Visual Study

Establishment of a 3.5-Megawatt Solar Photovoltaic (PV) facility on Erf 77, Greenbushes, within the Nelson Mandela Bay Municipality, Eastern Cape

Prepared for:

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Date submitted: 12 December 2022

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1. Declaration of independence

I, Roy de Kock as duly authorized representative of BlueLeaf Environmental (Pty) Ltd, hereby confirm my independence (as well as that of BlueLeaf) as a specialist and declare that neither I nor BlueLeaf have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which BlueLeaf was appointed as environmental specialist in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), other than fair remuneration for worked performed, specifically in connection with the Basic Environmental Assessment for the proposed Erf 77, Greenbushes solar PV project. I further declare that I am confident in the results of the studies undertaken and conclusions drawn because of it – as is described in this report.

Full Name: Roy de Kock

Title / Position: Visual specialist
Qualification(s): BSc (Hons) Geology; MSc Botany; Candidate PhD Botany
Experience (years/ months): 16 years
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2. Expertise of specialist

Roy has over 16 years' experience in environmental consulting and specialist services in the EasternCape. Various projects throughout South Africa as well as Africa at larges has also been undertaken.Projects include baseline studies, impact assessments and compliance auditing for various large- scale projects including numerous wind farms, roads (National and Provincial), and infrastructure expansion projects. Roy has also conducted numerous specialist studies including but not limited to Ecological and Botanical assessments, Visual studies, Biodiversity studies, Plant and Animal Search and Rescuer, Fauna and Flora permits, Aquatic Assessments, Agricultural and Soil Assessments and Environmental and Venomous Animals training workshops.

Roy holds a BSc Honours in Geology and an MSc in Botany from the Nelson Mandela University in Port Elizabeth. He is currently busy with his PhD (Doctorate degree) in Botany and Soil Science. He has over 16 years' experience in the environmental consulting focusing on Ecological and Agricultural Assessments, Geological and Geotechnical analysis, Environmental Management Plans,mining applications and various environmental impact studies.

Roy has been conducting Visual Assessments since 2015. Projects include:

- Cove Rock Estate WULA for the treatment of sewage, East London, Eastern Cape.
- Enviroworks Addo Elephant National Park Development – Expansion of housing infrastructure, Eastern Cape.
- Public Participation Process Citrus Development, Addo, Eastern Cape.
- Knight Piesoldt Upgrade of the N1 from Louis Trichardt to Musina, Limpopo.
- UWP Consulting Ecological Assessment of the R63 between Komga and the N9 Bridge, Eastern Cape Province

Roy is a registered as a professional natural scientist (Pri.Sci.Nat.) with SACNASP (Registration nr: 400216/16).

This study complies with the requirements as listed in the Gazetted protocols for a general specialist assessment (GN. R 320 of 2020) and minimum report content requirements.

3. Introduction

BlueLeaf Environmental (Pty) Ltd has been appointed by Habitat Link Consulting to provide visual input into their proposed environmental assessment for a proposed new 3.5 MW Solar PV plant within the 2.2 hectare (ha) of Erf 77 in Greenbushes, Gqeberha (Port Elizabeth) in the Eastern Cape province. The proposed development will include the installation of several solar panels to be connected to the municipal electricity grid to supply renewable (solar) energy. Erf 77 is situated approximately 15 km west of Port Elizabeth city center, within the Nelson Mandela Bay Municipality (Figure 3.1).

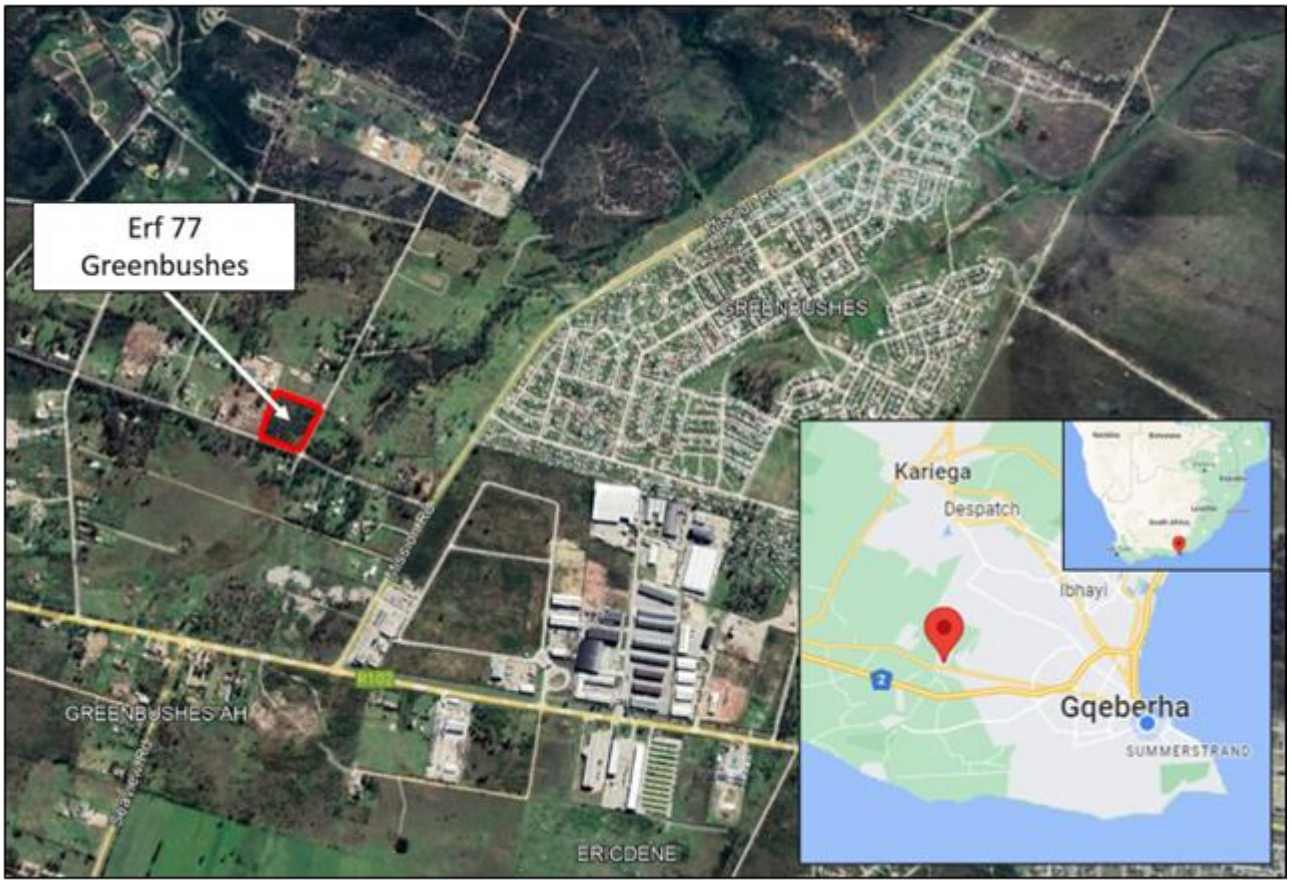

Figure 3.1: Locality Map of the proposed solar PV development on Erf 77, Greenbushes, within the Nelson Mandela Bay Municipality, Eastern Cape

