CHAPTER 9:
CONCLUSION AND RECOMMENDATIONS

Table of Contents

List of Figures

List of Tables

9. CONCLUSION AND RECOMMENDATIONS

9.1 Summary of specialist findings – impacts, actions and reasoned opinions

9.1.1 Geohydrology[1]

The proposed site for the 29 Solar Dealesville Development, associated electrical infrastructure and the connection points to the substation will have a minimal effect on the geohydrology of the area.

Potential impacts to groundwater during all phases are expected to be low to very low negative with implementation of appropriate mitigation. The greatest risk to groundwater is the cumulative over-abstraction of reserves for the construction of multiple solar energy facilities proposed in the Dealesville area (Figure 9.1). However, the significance of this impact may be reduced to low with proper management.

	Aspect/ Impact pathway	Nature of potential impact/risk	Significance of impact/risk					
			None	Very Low	Low	Moderate	High	Very high
Geohydrology	Construction of storage and labour accommodation yards	Groundwater contamination		-				
	Stormwater outflows	Groundwater contamination		-				
	Accidental oil spillage / fuel leakage	Groundwater contamination		-				
	Cumulative use of groundwater	Over-abstraction		-				

Figure 9.1: Groundwater impact assessment summary. Bordered blocks represent impact significance after mitigation.

Key management actions and mitigation measures include, but are not limited to:

- Keep the footprint of the disturbed area to the minimum and designated areas only;
- Preconstruction walk through of the facility in order to locate species of conservation concern that can be translocated as well as comply with permitting conditions;
- Preconstruction environmental induction should be done for all construction staff and visitors;
- Adhere to existing roads;
- Limit vegetation removal; and
- Rehabilitate vegetation cleared and disturbed areas using indigenous species.
- There must be no oil leaks from the construction vehicles on site and fuel spillages must be prevented.

> *"Although the planned facilities will not impact on the groundwater resources of the area and **from a geohydrological perspective the construction and operation can proceed**, reasonable care must be taken not to cause any contamination of groundwater."* (Conrad & Peek, 2016)

The groundwater of the study area has the potential to be utilized in all phases of the proposed project. Groundwater exploration, development, monitoring, management and authorization will have to be addressed as a separate project.

9.1.2 Fauna & Flora[2]

The study area falls primarily with in the Western Free State Clay Grassland but also in the Vaal-Vet Sandy Grassland (Mucina and Rutherford, 2006). The ephemeral pans are classified as Highveld Salt Pans. Vegetation was largely karroid and vegetation was mostly comprised of *Themeda triandra* –

[1] Conrad & Peek, 2016.
[2] Digby Wells Environmental, 2016 a

Rosenia humilis mixed shrubland/grassland (covering 292ha), in addition to alien bushclumps and ephemeral pans.

A total of 17 mammals were recorded, many of which were game species and none of which were Red Data listed. No amphibians were recorded and four reptiles were recorded. Each reptile has been listed on the Transvaal Nature Conservation Ordinance (1983) list of protected species. No recent protected species list has been published for the Free State Province, however, and this list needs revision.

The proposed development will result in the loss of Very High ecologically sensitive habitat in the form of pans. It is strongly recommended that these areas are avoided and the specific mitigation measures described in the wetlands assessment report are adhered to. The overall impact of the proposed Solar PV facility will be moderate to low.

Potential impacts to fauna and flora during all phases are expected to be moderate to low and very low negative with implementation of appropriate mitigation (Figure 9.2). The greatest risk to fauna and flora is habitat and species loss, which can be mitigated by minimising disturbance and site remediation. Cumulative impacts of vegetation clearing range from moderate to low and very low negative (Figure 9.2).

	Aspect/ Impact pathway	Nature of potential impact/risk	Significance of impact/risk					
			None	Very Low	Low	Moderate	High	Very high
Fauna & Flora	Internal access roads and vehicular activities on site	Habitat and species loss		-				
	Internal access roads and vehicular activities on site	Exposed soil susceptible to erosion		-				
	Site Preparation	Habitat and species loss		-				
	Site Preparation	Exposed soil susceptible to erosion		-				
	Construction of surface infrastructure and preparation	Habitat and species loss		-				
	Construction of surface infrastructure and preparation	Exposed soil susceptible to erosion		-				
	Soil disturbance resulting in the spread of alien plant species on site	Spread of Alien plant species		-				
	Soil disturbance resulting in the spread of alien plant species on site	Exposed soil susceptible to erosion		-				
	Access control and fencing	Fencing in, or out certain grazers		-				
	Access control and fencing	Over or under grazed veld		-				
	Disassemble components	Damage of vegetation and habitat types		-				
	Cumulative clearing of vegetation	Habitat and species loss		-				
	Cumulative clearing of vegetation	Exposed soil susceptible to erosion		-				

Figure 9.2: Fauna and flora impact assessment summary. Bordered blocks represent impact significance after mitigation.

Key management actions and mitigation measures include, but are not limited to:

- Avoid pans and pan buffer areas;
- Keep the footprint of the disturbed area to the minimum and designated areas only;
- Preconstruction walk through of the facility in order to locate species of conservation concern that can be translocated as well as comply with permitting conditions;
- Preconstruction environmental induction should be done for all construction staff and visitors;
- Adhere to existing roads;
- Limit vegetation removal; and
- Rehabilitate vegetation cleared and disturbed areas using indigenous species.

The option with the least impact on very high sensitivity habitat is Faraday PV B. Therefore the preferred alternative, from an environmental perspective, is Faraday PV B.

"Since the majority of the site is of moderate ecological sensitivity, ***it is of the specialist's opinion that the development goes ahead***." (Digby Wells, 2016 a)

It is important to note that the field investigation took place in during drought conditions, although this was during the expected rainy season i.e. January 2016. As not all plant species on site were identifiable

during the flora survey, it is possible that Red Data species could have been missed. It is strongly recommended that an additional flora Red Data survey is conducted prior to the clearing of any habitat associated with the site.

9.1.3 Avifauna[3]

A total of 46 birds were recorded, three of these species are protected according to the IUCN (2015). One species was found to be endemic and two species near endemic, 45 species are protected according to the Transvaal Nature conservation act.

