



## Water Use License Application Freshwater Report

For the construction of a solar power plant on a portion of Erf 327, Malmesbury

A requirement in terms of Section 21 (c ) and 21(i) of the National Water Act 36 of 1998  
as well as the National Environmental Management Act 107 of 1998

October 2023  
Revised January 2024



## Executive Summary

The Swartland Municipality in the Western Cape Province is planning a 20MW solar energy plant on Erf 327 to the southwest of the town of Malmesbury. The electricity generated will be fed into the local grid to reduce the effect of the current failures of the national electricity supply and concomitant load shedding.

The Diep River and a drainage line borders onto the proposed site of the solar energy plant. This triggers Section 21(c) and Section 21 (i) of the National Water Act.

It is legally imperative that an application for a water use license be logged on the online eWULLAAS system. For this a Freshwater Report must be compiled and uploaded along with a completed Risk Matrix.

Dr Dirk van Driel of WATSAN Africa in Knysna was appointed to prepare the documentation and lodge the application.

The Diep River and its drainage lines are already impacted, with many major impacts from agriculture, urban and industrial development and roads, bridges and railway lines. The Diep River already lost much of its ecological functioning. The proposed solar energy plant, its construction and operation, is not expected to materially add to these impacts.

A premeditated set of assessments have been done focussed on the ecological state of the Diep River, its catchment and the drainage line as well as the environmental impacts that the solar energy plant would bring.

The solar energy plant and associated high voltage power line, its construction and operation, its pylons and overhead cables, are essentially low-impact activities. It is not expected that the installation would measurably add to the already existing impacts.

It is therefore concluded that a General Authorisation is the correct level of approval. A license is not called for.

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## 1 Introduction

According to a report produced by NJ de Kock of the company CK Rumboll and Partners, the motivation and scope of the proposed project is as follows:

*CK Rumboll and Partners were appointed by Madelaine Terblanche, on behalf of Swartland Municipality the owners of Erf 327, Malmesbury, to prepare a land use application to obtain the necessary land use rights for the establishment of a solar photovoltaic facility. The ongoing deterioration of Eskom's power generation infrastructure continues to plague the nation with frequent and disruptive load shedding episodes. This persistent issue has imposed a daily burden on citizens at varying intensities. Concurrently, the nation grapples with annual electricity tariff hikes that surpass the inflation rate by more than double. This financial strain extends to municipalities, compelling them to consider raising their electricity tariffs to cope with escalating costs.*

*While it is acknowledged that solar energy alone cannot completely eradicate the spectre of load shedding within local municipalities, it presents a unique opportunity to collaborate with Eskom in bolstering the grid's resilience. By introducing supplementary energy sources, municipalities stand to gain several advantages. Foremost, it lessens their dependence on Eskom, thereby reducing vulnerability to load shedding. Moreover, it holds the potential to drive down the average bulk purchase price of electricity, alleviating fiscal pressures on both the municipality and its residents.*

*In addition, the Integrated Resource Plan (IRP 2010) which was promulgated in May 2011, a target of 17 800 MW of renewable energy is aimed to be achieved by 2030 in respect of the electricity generation mix.*

*Application is therefore made to obtain the land use rights, in order to establish a ±20MW solar photovoltaic facility on a portion (±135ha) of Erf 327, Malmesbury.*

*Swartland Municipality is in the process to obtain the land use rights but will not operate the facility themselves. The portion of land will be leased to a future developer. Application is made for the entire ±135ha site, but once all the relevant studies have been concluded, only about ±60ha of land use be utilised for the renewable energy facility.*

Subsequently, Enviro Africa of Somerset West was appointed to carry out the environmental impact assessment in terms of the National Environmental Management Act. The EIA includes a public participation process. The posters (Figure 1) and advertisements in relevant newspapers have been prepared and published.

The proposed solar power plant is adjacent to drainage lines and to the Diep River. This triggers Section 21(c) and Section 21 (i) of the NWA. A Water Use License is

therefore required. To prepare the required documents and obtain the necessary authorisations, Dr Dirk van Driel of WATSAN Africa in Knysna was appointed.

The WULA requires a Freshwater Report. The report must be compiled according to a set format and contents, with prescribed methodologies.

The Freshwater Report must be submitted along with a Risk Matrix.

After the completion of the Freshwater Report, the project must be registered on the online eWULAAS facility. This facility dictates the procedures and the steps that must be followed leading to the licensing of the project and its components. This report must include aspects that are required for the EIA process and its scoping report, as well as for the EMPr.

The WULA public participation process (Figure 1) runs along with that for the EIA, on the same posters and advertisements.

A site visit was conducted on 27 July 2023.

**NEMA PUBLIC PARTICIPATION PROCESS**

**THE PROPOSED SOLAR PV FACILITY ON PORTION OF ERF 327, MALMESBURY, WESTERN CAPE  
(KLIPKOPPIE SOLAR)**

Notice is hereby given of the intention to submit a NEMA application, and the public participation process, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended ("NEMA"), Environmental Impact Assessment Regulations 2014, as well as a Water Use License Application in terms of the National Water Act (Act 36 of 1998) (NWA) for the proposed Solar PV facility and associated infrastructure. The proposed solar PV development includes activities listed in terms of the NEMA EIA Regulations 2014.

EnviroAfrica cc has been appointed by the Swartland Municipality to undertake a NEMA application process for Environmental Authorisation for the proposed solar PV facility.

**Application for environmental authorization to undertake the following listed activities\* in terms of NEMA EIA Regulations 2014:**

- Government Notice R327 (Listing Notice 1): Activity No. 1, 11, 12, 19, 24, 27, 28.]
- Government Notice R327 (Listing Notice 2): Activity No. 1, 15
- Government Notice R324 (Listing Notice 3): Activity No. 4, 12, 14

**Application in terms of NWA: Sections 21 (c) and (i):**

\*Please note that the listed activities above may change during the course of the NEMA Application process. Registered I&APs will be notified of any changes.

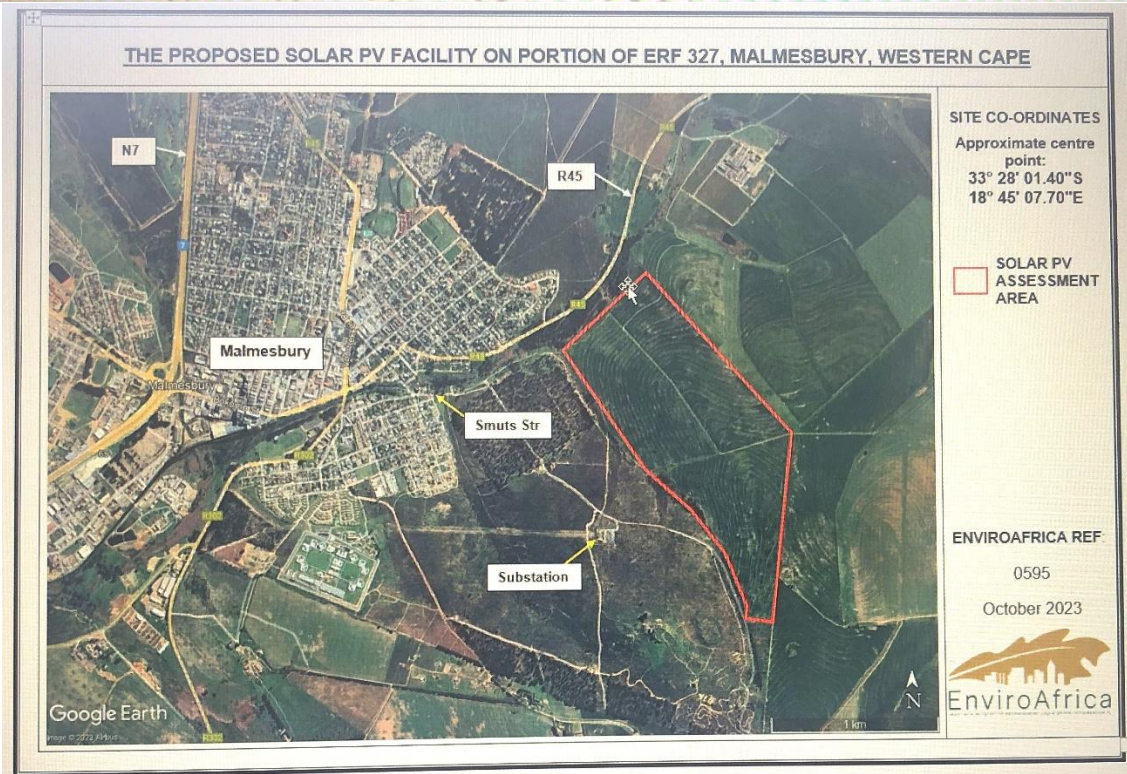
**Project Description & Location:** It is proposed that a solar photovoltaic (PV) facility including associated infrastructure be developed on Portion of Erf 327, Malmesbury. This will be connected to the substation located to the south-western portion of the development, on Erf 2445. The proposed solar PV facility will have a total generating capacity of approximately 20MW and cover an area of approximately 60ha. An area of approximately 135ha will be assessed.

The proposed site is located just outside of Malmesbury, approximately 1km east of the town centre. The site located on the south-eastern side of the R45 and is accessed from Smuts Street along a gravel road. Site co-ordinates (estimated central point): 33° 28' 01.40" S, 18° 45' 07.70" E.

**Public Participation:** Interested and Affected Parties (I&APs) are hereby notified of the applications and invited to register (in writing) and/or provide initial comments and identify any issues, concerns or opportunities relating to either, or all of, the projects to the contact details provided below, on or before **13 November 2023** in terms of the environmental aspects (NEMA Application) and on or before **15 December 2023** for water related issues (NWA application). In order to register or submit comment, I&APs should refer to the project name/s, and provide their name, address & contact details (indicating your preferred method of notification) and an indication of any direct business, financial, personal, or other interest which they have in the application. You are also requested to pass this information to any person you feel should be notified.

Please note that only Registered I&APs will be notified of the availability of reports and other written submissions made (or to be made) to the Department by the applicant, and be entitled to comment on these reports and submissions; will be notified of the outcome of the application, the reasons for the decision, and that an appeal may be lodged against a decision; and will be notified of the applicant's intention to appeal the decision, and where and for what period the appeal submission will be available for inspection.