3.1 Methodology

This report has been drafted in accordance with the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in Terms of Sections 24(5)(a) and (h) and44 of NEMA (G.NR. 1150 of 2020) – Site Sensitivity Verification Requirements where a Specialist Assessment is Required but no Specific Assessment Protocol has been prescribed.

A site sensitivity verification has been conducted (see Chapter 6) to confirm/dispute the current useof the land and environmental sensitivity as identified by the Screening Tool. Motivation, with photographic evidence, was provided as part of the site sensitivity verification.

The visual assessment was done as per the DEA&DP Guideline for Involving Visual and Aesthetic Specialists in EIA processes (Oberholzer; 2005).

Current literature that was used to describe the site includes:

- The Eastern Cape Provincial Spatial Expansion Framework (PSDF) 2020
- The Nelson Mandela Bay Municipal Spatial Expansion Framework (SDF) 2021

Criteria evaluated include:

- Density of expansion.
- Aesthetics (design, scale, layout).
- Location.
- Value in terms of '*sense of place'*.
- Character and nature of adjacent land use.
- Character of the general area, and
- Cumulative environmental impacts.

4. Project description and Scenic Resources

The proposed facility will consist of approximately 4 000 solar panels that will feed renewable energy to the existing municipal electrical connection via a new municipal substation (Figure 4.1). The development will also consist of several out-buildings including ablution facilities, security control, storeroom, transformer/switch gear room and electrical metering room. Stormwater from the site will be diverted to a proposed pond in the south-east corner. Access to the site will be obtained off Pennelsdrift Road on the south-west corner and a new internal access road will be established along the boundary of the property. Several parking spaces will be allocated near the buildings (Figure 4.1 and Figure 4.2).

The proposed solar energy generation facility will initially produce 2.3 MW of green power (and later be upgraded to 3.5 MW), which can then be distributed to businesses in the area. This green power will allow these businesses to meet their sustainable mandates and assist with the exponential costs of electricity. This facility will also help to alleviate electrical consumption, improving grid stability and reducing load shedding.

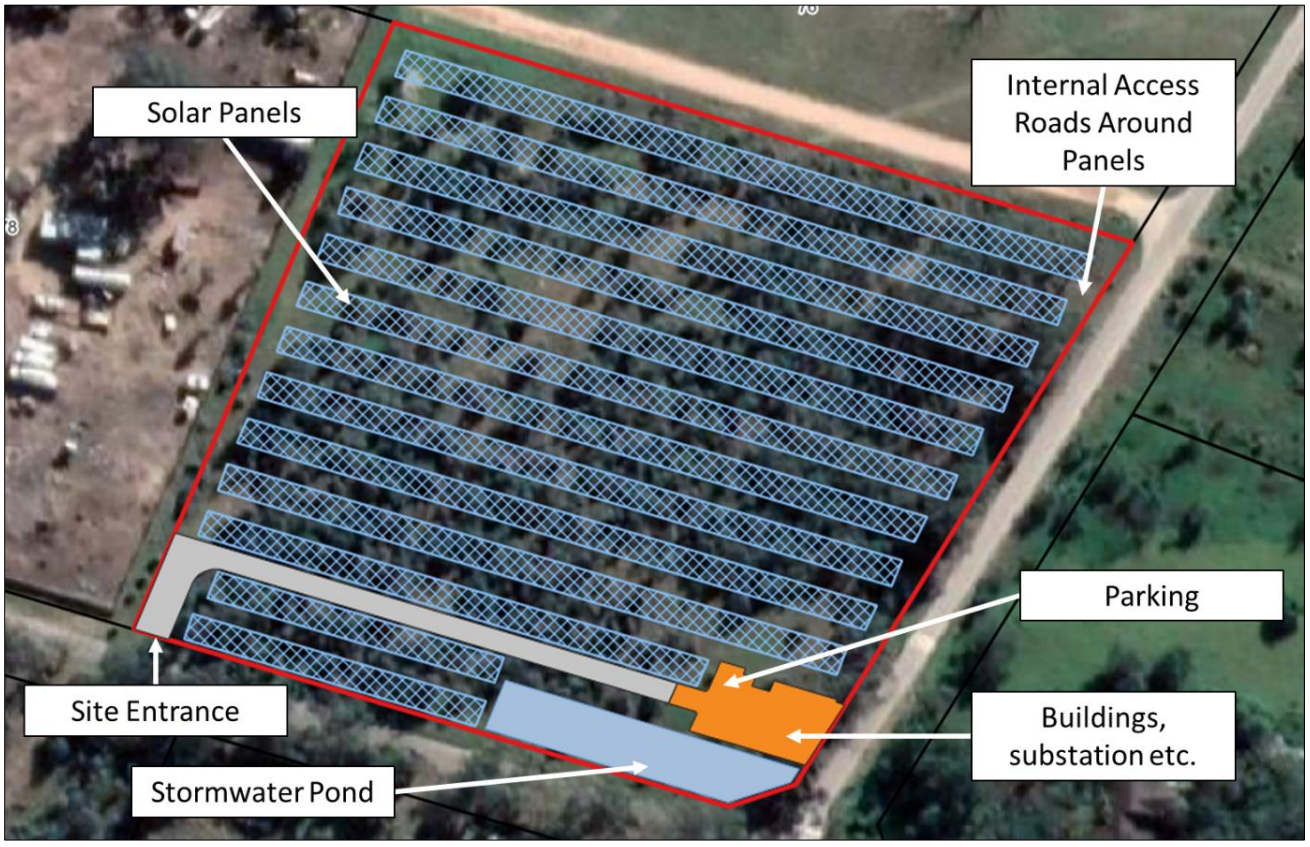

Figure 4.1: Layout of the proposed new Solar PV development of Erf 77 in Greenbushes.

