authorisation (GA); or if a responsible authority waives the need for a water use licence (WUL).<br><br>Water use is defined broadly and includes consumptive and non-consumptive water uses; taking and storing water; activities which reduce stream flow; waste discharges and disposals; controlled activities (activities which impact detrimentally on a water resource); altering a watercourse; removing water found underground for certain purposes; and recreation.<br><br>Consumptive water uses may include taking water from a water resource (Section 21(a)) and storing water (Section 21(b)).<br><br>Non-consumptive water uses may include impeding or diverting of flow in a watercourse (Section 21(c)); and altering of bed, banks, or characteristics of a watercourse (Section 21(i)). | Regional Department of Water and Sanitation | A WUL or GA is required to be obtained if water resources are impacted (either directly or indirectly). The development area is located within the 500m regulated area of wetland features. A General Authorisation for the project will therefore need to be registered with the DWS for water uses 21(c)&21(i); |
| National Water Act (Act No 36 of 1998) (NWA) | In terms of Section 19, Harmony Gold must ensure that reasonable measures are taken throughout the project's lifecycle to prevent and remedy pollution to water resources from occurring, continuing, or recurring. | Regional DHSWS | This section will apply with respect to the potential impact on the wetland features located within the 500m regulated area of the development area, primarily during the construction |

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| | | | phase (i.e., pollution from construction vehicles). |
| Minerals and Petroleum Resources Development Act (Act No 28 of 2002) (MPRDA) | In accordance with the MPRDA, a mining right permit is required where a mineral in question is to be mined, including the mining of materials from a borrow pit. | Department of Mineral Resources and Energy (DMRE) | Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA. No borrow pits are expected to be required for the construction of the project, and as a result a mining permit or EA in this regard is not required to be obtained. |
| | Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which may be contrary to any object of the Act, or which is likely to impede any such object must apply to the Minister for approval in the prescribed manner. | | In terms of Section 53 of the MPRDA, approval is required from the Minister of Mineral Resources and Energy to ensure that the proposed development does not sterilise a mineral resource that might occur on site. |
| National Environmental Management: Air Quality Act (Act No 39 of 2004) (NEM: AQA) | The National Dust Control Regulations (GNR 827), published under Section 32 of NEM: AQA, prescribe the general measures for dust control in all areas, and a standard for acceptable dust fall rates in residential and non-residential areas.<br><br>In accordance with these Regulations any person who conducts any activity in such a way as to give rise to dust in quantities and concentrations that may exceed the dust fall standard set out in Regulation 3 must, upon receipt of a notice from the air quality officer, implement a dust fall monitoring programme.<br><br>Any person who has exceeded the dust fall standard must, within three months after | FSDESTEA<br><br>Fezile Dabi District Municipality | If the project results in the generation of excessive levels of dust, a dust fall monitoring programme would be required for the project. Dust fall monitoring results from the dust fall monitoring programme would then need to be included in a dust monitoring report, and a dust management plan would need to be developed. |

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| | submission of the dust fall monitoring report, develop and submit a dust management plan to the air quality officer for approval. | | |
| National Heritage Resources Act (Act No 25 of 1999) (NHRA) | Relevant sections include-<br>Section 7 stipulates assessment criteria and categories of heritage resources according to their significance.<br>Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites.<br><br>Section 36 provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority.<br><br>Section 38(1) lists activities which require developers or any person who intends to undertake a listed activity to obtain consent from the responsible heritage resources authority through the procedure set out in section 38. This is not required where a basic assessment is undertaken under NEMA, including a HIA, and SAHRA's requirements are considered the competent authority when granting the EA.<br><br>Section 44 requires the compilation of a Conservation Management Plan and a permit from SAHRA for the presentation of archaeological sites as part of public enjoyment, education, research, tourism attraction. | South African Heritage Resources Agency (SAHRA)<br><br>Free State Heritage Resources Authority | A Heritage Impact Assessment (including palaeontology) was undertaken for the project as per the requirements of Section 38 of the NHRA (refer to **Appendix D3**).<br><br>During the field survey, no heritage and archaeological resources of significance were identified within the development footprint. No sensitivity exclusions from a palaeontological perspective. The site visit confirmed that there were no fossils visible on the site and along the route for the grid connection.<br><br>Should a heritage resource be impacted upon, a permit may be required from SAHRA or Free State Heritage Resources Authority, in accordance with of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668). |

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| National Environmental Management: Biodiversity Act (Act No 10 of 2004) (NEM:BA) | Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in a listed ecosystem as a threatening process.<br><br>Three government notices have been published in terms of Section 56(1) of NEM:BA as follows:<br><br>» Commencement of TOPS Regulations, 2007 (GNR 150).<br>» Lists of critically endangered, vulnerable, and protected species (GNR 151), as amended in 2020 (GN627).<br>» TOPS Regulations (GNR 152).<br><br>NEM:BA provides for listing threatened or protected ecosystems in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process, including the: purpose and rationale for listing ecosystems; criteria used to identify listed ecosystems; implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection, (Government Gazette 1002, 9 December 2011, GG 34809. | DFFE and FSDESTEA | Under NEM:BA, a permit would be required for any activity that is of a nature that may negatively impact on the survival of a listed protected species.<br><br>A Terrestrial Ecology and Wetland Impact Assessment has been undertaken as part of the BA process (refer to **Appendix D1**).<br><br>The development area is split between the northern portion (where the development footprint is located) and the southern section (where no development is planned).<br><br>Some plants species identified within the development area is regarded as protected within the Free State Province<br><br>For the southern Portion of the site this includes Helichrysum *spp., Euphorbia striata, Orthanthera jasminiflora, Boophone distichia, Pentharhinum insipidum, Schixocarpus nervosus, Satyrium sp., Raphionecma velutina, Babiana bainesii* and *Aloe greatheadii)*.<br><br>Species identified in the northern section include *Helichrysum callicomum, Babiana bainesii, Crinum graminicola, Raphionacme velutina* and *Vachellia erioloba*. |

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| | | | Where any of these protected species will be affected by the development, permits will have to be obtained for their removal. Where the development will affect geophytic or succulent species, permits will also have to be obtained, but affected plants transplanted to adjacent areas where they will remain unaffected. |
| National Environmental Management: Biodiversity Act (Act No 10 of 2004) | Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted activity involving a specimen of an AIP without a permit issued in terms of Chapter 7 of NEM:BA; and that a permit may only be issued after a prescribed assessment of risks and potential impacts on biodiversity is carried out.<br><br>Applicable, and exempted AIP are contained within the Alien and Invasive Species List 2020, GNR 1003 of Government Gazette No. 43726. | DFFE and FSDESTEA | A Terrestrial Ecology and Wetland Impact Assessment (refer to **Appendix D1**) was undertaken as part of the BA process to identify any alien invasive plants present on site. |
| Conservation of Agricultural Resources Act (Act No 43 of 1983) (CARA) and<br><br>Regulations (GN R1048) (CARA Regulations) | Section 5 of CARA provides for the prohibition of the spreading of weeds.<br><br>Relevant sections include:<br><br>Regulation 15 provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur. | Department of Agriculture, Land Reform and Rural Development (DALRD) | CARA will apply throughout the project's lifecycle. In this regard, soil erosion prevention and soil conservation strategies need to be developed and implemented. In addition, a weed control and management plan must be implemented.<br><br>In terms of Regulation 15E, where Category 1, 2 or 3 plants occur a land user is required to control them by |

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| | Regulation 15E provides requirements and methods to implement control measures for different categories of AIPs. | | means of one or more of the following methods:<br>» Uprooting, felling, cutting, or burning.<br>» Treatment with a weed killer that is registered for use in connection with such plants, in accordance with the directions for the use of such a weed killer.<br>» Biological control, carried out in accordance with the stipulations of the Agricultural Pests Act (No. 36 of 1983), the ECA and any other applicable legislation.<br>» Any other method of treatment recognised by the executive officer that has as its object the control of plants concerned, subject to the provisions of sub-regulation 4.<br>» A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods if the agents are destroyed or become ineffective. |
| National Forests Act (Act No. 84 of 1998) (NFA) | According to the NFA, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the NFA was published in GNR 536. | DFFE | A permit would need to be obtained for any protected trees that are affected by the project.<br><br>The Terrestrial Ecology and Wetland Impact Assessment included a site visit which allowed for the identification of |

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| | The prohibitions provide that "*no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister*". | | protected trees that may require a license in terms of the NFA within the project area (refer to **Appendix D1**). The Terrestrial Ecology and Wetland Impact Assessment (Appendix D1) identified no protected trees that may require a license in terms of the NFA within the development area. |
| National Veld and Forest Fire Act (Act 101 of 1998) (NVFFA) | Chapter 4 places a duty on owners to prepare and maintain firebreaks; the procedure in this regard; and the role of adjoining owners and the fire protection association. The applicant must ensure that: firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land; it does not cause soil erosion; and it is reasonably free of inflammable material capable of carrying a veldfire across it.<br><br>Chapter 5 places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn, or from whose land it may spread, must have such equipment; protective clothing; and trained personnel for extinguishing fires. Such owners must ensure that in their absence responsible persons are present on or near their land who, in the event of fire, will extinguish it, or assist in doing so, and take all reasonable steps to alert adjoining landowners and the relevant fire protection association, if any. | DFFE | Whilst the NVFFA has no permitting or licensing requirements, it will be applicable during the construction and operation of the project for the preparation and maintenance of firebreaks; and provision of appropriate equipment and trained personnel for firefighting purposes. |

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| Hazardous Substances Act (Act No 15 of 1973) | This Act regulates the control of: (i) substances that may cause injury, ill health, or death (due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances); and (ii) certain electronic products. It provides for the: rating of such substances or products by the degree of danger; and prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.<br><br>» *Group I and II:* Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat, or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance.<br>» Group IV: any electronic product, and<br>» Group V: any radioactive material.<br><br>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate licence being in force. | Department of Health | It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on the project area and in what operational context they are used, stored, or handled. If applicable, a licence would be required to be obtained from the Department of Health. |
| National Environmental Management: Waste Act, 2008 (Act No 59 of 2008) (NEMWA) | The Minister may by notice in the *Gazette* publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment.<br><br>The Minister may amend the list by –<br>» adding other waste management activities to the list. | DFFE (hazardous waste)<br><br>FSDESTEA (general waste) | No waste listed activities are triggered by proposed project, therefore, no Waste Management Licence is required to be obtained.<br><br>General and hazardous waste handling, storage and disposal will be required during construction and |

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| | » removing waste management activities from the list; and<br>» making other changes to the particulars on the list.<br><br>In terms of the Regulations published in terms of NEMWA (GN 921), a basic assessment or EIA is required to be undertaken for identified listed waste management activities.<br><br>Any person who stores waste must at least take steps, unless otherwise provided by this NEMWA, to ensure that:<br>» the containers in which any waste is stored are intact and not corroded or in any other way rendered unlit for the safe storage of waste.<br>» adequate measures are taken to prevent accidental spillage or leaking.<br>» the waste cannot be blown away.<br>» nuisances, such as odour, visual impacts, and breeding of vectors, do not arise; and<br>» environmental pollution and harm to health are prevented. | | operation. The National Norms and Standards for the Storage of Waste (GNR 926), published under Section 7(1)(c) of NEM: WA, will need to be considered in this regard. |
| National Road Traffic Act (Act No 93 of 1996) (NRTA) | The technical recommendations for highways (TRH 11): "*Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads*" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads; and the prescribed procedures in applying for exemption permits are described and discussed. | South African National Roads Agency Limited (national roads)<br><br>Free State Department of Roads and Transport | An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits for vehicles carrying abnormally heavy or abnormally dimensioned loads; and transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, |

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| | Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.<br><br>The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the NRTA and its relevant Regulations. | | some of the on-site substation components may not meet specified dimensional limitations (height and width). |
| Astronomy Geographic Advantage Act (Act No. 21 of 2007) (AGA) | The AGA provides for: the preservation and protection of areas within South Africa that are uniquely suited for optical and radio astronomy; intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas; and matters connected thereto.<br><br>Chapter 2 of the AGA allows for the declaration of astronomy advantage areas. Chapter 3 pertains to the management and control of astronomy advantage areas, which includes the following:<br>» Restrictions on use of radio frequency spectrum in astronomy advantage areas.<br>» Declared activities in core or central astronomy advantage area.<br>» Identified activities in coordinated astronomy advantage area; and | Department of Science and Technology | The project site is located within the Free State Province and well outside of areas considered as nationally significant astronomy advantage areas. Therefore, the requirements of AGA are not considered applicable. |

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| | » Authorisation to undertake identified activities. | | |
| Aviation Act (Act No 74 of 1962)<br>13th amendment of the Civil Aviation Regulations (CARS) 1997 | Any communications structure, building or other structure, whether temporary or permanent, which has the potential to endanger aviation in navigable airspace or interfere with the operation of navigation or surveillance systems or Instrument Landing Systems, including meteorological systems for aeronautical purposes, is considered an obstacle, and must be submitted to the Commissioner for Civil Aviation for evaluation (refer SA-CAR Part 139.01.33).<br><br>The following structures require markings:<br><br>» Any structure exceeding 45m above ground level or structures where the top of the structure exceeds 150m above the mean ground level, the mean ground level considered to be the lowest point in a 3km radius around such structure.<br>» Structures lower than 45m, which are considered as a danger to aviation shall be marked as such when specified.<br>» Overhead wires, cables etc., crossing a river, valley or major roads shall be marked; and, in addition, their supporting towers marked and lighted if an aeronautical study indicates it could constitute a hazard to aircraft. | South African Civil Aviation Authority (CAA) | This Act will find application during the operation phase of the project. Appropriate marking of project infrastructure >45m above ground level is required to meet the specifications. as detailed in the CAR Regulations Part 139.01.33. An obstacle approval (or confirmation that no approval is required) would be obtained from the South African CAA. |
| **Provincial Legislation** | | | |

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| Free State Nature Conservation Ordinance 8 of 1969 | Lists plant and animal species as protected | FSDESTEA | A Terrestrial Ecology and Wetland Impact Assessment has been undertaken as part of the BA process (refer to **Appendix D1**). No protected flora and fauna species which require a permit under the Free State Nature Conservation Ordinance were identified within the development area. |

## 9. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

### a) Solid waste management

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| Will the activity produce solid construction waste during the construction/initiation phase? | **YES** |
| If YES, what estimated quantity will be produced per month? | Not determined at this stage. |

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

The solid waste generated during construction will mainly be construction material, excavated substrate, and domestic solid waste. Cardboard waste will be produced from panel packaging and compacted on site prior to removal. Other wastes will include rubber caps on panel edges, wooden pallets, and plastic wrapping (all related to the panel packaging). There may also be some broken panels, which must be removed as per the latest regulations regarding producer responsibilities to minimise waste. Waste will be disposed of in either waste skips and/or scavenger-proof recycling bins (where possible) and temporarily placed in a central location for removal by an appropriate contractor. Where possible, waste will be recycled. Non-recyclable solid construction waste will be temporarily held in skips or other appropriate waste containers, to be disposed of at an appropriately licensed landfill site. Any other waste and excess material will be removed once construction is complete and disposed of at a registered waste facility.

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

Recyclable waste will be recycled through accredited recycling companies and non-recyclable solid construction waste will be disposed at a registered municipal solid waste disposal site.

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| Will the activity produce solid waste during its operational phase? | **YES** |
| If **YES**, what estimated quantity will be produced per month? | Not determined at this stage. |

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

The operation of the PV facility will result in the generation of general solid waste, such as damaged or broken panels; general waste from the offices; and oils from the on-site substation. The general solid waste generated during the operational phase will be temporarily stored in either waste skips and/or scavenger proof recycling bins (where possible), for removal by an appropriate contractor and subsequent disposal at an appropriately licensed landfill site. Where possible, waste will be recycled. Hazardous waste produced during the operational phase will be appropriately stored in bunded areas for removal by an appropriate contractor and subsequent disposal at a registered hazardous waste disposal facility.

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

This has not been determined at this stage. Waste streams can be disposed of together with waste generated at the mining facilities. The Moqhaka Local Municipality will be engaged to determine if any their registered landfill sites have the capacity to accept waste generated by the project.

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

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| Solid waste generated during the operational phase will be fed into a municipal waste stream. Should the municipal landfill sites not have capacity to accept solid waste generated during the operational phase, other options will be explored by the operator. |

*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? [redacted] **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.

Is the activity that is being applied for a solid waste handling or treatment facility? [redacted] **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? [redacted] **NO**

If **YES**, what estimated quantity will be produced per month? [redacted]

Will the activity produce any effluent that will be treated and/or disposed of onsite? [redacted] **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? [redacted] **NO**

If **YES**, provide the particulars of the facility:

**Facility name:** [redacted]
**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 wastewater, if any:

- » During the construction phase, measures may be put in place to separate clean and dirty water.
- » Sewage will be handled/managed by establishing portable ablution facilities. The sewage will be collected and treated in accordance with the legislative framework using a septic or conservancy tank.
- » Water used within the construction process, if tested and found to be within the required limits, may be used for dust suppression.

**c) Emissions into the atmosphere**

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| Will the activity release emissions into the atmosphere other that exhaust emissions and dust associated with construction phase activities? | **NO** |
| If **YES**, is it controlled by any legislation of any sphere of government? | |

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:

Solar energy installations operate by converting solar energy into electricity. This is characterised as a non-consumptive use of a natural resource and consumes no fuel for its continuing operation. Solar PV facilities produce an insignificant quantity of greenhouse gasses over their lifecycle. During the construction phase, minor dust impacts and exhaust emissions may occur; however, acceptable limits will not be exceeded. The operational phase of a solar PV facility does not produce carbon dioxide, sulphur dioxide, mercury, particulates, or any other type of pollution.

**d) Waste permit**

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| Will any aspect of the activity produce waste that will require a waste permit in terms of the NEM: WA? | **NO** |

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

**e) Generation of noise**

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| Will the activity generate noise? | **NO** |
| If **YES**, is it controlled by any legislation of any sphere of government? | |

Describe the noise in terms of type and level:

Minimal noise will occur during the construction phase due to vehicle movement; the presence of construction workers on site; and machinery operation. This is not regarded as a significant noise source/impact and will not constitute a "disturbing noise". No noise will be generated during the operation phase.

**10. WATER USE**

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

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| **Municipal** | Water board | Groundwater | River, stream, dam, or lake | **Other** | The activity will not use water |

Water will be sourced from the Harmony Gold Moab and Great Noligwa Mines water supply.

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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: | **N/A** |
| Does the activity require a water use authorisation (general authorisation or water use license) from the Department of Water Affairs? | **YES** |

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

A General Authorization will be required. The application process will be completed once a positive EA is received from the Competent Authority.

## 11. ENERGY EFFICIENCY

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

The activity is in itself an activity that is proposed to generate electricity from a cleaner alternative energy source (i.e., solar radiation).

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

The purpose of a Solar PV Energy Facility is to utilise a renewable energy source (i.e., solar radiation) for electricity production. Therefore, it is not required to consider any additional alternative energy sources.

# SECTION B: SITE/AREA/PROPERTY DESCRIPTION

**Important notes:**

1. 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.

| Section B Copy No. (e.g., A): | |
|---|---|

2. Paragraphs 1 - 6 below must be completed for each alternative.

3. Has a specialist been consulted to assist with the completion of this section? **YES**

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

Property description/physical address:

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| **Province** | Free State Province |
| **District Municipality** | Fezile Dabi District Municipality |
| **Local Municipality** | Moqhaka Local Municipality |
| **Nearest town(s)** | Vierfontein (~10km) |
| **Ward Number(s)** | 22 |
| **Farm name and number**<br>**Portion number**<br>**SG Code** | » Farm Anglo 593 (F03600000000059300000)<br>» Farm Hoekplaats 598 (F03600000000059800000)<br>» Farm Mispah 274 (F03600000000027400000)<br>» Remaining Extent of Farm Doornkom Wes 446 (F03600000000044600000)<br>» Farm Chrystalkop 69 (F03600000000006900000)<br>» Portion 1 of Farm Zaaiplaats 190 (F03600000000019000001).<br>» Portion 1 of Farm Zuiping 394 (F03600000000039400001)<br>» Portion 3 of Farm Zuiping 394 (F03600000000039400003)<br>» Portion 4 of Farm Zuiping 394 (F03600000000039400004)<br>» Portion 5 of Farm Zuiping 394 (F03600000000039400005)<br>» Remaining Extent of Farm Zuiping 394 (F03600000000039400000) |

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.

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| Current land-use zoning as per local municipality IDP/records: | The project site is currently zoned for mining and 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.

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

**1. GRADIENT OF THE SITE**

Indicate the general gradient of the site.

**Alternative S1:**

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| **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 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 |

**2. LOCATION IN LANDSCAPE**

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

| | | | | | |
|---|---|---|---|---|---|
| 2.1 Ridgeline | | 2.4 Closed valley | | **2.7 Undulating plain / low hills** | **X** |
| 2.2 Plateau | | 2.5 Open valley | | 2.8 Dune | |
| 2.3 Side slope of hill/mountain | | **2.6 Plain** | **x** | 2.9 Seafront | |
| 2.10 At sea | | | | | |

**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):** | | **Alternative S3 (if any):** | |
|---|---|---|---|---|---|---|
| Shallow water table (less than 1.5m deep) | YES | **NO** | YES | NO | YES | NO |
| Dolomite, sinkhole, or doline areas | **YES** | | YES | NO | YES | NO |
| Seasonally wet soils (often close to water bodies) | | **NO** | YES | NO | YES | NO |
| Unstable rocky slopes or steep slopes with loose soil | YES | **NO** | YES | NO | YES | NO |
| Dispersive soils (soils that dissolve in water) | YES | **NO** | YES | NO | YES | NO |

| | | | | | | |
|---|---|---|---|---|---|---|
| Soils with high clay content (clay fraction more than 40%) | | **NO** | YES | NO | YES | NO |
| Any other unstable soil or geological feature | | **NO** | YES | NO | YES | NO |
| An area sensitive to erosion | | **NO** | 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[7][8]. 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 - 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.

An ecologist has been appointed to define the ground cover over the extent of the site (refer to **Appendix D1**).

**5. SURFACE WATER**

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

| | | | |
|---|---|---|---|
| Perennial River | | **NO** | UNSURE |
| Non-Perennial River | | **NO** | UNSURE |
| Permanent Wetland | YES | **NO** | UNSURE |
| Seasonal Wetland | **Yes** | NO | UNSURE |
| Artificial Wetland | | **NO** | UNSURE |
| Estuarine / Lagoonal wetland | | **NO** | UNSURE |

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

[7] Please see appendix D2 for soils report
[8] A soil specialis has been appointed to conduct soil samples on which this section is based

A large wetland system transects the south eastern portion of the site. This valley bottom wetland is a large system which originates approximately 5 km to the south of the site and then flows into the Vaal River about 4 km to the north of the site. The wetland therefore transects the eastern portion of the site and flows from south to north through it. The wetland is an unchanneled system which does not have a defined main channel and banks though flow is still unidirectional from south to north. The width of the wetland can also be quite broad and while varying in width over its course, may be as wide as 100m in some areas. The wetland is largely fed by the upper reaches while inflow from the side slopes are also likely.

A few shallow excavations as well as surface obstructions (berms, roads, and ditches) also promote the accumulation of surface water and consequent formation of artificial wetland areas.

**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:

The primary land uses for the broader area surrounding the project site are illustrated in Figure 3 below.