**Consultant:** EnviroAfrica CC, P.O. Box 5367, Helderberg, 7135 / Fax: 08 6 512 0154 / Tel: 021 8511616 / E-mail: [clinton@enviroafrica.co.za](mailto:clinton@enviroafrica.co.za)



**Figure 1 Public Participation**

## 2 Locality



**Figure 2** Malmesbury Location

Malmesbury's location is indicated in Figure 2. The proposed solar energy plant is planned on a location to the southeast of Malmesbury. Its coordinates are as follows:

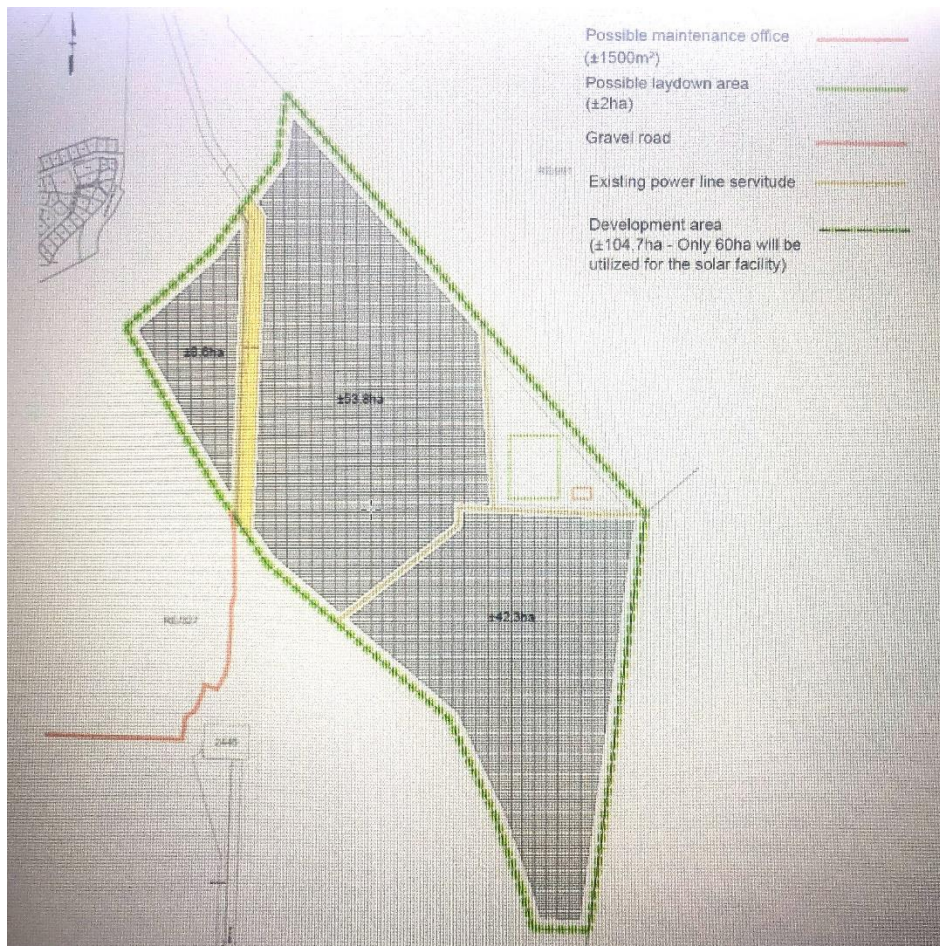
33°28'08.94" S and 18°45'12.72"E.



### 3 Quaternary Catchment

The new power line is to be constructed in the G21C quaternary catchment

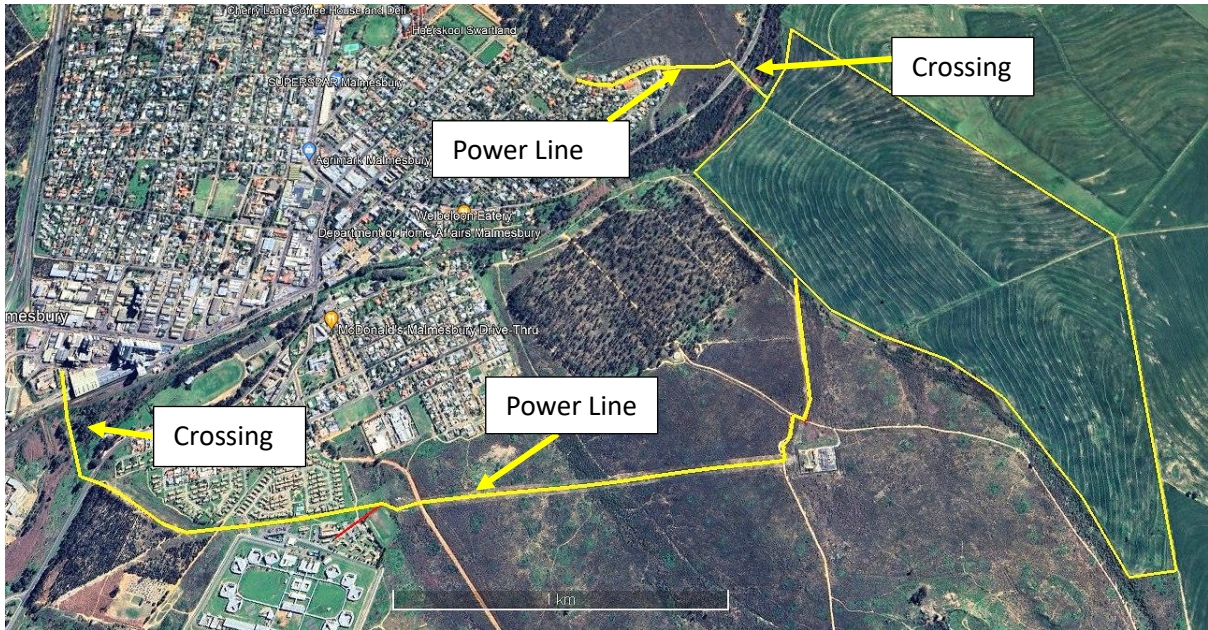
### 4 The Project



**Figure 3** Solar panels array outlay (CK Ruboll).

Initially, only 60ha of the available land will initially be covered with solar panels. The lay-out (Figure 3) illustrates a full coverage of the available land, should development proceed to that extend.

The power line will cross a drainage line. It would probably connect to an exiting electric sub-station adjacent to the site.



**Figure 4 Power Lines**

The need for two more high voltage power lines was added during January 2024. The proposed power lines are depicted in Figure 4. These power lines will cross the Diep River at two places.

The power lines will be suspended on existing pylons. No work will need to be done in the river or its riparian zone.

If the engineers decide that the space on the existing pylons do not allow for fixing the new power lines, new pylons will have to be constructed. These will be far outside the river's riparian zone. Again, no impacts on the river is foreseen.

Because there would be no new impacts on the river, the crossing of these two power lines will not be discussed any further in this document.

## 5 Legal Framework

The proposed development “triggers” sections of the National Water Act. These are the following:

### S21 (c) *Impeding or diverting the flow of a water course*

The proposed rock quarry is adjacent to natural drainage lines that are identified in the NWA and its regulations as legitimate water resources. The drainage lines could possibly be altered, should the development go ahead.

### S21 (i) *Altering the bed, bank, course of characteristics of a water course.*

The proposed pipeline may alter the characteristics of the drainage lines.

Government Notice 267 of 24 March 2017

Government Notice 1180 of 2002. *Risk Matrix.*

The Risk Matrix as published on the DWS official webpage must be completed and submitted along with the Water Use Licence Application (WULA). The outcome of this risk assessment determines if a letter of consent, a General Authorization or a License is required.

Government Notice 509 of 26 August 2016

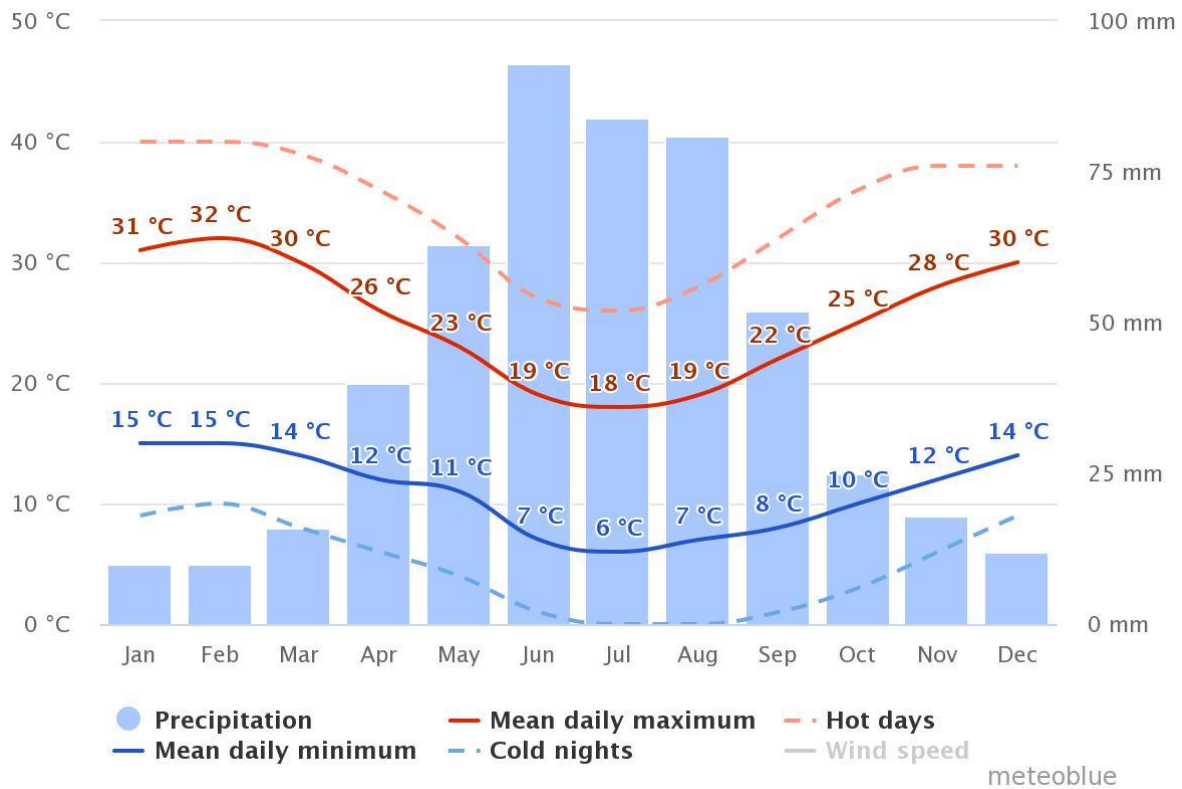
An extensive set of regulations that apply to any development in a water course is listed in this government notice in terms of Section 24 of the NWA. No development take place within the 1:100 year-flood line without the consent of the DWS. If the 1:100-year flood line flood line is not known, no development may take place within a 100m from a water course without the consent of the DWS. Likewise, no development may take place within 500m of a wetland without the consent of the DWS.

National Environmental Management Act (107of 1998)

NEMA and regulations promulgated in terms of NEMA determines that no development without the consent and permission of the DEA and its regional agencies, in this case the DENC of the Northern Cape Provincial Government, may take place within 32m of a water course. The mostly dry drainage lines are perceived to be legitimate water courses.

