RIVER MAINTENANCE MANAGEMENT PLAN (MMP)

for the proposed

THE PROPOSED EXPANSION OF AN INSTREAM DAM ON THE REMAINDER OF FARM ZWARTFONTEIN NO. 792 AND PORTION 8 OF THE FARM ZWARTFONTEIN NO. 792, ZWARTFONTEIN, MALMESBURY, WESTERN CAPE

DEADP reference number: 16/3/3/1/F5/16/2002/21

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INDEPENDENCE & CONDITIONS

EnviroAfrica is an independent consulting firm that has no interest in the proposed activity other than fair remuneration for services rendered. Remuneration for services is not linked to approval by decision making authorities and EnviroAfrica has no interest in secondary or downstream development as a result of this project. There are no circumstances that compromise the objectivity of this EMP. The findings, results, observations and recommendations given here are based on the author's best scientific and professional knowledge and available information. EnviroAfrica reserves the right to modify aspects of this report, including the recommendations if new information becomes available which may have a significant impact on the findings of this report.

RELEVANT QUALITFICATIONS & EXPERIENCE OF THE EAP

This River Maintenance and Management Plan was prepared by Anthony Mader who holds a BSc Honours in Ecology, Environment and Conservation from, and is currently completing his PhD at, the University of the Witwatersrand, Johannesburg, South Africa. Relevant experience includes over six (6) years cumulative experience in field and laboratory work in the field of phytoremediation (which involves the use of plants to remediate highly saline and heavy metal- contaminated sites) and over three (3) years' experience in the field of environmental consultancy. Anthony has facilitated EAs and WUAs for numerous projects including water supply schemes, housing development projects, roads, culverts, warehouses, and a substation. Experience also includes the auditing of some of these projects (i.e. involved in the entire project's lifecycle - cradle-to-grave).

The whole process and report were supervised by Bernard De Witt who has more than 30 years' experience in environmental management and environmental impact assessments.

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1. EXECUTIVE SUMMARY

Black Orchid Farming proposed the enlargement of the existing instream dam on the Remainder of Farm Zwartfontein No. 792 and Portion 8 of the Farm Zwartfontein No. 792, Wellington of which an existing water use license is in place. The proposed enlargement of the existing dam on the Zwartfontein Farm (located adjacent to Bonathaba Farm), forms part of a development plan to approximately double the productive hectares of the farm's agricultural output. The aim of this development plan is to create a large-scale, sustainable citrus and grape operation, creating over 200 new employment opportunities while retaining over 600 jobs . Soil and climatic conditions, along with the farms' proximity to Cape Town Harbour (approximately 60km as the crow flies), provides suitable growing and export conditions for the grape and citrus production industry. This application does not include the expansion of any cropland.

The proposed enlargement of the Zwartfontein Dam is in line with the West Coast District Municipality's IDP with regards to sustaining and supporting primary and secondary sectors within the District's economy. The West Coast District's economy is dominated by manufacturing (20.3% in 2016) and the agricultural sector (at 20.2%, generating R 5 482 300 in 2016), highlighting the need for sustainable agricultural developments. One of the main issues highlighted by the West Coast Districts Spatial Development Framework (SDF) is the recent drought and the implications of drought on the agricultural sector. Various climatic drivers, namely higher temperatures and drier conditions further exacerbate the impact of drought events on the agricultural sector , which require careful planning and adequate responses to sustain and grow the agricultural sector. The agricultural industry, and more specifically the Zwartfontein (and Bonathaba) Farm depend on water abstracted from the Bergrivier for irrigation. Due to the absence of rainfall during mid-summer when water is required (which is generally too little to sustain agricultural activities), water is generally abstracted during winter and subsequently stored in dams for irrigation during the summer months.

Therefore, the proposed project is comprised of the:

1. Enlargement of Zwartfontein Dam

The proposed enlargement/ expansion of the existing Zwartfontein Dam, of which various design alternatives were investigated, will comprise of:

- Increased Storage capacity: proposed expansion of the existing storage capacity of 150 000m^3 to a total storage capacity of 915 000m^3, effectively increasing the dam's storage capacity by 765 000m^3 (83.60%);
- Raising Dam Wall Height: the current dam height of 11.7m will be raised to a total of 22.5m, proposed increase of 10.8m;
- Increase in Dam Footprint: the existing dam footprint of ±3.6ha (36 000m^2) will be increased to a total of ±10.9ha (109 000m^2), a proposed increase of ±7.3ha (73 000m2);
- Total Development Footprint: a total of 14.5ha (145 000m^2) is expected of which approximately 3.6ha (36 000m^2) is existing /transformed. Therefore, a new disturbance footprint of 10.9ha (109 000m^2) is expected. The total development footprint includes the relocation of infrastructure associated with the Dam.

2. Relocation of Pumphouse

- The exiting pumphouse is comprised of two sections, namely the (1) pump station (consisting of pumps and filters, compost pumps), and (2) compost tanks stored in a bunded area (Figure 1 and Figure 4). The proposed pumphouse will have a footprint of approximately 200m^2.

- With the dam enlargement and raising of the dam wall it is proposed that the pumphouse and compost storage facility be split in two section and relocated. The co-ordinates of the proposed relocated pumphouse is **33°30'37.43"S, 18°54'45.57"E**.

3. Replacement and extension of outlet pipeline

- Replacement and extension of the existing outlet pipeline is proposed. It is proposed that the pipeline be replaced with a new pipeline of 500mm Ø (0.5m). The total pipeline length is expected to be 265m and will connect to the relocated pumphouse. Refer to Activity 45 of LN1.

4. Relocation of existing Eskom Infrastructure

- Existing Eskom electrical infrastructure (Figure 2), located directly below the existing dam embankment to downstream of the raised embankment footprint, will be relocated as per Eskom's legal requirements.

5. Relocation of irrigation pipelines

- Relocation and extension of irrigation pipelines. Pipeline Ø will vary from 110mm (0.11m) to 250mm (0.25m) and will be approximately ±1 150m in length. Pipelines will be constructed within a previously transformed area (ploughed land).

6. Construction of access road

- The existing access roads around the existing dam footprint will be inundated by the proposed dam enlargement. It is therefore proposed that a 10m wide and 1600m long road be constructed along the new dam footprint.

Figure 1: Existing pumphouse and compost containers in compost storage facility to be relocated. The existing dam wall is located in the background (red arrow). The drainage line is located in the forefront (blue arrow).