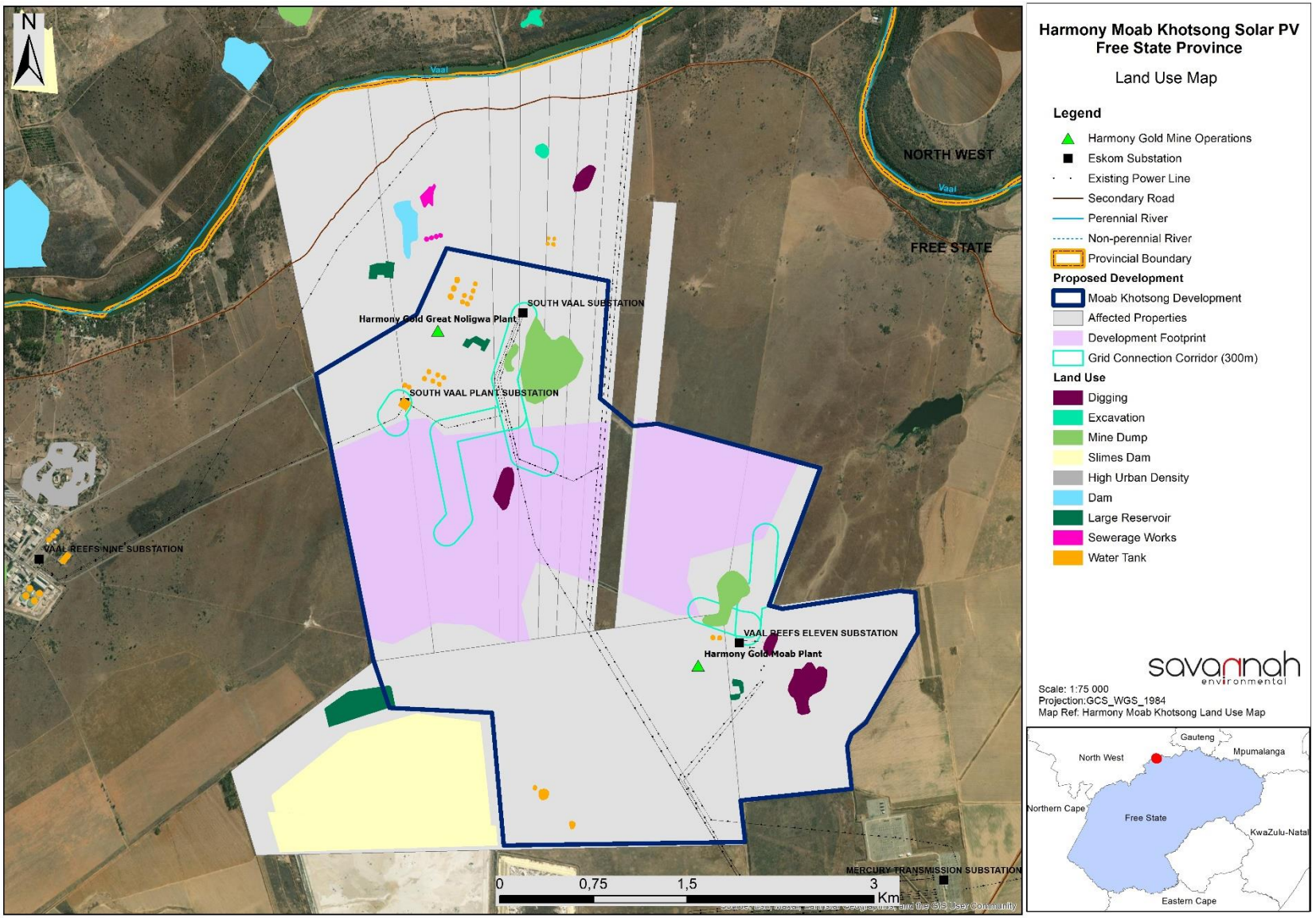



**Figure 3**: Map showing the land use character of the surrounding area (refer to Appendix A)

| | | |
|---|---|---|
| **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** | **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** | **Sport facilities** | **Archaeological site** |
| **Quarry, sand or borrow pit** | **Golf course** | **Other land uses (describe) – Mining operation** |

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

[redacted]

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:

[redacted]

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:

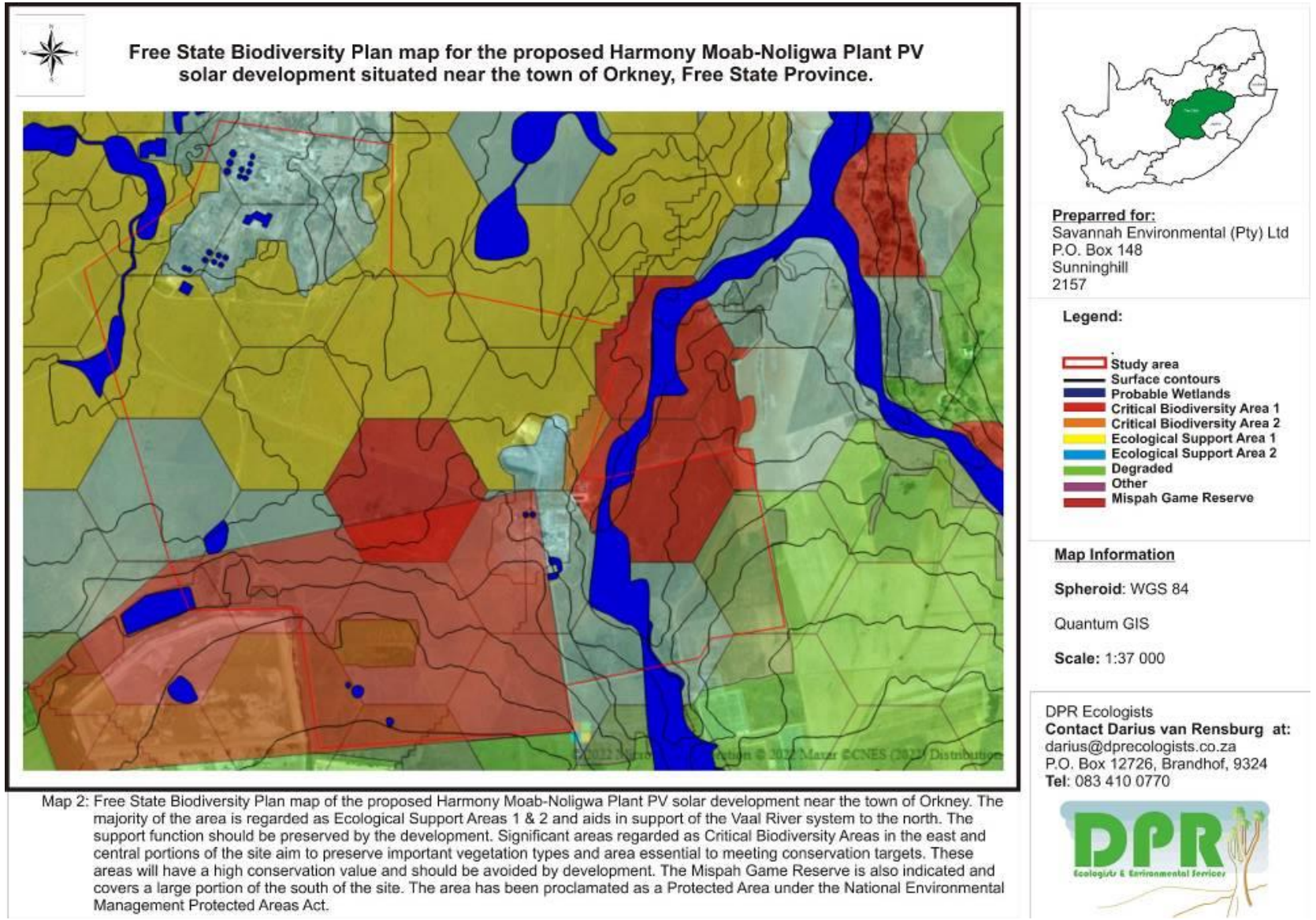
[redacted]

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? | [redacted] | **NO** |
| Buffer area of a protected area? | [redacted] | **NO** |
| Planned expansion area of an existing protected area? | [redacted] | **NO** |
| Existing offset area associated with a previous Environmental Authorisation? | [redacted] | **NO** |
| Buffer area of the SKA? | [redacted] | **NO** |

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

A map which indicates the development area, which includes a CBA1 area is included below as **Figure 4**, and included in **Appendix A**. As these CBA areas are clustered to the south of the development area, these are reasonably being avoided by the planned development footprint (implementation of avoidance mitigation), and these area, therefore, **have minimal infringement as a result.**




Map 2: Free State Biodiversity Plan map of the proposed Harmony Moab-Noligwa Plant PV solar development near the town of Orkney. The majority of the area is regarded as Ecological Support Areas 1 & 2 and aids in support of the Vaal River system to the north. The support function should be preserved by the development. Significant areas regarded as Critical Biodiversity Areas in the east and central portions of the site aim to preserve important vegetation types and area essential to meeting conservation targets. These areas will have a high conservation value and should be avoided by development. The Mispah Game Reserve is also indicated and covers a large portion of the south of the site. The area has been proclamated as a Protected Area under the National Environmental Management Protected Areas Act.

**Figure 4:** Location of the CBA1 area within the Harmony Moab Khotsong Solar PV Facility development area.

## 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: | **YES** | NO | Uncertain |
|---|---|---|---|

There are three archaeological sites present within the Harmony Moab Khotsong solar PV development area. Two of the documented archaeological sites within the development area are classified to be of low significance. A 30m No-Go development buffer was recommended for the third site, however this site is located outside of the development footprint (implementation of avoidance mitigation). No archaeological resources of scientific cultural value were, therefore, identified within the development footprint area proposed for the PV Facility and its grid connection and as such, no impact to significant archaeological heritage resources is anticipated.

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:

Briefly explain the findings of the specialist:

A Heritage Impact Assessment (refer to **Appendix D3**) was undertaken for the proposed project. A Heritage Impact Assessment is required in terms of Section 38(8) of the NNHRA. The findings of the assessment are described below:

**Heritage Resources**

The areas surveyed as part of this assessment have been transformed through agricultural interventions and/or mining activity. As such, the results of the survey only identified one site of scientific cultural value - CM1 (Isolated artefacts on sub-volcanic rock: Levallois core; Bladelet core and several flakes) within the Development Area proposed for the Moab Khotsong Solar PV development, this site was graded IIIC.

A IIIC grading refers to a resource that is of contributing significance to the environs These are heritage resources which are significant in the context of a streetscape or direct neighbourhood. This grading is applied to buildings and/or sites whose significance is contextual, i.e., in large part due to its contribution to the character or significance of the environs. These buildings and sites should, as a consequence, only be regulated if the significance of the environs is sufficient to warrant protective measures, regardless of whether the site falls within a Conservation or Heritage Area. Internal alterations should not necessarily be regulated. The identified site of archaeological significance has the potential to provide scientific insight into the past and as such, it is recommended that this area is not impacted by the proposed development.

A 30m no-go development buffers was therefore recommended, however no development activity relating to the PV development will impact or encroach on this resource.

Two archaeological sites were identified within the development footprint, these were however rated as ''NCW'' meaning Not conservation-worthy. This refers to a resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate. No further actions under the NHRA are required.

The location of the three sites is indicated in **Figure 5**

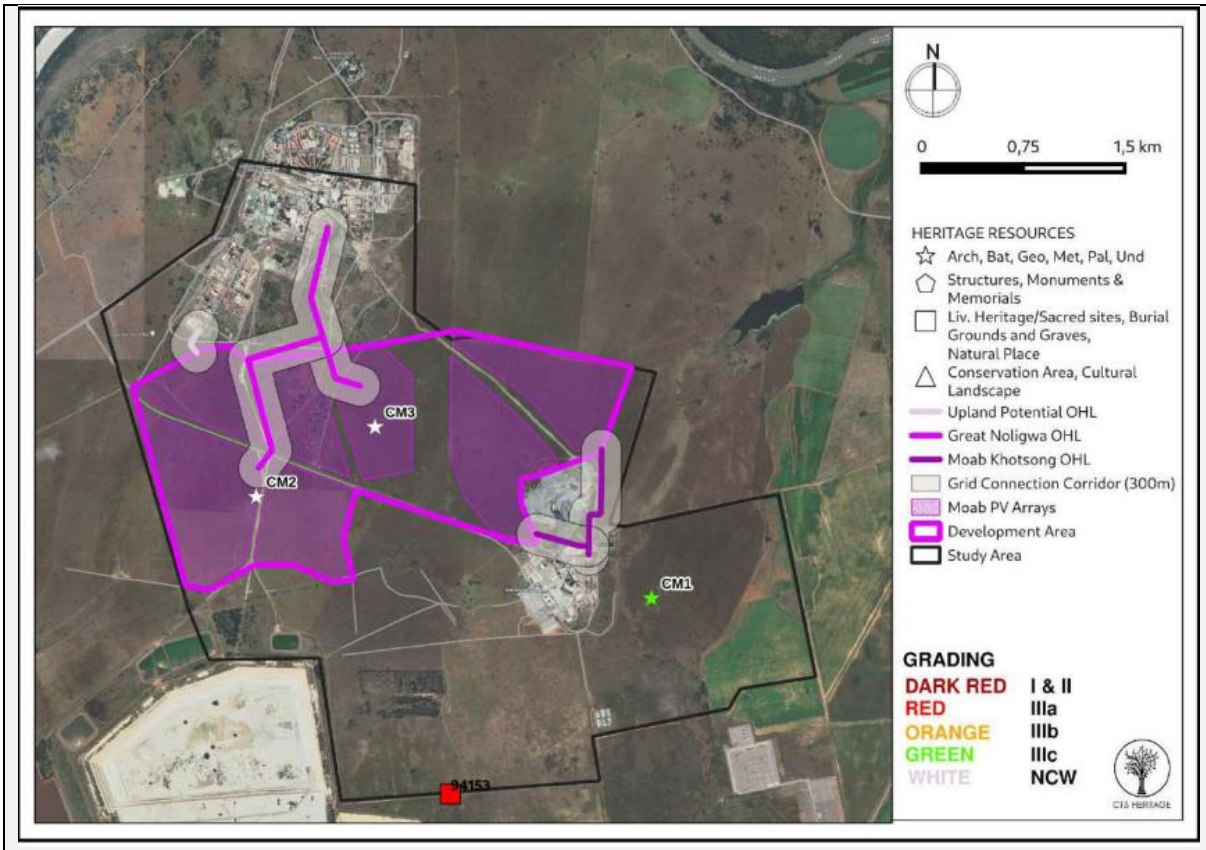



**Figure 5:** Location of archaeological sites identified

**Cultural Landscape and the Built Environment**

The area proposed for development has been extensively previously disturbed through agriculture and mining infrastructure (Harmony Moab Khotsong Solar PV Facility is proposed to be located between the Harmony Gold Moab and Harmony Noligwa Gold Plants).

No impacts to the cultural landscape are anticipated.

**Palaeontology**

According to the SAHRIS Palaeosensitivity Map (**Figure 6**), the area proposed for development is underlain by sediments of moderate to very high palaeontological sensitivity consisting of Quaternary sands and alluvium that overlie the Vryheid Formation and the Malmani subgroup. Quaternary sands present is this area does not preserve fossils because they are transported and porous.

The site visit confirmed that the area has been disturbed from farming and mining so no fossils were present on the surface. It is unknown if the Malmani dolomite occurs below the surface or if it has stromatolites. The geological structures suggest that the rocks are the right age and type to contain fossils, but the area is covered in deep cultivated soils.

Based on the nature of the project, surface activities may impact upon the fossil heritage, only if preserved. Since there is an extremely small chance that fossils from the Vryheid Formation may occur below ground and may be disturbed, a Fossil Chance Find Protocol is appended within the Heritage Assessment (Appendix D3, as well as the EMP. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

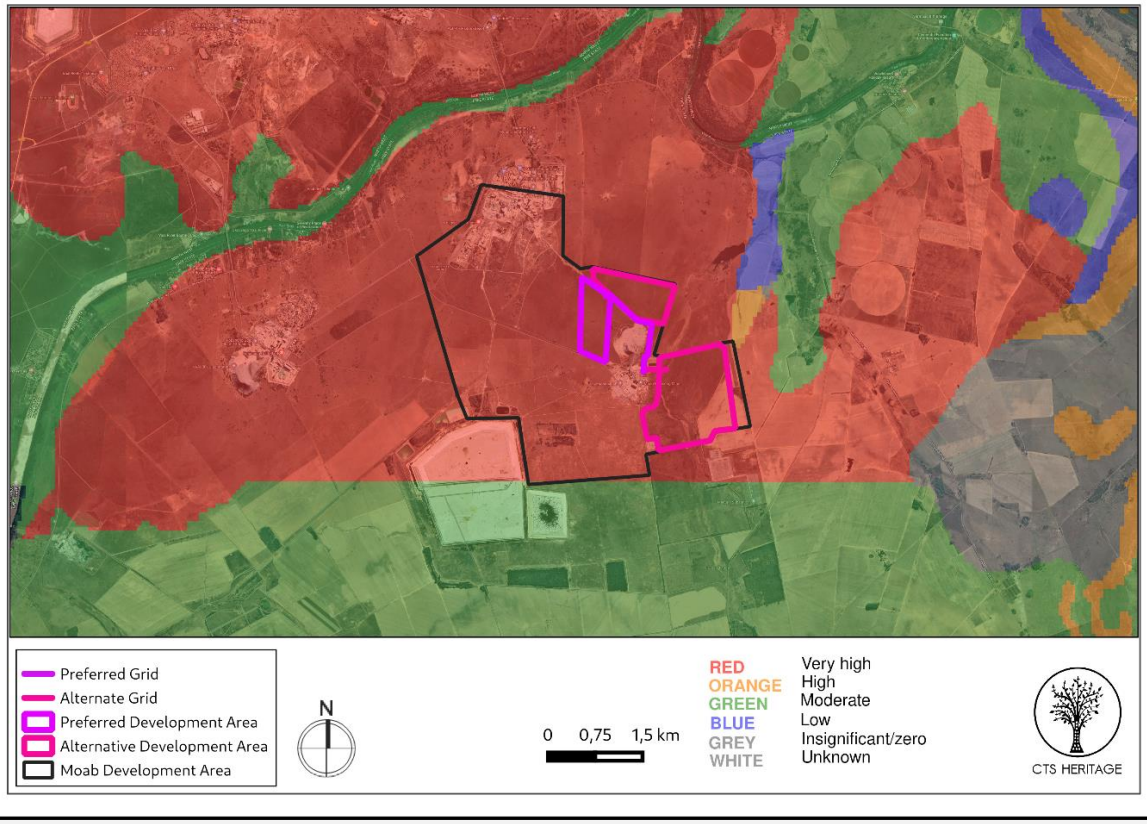



**Figure 6**: Palaeontological sensitivity of the area

| | |
|---|---|
| Will any building or structure older than 60 years be affected in any way? | **NO** |
| Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)? | **NO** |

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

## 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 unemployment:

**District Municipality**

Within the Fezile Dabi District Municipality, Mafube Local Municipality has the highest percentage of people living in poverty, using the upper poverty line definition, with a total of 67.5%. The lowest percentage of people living in poverty can be observed in the Metsimaholo Local Municipality with a total of 49.8% living in poverty, using the upper poverty line definition.

In 2019, the Gini coefficient in Fezile Dabi District Municipality was at 0.618, which reflects an increase in the number over the ten-year period from 2009 to 2019. The average annual income is R30 000 which is

the same as the South Africa and Free State average. 62% of the households earn less than R40 000 per annum and 8% have no income.

The working age population in Fezile Dabi in 2019 was 343 000, increasing at an average annual rate of 0.69% since 2009. For the same period the working age population for Free State Province increased at 0.39% annually, while that of South Africa increased at 1.62% annually. The graph below combines all the facets of the labour force in the Fezile Dabi District Municipality into one compact view. The chart is divided into "place of residence" on the left, which is measured from the population side, and "place of work" on the right, which is measured from the business side.

Out of the economically active population, there are 72 600 (33%) unemployed people. Most of the formal employment lies in the Tertiary industry, with 54 600 jobs. Formal jobs make up 62.7% of all jobs in the Fezile Dabi District Municipality. The difference between the employment measured at the place of work, and the people employed living in the area can be explained by the net commuters that work outside of the district municipality.

**Local Municipality**

Moqhaka Local Municipality had an estimated population of 160 532 in 2011, with an estimated 45 661 household units and -0.45% growth rate. The population declined in 2016 community survey to 154 732 with unemployment rate of 35.2%. The youths are the hardest hit with 47.2 %. This decline exacerbates the range of challenges facing Moqhaka, including, but not limited to, unemployment and migration to name but a few. It has the necessary basic economic infrastructure like industrial areas of Kroonstad and Viljoenskroon, which plays an important role in agricultural industries.

The closure of two diamonds mine in the area, has negatively affected the economic standing of the municipality which is progressively shifting towards agriculture, tourism, and transport. The largest areas of focus being black emerging farmers and the development businesses.

Economic profile of local municipality:

In 2019, the manufacturing sector is the largest within Fezile Dabi District Municipality accounting for R 14 billion or 27.0% of the total GVA in the district municipality's economy. The sector that contributes the second most to the GVA of the Fezile Dabi District Municipality is the mining sector at 18.2%, followed by the community services sector with 13.1%. The sector that contributes the least to the economy of Fezile Dabi District Municipality is the construction sector with a contribution of R 1.14 billion or 2.20% of the total GVA.

The community sector, which includes the government services, is generally a large contributor towards GVA in smaller and more rural local municipalities. When looking at the regions within the district municipality, the Metsimaholo Local Municipality made the largest contribution to the community services sector at 40.09% of the district municipality. The Metsimaholo Local Municipality contributed R 34.6 billion or 66.47% to the GVA of the Fezile Dabi District Municipality, making it the largest contributor to the overall GVA of the Fezile Dabi District Municipality. This is due to the large petrochemical hub in Sasolburg and the related economic activities.

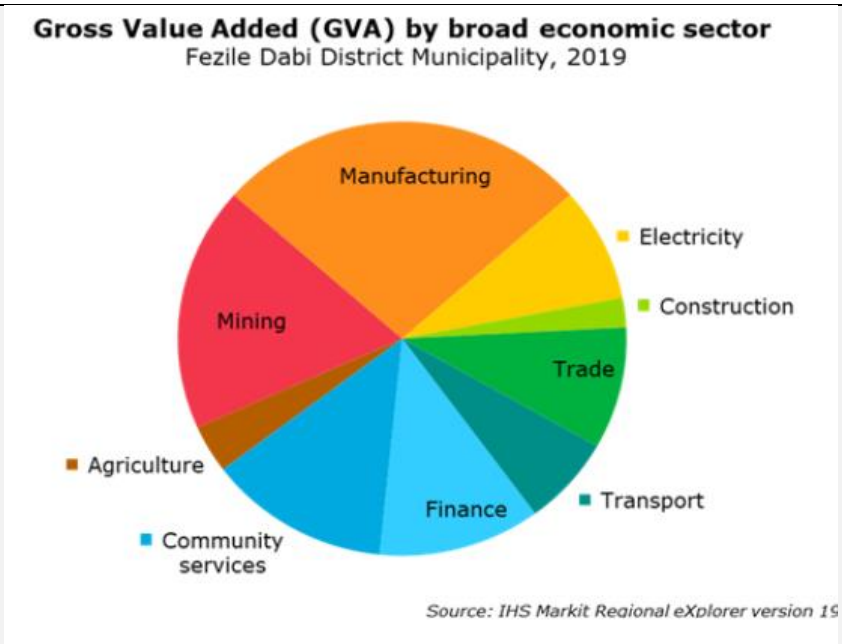



*Figure 7: District municipality Economic Sector*

**Primary Sector**

The primary sector consists of two broad economic sectors namely the mining and the agricultural sector. Both the agriculture and mining sectors are generally characterised by volatility in growth over the period. The Primary sector is expected to grow at an average annual rate of -5.04% between 2019 and 2024, with the Secondary sector growing at -0.80% on average annually. The Tertiary sector is expected to grow at an average annual rate of -0.33% for the same period.

Agriculture

Fezile Dabi district municipality has a strong agriculture base and is known as the grain/maize basket for South Africa. The district has a total of 327 592ha (15, 4% of all agricultural land in the province) of high potential agricultural land and 59% of agricultural land has low potential. The Integrated Development Plan (IDP, 2017/18) notes that land needs to be optimally used for agriculture and food production. Cattle and sheep farming provide opportunities for the processing of meat, wool, and dairy products. Maize, sunflower seed, sorghum and wheat are cultivated in the district. There is a need for more agro-processing initiatives to boost agriculture in the district. A lack of funding for agricultural projects (Koppies Green House Vegetable production Project) has been identified (IDP, 2017/18). National Department of Agriculture has conceptualised Agri- Parks, & Ngwathe LM has been identified as one of the areas where Agri- Parks will be established (IDP, 2017/18).

Mining

Fezile Dabi district has location advantages in sectors such as agriculture, mining, manufacturing, and electricity provision. In terms of mining, there are extensive areas with rich underground coal deposits. Large quantities are mined in the Sasolburg district by means of conventional and strip mining methods. The rare clay, Bentonite, is mined in the vicinity of Koppies. The re-exploitation of the Lacemyn diamond mine in the vicinity of Kroonstad is currently taking place and gold is mined at the Vaal Reefs Mine, part of the Witwatersrand gold reef, in the Viljoenskroon area (IDP, 2017/18).

The Greater Kroonstad is the centre of a large agriculture community that plays an important role in the economy of the district. Industrial activities subsequently contribute significantly to the district's economy. The Department of Correctional Services and the School of Engineer's Military bases are situated in the town. Kroonstad has of late become a distinguished holiday destination due to the ultra-modern and popular holiday resort of Kroonpark, adjacent to the Vals River. The urban area is situated adjacent the N1 National Road and located adjacent one of the largest and most important four-way railway junctions in South Africa...

The municipality has a number of competitive advantages and key positives on which the economy can built. It has a solid economic infrastructure, the N1 road run just few minutes from the CBD. It has a solid railway line which plays a significant role in transporting agricultural products and other industrial good. The railway line linking the North West Province particularly Lichtenburg and Kwa Zulu Natal Province particularly the Durban Harbour passes through all the three towns of Moqhaka Local Municipality. It has airport that is designed for large aircraft such as Boeing 737s that can attract both international and national investors.

Main Economic Sectors include agriculture, manufacturing, trade, construction, electricity, transport, and finance. The 2016 forecast of economic activity for each sector was as follows:

- Agriculture -2.0%
- Mining -1.4%
- Manufacturing -2.0%
- Electricity -0.6%

**Population characteristics**

- The Fezile Dabi District Municipality has a population of 527 788, of which 160 532 are from the Moqhaka Local Municipality
- the number of households increased by 10.0% from 41 514 in 2001 to 45 661 in 2011 and increased again with 17.39% to 53 601 according to the Community Survey results of 2016.
- The population pyramid below shows a bulge from ages 15-19, 20-24 and 25-29 which is a reflection that Moqhaka Local Municipality consists of a young population that still needs to go to school and a pool of new entrants into the labour market.

