Botanical Assessment for a proposed dam at Van der Watts Kraal 399 Portion 5, near Riviersonderend, Overberg, Western Cape Province

Gladiolus gracilis

bergwind
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Prepared for EnviroAfrica

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National Legislation and Regulations governing this report

This is a 'specialist report' and is compiled in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2014.

Appointment of Specialist

David J. McDonald of Bergwind Botanical Surveys & Tours CC was appointed by EnviroAfrica CC to provide specialist botanical consulting services for the assessment of the area of a proposed dam (Dasberg Dam) at Van Der Watts Kraal near Riviersonderend, Western Cape Province.

Details of Specialist

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Expertise

Dr David J. McDonald:

- Qualifications: BSc. Hons. (Botany), MSc (Botany) and PhD (Botany)
- Botanical ecologist with over 35 years' experience in the field of Vegetation Science.
- Founded Bergwind Botanical Surveys & Tours CC in 2006
- Has conducted over 400 specialist botanical / ecological studies.
- Has published numerous scientific papers and attended numerous conferences both nationally and internationally (details available on request)

Curriculum Vitae – Appendix 3

Independence

The views expressed in the document are the objective, independent views of Dr McDonald and the study was carried out under the aegis of, Bergwind Botanical Surveys and Tours CC. Neither Dr McDonald nor Bergwind Botanical Surveys and Tours CC have any business, personal, financial or other interest in the proposed development apart from fair remuneration for the work performed.

Conditions relating to this report

The content of this report is based on the author's best scientific and professional knowledge as well as available information. Bergwind Botanical Surveys & Tours CC, its staff and appointed associates, reserve the right to modify the report in any way deemed fit should new, relevant or previously unavailable or undisclosed information become known to the author from on-going research or further work in this field, or pertaining to this investigation

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THE INDEPENDENT PERSON WHO COMPILED A SPECIALIST REPORT OR UNDERTOOK A SPECIALIST PROCESS

I David Jury McDonald, 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, 2014, as amended, and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential 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, 2014 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2014 (specifically in terms of regulation 13 of GN No. R. 326) 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 in 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 was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all 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, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 13 of GN No. R. 326.

Note: The terms of reference must be attached.

Signature of the specialist:

Bergwind Botanical Surveys & Tours CC

Name of company:

26 October 2017

Date:

CONTENTS

1. Introduction

EnviroAfrica CC has been appointed by the applicant to conduct the environmental assessment process for a dam on the farm Van der Watts Kraal 399 Portion 5, near Riviersonderend in the Overberg of the Western Cape Province. The study is conducted in terms of the National Environmental Management Act (NEMA) (No.7 of 1998) as amended and the 2014 Environmental Regulations. Bergwind Botanical Surveys & Tours CC was appointed by EnviroAfrica on behalf of the applicant, to carry out a botanical assessment of the designated property to support the environmental impact assessment process. The purpose of the botanical impact assessment is to inform the environmental assessment on (a) the suitability of the site from a botanical viewpoint and (b) to determine any constraints that should be implemented to conserve the vegetation and flora (sensitivity analysis) while permitting the development to continue.

The principles, guidelines and recommendations of CapeNature and the Botanical Society of South Africa for proactive assessment of the biodiversity of proposed development sites have been followed (Brownlie 2005, Cadman *et al*. 2016).

2. Terms of Reference

The Terms of Reference are:

- Describe the broad ecological characteristics of the site and its surrounds in terms of any mapped spatial components of ecological processes and/or patchiness, patch size, relative isolation of patches, connectivity, corridors, disturbance regimes, ecotones, buffering, viability, etc.
- In terms of biodiversity **pattern**, identify or describe:

  Community and ecosystem level

  a. The main vegetation type, its aerial extent and interaction with neighbouring types, soils or topography;
  b. The types of plant communities that occur in the vicinity of the site
  c. Threatened or vulnerable ecosystems

  Species level

  a. Red List species (give location if possible using GPS)

b. The viability of an estimated population size of the Red List species that are present (include the degree of confidence in prediction based on availability of information and specialist knowledge, i.e. High=70-100% confident, Medium 40-70% confident, low 0-40% confident)

c. The likelihood of other Red List species, or species of conservation concern, occurring in the vicinity (include degree of confidence).

Other pattern issues

a. Any significant landscape features or rare or important vegetation associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity.

b. The extent of alien plant cover of the site, and whether the infestation is the result of prior soil disturbance such as ploughing or quarrying (alien cover resulting from disturbance is generally more difficult to restore than infestation of undisturbed sites).

c. The condition of the site in terms of current or previous land uses.

- In terms of biodiversity **process**, identify or describe:

  a. The key ecological "drivers" of ecosystems on the site and in the vicinity, such as fire.

  b. Any mapped spatial component of an ecological process that may occur at the site or in its vicinity (i.e. *corridors* such as watercourses, upland-lowland gradients, migration routes, coastal linkages or inland-trending dunes, and *vegetation boundaries* such as edaphic interfaces, upland-lowland interfaces or biome boundaries)

  c. Any possible changes in key processes, e.g. increased fire frequency or drainage/artificial recharge of aquatic systems.

  d. Would the conservation of the site lead to greater viability of the adjacent ecosystem by securing any of the functional factors listed in the first bullet?

- Would the site or neighbouring properties potentially contribute to meeting regional conservation targets for both biodiversity pattern and ecological processes?

3. Study Area

3.1 Locality

The study area is on Van der Watts Kraal 399 Portion 5 and lies approximately 12 km due east of Riviersonderend in the Overberg. The site is 1.5 km along a farm road that links the R317 with the N2 national highway, in the Overberg Region (Overberg District Municipality) of the Western Cape Province (Figures 1 - 3).

3.2 Topography and geology

The extensive area between the Riviersonderend and Langeberg mountain ranges and the sea is known as the Rûens. It takes its name from the undulating 'whale-back' topography formed by erosion of the of the Bokkeveld Group shales that are the dominant rock-type of the region (Lambrechts, 1979). The shales weather to form clay-rich arable soil and large areas of natural habitat that were once covered with renosterveld are now transformed to wheat-lands. The wheat-lands are used for grazing of livestock in summer when it is dry. The dam would be located on a moderate slope with westerly aspect. The 'smooth' cultivated slopes are clearly visible in the aerial image of Figure 3. The dam would be fed by a seasonal stream that is located between two cultivated fields and runs downslope from east to west.

Small areas of uncultivated land lie alongside the stream on both sides. The terrain is rocky and has shallow clay-rich soil.

