RIVER MAINTENANCE MANAGEMENT PLAN (MMP)

for the proposed

SANGASDRIFT TRUST: HUT DAM & WEIR REHABILITATION

Portion 3 & 5 of Farm Van der Wattskraal No. 394 and Remaining Extent of farm 234, Swellendam, Western Cape

DEADP reference number: 16/3/3/2/E3/10/1005/17

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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 Ms Inge Erasmus who has a BA Honours in Geography and Environmental Studies from Stellenbosch University. Before completing her honours degree Inge gained practical experience as a junior environmental consultant at Hatch Goba in Johannesburg from 2014 until 2015. Inge acted as an environmental control officer on a variety of projects in the Northern Cape, conducting environmental compliance audits, as well as being part of a project team working on a major resettlement project for Kumba Iron ore. Inge joined Enviro Africa in February 2017, generally performing duties as an environmental assessment practitioner with regards to NEMA EIA applications.

The whole process and report was supervised by Peet Botes who has more than 10 years' experience in environmental management and environmental impact assessments. Mr. Peet Botes holds a who holds a BSc. (Hons.) degree in Plant Ecology from the University of Stellenbosch (with Nature Conservation III & IV as extra subjects). Since qualifying with his degree, he has been employed for more than 20 years in the environmental management field, first at the Overberg Test Range (a Division of Denel), between Arniston and the De Hoop Nature Reserve, managing the environmental department of OTB and being responsible for developing and implementing an ISO 14001 environmental management system, ensuring environmental compliance, performing environmental risk assessments with regards to missile tests and planning the management of the 26 000 ha of natural veld and adjacent coastline, working closely with CapeNature (De Hoop Nature Reserve). In 2005 he joined Enviroscientific, an independent environmental consultancy specializing in wastewater management, botanical assessments and developing environmental management plans and strategies, environmental control work as well as doing environmental compliance audits. He was also responsible for the development of biodiversity section of the Farming for the Future audit system implemented by Woolworths. During his time with Enviroscientific he performed more than 400 botanical and environmental legal compliance audits. During 2010 he joined EnviroAfrica in order to move back to the biodiversity aspects of environmental management. Experience with EnviroAfrica includes NEMA EIA applications, project management, biodiversity- and botanical assessments, environmental compliance audits and environmental control work.

Mr. Botes is also a registered Professional Environmental and Ecological Scientists, since 2005, at SACNASP (South African Council for Natural Scientific Professions) as required in terms of Section 18(1)(a) of the Natural Scientific Professions Act, 2003, since 2005.

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1. EXECUTIVE SUMMARY

The applicant Sangasdrift Trust proposes that zoned earth dam be constructed on Portion 3 & 5 of Farm van der Wattskraal No. 394, about 16 km east of Riviersonderend and 46 km west of Swellendam in the Western Cape. Water will be used for the irrigation of proposed 55ha of orchards (nuts and vineyards) on Portion 5 of Farm van der Wattskraal No 394. The water requirements will be met with the use of water abstracted from a natural watercourse at the Eksteenskloof weir located on the adjacent property (remaining extent of Farm 234). The Eksteenskloof weir requires reconstruction following a flood event in 2008. The water will be piped from the weir to the Hut dam that will be constructed approximately 300m south east of the Eksteenskloof weir within a natural watercourse. Water will only be abstracted during winter, which will ensure downstream aquatic habitat will receive adequate water volumes during the remainder of the year. Access to the farm is from the N2, the sites can be accessed via existing access roads on the property.

Botanically. the study area at Sangasdrift has been subject to intensive disturbance over a long period. The disturbance has resulted from intensive agriculture; ploughing and planting of pastures for livestock production, as well as invasion by woody alien invasives. The specialist suggests that the area of the proposed 'Hut Dam´ is extremely disturbed and degraded and has very low botanical and ecological value.

