HWC CASE NO. 18012908WD0131E

HERITAGE IMPACT ASSESSMENT

PROPOSED ENLARGEMENT OF THE DRIEFONTEIN DAM, PORTION 33 OF THE FARM RIETVALLEY NO. 364, CERES WESTERN CAPE

Assessment conducted under Section 38 (3) of the National Heritage Resource Act (No. 25 of 1999)

Prepared for

ENVIROAFRICA
Att: Ms Inge Erasmus
PO Box 5367, Helderberg, 7135
Email: inge@enviroafrica.co.za

On behalf of

AGTERFONTEIN BOERDERY (PTY) LTD

By

ACRM
5 Stuart Road, Rondebosch, 7700
M 0823210172
Email: acrm@wcaccess.coz.a

MAY 2018[1]

[1] Revised August 2018

Executive summary

1. Introduction

ACRM was appointed by EnviroAfrica to conduct a Heritage Impact Assessment (HIA) for the proposed enlargement of the Driefontein Dam on Portion 33 of the Farm Rietvalley No. 364, near Ceres in the Western Cape.

An area of approximately 13ha of disturbed land will be lost in order to enlarge the existing dam.

2. Legal Framework

The National Heritage Resources Act (Act No. 25 of 1999) makes provision for a compulsory HIA when an area exceeding 5000m² is being developed. This is to determine if the area contains heritage sites and to take the necessary steps to ensure that they are not damaged or destroyed during development.

The Driefontein Dam is underlain by Early Devonian marine sediments of the Lower Bokkeveld Group (Voorstehoek Formation) that are of known high palaeontological sensitivity.

Archaeological resources known to occur in the Ceres area include open scatters of ESA and MSA artefacts in secondary contexts.

A HIA, comprising a palaeontological study was requested by Heritage Western Cape (HWC), following the submission of a Notice of Intent to Develop (or NID).

John Almond of Natura Viva was appointed to conduct the Palaeontological Impact Assessment (or PIA).

ACRM is responsible for writing up the integrated HIA, which includes comments from the local municipality and registered conservation bodies.

Enviroafrica is the appointed Environmental Assessment Practitioner (EAP) responsible for facilitating the environmental assessment process.

Since the proposed development entails the enlargement of an existing dam, no dam alternatives were presented for assessment, and no site location alternative.

3. Aim of the HIA

The purpose of the HIA is to assess the sensitivity of palaeontological resources in the study area, to determine the potential impacts on such resources, and to avoid and/or minimise such impacts by means of management and/or mitigation measures.

4. Results of the study

Lower Bokkeveld Group (Voorstehoek Formation) bedrocks in the Warm Bokkeveld region have yielded rich assemblages of shelly marine invertebrates. However, in the Driefontein Dam study area the Voorstehoek Formation bedrocks are generally poorly exposed, highly-weathered near the surface, fractured and secondarily mineralised locally. Shelly fossil remains here are very sparse, with only two invertebrate specimens recorded during the site visit - *viz.* a poorly-preserved orthocone nautiloid and a juvenile homalonotid trilobite.

The heritage remains have been rated as having *low* (Grade IIIC) significance.

5. Conclusion

According to Almond, `the bedrocks within the study area are generally of low palaeontological sensitivity and the proposed Driefontein Dam project therefore does not pose a significant threat to local palaeontological heritage resources'.

Pending the chance discovery of substantial new fossil remains during construction, no further specialist palaeontological studies or mitigation are recommended.

According to Almond, further enlargement of the Driefontein Dam will not impact on significant palaeontological resources.

6. Recommendations

1. In the case of any significant new fossil finds exposed during dam construction (*e.g.* concentrations of well-preserved fossil shells such as "starfish beds"), these should be safeguarded - preferably *in situ* - and reported by the ECO as soon as possible to Heritage Western Cape (Att: Mr Andrew September 021 483 9543).

2. These recommendations must be incorporated into the Environmental Management Programme (EMPr) for the proposed project.