## 6 Malmesbury Climate

[https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/malmesbury\\_south-africa\\_3364346](https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/malmesbury_south-africa_3364346)



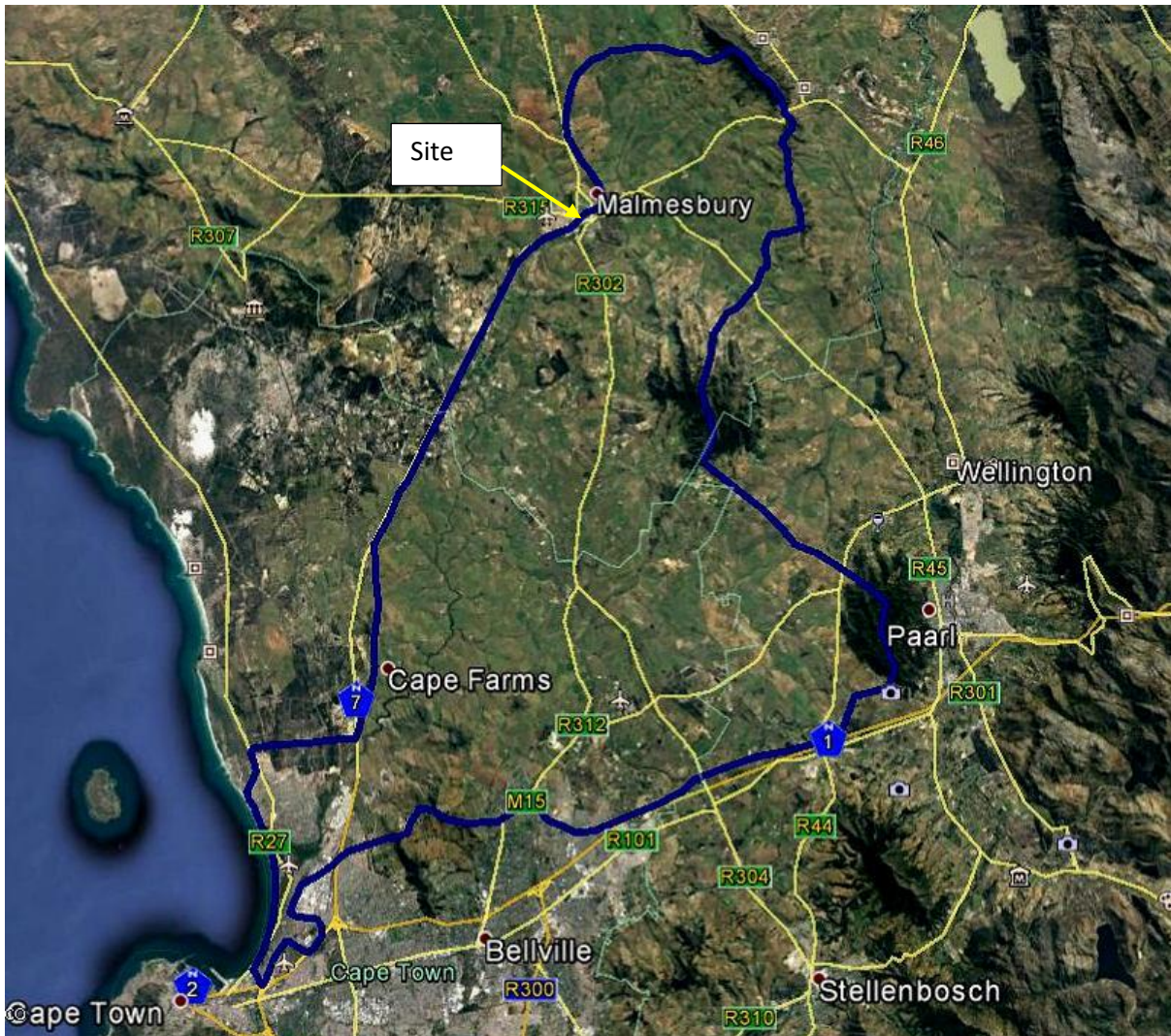
**Figure 5 Malmesbury Climate**

Malmesbury's climate is shown in Figure 5. Malmesbury is in South Africa's winter rainfall area. Rain is mostly orographic and rainfall events are often soft and spread out over a number of days. The summers are hot and dry with desiccating winds. This is a Mediterranean climate.

The average annual rainfall demands to only 437mm. This is a low rainfall, leading to arid conditions.

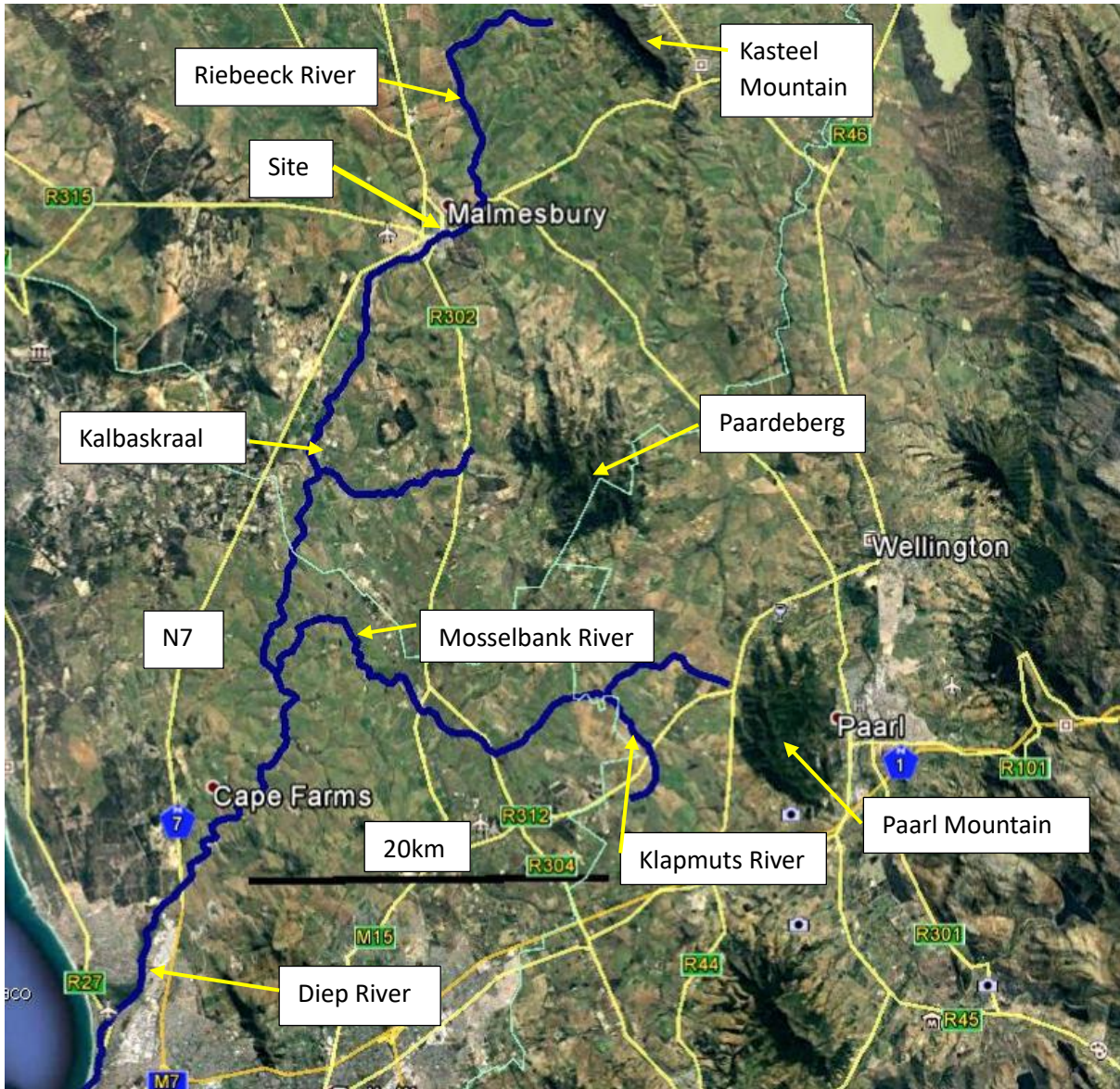
<https://www.weather-atlas.com/en/south-africa/malmesbury-climate>

## 7 Regional Setting



**Figure 6** Diep River Catchment

The catchment area is depicted in Figure 6. The Diep River and its tributaries is shown in Figure 7.



**Figure 7 Regional Setting**

The Diep River rises on a ridge some 900m high to the northeast of Malmesbury known as the Kasteel Mountain. From there it runs for approximately 70 km, as the crow flies, to the southwest to open in the Atlantic Ocean at Milnerton in the north of Cape Town.

To be more precise, from the Kasteel Mountain the river is known as the Riebeeck River to where it joins the Diep River at Malmesbury.

The main tributary of the Diep River is the Mosselbank River that rises in the east of the catchment on the high ground of the Paarlberg Mountain. This tributary drains a

large part of Durbanville and Kraaifontein, which are the northern suburban areas of Cape Town.

The catchment is situated on the coastal lowlands of the Western Cape, with a surface area of 1495km<sup>2</sup>. The landscape is rather flat, with undulating sandy hills and a couple of isolated mountains such as the Kasteel Mountain, Paardeberg and the Paarlberg. These mountains are along the eastern boundary of the catchment.

The naturalised runoff amounts to 50 million m<sup>3</sup>. Most of the farm dams are located in the Mosselbank River sub-catchment. There are more farms in the upper Kasteel River against the slopes of the Kasteel Mountain. The runoff after development has been reduced to 45 million m<sup>3</sup>.

The mountains and high ridges receive a high rainfall, according to some sources of up to 1200mm. The coastal lowlands receive 400mm and even less. The Diep River is characterized by a pulse of flow during the wet winter months. The orographic rain arrives as cold fronts that pass over the Western Cape.

The evaporation rate amounts to 1600mm per year.

During the hot summer months of up to 40 degrees centigrade with its desiccating winds the river dries up, with only stagnant pools (Figure 8). The main driver of the river is the seasonal rain on the mountain peaks.



**Figure 8** Stagnant Pool

## 8 State of the Catchment

Most of the catchment originally was Swartland Shale Renosterveld, with Swartland Alluvium Renosterveld along the water courses. There are patches of Swartland Granite Renosterveld in the northern parts of the catchment. Up the mountains Hawequas Sandstone Fynbos still prevails. A more detailed description of the vegetation can be found on the SANBI webpage (<http://bgisviewer.sanbi.org>).

The entire catchment has been heavily impacted. Most of it has been ploughed over for an extensive dry land wheat farming industry. Against the slopes and higher ground an extensive wine farming industry was established in a previous millennium and has grown to be an important part of the local economy. Less than 5% of the original Renosterveld has survived the onslaught.

A large number of small to medium sized farm dams support the large-scale farming operation in the catchment. Most of these are against the slopes and in the valleys of the mountains. On the lowlands much water is abstracted from the aquifers for irrigations with centre pivot systems.

The treated effluent from the Kraaifontein, Malmesbury and Milnerton (Potsdam) impacts on the water quality of the Diep River.

There are a number of feedlots and dairy farms in the catchment that can impact on the water quality of the Diep River.





**Figure 8** Eucalyptus trees in the Diep River

The available water in the Diep River and its tributaries are further compromised by the vast stand of mature eucalypt trees (Figure 9) along most of the river's length. These trees evapotranspire large volumes of ground water into the atmosphere.

The closest biomonitoring sampling point to the proposed high voltage powerline in the Diep River for the State of the River Report (2003) was at Kalbaskraal. The river here was assigned a "fair" status, apart from the riparian zone that was "poor". According to the report a "fair" status was the desired status at the time.