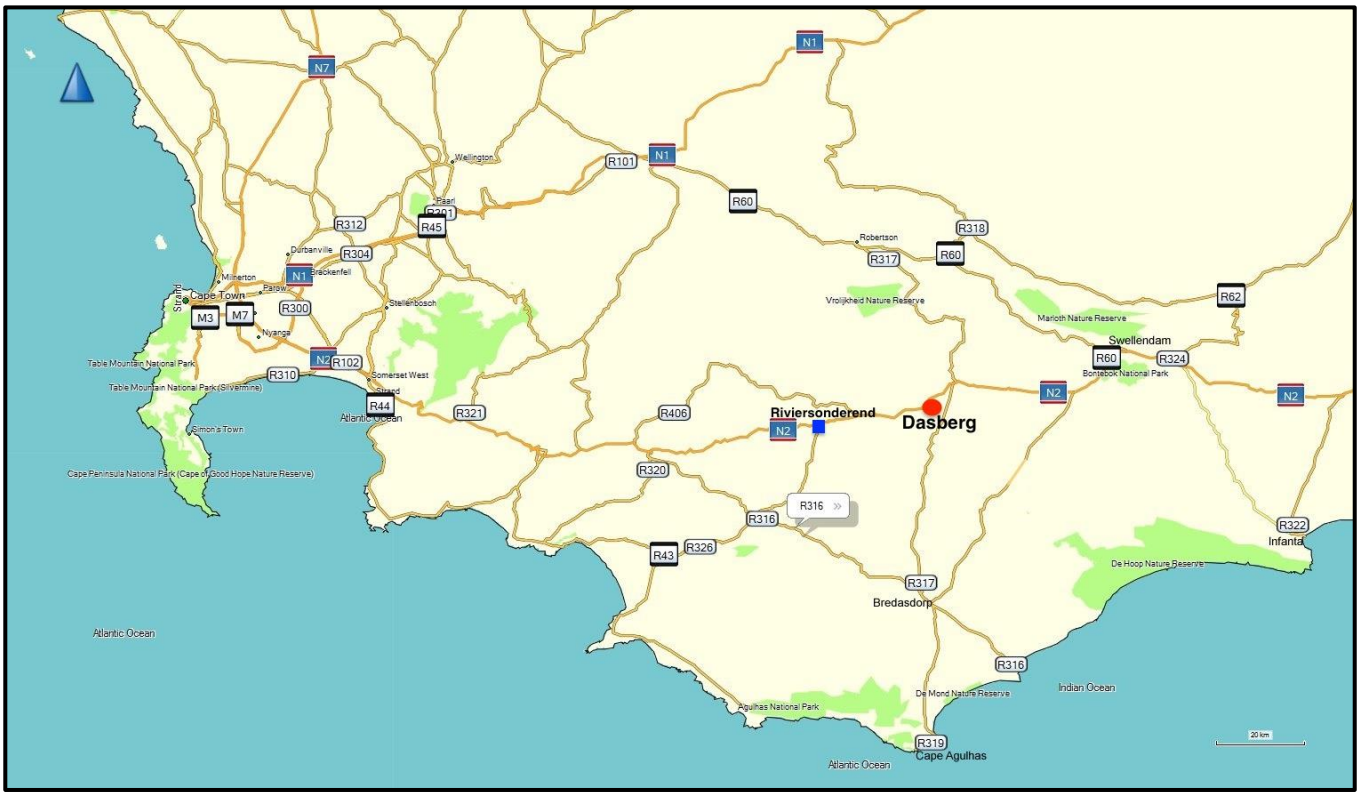

Figure 1. Location of the proposed Dasberg Dam (marked with a red dot 'Dasberg') east of Riviersonderend.

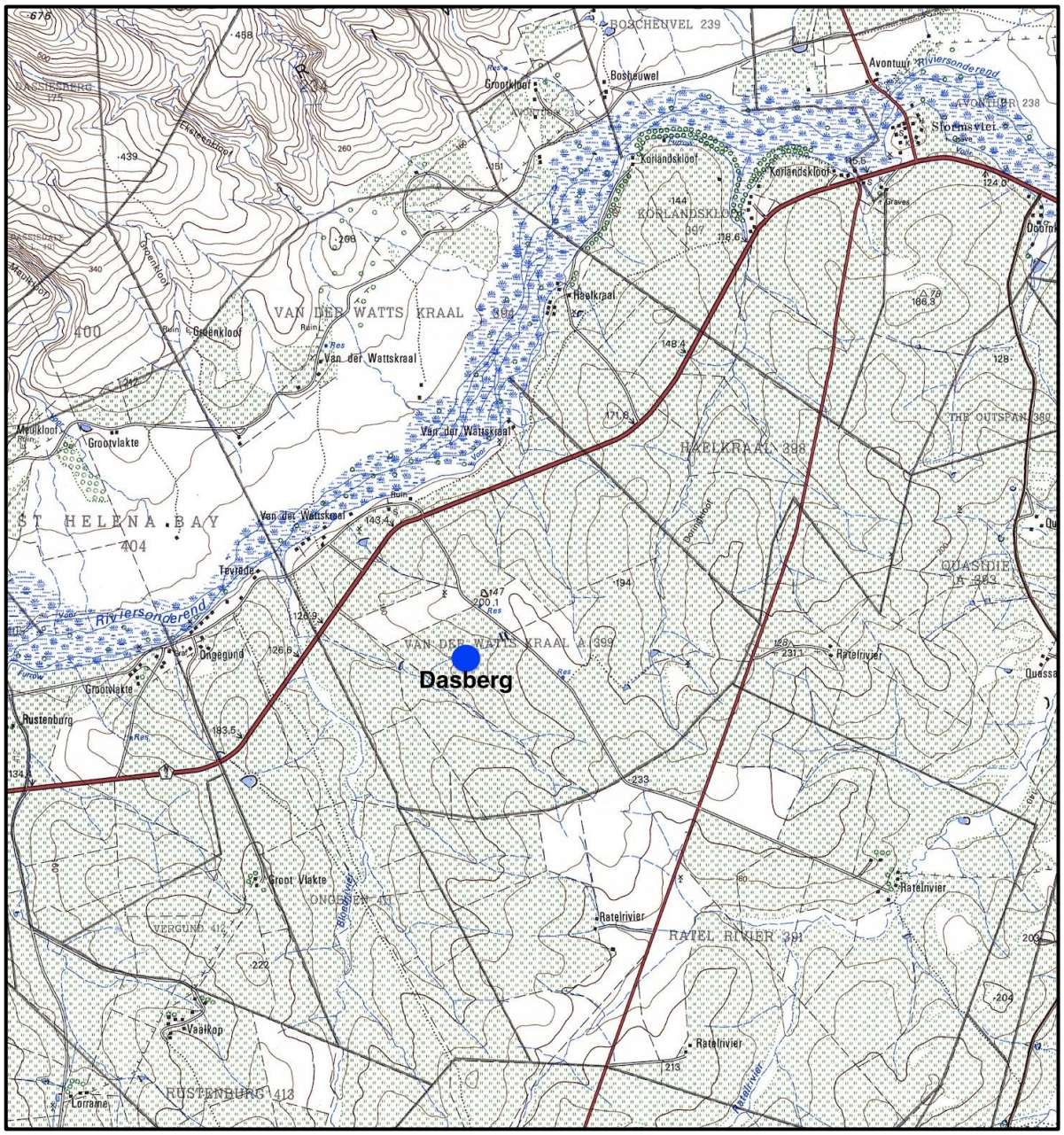

Figure 2. Topographic map indicating the location of the Dasberg Dam study site (blue dot). (Portion of 3420AA Stormsvlei 1: 50 000 topographic map – Chief-Director: National Geo-spatial Information).