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1. INTRODUCTION

ACRM was appointed by EnviroAfrica to conduct a Heritage Impact Assessment (HIA) for the proposed enlargement of the Driefontein Dam on Portion 33 of the Farm Rietvalley No. 364, near Ceres (Witzenberg Municipality) in the Western Cape (Figures 1-3).

The Driefontein Dam is underlain by Early Devonian marine sediments of the Lower Bokkeveld Group (Voorstehoek Formation) that are of known high palaeontological sensitivity (Almond 2018). The proposed development will entail voluminous excavations into the superficial sediment cover and the underlying bedrock as well. The proposed project may adversely affect potential fossil heritage within the study area by destroying, disturbing or permanently sealing-in fossils at or beneath the surface of the ground that are then no longer available for scientific research or other public good.

Archaeological resources known to occur in the Ceres area include open scatters of ESA and MSA artefacts in secondary contexts (Kaplan 2007a, 2007b, 2009, 2010).

A HIA, comprising a palaeontological study was requested by Heritage Western Cape (HWC), following the submission of a Notice of Intent to Develop (or NID).

HWC requested that comments from registered conservation bodies and the local municipality must also be included in an integrated HIA report.

Natura Viva was appointed to conduct the field based PIA.

ACRM is responsible for writing up the integrated HIA.

Enviroafrica is the appointed Environmental Assessment Practitioner (EAP) responsible for facilitating the environmental assessment process.