Each row of solar panels will be fitted with two 80 kilowatt (kW) inverters, which will be connected, via cabling, to the on-site mini-substation/transformer via the electrical metering room. The mini-substation will be connected to the nearest municipal supply by either tapping into an existing 11 kilovolt (kV) or 22 kV cables by means of a Ring Main Unit, or by connecting to the nearest substation by means of an additional switch. If required, permissions for connecting to existing infrastructure via the municipal road will need to be obtained from the NMBM as well as from the adjacent landowner. For future upgrades to the 3.5 MW capacity, it is possible (although unlikely) that 33 kV underground cabling will be required for the development. The cable upgrades will occur within the footprint of any existing cabling and will not exceed 2 km in length.

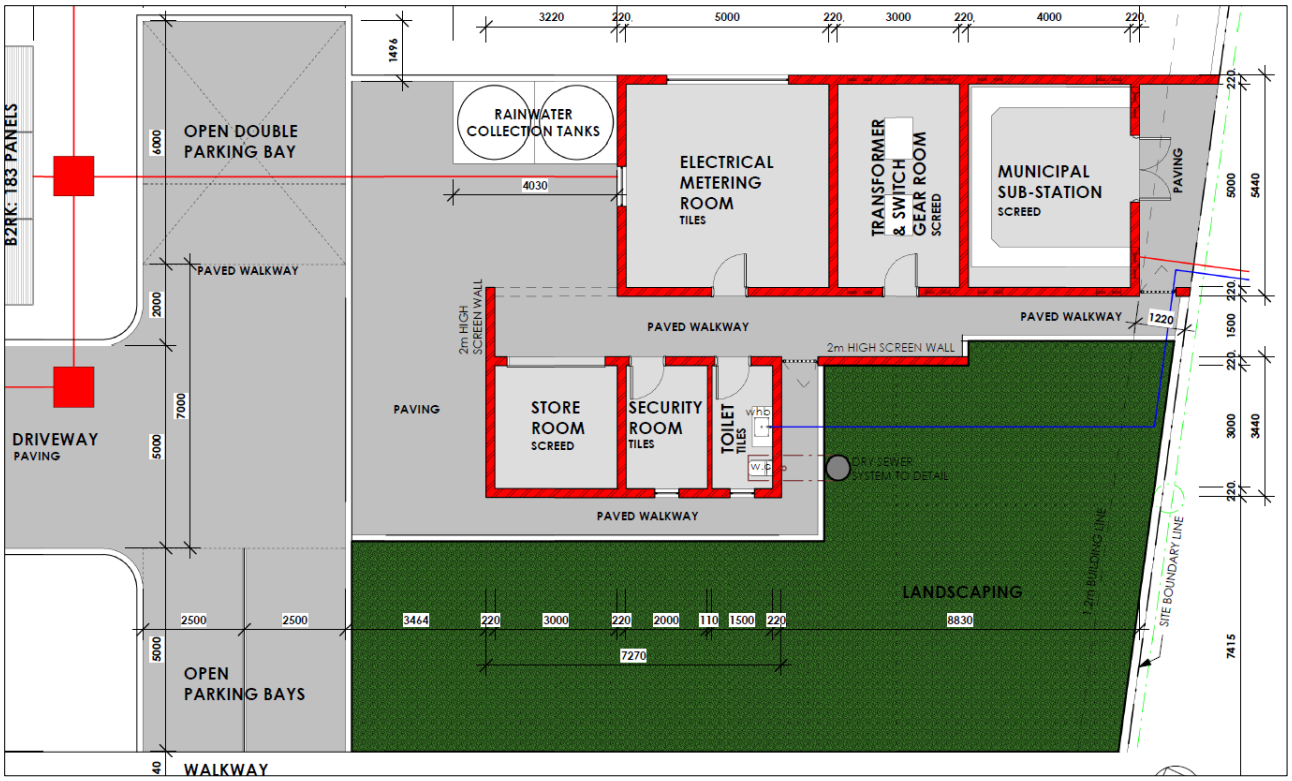

Figure 4.2: Detailed layout of the proposed building and substation.

While most of the property will consist of solar panels, the southern portion of the site has been earmarked for the development of the abovementioned associated infrastructure which include ablution facilities, security control room, storeroom, municipal sub-station, transformer/switch gear room and electrical metering room and parking. There is also proposed to be a 700 m^2 stormwater retention pond in the south-east corner of the site. It is proposed that the entire site will be fenced-off with mesh fencing, fitted with electrified fencing, to ensure security of the site. Further security measures will include full CCTV cameras fitted around the property boundary and at strategic points within the property. Remote off-site security monitoring will be carried out from a central control room.

4.1 Water supply

Limited water will be required during the construction phase. This water will be used primarily for the suppression of dust following the clearance of vegetation. During the operational phase, a small amount of water will be required for the cleaning of solar panels up to three (3) times per year. The panels will primarily be cleaned using waterless microfibre cleaning devices. In some instances, water will be combined with this method to remove stubborn dirt and dust on the panels. The site only requires a standard municipal residential water connection. An existing municipal connection is located opposite the site (adjacent to the southern boundary of Pennelsdrift Road. A small (approximately 25 mm diameter) High Density Polyethylene (HDPE) pipeline will be connected and extended to the site.

4.2 Energy sources

Fuel will be required for the bulldozer and excavator during the construction period. Since this is a renewable energy development, the only energy requirements would be those of 'start-up' during the operational phase. The facilities will be connected to the existing municipal electricity supply for start-up after which the site will operate off the proposed solar-generated power supply.