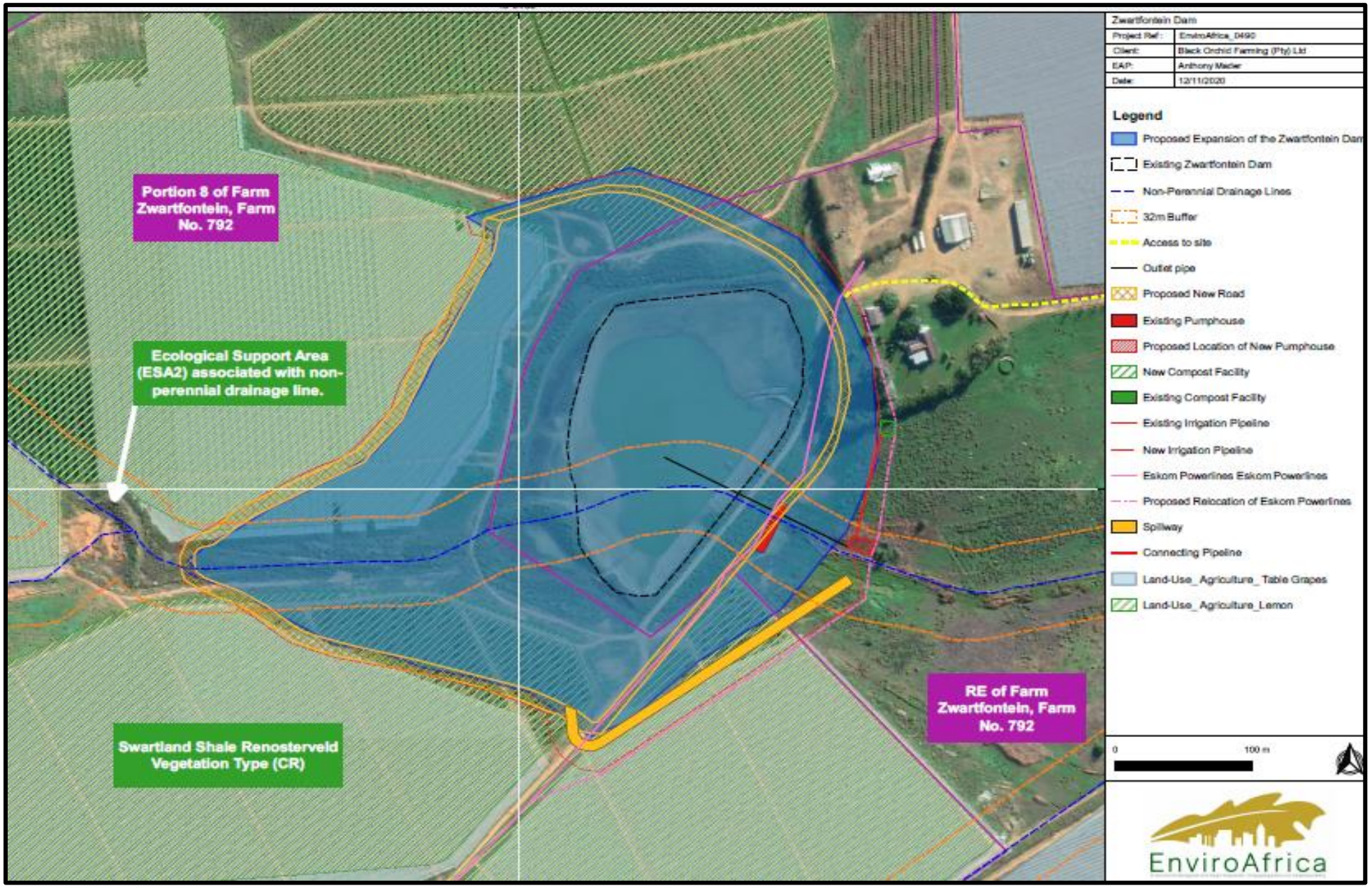

Figure 2: Spatial Development Plan of the proposed Expansion of the Zwartfontein Dam. QGIS, version 3.3.

1.1 PURPOSE OF THE MMP

A River Maintenance Management Plan (RMMP) was recommended by the DEA&DP as per the following comment received on the 8th February 2021;

The Freshwater Impact Assessment indicates that certain maintenance activities may be necessary. It is therefore recommended that a Maintenance Management Plan ("MMP") should be compiled and form part of this Basic Assessment application, so that the MMP be approved as part of this application. Should you decide to compile the said MMP, please include the MMP as part of the Environmental Management Programme ("EMPr") and provide all registered I&APs with an opportunity to provide comment on the revised BAR.

Therefore, the main purpose of this river maintenance and management plan is to guide the applicant [Black Orchid Farming Pty (Ltd)] which actions to follow to prevent avoidable damage to the aquatic habitat associated with the proposed Expansion of the Zwartfontein Dam, as well as to enhance the positive benefits of the project.

It should be noted that this MMP with its Method Statements (Appendix E1 – E7) should be read in conjunction with the Environmental Management Programme (EMPr). It should be noted that these method statements are merely guidelines and must be refined once the applicable contractors are appointed. The department must be informed of any changes to the method statements and MMP.

2. DEFINITIONS AND ABBREVIATIONS:

2.1 DEFINITIONS

Applicant: the person or responsible person from an organization who applied for the proposed activity described in the ROD / EA.

Bund: enclosure under / around a storage facility to contain spillage.

Construction: means the construction period of the project during which the actual works are carried out, deemed to include site establishment, site preparation, the works, maintenance period and decommissioning and is defined as from commencement of site establishment until site handover (practical completion).

Construction site: means the area influenced and affected by the construction activities or under the control of the Contractor often referred to as "the Site".

Construction Supervisor: The person responsible (appointed by the Applicant) to ensure that the construction is carried out to completion on time, within budged and that the Contractor fulfils his obligations in terms of the EMP.

Contaminated water: means water contaminated by the Contractor's activities, *e.g.* concrete water and runoff from plant/ personnel wash areas.

Contractor: the principal persons / company and all other sub-contractors involved in the construction of the project.

Declaration of understanding: Form that is signed by all contractors involved in the construction works of their understanding and acceptance of the EMP and site-specific additions to the EMP.

Development site: boundary and extent of development works and infrastructure.

Environment: means the surroundings within which humans exist and that are made up of:

- the land, water and atmosphere of the earth;
- micro-organisms, plant and animal life;
- any part of the combination of the above two bullets and the interrelationships between them;
- the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being

Environmental Aspect: Any element of any construction activity, product or services that can interact with the environment.

Environmental Control Officer: The ECO must be independent and suitably qualified and must have a sound knowledge of the environment in which the activity will take place.

Environmental Impact: Any change to the environment, whether adverse or beneficial, wholly or partially resulting from any construction activity, product or services.

Method statement: A statement by the Contractor, describing the scope of intended construction works step-by-step, in order for the ECO and Construction Supervisor to understand the Contractors intentions and be able to comment on, so that they could assist with devising mitigating measures should it be necessary to avoid environmental impact.

No-Go Area(s): An area of such (environmental/aesthetical) importance that no person or activity are allowed within a designated boundary surrounding this area.

Site meetings: Periodic (weekly or monthly) meetings between the ECO, Construction Supervisor and Contractor to discuss construction activities that relate to the environment or any other environmental issues that might arise.

Works: The works to be executed in accordance with a contract.

Start-up meeting: a start-up meeting held on site, before any construction has begun to discuss EMP and determine site specific additions that will be included as the basis for the EMP.

Potentially hazardous substance: is a substance, which, in the reasonable opinion of the Engineer, can have a deleterious (detrimental) effect on the environment.

Precautionary principle: means the basic principle, that when in doubt or having insufficient or unreliable information on which to base a decision, to then undertake actions that will have minimum risk.

Reasonable: means unless the context indicates otherwise, reasonable in the opinion of the Engineer/Project Leader after he has consulted with a person, not an employee of the Applicant, suitably experienced in "environmental implementation plans" and "environmental management plans", both as defined in the Environmental Management Act (Act No 107, 1998).

Solid waste: means all solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

2.2 ABBREVIATIONS

CARA	Conservation of Agricultural Resources Act no. 43 of 1983
CBA	Critical Biodiversity Area
DEA	Department Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning (Western Cape)
DWA	Department of Water Affairs
EA	Environmental Authorization (Record Of Decision) issued by relevant authority for the authorisation to commence construction under certain environmental compliances
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer - Must be a suitably qualified independent environmental consultant appointed to ensure compliance to the EMP
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
ESA	Ecological Support Area
EMP	Environmental Management Plan or Programme
FEPA	Freshwater Ecological Support Area
GPS	Global Positioning System
IHI	Index of Habitat Integrity
HWC	Heritage Western Cape
NWA	National Water Act
NEMA	National Environmental Management Act no. 107 of 1998.
NEM: AQA	National Environmental Management: Air Quality Act 39 of 2004.
NEM:BA	National Environmental Management: Biodiversity Act 10 of 2004.
NEM: PAA	National Environmental Management: Protected Areas Act 57 of 2003
NEM: WA	National Environmental Management: Waste Act 59 of 2008.
NFA	National Forest Act 84 of 1998.