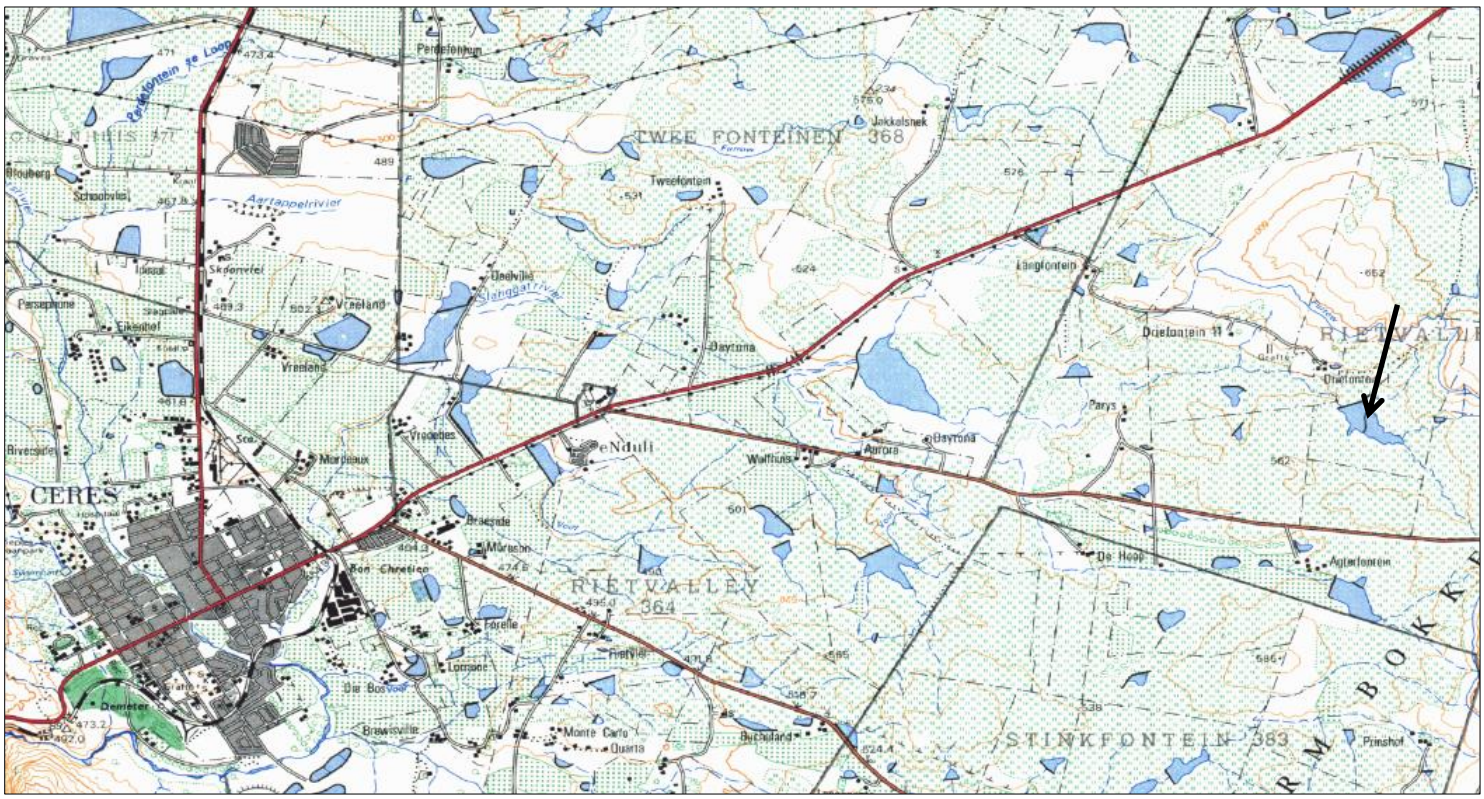

Figure 1. Locality Map (3319AD Ceres). Arrow indicates the location of the existing Driefontein Dam

Figure 2. Google satellite map showing the location of the existing Driefontein Dam

Figure 3. Google satellite map showing the dam study site in blue

2. THE DEVELOPMENT PROPOSAL

Agterfontein Trust proposes the enlargement of the existing Driefontein Dam on Portion 33 of the Farm Rietvalley No. 364, Ceres, for which an existing water use license already exists. The dam currently does not provide enough storage capacity on the farm for winter listed water. The proposed enlargement of the dam would therefore allow for the storage of summer irrigation water, thus providing a more efficient use of an existing water use licence.

No new water will be extracted, but if enlargement is granted, the dam will have the capacity to store an additional 80 000m³ of water per year. The dam wall length will be enlarged from 300m to 367m, and the dam wall will be raised by 1m, from 7,4 to 8,4m. The full capacity surface area will be enlarged from 10,51ha to 12,67ha and the dam's full capacity will be 321 000m³. 8 900m³ of soil will be removed from the bottom of the dam to be used to enlarge the dam wall. An area of approximately 13ha of agricultural will thus be lost in order to enlarge the dam.

The proposed activity entails enlargement of an existing dam, and therefore no dam alternatives were presented for assessment and no site location alternative. There is thus only one site layout alternative, *viz* the preferred alternative.

3. DESCRIPTION OF THE RECEIVING ENVIRONMENT

The study area for the Driefontein Dam is situated at an elevation of *c*. 550 m amsl in gently rolling hill terrain of the Warm Bokkeveld region, some 8.2 km to the NE of Ceres on the R46. The surrounding area has been completely transformed by agriculture (Figures 4 & 5). There is virtually no natural vegetation occurring within the 13ha inundation area. Several shallow drainage lines converging on the dam site are incised into thick soils and saprolite with no fresh bedrock exposure. There are no significant landscape features within the inundation area. Surrounding land use is intensive agriculture (dryland wheat).

Figure 4. Driefontein Dam and the receiving environment. The blue polygon in the full supply level. Note the surrounding transformed landscape

Figure 5. View southwards across the existing Driefontein Dam from the dam wall towards the Hex River Mountains. Low exposures of Bokkeveld Group bedrocks are visible along the north western edge of the dam (source Almond, 2018)

4. APPROACH TO THE STUDY

The approach to this palaeontological heritage study is briefly as follows. Fossil bearing rock units occurring within the broader study area are determined from geological maps and satellite images. Known fossil heritage in each rock unit is inventoried from scientific literature, previous assessments of the broader study region, and the author's field experience and palaeontological database. Based on this data as well as field examination of representative exposures of all major sedimentary rock units present, the impact significance of the proposed development is assessed with recommendations for any further studies or mitigation.