The proposed development will result in the loss of Very High ecologically sensitive habitat in the form of pans, which in turn will impact on bird species. It is strongly recommended that these areas are avoided and the specific mitigation measures described in the wetlands assessment report are adhered to. Collision and electrocution of birds with infrastructure, specifically powerlines is a high impact, but one that can be mitigated through measures listed in this report.

The overall impact of the proposed 29 Dealesville Development during all phases will be moderate to high negative. The significance of impacts may be reduced to low negative with the implementation of proper management actions and mitigation measures (Figure 9.3). The greatest risks to avifauna are due to the electricity infrastructure. Cumulative impacts are expected to be high to moderate negative with the implementation of proposed management and mitigation (Figure 9.3).

	Aspect/ Impact pathway	Nature of potential impact/risk	Significance of impact/risk					
			None	Very Low	Low	Moderate	High	Very high
Avifauna	Loss of Avifauna Diversity due to habitat destruction	Habitat and species loss		-				
	Loss of Avifauna Diversity due to disturbance and barrier effect	Species loss		-				
	Avifauna habitat fragmentation	Habitat and species loss		-				
	Collision and electrocution on powerlines	Species loss		-				
	Electrocutions on substations and switching stations	Species loss		-				
	Collision of birds with panels and other infrastructure	Species loss		-				
	Cumulative impact of infrastructure	Avifauna habitat and Species loss		-				

Figure 9.3: Avifauna impact assessment summary. Bordered blocks represent impact significance after mitigation.

Key management actions and mitigation measures include, but are not limited to:

- Avoid pans and pan buffer areas;
- Keep the footprint of the disturbed area to the minimum and designated areas only;
- Preconstruction walk through of the facility in order to locate species of conservation concern that can be translocated as well as comply with permitting conditions;
- Limit vegetation removal;
- Monitor bird collisions and fatalities;
- Install bird reflectors/deflectors ;
- Utilize underground cabling as far as possible;
- All line structures must be used in tandem with the standard Eskom Bird Perch to provide safe perching substrate high above the dangerous hardware; and
- Regular maintenance to remove nesting sites in infrastructure components establishing.

The option with the least impact on very high sensitivity habitat is Faraday PV B. Therefore the preferred alternative, from an environmental perspective, is Faraday PV B.

[3] Digby Wells Environmental, 2016 d

> *"Since the majority of the site is of moderate ecological sensitivity,* ***it is of the specialist's opinion that the development goes ahead."*** (Digby Wells, 2016 d)

It is important to note that the field investigation took place in during drought conditions, although this was during the expected rainy season i.e. January 2016. As not all bird species on site were identifiable during the survey, it is possible that Red Data species could have been missed. It is strongly recommended that an additional avifauna Red Data survey is conducted prior to the clearing of any habitat associated with the site.

9.1.4 Wetlands[4]

The study area falls within the C52K catchment, associated with the Modder River. Ephemeral pans occur as a belt in the region and many are salt pans. NFEPA recognises some of the larger pans on site; which have been allocated a ranking of 4, which is indicative of wetlands in a near natural condition.

Two ephemeral pans and one hillslope seep occur within Faraday PV A. In addition Palmietfontein Pan occurs to the south of Faraday PV A. No wetlands were identified within the Faraday PV B footprint area, however, this area is bound by an ephemeral pan to the west, referred to as Brakfontein Pan. The hillslope seep wetland that was delineated that links the three pans is likely to be linked to the watercourse to the north of the site. None of the pans associated with the proposed developments are in a pristine ecological state and Palmietfontein, Mooihoek north and Brakfontein Pan have been assigned a PES class of C – moderately modified. All large pans, as well as the hillslope seep, were allocated an EIS of C and the remaining wetlands were assigned a D.

No direct impacts are expected due to the construction and operation of Faraday PV B. The footprint area, however, should be slightly amended to avoid the buffer of Brakfontein Pan. Faraday PV A will result in a loss of wetlands and buffers and it is strongly recommended that the footprint area is amended to avoid wetlands and the buffer of 100 m for the smaller pans and 200 m for the larger pans (Brakfontein and Palmietfontein Pan). The proposed Solar PV development may infringe of the buffers of the pans, resulting in moderate negative impacts to their PES. It is important to maintain the pan catchment since these wetlands are inward draining systems. Avoiding the wetlands and proposed wetland buffers will result no to low impact significance (Figure 9.4). The risk of cumulative loss of ephemeral pans is moderate negative, but avoiding these features results in no impact (Figure 9.4).

	Aspect/ Impact pathway	Nature of potential impact/risk	Significance of impact/risk					
			None	Very Low	Low	Moderate	High	Very high
Wetlands	Clearing of vegetation for the solar facility	Loss of wetland buffers						
	Clearing of vegetation for electrical infrastructure	Loss of pan area, pan habitat and buffers		-				
	Vegetation clearing	Cumulative loss of ephemeral pans						

Figure 9.4: Wetland impact assessment summary. Bordered blocks represent impact significance after mitigation.

Key management actions and mitigation measures include, but are not limited to:

- Avoid pans and pan buffer areas; and
- In the event that any wetlands are impacted, the disturbed areas should be rehabilitated and revegetated immediately.

[4] Digby Wells Environmental, 2016 b

Faraday PV B is the preferred option from a wetlands perspective.

> ***"It is the specialist's opinion that the proposed development is authorised**, provided that mitigation measures are adhered to."* (Digby Wells, 2016 b)

9.1.5 Aquatic ecology[5]

Pan 1 was found to be largely natural, whilst Pans 3, 4 and 5 were found to be in moderately modified states. The majority of the impacts stem from livestock trampling within the catchment which is causing sedimentation and erosion along preferential flow paths within the pan catchments. The presence of alien vegetation may also be contributing to flow modification via increased water uptake from below the ground surface. Anthropogenic impacts were discovered in the catchment of the Pan 3 and Pan 4. These impacts included roads, fences and water abstraction.