4.3 Solid waste, Wastewater and Sewage

Solid waste derived from the construction phase of the proposed development will include minor discarded construction material, general domestic waste, existing waste located on the site and cleared vegetation

(predominantly eucalyptus trees). This spoil waste will be reused, wherever possible (e.g., as fill material, depending on the quality). Any vegetation waste will be chipped and mulched and re-used on site wherever possible. All additional waste will be removed and disposed of in the correct manner at a licensed landfill site. During the construction phase, liquid effluent will be handled via the implementation of portable/temporary toilets for construction staff. The facilities will be serviced by an external service provider (e.g., Sanitech) to remove the waste to a sewage treatment facility. Should any soil become contaminated by an effluent or hydrocarbon spill, this will be separated as hazardous waste and removed to an adequate disposal facility. Construction phase activities may also generate hazardous waste such as empty chemical containers, oil rags and possible cement bags. These will be disposed by the Contractor at the nearest permitted landfill site.

During the operational phase, most of the waste derived from the development will be in the form of general domestic waste, derived from the operators and security staff present at the site. This waste will be disposed of via the municipal collection services on a weekly or biweekly basis and/or by an appointed recycling and/or waste removal company. The operational phase of the proposed development will generate effluent comprised of limited wash water and sewage. The applicant has confirmed that only a limited amount of water is required for the washing of solar panels and that no cleaning chemicals would be required. Effluent from the other facilities (e.g., ablution block) will be managed with a dry toilet solution that will be emptied on a regular basis by an appointed contractor. A typical example of such a dry toilet solution would be the ECOSAN waterless toilet system.

4.4 Stormwater infrastructure

The management of stormwater during the construction phase may require the implementation of water diversion berms prior to the commencement of the site establishment. The diversion berms will be designed in such a way as to ensure that the proposed development site is properly protected from excess stormwater flow, while also ensuring that the surrounding land, specifically the nearby drainage areas, can handle the additional (diverted) water. During the operational phase, stormwater from the entire property will be diverted to the proposed stormwater retention pond. The retention pond, which will be approximately 1 m in depth (with its highest point located at current ground level), has been designed to accommodate a 1:100-year flood event to avoid excess stormwater runoff from leaving the site. A new stormwater pipeline (approximately 300 m in length) will be implemented below-ground, extending from the retention pond to an outlet within the servitude of the Pennelsdrift Road reserve (Figure 4.3). The outlet from the pipeline, which will be located outside the floodplain of the nearby drainage line, will consist of a headwall and reno mattress with a total footprint of approximately 8 m^3.

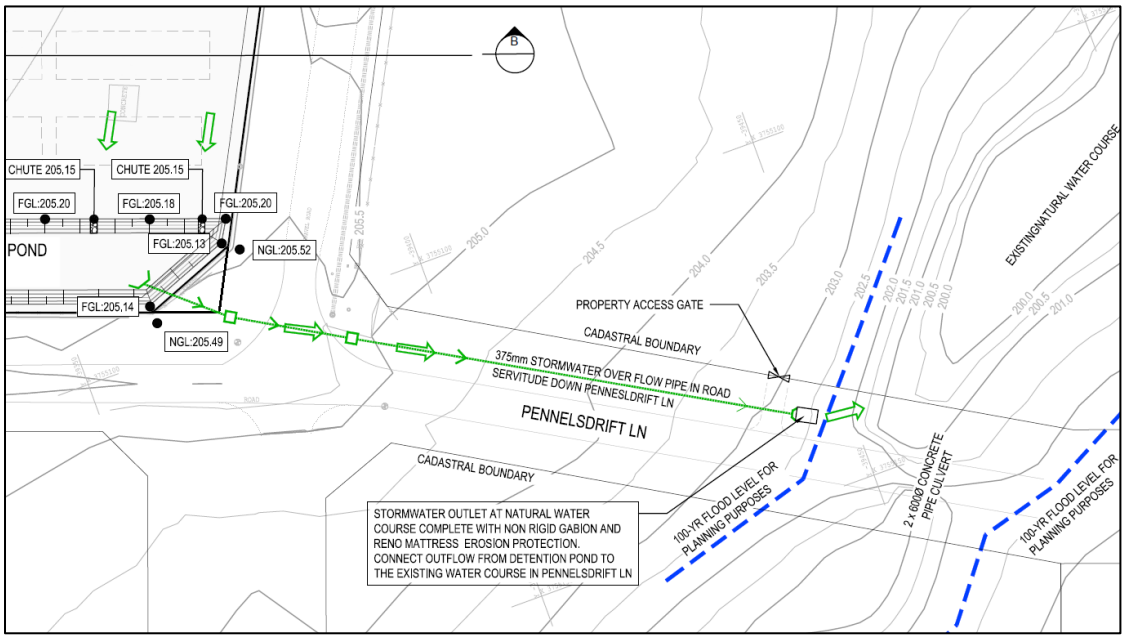

Figure 4.3: Stormwater management plan showing the proposed stormwater pipe extending from the site along the road reserve to the proposed stormwater outset with reno mattress erosion protection.

4.5 Current land use

The site currently consists of vacant land with vegetation cover dominated by alien vegetation like black wattle and eucalyptus (Gum) trees (Figure 4.4).