**DFFE Screening Tool**

**Table 1** DFFE Screening Tool Results

Theme	Sensitivity
Animal species	High
Avian species	Not mentioned
Aquatic biodiversity	Very High
Plant species	High
Terrestrial biodiversity	Very High

**Animal species**

The animal species theme’s sensitivity is indicated as very high probably because of the possible presence of endangered raptors such as the secretary bird and the black harrier. These birds can occur here, even though a ploughed-over wheatfield may not be their preferred habitat. These birds have a wide distribution area with much habitat left. A wheatfield turned into a solar energy plant won’t make much difference to their survival.

The dung beetle *Pachysoma easculapius* was observed in the district several times over. It probably occurs on the site as well, even though it is not preferred habitat.

*The Yellow-winged Agile Grasshopper (Aneuryphymus montanus) is endemic to the Cape region of South Africa. Its area of occupancy (AOO) is between 100 and 1,000 km² and there is a continuing decline in the quality of habitat, from which a continuing decline in the number of mature individuals is inferred. The number of locations (based upon the threat of invasions of non-native plant species) is between six and ten. Therefore, the species is assessed as Vulnerable.*

<http://speciesstatus.sanbi.org/assessment/last-assessment/4408/>

Theoretically, this insect can occur on the site, but it seems unlikely. It probably prefers natural habitat above a wheatfield.

## **Aquatic biodiversity**

The Diep River is listed as a CBA. It seems as if the drainage line along the site is not listed.

The aquatic biodiversity theme is listed as Very High, probably because of the Diep River's status as a CBA. The river is highly impacted and degraded. The significance of the proposed impact combined with the conservation value of the river is low. Therefore, the Very High sensitivity is disputed, as is provided for in the screening tool procedures. At the site of the proposed development, the aquatic sensitivity can only be listed as Low. Clarification is provided in what follows in this report.

## **Plant Species**

The screening tool produced a long list of medium-sensitivity plants. Many of these are unnamed numbered species of which the names may not be published. Not many of these would have survived a long history of high-intensity farming. Some may still be present on the verges of the wheatfields.

## **Terrestrial biodiversity**

The land is listed as a terrestrial CBA, an ESA and part of the National Protected Area Expansion Strategy.

The vegetation is listed as endangered Swartland Granite Renosterveld. Nothing is left of the original vegetation on the site as it has been wholly transformed into wheatfields. Commercial agriculture has been going on for many generations of farmers, probably over the past 2 or 3 millennia. Perhaps some remnants are still present along the verges of the field.

## **10 The Site**

The proposed solar energy plant is planned on a wheatfield on a rounded hill (Figure 10).

The slopes of the hill are steep, with the highest point at the southern tip of the site (Figure 11) at 243masl. The distance from the southern tip to the Diep River at 117masl, following the western boundary of the site, is 2377m. This translates into a mean slope of 5.4 vertical metres over every 100 horizontal metres. This is steep and can give rise to a high erosion potential during high rainfall events. The sides of the

hill from the middle crest to the eastern as well as the western boundaries are equally steep.

The site was manicured into a workable wheatfield with the typical contours common in the region to direct stormwater during winter rains and to combat erosion. These contours are clearly visible on the Google Earth image.

The site is demarcated in the north by the Diep River. The river here is entirely overgrown by a mature stand of blue gum trees, with little if any room for other vegetation in the riparian zone (Figure 12). Across the river are Malmesbury's streets and dwellings (Figure 13). The river is flanked by a dirt road. There are small-scale sand winning operations along the northern bank of the river.

The drainage line that forms the eastern boundary of the site is overgrown with exotic vegetation such as Port Jackson willow and blue gum trees. This is a dominant feature of the landscape up the hill (Figure 14).

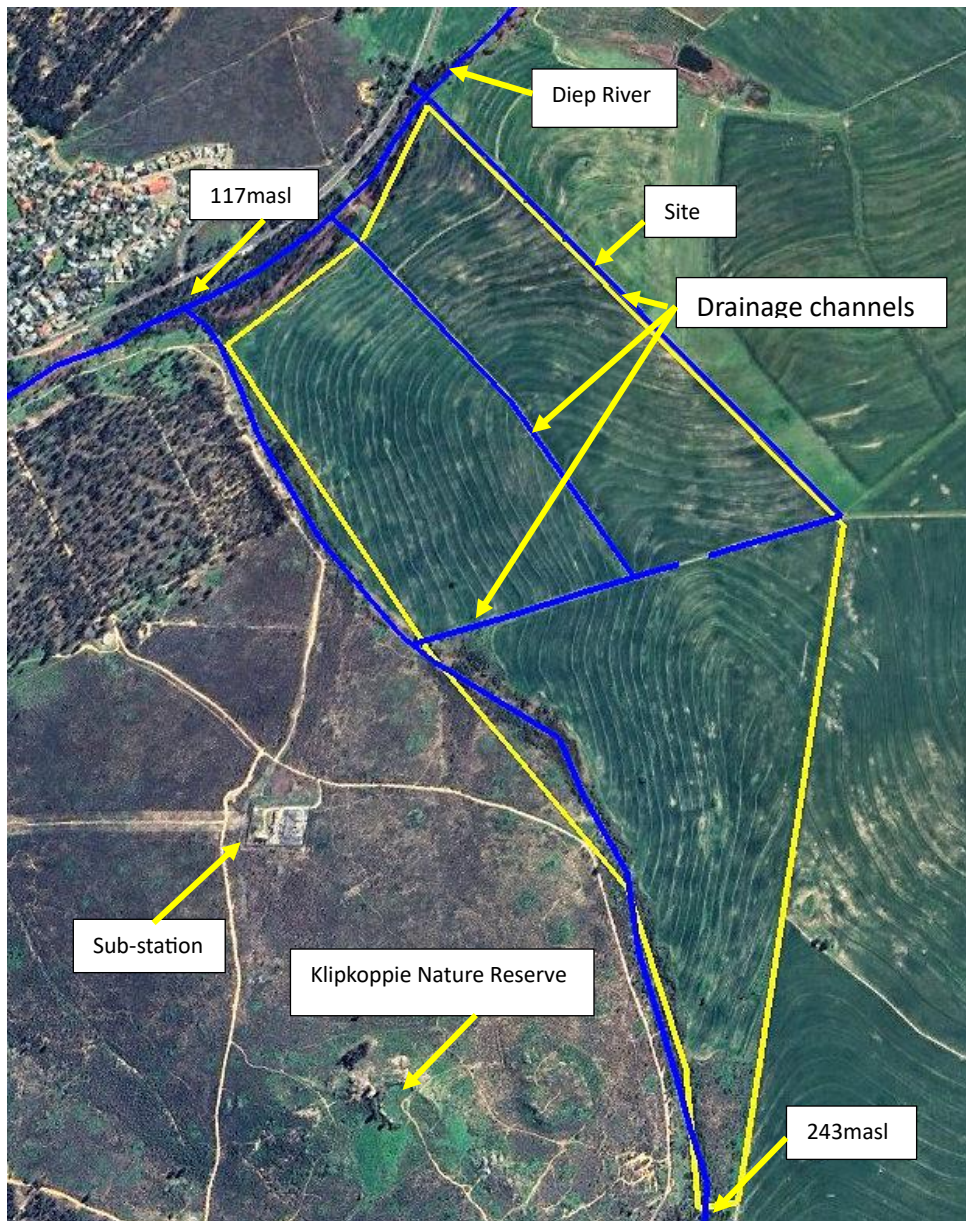
The straight drainage channel down the middle of the wheatfield is clearly visible on Figure 10. Drainage channels transverse the site as well along the eastern boundary (Figure 11).

Across the drainage line on the western boundary is a eucalypt plantation (Figure 13). This is a prominent feature driving into Malmesbury from the east along the trunk road.

The high voltage power line from the solar energy plant to the sub-station (Figure 11 and 15) must cross the drainage line. This sub-station is in the Klipkoppie Nature Reserve (Figure 11). This nature reserve is crisscrossed by several dirt roads which form preferential flow paths for stormwater, with the concomitant impact on the drainage line and the Diep River.



**Figure 10** Wheatfield



**Figure 11** The site



**Figure 12** Diep River riparian zone



**Figure 13** Klipkoppie and plantation



**Figure 14** Drainage line



**Figure 15** Sub-station

## 11 Present Ecological Status (PES)

**Table 2** Habitat Integrity according to Kleynhans, 1999

Category	Description	% of maximum score
A	Unmodified, natural	90 – 100
B	Largely natural with few modifications. A small change in natural habitats and biota, but the ecosystem function is unchanged.	80 – 89
C	Moderately modified. A loss and change of the natural habitat and biota, but the ecosystem function is predominantly unchanged.	60 – 79
D	Largely modified. A significant loss of natural habitat, biota and ecosystem function.	40 – 59
E	Extensive modified with loss of habitat, biota and ecosystem function	20 – 39
F	Critically modified with almost complete loss of habitat, biota and ecosystem function. In worse cases ecosystem function has been destroyed and changes are irreversible	0 - 19

The PES and EIS are protocols that have been produced by Dr Neels Kleynhans in 1999 of the then DWAF to assess river reaches. The scores (Table 2) given are solely that of the practitioner and are based on expert opinion. The practitioner has had many years of experience of the Diep River, from the start of the National River Health Program and when the State of the River Reports were produced.

At the time of the site visit on 27 July 2023, the Diep River flowed strongly because of the abundant winter rains sustained over the last 2 months. This was an exceptionally wet year.

The Diep River comes down in force during the winter rains. A great volume of water washes out to sea. As summer sets in, the water dries up, with no flow and with stagnant pools. The impact of the many farm dams and evapotranspiration is taken into consideration, which substantially shortens the hydroperiod.



**Table 3** Present Ecological State of the Diep River.

<b>Instream</b>	<b>score</b>	<b>weight</b>	<b>Product</b>
Water Abstraction	15	14	210
Flow modification	15	13	195
Bed modification	20	13	260
Channel modification	20	13	260
Water quality	12	14	168
Inundation	15	10	150
Exotic macrophytes	12	9	108
Exotic fauna	8	8	64
Solid waste disposal	20	6	120
max score		100	1445
% of total			57.8
<b>Class</b>			<b>D</b>
<b>Riperian Zone</b>			
Water abstraction	15	13	195
Inundation	15	11	165
Flow modification	20	12	240
Water quality	12	13	156
Indigenous vegetation removal	1	13	26
Exotic vegetation encroachment	1	12	12
Bank erosion	15	14	210
Channel modification	15	12	180
		100	1184
% of total			47.4
<b>Class</b>			<b>D</b>

The river is hugely taken over by exotic carp *Cyprinus carpio*. In some place the indigenous minnow *Galaxias zebratus* still persists and one can be lucky to find the Cape kurper *Sandelia capensis*.

**Table 4** Present Ecological State of the drainage line.

<b>Instream</b>	<b>score</b>	<b>weight</b>	<b>Product</b>
Water Abstraction	24	14	336
Flow modification	10	13	130
Bed modification	10	13	130
Channel modification	15	13	195
Water quality	17	14	238
Inundation	10	10	100
Exotic macrophytes	2	9	18
Exotic fauna	19	8	152
Solid waste disposal	22	6	132
max score		100	1431
% of total			57.2
Class			<b>D</b>
<b>Riparian Zone</b>			
Water abstraction	24	13	312
Inundation	9	11	99
Flow modification	9	12	108
Water quality	17	13	221
Indigenous vegetation removal	4	13	52
Exotic vegetation encroachment	2	12	24
Bank erosion	18	14	252
Channel modification	9	12	108
		100	1176
% of total			47.0
Class			<b>D</b>

Both the Diep River and the drainage line adjacent to the proposed site are heavily impacted, with a significant loss of ecosystem functioning. The drainage line is clogged with Port Jacson willow and in places with blue gum trees. Some short reaches are still fairly intact, but most of the drainage line is entirely altered.