The information used in the palaeontological heritage study was based on the following:

1. Project descriptions, maps, kml files and supporting documents provided by ACRM;

2. A review of the relevant satellite images, topographical maps and scientific literature, including published geological maps and accompanying sheet explanations, as well as several previous desktop and field-based palaeontological assessment studies in the Ceres region and comparable bedrocks.

2. The author's previous field experience with the formations concerned and their palaeontological heritage;

4. A short palaeontological field assessment on 12 April 2018

5. OBSERVATIONS AND FINDINGS

According to Almond (2018), Bokkeveld Group bedrock exposure in the study area is largely confined to small outcrops of gently - to steeply-dipping beds of dark grey, grey-green, blueish-green, rusty-brown to khaki, massive to laminated siltstone and wacke. These sediments crop out around the north-western and north-eastern margins of the existing dam as well as in the walls of a short pipeline trench leading from a small concrete reservoir on the southern side of the dam (Figures 6 & 7). The bedrocks are highly-weathered, and fractured with very little bedding plane exposure. They are locally impregnated with secondary iron and manganese minerals, including small ferruginous nodules. Soft-sediment loading of wacke units is locally developed and the succession is cut by several small-scale faults. Mottling of some horizons indicates high levels of bioturbation.

The bedrocks are overlain by fairly thick, sparsely gravelly, loamy to clay-rich soils of mixed alluvial and colluvial origin. A zone of downwasted coarse gravels along the eastern side of the dam includes angular to occasionally well-rounded clasts of pale quartzite, sandstone (often ferruginised), wacke and vein quartz (Figure 8). The surface gravels also include sparse crudely-flaked Early Stone Age (ESA) quartzite bifaces (Figure 9).

Figure 6. Low exposures of gently-dipping Voorstehoek Formation mudrocks & wackes along the north-western margins of the Driefontein Dam (dam wall in the background) Hammer = 30 cm (Source Almond 2018).

Figure 7. Highly fractured, faulted & weathered Voorstehoek Formation bedrocks exposed in a short pipeline trench on the southern edge of the existing dam (Source Almond, 2018).

Figure 8. Dense scatter of downwasted angular clasts of quartzite, wacke and vein quartz along the eastern margins of the dam (Source Almond, 2018).

Figure 9. Examples of sparse bifacially-flaked ESA quartzite artefacts scattered within the gravel-rich area illustrated above (Source Almond, 2018).

The Voorstehoek Formation bedrocks in the Driefontein Dam study area are generally highly weathered, fractured and locally secondarily mineralised, compromising preservation of scientifically-useful fossil remains. The only fossils recorded during the site visit were internal moulds of an orthocone nautiloid (Figure 10) and an incomplete juvenile homalonotid trilobite (Figure 11). Nautiloids are comparatively rare in existing Bokkeveld Group fossil collections. The specimen here is unfortunately poorly preserved, while homalonotid trilobites are a very common element within Voorstehoek invertebrate biotas.

According to Almond (2018:12), neither of these fossils is considered to be of high scientific or conservation value, and have been rated as having *low (Grade* IIIC) significance.

No fossils were recorded from the overlying soils and downwasted gravels. The presence of sparse ESA quartzite artefacts in a disturbed context is noted. Comparable stone artefact assemblages have been reported elsewhere in the Warm Bokkeveld region by Kaplan (2007a, 2007b, 2009, 2010).

Note: *According to Almond (email dated 22 May 2018) `proposed dam dimension changes will have no significant impact on the original conclusions'.*

Figure 10. Poorly-preserved internal mould of an orthocone nautiloid showing nested series of lens-shaped, biconvex casts of the shell chambers preserved within massive dark siltstone (Specimen is *c*. 3 cm long) (33 21 12.4 S, 19 24 19.1 E) (Source Almond, 2018).