NHRA	National Heritage Resources Act 25 of 1999.
NVFFA	National Veld and Forest Fire Act 101 of 1998.
NWA	National Water Act 36 of 1998
PES	Present Ecological State
Sub-WMA	Sub – Water Management Area
WMA	Water Management Area

3. LEGISLATIVE FRAMEWORK

The following specific environmental legislative is applicable to this **Maintenance Management Plan:**

- This Maintenance Management plan is to be approved in terms of the **NEMA EIA** Regulations 2014 (as amended)
- The requirements of the **National Water Act 36 of 1998** (as amended);
- The requirements of the **National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA**) in terms of:
    - National list of ecosystems that are threatened and in need of protection (GN 1002 of 9 December 2011).
    - Alien and invasive species list 2016 (GN R. 864 of 29 July 2016).
- **Conservation of Agricultural Resources Act 43 of 1983**, as amended (CARA) in terms of:
    - Combating/preventing erosion; and
    - Combating weeds and invader plants

Overview of other applicable legislation:

- **Constitution of the Republic of South Africa (1996)**: of special relevance in terms of environment is section 24
- **Conservation of Agricultural Resources Act 43 of 1983 (CARA)**: supports conservation of natural agricultural resources (soil, water, plant biodiversity) by maintaining the production potential of the land and combating/preventing erosion; for example, by controlling or eradicating declared weeds and invader plants.
- **Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947),** to control the sell, purchase, use and disposal of agricultural or stock remedies.
- **Hazardous Substances Act 15 of 1973**: to control substances that may cause injury, ill-health, or death through their toxic, corrosive, irritant, strongly sensitizing or flammable nature, or by the generation of pressure
- **National Environmental Management Act 107 of 1998 (as amended):** replaces the Environmental Conservation Act (ECA) and establishes principles for decision-making on matters affecting the environment, and for matters connected therewith.
    - **Environmental Impact Assessment Regulations**: identifying activities (listed activities) for which environmental authorisation must be obtained.
- **National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA):** supports conservation of plant and animal biodiversity, including the soil and water upon which it depends.
    - **National list of ecosystems that are threatened and in need of protection** (GN 1002 of 9 December 2011).
    - **Alien and invasive species list 2016** (GN R. 864 of 29 July 2016).
- **National Environmental Management: Protected Areas Act 57 of 2003 (as amended Act 31 of 2004) (NEMPAA):** To provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes.
- **National Environmental Management: Waste Act 59 of 2008 (NEMWA):** To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.
    - **List of Waste Management Activities that have, or are likely to have a detrimental effect on the environment**: Identifies activities in respect of which a waste management license is required.
- **National Forests Act 84 of 1998 (as amended)**: supports sustainable forest management and the restructuring of the forestry sector.
    - **List of protected tree species** (GN 716 of 7 September 2012)

- **National Heritage Resources Act 25 of 1999**: supports an integrated and interactive system for the management of national heritage resources, including supports soil, water and animal and plant biodiversity.
- **National Veld and Forest Fire Act 101 of 1998 (NVFFA):** protects soil, water and plant life through the prevention and combating of veld, forest, and mountain fires
- **National Water Act 36 of 1998 (NWA):** promotes the protection, use, development, conservation, management, and control of water resources in a sustainable and equitable manner.

4. SITE DESCRIPTION

The proposed project is situated on RE of Farm Zwartfontein, Farm No. 792 [approximately 2 558 500m^2 (255.85ha) in extent] and Portion 8 of Farm Zwartfontein, Farm No. 792 [961 300m^2 (96.13ha) in extent]. No alternative properties and locations were investigated as this application is for the proposed expansion of the existing Zwartfontein dam.

4.1 BIODIVERSITY FEATURES

Biodiversity Spatial Plan (BSP; Figure 3):

From the Biodiversity Overlay Maps from Cape Farm Mapper (Appendix D) and the Botanical Assessment conducted by the Biodiversity Specialist (Appendix G1) the site falls within a small Critical Biodiversity Area (CBA). However, the small CBA is located within the dam. The dam will also further impact Ecological Support Area Class 2 (ESA2). The report further states that special care was taken when this area was studies in order to check for any special vegetation features. The terrain and its immediate surroundings are considered heavily degraded and transformed with only a few hardy indigenous species remains. It is recommended that topsoil removed from the drainage lines for construction be stored in a safe place and used for rehabilitation of the drainage lines, after construction. Properly managed and designed farm dams can attract a variety of bird, insect and animals to the area and so contribute to conservation of biodiversity.

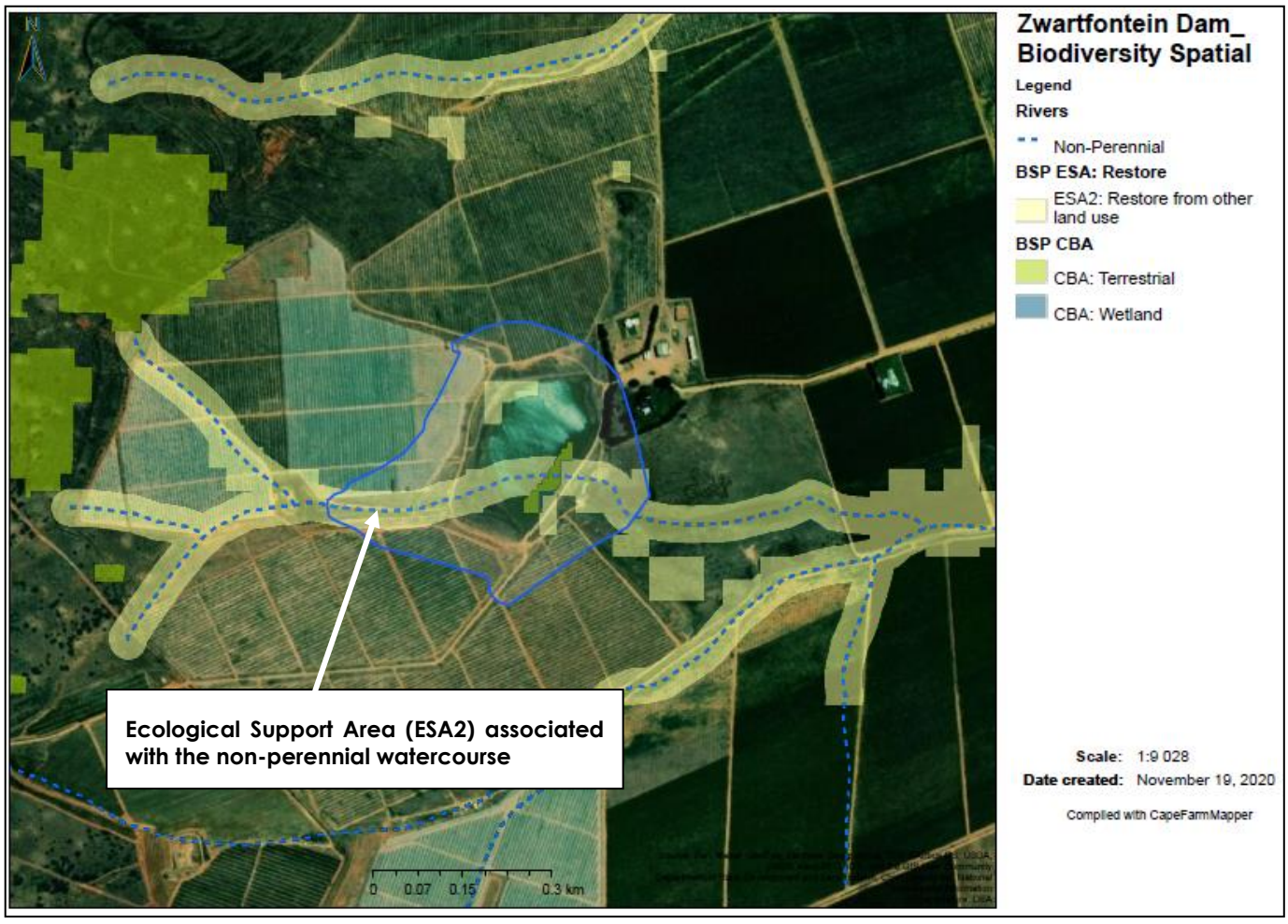

Figure 3. Biodiversity Spatial Plan (BSP) associated with the proposed expansion of the Zwartfontein Dam. Note, sections of the CBA and ESA2 (located within the total development footprint) have already been disturbed / transformed by the existing Zwartfontein Dam.