As far as can be established, the local authority has no plans on the table to remove invasive vegetation from the river and the drainage line. It would be to the advantage of sound water resource management and ecological functioning if the newly established solar energy company would take upon itself to control exotic vegetation.

## 12 Ecological Importance

The Ecological Importance (EI) is based on the presence of especially fish species that are endangered on a local, regional or national level (Table 5).

**Table 5** Ecological Importance according to endangered organisms (Kleynhans, 1999).

Category	Description
1	One species or taxon are endangered on a local scale
2	More than one species or taxon are rare or endangered on a local scale
3	More than one species or taxon are rare or endangered on a provincial or regional scale
4	One or more species or taxa are rare or endangered on a national scale (Red Data)

The two indigenous fish species *Sandelia capensis* and *Galaxias zebratus* were encountered in deep pools at the lower reach of the river but not anywhere near Malmesbury. *Galaxias* has distinct generic strains in rivers of the Southern Cape. If the Diep River strain were to be lost, it would represent a loss of genetic material.

The drainage line completely dry up during summer with no permanent water and therefore no fish.

Taken these aspects into consideration and given the general compromised ecological state of the river, the Diep River at Malmesbury cannot be considered as ecologically important.

The presence of fish cannot be the only yardstick for measuring ecological importance. All the large rivers on the Cape's coastal flats as well as in the country are ecologically important. Because of its downtrodden state, the Diep River at most can be considered as ecologically less important than other rivers in a better state.

### **13 Ecological Sensitivity**

Ecological Sensitivity (ES) is often described as the ability of aquatic habitat to assimilate impacts. It is not sensitive if it remains the same despite of the onslaught of impacts. Put differently, sensitive habitat changes substantially, even under the pressure of slight impacts.

The Ecological Sensitivity also refers to the potential of aquatic habitat to bounce back to an ecological condition closer to the situation prior to human impact. If it recovers, it is not regarded as sensitive.

If the human impacts were to be removed, all of it, will the Diep River bounce back to some status closer to the original unimpacted state? It probably would, as river do. This is not about to happen. As long as human habitation persists, the impacts will increase. Consequently, the state of the river will continue to deteriorate. The river will not bounce back. From this point of view, the Diep River and its drainage lines can be considered as ecologically sensitive, as all rivers are.

## 14 EISC

The EISC has been devised by Dr Neels Kleynhans of the then Department of Water and Forestry and is a number that must appear in the Risk Matrix. The EISC sheds light on the ecological worth of a site, as do some of the other indices.

**Table 6 EISC**

Determinant	Diep River	Drainage line
Rare and endangered species	2	1
Populations of unique species	2	1
Species / Taxon richness	2	2
Diversity of habitat	2	2
Migration Route/ Breeding and feeding site for wetland species.	4	2
Sensitivity to water quality changes	3	3
Flood storage, energy dissipation, particulate / element removal	4	2
Protection status	2	1
Ecological integrity	1	1
Average	2.4	1.7
Score	Moderate	Low

Score guideline:  
 Very High 4, High 3, Moderate 2, Low 1, None 0  
 Confidence Rating  
 Very High 4, High 3, Moderate 2, Low 1

## 15 Possible Impacts and Mitigating Measures

Dickens *et al* (2003) lists a number of possible impacts on wetlands. This outline can be used for the proposed high voltage line and the Diep River as well. The possible listed impacts are discussed as follows:

### Flow modification

The pylons must be at least 32m away from the riverbanks, preferably further away. The NWA buffer zone is 100m on either side of a river or outside of the 1 in 100-year flood line. This placement is quite possible, as pylons can be wide apart. If not, steel pylons and their concrete anchors, because of the low-impact nature of the construction are unlikely to measurably alter a large flow, as the riverbanks overflow during a large flood. The pylons must be constructed out of the danger area, if possible at all.

### Permanent inundation

The pylons and overhead cables are not going to have any effect on the inundation regime of the Diep River at all.

### Water quality modification

The pylons and overhead cables are not going to have any effect on the water quality regime of the Diep River at all. During the construction phase, remnants of concrete and rubble may end up in the river, but not if proper mitigating measures are being taken. Concrete must be mixed off site and trucked in, as is common practice at such sites.

### Sediment load modification

There is a possibility of sand and mud washing into the river during the construction phase. Soil will be disturbed that can end up in the river along with stormwater during rainfall events. If the pylons are placed away far enough from the river, the likelihood of this happening is remote.

The access road to the construction sites must be limited, as mud can wash into the river from these roads. No more roads must be constructed than necessary. If not used any more following construction, the roads must be rehabilitated.

The sites where the pylons are constructed must be levelled, landscaped and rehabilitated as soon as construction is completed. Loose sand must be compacted and grassed over.

### Canalization

The access roads create preferential flow paths. Access roads must be demolished and rehabilitated following construction, if not used any longer. During construction, stormwater management infrastructures such as berms and trenches may be necessary to divert stormwater from the roads.

### Topographic alteration

The proposed high voltage power line is not about to alter the topography of the landscape in any way.

### Terrestrial encroachment

The proposed power line will not add to any further encroachment into the riparian zone. The growth of Port Jackson and rooikrans invasive trees must be controlled over the longer term, as these are a major threat to the district's natural environment.

### Indigenous vegetation removal

There is little if any indigenous vegetation left on the Swartland's wheatfields and along the rivers and streams. The proposed power line will not lead to any more destruction of the natural vegetation.

### Alien fauna

At present the original wild ungulates are replaced with cattle. The proposed power line would not change the status.

## Over-utilization

The riverbanks are used for grazing. Human traffic on foot adds to the trampling of the riverbanks and surrounds. This situation would not change as a result of the proposed power line. Once construction is completed, it would be difficult to keep people and farm animals away from the riverbanks at the construction areas.

## Ground water table

The proposed high voltage power line, its construction and its operation will not have any effect on the groundwater table.

## Waste

At the moment waste and rubble is being dumped in and around the river. This is an ongoing municipal problem.

During the construction phase portable toilets will be serviced by a reputable company and wastewater will be discharged in the municipal wastewater treatment works. Waste will be collected in with the usual municipal system and it will be disposed of on the municipal waste disposal site at standard rates.

## Stormwater Management Plan

Apart from best management practices, a stormwater management plan during construction is not called for.

## **16 Impact Assessment**

Some of the authorities, such as the DFFE and its provincial offices prescribe an impact assessment according to a premeditated methodology.

The main benefit of this exercise is that it allows for the evaluation of mitigation measures. Later follows a Risk Assessment. This is different from the Impact Assessment as it does not attempt to weigh the success of mitigation measures.

The methodology is set out in the Appendix.

The impact assessment follows the stages in the life cycle of a project. These stages include planning, construction, operation, decommissioning and rehabilitation.



**Table 7 Impact Assessment**

<p><b>Description of impact: Construction Phase Solar Energy Plant</b></p> <p>Digging foundations for the solar panels          Casting concrete for the foundations          Mounting the solar panels          Connecting electric cables and swithgear          Cleanup, landscaping, gardening</p> <p><b>Main Impacts</b></p> <p>Soil washing into the river along with storm water.</p> <p><b>Mitigation measures</b></p> <p>Compile an environmental management program.          Appoint an ECO to implement program.          Keep mud and sand out of the river during construction.          Rehabilitate access roads.          Limit the footprint.          Rehabilitate and landscape as construction proceeds.</p>								
Type Nature	Spatial Extent	Severity	Duration	Significance	Probability	Confidence	Reversibility	Irreplaceability
Without mitigation								
Direct	Local	Low	Temporary	Medium	Probably	Certain	Reversible	Replaceable
With mitigation measures								
Negative	Local	Low	Temporary	Low	Unlikely	Possible	Reversible	Replaceable

**Description of impact: Construction Phase High Voltage Power Line**

Construction of access roads  
 Digging foundations for the pylons  
 Casting concrete for the pylon foundations  
 Putting together the steel structure  
 Positioning the high voltage cables.  
 Hoisting the cables onto the pylons.  
 Cleanup, landscaping, gardening

**Main Impacts**

Soil washing into the river along with storm water.

**Mitigation measures**

Compile an environmental management program.  
 Appoint an ECO to implement program.  
 Keep mud and sand out of the river during construction.  
 Rehabilitate access roads.  
 Limit the footprint.  
 Rehabilitate and landscape as construction proceeds.

Type Nature	Spatial Extent	Severity	Duration	Significance	Probability	Confidence	Reversibility	Irreplaceability
Without mitigation								
Direct	Local	Low	Temporary	Medium	Probably	Certain	Reversible	Replaceable
With mitigation measures								
Negative	Local	Low	Temporary	Low	Unlikely	Possible	Reversible	Replaceable

<b>Description of impact: Operational Phase</b>								
Clean solar panels Replace damage solar panels. Repair damaged pylons Replace overhead cables if necessary.								
<b>Main Impacts</b>								
Rubble in the drainage line and the river								
<b>Mitigation measures</b>								
Keep building rubble and wastewater out of the drainage line and the out of the river.								
Type Nature	Spatial Extent	Severity	Duration	Significance	Probability	Confidence	Reversibility	Irreplaceability
Without mitigation								
Direct	Local	Low	Temporary	Medium	Probably	Certain	Reversible	Replaceable
With mitigation measures								
Negative	Local	Low	Temporary	Low	Unlikely	Possible	Reversible	Replaceable

The construction and the maintenance of the proposed solar energy plant and the high voltage cable are low-impact actions, with no activity going on in the riverbed or on its riparian zone. If kept far enough out of the river, the impacts would be negligible.

Best management practices, an awareness that the river must be kept intact, is all that is required to keep the impacts at bay. Construction companies in this field have standing operating procedures, which are scrutinised for contract purposes. This ought to be adequate to protect the river.

The environmental risks are very low, negligible. This is because the construction and operation of the solar power plant and the electric power line are inherently low risk activities. The aquatic habitat at Malmesbury is already impacted. The proposed solar energy plant and the high voltage power line can hardly add more impacts than the ones already present.

The Risk Matrix indicates that a General Authorisation is the correct level of authorisation. A License is not called for.