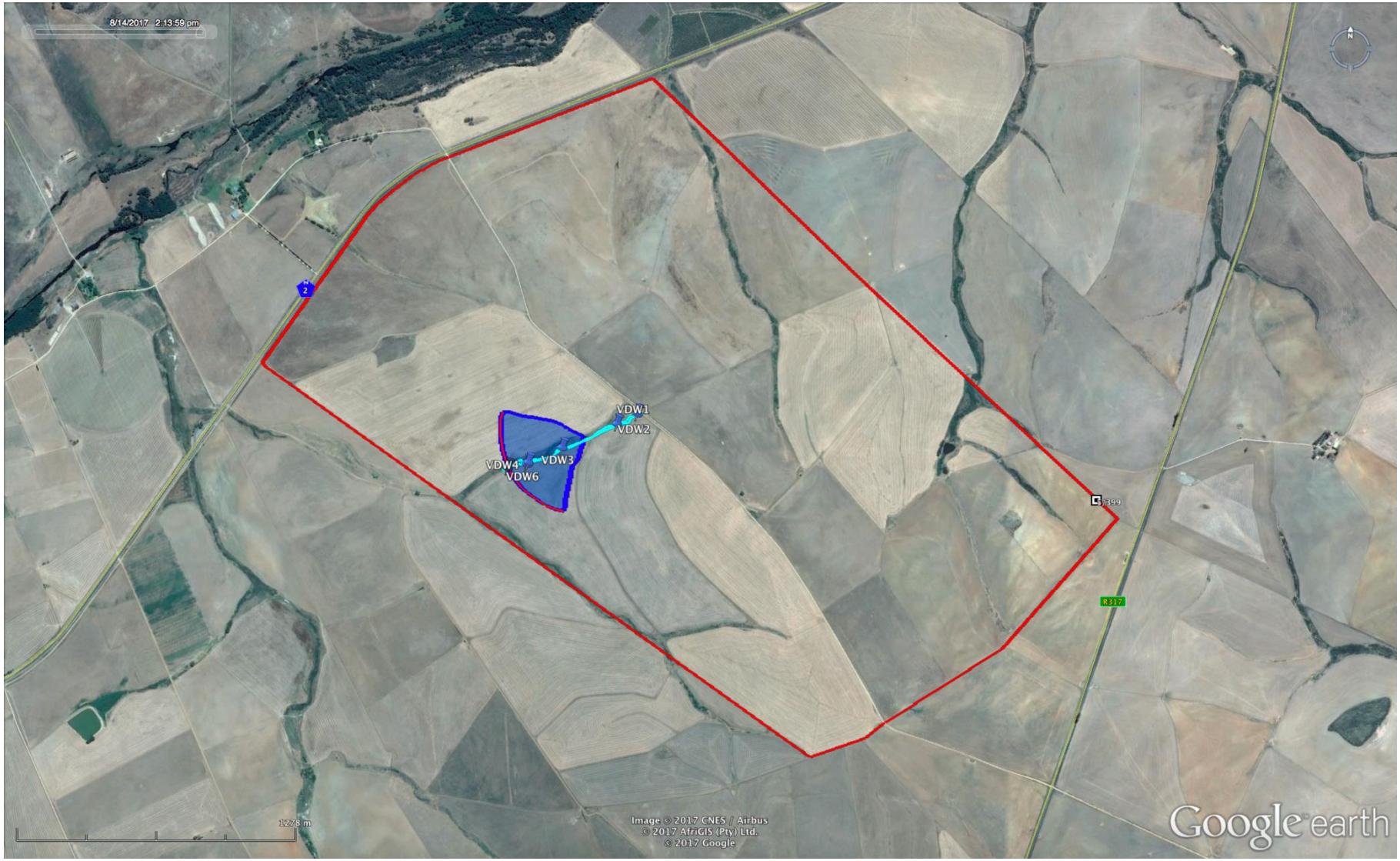

Figure 3. Aerial image (Google Earth ™) of the study area indicating the location and footprint of the proposed Dasberg Dam (dark blue). The light blue line with waypoints VDW# represents the survey track. The red boundary represents Portion 5 of Van der Watts Kraal 399.

3.3 Climate

Van der Watts Kraal (Dasberg) lies within a climate zone which is transitional between the winter-rainfall region of the extreme Western Cape and the non-seasonal rainfall region in the east. The climate of Van der Watts Kraal is similar to that of Bredasdorp for which rainfall (Figure 4) and temperature (Figure 5) information is available. Rain occurs in the winter months when westerly winds associated with cold fronts sweep across the southern Cape. During spring and autumn cold onshore winds that blow over the warm Agulhas Current draw moisture which is deposited over the land. Mean annual precipitation is in the order of 400 mm *per annum* (Figure 6).

Winter days are cool (12 --19°C) with the nights cold but seldom freezing. Summers are warm to hot with daytime temperatures mostly from 20 -- 25°C but occasionally exceeding 30°C (Figures 5 & 6).

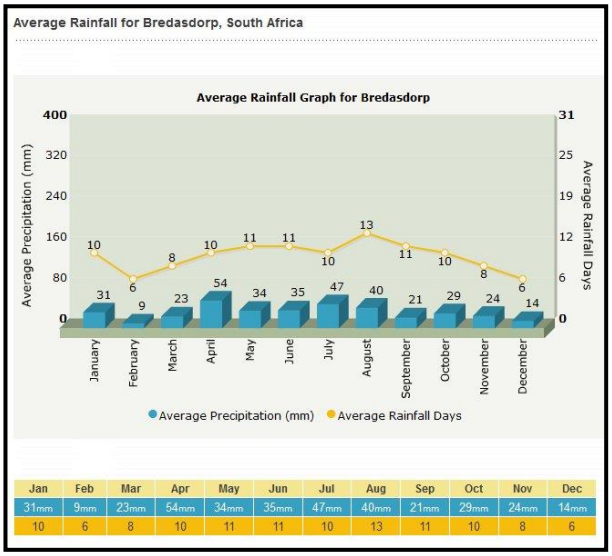

Figure 4. Rainfall for Bredasdorp (http://www.worldweatheronline.com/weather-averages/South-Africa/2610093/Bredasdorp/2611064/info.aspx)

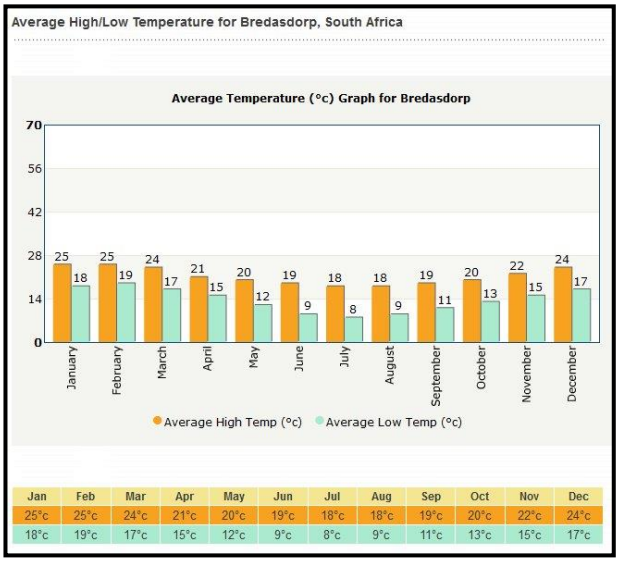

Figure 5. Temperatures for Bredasdorp (http://www.worldweatheronline.com/weather-averages/South-Africa/2610093/Bredasdorp/2611064/info.aspx)

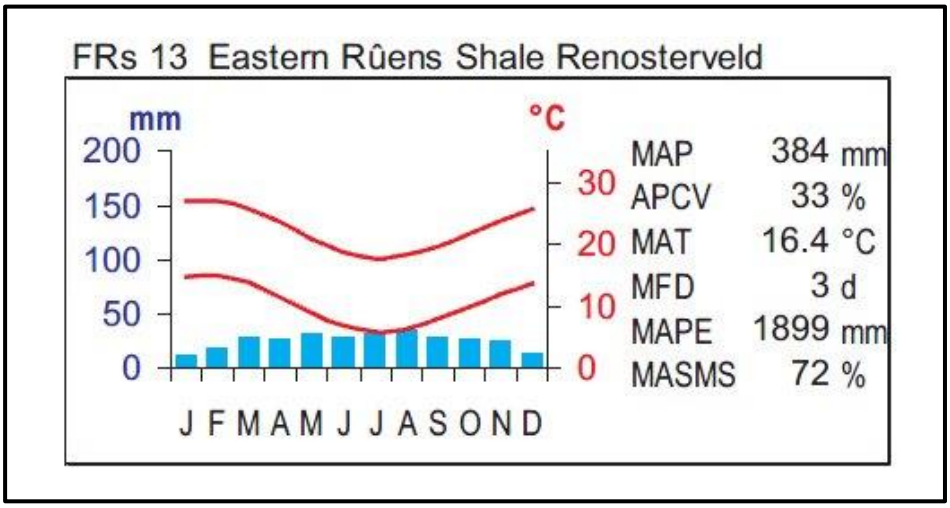

Figure 6. Climate diagram for Eastern Rûens Shale Renosterveld (from Rebelo et al. 2006 in Mucina & Rutherford, 2006) showing MAP – Mean Annual Precipitation; ACPV = Annual Precipitation Coefficient of Variance; MAT = Mean Annual Temperature; MFD = Mean Frost Days; MAPE = Mean Annual Potential Evaporation; MASMA = Mean Annual Soil Moisture Stress.

4. Methods

4.1 Field Sampling

The field-work for the assessment of Dasberg dam site was carried out on 14 August 2017 and the foot-survey took approximately three hours. The site was accessed from the farm road by walking downslope alongside the stream. A hand-held Garmin ® GPSMap 62S was used to track the route and record waypoints. The route and waypoints are shown in Figure 3. Observations were made at the respective waypoints and recorded with a photographic record of the vegetation and selected plant species. As is standard practice, particular attention was given to the possibility of finding endemic and 'Red List' species.

The spring period was ideal for the study, however the survey had some limitations that could not be avoided, for example a lower than expected showing of geophytes, probably due to the extended drought in the Western Cape Province.

The method used was a 'rapid-assessment technique' in which site observations and numerous photographs were taken at randomly distributed waypoints. This provided adequate information to characterize the vegetation of the site.