Vegetation:

According to the Vegetation map from Cape Farm Mapper, Appendix D, the vegetation that would have been present on the site is Swartland Shale Renosterveld. This type of vegetation is classified as *Critically Endangered* in terms of the *National Environmental Management: Biodiversity Act 2004, National List of Ecosystems that are threatened and in need of protection (NEMBA).* However, The Botanical assessment concludes that the proposed dam enlargement will not impact on any remaining vegetation or plant species of significant conservation value. Most of the terrain and its immediate surroundings are considered heavily degraded to transformed, only a few indigenous species and alien pioneer species remains. Therefore, the proposed dam enlargement, irrespective of Design option as well as associated infrastructure, will cause further loss of protected vegetation.

Freshwater resources:

According to the Freshwater Report, Appendix G2, the non-perennial stream which the Zwartfontein dam intersects, as indicated on the Water Resources Map from Cape Farm Mapper (Appendix D) is considered a drainage line. The drainage line is approx. 4,4k long. The drainage line upstream of the dam takes the shape of wide valleys with no discernible drainage line and with the same vegetation as elsewhere on the hill. The drainage line down-stream of the dam has been transformed into a straight agricultural return flow furrow, all the way down to its confluence with the Berg River. The drainage line is considered to be overgrown with reeds and is considered transformed and degraded. Please refer to Figure 4 for photographic representation of the status of the non-perennial drainage line.

The proposed dam will be filled with water from the Berg River, from an existing abstraction point with existing water use rights enlisted under the Berg River Irrigation Board. The existing abstraction point will remain as is. The freshwater report concludes that the existing legal water use is already fully utilised for irrigation and has already been discounted by the DWS against ecological flow requirements of the Berg river, and the proposed extra storage capacity would not alter the situation. However, with large irrigation schemes there is always the possibility of more agricultural return flow which impact the river system. However, the drainage lines have already been transformed into stormwater management systems and return flows and the enlargement of the dam will not add to these impacts.

From an environmental perspective, the proposed dam enlargement, irrespective of Design option, will not cause further loss of protected vegetation or contribute to the transformation of the drainage line any further. However, with the preferred Dam Design/Layout Alternative A: Option 10, approximately 4.3ha agricultural land will be sacrificed. The proposed relocation of the compost storage facility next to the house (Alternative A) will reduce further impact on the drainage line when compared to the original location and Alternative B , next to the new relocated pumphouse on the northern bank of the drainage line. Trucks delivering compost will utilise the existing road and avoid the drainage line completely.

According to the Biodiversity, Freshwater and comments from Heritage Western Cape, the proposed enlargement of Zwartfontein Dam will not have a significant impact on geographical, geological or physical environmental or heritage aspects as the site and associated drainage line is considered transformed with little no indigenous vegetation present on site. This is due to past and current agricultural activities on the farm and surrounds.

Current Status of the Non-Perennial Drainage Line

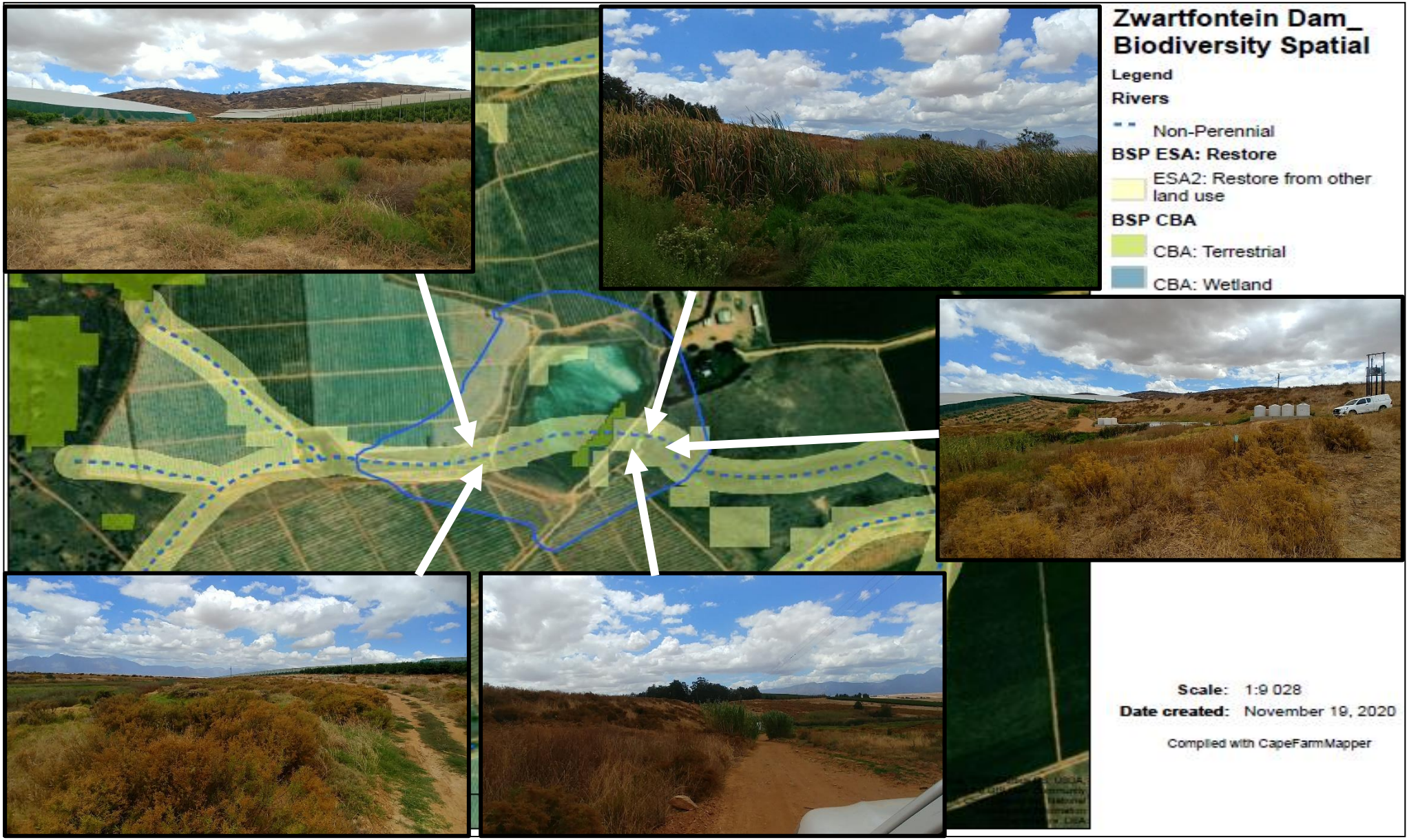

Figure 4. Current status of the transformed/ degraded, non-perennial drainage line. Note, intensive agricultural activites surrounding non-perennial drainage

5. OBJECTIVES OF MAINTENANCE ACTIVITIES/ TERMS OF REFERENCE

The main objectives of this river maintenance and management plan (MMP) is to guide the landowner and other responsible parties to correctly implement mitigation measures to protect the integrity of the aquatic habitat and to minimise the impact of the proposed expansion of the Zwartfontein Dam on the receiving environment.