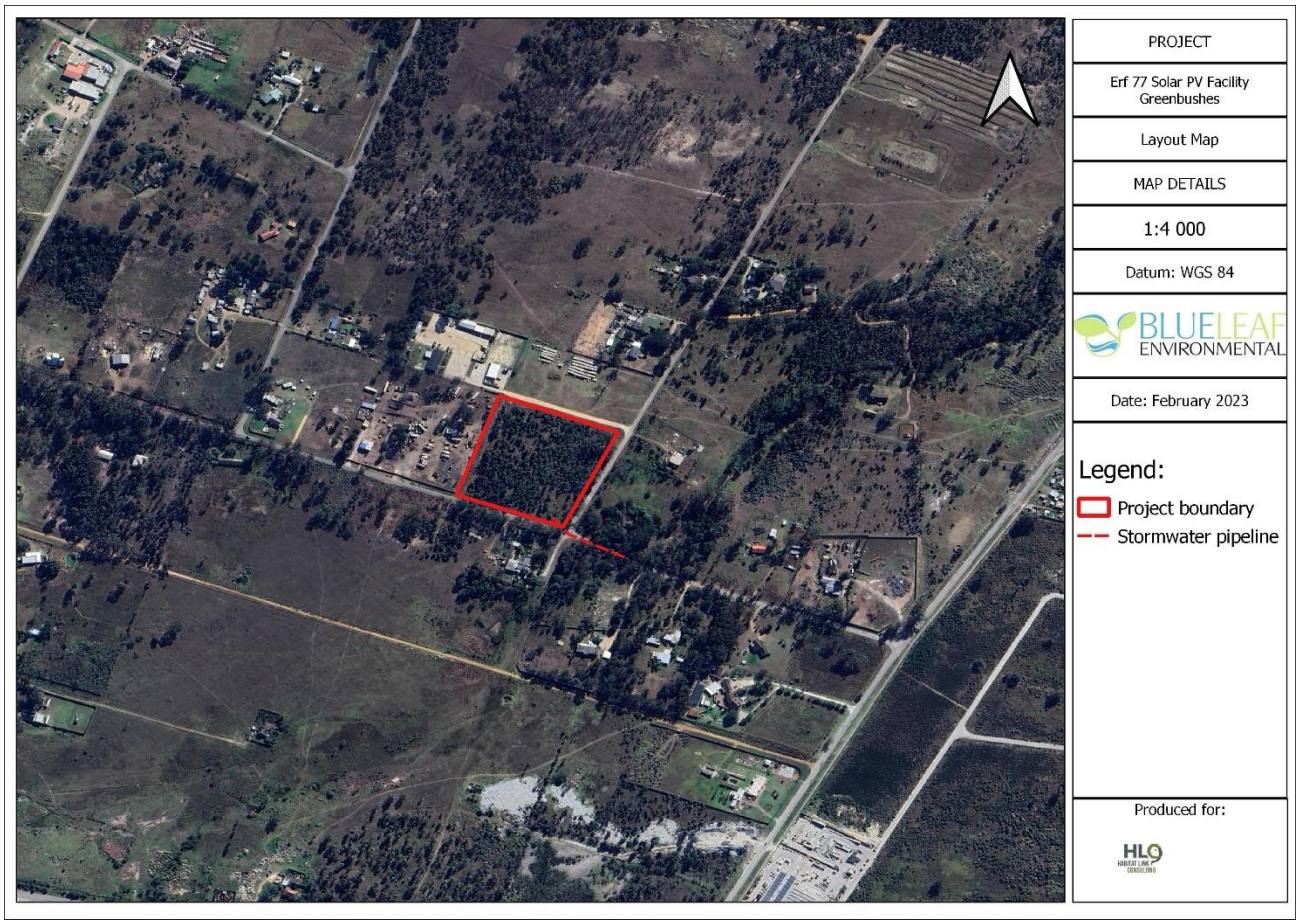

Figure 4.4: Aerial image of the study site and surrounding area

Below is a photo sequence of the study site environment:

Site along the northern boundary. Alien vegetation dominates:

Eastern boundary. Large gum trees and wattle dominate:


Southern boundary: Aliens still dominate but site is slightly more open:


A scrapyard forms the western boundary of the site. Alien trees still dominate:


4.6 Scenic resources

Factors contributing to the scenic resource of the environment include:

- Smallholdings/agriculture
- Smallholdings/small business
- Natural/wilderness
- Urban expansion

Based on the above, scenic resources are rated as **HIGH** (Oberholzer; 2005)

5. Visual Assessment of The Site

The DEA&DP Guideline for involving visual & aesthetic specialists in EIA processes Document provides several criteria that relate specifically to Visual Study namely:

- Visibility of the project;
- Visual exposure;
- Visual sensitivity of the area;
- Visual sensitivity of receptors;
- Visual Absorption Capacity; and
- Visual Intrusion.

The proposed project was assessed against these criteria to determine a sensitivity to the visual environment. Each criteria are discussed below:

5.1 Visibility of the project

The geographical area from which the project will theoretically be visible, or view catchment area, is dictated primarily by topography, and is often related to the catchment area of a river(s) and its watershed. Theoretically, the site could be seen from afar as it is located on a flattened hilltop. This is clearly seen in the Viewshed developed for this project (Figure 5.1).

The project can theoretically be seen up to 15 km away in the north. The reality is that there are various surface structures that screens this from happening. Screens include vegetation cover and urban development.