From the impact assessment for the proposed project it is clear that the minor impacts that could result from the proposed project, if managed correctly could result in a positive improvement to the biodiversity of the aquatic ecosystems (Figure 9.4). Annual wet season monitoring has been prescribed to determine if any impacts from the proposed project are occurring and to prescribe mitigation actions should they be necessary.

	Aspect/ Impact pathway	Nature of potential impact/risk	Significance of impact/risk					
			None	Very Low	Low	Moderate	High	Very high
Aquatic Ecology	Internal access roads, vehicular activities on site and site preparation	Erosion and Sedimentation		+				
	Increased runoff from hardened surfaces and vehicular incursions into the pan	Erosion and Sedimentation		+				
	Increased threat for loosened topsoil and lack of anchorage	Erosion and Sedimentation		+				

Figure 9.5: Aquatic ecology impact assessment summary. Bordered blocks represent impact significance after mitigation.

Key management actions and mitigation measures include, but are not limited to:

- Maintenance of alien vegetation, keeping it out of the pan catchment;
- Maintenance of a storm water management system that prevents heavy rainfalls outside the pan catchment being diverted into the pan system;
- Implementation of a 200 m wide buffer around the pans within the project area;
- No vehicles, waste material or infrastructure to be placed in the catchment of the pans.

The aquatic ecology study has shown that, from an environmental perspective, that Faraday PV B is the preferred option, as it is able to avoid the identified hillslope seep area.

> "***If the recommended mitigation measures are applied the Faraday South (Faraday PV B) 100 MW project should be authorised**."* (Digby Wells, 2016 c)

9.1.6 Soils and Agricultural potential[6]

The proposed development is located on land zoned and used for agriculture. South Africa has very limited arable land and it is therefore critical to ensure that development does not lead to an inappropriate loss of potentially arable land. The proposed site is on land which is unsuitable for cultivation predominantly due to soil limitations, but also due to climate limitations. The low agricultural potential of the site limits the significance of agricultural impacts. The site is not considered to be land that has a high priority for preservation as agricultural land.

[5] Digby Wells Environmental, 2016 c
[6] Lanz, 0215.

Because of the low agricultural potential of the site, which makes it unsuitable for cultivation, the development should, from an agricultural impact perspective, be authorised. Authorisation is promoted by the fact that the site falls within a proposed renewable energy development zone, where such land use has been assessed as very suitable in terms of a number of factors, including agricultural impact. It is preferable to incur a loss of agricultural land in such a region, without cultivation potential, than to lose agricultural land that has a higher potential, to renewable energy development elsewhere in the country.

No agriculturally sensitive areas occur within the proposed site and no part of it is therefore required to be set aside from the development. Potential impacts during all phases are expected to be moderate to low and very low negative. Whilst additional land use income and increased security against stock theft and predation are considered positive spin-offs from developing the proposed 29 Solar Dealesville Development (Figure 9.6). The impact of cumulative loss to agricultural land on a regional scale is moderate negative (Figure 9.6).

	Aspect/ Impact pathway	Nature of potential impact/risk	Significance of impact/risk					
			None	Very Low	Low	Moderate	High	Very high
Soil and Agricultural Potential	Occupation of the land by the project infrastructure	Loss of agricultural land use		-				
	Change in land surface characteristics.	Erosion		-				
	Disturbance to soil profile.	Loss of topsoil		-				
	Construction dust generation	Degradation of veld vegetation		-				
	Project land rental	Additional land use income		+				
	Change in land surface characteristics.	Erosion		-				
	Fencing and securing of facility perimeter	Increased security against stock theft and predation		+				
	Change in land surface characteristics.	Erosion		-				
	Decommissioning activities that disturb the soil profile.	Loss of topsoil		-				
	Decommissioning dust generation	Degradation of veld vegetation		-				
	Occupation of the land by infrastructure of multiple developments	Cumulative loss of agricultural land		-				

Figure 9.6: Soil and agricultural potential impact assessment summary. Bordered blocks represent impact significance after mitigation.

Key management actions and mitigation measures include, but are not limited to:

- Implement a storm water system that effectively collects and safely disseminates any run-off water from all hardened surfaces and it must prevent any potential down slope erosion;
- When activities mechanically disturb the soil below surface in any way, available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation;
- Topsoil stockpiles must be conserved against losses through erosion by establishing vegetation cover on them;
- During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface; and
- Control dust generation during construction activities by implementing standard construction site dust control measures.

Faraday PV B is the preferred alternative from an agricultural impact point of view, because it has lower potential soils.

"Because of the low agricultural potential of the site, which makes it unsuitable for cultivation, the development should, from an agricultural impact perspective, be authorised." (Lanz, 2016)

9.1.7 Heritage[7]

The two options (A and B) for the proposed Faraday PV facility and its associated electrical infrastructure have been assessed and it has been found that, overall and with mitigation, the heritage impacts are not likely to be of very high significance and they are entirely manageable. There are three very important heritage sites (all graves) within the Faraday PV A footprint though. They are located close to one another in the south-eastern part of the site which should be avoided. A possible grave also occurs in Faraday PV A (and also in the electricity infrastructure corridor). The various graves and other significant heritage sites within the electricity infrastructure corridor corridor are expected to be avoided by the final layout because of the small surface footprint of transmission lines. Potential impacts to heritage resources during all phases are moderate to low and very low negative (Figure 9.7), with adherence to proposed avoidance, management and mitigation action. Cumulative impacts range from moderate to low and very low negative (Figure 9.7).

	Aspect/ Impact pathway	Nature of potential impact/risk	Significance of impact/risk					
			None	Very Low	Low	Moderate	High	Very high
Heritage	Clearing of site	Destruction of palaeontological resources		-				
	Clearing of site	Destruction of archaeological resources		-				
	Clearing of site	Destruction of graves		-				
	Clearing of site and construction of facility	Alteration of the cultural and natural landscape		-				
	Workers wondering off site	Damage to graves		-				
	Operation of facility	Alteration of the cultural and natural landscape		-				
	Staff wondering off site	Damage to graves		-				
	Removal of facility infrastructure	Alteration of the cultural and natural landscape		-				
	Workers wondering off site	Damage to graves		-				
	Cumulative site clearing	Destruction of palaeontological resources		-				
	Cumulative site clearing	Destruction of archaeological resources		-				
	Cumulative site clearing and construction	Alteration of the cultural and natural landscape		-				

Figure 9.7: Heritage impact assessment summary. Bordered blocks represent impact significance after mitigation.