The restoration of the weir is certain to have an impact on the vegetation within the stream during the construction period. However, the impact will be temporary and must take into account the current status of the stream (alien infestation, existing disturbances and erosion).
Botanically speaking, the construction of the weir is not expected to have any significant long-term impacts on vegetation, since the species encountered at the site is mostly hardy and relatively common species, which will re-establish themselves quite easily (as a result impact is considered low). However, the disturbance associated with the construction will very likely stimulate alien plant germination in the construction footprint, which will have a negative long-term impact. It is thus essential that an ongoing alien eradication program is implemented at the weir and its immediate surroundings (e.g. a 20-50m boundary surrounding the weir location and all area impacted by construction footprint – including mixing and laydown areas). Preferably, or over time, it should also include the removal of the dense stands of alien invasive species upstream of the weir location.

The freshwater impact assessment suggest that all three freshwater features have been impacted as a result of decades of agricultural activities. The freshwater specialist is of the opinion that development of the dam and weir within the wetlands may result in the additional transformation of the critically endangered wetland vegetation associated with Greyton Shale Fynbos. However, that the transformation of a relatively small area (2.77ha) of already disturbed seasonal and temporary wetland habitat to artificial standing water habitat will not result in a significant cumulative impact to the critically endangered wetland habitat within the region.

From the freshwater fish specialist, the conclusion can be drawn that foothill rivers such as the Eksteenskloof are heavily impacted by water abstractions and habitat modifications throughout the Riviersonderend and Breede River catchments. As a result of these impacts and the presence of alien fishes in the main stem rivers, indigenous fish populations have been lost from up to 80 % of their former distribution ranges. The proposed development, if not properly mitigated, will likely contribute cumulatively to the impacts on fish populations elsewhere in the catchment.

1.1 PURPOSE OF THE MMP

The main purpose of this river maintenance and management plan is to guide the applicant and landowner, Mrs. Olivia Jonker, which actions to follow to prevent avoidable damage to the aquatic habitat associated with rehabilitation and maintenance activities of the proposed hut dam and weir, 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) (Appendix 11 of the EIR). 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.

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) and only relates to **Activity 19, Listing Notice 1 (GN R.327);**
- 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. INTRODUCTION AND PROJECT BACKGOUND

It is proposed that zoned earth dam be constructed on Portion 3 & 5 of Farm van der Wattskraal No. 394. Water will be used for the irrigation of proposed 55ha of orchards (nuts and vineyards) on Portion 5 of Farm van der Wattskraal No 394. It should be noted that these orchards will be developed on previously ploughed cow pastures.

The water requirements will be met with the use of water abstracted from a natural watercourse at the Eksteenskloof weir located on the adjacent property (remaining extent of Farm 234). The Eksteenskloof weir requires reconstruction following a flood event in 2008. The water will be piped from the weir to the Hut dam that will be constructed approximately 300m south east of the Eksteenskloof weir within a natural watercourse. Water will only be abstracted during winter, which will ensure downstream aquatic habitat will receive adequate water volumes during the remainder of the year

Reconstruction of the weir (Remaining extent of Farm 234):

It is recommended that the existing weir on the neighbouring farm, Remaining extent of farm 234 be rehabilitated with a steel enforced concrete weir and piped outlet works. The weir will have a maximum height of +- 2,2m, a total length of +-35m and top width of +-300mm. It will be based on a foundation of about 3,6m wide and will be equipped with a downstream flush valve. The construction site will include the total footprint of the weir including related small works on the side, as well as a maximum 2m wide workspace along the length of the weir. Since the size of the works is relatively small, not much area outside the 2m construction strip would be necessary. The total footprint of the weir with construction is thus 296m² (0,0295 ha). Please refer to **Appendix B** for layout plans and **Figure 4 of the EIR** for the preliminary design of the weir.

It is suggested that an area be made available where operators can park their vehicles as close as possible to the site where the weir will be rehabilitated. An area of 10m x 10m is suggested. Thus, having a total footprint of 100m² (0,01 ha). As per the method statement for the weir (Attached as **Appendix E7**) all concrete will be imported from a local supplier. No concrete will be mixed on site. Concrete will be transported on wheelbarrows to the weir site through alien vegetation and disturbed land. No vehicles will be allowed in the watercourse. Please refer to **Appendix B Figure** 2 for a map indicating the area suggested for vehicles to park and turn around. This area has already been disturbed and no clearing of vegetation will be required.