Figure 11. Internal mould of the posterior trunk and pygidium of a small (probably juvenile homalonotid trilobite (*Burmeisteria*) preserved within massive dark siltstone (Specimen is *c*. 5.5 cm long) (33 21 12.4 S, 19 24 19.1 E) (Source Almond 2018)

6. COMMENTS FROM REGISTERED CONSERVATION BODIES AND THE LOCAL MUNICIPALITY

Comments from registered conservation bodies (i. e. CapeNature & the Breede Gouritz Catchment Management Agency), are confined to biodiversity issues (Appendix B & C).

No heritage related comments were received.

The Witzenberg local Municipality was informed about the project (Appendix D), but to date no comment has been received from them.

7. CONCLUSIONS

It is concluded `that the bedrocks within the study area, are generally of low palaeontological sensitivity and that the proposed dam project does not pose a significant threat to local palaeontological heritage resources. Pending the chance discovery of substantial new fossil remains during construction, no further specialist palaeontological studies or mitigation are recommended here' (Almond, 2018:14).

According to Almond (email dated 22 May, 2018) further enlargement of the Driefontein Dam will not impact on significant palaeontological resources.

8. RECOMMENDATIONS

With regard to the proposed enlargement of the Driefontein Dam on Portion 33 of the Farm Rietvalley No 364, the following recommendations are made (Almond 2018)

1. In the case of any significant new fossil finds exposed during dam construction (*e.g.* concentrations of well-preserved fossil shells such as "starfish beds"), these should be safeguarded - preferably *in situ* - and reported by the ECO as soon as possible to Heritage Western Cape (Att: Mr Andrew September 021 483 9543).

2. These recommendations must be incorporated into the Environmental Management Programme (EMPr) for the proposed project.

9. REFERENCES

Almond, J. 2018. Palaeontological Heritage Report: Combined desktop and field study. Proposed enlargement of the Driefontein Dam, Portion 33 of Farm Rietvalley No. 364, Ceres, Witzenberg Local Municipality, Western Cape. Report prepared for EnviroAfrica. Natura Viva, Cape Town.

Kaplan, J. 2007a. Phase 1 Archaeological Impact Assessment proposed expansion of an existing irrigation dam on the Farm Lushof, Prince Alfred Hamlet. Report prepared for EnviroAfrica. ACRM, Riebeek West.

Kaplan, J. 2007b. Phase 1 Archaeological Impact Assessment, proposed Ceres Golf Estate, Hotel and Housing Development, Ceres, Western Cape Province. Report prepared for Ninham Shand Consulting Engineers. ACRM Riebeek West.

Kaplan, J. 2009. Proposed expansion of an existing irrigation dam on the Farm Lushof, Prince Alfred Hamlet, near Ceres, Portion 27 of Farm Elandsrivier No. 336, Western Cape. Report prepared for EnviroAfrica. ACRM, Riebeek West.

Kaplan, J. 2010. Phase 1 Archaeological Impact Assessment, proposed development of agricultural land on the Farm Laastedrif near Ceres, Western Cape. Report prepared for EnviroAfrica. ACRM, Cape Town.

Appendix A

Palaeontological Heritage Report

Appendix B

Comments from CapeNature

CapeNature

SCIENTIFIC SERVICES

postal Private Bag X5014 Stellenbosch 7599
physical Assegaaibosch Nature Reserve Jonkershoek
website www.capenature.co.za
enquiries Alana Duffell-Canham
telephone +27 21 866 8000 **fax** +27 21 866 1523
email aduffell-canham@capenature.co.za
reference SSD14/2/6/1/9/6/364-33_Water_DamEnlargement_Driefontein
date 22 November 2017

Inge Erasmus
EnviroAfrica
PO Box 5367
Helderberg
7135
By email: admin@enviroafrica.co.za

Dear Ms Erasmus

RE: Proposed enlargement of Driefontein Dam on portion 33 of the Farm Rietvalley 364, Ceres – Background Information Document.