Key management actions and mitigation measures include, but are not limited to:

- A palaeontologist should inspect the pre-construction geotechnical report to evaluate potential impacts to the Ecca Formation and the need for any further work;
- Avoid all identified heritage features by a buffer distance of 20 m;
- All activities must take place within the authorised construction footprint so as to minimise damage to nearby heritage resources.
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.
- Make use of neutral, earthy coloured paint on the built elements of the facility so as to reduce the degree of contrast in the landscape

There are no fatal flaws, but, from the heritage point of view, Faraday PV B is strongly preferred over Faraday PV B A.

***"It is recommended that the proposed Faraday PV B facility and the shared 29 Solar electricity infrastructure should be authorised**, subject to implementing recommended avoidance, management and mitigation actions."* (Orton, 2016)

[7] Orton, 2016.

9.1.8 Visual landscape character[8]

The landscape surrounding the proposed site has a rural agricultural character which has been transformed by extensive stock farming and large scale electrical infrastructure in the form of high voltage transmission lines and two large substations.

The visibility analysis indicates that the significance of the potential visual impacts will not be influenced by the exact location within the surveyed area of the 240 - 300 ha required for the facility. The analysis was conducted using maximum heights for structures in order to simulate a worst case scenario.

The impacts to sensitive visual receptors during all phases are expected to range from moderate to low and very low negative with the implementation of proposed mitigation measures, whilst cumulative impacts are expected to be low to very low negative (Figure 9.8)

	Aspect/ Impact pathway	Nature of potential impact/risk	Significance of impact/risk					
			None	Very Low	Low	Moderate	High	Very high
Visual	Visual intrusion of construction activities associated with PV facility	Loss of visual resources		-				
	Visual intrusion of construction activities associated with the electricity infrastructure	Loss of visual resources		-				
	Landscape impact of a large PV facility on a rural agricultural landscape	Change of landscape character		-				
	Landscape impact of the electricity infrastructure	Change of landscape character		-				
	Visual intrusion of operational PV facility	Change in existing views of sensitive visual receptors		-				
	Visual intrusion of opertaional the electricity infrastructure	Change in existing views of sensitive visual receptors		-				
	Impact of night lighting on the nightscape of the region	Light pollution in a dark nightscape.		-				
	Visual impact of decommissioning the PV facility	Impact on visual resources.		-				
	Visual impact of decommissioning the the electricity infrastructure	Impact on visual resources		-				
	Cumulative impact on the landscape of the region.	Change in landscape character		-				
	Cumulative impact on sensitive visual receptors.	Visual intrusion		-				

Figure 9.8: Visual impact assessment summary. Bordered blocks represent impact significance after mitigation.

Key management actions and mitigation measures include, but are not limited to:

- Preparation of the solar field area (i.e. clearance of vegetation, grading, contouring and compacting) and solar field construction should be phased in a way that makes practical sense in order to minimise the area of soil exposed and duration of exposure;
- Night time construction should be avoided;
- A lighting plan that documents the design, layout and technology used for lighting purposes should be prepared, indicating how nightscape impacts will be minimised;
- A maintenance plan for buildings and structures should be followed to ensure that structures remain as non-reflective as possible, and buildings remain as unobtrusive as possible.
- Appropriate coloured materials should be used for structures to blend in with the backdrop of the project where this is technically feasible and the colour or paint will not have a deleterious effect on the functionality of the structures;
- The project developer should maintain rehabilitated surfaces until a self-sustaining stand of vegetation is established and visually adapted to the undisturbed surrounding vegetation. No new disturbance should be created during operations without approval by the Environmental Officer;
- Restoration of disturbed land should commence as soon after disturbance as possible;
- Dust and noxious weed control should be part of maintenance activities;
- Road maintenance activities should avoid damaging or disturbing vegetation; and
- Where possible, the type of power line towers used for the proposed power line should be similar to existing power line towers in the landscape.

[8] Holland, 2016.

The difference between the two proposed alternative locations is very small in terms of potential visual impact. Faraday PV A will affect more residents on adjacent farms (although it should be taken into consideration that some of these farms are also proposed sites for solar energy projects similar to the Faraday PV project) than a plant at Faraday PV B. It will also impact more on motorists using the R64 (although visual intrusion will be low for these receptors). Faraday PV B will impact more on the game farm on Mierdam and particularly on viewpoints near the eastern boundary of the game farm. However, due to the existing electrical infrastructure in the landscape the visual intrusion on views of these visual receptors are all at most moderate. If a decision has to be made on visual criteria alone then Faraday PV B should be used for the PV Plant since:

- It is in a marginally more disturbed area under the existing transmission lines; and
- It is, in terms of cumulative visual impact, closer to the Kentani Solar Development projects, which means that the landscape disturbance will be contained over a smaller area.

*"If a decision has to be made on visual criteria alone then **Faraday PV B should be authorised**."* (Holland, 2016)

9.1.9 Socio-economics[9]

When considering the overall costs and benefits of the proposed project it was found that the benefits should be more prominent allowing for the achievement of a net benefit.

Benefits would be particularly prominent for the project applicants, land owners on the site, beneficiaries of local socio-economic development projects and in the achievement of national and regional energy policy goals. The project would also help to diversify the local economy and result in significant positive economic spin-offs primarily because of the expenditure injection and jobs associated with it.

Risks and negative impacts would primarily arise at a local scale and include risks associated with 'social ills' that may arise from an influx of workers and work-seekers along with risk to surrounding land owners. On the whole, these risks are considered manageable with adequate mitigation. Limited tourism facilities, the nature or surrounding land uses and visual impacts indicates that risks to tourism and property values would remain low overall with mitigation for Faraday PV (Figure 9.9).