Construction of "Hut Dam" (portion 3 & 5 of Farm van der Wattskraal 394):

It is proposed that a zoned earth dam be constructed. According to the engineer design the proposed dam will have a maximum dam wall height of 14 m, a dam wall length of approximately 519m, and will have a capacity of approximately 330 000 cubic meters. The bulk of the embankment earth fill would come from inside the dam basin below the full supply level. The construction site will include the total footprint of the dam, borrow areas and related works as well as 10m wide workspace surrounding the site. As per the method statement for the dam (Attached as **Appendix E6**) all concrete will be imported from a local supplier. No concrete will be mixed on site. The total dam footprint with construction footprint will total approximately 7 ha (70000 m²). Please refer to **Appendix B** for layout plans and **Figure 3 of Appendix B** for the preliminary design of the dam.

Pipeline:

A new pipeline, approximately 300 – 350 metres in length and 300 mm in diameter, will be constructed to feed water from the weir to the storage dam. No pump station will be required as water will flow with gravitational force. A construction footprint of 5 metres on both sides of the pipe can be calculated with the pipe line which gives a total footprint of 3605 m² (0.3605 ha) for the pipeline.

Total construction footprint:

The total construction footprint is expected to be: 0,0295 ha (weir) + 0,01 ha (parking area) + 7 ha (dam) + 0.3605 ha (pipeline) = 7,4 ha.

The dam will be located on existing agricultural land (Please refer to **Appendix C Figure 5** for the Crop census map) The location was chosen to ensure the project life cycle costs are minimised (gravity feed vs. pumping cost etc.). Access to the dam and weir will be from existing farm roads.

5. SITE LOCATION AND DESCRIPTION

The proposed dam is located on Portion 3 & 5 of Farm van der Wattskraal No. 394. The weir, which will be rehabilitated is located on Remaining extent of farm 234. The proposed site is located about 16 km east of Riviersonderend and 46 km west of Swellendam in the Western Cape (See Figure 1 below). The dam will be located on existing agricultural land. Refer to **Appendix A** for location maps.

The site coordinates for the dam wall are: S 34° 5'34.48", E20° 02'20.31".
The coordinates for the weir to be rehabilitated are: S 34° 4'57.01", E20° 1'10.19".
The codes of all proposed sites: C073 0000 00000394 00003 (Proposed Hut Dam)
C073 0000 00000394 00005 (Proposed Hut Dam)
C073 0000 00000234 00000 (Existing Weir)

Access to the farm is from the N2, the sites can be accessed via existing access roads on the property.

Figure 1: Areal image showing the site location, with a red polygon, in proximity to surrounding towns and roads