4.2 Desk-top analysis and reporting

The recorded waypoints were transferred to Google Earth ™ satellite aerial-photographs and together with the photographs obtained in the field as well as available literature, were used for description of the vegetation presented in this report. The National Vegetation Map (SANBI, 2012) (referred to as VEGMAP) was used as the 'base-map' to determine the principal original vegetation type.

5. Limitations and Assumptions

The main assumption was that the transformed grain-fields do not have any natural vegetation or that if there is any natural vegetation in their vicinity those patches would be extremely small and with variable, and probably limited, conservation significance.

6. Disturbance regime

Van der Watts Kraal farm is typical of most farms in the region where as much land as possible has been transformed from the original natural renosterveld to grain-fields. Only areas on particularly steep or rocky terrain or where the soil is not at all suitable for cultivation, or where there are well-defined water-courses, have not been ploughed. In some places, even in areas where there is a thin cap of duricrust (hardpan) it has been removed and the underlying soil has been ploughed.

7. The Vegetation

7.1 The vegetation in context

Only one vegetation type was originally found at the proposed Dasberg Dam site, as mapped and classified in the national classification of the vegetation of South Africa (Rebelo *et al.* 2006 in Mucina & Rutherford, 2006) (VEGMAP). The vegetation would have been extensive stands of Central Rûens Shale Renosterveld (FRs12) (Figure 7). Renosterveld vegetation types fall within the Fynbos Biome and are species rich. In addition, they have become increasing threatened due to the pressure from transformation to agriculture (Von Hase *et al.* 2003; Holness & Bradshaw, 2010).

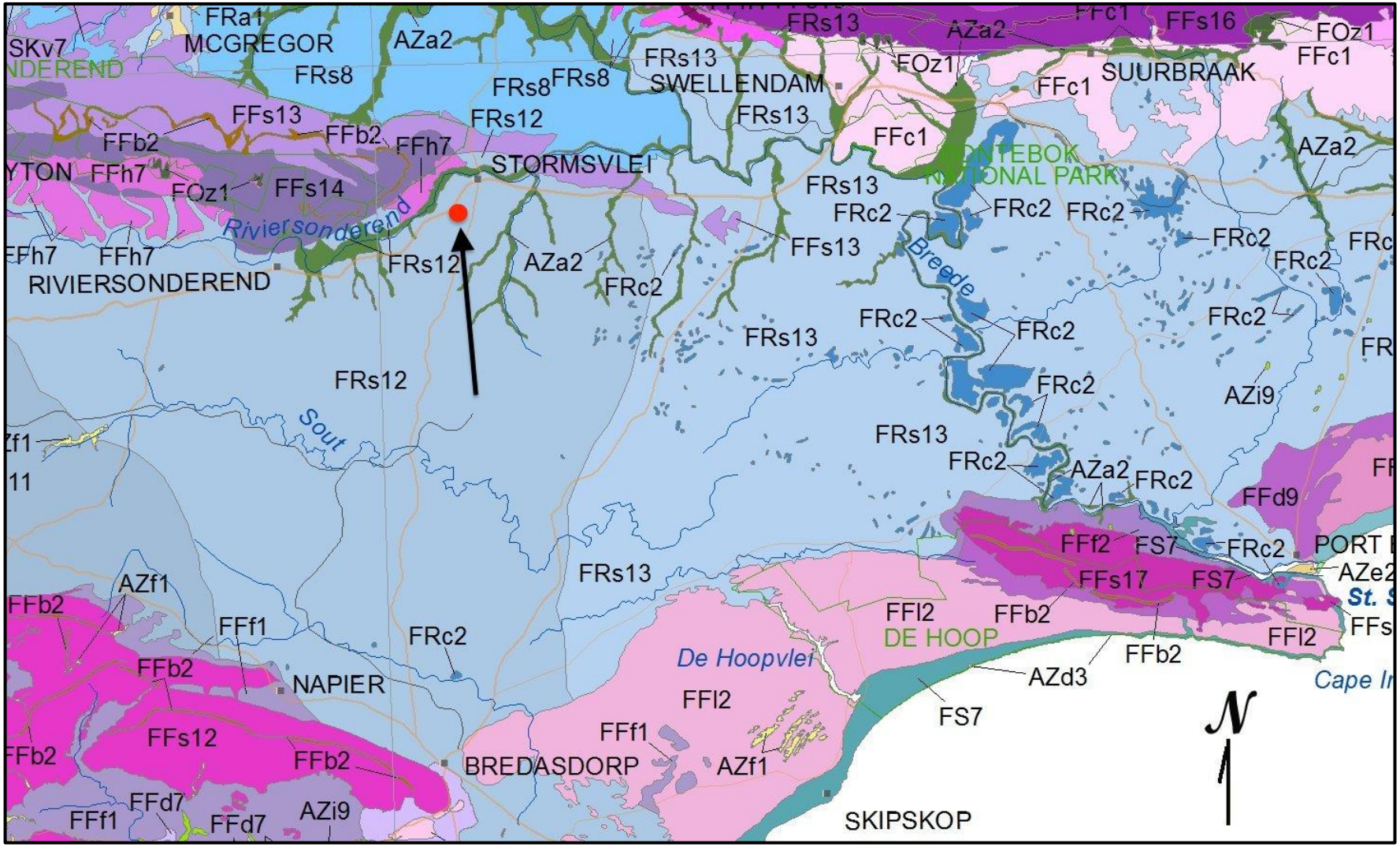

Figure 7. Portion of the *Vegetation map of South Africa, Lesotho, and Swaziland* (Mucina, Rutherford & Powrie 2005) with the study area indicated by a red dot and black arrow. The original vegetation type was Central Rûens Shale Renosterveld (light-blue: FRs12).

7.2 The vegetation of the Dasberg Dam site

Owing to the extremely high level of transformation of vegetation and habitat at Van der Watts Kraal and specifically at the Dasberg Dam site, only a small remnant of natural renosterveld vegetation remains, fringing the stream in two parallel strips on either side. The major part of the area that would be flooded or inundated by the dam would be existing cultivated fields. The only natural vegetation that would be affected is approximately 1.5 ha of remnant renosterveld and stream vegetation. In this investigation, the stream (water-course) vegetation was recognized but not specifically studied as this is in the realm of freshwater ecology. The emphasis in this study was on the natural **terrestrial** vegetation.

Waypoint VDW 1: S 34° 07' 42.8" E 20° 03' 14.2"

This waypoint was at the main access road in the dam catchment from where the site was accessed. This would be the point from which construction would be initiated but does not fall within the dam inundation area. This area is completely transformed, with two small dams on the water-course. The vegetation is all exotic herbaceous species.

Figure 8. The access point at the farm road above the existing two small farm dams and upslope from the study site. The vegetation is completely transformed here.

Figure 9. Looking westwards over the upper of the two existing farm dams. Note the transformed vegetation in the foreground.

Waypoint VDW 2: S 34° 07’ 44.3” E 20° 03’ 10.5”

The waypoint was recorded on the dam wall of the lower existing small dam. Figure 10 shows the view westwards from the dam wall following the line of the stream or water-course. The natural vegetation has mostly been lost at this waypoint (which would not fall within the inundation area). The main vegetation is a grassy sward that is grazed. The water channel is lined with *Juncus* cf. *kraussii.* Other plant species recorded here include *Asparagus capensis, Berkheya rigidus, Conyza scabrida, Cynodon dactylon, Moraea cf. flaccida, Oxalis pes-caprae, Oxalis purpurea* and *Searsia pallens.* Piles of shale rock are on the edge of the wheat-land, having been ploughed out during cultivation (Figure 11).

Figure 10. View westwards over the study area. Note the rush (*Juncus cf. kraussii*) in the foreground and the piles of rock adjacent to the drainage line.

Figure 11. Piles of shale rock removed from the ploughed fields, placed between the field and the drainage line (stream).