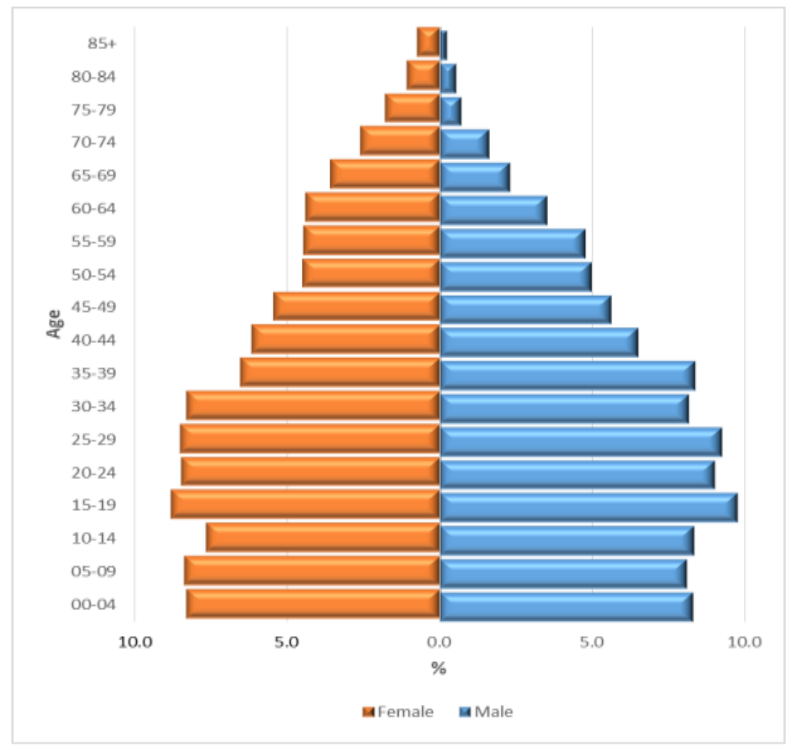



Figure 8: Population pyramid of Moqhaka Local Municipality

**Economic and household characteristics**

- Access to basic services is generally greater in the Moqhaka Local Municipality than at provincial level demonstrating that service delivery is generally more accessible.
- The shift of the economy from a primary to a tertiary economy is resulting in a large number of job losses and the mining sector is identified as suffering the largest loses. Moqhaka Local Municipality has been earmarked as a development nodal point for the coming 20 years, which is line with the proposed development.
- For households headed by children under 18 years, there is 167 households.
- 15% child-headed households are informal dwellings (shack)
- 58.7% child-headed households have women as their heads
- Annual household income is R7200

Level of education:

In 2019, the school pass rate in the municipality was 90.3%, the highest pass rate in the Free State province. According to the Community Survey, 2016, 94.8% or 109 806 of school-aged children between 5 and 17 years are in schools in the district which is about the same rate as in the District Municipality (91.96%) and in the Free State (94.9%). At a district wide level, 20.6% of the population have secondary education, whilst persons with tertiary education makes up only 1.3% of the district population.

**b) Socio-economic value of the activity**

| | |
|---|---|
| What is the expected capital value of the activity on completion? | R Not determined at this stage |

| | |
|---|---|
| What is the expected yearly income that will be generated by or as a result of the activity? | N/A |
| Will the activity contribute to service infrastructure? | **YES** / NO |
| Is the activity a public amenity? | **NO** |
| How many new employment opportunities will be created in the development and construction phase of the activity/ies? | Construction Team and security of up to 50 people |
| What is the expected value of the employment opportunities during the development and construction phase? | Not determined at this stage, will be finalized at procurement |
| What percentage of this will accrue to previously disadvantaged individuals? | 10% |
| How many permanent new employment opportunities will be created during the operational phase of the activity? | Four |
| What is the expected current value of the employment opportunities during the first 10 years? | Not determined at this stage, will be finalized at procurement |
| What percentage of this will accrue to previously disadvantaged individuals? | 10% |

**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 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 map which indicates the mapped biodiversity and ecological habitats and features on the site is included below as **Figure 9**, and included in **Appendix A**.

The study area is situated approximately 10 km east of the small town of Orkney and to the south of the settlement of Vaal Reefs. In terms of ecological habitats, a significant portion of this development area has been transformed by the existing mining plants and infrastructure. However, the majority of the area is still dominated by natural grassland with some disturbance also being evident. A large wetland area is present in the eastern portion of the development area, with a few small depression wetlands also occurring in the south.

According to Mucina & Rutherford (2006) the area consists of Vaal-Vet Sandy Grassland (Gh 10) and Vaal Reefs Dolomite Sinkhole Woodland (Gh 12). The former is currently listed as Endangered (EN), while the

latter is Least Concern (LC) under the National List of Threatened Ecosystems (Notice 1477 of 2009) (National Environmental Management Biodiversity Act, 2004). The Vaal-Vet Sandy Grassland dominated the southern portion of the site and is visible as undulating grassland but characterised by fairly deep, sandy soils. These remaining natural portions of this grassland would be regarded as being of high conservation value. The vegetation type is currently heavily affected by extensive transformation by agriculture, urban expansion, and mining operations.

The Vaal Reefs Dolomite Sinkhole Woodland dominates the northern portions of the site and is visible as undulating plains, although here exposed low rocky ridges become evident, deeper sandy soils are absent and the grass composition also differs slightly by containing a higher proportion of sour grasses. The woodland component, associated with dolomite sinkholes are not well represented on this site, although a few bush clumps were noted. This vegetation type is also heavily affected by transformation but not yet to such an extent as to warrant it being listed as a Threatened Ecosystem.

The Free State Province Biodiversity Management Plan (2015) has identified areas which are essential to meeting conservation targets for specific vegetation types, i.e. Critical Biodiversity Areas. The site is predominately listed as an Ecological Support Area 1 and 2 (ESA1 and ESA2) which functions in support of the Vaal River which is situated approximately 1km to the north of the site.

Furthermore, the site also contains two prominent areas being regarded as Critical Biodiversity Areas 1 (CBA1) and CBA 2 situated in the centre and eastern portion of the development area. These CBA1 area has been identified as being crucial for meeting conservation targets for the Endangered Vaal-Vet Sandy Grassland occurring in this area, but also to some extent the Vaal Reefs Dolomite Sinkhole Woodland in the area. These CBA1 areas have been identified as being Irreplaceable, i.e. "A site that is irreplaceable or near irreplaceable for meeting biodiversity targets. There are no or very few other options for meeting biodiversity targets for the features associated with the site. Such sites are therefore critical, and they need to be maintained to ensure that features targets are achieved and that such features persist." These portions of CBA1 occurring in the development area must as much as reasonably possible be excluded from development in order to ensure they remain intact (implementation of avoidance mitigation), in the event that areas of the development footprint cannot fully avoid the CBA areas, mitigation measures as recommended in the EMPr (Appendix G) must be implemented to mitigate any impacts.

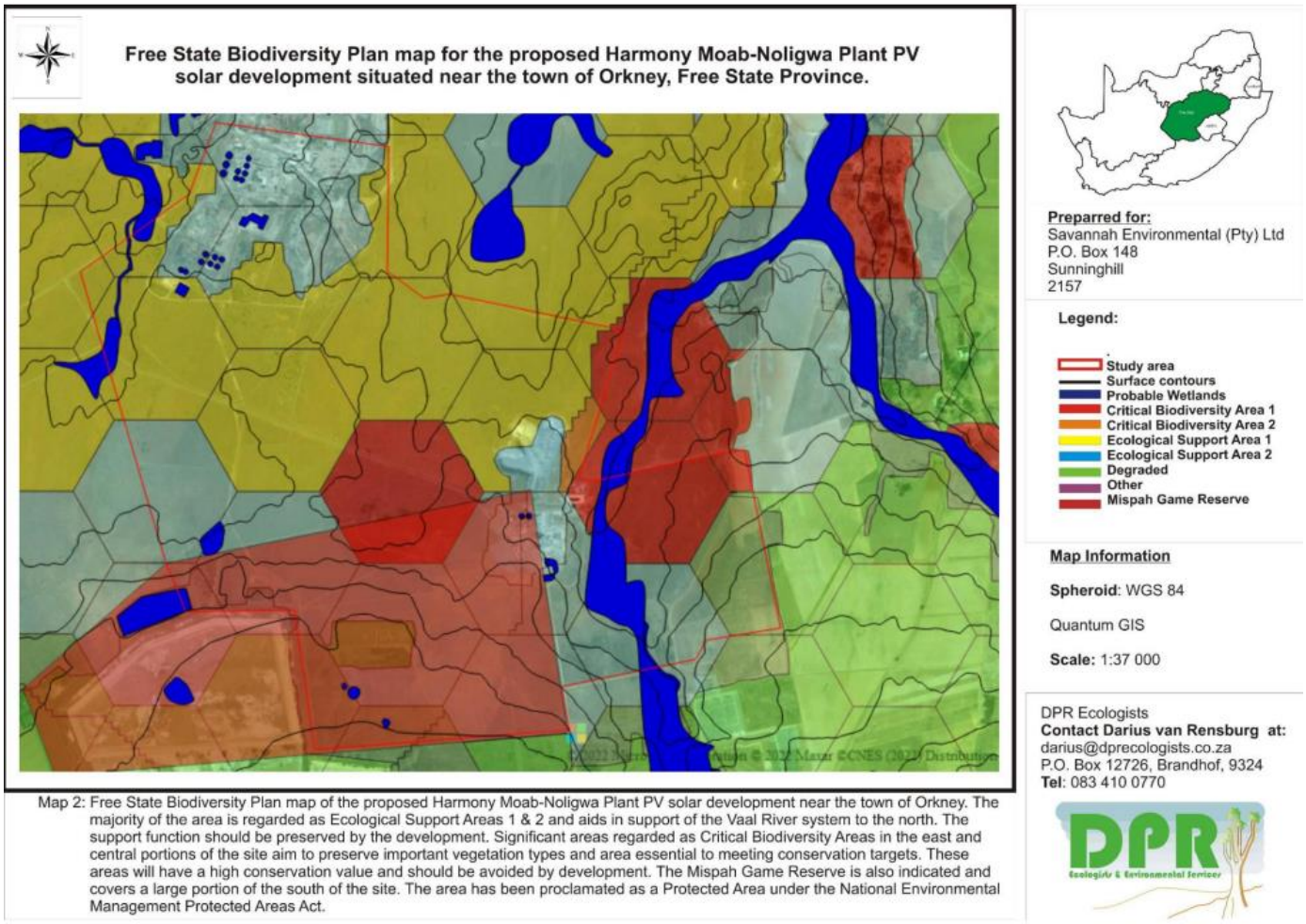
Given the above descriptions of the natural vegetation, the following areas of high sensitivity have been identified in the development area, should be avoided as far as possible (through implementation of avoidance mitigation) by the development footprint.

- The Mispah Game Reserve covers a large portion of the southern portion of the site. This is a Private Nature Reserve which has been proclaimed as a Protected Area (PA) under the National Environmental Management Protected Areas Act (NEMPAA of 2003). The area is listed as a Private Nature Reserve within the South Africa Protected & Conservation Areas Database (SAPAD) and was proclaimed in 2001 (Notice 23 of 2001). Development within any protected area is highly unlikely since this is largely prevented by the NEMPAA and any management plan of the protected area. This PA has also been taken into account in determining the provincial and national conservation targets and development within this PA will also affect these conservation targets.
- Two large CBA1 areas have been delineated by the Free State Biodiversity Management Plan. These CBA1 areas have been identified as being crucial for meeting conservation targets for the Endangered Vaal-Vet Sandy Grassland occurring in this area but also to some extent the Vaal Reefs Dolomite

Sinkhole Woodland in the area. These portions of CBA1 occurring in the development area must as much as reasonably possible be excluded from development in order to ensure they remain intact (implementation of avoidance mitigation), in the event that areas of the development footprint cannot fully avoid the CBA areas, mitigation measures as recommended in the EMPr (Appendix G) must be implemented to mitigate any impacts.

» Portions of remaining Vaal-Vet Sandy Grassland also occur in the south east of the development area, but which do not form part of the Mispah Game Reserve or identified CBA areas. However, since this vegetation type is currently listed as Endangered (EN) these areas must still be afforded a High level of sensitivity. Development should investigate all alternatives to avoid this area.

» A large wetland system transects the eastern portion of the site and should be completely excluded from development.




Map 2: Free State Biodiversity Plan map of the proposed Harmony Moab-Noligwa Plant PV solar development near the town of Orkney. The majority of the area is regarded as Ecological Support Areas 1 & 2 and aids in support of the Vaal River system to the north. The support function should be preserved by the development. Significant areas regarded as Critical Biodiversity Areas in the east and central portions of the site aim to preserve important vegetation types and area essential to meeting conservation targets. These areas will have a high conservation value and should be avoided by development. The Mispah Game Reserve is also indicated and covers a large portion of the south of the site. The area has been proclamated as a Protected Area under the National Environmental Management Protected Areas Act.

**Figure 9:** Habitats identified within the development area

**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)**

While the development area includes CBA1 and CBA2 areas, these are avoided as much as possible by the planned development footprint (through implementation of avoidance mitigation). The categorisation below is for the planned development footprint of the facility only. The development footprint area relative to CBA1 areas is indicated in **Figure 9**.

| 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) | CBA1 areas have been delineated by the Free State Biodiversity Management Plan and are in the proximity of the development area (one within the central portion, one to the west of the development area and not impacted by this project). The CBA1 area has been identified as being crucial for meeting conservation targets for the Endangered Vaal-Vet Sandy Grassland occurring in this area but also to some extent the Vaal Reefs Dolomite Sinkhole Woodland in the area. Infringement by the development footprint is minimal and considered acceptable loss. |

### 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 | 20% | Natural areas which have not been directly impacted by anthropogenic activities occur on site. These natural areas are the natural wetland features and drainage features identified within the development area and grid connection corridor. This habitat needs to be protected and improved due to the role of this habitat as a water resource. |
| Near Natural (includes areas with low to moderate level of alien invasive plants) | 20% | The degraded grassland habitat unit is regarded as semi-natural grassland, but disturbed due to mining, agricultural activities, and also human infringement in areas close to roads. Generally, this habitat unit has low ecological function attributed to floral communities, including the protected species. |
| Degraded (includes areas heavily invaded by alien plants) | 30% | The disturbed grassland habitat unit comprises areas where the grassland has been altered due to historic and/or current human activity as well as livestock pressure. This habitat is not entirely transformed but is in a constant modified state as it cannot recover to a more natural state due to ongoing disturbances and pressures imposed from the surrounding transformed areas and the current land use. This area is considered to have a low sensitivity due to the fact that it may be used as a movement corridor and in many cases forms a barrier between the more natural grassland and the transformed areas. |
| Transformed (includes cultivation, dams, urban, plantation, roads, etc) | 30% | The transformed areas are the areas which have little to no natural areas left due to being transformed by the informal housing, roads, mining practise and other infrastructure such as powerlines. Indirect impacts arise from the extensive anthropogenic presence from the current and historic land use. This habitat contributed to the high amount of alien vegetation recorded within the development area and grid connection corridor. |

**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.

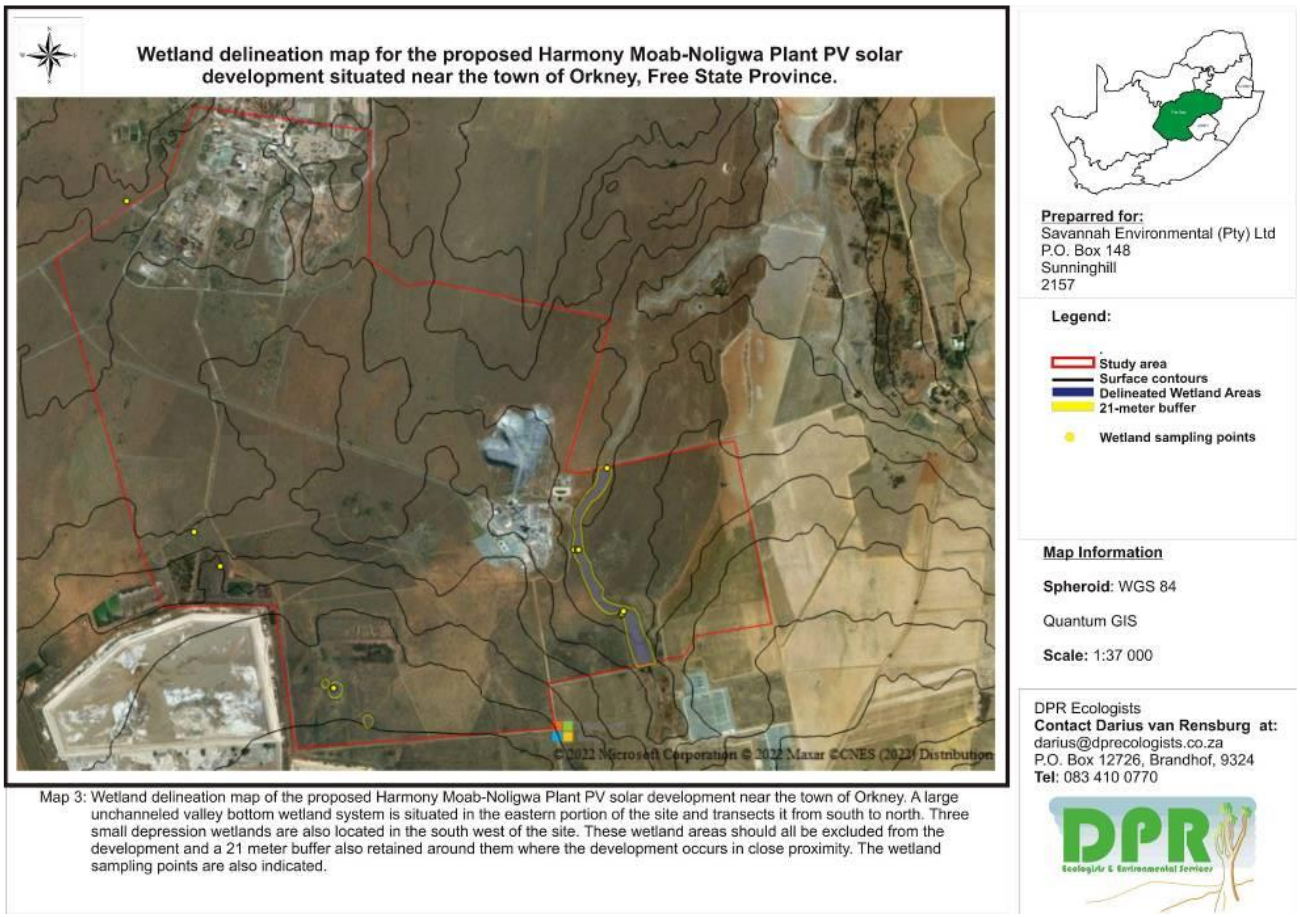
While the development area includes important vegetation types and a wetland feature, these are completely avoided by the planned development footprint (through implementation of avoidance mitigation). The categorisation below is for the broader site/Development Area (where the development footprint for the facility avoids these features and areas).

<table>
<tr><td colspan="2">Terrestrial Ecosystems<br>The site falls within the Vaal Reefs Dolomite Sinkhole Woodland and the Vaal-Vet Sandy Grassland vegetation types <u>(These vegetation types are limited within the development area)</u></td><td colspan="7">Aquatic Ecosystems<br>A large wetland system transects the eastern portion of the development area (but is avoided completely by the development footprint).</td></tr>
<tr><td rowspan="4">Ecosystem threat status as per the National Environmental Management: Biodiversity Act (Act No. 10 of 2004)</td><td>Critical</td><td rowspan="4" colspan="3">Wetland (including rivers, depressions, channelled and Unchanneled wetlands, flats, seeps pans, and artificial wetlands)</td><td rowspan="2" colspan="2">Estuary</td><td rowspan="2" colspan="2">Coastline</td></tr>
<tr><td>Endangered</td></tr>
<tr><td>Vulnerable</td></tr>
<tr><td>Least Threatened</td></tr>
<tr><td></td><td>YES</td><td>NO</td><td>UNSURE</td><td>YES</td><td>NO</td><td>YES</td><td>NO</td></tr>
</table>

The site falls within the Vaal Reefs Dolomite Sinkhole Woodland and the Vaal-Vet Sandy Grassland vegetation types. However, these vegetation types are limited within the development area.

A large wetland system transects the eastern portion of the development area, but the feature plus the recommended buffer is avoided by the planned development footprint.

These are discussed in further detail in the section below (also refer to **Figure 10**).




Map 3: Wetland delineation map of the proposed Harmony Moab-Noligwa Plant PV solar development near the town of Orkney. A large unchanneled valley bottom wetland system is situated in the eastern portion of the site and transects it from south to north. Three small depression wetlands are also located in the south west of the site. These wetland areas should all be excluded from the development and a 21 meter buffer also retained around them where the development occurs in close proximity. The wetland sampling points are also indicated.

Figure 10: Wetland features and delineations on site

**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)**

The development footprint of the Solar PV Facility will fall within the northern part of the development area. This area has been earmarked as favourable for development as it avoids the majority of the high to very high sensitivities found in the southern portion of the site.

**Vegetation Type**

The development area is still largely dominated by natural grassland and can be broadly divided into a northern and southern portion: where the northern portion is dominated by Vaals Reefs Dolomite Sinkhole Woodland and lies north of a large tarred road; while the southern portion is dominated by Vaal-Vet Sandy Grassland and situated south of the tarred road.

A significant portion of the development area has been transformed by the existing mining plants and infrastructure. However, the majority of the area is still dominated by natural grassland with some disturbance also being evident. A large wetland area is present in the eastern portion, with a few small depression wetlands occurring in the southern portion.

The following Vegetation types have been identified/described within the development area:

- **Southern portion[9] (Vaal-Vet Sandy Grassland – Deeper sandy soils)**

The southern portion of the site is still largely natural and dominated by a well-developed grass layer. Areas of local transformation include the mining operations, oxidation ponds, agricultural crop fields, a woodlot of exotic trees and smaller areas of temporary transformation. In transformed areas the natural vegetation is clearly no longer present or consists of pioneer species while those areas that remain largely natural are still dominated by climax grasses indicating a fairly good condition. Exotic weeds are present and may also become abundant around disturbed or transformed areas. It is also notable that the southern portion contains a higher degree of sweet grassland (highly palatable grasses adapted to sandier soils). The boundary between the southern Vaal-Vet Sandy Grassland and northern Vaal Reefs Dolomite Sinkhole Woodland is also not clearcut and the two transitions into the other and may also occur as interspersed patches. The vegetation composition in the southern portion confirms a largely natural vegetation type in a fairly good condition.

The grass layer is dominated by:

» Climax grasses including - *Themeda triandra, Triraphis andropogonoides, Eragrostis lehmanniana, Urelytrium agropyroides, Loudetia simplex, Anthephora pubescens, Brachiaria serrata, Digitaria eriantha* and *Eragrostis curvula*.
» Pioneer grasses (Where disturbance is evident in areas which were previously cleared of vegetation or where other disturbances such as overgrazing has occurred) - *Cynodon dactylon, Pogonarthria squarrosa, Eragrostis gummiflua, Perotis patens* and *Aristida canescens.*
» Prominent herbaceous component - *Helichrysum callicomum, Hermannia geniculata, Delosperma herbeum, Selago densiflora, Helichrysum caespititum, Selago burkei, Felicia muricata, Dicoma macrocephala, Ruschia hamata, Barleria macrostegia, Euphorbia striata, Helichrysum nudifolium* and *Ipomoea crassipes*.
» Where disturbance has occurred herbs such as - *Polydora poskeana, Ursinia nana* and *Nidorella resedifolia* may also be locally abundant.
» Geophytic species (plants with an underground storage organ) - *Orthanthera jasminiflora, Trachyandra laxa, Boophone distichia, Acanthosicyos naudinianus, Pentharhinum insipidum, Raphionacme velutina, Babiana bainesii* and *Schixocarpus nervosus*.
» An unidentified orchid species, *Satyrium sp.* was also noted
» A protected succulent, *Aloe greatheadii* is also present as scattered clumps.
» The Dwarf shrub, *Stoebe plumosus*, was present in this grassland, where previous transformation has occurred or where high levels of disturbance is evident
» Exotic weeds include - *Bidens bipinnata* and *Tagetes minuta*.

Many of the plants listed in the previous paragraph are also regarded as protected within the Free State Province (these include *Helichrysum spp., Euphorbia striata, Orthanthera jasminiflora, Boophone distichia, Pentharhinum insipidum, Schixocarpus nervosus, Satyrium sp., Raphionecma velutina, Babiana bainesii* and *Aloe greatheadii*). Where any of the herbaceous protected species will be affected by the development, permits will be required for their removal. Where the development will affect geophytic or succulent species, permits will also be required for removal and translocation to adjacent areas where they will remain unaffected.