If all of the individual PV projects go ahead along with other solar project approved or planned for the wider area, there would be a significant amplification of impacts. Positive impact associated with project expenditure and the funding of local socio-economic development initiatives would increase to a cumulative high significance. Cumulative social impacts associated with the influx of people and impacts on surrounding land owners should increase to a cumulative moderate significance given their intensity. Cumulative tourism and property value impacts should increase to a similar degree.

[9] Van Zyl, 2016.

	Aspect/ Impact pathway	Nature of potential impact/risk	Significance of impact/risk					
			None	Very Low	Low	Moderate	High	Very high
Socio-economics	Project expenditure	Expenditure related impacts on jobs etc.		+				
	Presence of facility and workers	Impacts on surrounding land owners		-				
	Visual and other impacts	Impacts on tourism		-				
	Visual and other impacts	Impact on surrounding property values		-				
	Socio-economic development contribution	Funding of socio-economic and enterprise development initiatives		+				
	Cumulative project expenditure	Expenditure related impacts on jobs etc.		+				
	Cumulative socio-economic development contribution	Funding of socio-economic and enterprise development initiatives		+				
	Cumulative influx of workers	Social impact associated with an influx of people		-				
	Cumulative presence of facility and workers	Impacts on surrounding land owners		-				
	Cumulative visual and other impacts	Impacts on tourism		-				
	Cumulative visual and other impacts	Impact on surrounding property values		-				

Figure 9.9: Socio-economic impact assessment summary. Bordered blocks represent impact significance after mitigation.

Key management actions and mitigation measures include, but are not limited to:

- Maximise positive impacts through tendering, procurement and employment policies.
- Set targets for use of local labour and maximise opportunities for the training of unskilled and skilled workers.
- Use local sub-contractors where possible
- Establish a Monitoring Forum for the project
- Implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase.
- Make necessary arrangements to enable workers from outside the area to return home over weekends and or on a regular basis during the construction phase. This would reduce the risk posed by non-local construction workers to local family structures and social networks.
- Closely monitor and manage the movement of workers on and off the site
- Implement measures to assist and, if needed, fairly compensate potentially affected surrounding landowners whereby damages to farm property, stock theft or significant disruptions to farming activities can be minimized or reduced
- Draw up a fire management plan prior to construction in agreement with neighbouring land owners.
- Close liaison with local municipal and other stakeholders involved in socio-economic development in order to ensure that any projects are integrated into wider strategies and plans with regard to socio-economic development.
- Monitor potential impacts on surrounding roperty values with the assistance of an independent valuer. If it is independently confirmed that value reductions have taken place and they cannot be mitigated, then this information can be used as a basis for negotiation and/or mediation between the applicant and neighbouring land owners focused on compensation.

For Faraday PV B risks are likely to be higher driven by their location closer to the game farm part of Mierdam, therefore, from a potential negative socio-economic impacts, Faraday PV A would be preferable.

"I, Dr Hugo van Zyl, am of the opinion that **the proposed Faraday PV and supporting electrical infrastructure could be authorised** on the basis of the socio-economic impacts assessed." (Van Zyl, 2016)

9.2 Authorisations, permits and licences

Table 9.1: Authorisation, permits and licences required for the 29 Solar Dealesville Development.

Legislation	Issuing authority	Permit requirement
NEMA (Act 107 of 1998) and EIA Regulations published under Chapter 5 of the NEMA on 04 December 204.	National DEA	• Environmental Authorisation • *This EIAr has been has been compiled in support of an application for EA to provide the DEA with the information required in order to make an informed decision on the EA application.*
National Environmental Management Biodiversity Act (NEMBA) (Act 10 of 2004), TOPS Regulations (Threatened or Protected Species Regulations)	Free State DESTEA	• The need for a TOPS permit and a permit to disturb protected species. • *The applicability and need for these permits depend on threatened/protected species present on site. This should be determined and confirmed by a terrestrial ecologist following the pre-construction walk-down of the site.*
National Heritage Resources Act (NHRA) (Act 25 of 1999)	SAHRA and Free State Heritage Authority	• The NHRA does not require the developer to obtain permits prior to construction. However, any archaeological or palaeontological mitigation work (e.g. test excavations, sampling) that may be required would need to be conducted under a permit issued to, and in the name of, the appointed archaeologist or palaeontologist. • This EIAr has been submitted to SAHRA. • *The applicability and need for any authorisation and/or permits will be identified and confirmed during SAHRA's review of this EIAr, and also by a heritage specialist during the pre-construction walk-down of the site.*
National Forests Act (Act 84 of 1998)	DAFF	• No protected tree species were recorded in the area, • *The applicability and need for these permits depend on threatened/protected species present on site. This should be determined and confirmed by a terrestrial ecologist following the pre-construction walk-down of the site.*
Subdivision of Agricultural Land Act (Act 70 of 1970)	DAFF	• Subdivision of Agricultural Land (SALA) approval is required for long term lease of land zoned for agriculture. • *The process of acquiring SALA consent will be executed by the Project Developer independently of this EIA process.*
National Water Act (Act No. 36 of 1998)	DWS	• Activities will take place within 500 m of a wetland boundary and would therefore require a Water Use License (WUL) under the Section 21 c & i the National Water Act, 1998 (Act No. 36 of 1998). In addition, should groundwater be abstracted via boreholes, Section 21 a & b will also be applicable to the project. • *A WUL is required for this project. The application*

Legislation	Issuing authority	Permit requirement
		process for acquiring a WUL will be executed by the Project Developer independently of this EIA process.
Civil Aviation Act (Act 13 of 2009) and Civil Aviation Regulations (CAR) of 1997 Civil Aviation Authority Act (Act 40 of 1998)	Civil Aviation Authority (CAA)	• Approval from the CAA is required. • *The process of acquiring CAA consent will be executed by the Project Developer independently of this EIA process.*

9.3 Need and desirability

South Africa is facing serious electricity shortages. Linked to this, the proposed projects aim to supply additional electricity to the national grid. Furthermore, the urgent need to reduce greenhouse gas emissions and the importance of a secure and diversified energy supply has resulted in a global shift towards, and an increased focus on, the use of renewable energy technologies. In South Africa, national government has encouraged the utilisation of renewable energy through national policy and strategic planning. The objective is to expand electricity generation capacity in South Africa and promote the practice of sustainable development. The key elements describing the need and desirability of the 29 Solar Dealesville Development are summarised in Figure 9.10.