Waypoint VDW 3: S 34° 07’ 47.8” E 20° 03’ 00.7”

This waypoint is at a soil pit (Figure 13) near the main drainage channel (stream). At this point the stream is dominated by *Phragmites australis* (common reed) (Figure 12) but *Juncus* cf. *kraussii* (rush) is also present. Other plant species recorded at this waypoint include *Arctotheca calendula, Asparagus capensis, Conyza scabrida, Galenia africana, Helichrysum crispum, Lycium cinereum, Oxalis purpurea, Oxalis sp. (red), Pteronia sp., Ruschia sp.* and *Senecio sp.*

Figure 12. Common reed (*Phragmites australis*) in the stream-bed.

Figure 13. Soil pit at waypoint VDW3. This area would be within the inundation zone.

Waypoint VDW 4: S 34° 07’ 50.08” E 20° 02’ 54.7”

Waypoint VDW 4 is at a patch of remnant renosterveld that is rich in species (Figures 14 & 15). This location would be within the area inundated by the dam. Plant species recorded include *Arctotis acaulis, Asparagus capensis, Babiana* sp., *Brunsvigia* cf. *orientalis, Chrysocoma* sp., *Cotula turbinata, Cyphia* cf. *digitata, Drosanthemum* sp., *Galenia africana, Gladiolus gracilis, Helichrysum crispum, Linum cinereum, Microloma sagittatum, Moraea ciliata, Oxalis purpurea, Oxalis* sp. (red), *Polygala garcinii, Romulea flava, Sparaxis* sp., *Syringodea longituba, Tenaxia stricta, Trachyandra* sp., *Trichodiadema* sp., *Tulbaghia alliacea* and *Indigofera heterophylla*. (Some of the plant species encountered are illustrated below).

Figure 14. *Juncus* cf. *kraussii* in the foreground with the remnant Central Rûens Shale Renosterveld further west (greyish vegetation).

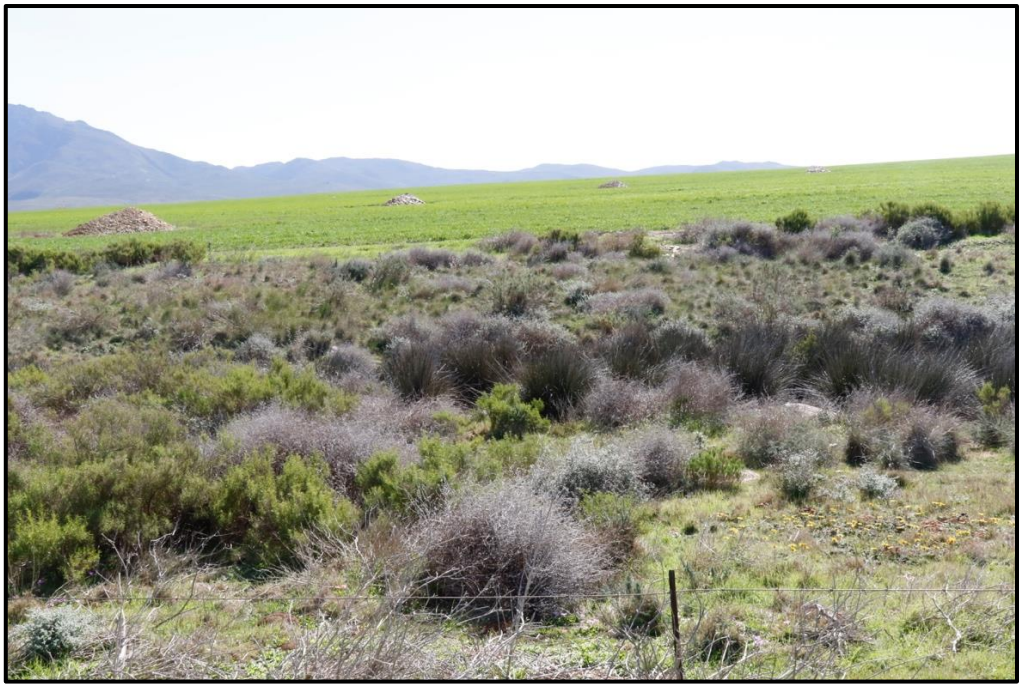

Figure 15. Remnant Central Rûens Shale Renosterveld in vicinity of waypoint VDW 4.

Gladiolus gracilis

Arctotis acaulis

Romulea flava

Cyphia cf. digitata

Indigofera heterophylla

Trichodiadema sp.

Waypoint VDW 5: S 34° 07’ 50. 8” E 20° 02’ 51.0”

Waypoint VDW 5 is at the position of where the dam wall would be. Species additional to those listed under waypoint VDW 4 include *Diascia capensis, Romulea* cf. *rosea, Ursinia nana* and *Zaluzianskya* sp.

It is recommended that the area below the dam wall (west of waypoint VDW 5) (Figures 16 & 17) should be a receptor area for plants that are rescued from the area of the dam (wall and inundation area). [See below under ‘Mitigation’]. Note the rocky nature of the terrain in Figure 17, providing many niches for various plant species.

Figure 16. The area of the Central Rûens Shale Renosterveld around waypoint VDW 5 that would be affected by the dam. The area to the west can act as a receptor area for relocated plants.

Figure 17. The area of the Central Rûens Shale Renosterveld around waypoint VDW 5 is notably rocky, creating numerous niches for plants. These plants should be rescued before the dam wall is constructed.

Waypoint VDW 6: S 34° 07' 50.3" E 20° 02' 54.4"

This waypoint is at the position (on the line) of a series of soil pits. The image in Figure 18 shows a soil-pit in the immediate foreground (in the remnant renosterveld) and a series of soil pits to the north in the cultivated field which would fall within the inundated area.

Figure 18. A soil pit within the remnant the Central Rûens Shale Renosterveld around waypoint VDW 6 at the position of the proposed dam wall. Other soil pits can be seen in the cultivated field in the background.

8. Conservation status

Central Rûens Shale Renosterveld is listed as **Critically Endangered A1** in the National List of Threatened Ecosystems (Government Gazette, 2011). This means that there should be no further loss of this vegetation type since the national conservation target will not ever be met. This immediately raises the need for caution when encountering this vegetation type. The study area falls within an Ecological Support Area 2 (ESA2[1] Figure 19) and thus has conservation merit but is not essential for meeting conservation targets. The area is also classified as a Freshwater Ecosystem Priority Area.

No Red List species (i.e. species of conservation concern) were encountered during the survey but it must be assumed as a precaution that such species may occur within the study area. Specific attention was paid to the possibility of the presence of *Ixia longituba* (see letter from CapeNature Ref. 4/2/6/1/7/3_SWEL/399/5_2017/CF098 dated 10 August 2017) but this species was not found.

[1] ESA 2 areas are defined as: *"Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning protected areas or critical biodiversity areas and are often vital for delivering ecosystem services."* ESA 2 conservation objectives are: *"Restore and/or manage to minimize impact on ecological processes and ecological infrastructure functioning, especially soil and water-related services, and to allow for faunal movement."*