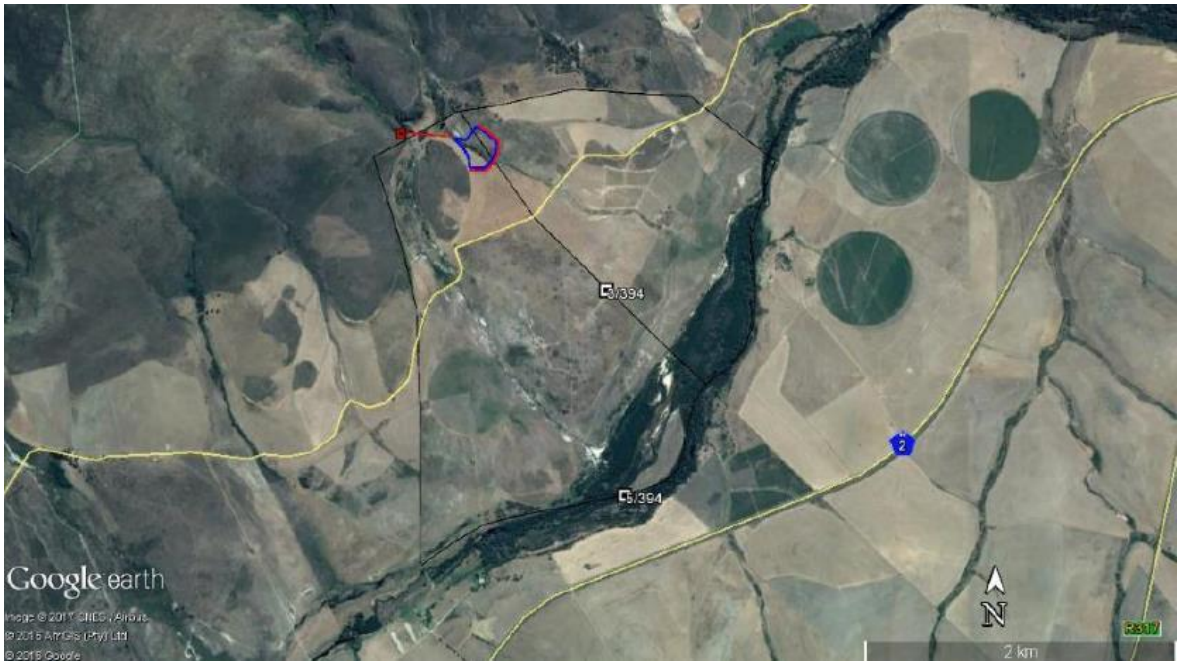

Figure 2: Areal image showing the location of the proposed dam, pipeline and weir

5.1 BIODIVERSITY FEATURES

According to the Overberg CBA overlay map, the proposed dam falls within an Ecological Support Area (ESA). The dam will also absorb the upper reaches of a small stream (and its buffer zone of approximately 40 m) which contains Central Rûens Shale Renosterveld, classified as critically endangered.

A Botanical Assessment was conducted by Bergwind Botanical and a Freshwater impact assessment was conducted by EnviroSwift. For the specialists terms of reference see the full specialist report attached as Appendix 7 and section 8 of the EIR

5.1.1 Botanical:

A Botanical Assessment was conducted by Bergwind Botanical (**Appendix 7.3 of the EIR**) and key findings include:

Hut dam site

- Only one vegetation type was originally found at the proposed Hut Dam (alternative A) and alternative dam sites (alternative B), 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 Greyton Shale Fynbos.
- Greyton Shale Fynbos is not listed in the National List of Threatened Ecosystems (Government Gazette, 2011) which implies that it is Least Threatened. However, Greyton Shale Fynbos is rated as Endangered A1 (A1 = irreversible loss of natural habitat). This means that there should be no further loss of this vegetation type otherwise the national conservation target may not be met. This immediately raises the need for caution when encountering this vegetation type.
- The area on the west side of the stream of the proposed Hut Dam (alternative A) has been completely transformed by cultivation and the establishment of pastures. Apart from the pasture grasses, *Athanasia trifurcata* (Klaaslouwsbos) that is known for indicating disturbance, is common. This area consequently has negligible botanical sensitivity. No Greyton Shale Fynbos remains here apart from an isolated remnant as shown in Figure 5 below. However, this remnant would not be affected by the dam at all since it lies west of the dam footprint.

- The area east of the stream was historically significantly disturbed by invasion by *Acacia saligna.* The subsequent clearing of the invasive trees and more recently by re-establishment of *A. saligna* again added another layer of disturbance. The use of this area for livestock grazing has added further disturbance. Ultimately this has left the area east of the stream in the Hut Dam footprint (and outside) in poor, degraded condition with low botanical sensitivity.
- The Hut Dam site (preferred) has a small area of critical Biodiversity Area 1 (CBA1), minimal areas of Ecological Support Areas 1 (ESA1) and a larger area of ESA21 (Figure 19). The ESA2 is related mainly to the stream and denotes that the area has conservation merit but is not essential for meeting conservation targets.
- The specialist suggests that the area of the proposed 'Hut Dam´ is extremely disturbed and degraded and has very low botanical and ecological value.

Weir site:

- According to the vegetation map (**Appendix C**) the weir would be located within North Sonderend Sandstone Fynbos, which is not classified as threatened. Greyton Shale Fynbos (endangered) is expected just south of the weir in the more open valley.
- Vegetation encountered within the banks of the stream where the weir will be located is typical hardy azonal vegetation as one would expect in lower mountain streams.
- The stream itself is still in relative good condition, although it seems to be slowly eroding its eastern banks. This is probably the result of earlier flood events combined with the impact from invasive alien plant species, which generally have poor soil binding capacity (suppressing indigenous plants with good soil binding capability). This has resulted in the eastern riverbank slowly being eroded into already disturbed areas, such as the picnic / camping site.
- Fortunately, there is evidence of recent alien clearance on Farm 234, which includes the area in the vicinity of the weir. However, alien invasive species has left its mark.
- About 50m downstream of the weir, the in-stream vegetation has been severely compromised and almost replaced with dense Port Jackson (*Acacia saligna*) stands. Slightly north of the weir, dense patches of Black Wattle *(Acacia mearnsii*) were observed, which extends to the lower slopes of the mountains to the east and south of the weir. Pine trees (Pinus species) are also common along the lower slopes of the mountain and also within the stream. Dense stands of bramble (*Rubus cf. fruticosus*) were also observed on the eastern banks of the stream in the vicinity of the picnic area.
- Indigenous species was also observed, *Carpobrotus edulis*, *Cassytha ciliolate, Chrysanthemoides monilifera*, *Elegia capensis, Empleurum unicapsulare, Psoralea pinnata, Pterocelastrus rostratus* (Red candlewood), *Stoebe plumose, Searsia angustifolia (=Rhus angustifolia).*
- A number of trees were planted in the vicinity of the picnic area which although they are indigenous to South Africa, is unlikely to have been found in this area. They includes at least one *Ficus natalensis,* one, *Ficus sur,* two *Podocarpus latifolius (Yellowwood),* 3-4 *Searsia lancea* (=*Rhus lancea*), one *Syzygium*

[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."*

cordatum and a number of *Vachellia karroo* (=*Acacia karroo*). These trees were probably planted as shade trees.

- In general the western banks of the stream seems to be botanically still in very good condition (apart from a few alien invader species). The in-stream vegetation show signs of alien infestation, but with good alien control could easily be reverted back to almost original status. The western bank of the stream (vicinity of the weir) is, however, in much poorer shape and was clearly disturbed in the past (used as a picnic or camping spot). Still with alien control it should also be able to revert back to a more natural status over time.

5.1.2 Freshwater:

A Freshwater impact assessment was conducted by EnviroSwift (**Appendix 7.2 of the EIR**), key findings include:

- The watercourse in which the repairs of the weir needs to be undertaken falls within the Southern Coastal Belt Ecoregion and the watercourse wherein the dam is proposed falls within the Southern Folded Mountains Ecoregion. Both watercourses do however fall within the Breede Water Management Area (WMA) and the Riviersonderend sub-Water Management Area (sub-WMA) as defined by the National Freshwater Ecosystem Priority Area project (2011). The quaternary catchment indicated for the project footprint is H60K and the applicable wetland vegetation unit is the Southwest Shale Fynbos which is listed as 'critically endangered' (NFEPA, 2011).
- The weir and Hut Dam are proposed in separate watercourses (referred to as watercourse 1 and watercourse 2, respectively) (Figure 7 above). An extensive wetland seep is located to the east of the area earmarked for the dam and will be partially flooded (Figure 3 above). No additional aquatic features were identified along the route proposed for the pipeline. Watercourse 1 and watercourse 2 are minor tributaries of the Riviersonderend River, which located approximately 1km to the south east of the proposed dam.
- The watercourse in which the repair of the weir is required (watercourse 1) has been indicated as a floodplain wetland within a moderately modified condition, according to the National Freshwater Ecosystems (NFEPA) database (2011).
- The watercourse in which the dam is proposed (watercourse 2) has not been identified as wetland habitat. The perennial Riviersonderend River is located approximately 1km to the south east of the proposed dam, however the catchment in which the proposed dam and weir fall has not been selected as a River Freshwater Ecosystem Priority Area (FEPA), which would have increased conservational importance of the catchment significantly.
- The proposed dam will intersect an Ecological Support Area 2 (ESA 2). Category 2 ESAs are areas that are likely severely degraded or have no natural cover remaining and therefore require restoration. These areas are not essential for meeting biodiversity targets but play an important role in supporting the functioning of Critical Biodiversity Areas (CBAs) or protected areas and are often vital for delivering ecosystem services. The management objectives for Category 2 ESAs is to restore or manage the features to minimize impacts on ecological processes and ecological infrastructure functioning, especially soil and water related services, and to allow for faunal movement.
- Several wetland indicators as defined by the then Department of Water Affairs and Forestry (DWAF, 2008) were encountered at watercourse 1 and 2. Therefore, both were classified with the use of the Classification System for Wetlands and other Aquatic Ecosystems in South Africa (Ollis et al. 2013) as channelled valley bottom wetlands rather than rivers with riparian habitat.
- The structure and function of all three features decreased substantially from their predicted natural reference condition due to decades of agricultural related activities. Consequently, watercourse 1 was determined to be within a Category C (Moderately modified) Present Ecological State (PES) and watercourse 2 as well as the wetland seep were determined to be within a Category D (Largely modified) PES.
- The South African Scoring System (SASS5) macroinvertebrate-based assessment method is specifically designed for the assessment of the ecological integrity of perennial river systems. Watercourse 2 is non-perennial and therefore the method could only be applied to. Out of the 22 families recorded at