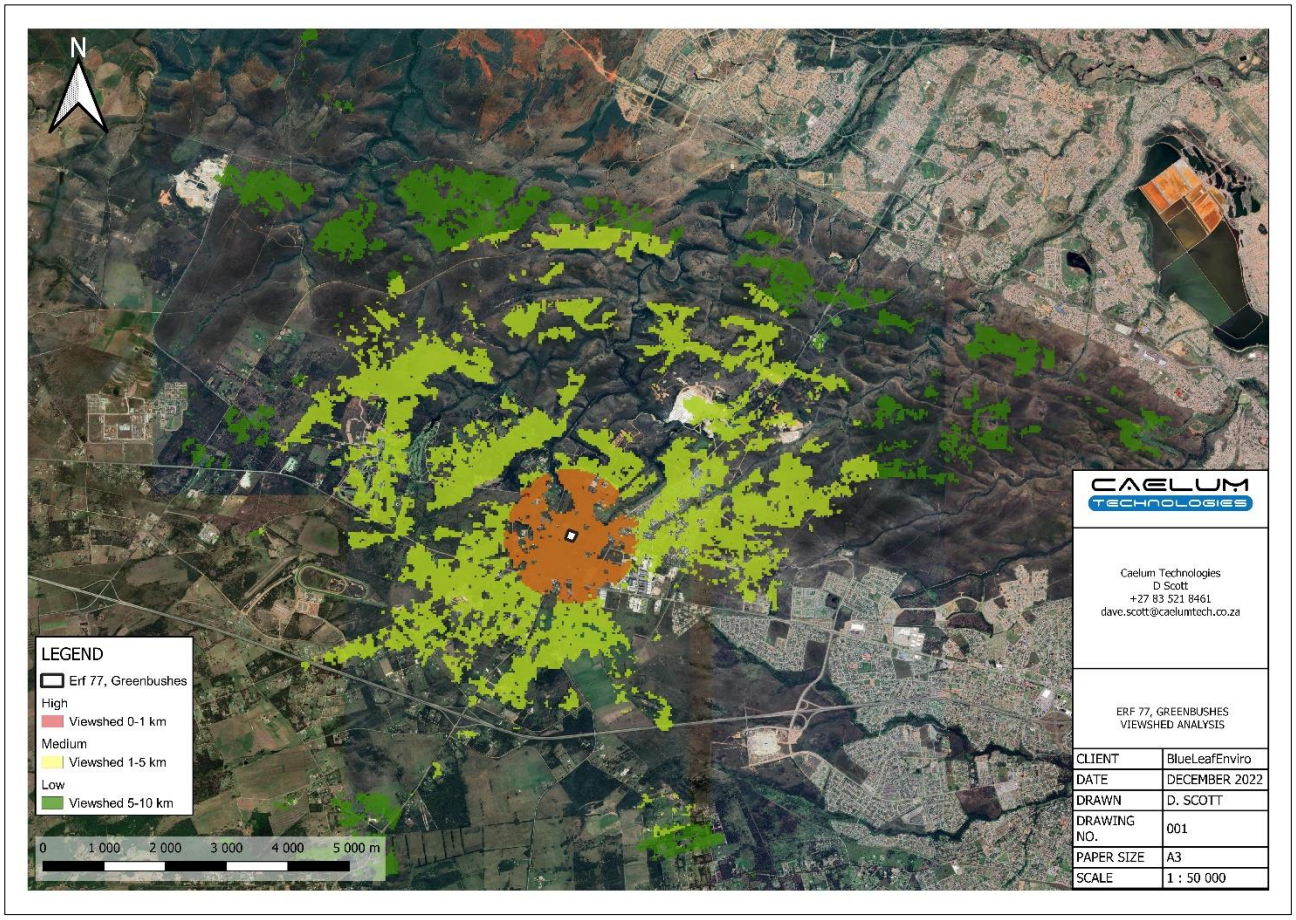

Figure 5.1: Viewshed for the proposed development on Erf 77, Greenbushes.

However, distance, infrastructure, vegetation, and topography will reduce the actual zone of visual influence that the site and project will have, to a much smaller area.

Zone of visual influence

The site is situated on a relatively flat plain running regionally from east to west. The highest visibility will therefore be within the first 5 km of the site where the proposed development can be partially seen provided there is no screening from vegetation and buildings. After that the visibility declines. The site is located in an area dominated by smallholdings. Various roads and dwellings also occur in the surrounding environment.

5.2 Visual receptors

The level of visual impact considered acceptable, as is dependent on the type of receptors within the surrounding environment:

- **High sensitivity** – includes residential areas, nature reserves and scenic routes or trails.
- **Moderate sensitivity** – includes sporting or recreational areas, or places of work.
- **Low sensitivity** – includes industrial, or degraded areas.

High sensitive receptors of the site include smallholdings immediately adjacent to the development site and residential zones to the east. Municipal roads surround the site. Scattered areas around the site are considered as moderate sensitive as they consist of places of work. A zone to the each is considered as low sensitive as it includes an industrial area. A sensitivity map was drawn to show the various sensitivities (Figure 5.2).

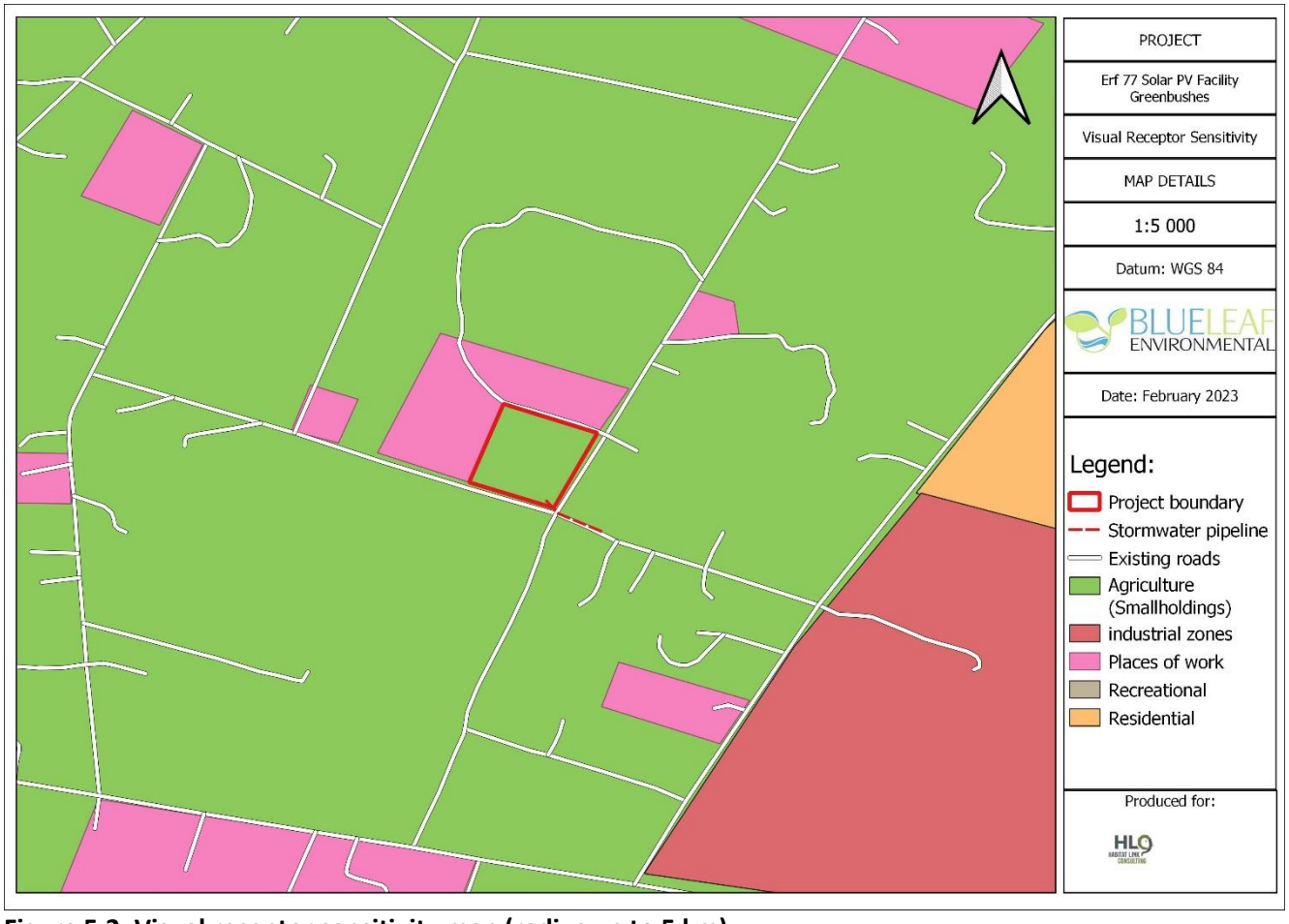

Figure 5.2: Visual receptor sensitivity map (radius up to 5 km)

5.3 Visual exposure

- **High exposure** – dominant or clearly noticeable
- **Moderate exposure** – recognizable to the viewer
- **Low exposure** – not particularly noticeable to the viewer

Within the Zone of Visual Influence - view corridors, viewpoints and receptors will experience "Visual Exposure" to the site and proposed expansion. Based on distance from the project to selected view corridors, viewpoints, or receptors, the 'visual exposure' or visual impact tends to diminish exponentially with distance.