## 17 Risk Matrix

**Table 8 Risk Matrix**

No.	Activity	Aspect	Impact	Significance	Risk Rating
1	<p><b>Construction of the solar energy plant</b></p> <p>Digging foundations for the solar panels Casting concrete for the foundations Mounting the solar panels Connecting electric cables and switchgear Cleanup, landscaping, gardening</p>	Mobilisation of soil	Soil washing into the river along with stormwater. Destruction of aquatic habitat	24	Low
2	<p><b>Construction of the high voltage power line</b></p> <p>Construction of access roads Digging foundations for the pylons Casting concrete for the pylon foundations Putting together the steel structure Positioning the high voltage cables. Hoisting the cables onto the pylons. Cleanup, landscaping, gardening</p>	Mobilisation of soil	Alteration of aquatic habitat	24	Low
3	<p><b>Operational phase</b></p> <p>Cleansing of solar panels Repair damaged pylons Replace overhead cables if necessary.</p>	Building rubble in the river Wash water in river	Alteration of aquatic habitat Pollution of the river	12	Low

**Table 8 Continued Risk Matrix**

No	Flow	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Consequence
1	1	1	1	1	1	1	1	3
2	1	1	1	1	1	1	1	3
3	1	2	1	1	1.25	1	3	5.25

No	Frequency of activity	Frequency of impact	Legal issues	Detection	Likelihood	Significance	Risk Rating
1	1	1	5	1	8	24	Low
2	1	1	5	1	8	24	Low
3	3	3	1	1	8	42	Low

The assessment was carried out according to the interactive Excel table that is available on the DWS webpage. Table 8 is a replica of the Excel spreadsheet that has been adapted to fit the format of this report. The numbers in Table 8 (continued) represent the same activities as in Table 8.

The risk assessment is a requirement of Government Notice 1180 of 2002 in terms of the National Water Act (36 of 1998).

The methodology is set out in the Appendix.

The environmental risks are very low, negligible. This is because the construction and operation of the solar power plant and the electric power line are inherently low risk activities. The aquatic habitat at Malmesbury is already impacted. The proposed solar energy plant and the high voltage power line can hardly add more impacts than the ones already present.

The Risk Matrix indicates that a General Authorisation is the correct level of authorisation. A License is not called for.

## 18 Numerical Significance

Decision-makers often press on a numerical score for Significance. The score takes into consideration both the environmental value of the site and the degree of impact.

Table 25.3, p54, Appendix provides a system for allocation values for each of the parameters Conservation Value, Extent, Duration, Severity and Likelihood about possible impacts. These values are then entered into the equation on p55 to derive at a value for Significance. The value for Significance can subsequently be evaluated according to Table 25.3.2.

Table 25.3.2 provides a yardstick for decision-making to allow or disallow a development with its concomitant impact on the environment.

The scores that were given are entirely those of the specialist (Table 9), based on his or her knowledge and experience. These scores form a bases for debate and consensus, should contemporaries and decision-makers wish to add to the process.

The scores apply under the assumption that mitigation measures will be in place.

This assessment shows that the potential impacts are insignificant.

**Table 9** Significance Score

Parameter	Score
Conservation value	2
Likelihood	2
Duration	5
Extent	1
Severity	1
Significance	18
	Low

## 19 Resource Economics

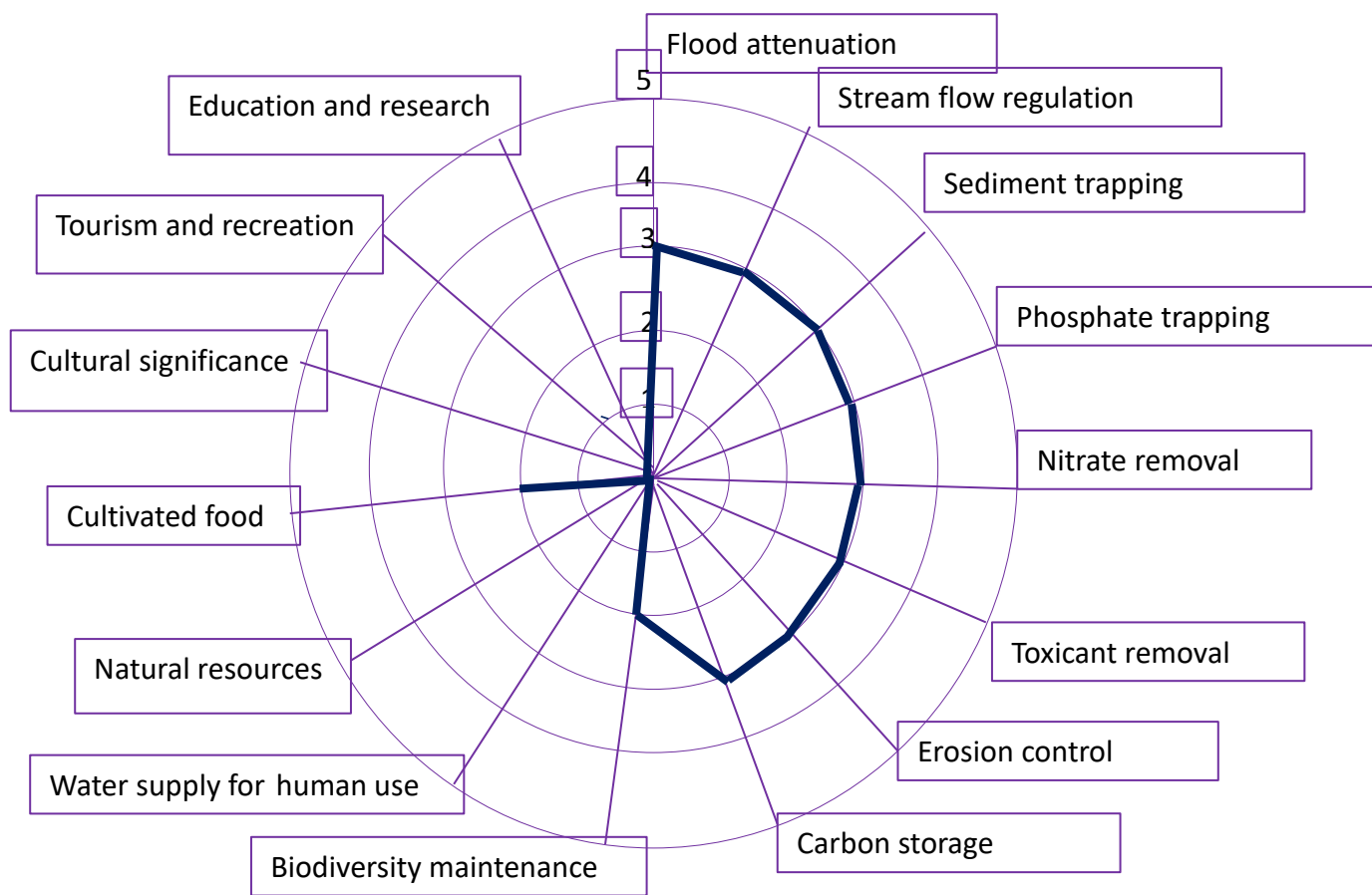
The goods and services delivered by the environment is a Resource Economics concept as adapted by Kotze *et al* (2009). The methodology was designed for the assessments of wetlands, but in the case of these environments, the goods and services delivered are particularly applicable, hence it was decided to include it in the report.

The diagram (Figure 16) is an accepted manner to visually illustrate the resource economic footprint the drainage lines, from the data in Table 10. A diagram for the Berg River is not shown, as it is a complete circle, a very large resource economics footprint, as are all large rivers in the country.

**Table 10.** Goods and Services

Goods & Services	Diep River	Drainage line
Flood attenuation.	5	3
Stream flow regulation	5	3
Sediment trapping	5	3
Phosphate trapping	5	3
Nitrate removal.	5	3
Toxicant removal	5	3
Erosion control	5	3
Carbon storage	5	3
Biodiversity maintenance	5	2
Water supply for human use	5	0
Natural resources	5	0
Cultivated food	5	2
Cultural significance	5	0
Tourism and recreation	5	0
Education and research	5	0

0	Low
5	High



**Figure 16.** Resource Economics Footprint of the drainage lines

A large resource economics footprint resulting in a large star shape would probably attract the attention of the decision makers. The resource economics footprint of the drainage line is very small, with the left-hand side depressed.

The proposed high voltage power line is not about to change any of this. Neither is planned the installation about it about to detract from the Diep River's footprint.



**Table 11** Summary of evaluations

Aspect	Status
DFFE Screening Tool	Sensitivity High and Very High
Conservation status	CBA, ESA and Conservation Expansion Priority Area
Vegetation	Endangered.
PES of the Diep River	Largely impacted, loss of ecosystem functioning
PES of the drainage lines	Largely impacted, loss of ecosystem functioning
Ecological Importance Diep River	Important
Ecological Importance of the drainage lines	Not important
Ecological Sensitivity Diep River	Sensitive
Ecological Sensitivity of the drainage lines	Sensitive
EISC of the Diep River	High
EISC of the drainage line	Low
Impact Assessment	Mitigating measures implementable
Risk Matrix	General Authorisation
Significance	Not significant
Resource Economics Diep River	Very large footprint
Resource Economics drainage lines	Small footprint

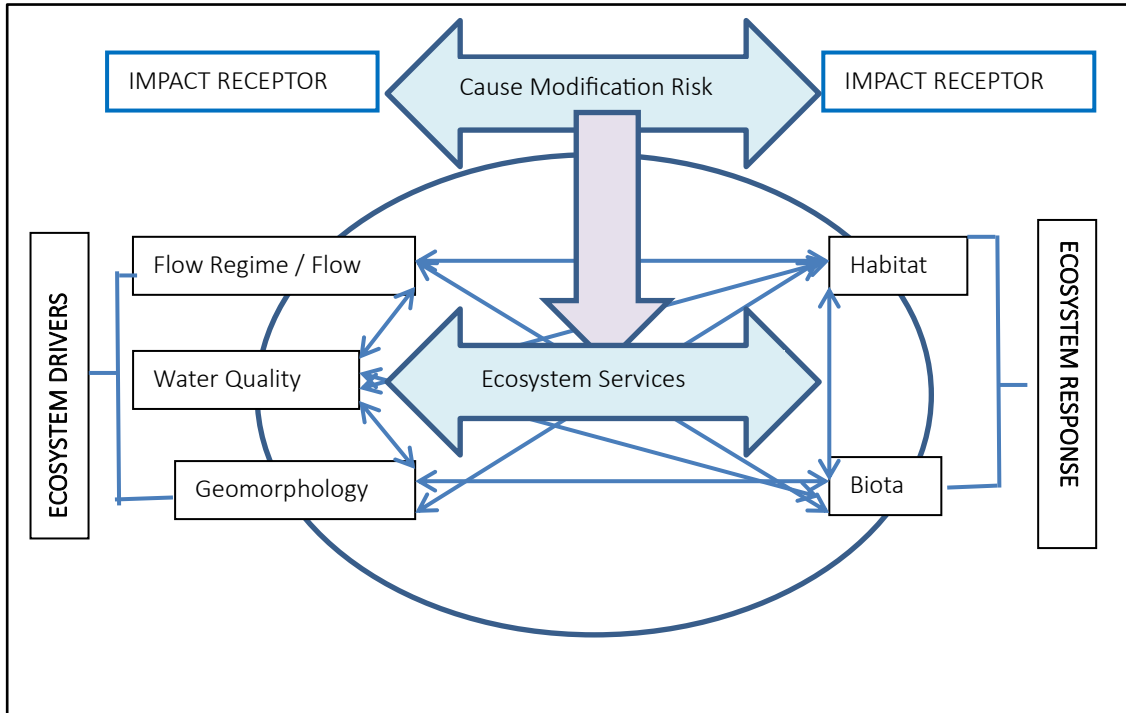
Table 11 gives an overall and much condensed view of the evaluations and methodologies that have been applied to the coastal salt pans.