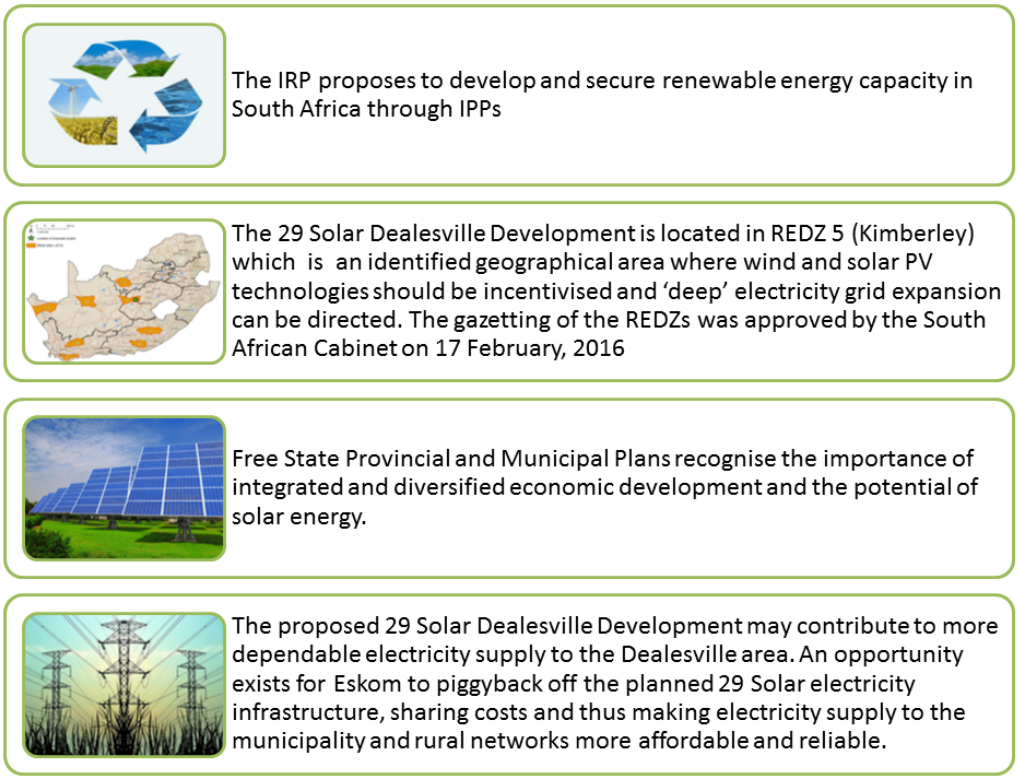

Figure 9.10: Need and desirability for the 29 Solar Dealesville Development.

9.4 Project specifications

The components that for part of Faraday PV, as part of the 29 Solar Dealesville Development, and their maximum specification are presented in Table 9.2.

Table 9.2: Summary of project components and their maximum specifications.

Component	Specification
PV FACILITY	
Capacity	100 MW
PV area	Footprint area: 240 - 300 ha; Height: 5 m
Number of inverters required	112
Buildings	Footprint area: 1 100 m^2 Height: 4 m
Laydown area	Footprint area: 40 000 m^2 = 4 ha;
Roads	Width: 3 - 5 m
Fencing	Electrified security fencing Height: 3 m
Water use (construction)	Volume: 16 700 m3 per year (duration of construction)
Water use (operation)	Volume: 4 672 m^3 per year
Waste water/sewage (construction)	Portable contained toilets will be on site and provided and serviced by a licensed contractor
Waste water/sewage (operation)	Volume: 183 m^3 per year
Solid waste (construction)	Weight: 300 t per year (duration of construction)
Solid waste (operation)	Weight: 36 t per year
ELECTRICITY INFRASTRUCTURE	
132/22/33 kV collector substations (x2)	Footprint area: 120 m x 120 m = 14 400 m^2 = 1.44 ha; Height: 21 m
275/132 kV MTS	Footprint area: 200 m x 300 m = 60 000 m^2 = 6 ha; Height: 25 m
132 kV transmission lines	Height: 35 m
275 kV transmission lines	Height: 35 m

9.5 Legislative context

Table 9.3: Activities listed in the 2014 NEMA EIA Regulations that are triggered by the proposed solar PV facility and shared electricity infrastructure.

EA 1: FARADAY PV SOLAR ENERGY FACILITY	EA 2: 29 SOLAR ELECTRICITY INFRASTRUCTURE
Activities:	
GN R983, Activity 28 (ii): Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.	
GN R984, Activity 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, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area.	
	GN R984, Activity 9: The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex.
GN R984, Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation.	
GN R985, Activity 12 (i): The clearance of an area of 300 square metres or more of indigenous vegetation in Free State 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.	

9.6 Environmental considerations

Potential risks and impacts associated with the 29 Solar Dealesville Development has an overall moderate to low negative significance, whilst positive impacts stem from the potential diversification of land use income, and heightened security against stock theft and predation. Implementation of proposed avoidance, management, mitigation and monitoring actions, as prescribed in Volume B: EMPr, are key to reducing anticipated impacts associated with the development to overall low to very low negative.

The following environmental buffers/setbacks have been proposed by specialists, and were included in the development footprint planning (see Section 9.7).

- 100 m from wetlands/pans;
- 200 m from the large Palmietfontein pan and associated hillslope seep area;
- 20 m from identified heritage features;
- Sensitive agricultural resources (cultivated fields); and
- 500 m from occupied buildings.

The avoidance of sensitive the above sensitive features minimise to potential impact of the proposed 29 Solar Dealesville Development.

9.7 Final development layout

Two location alternatives were proposed Faraday PV. The preferred alternative, based on specialist findings is Faraday PV B (Table 9.4).

Table 9.4: Preferred location for Faraday PV based on the findings and recommendations from specialist studies.