5.4 View corridors

The only two view corridors are 1) Pennelsdrift Road bordering the south of the site and 2) Blommelaan Road which borders the eastern section of the site. Both these roads are only used to access local sites and are not busy roads connecting large nodes of industry.

Blommelaan road with the project site on the left:	Pennelsdrift road with the project site on the right:
	

5.5 Visual sensitivity

The inherent visibility of the sites' landscape is usually determined by a combination of topography, landform, vegetation cover, settlement pattern and special features. This translates into visual sensitivity.

- **High visual sensitivity** – highly visible and potentially sensitive areas in the landscape,
- **Moderate visual sensitivity** – moderately visible areas in the landscape,
- **Low visual sensitivity** – minimally visible areas in the landscape

A desktop exercise was undertaken in whereby each of topography, landform, vegetation cover, settlement patterns and special features was mapped for the site and rated from low to high. These maps are overlaid, and the combined areas are assimilated to provide an overall sensitivity (see figures 5.1 and 5.2).

<u>Vegetation</u>

The South African National Biodiversity Institute (SANBI) vegetation map (called the VegMap; 2018) lists the proposed activity within **Algoa Sandstone Fynbos**.

Sandstone fynbos is the most extensive vegetation group in the Fynbos biome (301 km^2) almost four times bigger than the next most prominent group and covering almost a third of the Fynbos biome. In the Eastern Cape it covers the coastal flats at Port Elizabeth (Gqeberha), located mostly some kilometers from the coast on flat to slightly undulating plains supporting grassy shrubland (mainly graminoid fynbos). Grasses become dominant in wet habitats and can form mosaics with surrounding vegetation types.

SANBI classifies Algoa Sandstone Fynbos vegetation unit as **Critically Endangered** with only 2% of the targeted 23% conserved in the Van Stadens Wild Flower Reserve and other smaller private nature reserves. More than 50% has already been transformed through cultivation and urban sprawl.

The NMBM BP (2014) classifies vegetation on site as Rowallan Park Grassy Fynbos and classifies it as Endangered respectively.

A site visit confirmed that no natural vegetation occurred on site. The site is dominated by large alien invasive trees (wattle and gum).

Topography

The site occurs on a flat plain incised by various drainages and streams.

Land use

Current land use has been determined for the study site and surrounding environments (Figure 5.3). The map shows that the entire study area is used for agriculture (cultivation). However, the land has been laying vacant for a number of years with no use and alien vegetation is now dominating. No infrastructure exists on site. The surrounding land use is also agriculture but no cultivation occurs. The area is in the process of being transformed to urban settlement with various small businesses surrounding the study site.

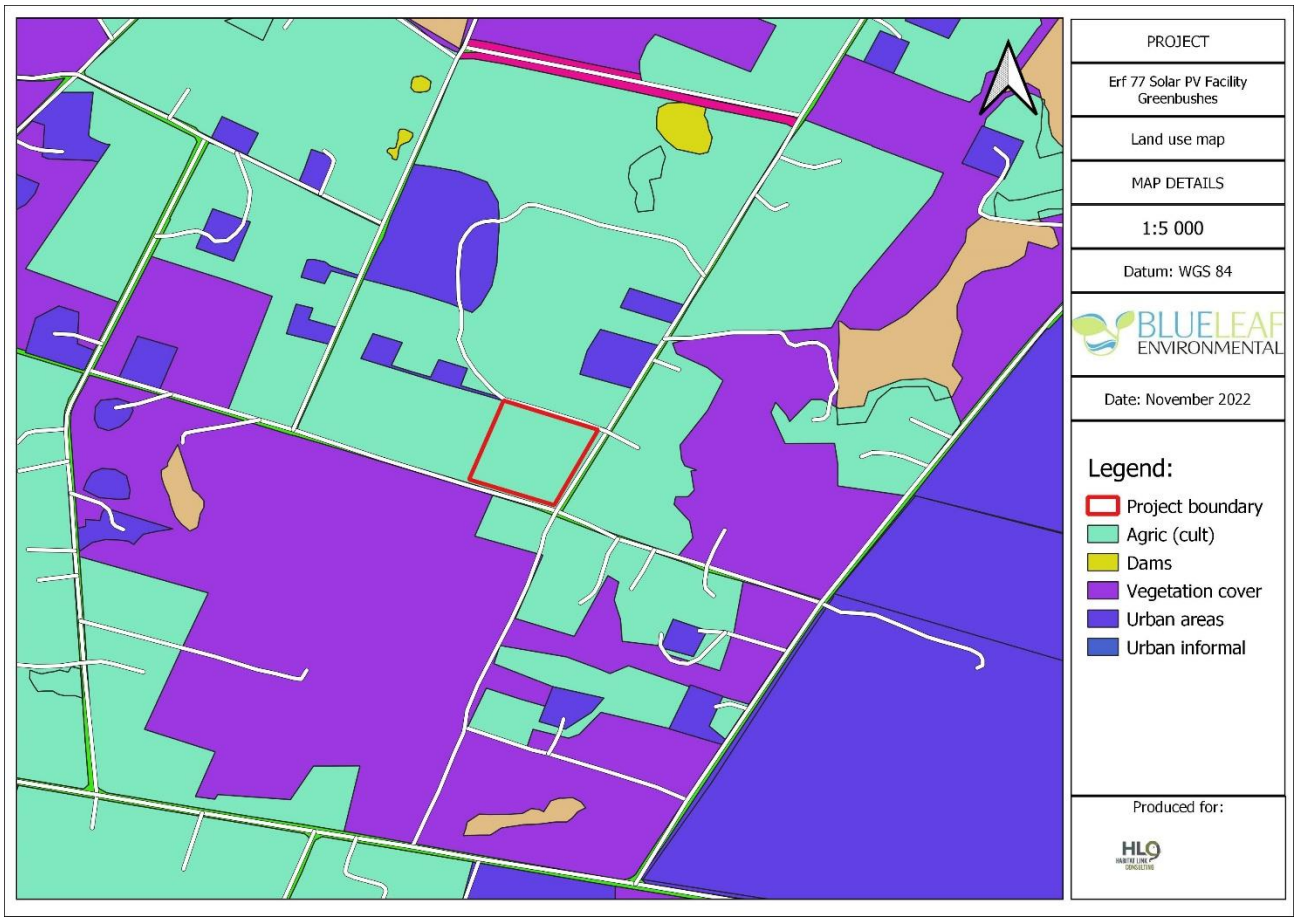

Figure 5.3: Land use map of the study area and surrounding areas.