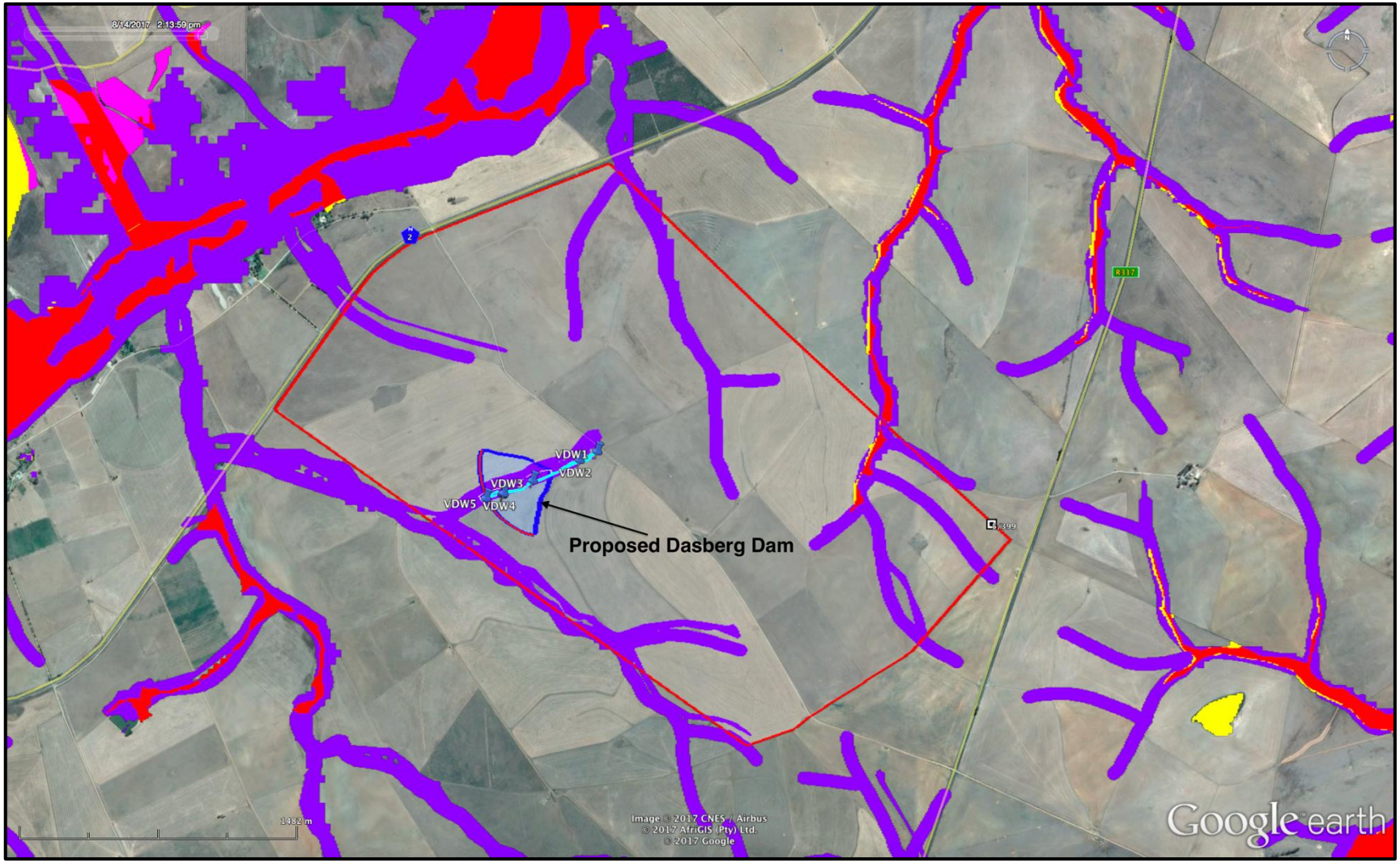

Figure 19. Aerial photo (Google Earth ™) with superimposed Critical Biodiversity Areas Map (CapeNature 2017). The red areas are Critical Biodiversity Areas (CBA1) and the yellow areas CBA2. The pink areas are Ecological Support Areas (ESA1) and the purple areas are ESA2. The proposed Dasberg Dam would impact and area classified as ESA2.

9. Development layouts

The proposed dam would have an earth wall that would be orientated in a roughly north-west – south-east direction. The dam wall would extend in a shallow arc from cultivated fields to the north of the stream, across the stream to cultivated fields south of the stream. The anticipated inundation by the dam at full supply level is shown in Figure 20 and would cover approximately 8.8 ha.

Figure 20. Magnified aerial image of the area of the proposed Dasberg Dam (blue shading) with the

10. Impact Assessment

Impacts on the vegetation are assessed for the construction of the Dasberg Dam at Van der Watts Kraal. Only one development alternative and the No Go alternative are assessed since no other alternative is proposed.

10.1 Direct Impacts

Direct impacts are those that would occur directly on the vegetation of the site as a result of the proposed dam construction. The rating system used is given in Appendix 1. In addition to determining the individual impacts using various criteria, mitigation is also brought into the assessment.

The impacts of the proposed Dasberg Dam development on the vegetation and habitat are considered with respect to:

- Loss of vegetation type and habitat including plant species due to construction and operational activities.
- Loss of ecological processes due to construction and operational activities.

10.1.1 Loss of vegetation type and habitat including plant species due to construction and operational activities

In the case of the **"No Go" option** where there would be no dam construction. The *status quo* would persist and the farming operation would continue in much the same way as at present. The 'no development' alternative or 'No Go' alternative would thus have a **LOW NEGATIVE** impact on the natural vegetation with no significant further loss in the long-term.

If the **development option** is followed there would be a **MEDIUM NEGATIVE** impact on the remnant renosterveld but **VERY LOW NEGATIVE** impact on the cultivated areas. After mitigation, the impact would be **LOW NEGATIVE** on the natural vegetation (Table 1).

Table 1 Impact and Significance – Loss of natural vegetation and habitat in general during construction and operational phases

CRITERIA	'NO GO' ALTERNATIVE		PREFERRED ALTERNATIVE Construction of Dasberg Dam	
Nature of direct impact (local scale)	**Loss of Central Rûens Shale Renosterveld**			
	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION
Extent	Local	Local	Local	Local
Duration	Long-term	Long-term	Long-term	Long-term
Intensity	Low	Low	High	High
Probability of occurrence	Probable	Probable	Probable	Probable
Confidence	High	High	High	High
Significance	Negligible	Negligible	Medium negative	Low negative
Nature of Cumulative impact	**Loss of Central Rûens Shale Renosterveld**			
Cumulative impact prior to mitigation	Low Negative			
Degree to which impact can be reversed	Not reversible			
Degree to which impact may cause irreplaceable loss of resources	Medium			
Degree to which impact can be mitigated	Medium			
Proposed mitigation	Search and rescue of relocatable plants; establishment of a conservation easement elsewhere on the farm Van Der Watts Kraal.			

Cumulative impact post mitigation	Low negative
Significance of cumulative impact (broad scale) after mitigation	Low negative

10.1.2 Mitigation

The **development option** would have a high physical impact. However, the area of natural vegetation that would be lost would amount to approximately 1.5 ha and not the entire 'strip' of renosterveld running downslope as described above. It is strongly recommended that there should be intensive 'Search and Rescue' in the area of renosterveld that would be lost (this would pertain particularly to bulbs and succulents) and that the rescued plant should be relocated into the area from waypoint VDW5 westwards that would not be affected by the dam.

A second mitigation measure is to ensure that the lowest possible impact is exerted on the area that would not be within the footprint of the dam wall or dam itself. In other words, a 'working zone' for the dam wall must be determined and now transgression into areas beyond that zone should be permitted. The objective must be to retain (conserve) as much of the remaining renosterveld as possible.

The author is aware that the landowner has entered into an agreement concerning a 'conservation easement' whereby another area of renosterveld is being set aside in compensation for the loss caused by the dam. That is an acceptable measure but it is still advocated that as much of the remnant natural vegetation as possible at the Dasberg Dam site should be conserved.

10.2.1 Loss of ecological processes

Ecological processes are highly compromised in the area around the Dasberg Dam site. The remaining fragment of Central Rûens Shale Renosterveld is small and has low connectivity by corridors to larger tracts of this vegetation. The natural habitat supports active birdlife and small mammals no doubt use this area as a refuge. Therefore, there would be a net loss of ecological processes in the dam inundation area. However, description and quantification of the ecological processes is not possible and only an estimate of the impact can be made. For that reason, the impact is rated as **MEDIUM NEGATIVE**, as applied only to the remnant natural vegetation that would be lost. No true mitigation would be possible so the impact would remain as **MEDIUM NEGATIVE**. In the grain-

fields practically no ecological processes would be lost so the impact would be **VERY LOW NEGATIVE** (Table 2).

Table 2. Impact and Significance – Loss of ecological processes in natural habitat areas during construction and operational phases

CRITERIA	'NO GO' ALTERNATIVE		PREFERRED ALTERNATIVE Construction of Dasberg Dam	
Nature of direct impact (local scale)	**Loss of ecological processes**			
	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION
Extent	Local	Local	Local	Local
Duration	Long-term	Long-term	Long-term	Long-term
Intensity	Low	Low	High	High
Probability of occurrence	Probable	Probable	Probable	Probable
Confidence	High	High	High	High
Significance	Negligible	Negligible	Medium negative	Medium negative
Nature of Cumulative impact	**Loss of ecological processes**			
Cumulative impact prior to mitigation	Low Negative			
Degree to which impact can be reversed	Not reversible but ecological processes would continue elsewhere			
Degree to which impact may cause irreplaceable loss of resources	Low			
Degree to which impact can be mitigated	Low			
Proposed mitigation	No mitigation possible			
Cumulative impact post mitigation	Low negative			
Significance of cumulative impact (broad scale) after mitigation	Low negative			

10.2.2 Mitigation

No mitigation for loss of ecological processes would be possible at the site since the habitat would be lost. However, those (similar) processes would continue in the area below the dam wall, albeit in a smaller area of natural habitat.