From the vegetation description of the southern portion of the development area dominated by Vaal-Vet Sandy Grassland it would seem to be largely intact and in a fairly good condition. Signs of disturbance are, however, also evident and areas where previous clearance of the vegetation had occurred are clearly degraded. The species diversity is moderate although the area does also contain a significant number of protected plant species which will contribute towards its conservation value. However, the vegetation here is dominated by Vaal-Vet Sandy Grassland, an Endangered (EN) vegetation type which would therefore have at least a High level of sensitivity. In addition,

[9] The Southern Portion of site is included in the development area, however the development footprint falls within the northern part of site, therefore little to no development will take place within this portion of the development area, and it is not foreseen that any vegetation as listed below will be disturbed.

several factors further contribute towards its conservation value which include the Mispah Game Reserve, a proclaimed Protected Area (PA) and sections having been listed as Critical Biodiversity Area 1 (CBA1) and are characterised as irreplaceable. This will contribute to an even higher level of sensitivity.

***This southern portion of the development area (comprising Vaal-Vet Sandy Grassland and deeper sandy soils) has been excluded from the development footprint and the necessary mitigation implemented to ensure no indirect impacts affect the sensitive habitats***.

- **Northern portion**[10] **(Vaal Reeds Dolomite Sinkhole Woodland – Rocky outcrops)**

The northern portion of the site, is also still largely natural and dominated by a well-developed grass layer (here a few scattered bush clumps are also present, associated with dolomite sinkholes). Rocky outcrops are also present along the higher lying areas which also promote the establishment of shrubs. Areas of local transformation include the mining operations, tailings dumps and fairly extensive areas of shallow excavations and rubble dumps. In these transformed areas, the natural vegetation has been quite heavily degraded and exotic and invasive weeds and trees are prominent. However, the majority of this portion is still largely natural and dominated by climax grasses indicating a fairly good condition. Large areas, especially the western portion of the development area is also being used as communal grazing for domestic livestock and this does contribute to the establishment of exotic weeds. It is also notable that this portion contains a higher degree of sour grassland (unpalatable grasses dominate in rockier soils).

The boundary between the southern Vaal-Vet Sandy Grassland and northern Vaal Reefs Dolomite Sinkhole Woodland is not clearcut, and the two transitions into the other and may also occur as interspersed patches.

The vegetation in the northern portion confirms a largely natural vegetation type in a fairly good condition.

» Climax grasses include - *Hyparrhenia hirta, Harpochloa falx, Trachypogon spicatus, Cymbopogon pospischillii, Themeda triandra* and *Cymbopogon excavatus*.
» Pioneer grasses such as - *Cynodon dactylon, Eragrosis gummiflua, Stipagrostis uniplumis* and *Sporobolus discosporus*.
» A prominent herbaceous component includes - *Helichrysum callicomum, Senecio coronatus, Limeum viscosum, Indigofera sp., Hilliardiella eleagnioides, Lasiosiphon sericocephalus, Vigna sp., Indigofera daleoides, Lippia scaberrima, Dicoma anomala* and *Chascanum pinnatifidum*.
» Where disturbance has occurred herbs such as - *Acrotome inflata* and *Nidorella resedifolia* may also be locally abundant.
» Dwarf shrubs, such as - *Triumfetta sonderi*, ferns, *Pellaea calomelanos*
» Small succulents - *Crassula lanceolata, Crassula capitella* and *Kalanchoe rotundifolia*.
» Geophytic (plants with an underground storage organ) and Suffrutices (plants with an extensive belowground stem network) species include - *Hypoxis hemerocallidae, Ledebouria sp., Elephanthorrhiza elephantina, Pygmaeothamnus zeyheri, Chlorophytum sp., Babiana bainesii, Drimia platyphylla, Crinum graminicola, Raphionacme velutina* and *Ziziphus zeyheriana*.
» Small trees and shrubs which include - *Gymnosporia buxiifolia, Asparagus larcinus, Ziziphus mucronata, Searsia pyroides, Celtis africana, Clematis brachiata, Vachellia erioloba, Vachellia karroo, Grewia flava* and *Searsia lancea*. Of these, *V. erioloba* (Camel Thorn) is also listed as a protected tree but is only represented by a few small specimens which therefore have a limited conservation value.
» Exotic weeds can be abundant in disturbed areas and include *Physalis viscosa* and *Achyranthes aspera*.

Many of the plants listed are also regarded as protected within the Free State Province. These include *Helichrysum callicomum, Babiana bainesii, Crinum graminicola, Raphionacme velutina* and *Vachellia erioloba*. Where any of

[10] The Development Footprint falls within the northern part of the development area, the majority of the development will take place within this portion.

the herbaceous and tree protected species will be affected by the development, permits will be required for their removal. Where the development will affect geophytic or succulent species, permits will be required for removal and translocation to adjacent areas where they will remain unaffected.

As previously indicated, a large area is affected by shallow excavations and rubble dumps and here the vegetation has become dominated by weeds and invasive trees.

- Invasive trees are abundant and include - *Melia azedarach, Eucalyptus camaldulensis, Gleditsia triacanthids, Nicotiana glauca, Acacia baileyana* and *Tamarix chinensis*.
- Invasive grasses such as *Pennisetum setaceum*
- Invasive succulents such as *Opuntia ficus-indica* are also abundant.
- Indigenous pioneer grasses are also abundant and include - *Melinis repens*
- Indigenous trees have also become established including - *Vachellia karroo* and *Searsia lancea*.

***This portion of the development area is almost completely transformed and degraded while invasive plants are also likely to spread into the surrounding natural areas. The northern portion of the site would therefore be regarded as generally of Moderate sensitivity.***

Other additional areas of transformation also include:

- A large portion in the southeast of the site has been ploughed and is being used for crop cultivation. This portion is completely transformed and covers an area of approximately 60 hectares.
- A small area of approximately 3 hectares in the southeast of the site was previously cleared of vegetation and used as a stockpile or construction yard. This area has now re-established a grass layer but is visibly degraded.
- A small area of approximately 3 hectares in the southeast consist of a complex of greenhouses which is clearly a transformed area.
- A large woodlot of approximately 20 hectares is situated in the southwestern portion of the site and consists of the invasive Bluegum (*Eucalyptus camaldulensis*). This area also forms part of the Mispah Game Reserve but is clearly transformed.
- Along the southwestern border of the study area, a large tailings dam is situated. This dam also seeps toward the northeast and into the study area. This seepage area is clearly quite degraded, most probably as a result of high salt concentrations. This results in the dominance of the dwarf shrub, *Stoebe plumosus*, a clear indicator of degraded grassland. Though these seepage areas are not necessarily transformed they are clearly quite degraded. This seepage area covers an area of approximately 7 hectares.
- A few oxidation ponds are situated along the northern border of the tailings dam situated along the southwestern border of the site. These and immediate surroundings have caused local transformation of the natural grassland and cover an area of approximately 30 hectares.
- A fairly large area (approximately 20 hectares) in the northern portion of the site consists of shallow excavations and dumps of rubble and spoil where invasive trees have also become established. These areas are completely transformed from the natural condition.

**Conclusion**

From the description of the area given above it is clear that the majority of the development area still consists of natural grassland which is still in a fairly good condition. The surroundings as well as significant portions of the site has been affected and transformed by historical mining operations. Being a mining area, this results in transformation and degradation of large portions of land. The cumulative impact of development and mining in this area is, therefore, high. ***The proposed solar development should therefore first consider the development of areas considered as already transformed and of low sensitivity (implementation of avoidance of sensitive areas as a mitigation strategy)***. These include areas previously cleared for construction activities, portions transformed by ploughing for crop production and degraded areas associated with the mining operations which also includes areas of shallow excavations and rubble dumps. It is however inevitable that the development will also encroach into areas of natural grassland which will result in significant impacts.

**Wetland Ecology**

The surface water features of the study area are dominated by a large valley bottom wetland system in the southeastern portion of the site. A few small depressions also occur in the southwest of the site and within the Mispah Game Reserve11. ***This wetland system has been excluded from the development footprint and the necessary mitigation implemented to ensure no indirect impacts affect the wetland system***.

The large valley bottom wetland system occurs in the southeastern portion of the development area. This is a seasonal system which flows mostly during the rainy season. Three small depression wetlands are situated in the southwest of the site and are included within the Mispah Game Reserve. ***Both the large valley bottom wetland and the three small depressions fall outside of the development footprint for the PV facility and therefore the impact is regarded as low***.

These depressions are currently affected by a tailings dam located approximately 350m to the west of these depressions and which cause seepage in the direction of these pans and which clearly has a high impact on them. These pans have become nutrient enriched which cause a large modification of their vegetation structure.

| **Watercourse name:** | **Coordinates of sampling:** | **Flow regime:** |
|---|---|---|
| #1 Unchanneled valley bottom wetland – Main wetland in the east of the site | S 26.992289°, E 26.808740°<br>S 26.988173°, E 26.805267°<br>S 26.982773°, E 26.807467° | Seasonal |
| **Description of watercourse:**<br>The largest and most significant surface water feature in the area. This valley bottom wetland is a large system which originates approximately 5 km to the south of the site and then flows into the Vaal River about 4 km to the north of the site. The wetland therefore transects the eastern portion of the site and flows from south to north through it. The wetland is clearly an unchanneled system which does not have a defined main channel and banks though flow is still unidirectional from south to north. The width of the wetland can also be quite broad and while varying in width over its course, may be as wide as 100m in some areas. The wetland is largely fed by the upper reaches while inflow from the side slopes is also likely. Development around this wetland is therefore also likely to directly affect it in terms of runoff generated by it and which will enter this system. Though this is a natural system, it is clearly affected by several large impacts. The upstream catchment is utilised for agricultural crop production and these fields will undoubtedly contribute to significant impacts on the wetland. This will include increased surface runoff rates due to the absence of vegetation and high concentrations of fertiliser runoff as well as some herbicide and pesticide contamination. Other impacts also include several road crossings which will act as flow obstructions and large woodlots of exotic trees which will decrease the groundwater inflow into the wetland.<br><br>The wetland is situated in a low-lying shallow valley, and in terms of topography clearly supports the formation of a wetland system and also aids in accurate delineation of the system. Vegetation within the wetland is also dominated by obligate wetland sedges and grasses which also confirm the presence of saturated soils. Surface water was still visible during the survey and also indicates that the system is at least seasonal in terms of its active hydrological regime. Soil samples also reliably confirm the presence of wetland conditions which indicate a seasonal zone of wetness within the wetland. | | |
| **Dominant plant species:**<br>Seepage wetland: *Setaria sphacelatum (FW), Eragrostis lappula (OW), *Verbena bonariensis, *Veronica anagalis-aquatica, *Oenothera rosea, Agrostis lachnantha (OW), Scirpoides burkei*.<br><br>Wetland border: *Triumfetta soderi, Asparagus larcinus, Hyparrhenia hirta, Ziziphus mucronata, Eragrostis gummiflua, Cynodon dactylon, Hypoxis hemerocallidae* | | |
| Protected plant species: None observed. | | |

11 No development associated with the Solar PV facility will be located within the wetland areas, the gridline infrastructure is however located within the 500m regulated area and a water use licence process will be undertaken in this regard.

Soil sample:

The wetland is clearly defined but clearly is devoid of a channel and banks. Here it is also quite narrow when passing through a rocky area.

The valley bottom wetland can become quite broad in some areas.

Wetland sedges and grasses dominate the wetland. Note the presence of surface water indicating it is at least seasonal.

View of the wetland from the surrounding area. It is clearly situated in a shallow valley with a linear flow pattern.

| **Watercourse name:** | **Coordinates of sampling:** | **Flow regime:** |
|---|---|---|
| #2 Depression wetlands – series of three small wetlands in southwest of the site | S 26.997414°, E 26.787146° | Seasonal |

**Description of watercourse:**

A series of three quite small depression wetlands located in the southwest of the site. These wetlands are all located adjacent to each other and have a diameter of approximately 80 meters. These wetland areas are clearly visible as shallow but distinct depressions in the landscape. They are mainly fed by runoff and groundwater inflow from the southwest. A large tailings dam is also situated to the southwest of these wetlands (approximately 350m) and it is clear that seepage from this tailings dam has a large effect on them. High salt concentrations are quite evident as a result of this seepage and the wetland itself is also modified by higher salt concentrations while the vegetation is also heavily degraded and dominated by exotic weeds. These wetland areas are however located in the southwest of the site and within the Mispah Nature Reserve and if this reserve is excluded from development the three small depressions should also remain unaffected by default.

The small depression wetlands form shallow but distinct depressions in the landscape and the topography therefore promotes the establishment of wetland conditions. Vegetation within these depressions are however quite modified and dominated by exotic weeds. This is most likely a consequence of seepage from the adjacent tailings dam which causes elevated salt concentrations and nutrient enrichment. Soil samples do however conclusively confirm the presence of wetland conditions which indicate a seasonal zone of wetness within the wetland.

**Dominant plant species:**

*Cyperus longus (OW), *Tegetes minuta, *Bidens bipinnata*.

Protected plant species: None observed.

Soil sample:

The small depression wetlands are clearly visible as depressions.

| **Watercourse name:** | **Coordinates of sampling:** | **Flow regime:** |
|---|---|---|
| #3 No wetland conditions | S 26.987061°, E 26.776743°<br>S 26.965037°, E 26.771725° | No wetland conditions |

**Description of watercourse:**

Current wetland resources including the National Wetland Map 5 (NWM 5) and the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) also indicate two additional wetland areas likely to occur in the area. The survey also sampled these areas and confirmed that no wetland conditions are present in these areas. They do not form part of any watercourse, wetland or surface water feature, and are therefore not relevant for the development. The following results also confirm that these areas were surveyed and confirmed to be devoid of wetland conditions:

- A circular seepage wetland is indicated to the north of the tailings dam in the south west of the site. This area contains a slight slope and soils consist of deep sandy soils without any soil wetness indicators. Vegetation is also dominated by grasses and pioneer herbs and while significant disturbance is evident, wetland conditions

are clearly absent. This area does not contain any seepage, does not form any prominent component of the local surface water drainage and does not form a wetland or watercourse.

- There is a probability indicated of an elongated watercourses system transecting the north western corner of the site. However, the on-site survey confirmed no wetland conditions occurring here and a channel or drainage line is also clearly absent.

Sampling to the north of the tailings dam confirm the absence of wetland conditions.

North western corner of the site contain no watercourse or wetland conditions.

From the above described impacts it should be clear that the valley bottom wetland system is affected by numerous impacts, which has resulted in a significant level of modification. A WET-Health determination was undertaken for the valley bottom wetland to determine its current condition given the impacts affecting it. The results of the WET-

Health indicated an overall 56 Present Ecological State of Category C: Moderately Modified. This is considered relatively accurate given the largely transformed catchment and impacts on the wetland.

The EI&S of the valley bottom wetland system has been rated as being Moderate: Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. This is mostly a result of the already modified condition of the wetland, though since it is a large system still providing several important functions the EI&S remains Moderate.

A Risk Assessment has been undertaken according to the Department of Water & Sanitation's requirements for risk assessment and the provisional Risk Assessment Matrix for Section 21(c) & (i) water use. Current layout plans do indicate that the eastern portion of the development area will be excluded though development will still occur within 350m of the edge of the wetland, and is then still likely to have some impact on it. The wetland and buffer zone should be regarded as no-go areas and no construction or operational activities including stockpiling, clearing, laydown areas, vehicle movement or any other associated activities should occur in or near this wetland system. Given the distance between the wetland area and current facility layout (approximately 350m), the anticipated risk will be low. However, since the catchment of the wetland lies largely within the development area, it will most likely have a significant impact on the runoff generated and inflow into the wetland. As a result, the development will have to implement a comprehensive stormwater management system which should ensure that the surface runoff patterns are retained as is, especially pertaining to solar panels, and that the development does not contribute toward increased surface flow, erosion and any impacts on downslope areas.

Given the current facility layout plan, it is unlikely that infrastructure such as roads and power lines will require crossing the wetland, and this was therefore not rated as a risk.

# SECTION C: PUBLIC PARTICIPATION

## 1. ADVERTISEMENT AND NOTICE

| | | |
|---|---|---|
| **Publication name** | Parys Gazette | |
| **Date published** | 22 September 2022 | |
| **Site notice positions** | **Latitude** | **Longitude** |
| | 26°58'23,007"S | 26°46'4,759"E |
| | 26°58'22.916"S | 26°46'4,705"E |
| | 26°56'46.119"S | 26°47'30,63"E |
| **Date placed** | 21 September 2022 | |

The person conducting a public participation process must take into account any guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of the application which is subjected to public participation by—

(a) fixing a notice board (of a size at least 60cm by 42cm; and must display the required information in lettering and a format as may be determined by the department) at a place conspicuous to the public at the boundary or on the fence of—

(i) the site where the activity to which the application relates is or is to be undertaken; and

(ii) any alternative site mentioned in the application.

Include proof of the placement of the relevant advertisements and notices in Appendix E2.

Three (3) site notices were placed at the development site on 21 September 2022. Refer to **Appendix E2** for proof of placement of the site notices.

One newspaper advertisement (in English) was published in the Parys Gazette on 22 September 2022. Refer to **Appendix E2** for the advertisement text. Proof of the media advertisement (tearsheet) will be included in the final BA Report.

(b) giving written notice to—

(i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;

(ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;

(iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;

(iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;

(v) the municipality which has jurisdiction in the area;

(vi) any organ of state having jurisdiction in respect of any aspect of the activity; and

(vii) any other party as required by the department.

A notification letter, inclusive of a Background Information Document (BID), announcing the commencement of the BA process being undertaken and how I&APs can become involved in the BA process were distributed via e-mail to pre-identified Interested and Affected Parties (I&APs) and key stakeholders on 26 September 2022. The notification letter also announced the availability of the BA Report and EMPr for a 30-day review and comment period. Refer to **Appendix E4** and **E5** for proof of distribution of the notification letter.

(c) placing an advertisement in—
  (i) one local newspaper; or
  (ii) any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations.

(d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the local municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in sub regulation 54I(ii).

An English advertisement announcing the commencement of the BA process and the availability of the BA Report and EMPr for a 30-day review and comment period was placed in the Parys Gazette on 22 September 2022. Refer to **Appendix E2** for the media advertisement text and proof of placement (tearsheet).

(e) using reasonable alternative methods, as agreed to by the department, in those instances where a person is desiring of but unable to participate in the process due to—
  (i) illiteracy;
  (ii) disability; or
  (iii) any other disadvantage.

Alternative means of undertaking consultation have been designed and implemented by Savannah Environmental to ensure that I&APs, including persons desire to participate but unable to do so due to limitations as per the EIA Regulations, 2014, as amended, are afforded sufficient opportunity to access project information and raise comments on the project through an interactive web-based platform (i.e. online stakeholder engagement platform) readily available and accessible to any person registering their interest in the project. It ensures that the public participation process is undertaken in line with Regulations 41 to 44 of the EIA Regulations, 2014, as amended. Consultation with the Ward Councillor and the Ward Committee members will take place to ensure that project related information reach those persons with limitations as listed in I above, are informed of the proposed development.

I&APs can also make use of the dedicated mobile number to contact the public participation team to request information regarding the project and/or submit verbal comments (including a '*Please call me*' option to allow for direct access to the project team.

The online stakeholder engagement platform implemented by Savannah Environmental for the project allows the EAP to visually present details regarding the project and consultation documentation, including project maps and plans, and background information documents. It also contains the BA Report and Appendices available for review. The use of an online tool enables stakeholders and I&APs

to explore the project-specific content in their own time, while still participating in a meaningful way in the consultation process.

**2. CONTENT OF ADVERTISEMENTS AND NOTICES**

A notice board, advertisement or notices must:

(a) indicate the details of the application which is subjected to public participation; and
(b) state—
  (i) that the application has been submitted to the department in terms of these Regulations, as the case may be;
  (ii) whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation;
  (iii) the nature and location of the activity to which the application relates;
  (iv) where further information on the application or activity can be obtained; and
  (v) the manner in which and the person to whom representations in respect of the application may be made.

The content of the site notices placed at areas accessible by public members complies with Regulation 41(2)(a)(i) and includes:

- the applicant;
- a description of the development and the on-site infrastructures;
- where the project site is located and list of affected properties;
- that a BA process is being undertaken (that is, explains that the project is in a REDZ); and
- how a person can obtain further information on the project, how to register on the project database and where and how to submit comments.

The advertisement placed in a local newspaper, Parys Gazette, complied with the requirements of Regulation 41(2)(c)(i) (as above), and included the dates for the review period for the BA Report.

Copies of the text as used for these notices are included in **Appendix E2** of the BA Report.

**3. PLACEMENT OF ADVERTISEMENTS AND NOTICES**

Where the proposed activity may have impacts that extend beyond the municipal area where it is located, a notice must be placed in at least one provincial newspaper or national newspaper, indicating that an application will be submitted to the department in terms of these regulations, the nature and location of the activity, where further information on the proposed activity can be obtained and the manner in which representations in respect of the application can be made, unless a notice has been placed in any Gazette that is published specifically for the purpose of providing notice to the public of applications made in terms of these Regulations.

**Advertisements and notices must make provision for all alternatives.**

Alternative sites are not applicable to this application.

## 4. DETERMINATION OF APPROPRIATE MEASURES

The practitioner must ensure that the public participation is adequate and must determine whether a public meeting or any other additional measure is appropriate or not based on the particular nature of each case. Special attention should be given to the involvement of local community structures such as Ward Committees, ratepayers associations and traditional authorities where appropriate. Please note that public concerns that emerge at a later stage that should have been addressed may cause the department to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was inadequate.

The sharing of information forms the basis of the public participation process and offers the opportunity for I&APs to become actively involved in the BA process from the outset. The public participation process is designed to provide sufficient and accessible information to I&APs in an objective and transparent manner. The public participation process affords I&APs opportunities to provide input into and receive information regarding the BA process in the following ways:

- provide an opportunity to submit comments regarding the project;
- assist in identifying reasonable and feasible alternatives, where required;
- identify issues of concern and suggestions for enhanced environmental assessment;
- contribute relevant local information and knowledge to the environmental assessment;
- allow registered I&APs to verify that their comments have been recorded, considered, and addressed, where applicable, in the environmental investigations;
- foster trust and co-operation;
- generate a sense of joint responsibility and ownership of the environment;
- comment on the findings of the environmental results as documented in the BA Report; and
- Identify issues of concern and suggestions for enhanced benefits.

The public consultation process has included the following to date:
- distribution of a notification letter with the BID to pre-identified I&APs;
- placement of site notices; and
- one-on-one meetings / discussions with adjacent landowners.

The public participation process has considered the nature and extent of the project to determine the most appropriate stakeholders are provided adequate opportunity to engagement and comment on the project. One-on-one consultation meetings with individuals (including adjacent landowners), Focus Group Meetings with the relevant stakeholder groups (i.e., landowners and authorities (including Organs of State, district & local authorities), and a Key Stakeholders Workshop with key stakeholders (including Eskom, Telkom, and official elected representatives of community-based organisations) are planned to be held prior to and during the 30-day public review and comment period. Meetings include:

| Date | Platform / Venue | Stakeholder Group |
|---|---|---|
| 21 September 2022 | In-person meetings with individuals at pre-arranged venues | Owner of Portion 3 of the Farm Buffelsfontein 443, located to the north east of the development site; Owner of Portion 4 of the Farm Doornkom-Oost 447 & Portion Remainder Extend of the Farm Kleinfontein 369 |

| | | |
|---|---|---|
| | | of which both properties are located to the east of the development site. |
| 28 September 2022 | Virtual meeting to allow for maximum attendance MS Teams or similar | Focus Group Meeting Fezile Dabi District Municipality and Moqhaka Local Municipality Officials, including Ward Councillors |
| 05 October 2022 | Virtual meeting to allow for maximum attendance MS Teams or similar | Key Stakeholders Workshop with National, Provincial and Local Authorities and Key Stakeholders i.e. Telkom, Eskom, South Africa Civil Aviation Authority, Representatives of Organisations i.e. Ratepayers Association |

Notes of the in-person meetings held with the adjacent landowners are included in **Appendix E7** of the BA Report, and notes of meetings held during the 30-day review and comment period will also be included in **Appendix E7** of the final BA Report.

E-mail correspondence was sent to Midvaal Water Company, owners of Portion 12 of the Farm Buffelsfontein 443, located to the north of the development site. Confirmation is awaiting who Midvaal Water Company's official representative would be with whom the project participation team needs to consult with (refer to **Appendix E4** of the BA Report).

In addition, all stakeholders will have access to all project documentation online on the Savannah Environmental stakeholder engagement platform. Access to the project documentation is unrestricted and easy to download. In the written notifications in which the BA and public participation process have been announced, including the media advertisement, I&APs has been made aware of the *"please call me"* that is available to those I&APs with limited data. The public participation team will attend to these messages received and determine the best way of communication with the I&AP.

Provide details of the measures taken to include all potential I&APs as required by Regulation 41(2)(e) and 41(6) of GN 326.

In terms of Regulation 41(2)(e) consultation with the Ward Councillor, the Ward Committee members and the officially elected representatives from organisations such as ratepayers associations and acknowledged community based organisation/s will take place to ensure that project related information reach those persons with limitations are informed of the proposed development.

In terms of Regulation 41(6) site notices were placed as the proposed development site, media advertisement placed in the local newspaper, and the BID distributed to those pre-identified I&APs. Where notification letters and the BID were distributed, it was requested that should a stakeholder know of any other person/s that need to be informed of the proposed development to provide Savannah Environmental with their contact details, in order for the public participation team to ensure that the additional contact/s are informed of the proposed development and provide them with the public documents available.