Screening report

The screening report does not classify the sensitivity of the visual environment. It does however list the study as one of the required specialist studies that must be conducted as part of the BAR process for the

proposed project. The aim of this report is to determine sensitivity allocations through a detailed desktop analysis and site verification as per GN R 320 of 2020 (Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on the General Environment).

Visual sensitivity

The visual sensitivity of the site is **categorized as medium sensitivity**. This is because the site is located on a relatively flat plain with the potential of high visual intrusion over long distances. Vegetation growth is on average over 4 m high and this with scattered urban buildings screen the site from the surrounding environment.

5.6 Visual Absorption Capacity

Visual Absorption Capacity (VAC) is the potential of the landscape to conceal the proposed project. VAC can be described as:

- **High VAC** – e.g. effective screening by topography and vegetation.
- **Moderate VAC** - e.g. partial screening by topography and vegetation.
- **Low VAC** - e.g. little screening by topography or vegetation.

The VAC of a landscape depends on its topography and on the type of vegetation that occurs in the landscape. The size and type of the development also plays a role.

The potential of the landscape of the sites and the surrounding areas to conceal the development, varies from low to high. Being situated on a flat plain but screened by vegetation and buildings results in the site being screened from the surrounding areas. The proposed development will only be seen from Blommelaan and Pennelsdrif roads immediately adjacent to the site. **The study site therefore has a high VAC**.

Residences across the street are screened by dense alien trees:

5.7 Visual Intrusion

Visual Intrusion is defined as the level of compatibility or congruence of the project with the particular qualities of the area, or its *'sense of place*'. This is related to the idea of context and maintaining the integrity of the landscape or townscape.

- **High visual intrusion** – results in a noticeable change or is discordant with the surroundings.
- **Moderate visual intrusion** – partially fits into the surroundings, but clearly noticeable.
- **Low visual intrusion** – minimal change or blends in well with the surroundings.

The proposed development will take place immediately adjacent to two small commercial businesses namely a plant hire and construction company to the north and a scrapyard to the west of the study site resulting in

noticeable changes to the landscape that partially fits into the surrounding landscape. **The visual intrusion will therefore be moderate**.

Scrapyard to the west of the study site:	Layout of the immediate surrounding landscape:
	

6. Potential Impacts

6.1 Impact Assessment Methodology

The assessment of visual impacts is based on a synthesis of criteria including nature of impact, extent, duration of the impact, intensity, probability of occurrence, reversibility, Irreplaceable loss of resources, cumulative effect and level of significance.

6.2 Nature of impacts

The following impacts have been identified:

1. Pre-construction phase:

1.1: Removal of site vegetation will be required for earthworks. Various tall trees exist on site but none of the surrounding trees which acts as screens will be removed therefore vegetation removal will have little impact on the visual resource.

2. Construction phase:

2.1: During construction, clearing activities together with the movement of heavy machinery could be conducive to the creation of dust clouds that could be visible from a wide area in the visual envelope of the construction site.

3. Operational Phase:

3.1: The site is currently undeveloped and covered in tall alien vegetation. The development will result in a change in visual character from an unbuilt landscape to a built landscape.

3.2: The proposed development would be visible from immediate adjacent roads (Blommelaan and Pennelsdrif roads).

3.3: The proposed development will require lighting which will have a visual impact at night. This will be visible to the surrounding areas and sensitive receptors in these areas.

6.3 Summary of impacts

The following table summarizes each visual impact identified and its respective ratings for each criteria:

Criteria	Impacts identified				
	Removal of vegetation	Creation of dust	Change in visual character	Visible from adjacent roads	Night lighting
Extent of impact	Site only	Local area	Local area	Local area	Local area
Duration of impact	Short term (less than 12 months)	Short term (less than 12 months)	Permanent	Permanent	Permanent
Intensity	Low	Moderate	High	High	Moderate
Probability	Possible	Definite	Definite	Definite	Probable
Reversibility	Reversible	Reversible	Reversible	Reversible	Reversible
Irreplaceable loss of	Significant	Significant	Significant	Significant	Marginal

Criteria	Impacts identified				
	Removal of vegetation	Creation of dust	Change in visual character	Visible from adjacent roads	Night lighting
resource					
Cumulative effect	Low	High	High	High	Moderate
Significance	Low	High	High	High	Moderate

7. Mitigations

A number of mitigation measures can be recommended to reduce the potential visual impact and visual intrusion potential of the proposed solar PV development. The coverage over the area of the site (approximately 2.3 ha in size) is nearly universal and PV arrays, as well as ancillary infrastructure will be developed over most of the site. The development will bring landscape change to the parts of the landscape in the areas from which it is able to be viewed and this factor can be partly mitigated over time. The following mitigations are proposed:

7.1 Lighting

Lighting at the plant could potentially exert a visual impact, especially if floodlight-type lighting is used. The following mitigation measures should be implemented with regards to lighting:

- Lighting of the solar PV plant at night should be limited to security lighting (where this is necessary). It is acknowledged that emergency operational lighting may be required, but this should not be permanently lit.
- The height of all lights should be limited; more lights should be installed at lower heights than floodlights that would be visible from a wider area.
- All lighting should be faced downward and inward facing (towards the solar PV plant), to avoid light spilling into the surrounding areas.

7.2 Other visual mitigation measures

- As the structures supporting the panels could create cumulative glint and glare if these are metallic and reflective, the consideration of non-reflective material for the supports is recommended.
- During construction, dust suppression should be applied to avoid the creation of dust clouds to areas cleared of vegetation.

8. References

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