This MMP aims to set guidelines for the correct management procedures and methods, in such a manner that they may be flexible.

5.1 TERMS OF REFERENCE

- Undertake a site visit in order to assess the site areas (and additional site visit was conducted on the 18th February 2021);
- Implemnt mitigation measures proposed by the Freshwater Specialist;
- Desktop review of DEA&DP's Maintenance Management Plan Guidelines;
- Identify the environmental risks associated with the maintenance management activities;
- Recommend appropriate, practicable mitigation measures that will reduce all major impact or enhance potential benefits, if any;
- Compile an MMP that takes into account all the aspects outlines in the DEA&DP Maintenance Management Plan Guidelines.

As per the Mitigation Hierarchy, attempts to avoid/ prevent, minimize, rehabilitate and offset (if necessary) must be addressed. For example - avoiding or preventing any impact on the receiving environment. If the impact is unavoidable, the extent of the impact must be minimized. All impacts must be rehabilitated accordingly, and if the impact results in irreversible damage – an offset may be required. In the context of this RMMP, it is envisaged that no offset will be required as part of this plan.

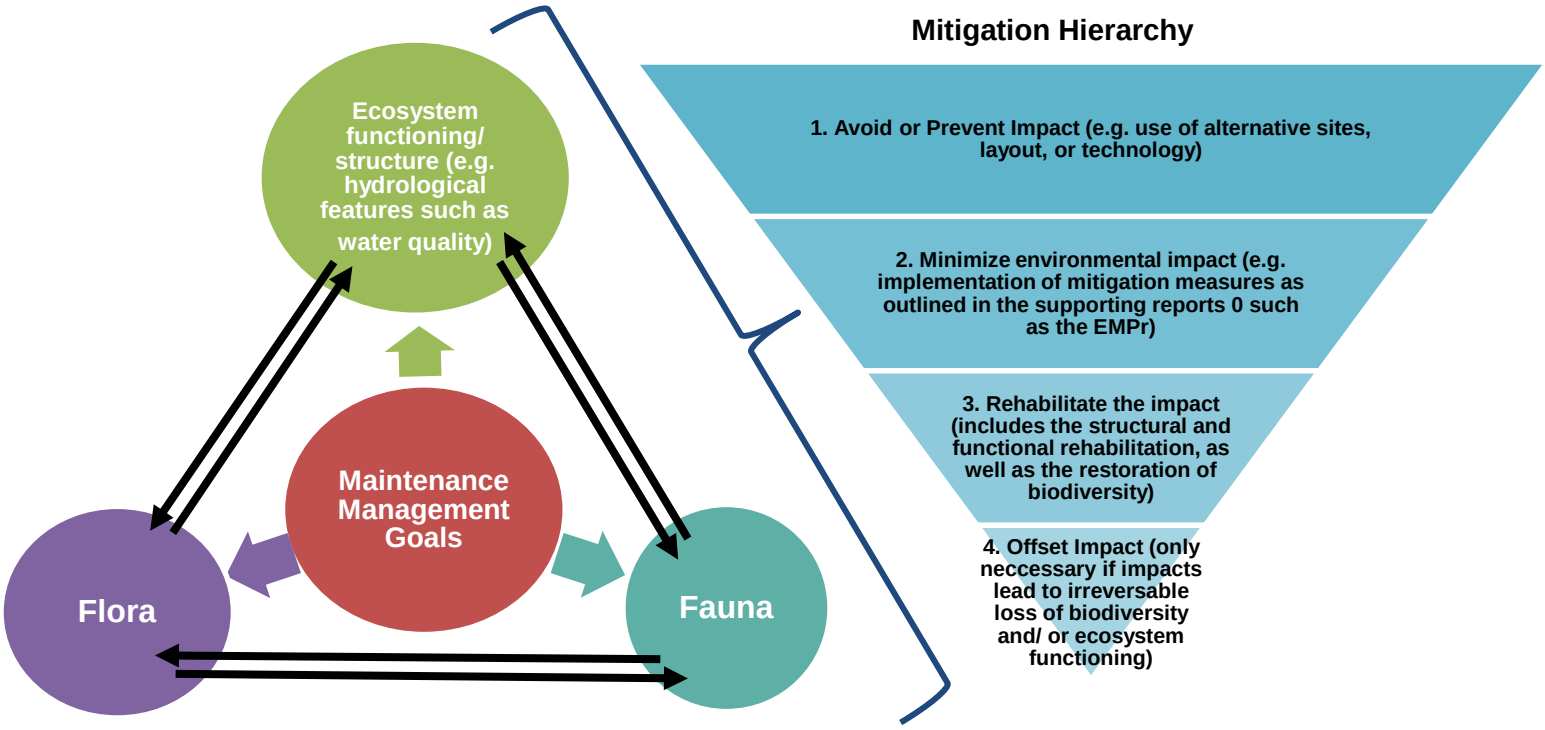

Figure 5. Mitigation hierarchy which must focus on the biological and ecosystem (structure and function) components. Note, arrows represent interplay between these components, showing that the river maintenance management plan (RMMP) requires an integrated, adaptive management approach. Adapted from DEA *et al.*, (2013). This is due to the receiving environment being dynamic in nature where biotic, abiotic, and human processes change through space and time, and therefore must be addressed accordingly.

6. BRIEF DISCRIPTION OF MAINTENANCE ACTIVITIES:

The following section briefly describe the maintenance activities. The MMP should be approved by the deciding authority and subsequently complied with by the landowner and responsible parties during maintenance activities.

The engineer responsible for the design and building of the dam must submit Operating, Maintenance and Emergency plan to DWS/BGCMA as a requirement of the dam safety regulation after construction which must be implemented.

The following general management activities and mitigation measures have been identified and must be implemented, should maintenance management activities be conducted:

- Repairs and maintenance should be undertaken within the dry season, except for emergency maintenance works;
- The contractor must demarcate the boundaries of the site or area scheduled for maintenance during the maintenance management activities as required;
- Where at all possible, existing access routes should be used;
- Responsible management of pollutants through ensuring handling and storage of any pollutants is away from the watercourse. When machinery is involved, ensure effective operation with no leaking parts and refuel outside of the riparian area, at a safe distance from the watercourse to manage any accidental spillages and pose no threat of pollution. Drip trays are required for any stationary heavy vehicles or small equipment (e.g. generators);
- With regards to maintainacne management, the flow of the watercourse should not be blocked (temporary diversions may be allowed) nor should the movement of aquatic and riparian biota (noting breeding periods) be prevented during maintenance actions;
- No new berms can be created for maintenance purposes;
- In circumstances which require the removal of any top soil, this must be sufficiently restored through sustainable measures and practices;
- Concerted effort must be made to actively rehabilitate repaired or reshaped banks with indigenous local vegetation;
- No deepening of the watercourse beyond the original, pre-damage determined thalweg, unless such deepening is directly related to the natural improved functioning and condition of such a watercourse.
- The build-up of debris/sediment removed from a maintenance site may:
    - be utilised for the purpose of in-filling or other related maintenance actions related to managing erosion, which forms part of an adopted MMP;
    - not be used to enlarge the height, width or any extent of existing berms;
    - not be deposited anywhere within 32m of the watercourse or anywhere along the banks of a river where such action is not part of the proposed maintenance activity(ies).
    - Material that cannot be used for maintenance purposes must be removed out of the riparian area (32m from the non-perennial drainage line) to a suitable stockpile location or registered disposal site.
- The use of foreign material, such as concrete, rubble, wood debris and/or dry land based soil, is strictly prohibited from being used in maintenance actions, unless for the specific purpose of repairs to existing infrastructure, coupled with appropriate mitigation measures.