Key stakeholders (other than organs of state) identified in terms of Regulation 41(2)(b) of GN 326

| Title, Name and Surname | Affiliation/ key stakeholder status | Contact details (tel number or e-mail address) |
|---|---|---|
| Samantha Ralston | BirdLife South Africa | The contact details of the key stakeholders have been excluded as per the requirements of the POPI Act. |
| Serame Motlhake | Sentech Ltd | |
| Zamikhaya Magogotya | South African Weather Services | |
| Simphiwe Masilela | Air Traffic and Navigation Services (ATNS) | |
| Selaelo Matlhane | South African Radio Astronomy Observatory (SARAO) | |
| Lizelle Stroh | South African Civil Aviation Authority | |

Refer to the database attached within **Appendix E1** of the BA Report.

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

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

Proof that the key stakeholders registered on the project database have received written notification of the proposed activities in included in **Appendix E4** of the BA Report. This proof includes the following:

(a) e-mail delivery reports;
(b) courier waybills – should hard copies be requested by an Organ of State or key stakeholder; and
(c) signed acknowledgements of e-mail receipt should the function be selected by the recipient.

**5. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES**

A summary of the key comments raised by stakeholders and/or I&APs are:

- would excess electricity be sold to Eskom?;
- concern regarding possible impact on road surface and traffic passing the Wawiel Park Holiday Resort located north of Vermaasdrift Road;
- commented that the agricultural land in the study area is classified by the Department of Agriculture as high potential agricultural soil for growing crops; and
- in principle, no objection to the proposed development.

Any and all comments received during the 30-day review period of the BA Report will be included in **Appendix E6** of the Final BA which will be submitted to DESTEA.

## 6. 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 E8.

The Comments and Responses Report will be drafted with the comments received during the 30-day review and comment period of the BA Report and attached as **Appendix E8** of the final BA Report.

## 7. AUTHORITY PARTICIPATION

Please note that a complete list of all organs of state and or any other applicable authority with their contact details must be appended to the basic assessment report.

All Organs of State and/or any other applicable authorities, including their contact details, have been included in the I&AP database (refer to **Appendix E1**).

Authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input[12]. Authorities and Organs of State identified as key stakeholders include:

| **Authority/Organ of State** | **Contact person** |
|---|---|
| Department of Forestry, Fisheries and the Environment: Biodiversity Conservation | Seoka Lekota |
| Department of Water and Sanitation: Free State Province | Dr Ntili |
| Department of Agriculture and Rural Development | Nozizwe Makgalemele |
| Department of Mineral Resources and Energy | Mthetheleli Maphinda |
| Free State Provincial Heritage Resources Agency | Ntando Mbatha |
| SAHRA | Natasha Higgit |
| Free State Department of Economic Small Business Development, Tourism and Environment | Grace Mkhosana |
| Free State Department of Agriculture and Rural Development | Thabita Mokone |
| SANRAL: Western Region | Nxobile Mabaso |
| Eskom Holdings SOC Ltd - Transmission | John Geeringh |
| Eskom Holdings SOC Ltd – Distribution | Gerrie van Schalkwyk |

Refer to the database attached as **Appendix E1**.

Include proof that the Authorities and Organs of State received written notification of the proposed activities.

Proof that the Authorities and Organs of State received written notification of the proposed project and the availability of the BA Report for a 30-day review and comment period has been included in **Appendix E4**.

[12] Contact details of the relevant authorities have been excluded as per the requirements of the POPI Act.

In the case of renewable energy projects, Eskom and the SKA Project Office must be included in the list of Organs of State.

| |
|---|
| Proof that the Eskom and the SARAO (SKA changed to SARAO in 2020) received written notification of the proposed project has been included in **Appendix E4**. |

**8. 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.

| |
|---|
| No deviation is required for this application. |

A list of pre-registered I&APs must be included as **Appendix E1**.

| |
|---|
| A list of registered I&APs has been included as **Appendix E1.** |

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

| |
|---|
| Copies of correspondence with Organs of State and Key Stakeholders will be included in the final BA Report as **Appendix E4** and correspondence with I&APs will be included in **Appendix E5**. Copies of minutes of meetings held will be included as **Appendix E7** to the final BA Report. |

| | |
|---|---|
| Has any comment been received from stakeholders? | **YES** |

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

| |
|---|
| A summary of the key comments raised by stakeholders and/or I&APs are:<br>• would excess electricity be sold to Eskom?<br>• impact on the road condition should it pass the Wawiel Park Holiday Resort located north of Vermaasdrift Road;<br>• avoidance of developing on agricultural land, especially land earmarked or utilised for crops;<br>• commented that the agricultural land to the east of the development site is classified by the Department of Agriculture as high agricultural land for growing crops; and<br>• in principle, no objection to the proposed development.<br>Any and all comments received during the 30-day review period of the BA Report will be included in **Appendix E6** of the Final BA which will be submitted to DESTEA. |

# SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2014 as amended 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 because 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.

### 1.1 Outcomes of the Department of Forestry, Fisheries, and the Environment (DFFE) Web-Based Screening Tool

In terms of GN R960 (promulgated on 5 July 2019) and Regulation 16(1)(b)(v) of the 2014 EIA Regulations (as amended), the submission of a Screening Report generated from the national web based environmental screening tool is compulsory for the submission of applications in terms of Regulations 19 and 21 of the EIA Regulations.

The requirement for the submission of a Screening Report (**Appendix G2**) for the project is applicable as it triggers Regulation 19 of the EIA Regulations, 2014 (as amended). **Table 2** provides a summary of the specialist assessments identified in terms of the screening tool and responses to each assessment from the project team, considering the project area under consideration.

**Table 2:** Sensitivity ratings from the DFFE's web-based on lines Screening Tool associated with the development of the Solar PV Energy Facility and associated infrastructure

| Specialist Assessment | Sensitivity Rating as per the Screening Tool (relating to the need for the study) | Project Team Response |
|---|---|---|
| Agricultural Impact Assessment | High Sensitivity | This specialist study is included in this Basic Assessment Report as **Appendix D2**. Based on the outcome of the desktop analysis of available data as well as the data obtained during the site visit, it has been concluded that the entire development area has medium to low sensitivity to the development from the perspective of soil and agricultural potential conservation. |
| Landscape/Visual Impact Assessment | Very High Sensitivity | A Visual impact assessment is included as **Appendix D4** in this Basic assessment Report. Some components of the PV Facility and associated infrastructure may be visible, but does not imply a high visual impact due to the nature of the existing |

| | | |
|---|---|---|
| | | activities in the area (including the Moab and Noligwa Mines). Sensitive visual receptors within (but not restricted to) a 3km buffer zone from the facility have been identified and impacts are assessed to be of a medium to low significance. |
| Archaeological and Cultural Heritage Impact Assessment | High Sensitivity | A Heritage impact assessment (which covers both archaeological, palaeontology and cultural aspects of the project site) is included in this Report as **Appendix D3.**<br><br>The areas surveyed as part of this assessment have been transformed through agricultural interventions and/or mining activity. As such, the results of the survey only identified one archaeological site of scientific cultural value - CM1. A 30m no-go development buffers was therefore recommended, however no development activity relating to the PV development will impact or encroach on this resource.<br><br>No impacts to the cultural landscape are anticipated. |
| Palaeontology Impact Assessment | Very High Sensitivity | The site visit confirmed that the area has been disturbed from farming and mining so no fossils were present on the surface. The geological structures suggest that the rocks are the right age and type to contain fossils, but the area is covered in deep cultivated soils.<br><br>Since there is an extremely small chance that fossils from the Vryheid Formation may occur below ground and may be disturbed, a Fossil Chance Find Protocol is recommended. |
| Terrestrial Biodiversity Impact Assessment | Very high Sensitivity | An Ecological impact assessment (including flora and fauna) has been undertaken for the PV facility and is included as **Appendix D1**. Based on the outcomes of the field work, areas of high significance have been demarcated within the southern portion of the development area. The development footprint has avoided these areas (implementation of the avoidance mitigation strategy), and the development footprint is limited to the northern areas of the development area.<br><br>The Vaal Reefs Dolomite Sinkhole Woodland dominates the northern portions of the site and is visible as undulating plains, although here exposed low rocky ridges become evident, deeper sandy soils are absent and the grass composition also differs slightly by containing a higher proportion of sour grasses. The woodland component, associated with dolomite sinkholes are not well represented on this site, although a few bush clumps were noted.<br><br>The northern portion is listed as an Ecological Support Area 1 and 2 which functions in support of the Vaal River which is situated approximately 1km to the north of the site. |

| | | |
|---|---|---|
| | | However, this northern portion of the development area is almost completely transformed and degraded from mining operations. In these transformed areas, the natural vegetation has been quite heavily degraded and exotic and invasive weeds and trees are prominent. However, the majority of this portion is still largely natural and dominated by climax grasses, indicating a fairly good condition. Large areas, especially the western portion of the development area is also being used as communal grazing for domestic livestock and this does contribute to the establishment of exotic weeds.<br><br>The northern portion of the site would therefore be regarded as generally of Moderate sensitivity. |
| Aquatic Biodiversity Impact Assessment | Very high Sensitivity | An Ecological impact assessment (including freshwater) has been undertaken for the PV facility and is included as **Appendix D1**. Wetlands or watercourse features are located within the project site. However, the development footprint avoids both the wetlands, watercourses and the 500m regulated areas. It has to be noted that development of the gridline infrastructure falls within the 500m regulated area, a risk assessment has however been undertaken of which the sensitivity has indicated a low significance. |
| Civil Aviation Assessment | Medium Sensitivity | A small local airfield is located approximately 6km from the proposed development. No predicted impacts are anticipated in this regard, however if applicable the Civil Aviation Authority (CAA) and Air Traffic Navigation Services (ATNS) will be consulted to obtain inputs. |
| Defence Assessment | Low Sensitivity | No defence or military base is located within close proximity to the PV facility. |
| RFI Assessment | Low Sensitivity | The project site under consideration for the development of the Harmony Moab Khotsong Solar PV Facility, is located within an area that is classified as having low sensitivity for telecommunication. |
| Plant Species Assessment | Medium Sensitivity | An Ecological Impact assessment (including flora and fauna) has been undertaken for the PV facility and is included as **Appendix D1**. |
| Animal Species Assessment | Medium Sensitivity | |
| Avian theme | Low Sensitivity | An Avifaunal Impact Assessment has been undertaken and is included in **Appendix D6**.<br><br>An evaluation of potential and likely impacts on the avifauna revealed that although areas of high sensitivities were identified within the development area, the development footprint avoids these sensitivities and therefore the impact significance was moderate to low after mitigation |

### 1.2 Assessment of Impacts Identified through the BA Process (Direct and Indirect)

Impacts that required investigation during the BA process and the specialist consultants involved in the assessment of these impacts are indicated in **Table 3** below.

A complete impact assessment in terms of Regulation 19(3) of GN 326 must be included as **Appendix F.**

**Table 3:** Specialist studies undertaken as part of the BA process

| Company | Specialist Area of Expertise | Specialist Name | Appendix |
|---|---|---|---|
| DPR Ecologists | Ecology and Wetlands | Darius Van Rensburg | Appendix D1 |
| Terra Africa Environmental Consultants | Soils and Agricultural Potential | Marinè Pienaar | Appendix D2 |
| CTS Heritage | Heritage and Palaeontology | Jenna Lavin | Appendix D3 |
| Eco Thunder Consulting | Visual | Brogan Geldenhuys | Appendix D4 |
| Eco Thunder Consulting | Social environment | Marti Le Roux | Appendix D5 |
| Pachnoda Consulting | Avifauna | Lukas Niemand | Appendix D6 |

Specialist studies considered direct and indirect environmental impacts associated with the development of all components of the facility. Identified impacts are assessed in terms of the following criteria:

- The **nature**, a description of what causes the effect, what will be affected, and how it will be affected.
- The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national, or international. a score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high).
- The **duration**, wherein it is indicated whether:
  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1.
  - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2.
  - Medium-term (5–15 years) – assigned a score of 3.
  - Long-term (> 15 years) - assigned a score of 4.
  - Permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment.
  - 2 is minor and will not result in an impact on processes.
  - 4 is low and will cause a slight impact on processes.
  - 6 is moderate and will result in processes continuing but in a modified way.
  - 8 is high (processes are altered to the extent that they temporarily cease).
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability of occurrence**, which describes the likelihood of the impact occurring. Probability is estimated on a scale, and a score assigned:
  - 1–5, where 1 is very improbable (will not happen).
  - 2 is improbable (some possibility, but low likelihood.)
  - 3 is probable (distinct possibility).
  - 4 is highly probable (most likely).
  - 5 is definite (impact will occur regardless of any prevention measures).

- The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium, or high.
- The **status**, which is described as either positive, negative, or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

S = (E+D+M) P; where
S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- **< 30 points:** Low (i.e., where this impact would not have a direct influence on the decision to develop in the area).
- **30-60 points:** Medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated).
- **60 points:** High (i.e., where the impact must have an influence on the decision process to develop in the area).

As Harmony Moab Khotsong Operations (Pty) Ltd has the responsibility to avoid or minimise impacts and plan for their management (in terms of the requirements of NEMA and the 2014 EIA Regulations (GNR 326)), the mitigation of significant impacts is discussed. Assessment of impacts with mitigation is made, to demonstrate the effectiveness of the proposed mitigation measures. An EMPr that includes all the mitigation measures recommended by the specialists for the management of significant impacts is included as **Appendix F** to this BA Report.

### 1.3 Assessment of Cumulative Impacts

The project may have effects (positive and negative) on natural resources; the social environment; and on the people living in the project area.

Specialist studies also considered cumulative impacts associated with similar developments within a 30km radius of the proposed project. The purpose of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e., whether the addition of the proposed project in the area will increase the impact). In this regard, specialist studies considered whether the construction of the project will result in:

- Unacceptable risk to environmental sensitivities
- Unacceptable loss of environmental features
- Complete or whole-scale changes to the environment or sense of place.

» Unacceptable increase in impact.

A conclusion regarding whether the project will result in any unacceptable loss or impact considering all the projects proposed in the area is included in the respective specialist reports.

The impacts as well as a brief overview of the cumulative impacts are assessed for each of the identified sensitivities in the below tables. In addition, a detailed cumulative assessment has been assessed in **Appendix F.** This assessment is based on information currently available and considers impacts from similar solar power generation developments in the vicinity of the proposed project. The following potential cumulative impacts are considered on:

» Terrestrial Ecology (including fauna and flora)
» Freshwater resources (i.e., wetlands and drainage features)
» Avifauna
» Soil, land capability and agricultural potential
» Heritage resources (including archaeology and palaeontology)
» Visual impacts
» Social impacts

**Figure 11** indicates the location of the project in relation to all known solar power generation developments located within a radius of 30km. These developments were identified using DFFE database which list all renewable projects which currently have environmental authorisation, and information available in the public domain at the time of this assessment.

It should be noted that not all the solar facilities presently under consideration by various developers will be built for operation. Not all proposed developments will be granted all relevant permits by the relevant authorities (DFFE, DMRE, NERSA) due to the following reasons:

» There may be limitations to the capacity of the existing or future Eskom grid.
» Not all applications will receive a positive EA.
» Where projects are to be developed as part of the national energy mix, stringent requirements must be met by applicants in terms of the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme and a highly competitive process that only selects the most competitive projects.
» Not all proposed PV facilities will be able to reduce the associated negative impacts to acceptable levels or mitigate the impacts to acceptable levels (fatally flawed).
» Not all proposed facilities will eventually be granted a generation license by NERSA and/or sign a Power Purchase Agreement.
» Not all developers will be successful in securing financial support to advance their projects further.

It may be important to note that the site is located within an area that has been disturbed by numerous mining and industrial activities, as well as built-up areas. As such, it is not anticipated that the proposed PV development will have a negative cumulative impact on the broader landscape which is already dominated by mining infrastructure and agriculture. In terms of renewable development activities which can have an industrial feel, it is recommended that such infrastructure be grouped or clustered to avoid sprawl across natural landscapes.

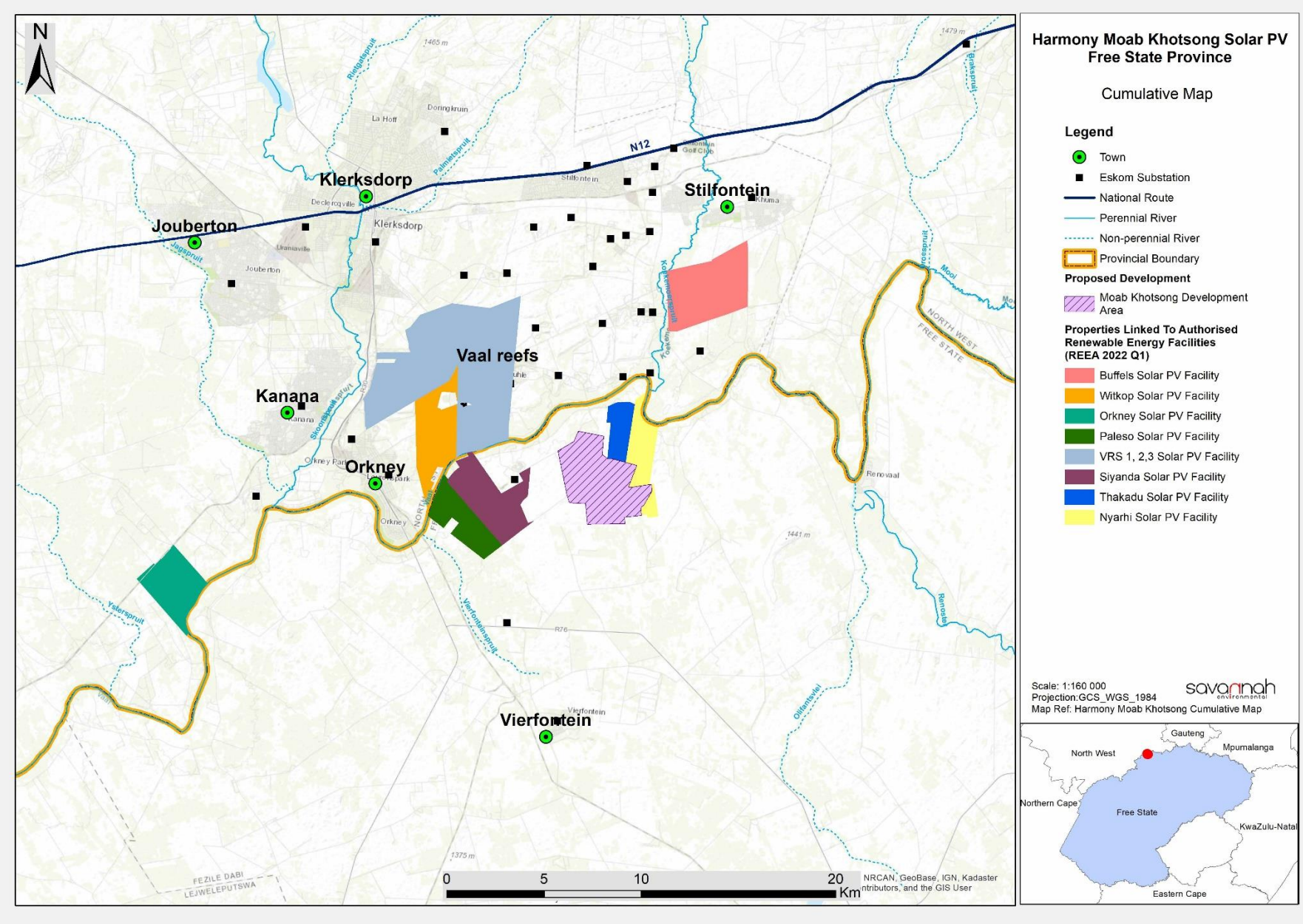



**Figure 11:** Cumulative map indicating the location of other authorised solar PV developments within 30km of the site (none are constructed)

**1.4. Assessment of Impacts on Terrestrial Ecology (Direct, Indirect and Cumulative)**

The site falls within the Vaal Reefs Dolomite Sinkhole Woodland (LC) and the Vaal-Vet Sandy Grassland (EN) vegetation types. However, the occurrence of these vegetation types is limited within the development area. The Vaal-Vet Sandy Grassland dominated the southern portion of the site and is visible as undulating grassland but characterised by fairly deep, sandy soils. These remaining natural portions of this grassland would be regarded as being of high conservation value. The vegetation type is currently heavily affected by extensive transformation by agriculture, urban expansion, and mining operations. ***This southern portion of the development area (comprising Vaal-Vet Sandy Grassland and deeper sandy soils) has been excluded from the development footprint and the necessary mitigation implemented to ensure no indirect impacts affect the sensitive habitats***.

The Vaal Reefs Dolomite Sinkhole Woodland dominates the northern portions of the site and is visible as undulating plains, although here exposed low rocky ridges become evident, deeper sandy soils are absent and the grass composition also differs slightly by containing a higher proportion of sour grasses. The woodland component, associated with dolomite sinkholes are not well represented on this site, although a few bush clumps were noted. ***This portion of the development area is almost completely transformed and degraded. The northern portion of the site would therefore be regarded as generally of Moderate sensitivity, and suitable for a development of this nature.***

The site is listed as an Ecological Support Area 1 and 2 (ESA1 and ESA2) which functions in support of the Vaal River which is situated approximately 1km to the north of the site. In addition, the site also contains two areas being regarded as Critical Biodiversity Areas 1 and 2 (CBA1 and CBA2) situated in the centre and in the eastern portion of the development area. These CBA areas have been identified as being important for meeting conservation targets for the Endangered Vaal-Vet Sandy Grassland occurring in this area, but also to some extent the Vaal Reefs Dolomite Sinkhole Woodland in the area. The CBA1 area has been identified as being Irreplaceable. ***The CBA1 occurring in the development area must as much as reasonably possible be excluded from development footprint (implementation of avoidance mitigation), and in the event that areas of the development footprint cannot fully avoid the CBA areas, mitigation measures as recommended in the EMPr (Appendix G) must be implemented to mitigate any impacts.***

The majority of the development area still consists of natural grassland which is still in a fairly good condition. The surroundings as well as significant portions of the site has been affected and transformed by historical mining operations. Being a mining area, this results in transformation and degradation of large portions of land. ***The proposed solar development should therefore first consider the development of areas considered as already transformed and of lower sensitivity (implementation of avoidance of sensitive areas as a mitigation strategy)***.

While the assessment and significance rating consider the ***full extent of the development area***, the implementation of avoidance of sensitive areas as a mitigation strategy has been adopted. The southern portion of the development area (comprising Vaal-Vet Sandy Grassland, deeper sandy

soils and CBA1 rating) has been excluded as much as possible from the development footprint and the necessary mitigation implemented to ensure no indirect impacts affect the sensitive habitats.