It shows a mixed bag of outcomes.

Given the low impact nature of the construction and operation of a solar energy plant and a power line on the aquatic environment, the proposed project is not about to change anything if mitigating measures are adhered to. Table 11 does not suggest that the project cannot go ahead.

*‘An anthropogenic activity can impact on any of the ecosystem drivers or responses and this can have a knock-on effect on all the other drivers and responses. This, in turn, will predictably impact on the ecosystem services (Figure 17). The WULA and the EAI must provide mitigation measured for these impacts.’*

Figure 17 has been adapted from a DWS policy document.



**Figure 17** Minimum Requirements for a S21(c) and (i) Application

The driver for the Diep River and its drainage lines is the winter rainfall. Rainfall is variable, with the river coming down in flood during high rainfall events. The summer drought is as much of a driver as the winter rains. The river dries up, with only standing pools remaining.

Human impact has added to the low flow and drought flow conditions in the river. Water abstraction for large-scale agriculture exacerbates the low flow conditions in the river.

The Diep River and its catchment has departed a long way from its original condition. Solar energy plants and high voltage power lines with it overhead cables suspended on steel towers, its construction and its operation, are essentially low-impact activities. The proposed installation is not expected to measurably add to the existing impacts.

The Risk Matrix indicates that a General Authorisation is the correct level of approval. A license is not called for.

## 22 References

- De Kock, N.J. 2023. Motivation Report. *Proposed consent use to establish a solar photovoltaic facility on Portion of Erf 327, Malmesbury*. CK Rumboll & Partners, Malmesbury.
- Dickens, CWS & PM Graham. 2002. *The South African Scoring System (SASS) Version 5 Rapid Bioassessment*. African Journal of Aquatic Science 2002, 27: 1–10.
- Kleynhans, C.J. 1999. *Assessment of Ecological Importance and Sensitivity*. Department of Water Affairs and Forestry. Pretoria.
- Kotze, G., G. Marneweck, A. Batchelor, D. Lindley & Nacelle Collins. 2009. *A technique for rapidly assessing ecosystem services supplied by wetlands*. Water Research Commission, Pretoria.
- Mucina, L. & M.C Rutherford. 2006. *The vegetation of South Africa, Lesotho and Swaziland*. SANBI, Pretoria.
- Van Driel, D. 2023. Freshwater Report. *Abbottsdale high volage power line*. WATSAN Africa, Cape Town

## 23 Declaration of Independence

I, Dirk van Driel, as the appointed independent specialist hereby declare that I:

- Act/ed as the independent specialist in this application
- Regard the information contained in this report as it relates to my specialist input/study to be true and correct and;
- Do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management act;
- Have and will not have vested interest in the proposed activity;
- Have disclosed to the applicant, EAP and competent authority any material information have or may have to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the environmental Impact Assessment Regulations, 2010 and any specific environmental management act.
- Am fully aware and meet the responsibilities in terms of the NEMA, the Environmental Impacts Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R543) and any specific environmental management act and that failure to comply with these requirements may constitute and result in disqualification;
- Have ensured that information containing all relevant facts on respect of the specialist input / study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties facilitated in such a manner that all interested and affected parties were provided with reasonable opportunity to participate and to provide comments on the specialist input / study;
- Have ensured that all the comments of all the interested and affected parties on the specialist input were considered, recorded and submitted to the competent authority in respect of the application;
- Have ensured that the names of all the interested and affected parties that participated in terms of the specialist input / study were recorded in the register of interested and affected parties who participated in the public participation process;
- Have provided the competent authority with access to all information at my disposal regarding the application, weather such information is favourable or not and;
- Am aware that a false declaration is an offence in terms of regulation 71 of GN No. R543.

Signature of the specialist:



24 November 2023



### Experience

**USAID/RTI, ICMA & Chemonics.** Iraq & Afghanistan **2007 -2011**  
Program manager.

**City of Cape Town** **1999-2007**  
Acting Head: Scientific Services, Manager: Hydrobiology.

**Department of Water & Sanitation, South Africa** **1989 – 1999**  
Senior Scientist

**Tshwane University of Technology, Pretoria** **1979 – 1998**  
Head of Department

**University of Western Cape and Stellenbosch University** **1994 - 1998** part-time

- Lectured post-graduate courses in Water Management and Environmental Management to under-graduate civil engineering students
- Served as external dissertation and thesis examiner

### Service Positions

- Project Leader, initiator, member and participator: Water Research Commission (WRC), Pretoria.
  - Director: UNESCO West Coast Biosphere, South Africa
- Director (Deputy Chairperson): Grotto Bay Homeowner's Association
- Member Dassen Island Protected Area Association (PAAC)

### Membership of Professional Societies

- South African Council for Scientific Professions. Registered Scientist No. 400041/96
  - Water Institute of South Africa. Member

## Reports

- Process Review Kathu Wastewater Treatment Works
- Effluent Irrigation Report Tydstroom Abattoir Durbanville
- River Rehabilitation Report Slangkop Farm, Yzerfontein
- Fresh Water and Estuary Report Erf 77 Elands Bay
- Ground Water Revision, Moorreesburg Cemetery
- Fresh Water Report Delaire Graff Estate, Stellenbosch
- Fresh Water Report Quantum Foods (Pty) Ltd. Moredou Poultry Farm, Tulbagh
- Fresh Water Report Revision, De Hoop Development, Malmesbury
- Fresh Water Report, Idas Valley Development Erf 10866, Stellenbosch
- Wetland Delineation Idas Valley Development Erf 10866, Stellenbosch
- Fresh Water Report, Idas Valley Development Erf 11330, Stellenbosch
- Fresh Water Report, La Motte Development, Franschhoek
- Ground Water Peer Review, Elandsfontein Exploration & Mining
- Fresh Water Report Woodlands Sand Mine Malmesbury
- Fresh Water Report Brakke Kuyf Sand Mine, Cape Town
- Wetland Delineation, Ingwe Housing Development, Somerset West
- Fresh Water Report, Suurbraak Wastewater Treatment Works, Swellendam
- Wetland Delineation, Zandbergfontein Sand Mine, Robertson
- Storm Water Management Plan, Smalblaar Quarry, Rawsonville
- Storm Water Management Plan, Riverside Quarry
- Water Quality Irrigation Dams Report, Langebaan Country Estate
- Wetland Delineation Farm Eenzaamheid, Langebaan
- Wetland Delineation Erf 599, Betty's Bay
- Technical Report Bloodhound Land Speed Record, Hakskeenpan
- Technical Report Harkerville Sand Mine, Plettenberg Bay
- Technical Report Doring Rivier Sand Mine, Vanrhynsdorp
- Rehabilitation Plan Roodefontein Dam, Plettenberg Bay
- Technical Report Groenvlei Crusher, Worcester
- Technical Report Wiedouw Sand Mine, Vanrhynsdorp
- Technical Report Lair Trust Farm, Augrabies
- Technical Report Schouwtoneel Sand Mine, Vredenburg
- Technical Report Waboomsrivier Weir Wolseley
- Technical Report Doornkraal Sand Mine Malmesbury
- Technical Report Berg-en-Dal Sand Mine Malmesbury
- Wetland Demarcation, Osdrif Farm, Worcester
- Technical Report Driefontein Dam, Farm Agterfontein, Ceres
- Technical Report Oewerzicht Farm Dam, Greyton
- Technical Report Glen Lossie Sand Mine, Malmesbury
- Preliminary Report Stellenbosch Cemeteries
- Technical Report Toeka & Harmony Dams, Houdenbek Farm, Koue Bokkeveld
- Technical Report Kluitjieskraal Sand & Gravel Mine, Swellendam
- Fresh Water Report Urban Development Witteklip Vredenburg
- Fresh Water Report Groblershoop Resort, Northern Cape
- Fresh Water Report CA Bruwer Quarry Kakamas, Northern Cape
- Fresh Water Report, CA Bruwer Sand Mine, Kakamas, Northern Cape
- Fresh Water Report, Triple D Farms, Agri Development, Kakamas
- Fresh Water Report, Keren Energy Photovoltaic Plant Kakamas
- Fresh Water Report, Keren Energy Photovoltaic Plant Hopetown

- Fresh Water Report Hopetown Sewer
- Fresh Water Report Hoogland Farm Agricultural Development, Touws River
- Fresh Water Report Klaarstroom Wastewater Treatment Works
- Fresh Water Report Calvinia Sports Grounds Irrigation
- Fresh Water Report CA Bruwer Agricultural Development Kakamas
- Fresh Water Report Zwartfontein Farm Dam, Hermon
- Statement Delsma Farm Wetland, Hermon
- Fresh Water Report Lemoenshoek Farms Pipelines Bonnyvale
- Fresh Water Report Water Provision Pipeline Brandvlei
- Fresh Water Report Erf 19992 Upington
- Botanical Report Zwartejongensfontein Sand Mine, Stilbaai
- Fresh Water Report CA Bruwer Feldspath Mine, Kakamas
- Sediment Yield Calculation, Kenhardt Sand Mine
- Wetland Demarcation, Grabouw Traffic Center
- Fresh Water Report, Osdrift Sand Mine, Worcester
- Fresh Water Report, Muggievlak Storm Water Canal, Vredenburg
- Fresh Water Report, Marksman's Nest Rifle Range, Malmesbury
- Biodiversity Report, Muggievlak Storm Water Canal, Vredenburg
- Strategic Planning Report, Sanitation, Afghanistan Government, New Delhi, India
- Fresh Water Report, Potable Water Pipeline, Komaggas
- Fresh Water Report, Wastewater Treatment Works, Kamieskroon
- Fresh Water Report, Turksvy Farm Dam, Upington
- Fresh Water Report, Groblershoop Urban Development, IKheis Municipality
- Fresh Water Report, Boegoeberg Urban Development, IKheis Municipality
- Fresh Water Report, Opwag Urban Development, IKheis Municipality
- Fresh Water Report, Wegdraai Urban Development, IKheis Municipality
- Fresh Water Report, Topline Urban Development, IKheis Municipality
- Fresh Water Report, Grootdrink Urban Development, IKheis Municipality
- Fresh Water Report, Gariiep Urban Development, IKheis Municipality
- Fresh Water Report, Bonathaba Farm Dam, Hermon
- Botanical Report, Sand Mine Greystone Trading, Vredendal
- Botanical Report Namakwa Klei Stene, Klawer
- Fresh Water Report Buffelsdrift Quarry, George
- Fresh Water Report Styerkraal Agricultural Development, Onseepkans.
- Technical Report Arabella Country Estate Wastewater Treatment Works, Kleinmond
- Fresh Water Report Calvinia Bulk Water Supply
- Fresh Water Report Swartdam Farm Dams, Riebeeck Kasteel
- Fresh Water Report Erf 46959, Gordon's Bay
- Fresh Water Report Melkboom Farm Dam, Trawal
- Stormwater Management Plan, Bot River Bricks
- Freshwater Report, Bot River Bricks
- Freshwater Report Sanddrif Farm, Joubertina
- Freshwater Report Zouterivier Cell phone tower, Atlantis
- Biodiversity Report Birdfield Sandmine, Klawer
- Freshwater Report New Wave Dam, Klawer
- Freshwater Report Harvard Solar Energy Plant, Bloemfontein
- Freshwater Report Doorn River Solar Energy Plant, Virginia
- Freshwater Report Kleingeluk Farm, De Rust
- Freshwater Report, Solar Energy Plant, Klein Brak River
- Site Verification Report Laaiplek Desalination Plant