The conservation easement on the farm Van der Watts Kraal would compensate for the loss of the remnant renosterveld at the Dasberg Dam site. It is assumed that since the habitat is renosterveld, the area of the conservation easement is likely to support similar ecological processes as those found at the proposed dam site.

10.3 Indirect impacts

By definition indirect impacts occur away from the 'action source' i.e. away from the development site. The impact assessed here is specifically how the proposed development

would have an indirect impact on vegetation and flora away from the development site. Indirect impacts would probably be insignificant if any.

10.4 Cumulative impacts

There has been such widespread degradation of Central Rûens Shale Renosterveld in the Overberg that the proposed dam would not add significantly to the loss of this vegetation type when compared to its original extent. However, now that there is so little left, the cumulative effect of loss of even a small area is much more significant. In the current context therefore, the cumulative impact is at least **MEDIUM NEGATIVE** if not **HIGH NEGATIVE**.

11. General Assessment and Recommendations

- A single Critically Endangered (A1) vegetation type, Central Rûens Shale Renosterveld was the original vegetation type found over an extensive area and over most of Van der Watts Kraal. At the study site this vegetation type persists as a small remnant on both sides of the stream below the existing two small dams.
- The remnant renosterveld was found to be species-rich but not all species were in flower or were identifiable even though the survey was undertaken in spring. No species of conservation concern were recorded but the importance of the remnant should nevertheless not be underestimated.
- It is estimated that approximately 1.5 ha of the remnant renosterveld would be lost due to dam construction and inundation (operation). This is roughly half of the renosterveld found along the stream.
- The impact of the loss of Central Rûens Shale Renosterveld at a local scale at the Dasberg Dam site would result in **MEDIUM NEGATIVE** impact but the proposed conservation easement and recommended 'Search and Rescue' (see below) would provide mitigation for the lost habitat.
- Plants that can be relocated such as geophytes (bulbs) and succulents e.g. *Trichodiadema* sp. should be located, marked and rescued before the dam-building commences. The rescued plants should be relocated into the remaining part of the remnant not affected by the dam or to the area of the conservation easement.

12. Conclusions

The greater part of the farm Van der Watts Kraal has been transformed to intensive agriculture; mainly cereal farming and livestock production. Very little Central Rûens Shale Renosterveld remains and what remains has significant conservation value.

These areas must generally be avoided with no further disturbance permitted. However, in some circumstances there is no other logical place for a dam except in the in-stream situation and where there may be, as is the case here, remnant renosterveld vegetation. It is unfortunate to lose any more renosterveld notwithstanding that the area has a relatively 'low' classification (ESA2) but the positive spin-off is that the dam project has stimulated the intention of the landowner to set aside an area of intact Central Rûens Shale Renosterveld. This would successfully compensate for the localized loss of the renosterveld at the Dasberg Dam site. The overall result of the impact assessment is that the 'No Go' option would allow the *status quo* to continue which would have a **LOW NEGATIVE** impact on the site. The proposed Dasberg Dam would have a **LOW NEGATIVE** impact after mitigation, and given positive actions, both the conservation easement and 'Search & Rescue' as mitigation, the development of the dam is supported from a botanical perspective.

13. References

Brownlie, S. 2005. Guideline for involving biodiversity specialists in EIA processes: Edition 1. *CSIR Report No. ENV-S-C 2005-053 C*. Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning.

Cadman, M. 2016. (ed.) Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape, Edition 2. Fynbos Forum, Cape Town, 201pp.

Government Gazette No. 34809. 2011. Threatened Terrestrial Ecosystems in South Africa.

Holness, S. & Bradshaw, 2010. Critical Biodiversity Areas of the Overberg District Municipality – Conservation Planning Report. Park Planning and Development Unit, SANParks.

Lambrechts, J.J.N. 1979. Geology, geomorphology and soils. In: Day, J., Siegfried, W.R., Louw, G.N. & Jarman, M.L. (eds), Fynbos ecology: a preliminary synthesis. *South Africa National Scientific Programmes Report No. 40.* CSIR, Pretoria.

Mucina, L., Rutherford, M.C., & Powrie, L.W. (Eds.). 2005. Vegetation map of South Africa, Lesotho, and Swaziland 1:1 000 000 scale sheet maps. South African National Biodiversity Institute, Pretoria. ISBN 1-919976-22-1.

Mucina, L. & Rutherford, M.C. 2006. (eds.) The Vegetation of South Africa. Lesotho & Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

Rebelo, A.G., Boucher, C., Helme, N., Mucina, L. & Rutherford, M.C. 2006. Fynbos Biome. In: Mucina, L. & Rutherford, M.C. (eds.) The Vegetation of South Africa. Lesotho & Swaziland. *Strelitzia 19.* South African National Biodiversity Institute, Pretoria.

Von Hase, A., Rouget, M., Maze, K., & Helme, N. 2003. A Fine-Scale Conservation Plan for Cape Lowlands Renosterveld: Technical Report.

Website: (http://www.worldweatheronline.com/weather-averages/South-Africa/2610093/Bredasdorp/2611064/info.aspx)

Report submitted: 26 October 2017

Appendix 1: Impact Assessment Methodology

The assessment of impacts needs to include the determination of the following:

- The nature of the impact – see Table 1.1
- The magnitude (or severity) of the impact – see Table 1.2
- The likelihood of the impact occurring - see Table 1.2

The degree of confidence in the assessment must also be reflected.

Table 1.1 Impact assessment terminology

Term	Definition
Impact nature	
Positive	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Negative	An impact that is considered to represent an adverse change from the baseline, or introduces a new undesirable factor.
Direct impact	Impacts that result from a direct interaction between a planned project activity and the receiving environment/receptors (e.g. between occupation of a site and the pre-existing habitats or between an effluent discharge and receiving water quality).
Indirect impact	Impacts that result from other activities that are encouraged to happen as a consequence of the Project (e.g. in-migration for employment placing a demand on resources).
Cumulative impact	Impacts that act together with other impacts (including those from concurrent or planned future third party activities) to affect the same resources and/or receptors as the Project.

Assessing significance

There is no statutory definition of '*significance*' and its determination is, therefore, somewhat subjective. However, it is generally accepted that significance is a function of the magnitude of the impact and the likelihood of the impact occurring. The criteria used to determine significance are summarized in *Table 1.2*

Table 1.2 Significance criteria

Impact magnitude	
Extent	*On-site* – impacts that are limited to the boundaries of the rail reserve, yard or substation site. *Local* – impacts that affect an area in a radius of 20km around the development site. *Regional* – impacts that affect regionally important environmental resources or are experienced at a regional scale as determined by administrative boundaries, habitat type/ecosystem. *National* – impacts that affect nationally important environmental resources or affect an area that is nationally important/ or have macro-economic consequences.
Duration	*Temporary* – impacts are predicted to be of short duration and intermittent/occasional. *Short-term* – impacts that are predicted to last only for the duration of the construction period. *Long-term* – impacts that will continue for the life of the Project, but ceases when the Project stops operating. *Permanent* – impacts that cause a permanent change in the affected receptor or resource (e.g. removal or destruction of ecological habitat) that endures substantially beyond the Project lifetime.