- Erosion mitigation measures[1] must be implemented where applicable / appropriate.
- Maintenance material should be certified free of invasive alien plant seed to prevent infestation in the watercourse.

6.1 SITE SPECIFIC MAINTENANCE ACTIVITIES AND MIITGATION MEASURES

Site specific maintenance activities aim to protect the integrity of the watercourse habitat by mitigating, where possible, the loss aquatic habitat during maintenance activities.

Please refer to **Appendix M1-4** for the Method Statements for these maintenance activities. The Environmental Management Programme (EMPr) and Revised Draft BAR should be read in conjunction with these Method Statements.

It should be noted that these method statements are merely guidelines and must be refined once the applicable contractors are appointed and are therefore subject to change. Not all actions may be applicable to the maintenance activities associated with the proposed expansion of the Zwartfontein Dam. The department must be informed of any changes to the method statements and MMP.

Objective: Mitigate and monitor alien plant invasion on the property

As per the Botanical Assessment, the proposed site *is heavily degraded, and although it supported a few more indigenous species, even this area has been heavily degraded with the only plants remaining being hardy shrubs and weedy and alien pioneer species.* Alien invasive plant species identified on site include; invasive trees were also observed namely *Acacia saligna* (Port Jackson Willow) and *Casuarina cunninghamiana* (Beefwood). The landowner/ applicant is responsible for the removal of alien invasive plant species on their properties.

Mitigation Action:

- Removal of the invasive and alien plants should be according to the appropriate invasive plant clearing guidelines/ methods provided by the Working for Water Programme
- Alien and invasive plant species should be removed manually as far as possible, form the site as well as any areas on the property. All work will be done by hand (manually), either by pulling, using shears, hand saws or chainsaws (depending on the size of the tree). The use of vehicles or mechanical means for alien removal will be prohibited within the riparian zone.
- The use of herbicides should be avoided. However, only herbicides which have been certified and proved for watercourse/ aquatic environments by an independent testing authority may be considered.
- Cape Nature generally recommends that all removed vegetation should be removed from site to be disposed of to reduce fire hazard.

Please refer to Method Statement 1: MS01 Alien invasive plant eradication management (Appendix M1).

[1] Erosion control methods include silt fences, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, mulching, etc. Exposed areas, susceptible to erosion, must be rehabilitated. Mitigation measures are not limited to measures mentioned here as such measures may need to be adapted for site-specific maintainance. This includes planting vegetation, characteristic of the pertinent vegetation type, to stabilize the soil.

Objective: Mitigate alteration of hydrology during maintenance activities.

Surface water within the channel of the watercourse will be collected and diverted through or around the site by way of a combination of temporary works including cut-off and bypass channels, a small coffer dam, temporary pumps if necessary, etc, to collect and contain the water in order to ensure safe and acceptable working conditions. The development of a coffer dam within the watercourse and the diversion of surface water will result in the temporary alteration of aquatic habitat and hydrological flow patterns through the watercourse.

Mitigation Action:

- Demarcate the working area and put up signage to ensure maintenance activities only remain within the dedicated area
- Physically demarcate the cut-off and bypass channels, the small coffer dam as well as areas where temporary pumps will be placed if needed prior to the commencement of any activity and strictly prohibit any vehicles or maintenance activities outside of the demarcated footprint area. This can be done with danger tape, which should be removed once the maintenance activities have been completed.
- Vegetation removal should be limited as far as practically possible. Topsoil management should be implemented for the clearing of vegetation and stripping of soil
- Remove and stockpile topsoil and subsoil separately.
- Stockpile topsoil within an area where no stormwater runoff is expected.
- Replace soil in the correct order e.g. subsoil below and topsoil above, as soon as possible after maintenance activities has been completed.
- During the completion of maintenance within the watercourse natural material (coarse in the case of watercourse beds) should be used to re-surface the bed of the watercourse to re-instate habitat.
- Compact subsoil while in a moist state and spread the topsoil as evenly as possible over the subsoil.

Please refer to Method Statement 2: MS02 Hydrology management (Appendix M2).

Objective: Mitigate the disturbance of habitat and compaction of soils up and down stream of the proposed sites due to maintenance activities.

Maintenance activities such as the indiscriminate movement of vehicles and personnel and the dumping of excavated materials may result in the disturbance of watercourse vegetation and the compaction/ disturbance of soil located up and down stream of the proposed dam expansion. Disturbance may also result in the proliferation of alien and invasive plant species.

Mitigation Action:

- Demarcate working area and put up signage to ensure maintenance activities only remain within the dedicated area
- Immediately rip compacted soil to a depth of 300mm and reprofile the area according to natural terrain units where any accidental disturbance to portions of the watercourse falling outside of the demarcated maintenance footprint area has taken place.
- If the disturbed area will be prone to erosion (sheet runoff or formation of gullies), it is recommended that straw bales (not Lucerne or hay) are used to intercept the bulk of the runoff. The bales should be placed strategically along contour lines and pegged. Disturbance and removal of vegetation within the immediate vicinity of the area where the bales are placed should be kept to a minimum.
- Sediment should be cleared manually as needed.
- If stockpiling of materials is required, stockpiles must be placed at least 32m away from the watercourse.
- Prohibit dumping of excess excavated material within the watercourse.
- Once maintenance is completed, all waste i.e. rubble and equipment must be removed and disposed of in an appropriate manner as per the EMP.

Please refer to Method Statement 3: MS03 Mitigate compaction of soil up and down stream of the dam due to maintenance activities (Appendix M3).

Objective: Mitigate the increased stormwater runoff, erosion and sedimentation during maintenance activities

An increase in stormwater runoff from cleared, disturbed, and compacted areas may result in an increase in stormwater flows and flow velocities into the aquatic habitat which can cause erosion. Earth moving activities can also result in an increase in the runoff of sediment onto the downstream aquatic habitat.

Mitigation Action:

- It is suggested that the maintenance of the dam should be undertaken during the dry summer months.
- Limit sedimentation at the outflow side (downstream of the works)
- Erosion control measures must be implemented to prevent erosion and sedimentation of downstream watercourse areas.
- Strategically divert runoff from areas where earth moving activities is undertaken in the direction of pegged straw bales where required, in an attempt to intercept sediment-laden runoff before it reaches downstream watercourse habitat.
- Protect stockpiles, if required, from erosion using tarp or erosion blankets.
- Seed the dam wall after maintenance with indigenous grass that has a good soil binding capacity such as *Cynodon dactylon* or stabilised with geotextiles in order to prevent erosion.

Please refer to Method Statement 4: MS04 Runoff, erosion and sedimentation control during maintenance activities (Appendix M4)

7. RESPONSIBLE PARTIES

- **The Applicant/client** – the applicant is responsible for employing the Contractors for the duration of the maintenance work. The contractor will employ the ECO. The applicant/ client will ensure, as a signatory to the MMP, that the Contractor fulfil their obligation in terms of this MMP

- **Principal agent** - the Principal Agent is appointed by the client and is responsible to the client for ensuring that the maintenance work is carried out to completion on time, in budget and that the Contractor fulfils their obligations in terms of the MMP. The Principal Agent and ECO are expected to develop a close working relationship and to communicate frequently. The Principal Agent must be recognized as the senior authority on site and all communications and instructions between the ECO and the Contractor must occur via the Principal Agent. The Principal Agent is also responsible for deducting environmental penalties from the Contractor. The Principal Agent must ensure that the Contractor has a copy of this MMP and all approved Method Statements and that the Contractor is familiar with the relevant documentation.