Potential impacts on biodiversity resulting from the project would stem from a variety of different activities and risk factors associated with the project pre-construction, construction, and operation phases. Potential impacts; their relative significance; and the recommended mitigation measures are summarised below (refer to the Specialist report: **Appendix D1** or the full impact assessments in **Appendix F** for more details).

| Activity | Impact summary | Significance[13] (without mitigation) | Significance[14] (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| **CONSTRUCTION, OPERATION AND DECOMMISSIONING** | | | | |
| ***Direct impacts:*** Assessment considering the full extent of the development area, and not only the development footprint | | | | |
| Construction, operation and decommissioning of the Solar PV Facility and its associated infrastructure, including the power lines, substation/s, and access roads | » Loss of vegetation and consequently habitat and species diversity. | High (95) | High (64) | » Areas rated as High sensitivity and their buffers in proximity to the development areas must be **avoided as much as feasible.**<br>» Avoided areas must be declared as 'no-go' areas during the life of the project, and all efforts must be made to prevent access to these areas from construction workers and machinery.<br>» All activities must be restricted to within the low/medium sensitivity areas, and development occurring in high sensitive areas must be Mitigated<br>» Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should not be fragmented or disturbed further.<br>» Clearing of vegetation should be minimised and avoided where possible.<br>» Areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon. |
| | » Loss of protected, rare, or threatened plant species. | High (68) | Moderate (39) | |
| | » Fragmentation of habitat, disruption of ecological connectivity and - functioning in terms of the surrounding areas. | High (68)) | High (64) | |
| | » Impacts that will result on the mammal population on and around the site. | High (76) | High (72) | |

[13] Assessment considering the full extent of the development area, and not only the development footprint..
[14] Assessment considering the full extent of the development area, and not only the development footprint.

| Activity | Impact summary | Significance[13] (without mitigation) | Significance[14] (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | | | | » Where development will affect protected, rare, or threatened plant species, the necessary permits should be obtained and a significant proportion of these transplanted to adjacent areas where they will remain unaffected. In addition, there are also a few protected herbaceous plants (*Helichrysum spp.*) and a few specimens of the protected *Vachellia erioloba* (Camel Thorn).<br>» Where any of these will require removal, the necessary permits should be obtained to do so. Provided that this mitigation is successfully implemented, the anticipated impact should remain moderate to low.<br>» Due care to ensure none of the faunal species on site are harmed.<br>» The hunting, capturing, or harming in any way of mammals on the site should not be allowed.<br>» Voids and excavations may also act as pitfall traps to fauna, and these should continuously be monitored, and any trapped fauna removed and released in adjacent natural areas.<br>» Near Threatened Serval (*Leptailurus serval*) occurs in the development area, and development may impact on its habitat. According to the National Red List (2016) the following recommendations and mitigation should be implemented where this species will be affected:<br>• Natural habitat should be conserved as far as possible. Managers and landowners must avoid wetland loss and should retain natural grassland areas in a good condition.<br>• The Serval population on the site should be monitored to determine abundance and trends |

| Activity | Impact summary | Significance[13] (without mitigation) | Significance[14] (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | | | | and to determine the impact that development has on the population dynamics.<br>• Monitoring should also include the implementation of fixed camera traps for long term monitoring. Due to their specialised habitat requirements at small spatial scales, they may serve as a useful ecosystem indicator of the effect of habitat fragmentation in transformed landscapes.<br>• Monitoring of the Serval population must be introduced as a compliance measure in Environmental Impact Assessment reports.<br>• The development site should incorporate the long-term persistence of Serval and associated habitats into onsite biodiversity management practices.<br>• Buffer habitats could be modelled based on minimum wetland size and available cover<br>» Existing access routes, especially roads must be used.<br>» All laydown and O&M area should be restricted to low/medium sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded.<br>» No storage of vehicles or equipment will be allowed outside of the designated project areas.<br>» A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor must be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil |

| Activity | Impact summary | Significance[13] (without mitigation) | Significance[14] (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | | | | absorbent material must be placed underneath vehicles/machinery and equipment when not in use. All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area.<br>» No persons permitted to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.<br>» A fire management plan must be complied and implemented to restrict the impact fire might have on the surrounding areas.<br>» Environmentally friendly dust suppressants must be utilised.<br>» A qualified Environmental Control Officer must be on site when construction begins. A site walk through by a suitably qualified ecologist prior to any construction activities, preferably during the wet season in order for any SSC to be noted.<br>» Where the threatened and protected plants must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development of a search, rescue and recovery program is suggested for the protection of these species.<br>» Should animals not move out of the area on their own, relevant specialists must be contacted to advise on how the species can be relocated. |

| Activity | Impact summary | Significance[13] (without mitigation) | Significance[14] (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | | | | » The duration of the construction phase should be minimized to as short term as possible, to reduce the period of disturbance on fauna.<br>» Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.<br>» All vehicle operators to comply with speed limits. Speed limits must still be enforced to ensure that road killings and erosion is limited.<br>» Any holes/deep excavations must be dug and planned in a progressive manner and should not be left open overnight unless appropriate demarcation is in place. Should the holes be left open overnight, they must be covered temporarily to ensure no small fauna species fall in.<br>» Ensure that cables and connections are insulated successfully to reduce electrocution risk and preferably buried.<br>» All personnel and contractors to undergo Environmental Awareness Training and be informed of sensitive environmental receptors within the project area, the presence of Red / Orange List species, their identification, conservation status and importance, biology, habitat requirements and management requirements. The avoidance and protection of the wetland areas must be included into a site induction. Contractors and employees must all undergo the induction and made aware of the "no-go" areas to be avoided. |

| Activity | Impact summary | Significance[13] (without mitigation) | Significance[14] (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | | | | » Areas that are denuded during construction need to be re-vegetated with indigenous vegetation where possible to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species. All livestock must always be kept out of the project area, especially areas that have been recently re-planted.<br>» Compilation of and implementation of an alien vegetation management plan.<br>» The footprint area should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprint of the roads must be kept to prescribed widths.<br>» Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. |
| | ***Indirect Risks:*** Assessment considering the full extent of the development area, and not only the development footprint | | | |
| | » The impact that the development will have on exotic weeds and invasive species, both current and anticipated conditions. | High (80) | Moderate (36) | » Weed control be judiciously and continually practised. Monitoring of weed establishment should form a prominent part of management of the development area. Where category 1 and 2 weeds occur, they require removal by the property owner according to the Conservation of Agricultural Resources Act, No. 43 of 1983 and National Environmental Management: Biodiversity Act, No. 10 of 2004. |
| | » Increase erosion risk | Moderate (56) | Moderate (33) | |

| Activity | Impact summary | Significance[13] (without mitigation) | Significance[14] (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | | | | » The development should focus on areas of lower sensitivity, and should continue to exclude areas of high sensitivity as much as possible, and exclude the wetland system in the eastern portion of the site and should limit the extent of transformation as far as possible.<br>» the extent of transformation as far as possible.<br>» A stormwater management plan must be compiled and implemented.<br>» Implementation of a rehabilitation plan.<br>» Implementation of an alien invasive management plan and monitoring on an annual basis for 3 years post construction.<br>» There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous flora including seeds of the SCCs found on site. |
| | ***Cumulative Impacts***: Assessment considering the full extent of the development area, and not only the development footprint | | | |
| | » Increase in vegetation and habitat loss of natural areas | High (95) - Overall impact of the proposed project considered in isolation | High (64) - Cumulative impact of the project and other projects in the area | » The development footprint should make use of historically transformed areas. Should the development be able to remain within these transformed areas, the project would not contribute significantly toward the cumulative ecological impacts in this area.<br>» Exclusion of areas identified as having a high conservation value as far as possible. This would entail the preservation of at least a portion of the remaining natural areas though since the development will still result in significant transformation of natural areas, the cumulative impact will remain significant. |

**1.5. Assessment of Impacts on Avifauna (Direct, Indirect and Cumulative)**

From an avifaunal perspective it is evident that bird diversity is positively correlated with vegetation structure, and floristic richness is not often regarded to be a significant contributor of patterns in bird abundance and their spatial distributions. Although grasslands are generally poor in woody plant species, and subsequently support lower bird richness values, it is often considered as an important habitat for many terrestrial bird species such as larks, pipits, korhaans, cisticolas, widowbirds including large terrestrial birds such as Secretarybird, cranes and storks. Many of these species are also endemic to South Africa and display particular narrow distribution ranges. Due to the restricted spatial occurrence of the Grassland Biome and severe habitat transformation, many of the bird species that are restricted to the grasslands are also threatened or experiencing declining population sizes.

The full extent of the development area was considered, during the survey eight avifaunal habitat types were identified on the extent of the development area and surroundings, consisting of four untransformed types and four transformed units.

The project site is also surrounded by slimes dams and an impoundment to the east (c. 700m from the site), which provided additional habitat for waterbird and shorebird taxa (especially the latter). Approximately 222 bird species are expected to occur in the wider study area, of which 109 species were observed in the development area (during two independent surveys). Before the studies were conducted the expected species richness included five threatened or near threatened species, 18 southern African endemics and 17 near-endemic species. However, **the occurrence of threatened and near threatened bird species was predicted to be low, although the natural broad-scale habitat units provided foraging habitat for the occasional occurrence of the vulnerable Lanner Falcon (*Falco biarmicus*) and the regionally near threatened Abdim's Stork (*Ciconia abdimii*).**

In addition, the valley-bottom seep/stream on the south eastern part of the development area provides suitable foraging habitat for the regionally endangered African Marsh Harrier (*Circus ranivorus*), although this species was not observed during the respective surveys. The African Marsh Harrier was recorded on the study site during the survey period, it is therefore recommended that all potential habitat be conserved (as a precautionary principle) which included the seep zone/stream on the eastern part of the development area**. The recommendations made have been included in the final layout of the Moab Khotsong Solar PV Facility which is located to the northern parts of the development area, avoiding the valley bottom and the habitats associated with it.**

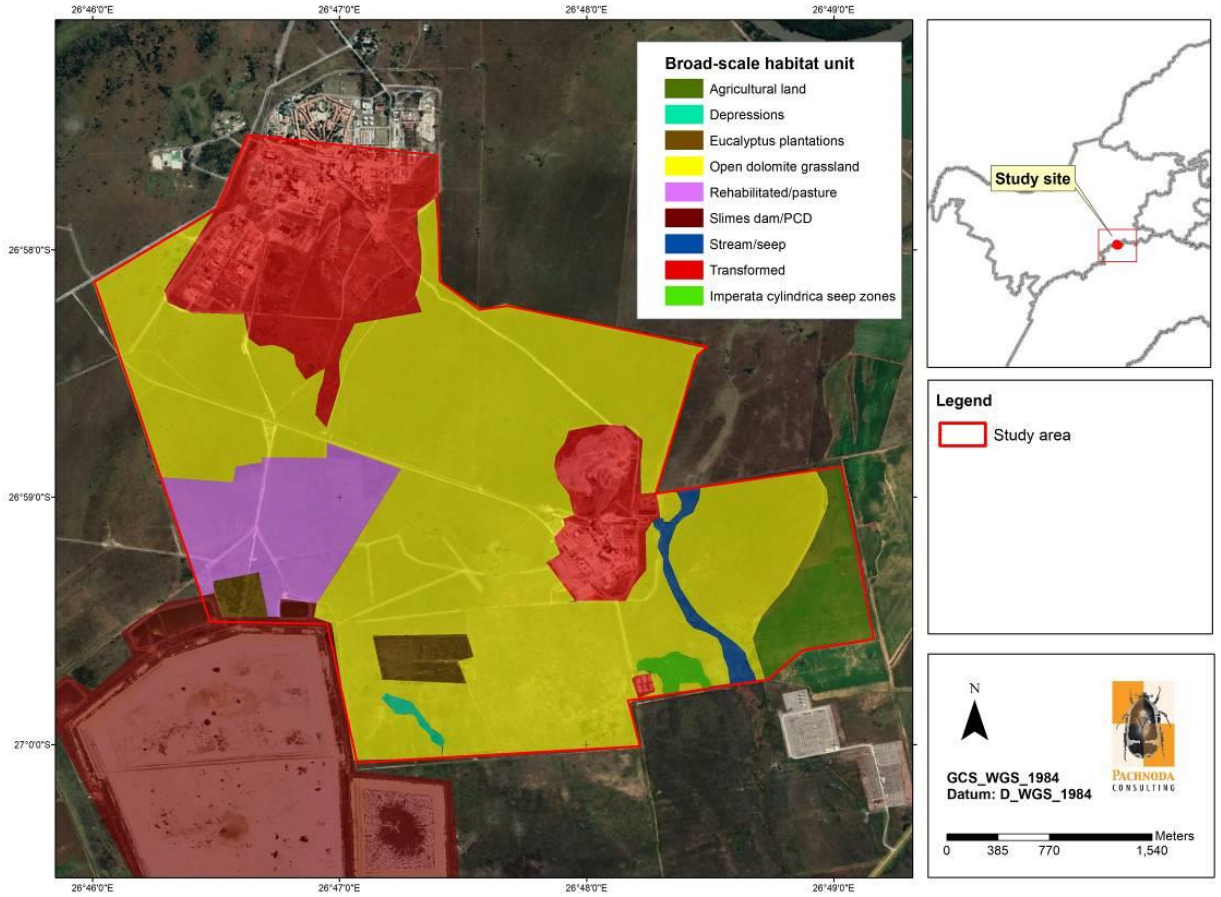



**Figure 12:** A map illustrating the avifaunal habitat types on the study and development areas.

**An evaluation of potential and likely impacts on the avifaunal habitats and receptors are said to be moderate to low after mitigation** (depending on the type of impact).

Potential impacts on avifauna and the relative significance of the impacts associated with the construction, operation and decommissioning of the project are summarised below (refer specialist Report noted in Appendix **D1** or in **Appendix F** for more details).

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| **CONSTRUCTION, OPERATION AND DECOMMISSIONING** | | | | |
| **Direct Impacts** | | | | |
| Construction, operation and decommissioning of the Solar PV Facility and its associated infrastructure, including the power lines, and substation/s and access roads | » Losses of natural habitat and displacement of birds through physical transformation, modifications, removals, and land clearance. This impact is restricted to the construction phase and is permanent. | High (70) | Medium (48)) | » Both the PV facility and associated infrastructure occur predominantly on habitat types of medium and low sensitivity. The best practicable mitigation will be to consolidate infrastructure (e.g., proposed power lines) to areas where existing impacts occur (e.g., placing the proposed power lines alongside existing power lines) and to avoid areas of high sensitivity.<br>» Apply bird deterrent devices and remove nest structures constructed on infrastructure associated with the PV facility under the guidance of the ECO.<br>» Apply bird deterrent devices such as rotating flashers/reflectors to the panels for birds that may mistake the panels for open water and to prevent them from landing on the panels - these should especially be placed at panels nearest to wetland features, pollution control dams and slimes dams.<br>» Security/CCTV cameras may be installed to quantify mortalities (cameras are also installed along the perimeter fence for security measures and may also prove effective to quantify mortalities).<br>» Buffer wetland features, slimes dams and pollution control dams by at least 500m. If post-construction monitoring predicts and/or confirms bird mortalities, an option is to employ video cameras at selected areas to document bird mortalities and to conduct direct observations and carcass searches on a regular and systematic basis. |
| | » Each of the projects should adhere to the highest standards for soil pollution prevention and management | Medium (48) | Low (24)) | |
| | » Avian electrocution related to the new distribution lines during operation. | Low (36) | Low (24) | |

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | | | | » Apply bird deterrent devices to any overhead power lines and make use of "bird-friendly" pylon structures. It is highly to retrofit existing power lines with bird deterrent devices. To aid post-construction monitoring and/or monitoring of bird mortality rates, it is advised to conduct direct observations and carcass searches on a regular and systematic basis. Collisions will be reduced if the proposed corridors are placed alongside existing power lines.<br>» All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting, or hunting terrestrial species (e.g., guineafowl, francolin), and owls, which are often persecuted out of superstition.<br>» Signs must be put up stating that should any person be found poaching any species they will be fined.<br>» Construction must take place in the winter months as much is feasible.<br>» Ensure that cables and connections are insulated successfully to reduce electrocution risk and preferably buried.<br>» Monitoring of the OHL route must be undertaken to detect bird carcasses, to enable the identification of any potential areas of high impact to be marked with bird flappers if not already done so. Monitoring should be undertaken at least once a month for the first year of operation.<br>» The design of the proposed PV must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the |

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | | | | mitigation guidelines recommended by Birdlife South Africa.<br>» All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution.<br>» Fencing mitigations:<br>* Top two strands must be smooth wire<br>* Routinely retention loose wires<br>* Minimum 30cm between wires<br>* Place markers on fences<br>» White strips should be placed along the edges of the panels, to reduce similarity to water and deter birds and insects. Consider the use of bird deterrent devices to limit collision risk.<br>» Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used.<br>» If any power lines/connection lines from existing lines to the facility are to be placed above ground, they must be marked with industry-standard bird flight diverters.<br>» Ensure that monitoring is sufficiently frequent (preferably monthly) to detect electrocutions reliably and that any areas where electrocutions occurred are repaired as soon as possible. |
| | **Indirect Impact** | | | |
| | » Decreased bird species richness, low evenness values and subsequent loss of avian diversity on a local scale. The impact will also result in sterilisation of | Low (18) | Low (12) | » Apply bird deterrent devices and remove nest structures constructed on infrastructure associated with the PV facility under the guidance of the ECO. |

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | local landscapes and increased fragmentation of habitat. | | | » Apply bird deterrent devices such as rotating flashers/reflectors to the panels for birds that may mistake the panels for open water and to prevent them from landing on the panels - these should especially be placed at panels nearest to wetland features, pollution control dams and slimes dams.<br>» Security/CCTV cameras may be installed to quantify mortalities (cameras are also installed along the perimeter fence for security measures and may also prove effective to quantify mortalities).<br>» Buffer wetland features, slimes dams and pollution control dams by at least 500m. If post-construction monitoring predicts and/or confirms bird mortalities, an option is to employ video cameras at selected areas to document bird mortalities and to conduct direct observations and carcass searches on a regular and systematic basis. |
| | » The creation of novel or new avian habitat for commensal bird species or superior competitive species. This is expected to occur during the operation phase of the facility. | Low (18) | Low (12) | |
| | **Cumulative Impacts** | | | |
| | » Regional losses of natural habitat and subsequent displacement of birds | Medium (48) | Medium (52) | » Consolidation of infrastructure to areas where existing impacts occur (e.g., placing the proposed power lines alongside existing power lines).<br>» Apply bird deterrent devices to the panels for birds that may mistake the panels for open water and to prevent them from landing on the panels. To aid post-construction monitoring and/or monitoring of bird mortality rates, it is advised to employ video cameras to document any bird mortalities and to conduct direct observations and carcass searches on a regular and systematic basis.<br>» Apply bird deterrent devices to the power lines and make use of "bird-friendly" pylon structures. As a priority, all new |
| | » Avian collision impacts related to the PV facility during the operation phase (collision with the PV panels). | Medium (36) | Medium (60) | |
| | » Avian collision impacts related to the power lines during operation. | Low (24) | Medium (36) | |
| | » Avian electrocution related to the power lines during operation | Low (24) | Low (36) | |

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | | | | power lines should be marked with bird diverters. Make use of bird-friendly pylons and bird guards. Position electrical infrastructure in close proximity to existing infrastructure. |

### 1.6. Assessment of Impacts on Freshwater Features (Direct, Indirect and Cumulative)

The surface water features of the study area are dominated by a large valley bottom wetland system in the south eastern portion of the site. A few small depressions also occur in the southwest of the site and within the Mispah Game Reserve[15]. This is a seasonal system which flows mostly during the rainy season but did still illustrate an active hydrological regime at the time of the survey. The wetland transects the site from south to north and originates approximately 5 km to the south of the site. The catchment is also situated in agricultural areas used for crop production which will have a large impact on it though where it occurs on the site is still naturally functioning and provides ample wetland habitat which will provide unique habitats and will provide vital downstream ecological functions.

The Three small depression wetlands are situated in the southwest of the site and are included within the Mispah Game Reserve and are therefore highly unlikely to be affected by the development. These depressions are clearly affected by a tailings dam located approximately 350 meters to the west of these depressions and which cause seepage in the direction of these pans and which clearly has a high impact on them. These pans have become nutrient enriched which cause a large modification of their vegetation structure.

A Risk Assessment for the proposed solar facility and its effect on the valley bottom wetland system in the eastern portion of the site has been undertaken. Current layout plans indicate that the development will avoid the eastern portion of the development area which will significantly decrease the anticipated impact. The current layout plans indicate that **both the large valley bottom wetland and the three small depressions fall outside of the development footprint for the PV facility and therefore the impact on the wetland features is regarded as low.**

Potential impacts on aquatic features and the relative significance of the impacts associated with the construction, operation and decommissioning of the project are summarised below (refer to **Appendix D1** or **Appendix F** for more details).

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| **CONSTRUCTION, OPERATION AND DECOMMISSIONING** | | | | |
| **Direct Impacts** | | | | |

15 No development associated with the Solar PV facility will be located within the wetland areas, the gridline infrastructure is however located within the 500m regulated area and a water use licence process will be undertaken in this regard.

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| Construction, operation and decommissioning of the Solar PV Facility and its associated infrastructure, including the power lines, substation/s, and access roads | » Impacts on watercourses, wetlands, or the general catchment. | High (95) | Moderate (56) | » Demarcate and avoid all wetlands and the associated 30m buffer area.<br>» Clearly demarcate the construction footprint and restrict all construction activities to within the proposed infrastructure area.<br>» Consolidation of infrastructure to areas where existing impacts occur (e.g., placing the proposed power lines alongside existing power lines).<br>» When clearing vegetation, allow for some vegetation cover as opposed to bare areas.<br>» Educate staff and relevant contractors on the location and importance of the identified wetlands through toolbox talks and by including them in site inductions as well as the overall master plan.<br>» Limit construction activities near to (within 50m) the wetland features to take place during low rainfall periods where possible. Activities in hydromorphic soils can become messy during the height of the rainy season and construction activities should be minimised during these times to minimise unnecessary soil disturbances.<br>» Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash.<br>» Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility.<br>» Appropriately stockpile topsoil cleared from the project area.<br>» Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) or construction materials |

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | | | | on site (e.g., concrete) in such a way as to prevent them leaking and entering the wetlands.<br>» Design and implement an effective stormwater management plan.<br>» Promote water infiltration into the ground beneath the solar panels.<br>» Release only clean water into the environment.<br>» Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g., slabs of concrete with rocks cemented in).<br>» Regularly clear drains.<br>» Minimise the extent of concreted / paved / gravel areas.<br>» A covering of soil and grass (regularly cut and maintained) below the solar panels is ideal for infiltration. If not feasible then gravel is preferable over concrete or paving.<br>» Avoid excessively compacting the ground beneath the solar panels.<br>» Develop and implement a rehabilitation and closure plan.<br>» Appropriately rehabilitate the project area by ripping, landscaping, and re-vegetating with locally indigenous species |
| | Indirect Impacts | | | |
| | None Identified | | | |

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | Cumulative Impact | | | |
| | » Cumulative habitat loss, especially in the ecological corridors like the wetland and thereby impact the water resource and ecological processes in the region. | High (95) Overall impact of the proposed project considered in isolation | High (64)- Cumulative impact of the project and other projects in the area | » The development footprint should make use of historically transformed areas. Should the development be able to remain within these transformed areas, the project would not contribute significantly toward the cumulative ecological impacts in this area.<br>» Exclusion of areas identified as having a high conservation value. This would entail the preservation of at least a portion of the remaining natural areas though since the development will still result in significant transformation of natural areas, the cumulative impact will remain significant. |

### 1.7. Assessment of Impacts on Soils, Land Capability and Agricultural Potential (Direct, Indirect and Cumulative)

Observations made during the site visit include recording the presence of farm buildings, cattle handling facilities and water troughs. The larger area around the study area was also assessed by driving through the area to gain an understanding of the agro ecosystem within which the study area functions.

Vaalbos and Clovelly is found in the southwestern parts of the study area and covers a small area. Both the Vaalbos and Clovelly have dephs between 500 and 1000 mm respectively. The lithic horizon mainly consisted of iron ore. All soil forms have chromic topsoils indicating sufficient amount of organic carbon. The grid connection corridor primarily consists of transported Technosols, which is material intentionally transported by humans. The largest part of the Moab PV Facility development area consists of land with Moderate (Class 06 and 07) land capability. This land capability class is present within the entire center boundary of the development area while the eastern and western section of the boundary consists of land with Moderate-High (Class 08 and 09) land capability.

The largest part of the development area assessed, has Low-Moderate agricultural potential. Low-Moderate agricultural potential has been assigned to the Glenrosa soil form. It is possible that the weathering of the shallow soils allows root penetration and water infiltration, which would increase the agricultural potential dramatically. The High agricultural potential is allocated to the Hutton, Vaalbos, Nkonkoni and Clovelly soil form due to its deep soil depth and was found in the north-western, southern and center part of the study area (102.5ha).

Following the consideration of all the desktop and gathered baseline data above, the findings of the report are not the same as the Environmental Screening Tool. No irrigation infrastructure, such as centre pivots or drip irrigation, are present within the project area and irrigated agricultural is currently not practiced in the area.

The area is not currently used for livestock farming although the Proposed Moab PV Facility project area can support 77 head of cattle at the long-term grazing capacity of 7ha/LSU (DALRRD, 2018). Considering the soil properties, land capability and agricultural potential of the development area, most of the area has **Low Agricultural Sensitivity** with only 166ha having **Medium Agricultural Sensitivity**. Soil in the project area will have Low sensitivity, depending on the successful implementation of mitigation measures to prevent soil erosion, compaction, and pollution. It should be noted that development will only be taken place in the development footprint and thus not the entire development area.

Potential impacts on soils, land capability and agricultural potential and the relative significance of the impacts associated with the construction and operation of the project are summarised below (refer to **Appendix D2** or **Appendix F** for more details).