Thank you for providing us with a Background Information Document. We would like to be registered as a commenting authority for this project. We would also like to make the following initial comments:

Historically, the vegetation on the dam site was Ceres Shale Renosterveld which is currently listed as a Vulnerable ecosystem although it is steadily declining and almost qualifies as an Endangered ecosystem. Ceres Shale Renosterveld has hardly any formal protection. However, the site has been largely transformed by cultivation and there is no significant natural vegetation around the dam. Impacts on terrestrial ecology are therefore of low concern.

The dam does however appear to be instream and several stream lead into it. These streams have been determined as Ecological Support Areas category 2 (ESA2) which means that ideally they should be rehabilitated so that there is some ecological functioning. Please refer to the 2017 Western Cape Biodiversity Spatial Plan (WCBSP)[1]. Consideration does therefore need to be given to ecological flow requirements. In addition, if storage capacity of winter runoff increases, abstraction from the streams and other sources should decrease or even stop during summer.

The dam area (13ha) seems relatively large for the volume (80 000m³). Is this the only design possible and has consideration been given to evaporation? Large shallow dams are more prone to water loss through evaporation than smaller, deeper dams.

We will provide additional comment once more detailed information has been supplied.

CapeNature reserves the right to revise initial comments and request further information based on any additional information that may be received.

[1] Geographic Information System (GIS) layers, maps and the BSP handbook are available for download on the South African National Biodiversity Institute's BGIS website: http://bgis.sanbi.org/Projects/Detail/194. They can are also available on a viewing platform on the Western Code Department of Agriculture's CapeFarmMapper website: https://gis.elsenburg.com/apps/cfm/

Yours sincerely

Alana Duffell-Canham
For: Manager (Scientific Services)

Appendix C

Comments from the Breede Gouritz Catchment Management Agency

BREEDE-GOURITZ

Catchment Management Agency
Opvanggebied Bestuursagentskap
I-Arhente yoLawulo lomMandla nokungqongileyo

53 Baring Street Worcester 6850, Private Bag X3065 Worcester 6850

Enquiries: S. Lupo	Tel: 023-3468000	Fax: 0233472012	E-mail: slupo@bgcma.co.za
Your Ref:	Our Ref: 4/10/2/H108/Rietvalley364/33		Date: 14/12/2017

EnviroAfrica
P. O. Box 5367
HELDERBERG
7135
admin@enviroafrica.co.za

Attention: EnviroAfrica

COMMENT: PROPOSED ENLARGEMENT OF DRIEFONTEIN DAM ON PORTION 33 OF THE FARM RIETVALLEY 364, CERES.

Notice for NEMA EIA Public Participation process for the proposed enlargement of Driefontein Dam was received by BGCMA on 17 November 2017.

BGCMA would like register as one of the Interested and Affected Parties (I&AP) for the proposed above mentioned project. BGCMA will therefore, wait for the draft EIA in order to provide comments.

General

- No water must be taken from a water resource for any purpose without authorisation from the National Water Act, 1998 (Act 36 of 1998).
- No waste or water containing waste may be disposed without authorisation from the National Water Act, 1998 (Act 36 of 1998) and National Environmental Management: Waste Act, 2008 (Act 59 of 2008).
- All relevant sections and regulations of the National Water Act, 1998 (Act 36 of 1998) regarding water use must be adhered to.
- No pollution of surface water or groundwater resources may occur.
- Stormwater management must be addressed both in terms of flooding, erosion and pollution potential.
- No stormwater runoff from any premises containing waste, or water containing waste emanating from industrial activities and premises may be discharged into a water resource. Polluted stormwater must be contained.

Please be advised that no activities may commence without the appropriate approvals/authorisations where needed from the responsible authority. The onus remains with the registered property owner to confirm adherence to any relevant legislation that such activities might trigger and/or need authorisation for.

This office reserves the right to amend and revise its comments as well as to request any further information.