- **The ECO** – the ECO must be appointed prior to the commencement of any maintenance activities. The ECO will advise the Contractor of any environmentally related issues during the maintenance phase of the development.
  - The responsibilities of the ECO will include monitoring of compliance of the MMP by the contractor
  - The ECO has the authority to recommend the cessation of works or any portion of the maintenance activity to the Principal Agent. This will be triggered if in his/her opinion the activity has caused or will imminently cause significant damage and/or harm to the environment or is in contravention of the relevant environmental legislation/permits/authorizations applicable to the site and/or activity/ies.
  - If the Contractor fails to show adequate consideration to the MMP or the recommendations of the ECO, then the ECO may recommend that the Contractor's representative or any employee/s responsible for not showing adequate consideration to the MMP are removed from the site. Alternatively, the ECO may recommend that all maintenance work on site be suspended until the matter is remedied. All costs will be carried by the Contractor.
  - Should modifications to this document be required, these must be agreed to by all parties concerned.

- **The Contractor** – the Contractor will adhere to the conditions of this MMP and ensure that all of its sub-Contractors, employees, suppliers, agents and so forth, for whom the Contractor is fully responsible for their actions on site, are fully aware of this MMP, its requirements and the consequences of any breach of the requirements of this MMP. The Contractor is fully responsible for implementing the MMP. The Contractor will ensure that works on site are conducted in an environmentally responsible manner and in accordance with the requirements of this MMP.

- **Council Representative** – will be an appropriately qualified environmental officer of the Municipality. This representative will monitor compliance of this MMP by the client through the ECO.

- **Problematic Issues** – should problematic issues arise, as identified by the ECO, the ECO has the authority to call a special meeting with the Principal Agent to address and rectify the matter.

7.1 CONTACT DETAILS OF APPLICANT/ CLIENT

Applicant / Organisation / Organ of State:	Black Orchid Farming Pty (Ltd)		
Contact person:	Ms Mine van Wyk		
App Postal address:	P.O. Box 6100 Roggebaai		
Telephone:	021 421 2129	Postal Code:	8012
Cellular:	082 511 6036	Fax:	021 421 0510
E-mail:	Mine.van.wyk@uff.co.za		

8. ENVIRONMENTAL AWARENESS TRAINING

The applicant (who is also the landowner) has been involved during the NEMA EIA application process and understands the implications off the recommendations made by the various specialists' reports, especially the freshwater specialist. By signing the declaration of understanding **(Appendix F)** the applicant declares that they understand their responsibility towards the implementation of the MMP and EMPr.

General awareness training will be given (as needed) in accordance with the EMPr **(Section 7.5.1 of the EMPr)**.

- An ECO should be appointed prior to the commencement of any maintenance activities.
- The ECO should train the Contractor on site in order to ensure that all parties involved are familiar with the potential impacts and environmental risks of the maintenance and monitoring activities as week as the mitigation measures to reduce or avoid these impacts and potential pollution or degradation of the site and surrounding environment.

As a minimum, the following should be included in the awareness programme:

- Explanation of the importance of this MMP;
- Discussion of the potential environmental impacts of maintenance activities;
- Explanation of the management structure of individuals responsible for matters pertaining to this MMP;
- employees' roles and responsibilities, including emergency preparedness (also refer to **Section 8.11 of the EMPr**);
- Explanation of the mitigation measures that must be implemented when carrying out maintenance activities; and
- Explanation of the Environmental Do's and Don'ts (please refer to the **Appendix 3 of the EMPr**) for the Environmental Education section).

Attention should be focussed on the following areas of sensitivity:

- Removal/ disturbance of riparian vegetation;
- Aquatic habitat disturbance
- Soil erosion and sedimentation; and

The awareness training for the maintenance activities should aim to prevent, and where prevention is not possible, mitigate detrimental health, safety and environmental impacts. In particular, it should promote awareness of environmental risk and management thereof.

9. GENERAL CONTROL

The following additional general management activities and mitigation measures have been identified and should be implemented where required during the maintenance management activities:

Description of the Activity & Associated Impacts	**Site Boundaries and No-Go Areas**
Measures to be implemented during maintenance activities	• The Contractor must demarcate the boundaries of the site or area scheduled for maintenance during maintenance management activities as required. • The minimum area scheduled for the maintenance activities should be demarcated. • Access to the site during maintenance activities must be restricted to ensure to only the required personnel in order to gain access via the designated, controlled access points. Sensitive areas must be demarcated in conjunction with the ECO prior to any maintenance work starting on site.

Description of the Activity & Associated Impacts	**Use of Materials** **Potential environmental impact as a result of the use/misuse of inappropriate materials**
Measures to be implemented during maintenance activities	• The principle of "re-use and recycle" (i.e. try to use recycled materials) should be implemented as far as possible on site for all maintenance related activities. • The Contractor must at all times carefully consider the requirements of the NEMA Principles and take appropriate measures to implement such as far as practicably possible.

Description of the Activity & Associated Impacts	**Occupational Health and Safety** **Potential health and Safety Impacts associated with the maintenance activities on site**
Measures to be implemented during maintenance activities	• All people working on site are responsible for their own safety on site. • Contractors must at all times comply with the relevant statutory requirements including the Occupational Health and Safety Act, Act 85 of 1993. • A comprehensive site specific first aid kit must be available on site at all times. • At least one person trained in safety and first aid and familiar with the first aid equipment on site must be present on the site at all times. Emergency procedures must also be established prior to the start of maintenance operations on site.

Description of the Activity & Associated Impacts	Waste Management Possible pollution of or damage to the environment in the general areas of the site, as a result of incorrect or poor waste management.
Measures to be implemented during maintenance activities	**Liquid waste:** (if machinery is used) • Use of machinery should only be as a last resort • Liquid dispensing receptacles (e.g. lubricants, diesel, shutter oil etc.) must have drip trays beneath them/beneath the nozzle fixtures. • Material safety data sheets (MSDS) must be available on site (if required) where products are stored, so that in the event of an incident, the correct action can be taken. • Depending on the types of materials stored on site during the maintenance activities, suitable product recovery materials (such as Spillsorb or Drizit products) must be readily available. Vehicles should ideally be washed at their storage yard as opposed to on site. • Storm water must be managed in such a way that no overland flow is possible onto any area of the site which could contain potential contaminants (such as concrete mixing areas, material and hazardous storage areas from any adjacent area). **Solid waste:** • Waste must be categorized by the Contractor and disposed of in a suitable manner into separate waste streams (this includes general, hazardous and recyclable waste) only at authorised waste disposal facilities. • The Contractor must provide an adequate number of waste receptacles for the duration of the maintenance management activities for general waste at points around the site as well as for hazardous and recyclable waste. • Waste is to be disposed via a licensed waste disposal Contractor. • The frequency of collections/emptying of waste receptacles will be of such a frequency that waste receptacles do not overflow. Particular care must be taken with the disposal of materials that could be wind-borne or waterborne to ensure that the release of these materials is minimised (the latter is a requirement for hazardous waste). The use of netting covers or similar sealed containers must be implemented as and when required by the ECO. • Areas demarcated for specific activities including food consumption must have suitable waste receptacles provided. • Wherever possible recycling must be carried out. • No dumping within the surrounding area is to be permitted. No burning of solid waste is allowed. • All material used by the Contractor during the maintenance management activities must be managed in such a way that it does not cause pollution, or that it minimises pollution. In the event of a spillage, the Contractor should have suitably trained personnel who can correctly clean up any spillage in an efficient and environmentally sound manner.