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| **CONSTRUCTION AND OPERATION** | | | | |
| **Direct Impact** | | | | |
| Construction and operation of the Solar PV Facility and its associated infrastructure, including the power lines, substation/s, and access roads | » Change in land use from mixed mining and livestock grazing to energy generation | Medium (40) | Medium (32) | » All left-over construction material must be removed from site once construction on a land portion is completed.<br>» No open fires made by the construction teams are allowable during the construction phase<br>» Land clearance must only be undertaken immediately prior to construction activities and only within the development footprint.<br>» Unnecessary land clearance must be avoided.<br>» Level any remaining soil removed from excavation pits (where the PV modules will be mounted) that remained on the surface, instead of allowing small stockpiles of soil to remain on the surface.<br>» Where possible, conduct the construction activities outside of the rainy season; and<br>» Stormwater channels must be designed to minimise soil erosion risk resulting from surface water runoff.<br>» Vehicles and equipment must travel within demarcated areas and not outside of the construction footprint.<br>» Materials must be off-loaded and stored in designated laydown areas<br>» Maintenance must be undertaken regularly on all vehicles and construction/maintenance machinery to prevent hydrocarbon spills. |
| | » Soil erosion | Medium (30) | Low (16) | |
| | » Soil compaction | Medium (30) | Low (16) | |
| | » Soil pollution | Medium (36) | Low (14) | |
| | | | | |

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | | | | » Any waste generated during construction must be stored into designated containers and removed from the site by the construction teams.<br>» The Environmental Control Officer (ECO) must monitor the construction site to detect any early signs of fuel and oil spills and waste dumping<br>» The area around the project, including the internal access roads, must regularly be monitored to detect early signs of soil erosion on-set; and<br>» If soil erosion is detected, the area must be stabilised using geo-textiles and facilitated re-vegetation. |
| | **Indirect Impact** | | | |
| | » Change in land use from mixed mining and livestock grazing to energy generation | Medium (40) | Medium (32) | » Vegetation clearance must be restricted to areas where infrastructure is constructed.<br>» No materials removed from development area must be allowed to be dumped in nearby livestock farming areas.<br>» Most of the grazing animals migrate from the Mispah Game farm, therefore prior arrangements must be made with the surrounding landowners to ensure that livestock and game animals are moved to areas where they cannot be injured by vehicles traversing the area. |
| | **Cumulative Impact** | | | |
| | » Decrease in areas with suitable land capability for farming and livestock grazing | Low (28) | Medium (40) | » Keep the footprints of all renewable energy facilities as small as possible and to manage the soil quality by avoiding far-reaching soil degradation such as erosion.<br>» Adherance to the highest standards for soil erosion prevention and management |
| | » Increase in areas susceptible to soil erosion | Medium (30) | Medium (33) | |

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | | | | » Each of the projects should adhere to the highest standards for soil pollution prevention and management |

### 1.8. Assessment of Impacts on Heritage Resources (including Archaeology and Palaeontology) (Direct, Indirect and Cumulative)

The areas surveyed as part of this assessment have been transformed through agricultural interventions and/or mining activity. As such, the results of the survey only identified one archaeological site of scientific cultural value - CM1. A 30m no-go development buffers was therefore recommended, however no development activity relating to the PV development will impact or encroach on this resource.

No impacts to the cultural landscape are anticipated.

The site visit confirmed that the area has been disturbed from farming and mining so no fossils were present on the surface. The geological structures suggest that the rocks are the right age and type to contain fossils, but the area is covered in deep cultivated soils.

Since there is an extremely small chance that fossils from the Vryheid Formation may occur below ground and may be disturbed, a Fossil Chance Find Protocol is recommended.

Potential impacts on heritage resources and the relative significance of the impacts associated with the construction of the project are summarised below (refer to **Appendix D3 or appendix F** for more details).

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| **CONSTRUCTION** | | | | |
| **Direct Impacts** | | | | |
| Construction and operation of the Solar PV Facility and its associated infrastructure, including the power lines, substation/s, and access roads | » Buried archaeological resources impacted by the proposed development in the preferred location. | High (60) | Low (27) | » The Chance Fossil Finds Procedure must be implemented for the duration of construction activities.<br>» A no-impact buffer of 30m is implemented around Site CM1.<br>» Should any previously unrecorded archaeological resources or possible burials be identified during construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward. |
| | » Buried palaeontological resources impacted by the proposed development in the preferred location. | Low (14) | Low (14) | |
| | Indirect Impacts | | | |

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | » None identified | | | |
| | **Cumulative Impacts** | | | |
| | » The location of the PV facility within an area with existing mining activities may lend itself to cumulative impacts. However, in terms of cumulative impacts to heritage resources, it is preferable that industrial-type infrastructure is clustered within an area to prevent the sprawl of industrial development across otherwise sensitive cultural landscapes. As such, it is not anticipated that the proposed development will have a negative cumulative impact on significant heritage resources. | Low (14) - Overall impact of the proposed project considered in isolation | Low (14) - Cumulative impact of the project and other projects in the area | » Consolidation of infrastructure to areas where existing impacts occur. |



### 1.9. Assessment of Visual Impacts (Direct, Indirect and Cumulative)

The proposed Harmony Moab Khotsong Solar PV development is located in close proximity to the Vaal River, approximately 1.2km to the north. Most of the site is located within the Vaal River Mining Area, a degraded grassland transformed by mining. The landscape is dominated by plains with some scattered, slightly irregular undulating plains and hills. The site is located in an area with relatively low significance in elevation.

According to the South African National dataset of 2013-2014 (Geoterrainimage, 2015) the study area comprehends the following land cover categories:
Natural areas:

» Mainly Grassland;
» Low shrubland; and
» Wetlands.
» Transformed areas:
  - Mine infrastructure and build-up land;
  - Eucalyptus plantations; and
  - Cultivation and Agriculture

A number of large gold and diamond mines are located in between the solar PV sites, namely Taulekoa Mine next to Goedgenoeg 433, Kopanong Gold Mine next to Pretorius Kraal 53 and Great Noligwa Mine next to Groot Vaders Bosch 592. The cultural landscape is characterised by agriculture with abrupt transitions into industrial areas and mining compounds. The installation of solar PV plants is therefore unlikely to have any impacts on the landscape character of the area.

Potential visual impacts and the relative significance of the impacts associated with the construction, operation and decommissioning of the project are summarised below (refer to **Appendix D4** for **Appendix F** or more details).

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| **CONSTRUCTION, OPERATION AND DECOMMISSIONING** | | | | |
| **Direct Impacts** | | | | |

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| Construction, operation and decommissioning of the Solar PV Facility and its associated infrastructure, including the power lines, substation/s, and access roads | ***Direct impacts:***<br>» Impact of PV facility on roads within the 0 – 3 km impact range | Medium (48) | Low (25) | » Plan the placement of laydown areas and temporary construction equipment camps to minimise vegetation clearing (i.e., in already disturbed areas) where possible.<br>» The laydown area should be set back as much as possible from the unnamed Viljoenskroon Road and any trees located between the laydown and the road should initially be retained as much as possible.<br>» Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.<br>» In line with mining policies and procedures, ensure that rubble, litter, etc. are appropriately stored (if it cannot be removed daily) and then disposed of regularly at a licenced waste site.<br>» In line with mining policies and procedures, reduce and control dust during construction by utilising dust suppression measures.<br>» Construction activities should be limited to between the hours of 07:00 and 18:00, where possible, to reduce the impacts of construction lighting.<br>» Rehabilitate all disturbed areas immediately after the completion of construction work and maintain good housekeeping.<br>» Any trees or vegetation which do not create shade or fire risk, between the proposed PV site and the unnamed Viljoenskroon Road, should be retained for visual intervisibility screening.<br>» Fencing should be simple, (for example, diamond shaped (to catch wind-blown litter)) and appear transparent from a distance. The fences should be |
| | » PV landscape has the potential to generate strong levels of colour, form, texture, and lines impacts | Low (30) | Low (14) | |
| | » Excavation and development of permanent structures could create temporary unvegetated areas in the landscape that could create a visual contrast with the natural vegetation | Medium (55) | Medium (30) | |
| | » The combined landscape and visual/aesthetic effect of the presence of the development | Medium (42) | Low (24) | |
| | » Visual impact on Residences and Homesteads within the 0 – 3 km impact range | Medium (33) | Low (22) | |
| | » Glint and glare | Low (24) | Low (24) | |

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | » Impact on sense of place | Low (22) | Low (22) | checked monthly for the collection of litter caught on the fence<br>» Lights at night have the potential to significantly increase the visual exposure of the proposed project, therefore the following mitigations can be implemented to reduce light spillage.<br>• Effective light management needs to be incorporated into the design of the PV facility's lighting to ensure that the visual influence is limited to the facility and the surrounding mine, without jeopardising mine operational safety and security.<br>• Directional lighting on the more exposed areas of operation, where point light source is an issue.<br>• No use of lighting and, if possible, locate the light source closer to the operation.<br>• If possible, the existing lighting method utilised at the mine should incorporated to not alter the sense of place.<br>• Control of lights at night to allow only local disturbance to the current dark sky night landscape.<br>» All broken or damaged structures should be removed and where possible, recycled.<br>» Retain and maintain natural vegetation (if present) immediately adjacent to the development footprint. |
| | **Indirect Impacts** | | | |
| | » Visual Impact in cumulation with the existing surrounding land use (mining and open fields) | Medium (55) | Low (28) | » Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.<br>» In line with mining policies and procedures, ensure that rubble, litter, etc. are appropriately stored (if it cannot |
| | » Impact on sense of place | Low (22) | Low (22) | |

| Activity | Impact summary | Significance (without mitigation) | Significance (with mitigation) | Proposed mitigation |
|---|---|---|---|---|
| | | | | be removed daily) and then disposed of regularly at a licenced waste site.<br>» In line with mining policies and procedures, reduce and control dust during construction by utilising dust suppression measures. |
| | **Cumulative Impact** | | | |
| | » Cumulative visual impact of the PV facility on the visual quality of the landscape. | Medium (42) | Low (10) | » Consolidation of infrastructure to areas where existing impacts occur.<br>» Plan the placement of laydown areas and temporary construction equipment camps to minimise vegetation clearing (i.e., in already disturbed areas) where possible.<br>» Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.<br>» Lights at night have the potential to significantly increase the visual exposure of the proposed project, therefore the following mitigations can be implemented to reduce light spillage.<br>» Retain and maintain natural vegetation (if present) immediately adjacent to the development footprint. |

**1.10. Assessment of Social Impacts (Direct, Indirect and Cumulative)**

The proposed development is located in the Free State Province in the central interior of South-Africa. The town of Viljoenskroon to the southeast and Orkney is located approximately 6.5km northwest of the proposed development. The site is located in the Free State Province which is the landlocked core of the country. It is centrally placed, with good transport corridors to the north and the coast. It is the third biggest of South Africa's nine provinces in terms of size, and primary agriculture is a key economic sector. The Moab Khotsong Solar PV facility is however located in a agricultural and mining region.

The development of the Moab Khotsong Solar Facility and its associated infrastructure may have an impact on some vulnerable communities within the project area. Traditionally, the majority of social impacts are associated with the construction phase of a PV solar development. Many of the social consequences are unavoidable and will occur to some extent, but they can be managed through careful planning and implementation of appropriate mitigation measures.

The site is within the existing mining development area and thus within the mine's social and economic processes and structures; things like socio-economic development and local economic development plans will take the development of the PV facilities into account.

As per the mines Social labour plan, the Human Resources Development interventions aims to address the abovementioned challenges through a variety of initiatives such as:

(i) Management Trainee Programmes
(ii) Bursary Schemes
(iii) Trainee Programmes
(iv) Learnerships

Mining companies are required to design and implement programmes to ensure mineral wealth is used for the development of communities and workers. It is within this context that the existing processes and procedures being implemented be incorporated into the development of the Solar PV facility to act as a vehicle for creating and maintain a relationship between companies on the one hand and communities and workers on the other.

The Developer should be committed to the sustainable socio-economic development and well-being of the communities in which they operate and from which they draw their employees. Both Solar PV Facilities and mining operations have a limited lifespan, therefore strategic objective should focus on contributing to community development that is sustainable long after such operations have ceased.

Potential social impacts and the relative significance of the impacts associated with the construction, operation and decommissioning of the project are summarised below (refer to **Appendix D5 or Appendix F** for more details).

| Activity | Impact summary | Significance (without mitigation/enhancement) | Significance (with mitigation/enhancement) | Proposed mitigation/enhancement |
|---|---|---|---|---|
| **Alternative 1 (preferred alternative)** | | | | |
| **CONSTRUCTION, OPERATION AND DECOMMISSIONING** | | | | |
| **Direct Impacts** | | | | |
| Construction, operation and decommissioning of the Solar PV Facility and its associated infrastructure, including the power lines, substation/s, and access roads | » The creation of employment opportunities and skills development opportunities. | Low Positive (30) | Medium Positive (55) | » *Enhancement measures:*<br>• It is recommended that the development be incorporated into the mine's SLP, and that the current skills development processes and policies at the mine or associated infrastructure be incorporated into the development and operation of the Solar energy facility<br>• The SLP strategies (Adult Basic Education Training, Management Development Programs, Community Human Resource Development Programs, and so on) are specifically targeted at the mining and renewable energy development sectors<br>• Be committed to involving and benefiting the communities' surrounding mines, contributing to |
| | » Safety and Security Risk | Low (27) | Low (16) | |
| | » Presence of Non-Local and Foreign Construction Workers in the Area | Low for the community as a whole (27)<br><br>Moderate-High for specific individuals who may be affected by pregnancy and STDs etc. (57) | Low for the community as a whole (24)<br><br>Moderate-High for specific individuals who may be affected by pregnancy and STDs etc. (51) | |

| Activity | Impact summary | Significance (without mitigation/enhancement) | Significance (with mitigation/enhancement) | Proposed mitigation/enhancement |
|---|---|---|---|---|
| | » Disruption of daily living and movement patterns | Medium (40) | Low (21) | their development and growth; thus, it is recommended that special attention be paid to the needs of people living near mines in the Free State Province<br>• It is recommended to conduct structured and proactive engagement sessions within the municipal district, to expose local small, micro, and medium enterprises which will benefit from the proposed development<br>• Training and skills development programmes should be initiated prior to the commencement of the construction phase<br>» Where measures are in place that speak to economic development in terms of the mining operations, these must also be considered.<br>» Establishing liaison and communication structures with the district and local government structures<br>» Liaises with the local governmental structures and municipal authorities in the labour- sending communities to ensure that group development initiatives are integrated into the economic and development plans of those areas<br>» The continuous review of the economic development of the project |
| | » Increased pressure on local services/resources | Medium (30) | Low (30) | |
| | » Nuisance impacts (noise and dust) | Medium (44) | Low (18) | |

| Activity | Impact summary | Significance (without mitigation/enhancement) | Significance (with mitigation/enhancement) | Proposed mitigation/enhancement |
|---|---|---|---|---|
| | | | | during the implementation process will ensure that the project does not become static but is revised in terms of changing needs and to ensure sustainability<br>» Local procurement policy be adopted by the developer to maximise the benefit to the local economy, where feasible<br>» Create job opportunities, boost local economies by supporting business activities, and contribute to government tax revenues through the development of the Solar Facility<br>» Prior to the start of the construction contractor procurement, the Developer of the Solar Facility should create a database of local companies, specifically Historically Disadvantaged (HD) companies, which qualify as potential service providers (e.g., construction companies, catering companies, waste collection companies, security companies, etc.). These businesses should be informed about the tender process and invited to bid on project-related work, if applicable<br>» Engage with local authorities and business organisations to investigate the feasibility of obtaining construction materials, goods, and products from local suppliers, where possible |

| Activity | Impact summary | Significance (without mitigation/enhancement) | Significance (with mitigation/enhancement) | Proposed mitigation/enhancement |
|---|---|---|---|---|
| | | | | » Stopping significant unwanted events by focusing on critical control management<br>» Safety awareness and training as well as positive behaviour reinforcement<br>» Improving system monitoring and analysis to improve risk management<br>» Encourage employees to stop working when a workplace is considered unsafe and/or to prevent unsafe actions<br>» Focus on critical control management (as per International Council on Mining and Metals guidelines)<br>» Education, Training and Development Services must be implemented<br>» Access in and out of the construction area should be strictly controlled by a security company<br>» The contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff<br>» Have clear rules and regulations for access to the proposed site to control loitering<br>» A comprehensive employee induction programme would cover land access protocols, fire management and road safety must be prepared<br>» A Community Liaison Officer should be appointed |

| Activity | Impact summary | Significance (without mitigation/enhancement) | Significance (with mitigation/enhancement) | Proposed mitigation/enhancement |
|---|---|---|---|---|
| | | | | » A method of communication should be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process |
| | ***Indirect impacts:*** | | | |
| | Contribution to the local economy | Medium Positive (36) | Medium Positive (60) | » Where measures are in place that speak to economic development in terms of the mining operations, these must also be considered.<br>» Establishing liaison and communication structures with the district and local government structures<br>» Liaises with the local governmental structures and municipal authorities in the labour- sending communities to ensure that group development initiatives are integrated into the economic and development plans of those areas<br>» The continuous review of the economic development of the project during the implementation process will ensure that the project does not become static but is revised in terms of changing needs and to ensure sustainability<br>» A local procurement policy be adopted by the developer to |
| | Increased pressure on local services/resources | Medium (30) | Low (30) | |
| | Loss of Labour from the mines or surrounding community to the Construction of the PV Facility | Medium (30) | Low (24) | |

| Activity | Impact summary | Significance (without mitigation/enhancement) | Significance (with mitigation/enhancement) | Proposed mitigation/enhancement |
|---|---|---|---|---|
| | | | | maximise the benefit to the local economy, where feasible<br>» Create job opportunities, boost local economies by supporting business activities, and contribute to government tax revenues through the development of the Solar Facility |
| | **Cumulative Impacts** | | | |
| | » An increase in employment opportunities, skills development, and business opportunities with the establishment of more than one solar energy facility. | Medium (33) - Overall impact of the proposed project considered in isolation | Medium (52) - Cumulative impact of the project and other projects in the area | » The establishment of several solar energy facilities in the area does have the potential to have a positive cumulative impact on the area in the form of employment opportunities, skills development, and business opportunities.<br>» Enhancement measures in line with existing mining processes are advised<br>» Develop a recruitment policy / process (to be implemented by contractors), which will ensure the sourcing of labour locally, where available.<br>» Work together with government agencies to ensure that service provision is in line with the development needs of the local area.<br>» Form joint ventures with community organisations, through Trusts, which can provide local communities with benefits, such as employment opportunities and services.<br>» Develop and implement a recruitment protocol in consultation with the municipality and local community |
| | » The establishment of several renewable energy facilities places pressure on local services. | Low (27) | Medium (30) | |
| | » Change to the local economy. | Low (7) - Overall impact of the proposed project considered in isolation | Low (22) - Cumulative impact of the project and other projects in the area | |

| Activity | Impact summary | Significance (without mitigation/enhancement) | Significance (with mitigation/enhancement) | Proposed mitigation/enhancement |
|---|---|---|---|---|
| | | | | leaders. Ensure that the procedures for applications for employment are clearly communicated. |

## 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 considered, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

A technically viable site for the project was proposed by Harmony Moab Khotsong Operations (Pty) Ltd and assessed as part of the BA process. The environmental assessment of the development area (including the development footprint) was undertaken by independent specialists and their findings have informed the results of this BA Report.

A project site considered to be technically suitable for the development of the solar PV facility, with an extent of approximately 1400ha, was identified. A development area of ~900ha was demarcated within this project site and allowed an adequate footprint (450ha) for the installation of a solar PV facility with a contracted capacity of up to 100MW, while allowing for the avoidance of environmental site sensitivities.

As part of the process of identifying the most environmentally acceptable development footprint for the Moab Khotsong Solar PV facility, a funnel down approach was followed: initially a high-level desktop screening assessment from an environmental acceptability perspective was undertaken on the project site, with the primary objective of highlighting or red-flagging potential environmental sensitivities. The results of the screening assessment provided Harmony Moab Khotsong (Pty) Ltd with necessary environmental insight and flagged potential risks in order for a suitable development area to be identified for detailed assessment.

Specialists assesses the entire development area in order to highlight any features of very high sensitivity, or no-go area. The aim was for the developer to use the findings from the assessment and field surveys to identify the placement of the development footprint in an area which avoids, as best possible, any environmentally sensitive features.

In addition to implementing the 'funnel down' approach, the Moab Khotsong Solar PV development also considered and implemented the mitigation hierarchy[16]; a tool which aims to assist in the management of environmental risks.

» Avoidance: Specialists evaluated the development area, and features were rated based on the significance of sensitive features (No Go, Very High, High, Medium, and Low). Avoidance of features of high sensitivity indicated that the development footprint should be located within the northern section of the development area.

[16] The mitigation hierarchy is tool which is used reiteratively throughout a project lifecycle to limit negative impacts on the environment. The first tier considers how to avoid the impact entirely and is considered early in the project to allow for alternatives to be considered. The impacts which cannot be avoided should be minimised. Effective minimisation can eliminate some impacts and reduce others allowing for sustainability targets to be met. The next consideration is restoration and takes place where minimisation efforts have failed to reach the required target. Finally, and as a last resort to compensate for ecological loss or residual impacts, the environmental loss or damage can be offset through compensation. The intention of this level is to ensure the protection of equivalent or greater ecological assets than those lost, or to rehabilitate a degraded environment restoring equivalent ecological assets.

» Minimisation: Consideration of practicable mitigation measures for the development to reduce the duration, intensity and/or extent of impacts that cannot be completely avoided.

» Rehabilitation/restoration: Improve degraded ecosystems following exposure to impacts that cannot be completely avoided or minimised. Rehabilitation and restoration are frequently needed towards the end of a project life cycle but may be possible in some areas during operation (this has further been addressed in the EMPr).

Collectively, avoidance, minimisation and rehabilitation/restoration serve to reduce, as far as possible, the residual impacts that the development has on the biological environment.

**Impact Statement for the Development Footprint**

The above approach speaks to the methods utilized to determine an appropriate development footprint.

Several types of impacts have been identified by the specialists which speaks to the development area, all efforts have therefore been made to place the development footprint outside of sensitive areas, taking into consideration the adaptation of the mitigation hierarchy in collaboration with the mitigation measures proposed by the various specialists.

Based on the environmental sensitivities identified by specialists, the development area can be 'divided' into a northern and southern section. The majority of the features of Very high and High sensitivity are located towards the southern portion of the development area, which includes a CBA 1 area, the Mispah game farm, a valley bottom wetland, an existing owl habitat, the tailings dam (high avifauna sensitivity), and the CM1 no-go archaeological feature.

The northern section of the development area contains limited to no features of Very high and High sensitivity, and is almost completely transformed and degraded. The northern portion of the site would therefore be regarded as generally of Moderate sensitivity, and suitable for a development of this nature.

Therefore, the placement of the development footprint within the northern portion of the development area allows for minimal impact on the majority of the features of high or very high environmental sensitivity (that is, acceptable loss). The implementation of this mitigation measure ensure that the development footprint is located in the northern portion with lower sensitivity ratings, and where applicable, takes into consideration the necessary mitigation to ensure no indirect impacts affect the sensitive habitats, have been earmarked for development.

The following summarises the impact that the proposed activity may have on the environment after the management and mitigation of impacts have been considered – that is the avoidance of the sensitivities located in the south of the development area. **Figure 13** (and **Appendix A)** indicates the sensitive environmental features identified within the project area and broader study area, and illustration of the development footprint area as assessed. The assessment of the development footprint is summarised below:

**Terrestrial Ecology**

Current layout plans do indicate that areas of High Sensitivity are largely being avoided while mostly retaining development within areas of **Moderate Sensitivity**.

» The anticipated impact which will be mitigated are:
  - Loss of vegetation and consequently habitat and species diversity as a result.
  - Loss of protected, rare, or threatened plant species.
  - Impacts on watercourses, wetlands, or the general catchment.
  - The impact that the development will have on exotic weeds and invasive species, both current and anticipated conditions.
  - Any increased erosion that the development may cause.
  - Fragmentation of habitat, disruption of ecological connectivity and -functioning in terms of the surrounding areas.
  - Impacts that will result on the mammal population on and around the site.
  - Any significant cumulative impacts that the development will contribute towards.
» The development on the site will create a highly localised reduction of indigenous trees and shrubs, and other species of conservation concern, but not to a degree that the current conservation status of such species will be negatively affected.
» Many of the plants listed is regarded as protected within the Free State Province. Where any of the herbaceous and tree protected species will be affected by the development, permits will have to be obtained for their removal.
» Where the development will affect geophytic or succulent species, permits will also have to be obtained, but affected plants transplanted to adjacent areas where they will remain unaffected.
» The proposed development will also have to implement a comprehensive monitoring and eradication programme to ensure that invasive plant species are removed from the area and prevented from re-establishing.

The most significant impact on mammals anticipated on the site itself is primarily concerned with the loss and fragmentation of available habitat. Transformation of the natural vegetation on the site will result in a decrease in the population size as available habitat decreases. Since it is inevitable that the development will involve the transformation of natural grassland this contributes significantly toward habitat loss which in turn will result in a high impact on the mammal population. This also indicates the need to take extra care in determining the development

» The development footprint should focus on areas of lower sensitivity and should exclude as far as possible areas of high sensitivity and the wetland system in the eastern portion of the site and should limit the extent of transformation as far as possible.
» Monitoring of the Serval population must be introduced as a compliance measure in Environmental Authorization
» The development site should incorporate the long-term persistence of Serval and associated habitats into onsite biodiversity management practices. Buffer habitats could be modelled based on minimum wetland size and available cover.
» Construction itself may also affect the mammal population and care should therefore be taken to ensure none of the faunal species on site is harmed.
» The hunting, capturing, or harming in any way of mammals on the site should not be allowed.
» Voids and excavations may also act as pitfall traps to fauna, and these should continuously be monitored and any trapped fauna removed and released in adjacent natural areas.

**Current layout plans do indicate that areas of High Sensitivity are largely being avoided while mostly retaining development within areas of Moderate Sensitivity.**

**Avifauna**

Although areas of high sensitivity exist within the development area, the development footprint will predominantly include areas of **Moderate and Low sensitivities after mitigation**

The moderate areas include the open grassland and bush clump mosaics, and *Areas of low sensitivity* include the habitat units which are transformed habitat, mine infrastructure, agricultural and rehabilitated land, and the *Eucalyptus* plantations to the north of the development area.

» The threat to **avifauna** communities would be from the loss of habitat, disturbance, collisions with any overhead power line and/or any interaction with birds with the facility.
» It is anticipated that the **avifauna impacts** will be of a medium acceptable significance after mitigation.