	Preferred alternative	
	Faraday PV A	Faraday PV B
Geohydrology		✓
Fauna & Flora		✓
Avifauna		✓
Wetlands		✓
Aquatic ecology		✓
Soils and agriculture		✓
Heritage		✓
Visual		✓
Socio-economics	✓	

Even though the socio-economic study found Faraday PV A to be preferable, Faraday PV B is able to avoid most environmental sensitivities, whilst socio-economic benefits from the development outweigh potential negative impacts. Therefore, Faraday PV is proposed on farms Doornhoek 37 (SG Code: F00400000000003700000), Brakfontein 2/636 (SG Code: F00400000000063600002) and Brakfontein 2/636 (SG Code: F00400000000063600003).

Figure 9.11 indicates the final development footprint for Faraday PV with proposed technical layout. Figure 9.12 indicates the shared electricity infrastructure. Relevant corner coordinates for footprints and infrastructure are provided in Table 9.5.

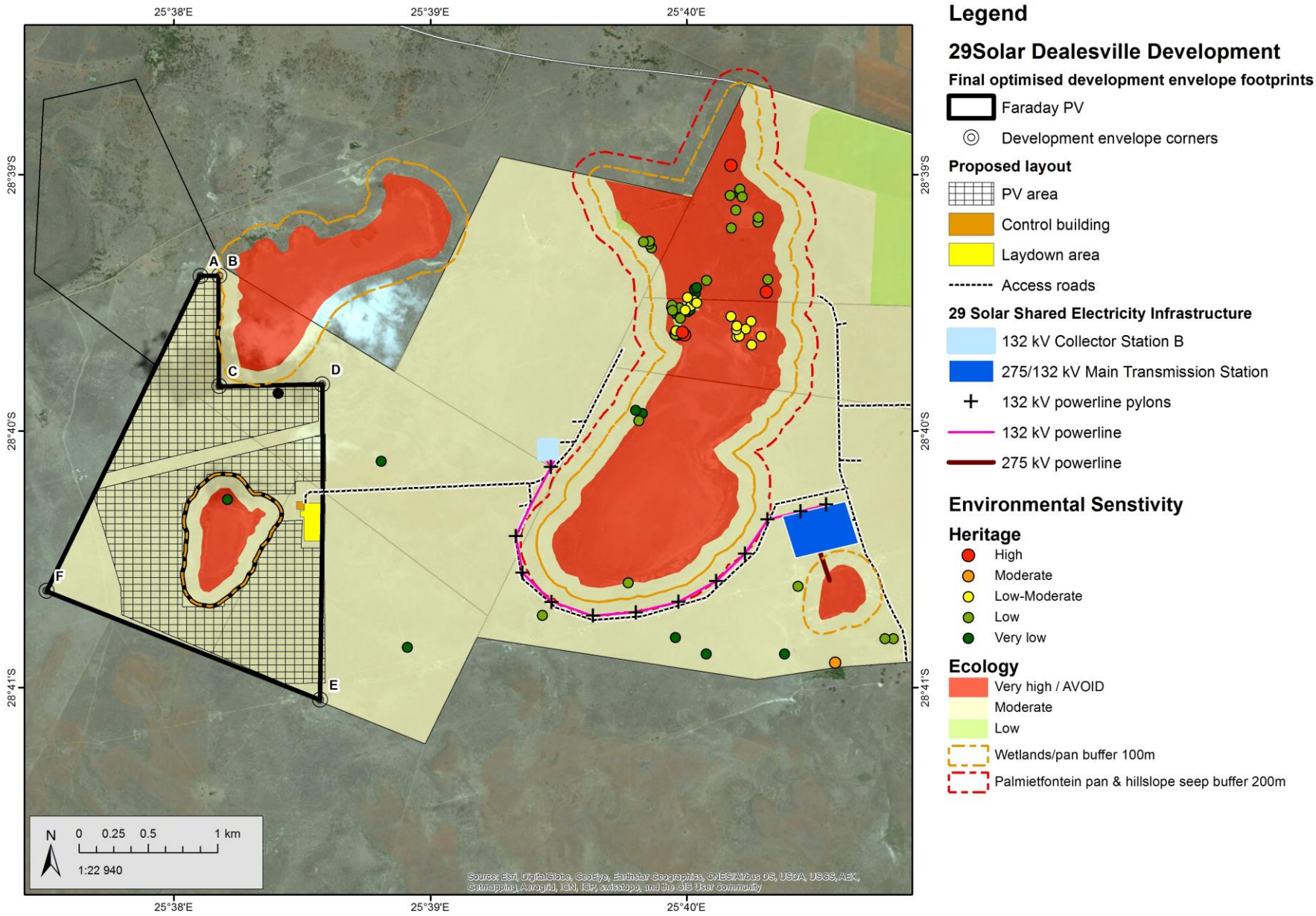

Figure 9.11: Environmental sensitivity map indicating Faraday PV development envelope with proposed technical layout, which avoids all environmental sensitivities.