Intensity	BIOPHYSICAL ENVIRONMENT: *Intensity can be considered in terms of the sensitivity of the biodiversity receptor (ie. habitats, species or communities).* **Negligible** – the impact on the environment is not detectable. **Low** – the impact affects the environment in such a way that natural functions and processes are not affected. **Medium** – where the affected environment is altered but natural functions and processes continue, albeit in a modified way. **High** – where natural functions or processes are altered to the extent that it will temporarily or permanently cease. ***Where appropriate, national and/or international standards are to be used as a measure of the impact.*** *Specialist studies should attempt to quantify the magnitude of impacts and outline the rationale used.* SOCIO-ECONOMIC ENVIRONMENT: *Intensity can be considered in terms of the ability of project affected people/communities to adapt to changes brought about by the Project.* **Negligible** – there is no perceptible change to people's livelihood **Low** - People/communities are able to adapt with relative ease and maintain pre-impact livelihoods. **Medium** - Able to adapt with some difficulty and maintain pre-impact livelihoods but only with a degree of support. **High** - Those affected will not be able to adapt to changes and continue to maintain-pre impact livelihoods.
Impact likelihood (Probability)	
Negligible	The impact does not occur.
Low	The impact may possibly occur.
Medium	Impact is likely to occur under most conditions.
High	Impact will definitely occur.

Once a rating is determined for magnitude and likelihood, the following matrix can be used to determine the impact significance.

Table 7.5 Example of significance rating matrix

SIGNIFICANCE RATING					
	LIKELIHOOD	**Negligible**	**Low**	**Medium**	**High**
MAGNITUDE	**Negligible**	**Negligible**	**Negligible**	**Low**	**Low**
	Low	**Negligible**	**Negligible**	**Low**	**Low**
	Medium	**Negligible**	**Low**	**Medium**	**Medium**
	High	**Low**	**Medium**	**High**	**High**

In *Table 7.6*, the various definitions for significance of an impact is given.

Table7.6 Significance definitions

Significance definitions	
Negligible significance	An impact of negligible significance (or an insignificant impact) is where a resource or receptor (including people) will not be affected in any way by a particular activity, or the predicted effect is deemed to be 'negligible' or 'imperceptible' or is indistinguishable from natural background variations.
Minor significance	An impact of minor significance is one where an effect will be experienced, but the impact magnitude is sufficiently small (with and without mitigation) and well within accepted standards, and/or the receptor is of low sensitivity/value.

Moderate significance	An impact of moderate significance is one within accepted limits and standards. The emphasis for moderate impacts is on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that 'moderate' impacts have to be reduced to 'minor' impacts, but that moderate impacts are being managed effectively and efficiently.
Major significance	An impact of major significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. A goal of the EIA process is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a development. It is then the function of regulators and stakeholders to weigh such negative factors against the positive factors such as employment, in coming to a decision on the Project.

Once the significance of the impact has been determined, it is important to qualify the **degree of confidence** in the assessment. Confidence in the prediction is associated with any uncertainties, for example, where information is insufficient to assess the impact. Degree of confidence can be expressed as low, medium or high.

Appendix 2: Botanical Assessment Content Requirements of Specialist Reports, as prescribed by Appendix 6 of GN R326.

Regulation	Content as required by NEMA	Specialist Report Section/Annexure Reference
1 (1) (a)	Details of- (i) The specialist who prepared the report; and	Cover page and Page 2
	(ii) The expertise of that specialist to compile a specialist report, including a CV.	Page 2 and Appendix 3
1 (1) (b)	A declaration that the specialist is independent in a form as may be specified by the competent authority.	Pages 3 & 4
1 (1) (c)	An indication of the scope of, and purpose for which, the report is prepared.	Pages 6 & 7
1 (1)(cA)	An indication of the quality and age of base data used for the specialist report.	Pages 8—24
1 (1)(cB)	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change.	Pages 24—28
1 (1) (d)	The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment.	Page 12
1 (1) (e)	A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used.	Pages 12 & 13; Appendix 1
1 (1) (f)	Details of an assessment of the specifically identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives.	Pages 24
1 (1) (g)	An identification of any areas to be avoided, including buffers.	Not applicable
1 (1) (h)	A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers.	Page 24
1 (1) (i)	A description of any assumptions made and any uncertainties or gaps in knowledge.	Page 13
1 (1) (j)	A description of the findings and potential implications of such findings on the impact of the proposed activity or activities.	Page 28
1 (1) (k)	Any mitigation measures for inclusion in the EMPr.	Pages 26 & 27
1 (1) (l)	Any conditions for inclusion in the environmental authorisation.	Pages 26 & 27
1 (1) (m)	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Not applicable

Regulation	Content as required by NEMA	Specialist Report Section/Annexure Reference
1 (1) (n)	A reasoned opinion- (i) whether the proposed activity, activities or portions thereof should be authorised; and	Page 29
	(iA) regarding the acceptability of the proposed activity or activities; and	Page 29
	(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Pages 26, 27, 29
1 (1) (o)	A description of any consultation process that was undertaken during the course of preparing the specialist report	Not applicable
1 (1) (p)	A summary and copies of any comments received during any consultation process and where applicable, all responses thereto	Page 22
1 (1) (q)	Any other information requested by the competent authority	Not requested

Appendix 3: Curriculum Vitae

Dr David Jury McDonald Pr. Sci. Nat.

Name of Company: Bergwind Botanical Surveys & Tours CC. (Independent consultant)

Work and Home Address: 14 A Thomson Road, Claremont, 7708

Tel: (021) 671-4056 **Mobile:** 082-876-4051 **Fax:** 086-517-3806

E-mail: dave@bergwind.co.za

Website: www.bergwind.co.za

Profession: Botanist / Vegetation Ecologist / Consultant / Tour Guide

Date of Birth: 7 August 1956

Employment history:

- 19 years with National Botanical Institute (now SA National Biodiversity Institute) as researcher in vegetation ecology.
- Five years as Deputy Director / Director Botanical & Communication Programmes of the Botanical Society of South Africa
- Twelve years as private independent Botanical Specialist consultant (Bergwind Botanical Surveys & Tours CC)

Nationality: South African (ID No. 560807 5018 080)
Languages: English (home language) – speak, read and write
Afrikaans – speak, read and write

Membership in Professional Societies:

- South Africa Association of Botanists
- International Association for Impact Assessment (SA)
- South African Council for Natural Scientific Professions (**Ecological Science, Registration No. 400094/06**)
- Field Guides Association of Southern Africa

Key Qualifications:

- Qualified with a M. Sc. (1983) in Botany and a PhD in Botany (Vegetation Ecology) (1995) at the University of Cape Town.
- Research in Cape fynbos ecosystems and more specifically mountain ecosystems.
- From 1995 to 2000 managed the Vegetation Map of South Africa Project (National Botanical Institute).
- Conducted botanical survey work for AfriDev Consultants for the Mohale and Katse Dam projects in Lesotho from 1995 to 2002. A large component of this work was the analysis of data collected by teams of botanists.
- **Director: Botanical & Communication Programmes** of the Botanical Society of South Africa (2000—2005), responsible for communications and publications; involved with conservation advocacy particularly with respect to impacts of development on centres of plant endemism.

- Further tasks involved the day-to-day management of a large non-profit environmental organisation.
- **Independent botanical consultant** (2005 – to present) over 300 projects have been completed related to environmental impact assessments in the Western, Southern and Northern Cape, Karoo and Lesotho. A list of reports (or selected reports for scrutiny) is available on request.

Higher Education

Degrees obtained
and major subjects passed:

B.Sc. (1977), University of Natal, Pietermaritzburg
Botany III
Entomology II (Third year course)

B.Sc. Hons. (1978) University of Natal, Pietermaritzburg
Botany (Ecology /Physiology)

M.Sc. - (Botany), University of Cape Town, 1983.
Thesis title: 'The vegetation of Swartboschkloof, Jonkershoek, Cape Province'.

PhD (Botany), University of Cape Town, 1995.
Thesis title: 'Phytogeography endemism and diversity of the fynbos of the southern Langeberg'.

Certificate of Tourism: Guiding (Culture: Local)
Level: 4 Code: TGC7 (Registered Tour Guide: WC 2969).

Employment Record:

January 2006 – present: Independent specialist botanical consultant and tour guide in own company: **Bergwind Botanical Surveys & Tours CC**
August 2000 - 2005 : Deputy Director, later Director Botanical & Communication Programmes, Botanical Society of South Africa
January 1981 – July 2000 : Research Scientist (Vegetation Ecology) at National Botanical Institute
January 1979—Dec 1980 : National Military Service

Further information is available on my company website: www.bergwind.co.za