Description of the Activity & Associated Impacts	**Erosion Control** **Erosion of soil and material resulting along the impacted areas.**
Measures to be implemented during maintenance activities	• Soil erosion on site must be prevented at all times. • Maintenance activities should preferably be undertaken in the low rainfall months when the potential for erosion impacts from the maintenance activities can be contained.

Description of the Activity & Associated Impacts	**Fire Safety** **Potential fire risk associated with the maintenance activities on site.**
Measures to be implemented during maintenance activities	• Fires and burning of waste on site should not be allowed. • Open fires will not be permitted anywhere on the site during the maintenance activities.

10. REHABILITATION SPECIFICATIONS AND SITE CLEAN-UP

The following measures have been identified to ensure that restoration and rehabilitation of the environment affected by the maintenance activity following the completion of these activity:

- The contractor shall be responsible for rehabilitating (vegetation planting etc. where applicable) all disturbed areas during the maintenance activities to the satisfaction of the ECO.
- Vegetation to be replanted shall be indigenous species that are endemic to that region only. Any invasive alien plants within the disturbed area should be removed according to **MSO1 (Appendix M1)** according to the guidelines provided in the Working for Water Programme.
- Any soil and vegetation cover removed during the maintenance activities should be replaced at the same level as the existing level.
- All areas where temporary services were installed are to be rehabilitated to the satisfaction of the ECO.
- The implementing agent shall clear and clean the site and ensure that everything not forming part of the permanent works is removed from site before issuing the completion certificate or as otherwise agreed.
- Any rubble or waste associated with the maintenance activities should be removed to an approved disposal site after the maintenance activity is complete.
- Burying or burning rubble or waste on the site is strictly prohibited.
- The site is to be cleared of all litter following the completion of maintenance activities.
- All surfaces are to be checked for waste products from maintenance activities and cleared in a manner approved by the ECO.

11. ENVIRONMENTAL MONITORING & REPORTING

Monitoring aims to detecting changes that will inform intervention or remedial actions that might be needed to inform environmental performance. Monitoring will be done by physically walking the property, inspecting the dam itself as well as the watercourse habitat up and down stream of the dam.

Part of the watercourse that is monitored	Frequency of Monitoring	Monitoring procedure	How results are analysed and presented	Comments
The watercourse habitat up and down stream of the dam must be monitored.	Prior to the commencement of activities and after activities are complete. If necessary also during the maintenance activities.	➢ The ECO will visit the site during the maintenance management activities and ensure that conformance with the MMP. ➢ Guidance will be given to the implementing agent as required with regards to implementing the MMP. ➢ Photographs of the maintenance management activity will be taken as a record of the correct undertaking of the specific maintenance management activity.	The record of the site visit undertaken during the maintenance management activities will include the following: ➢ Report which will illustrate what activity was undertaken at the site; ➢ Correct implementation as well as non-conformance of the MMP will be outlined; ➢ Recommendations to ensure conformance with the MMP in future maintenance management activities if required. ➢ Photographs of all maintenance management activities undertaken at the site.	The following in particular should be monitored: • Post-construction monitoring of plants relocated during search and rescue to evaluate where the intervention was successful or not. This does not neccessirality have to be conducted by an ECO. This should be undertaken on a three-monthly basis for two years after transplanting in order to evaluate the success thereof, or as suggested by the appointed botanist who will be conducting the entire search and rescue operation. o Monitoring and clearing of alien invasive plants on the property will need to be undertaken on an ongoing basis according to the applicable recognised methods for clearing of alien invasive plant growth. o Monitor discharge points for erosion and incision on a quarterly basis and after heavy rainfall events. Should erosion and incision be noted, corrective measures must be undertaken.

11.1 MONITORING REPORT

The monitoring report will focus mainly on physical site inspections aiming at early detection of erosion and the need for intervention and the measures to be taken. As such the monitoring report needs to address the following minimum criteria, namely the date of inspection, the portion of the river that was inspected, the result of the inspection and any actions that was or needs to be taken as well as photographs showing the site before and after the maintenance activity was completed.

The landowner is responsible to ensure a record of all maintenance activities is recorded as per the forms below.

The Department may, within a reasonable notice period, request to evaluate the maintenance activities and assess the maintenance sites as per the adopted MMP.

Form A should be completed at least 7 working days before the commencement of any maintenance activity and Form B at least 3 working days following the completion of the maintenance activity(ies). At least two photographs are required from two different points of perspective (e.g. A and B) looking at the site (coordinates of these points are required). When listing the type and reference code, this must be done by specifically listing the relevant detail within the adopted MMP.

REPORTING FOR INTENT TO UNDERTAKE MAINTENANCE ACTIVITIES – FORM A				
Section A: Landowner Details				
Name	**Surname**	**Farm No.**	**Erf No.**	**Date**
Section B: Details of proposed maintenance activity				
WUA/GA reference number and DEA&DP reference number for MMP.	**Activity Type:**	**Reference code (*make reference to MMP*)**	**Footprint area (m^2)**	**Volume of material (m^3)**
Equipment to be used:	**Description of method for planned activity:**			**Date when work will commence:**
Date of last flood event for site:	**Note any further damage and comments regarding the state of the site**			
Section C: Photographs of activity location before maintenance				
Before A **Coordinates:** **S** **E**				
Before B **Coordinates:** **S** **E** **Date of photos taken:**				

REPORTING COMPLETION OF MAINTENANCE ACTIVITIES – FORM B				
Section A: Landowner Details				
Name	**Surname**	**Farm No.**	**Erf No.**	**Today's Date**
Section B: Details of proposed maintenance activity				
WUA/GA reference number and DEA&DP reference number for MMP.	**Activity Type:**	**Reference code (*make reference to MMP*)**	**Footprint area (m^2)**	**Volume of material (m^3)**
Equipment that was used:	**Description of method for completed activity and if the commence date changed**			**Date when work will commence:**
Date of last flood event for site:	**Note any challenges or difficulties experienced in following the MMP method statement**			
Section C: Photographs of activity location after maintenance				
Before A **Coordinates:** **S** **E**				
Before B **Coordinates:** **S** **E** **Date of photos taken:**				

12. APPENDICES TO THE MMP

Appendices to the MMP has been included as part of the appendices of the larger EMP (and Revised Draft BAR). Please refer to the following as reference to the applicable appendices:

- Locality maps (Appendix A)
- Layout Plans (Appendix B)
- Site photographs (Appendix C)
- Sensitivity Maps (Appendix D)
- Method statements pertaining to the MMP (Appendix M1 – M4)
  - MS01 Alien invasive plant eradication plan
  - MS02 Hydrology management during maintenance activities
  - MS03 Mitigate disturbance of habitat and compaction of soils due to maintenance activities
  - MS04 Runoff, erosion, sedimentation control during maintenance activities

Please note that this MMP should be read in conjunction with the EMPr (Appendix 11 of the BAR).

APPENDIX A: LOCALITY MAPS

APPENDIX B: LAYOUT PLANS

APPENDIX C: SITE PHOTOGRAPHS

APPENDIX D: SENSITIVITY MAPS

APPENDIX M: METHOD STATEMENTS

Appendix M1	MS01 Alien invasive plant eradication plan
Appendix M2	MS02 Hydrology management during maintenance activities
Appendix M3	MS03 Mitigate disturbance of habitat and compaction of soils due to maintenance activities
Appendix M4	MS04 Runoff, erosion, sedimentation control during maintenance activities

APPENDIX N: DECLARATION OF UNDERSTANDING