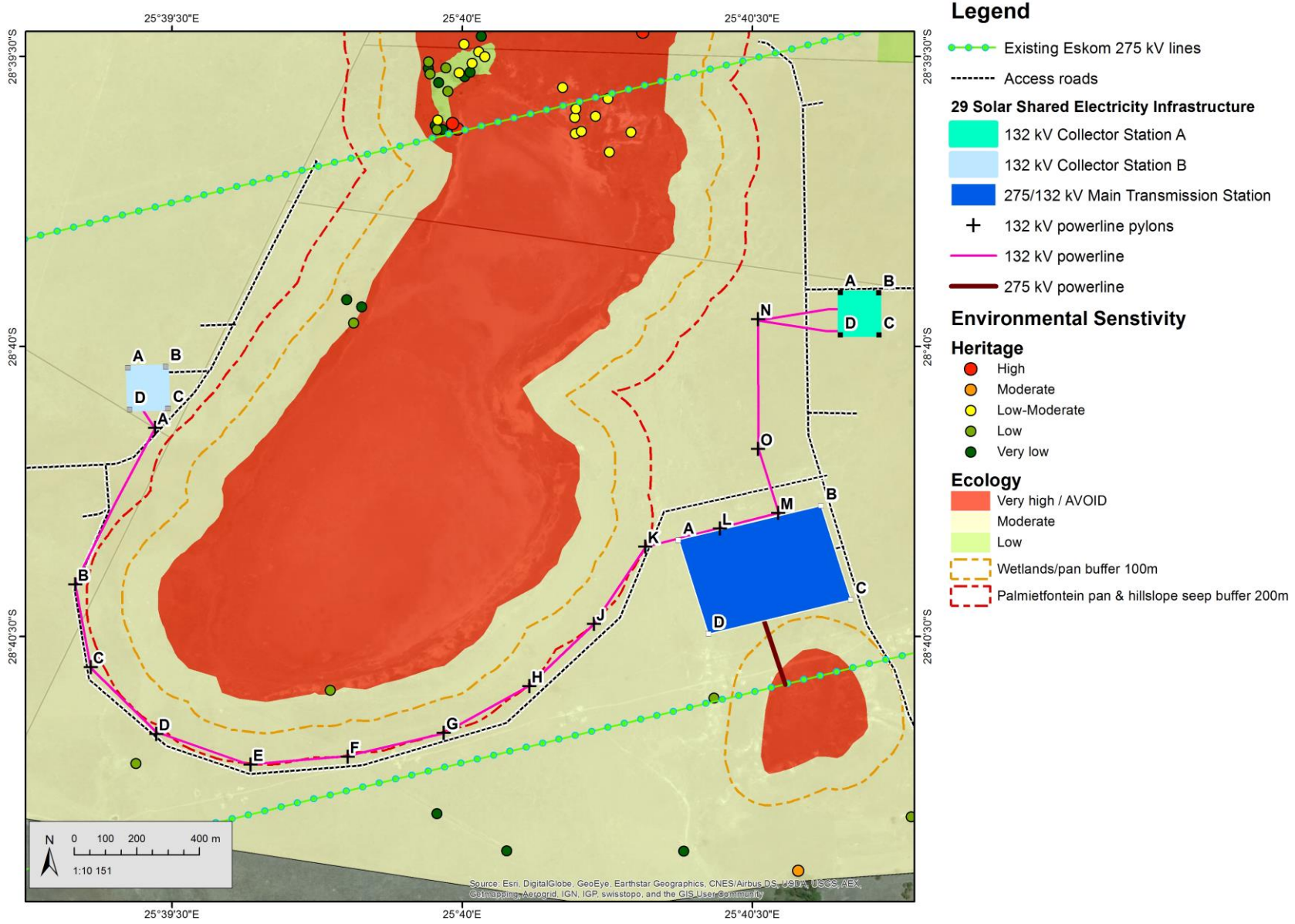

Figure 9.12: Environmental sensitivity map indicating the proposed collector substations, MTS, and 132 kV powerline. Pylons are outside the 200 m environmental setback for the Palmietfontein pan.

Table 9.5: Corner point coordinates for the i) Faraday PV development envelope footprint; ii) 132 kV powerline pylons; iii) collector substation A; iv) collector substation B; and v) the Main Transmission Station.

i)Faraday PV	Lat	Long	ii)132 kV line pylons	Lat	Long
A	28°39'23.81"S	25°38'6.17"E	**A**	28°40'8.44"S	25°39'28.27"E
B	28°39'23.71"S	25°38'10.55"E	**B**	28°40'24.65"S	25°39'20.01"E
C	28°39'49.55"S	25°38'10.56"E	**C**	28°40'33.18"S	25°39'21.60"E
D	28°39'49.13"S	25°38'34.66"E	**D**	28°40'40.10"S	25°39'28.39"E
E	28°41'2.89"S	25°38'34.14"E	**E**	28°40'43.26"S	25°39'38.13"E
F	28°40'37.46"S	25°37'30.12"E	**F**	28°40'42.48"S	25°39'48.17"E
			G	28°40'39.99"S	25°39'58.12"E
			H	28°40'35.16"S	25°40'6.96"E
			J	28°40'28.73"S	25°40'13.65"E
			K	28°40'20.74"S	25°40'18.96"E
			L	28°40'18.84"S	25°40'26.67"E
			M	28°40'17.25"S	25°40'32.69"E
			N	28°39'57.21"S	25°40'30.60"E
			O	28°40'10.61"S	25°40'30.62"E
iii)Collector A	**Lat**	**Long**	**iv)Collector B**	**Lat**	**Long**
A	28°39'54.44"S	25°40'39.09"E	**A**	28°40'2.22"S	25°39'25.43"E
B	28°39'54.47"S	25°40'43.07"E	**B**	28°40'2.11"S	25°39'29.32"E
C	28°39'58.81"S	25°40'43.10"E	**C**	28°40'6.42"S	25°39'29.58"E
D	28°39'58.81"S	25°40'39.09"E	**D**	28°40'6.53"S	25°39'25.61"E
v)MTS	**Lat**	**Long**			
A	28°40'20.05"S	25°40'22.36"E			
B	28°40'16.49"S	25°40'37.12"E			
C	28°40'26.21"S	25°40'40.19"E			
D	28°40'29.74"S	25°40'25.49"E			

9.8 Reasoned opinion of the EAP

The project proponent (29 Solar) has indicated their commitment to environmental responsibility by adhering to specialist recommendations of environmental buffers in planning the development footprints. Based on the findings of independent specialists and final development plans, **it is the reasoned opinion of the EAPs, Ms. Luanita van der Walt and Ms. Surina Laurie, that the proposed Faraday PV facility and the shared 29 Solar electricity infrastructure be granted environmental authorisation** in terms of the 2014 EIA Regulations.

Furthermore, the EAP, on behalf of 29 Solar, requests for Section 25 (2) of the 2014 EIA Regulations to be enacted by the Competent Authority by the means of issuing EAs for the solar PV aspects, components and activities associated with each of the five projects of the 29 Solar Dealesville Development (EA 1 – EA 5) and a single separate EA for the electricity infrastructure aspects, components and activities (EA 6).