Please do not hesitate to contact this office if you have any further queries. Please ensure to quote the above reference in doing so.

Yours faithfully,

JAN VAN STADEN
CHIEF EXECUTIVE OFFICER (ACTING)

4/10/2/H10B/Rietvalley 364/33

Appendix D

Proof of communication with Witzenberg Municipality

REGISTER OF INTERESTED & AFFECTED PARTIES

PHASE Notice of Intent

EnviroAfrica
Environmental Planning and Impact Assessment Consultants
Omgewingsbeplanning en Impakbeoordeling Konsultante

Project name Agterfontein Boerdery: Driefontein Dam Enlargement | **DEADP Ref. No.**

Advert Placed Witzenberg Herold | **Date** 10/11/2017

No.	Title	Initials/Name	Surname	Affiliation	Postal Address	Town/City	Code	Telephone	Fax	E-mail
1. Applicant										
1.1	Mr.	David	Malherbe	Agterfontein Trust	P.O. Box 77	Ceres	6835	023 312 1244	086 512 4784	admin@agterfontein.co.za
2. Property / Land Owners:										
2.1	Mr.	David	Malherbe	Agterfontein Trust	P.O. Box 77	Ceres	6835	023 312 1244	086 512 4784	admin@agterfontein.co.za
3. Occupiers										
3.1				Same as property owner						
4. Municipality										
4.1	Mrs.	Heloise	Truter	Witzenberg Municipality (Municipal Manager)	P.O. Box 44	Ceres	6835	023 316 1854	023 316 1877	heloise.truter@witzenberg.gov.za
4.2										
5. Municipal Ward Councillor:										
5.1	Mr.	Dirk	Swart	Ward 3 Councillor	50 Voortrekker Street	Ceres	6835	0233161854	233168133	dirk@witzenberg.gov.za
5.2	Mr.	Hennie	Smit	Ward 5 Councillor	50 Voortrekker Street	Ceres	6835	0233161854	233168133	hennies@witzenberg.gov.za
6. Ratepayers's association										
6.1				None						
7.State Organisations:										
7.1	Mr.	Eberiene	Rossouw	Breede-Gouritz Catchment Management Area (BGCMA)	Private Bag X5055	Worcester	6849	023 346 8000	023 347 2012	erossouw@bgcma.co.za
7.2	Ms	Alana	Duffell-Canham	Cape Nature	Private Bag X6014	Stellenbosch	7599	021 866 8029	021 866 1525	ad.ffell-canham@capenature.co.za
7.3	Mr	Jonathan	Winckegel	Heritage Western Cape	Private Bag X9067	Cape Town	8000	021 483 9543	021 483 9845	hwc@pgwc.gov.za
7.4	Mr.	Cor	Van der Walt	WC Department of Agriculture - Landuse Management	Private Bag X1	Elsenberg	7607	021 808 5099	021 808 5092	corvdW@elsenburg.com
7.5										
8. Neighbours										
8.1	Mr.	JCS (Gawie)	Prins	De Hoop/ Glen Peters	P.O. Box 70	Ceres	6835	0824918645		jgawes@lantic.net
8.2	Mr.	Nico	Bester		P.O. Box 201	Ceres	6835	0829228198		nico@oppsvrug.iohome.co.za
8.3	Mr.	GS (Bertie)	Visser	Hoenderkrans Farm	P.O. Box 102	Prins Alfred Hamlet	6840	071 125 1297		farm@bell.net.za
8.4		Witzenburg Properties		Witzenburg Properties	P.O. Box 120	Ceres	6835	023 3181915		
8.5	Mr.	Louis	Prins	Lanfontein Boerdery	P.O. Box 7	Ceres	6835	082 336 8084		
8.6	Mr.	Marius	Du Plessis	Aurora Boerdery	P.O. Box 764	Ceres	6835	0832949073		aurora@breede.co.za
9. Other										

POSTNET
0 9 NOV 2017
SOMERSET MALL