**Heritage and Palaeontology**

» Very sparse **heritage resources** were found during the field survey undertaken for the site. From an archaeological perspective the observed heritage resources may be regarded as being of generally low significance. CM1 was recommended to be avoided with the guidance of a 30m buffer. The fossil record from the geological deposits is very poor with respect to fossil finds.

**Agricultural Potential**

» The most significant impacts of the proposed project on soil and agricultural productivity will occur during the construction phase when the vegetation is removed, and the soil surface is prepared for the delivery of materials and assembly of the infrastructure.
» During the operational phase, the risk remains that soil will be polluted by the waste generated or in the case of a spill incident.
» During the decommissioning phase, soil will be prone to erosion when the infrastructure is removed from the soil surface.
» The cumulative significance of all the potential impacts on the **agricultural potential** for this project is anticipated to be of **Low sensitivity**, depending on the successful implementation of mitigation measures to prevent soil erosion, compaction, and pollution.

**Visual Impact.**

» The anticipated **visual** impact is not considered to be a fatal flaw from a visual perspective, considering the low incidence of visual receptors occurring within the region.

**Social and Economic Impacts**

» Potential positive impacts
- Creation of employment and business opportunities
- Skills Development
- Growth of the local communities

» Potential negative impacts
- Impacts associated with the presence of construction workers on site
- Threat to safety and security
- Impact of heavy vehicles, including damage to roads, safety, noise, and dust

» The development will only yield significant positive **economic** impacts.
» The development will have both positive and negative **social** impacts. It will create employment and business opportunities for locals during both the construction and operational phases and represent an investment in clean, renewable energy infrastructure.

The development footprint was therefore determined considering the results of the funnel down approach, the mitigation hierarchy and the best practice measures recommended by the specialists and largely avoids those areas of very high or high sensitivity (refer to **Figure 14** and **Appendix A**). Infringement of areas of high sensitivity are limited and are considered acceptable. There are no environmental fatal flaws that should prevent the Harmony Moab Khotsong Solar PV Facility layout (as presented in **Figure 15**), provided that the recommended mitigation and management measures are implemented and given due consideration during the process of finalising the facility layout.

The following features of high sensitivity **have been avoided** through the placement of the development footprint within the northern portion, and excluding the southern areas:

- The Mispah Game Reserve which covers a large portion of the southern portion of the site.
- The surface water features of the study area are dominated by a large valley bottom wetland system in the eastern portion of the site. A few small depressions also occur in the southwest of the site and within the Mispah Game Reserve.
- A tailings dam which is present to the southwest of the development area. The tailings dam is located outside the development footprint of the Solar PV Facility. A 500m buffer must be implemented around this feature and has been allocated a very-high avifauna sensitivity and is regarded as a no-go area. Infringement on this feature will be avoided.
- The wetland habitat to the southeaster portion of the development as well as the owl habitat which has been identified.
- The archaeological survey at Moab documented three resources within the development area (CM1 – CM3). The site at CM1 was recommended to be avoided with the guidance of a 30m buffer zone, this site does however fall outside of the development footprint and is not anticipated to be impacted by the development of the Solar PV facility

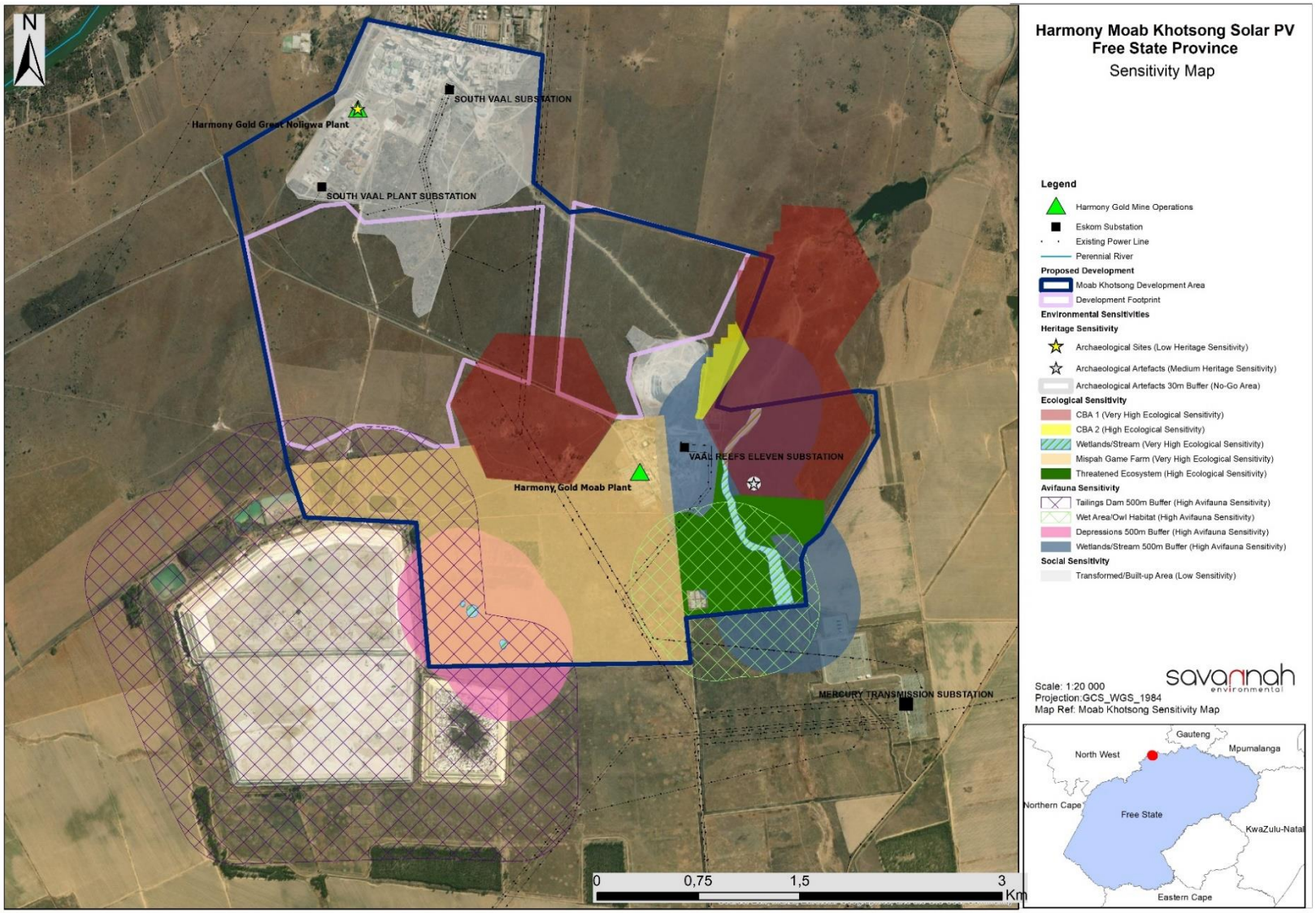



**Figure 13:** Sensitive environmental features identified within the project area and broader study area, overlain on the project layout

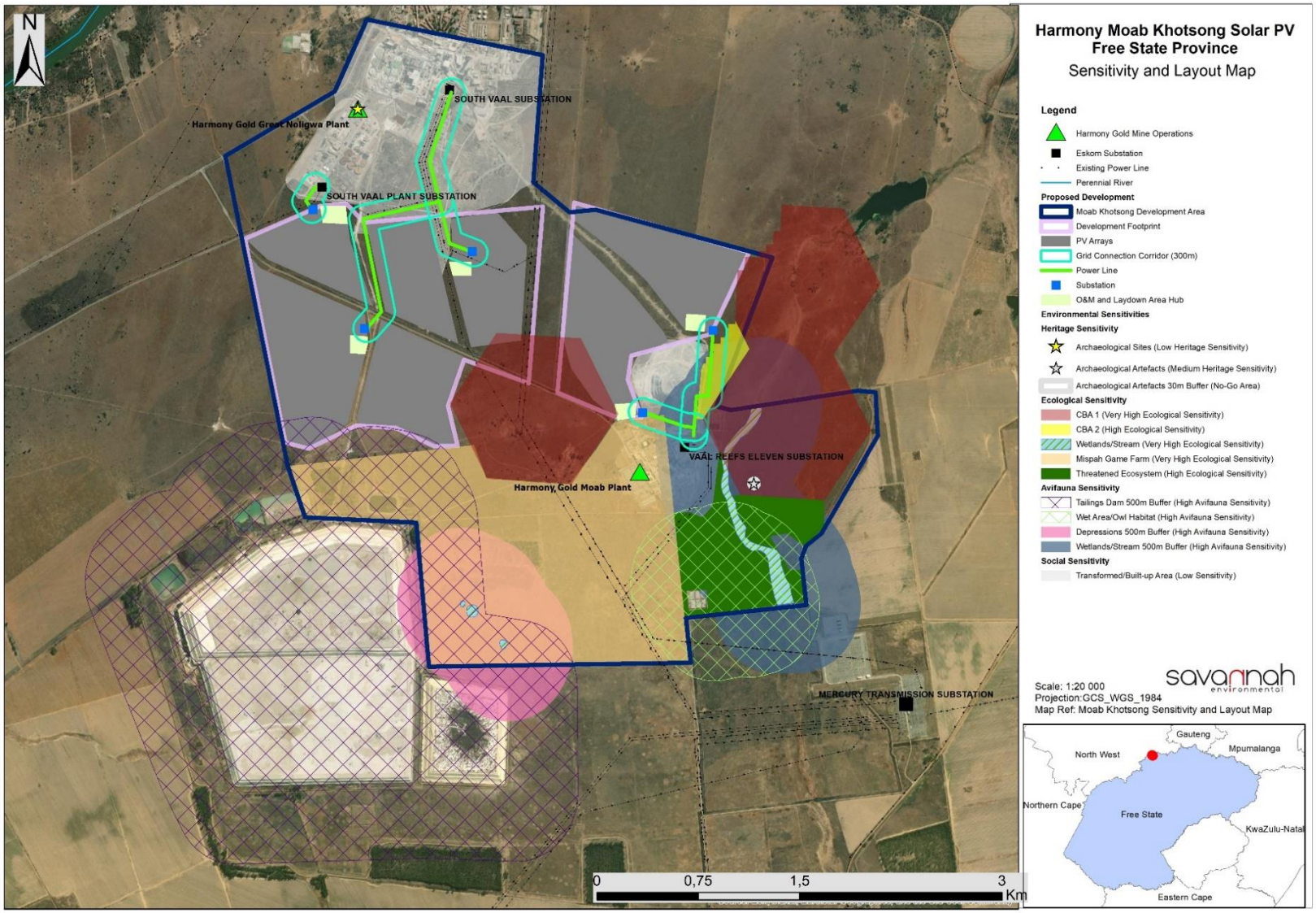



**Figure 14:** Environmental sensitivity map overlain with the facility layout

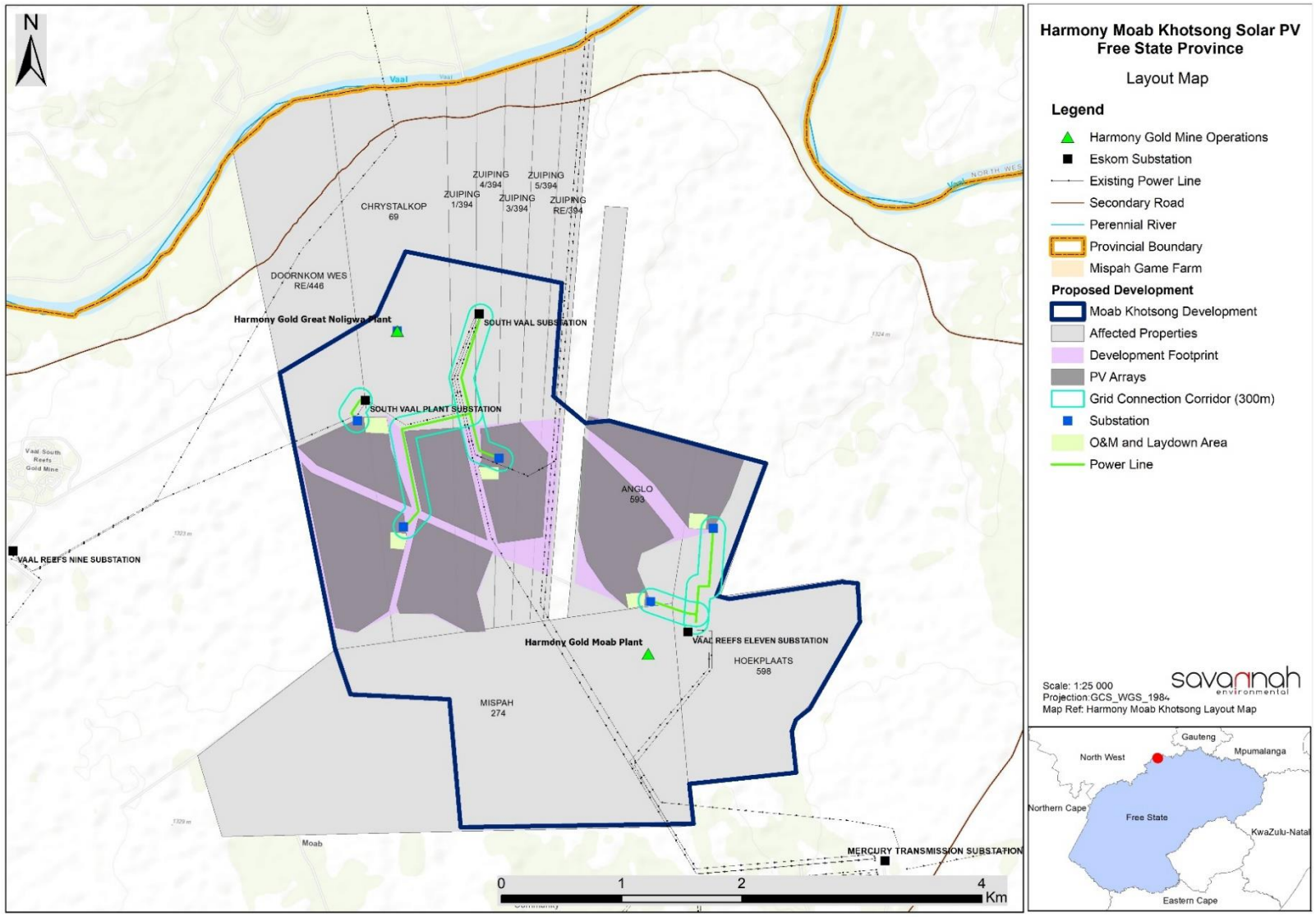



**Figure 15:** Facility layout proposed for authorisation

Through the assessment undertaken in this BA Report, the following can be concluded regarding the key environmental considerations in terms of the International Finance Corporation (IFC) Project Developers Guide for the project:

- *Construction phase impacts* (i.e., OHS, temporary air emissions from dust and vehicle emissions, noise related to excavation, construction and vehicle transit, solid waste generation and wastewater generation from temporary building sites) will be local in extent and of a low magnitude. The significance of impacts associated with the construction phase will be of a low to medium rating post-mitigation.
- *Water usage* (i.e., the cumulative water use requirements) will be kept to a minimum during construction and operation. Appropriate water demand and conservation measures will be implemented. Water for dust suppression and construction works will be sourced from the Mine. Potable water and water required for operation phase cleaning will be sourced from the Municipal supply currently providing water to the Mine.
- *Landscape and visual impacts* (i.e., the visibility of the solar panels within the wider landscape and associated impacts on landscape designations, character types and surrounding communities) for the construction and operation phases will mostly be of a medium significance due to the proximity of the site to the residential area. It is however important to note that there are existing mining and industrial activities and associated infrastructure within the region, and therefore, the visual quality of the area has already been compromised to a large degree.
- *Land matters* will be of low significance, as Harmony Gold is the owner of the affected properties. There will be no involuntary land acquisition / resettlement associated with this project. The facility is proposed adjacent to the mining operations and will be supported by infrastructure already in place for these operations, as may be required.
- *Ecology and natural resources* (i.e., habitat loss/fragmentation, impacts on designated areas and disturbance or displacement of protected or vulnerable species) will be impacted by the project. The layout of the facility has been designed to avoid areas of high sensitivity, thereby reducing impacts on these resources. It is important to note that the facility is proposed on a site is degraded and that was previously disturbed by anthropogenic activities.
- *Cultural heritage* impacts (i.e., impacts on possible buried archaeological and palaeontological resources and the cultural landscape) are of low significance, and no heritage, archaeological or palaeontological resources of significance are associated with the development area. One archaeological site fall within the grid connection corridor, but can be avoided by the micro-siting of the grid lines.
- *Transport and access* (i.e., impacts of transportation of materials and personnel) will be appropriately managed, and existing roads will be used during construction and operation. A gravel access road will be established to provide direct access to the site from existing roads. Nuisance type impacts associated with construction related activities and increased traffic and/or abnormal loads will be managed.
- *Consultation and disclosure* (i.e., consulting with key authorities, statutory bodies, affected communities and other relevant stakeholders) is being undertaken for the project and documented for inclusion in the assessment of the project. All identified stakeholders and interested and affected parties (I&APs) will be afforded the opportunity to participate in a meaningful way to the BA for the project.
- An Environmental Management Programme (EMPr) has been compiled to ensure that mitigation measures, as identified by the specialist studies undertaken, are implemented during the project lifecycle (refer to **Appendix G** of this BAR Report).

It can be concluded that the project is environmentally acceptable (subject to the implementation of the recommended mitigation and enhancement measures).

**No-go alternative (compulsory)**

The 'do-nothing' alternative (i.e., no-go alternative) is the option of not constructing the proposed development. Should this alternative be selected, there would be no environmental impacts on the site due to the construction and operation activities associated with the project.

Harmony Gold is proposing the establishment of a Solar PV Facility near Virginia, the purpose of which will be to reduce total carbon emissions and diversify electricity supply to the The Harmony Moab Khotsong Solar PV Facility operations (the exclusive off-taker of the power, and generation is for own-use). Should the facility not be constructed, The Harmony Moab Khotsong Solar PV Facility s reliance on fossil fuel-based power as a sole source of power at its operations will continue for the life of mine.

Furthermore, failure to establish an independent power supply source for the The Harmony Moab Khotsong Solar PV Facility operations would also result in a constant demand of power to be supplied from Eskom, adding pressure on the grid infrastructure in the region (and would require the additional consumption of fossil fuels to achieve the same level of electrical supply to the The Harmony Moab Khotsong Solar PV Facility). The electricity demand in South Africa is placing increasing pressure on the country's existing power generation capacity. Therefore, there is a need for additional electricity generation options to be developed throughout the country.

The support for renewable energy policy is guided by the need to address climate change. South Africa has ample solar and wind resources, and land available for the development of renewable energy facilities. Renewable applications are the least-cost energy service in most cases, particularly when social and environmental costs are considered. The generation of electricity from renewable energy in South Africa offers several socio-economic and environmental benefits, including:

- ***Exploitation of our significant renewable energy resource:*** At present, valuable national resources, including biomass by-products, solar radiation, and wind power, remain largely unexploited. The use of these energy flows will strengthen energy security through the development of a diverse energy portfolio.
- ***Pollution reduction***: The releases of by-products through the burning of fossil fuels for electricity generation have a particularly hazardous impact on human health and contribute to ecosystem degradation.
- ***Climate-friendly development:*** The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through reducing greenhouse gas (GHG) emissions. South Africa is estimated to be responsible for ~1% of global GHG emissions and is currently ranked 9th worldwide in terms of per capita $CO_2$ emissions.
- ***Employment creation:*** The sale, development, installation, maintenance, and management of renewable energy facilities have significant potential for job creation in South Africa.
- ***Acceptability to society:*** Renewable energy offers various tangible benefits to society, including reduced pollution concerns; improved human and ecosystem health; and climate friendly development.
- ***Support to a new industry sector:*** The development of renewable energy offers the opportunity to establish a new industry within the South African economy.

Environmental costs identified for the project include:

- Degradation, and further loss and fragmentation of remaining habitats, ecosystems, and vegetation communities in the area, including flora, fauna, and avifauna.
- Displacement of avifauna and fauna due to habitat loss, direct mortalities, and disturbance.
- Collision of avifauna with PV panels, associated power lines or fences.
- Electrocution of avifauna on power lines during the operation phase.
- Spread of alien and/or invasive species.
- Change in land capability.
- Impacts to buried archaeological and palaeontological resources.

The costs associated with the project are anticipated to occur at a site-specific level. Due to the nature and location of the proposed site for the development footprint, being on Mine-owned land which has been historically degraded, the site has limited land use options available, the significance of impacts can be largely reduced through the application of appropriate mitigation measures; and the appropriate placement of infrastructure within area of lower sensitivity identified on site. The project's benefits are expected to occur at a larger scale (i.e., national, regional, and local level); and partially offset the localised environmental costs of the project.

From the specialist studies undertaken, no environmental fatal flaws were identified to be associated with the project as long as all the high environmental sensitivities and no-go areas have been avoided. All impacts associated with the project can be mitigated to acceptable levels. The 'do-nothing' alternative will not assist Harmony Moab Khotosong Solar PV facility in addressing issues such as diversifying their electricity supply at their operations and reducing the total carbon emissions from the operations. As detailed above, the benefits associated with the project outweigh the costs; and the project is therefore considered sustainable. The costs of the 'do-nothing' alternative are expected to outweigh the benefits and therefore, this alternative is not preferred and not proposed to be implemented for the project.

# 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** | |
|---|---|---|

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 construction and operation of a solar PV facility with a contracted capacity of up to 100MW proposed on a site located north of the Harmony Gold Moab and south of the Harmony Gold Great Noligwa operations, with the intention of self-generation of the electricity for own use has been proposed by Harmony Gold. A technically viable development area and development footprint were proposed and assessed as part of the BA process. The assessment of the development footprint within the development area was undertaken by independent specialists and their findings have informed the results of this BA Report.

The specialist findings have indicated that there are no identified environmental fatal flaws with the implementation of the Harmony Moab Khotsong Solar PV facility within the demarcated development footprint. The Applicant has proposed a technically viable and suitable facility layout within the development footprint (an area of 450ha within the larger 900ha development area). All impacts associated with the preferred layout can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures.

The authorisation for the project would include the following key infrastructure and components:

- PV modules and mounting structures.
- Access roads, internal roads and fencing around the development area
- Temporary and permanent laydown areas
- Administrative building, control room, workshop, storage building, guard house, auxiliary buildings and structures, water supply infrastructure, weather station
- Peripheral boundary wall & fencing
- Inverters, transformers and up to 5 on-site facility substations and switching substations
- Cabling between the project components, to be laid underground where practical
- Grid connection infrastructure to be connected to the existing:
  - Vaalreefs Eleven Substation via a ~2km power line (located south-east of the facility).
  - Southvaal Plant Substation via a ~0.5km power line (located north-west of the facility); and
  - Southvaal Substation via a ~4km power line (located north of the facility).

The following key conditions would be required to be included within an EA issued for the project:
The following key conditions would be required to be included within an EA issued for the project:

- All mitigation measures detailed within this BA Report and the specialist reports contained within **Appendices D1 to D6** are to be implemented.
- The EMPr, as contained within **Appendix G** of this BA Report, should form part of the contract with the contractors appointed to construct and maintain project, to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of project is considered key in achieving the appropriate environmental management standards as detailed for this project.
- The No activities should be allowed to take place within the Mispah game farm.
- The high-sensitivity Valley Bottom wetland and its associated buffer areas should be regarded as no-go areas.
- The necessary authorisations should be obtained from the Department of Water and Sanitation (DWS).
- The development should design and implement a comprehensive stormwater management system in order to manage runoff and prevent erosion which will affect the wetland system.
- A Comprehensive facility layout plan must be implemented and located within the identified development footprint. The final layout must be submitted to FSDESTEA for review and approval following a detailed design.
- Consider the use of bird deterrent devices to limit collision risk.
- Where powerlines/connection lines are are to be placed above ground, they must be marked with industry standard bird flight diverters.
- A qualified environmental control officer must be appointed and on site when construction begins.
- A walkthrough survey by a walk-through survey should be undertaken prior to construction
- A permit must be obtained from the relevant nature conservation agency for the removal or destruction of indigenous, protected or endangered plant or animal species and a copy of such permit/s must be submitted to the Department for record keeping.
- No exotic plants may be used for rehabilitation purposes. Only indigenous plants of the area may be utilised.
- All other relevant environmental permits must be obtained prior to the construction of the facility.
- The Chance Fossil Finds Procedure must be implemented for the duration of construction activities.
- Should any previously unrecorded archaeological and palaeontological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.

Considering the findings of the independent specialist studies; impacts identified; the proposed facility layout which avoids all identified no-go/highly sensitive environmental features within the development area; and the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that the project is acceptable within the landscape and can reasonably be authorised. The preferred facility layout is illustrated in Figure 15. The period for which the EA is required to remain valid is 10 years from the date of authorisation, with a period of 5 years for the design, planning, construction, and commissioning of the activity to be concluded.

| Is an EMPr attached? | **YES** |
|---|---|

The EMPr is 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 K**.

Any other information relevant to this application and not previously included must be attached in **Appendix J**.

Ansone' Esterhuizen

NAME OF EAP

A Esterhuizen

SIGNATURE OF EAP

27/09/22

DATE