- Freshwater Report, CA Bruwer Quarry, Kakamas
- Freshwater Report, Orren Managanese Mine, Swellendam
- Wetland Delineation, Klipheuvel ZCC Solar Energy
- Freshwater Report Delville Park, George
- Freshwater Report Wolseley bulk water pipeline
- Freshwater Report Urban Settlement No.1 Pababello Upington
- Freshwater Report Urban Settlement No.2 Pababello Upington
- Freshwater Report Pringle Rock Distillery, Rooiels
- Freshwater Report De Kuilen Resort, Kamiesberg
- Wetland Delineation, Klipheuvel ZCC Solar Energy
- Freshwater Report Delville Park, George
- Freshwater Report ZCC Akkerboom electric vehicle charging station, Keimoes
- Freshwater Report ZCC Piketberg electric automobile charging station
- Freshwater Report ZCC electric truck charging station Piketberg
- Freshwater Report ZCC electric truck charging station Prince Albert Weg
- Freshwater Report Vleesbaai Wastewater Treatment Works
- Freshwater Report ZCC Brandvlei electric vehicle charging station.
- Site Sensitivity Report desalination plant Velddrif
- Technical Report desalination plant Velddrif
- Freshwater Report Abbottsdale High Voltage Power Line
- Freshwater Report Darling Solar Energy Plant



### 25.1 Methodology used in determining significance of impacts.

The methodology to be used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives is provided in the following tables:

**Table 25.1.1** Nature and type of impact

Nature and type of impact	Description
Positive	An impact that is considered to represent an improvement to the baseline conditions or represents a positive change
Negative	An impact that is considered to represent an adverse change from the baseline or introduces a new negative factor
Direct	Impacts that result from the direct interaction between a planned project activity and the receiving environment / receptors
Indirect	Impacts that result from other activities that could take place as a consequence of the project (e.g. an influx of work seekers)
Cumulative	Impacts that act together with other impacts (including those from concurrent or planned future activities) to affect the same resources and / or receptors as the project

**Table 25.1.2** Criteria for the assessment of impacts

Criteria	Rating	Description
Spatial extent of impact	National	Impacts that affect nationally important environmental resources or affect an area that is nationally important or have macro-economic consequences
	Regional	Impacts that affect regionally important environmental resources or are experienced on a regional scale as determined by administrative boundaries or habitat type / ecosystems
	Local	Within 2 km of the site
	Site specific	On site or within 100m of the site boundary
Consequence of impact/ Magnitude/ Severity	High	Natural and / or social functions and / or processes are severely altered
	Medium	Natural and / or social functions and / or processes are notably altered
	Low	Natural and / or social functions and / or processes are slightly altered
	Very Low	Natural and / or social functions and / or processes are negligibly altered
	Zero	Natural and / or social functions and / or processes remain unaltered
Duration of impact	Temporary	Impacts of short duration and /or occasional
	Short term	During the construction period
	Medium term	During part or all of the operational phase
	Long term	Beyond the operational phase, but not permanently
	Permanent	Mitigation will not occur in such a way or in such a time span that the impact can be considered transient (irreversible)

**Table 25.1.3 Significance Rating**

Significance Rating	Description
High	<p>High consequence with a regional extent and long-term duration</p> <p>High consequence with either a regional extent and medium-term duration or a local extent and long-term duration</p> <p>Medium consequence with a regional extent and a long-term duration</p>
Medium	<p>High with a local extent and medium-term duration</p> <p>High consequence with a regional extent and short-term duration or a site-specific extent and long-term duration</p> <p>High consequence with either local extent and short-term duration or a site-specific extent with a medium-term duration</p> <p>Medium consequence with any combination of extent and duration except site-specific and short-term or regional and long term</p> <p>Low consequence with a regional extent and long-term duration</p>
Low	<p>High consequence with a site-specific extent and short-term duration</p> <p>Medium consequence with a site-specific extent and short-term duration</p> <p>Low consequence with any combination of extent and duration except site-specific and short-term</p> <p>Very low consequence with a regional extent and long-term duration</p>
Very low	<p>Low consequence with a site-specific extent and short-term duration</p> <p>Very low consequence with any combination of extent and duration except regional and long term</p>
Neutral	<p>Zero consequence with any combination of extent and duration</p>

**Table 25.1.4** Probability, confidence, reversibility and irreplaceability

Criteria	Rating	Description
Probability	Definite	>90% likelihood of the impact occurring
	Probable	70 – 90% likelihood of the impact occurring
	Possible	40 – 70% likelihood of the impact occurring
	Unlikely	<40% likelihood of the impact occurring
Confidence	Certain	Wealth of information on and sound understanding of the environmental factors potentially affecting the impact
	Sure	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact
	Unsure	Limited useful information on and understanding of the environmental factors potentially influencing this impact
Reversibility	Reversible	The impact is reversible within 2 years after the cause or stress is removed
	Irreversible	The activity will lead to an impact that is in all practical terms permanent
Irreplaceability	Replaceable	The resources lost can be replaced to a certain degree
	Irreplaceable	The activity will lead to a permanent loss of resources.

## 25.2 Risk Matrix Methodology

### RISK ASSESSMENT KEY (Referenced from DWA RISK-BASED WATER USE AUTHORISATION APPROACH AND DELEGATION GUIDELINES)

#### Negative Rating

##### TABLE 1- SEVERITY

How severe does the aspects impact on the environment and resource quality characteristics (flow regime, water quality, geomorfology, biota, habitat)

Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful and/or wetland(s) involved	5

**Where "or wetland(s) are involved" it means**

##### TABLE 2 – SPATIAL SCALE

How big is the area that the aspect is impacting on?

Area specific (at impact site)	1
Whole site (entire surface right)	2
Regional / neighbouring areas (downstream within quaternary catchment)	3
National (impacting beyond secondary catchment or provinces)	4
Global (impacting beyond SA boundary)	5

##### TABLE 3 – DURATION

How long does the aspect impact on the environment and resource quality?

One day to one month, PES, EIS and/or REC not impacted	1
One month to one year, PES, EIS and/or REC impacted but no change in status	2
One year to 10 years, PES, EIS and/or REC impacted to a lower status but can be improved over this period through mitigation	3
Life of the activity, PES, EIS and/or REC permanently lowered	4
More than life of the organisation/facility, PES and EIS scores, a E or F	5

##### TABLE 4 – FREQUENCY OF THE ACTIVITY

How often do you do the specific activity?

Annually or less	1
6 monthly	2
Monthly	3
Weekly	4
Daily	5

##### TABLE 5 – FREQUENCY OF THE INCIDENT/IMPACT

How often does the activity impact on the environment?

Almost never / almost impossible / >20%	1
Very seldom / highly unlikely / >40%	2
Infrequent / unlikely / seldom / >60%	3
Often / regularly / likely / possible / >80%	4
Daily / highly likely / definitely / >100%	5

##### TABLE 6 – LEGAL ISSUES

How is the activity governed by legislation?

No legislation	1
Fully covered by legislation (wetlands are legally governed)	2
<b>Located within the regulated areas</b>	3

<b>TABLE 7 – DETECTION</b>	
How quickly can the impacts/risks of the activity be observed on the environment (water resource)	
Immediately	
Without much effort	
Need some effort	
Remote and difficult to observe	
Covered	

<b>TABLE 8: RATING CLASSES</b>		
<b>RATING</b>	<b>CLASS</b>	<b>MANAGEMENT DESCRIPTION</b>
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated. Wetlands may be excluded.
56 – 169	M) Moderate Risk	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and
170 – 300	(H) High Risk	Always involves wetlands. Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale

**A low risk class must be obtained for all activities to be considered for a GA**

<b>TABLE 9: CALCULATIONS</b>
Consequence = Severity + Spatial Scale + Duration
Likelihood=Frequency of Activity + Frequency of Incident +Legal Issues + Detection
Significance \Risk= Consequence X Likelihood

**Table 25.3 Numerical Significance**

**Table 25.3.1 Conservation Value**

<p><b>Conservation Value</b></p> <p>Refers to the intrinsic value of the area or its relative importance towards the conservation of an ecosystem or species or even natural aesthetics. Conservation status is based on habitat function, its vulnerability to loss and fragmentation or its value in terms of the protection of habitat or species.</p>	<p>Low</p> <p>1</p>	<p>The area is transformed, degraded not sensitive (e.g. Least threatened), with unlikely possibility of species loss.</p>
	<p>Medium / Low</p> <p>2</p>	<p>The area is in good condition but not sensitive (e.g. Least threatened), with unlikely possibility of species loss.</p>
	<p>Medium</p> <p>3</p>	<p>The area is in good condition, considered vulnerable (threatened), or falls within an ecological support area or a critical biodiversity area, but with unlikely possibility of species loss.</p>
	<p>Medium / High</p> <p>4</p>	<p>The area is considered endangered or, falls within an ecological support area or a critical biodiversity area, or provides core habitat for endemic or rare &amp; endangered species.</p>
	<p>High</p> <p>5</p>	<p>The area is considered critically endangered or is part of a proclaimed provincial or national protected area.</p>

**Table 25.3.2 Significance**

Significance	Score	Description
Insignificant	4 - 22	There is no impact or the impact is insignificant in scale or magnitude as a result of low sensitivity to change or low intrinsic value of the site.
Low	23 - 36	An impact barely noticeable in scale or magnitude as a result of low sensitivity to change or low intrinsic value of the site, or will be of very short-term or is unlikely to occur. Impact is unlikely to have any real effect and no or little mitigation is required.
Medium / Low	37 - 45	Impact is of a low order and therefore likely to have little real effect. Mitigation is either easily achieved. Impacts may have medium to short term effects on the natural environment within site boundaries.
Medium	46 - 55	Impact is real, but not substantial. Mitigation is both feasible and fairly easily possible, but may require modification of the project design or layout. These impacts will usually result in medium to long term effect on the natural environment, within site boundary.
Medium High	56 - 63	Impact is real, substantial and undesirable, but mitigation is feasible. Modification of the project design or layout may be required. These impacts will usually result in medium to long-term effect on the natural environment, beyond site boundary within local area.
High	64 - 79	An impact of high order. Mitigation is difficult, expensive, time-consuming or some combination of these. These impacts will usually result in long-term change to the natural environment, beyond site boundaries, regional or widespread.
Unacceptable	80 - 100	An impact of the highest order possible. There is no possible mitigation that could offset the impact. The impact will result in permanent change. Very often these impacts cannot be mitigated and usually result in very severe effects, beyond site boundaries, national or international.



**Table 25.3.3** Scoring system

Parameter	1	2	3	4	5
Conservation value	Low	Medium /Low	Medium	Medium / High	High
Likelihood	Unlikely	Possible	More possible	Probable	Definite
Duration	Temporary	Short term	Medium term	Long term	Permanent
Extent	Site specific	Local	Regional	National	International
Severity	Zero	Very low	Low	Medium	High

Significance = Conservation value (Likelihood + Duration + Extent + Severity)