watercourse 1, 5 of the taxa have high SASS sensitivity ratings, indicating that the stream has fairly good water quality. The site falls within Southern Coastal ecoregion and it was concluded that the site falls within Category C, indicating a moderately modified condition.

- Watercourse 1 was determined to be of a High EIS (Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers).
- Watercourse 2 and the wetland seep were determined to be of a Moderate EIS (Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers).

DESCRIPTION	**WATERCOURSE 1 (weir)**	**WATERCOURSE 2 & WETLAND SEEP (Hut dam)**
Ecoregions	Southern Coastal Belt Ecoregion	Southern Folded Mountains Ecoregion
Water Management Area (WMA)	Breede Overberg WMA & Riviersonderend sub-WMA	Breede Overberg WMA & Riviersonderend sub-WMA
Catchment Area	Breede River	Breede River
Wetland vegetation	Southwest Shale Fynbos, listed as 'critically endangered' (NFEPA, 2011	Southwest Shale Fynbos, listed as 'critically endangered' (NFEPA, 2011
Quaternary Catchment	H60K	H60K
Current Present Ecological State (PES)	C – Moderately modified	D – largely modified
Ecological importance and sensitivity (EIS)	High	Moderate
River Freshwater Ecosystems Priority Area (FEPA) or Biodiversity conservation value	The site does not fall within a FEPA	The site does not fall within a FEPA
Co-ordinates of applicable river portion	• S34° 05' 27.99" E20° 01' 55.64" (Approximately 50m upstream from the weir site • S34° 05' 29.99" E20° 01' 59.04" (Approximately 50m downstream from weir site)	• S34° 05' 29.10" E20° 02' 09.13" (Approximately 50m upstream from the dam toe • S34° 05' 35.33" E20° 02' 21.55" (Approximately 50m downstream from weir site)
Fresh Water Specialist	Mrs. Natasha van Haar and Louise Zdanow from EnviroSwift	Mrs. Natasha van Haar and Louise Zdanow from EnviroSwift

6. 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 Hut dam and rehabilitation of the weir on the receiving environment. Weirs and dams require regular maintenance and monitoring to remain in a good working condition and to ensure these structures work in harmony with the environment.

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

6.1 TERMS OF REFERENCE

- Undertake a site visit in order to assess the site areas;
- Desktop review of DEADP'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 DEADP Maintenance Management Plan Guidelines.

7. BRIEF DISCRIPTION OF MAINTENANCE ACTIVITIES:

The following section briefly describe the maintenance activities. Site specific Method Statements were developed for river maintenance from recommendations made by the specialists. 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. In cases where none exist.
- 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.
- At no time should the flow of the watercourse 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.
- 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 form part of an adopted MMP;
    - not be used to enlarge the height, width or any extent of existing berms;
    - not be deposited anywhere within 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 to a suitable stockpile location or disposal site. Further action and consideration may be required where the possibility of contaminated material may occur, such as in urban watercourses.
- The use of foreign material, such as concrete, rubble, woody 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.
- Maintenance material should be certified free of invasive alien plant seed to prevent infestation in the watercourse.

7.1 SITE SPECIFIC MAINTENANCE ACTIVITIES AND MIITGATION MEASURES

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

Please refer to **Appendix E1 – E7** for the Method Statements for these maintenance activities. The Environmental Management Programme (EMPr) (**Appendix 11 of the EIR**) 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. The department must be informed of any changes to the method statements and MMP.

Objective: Mitigate and monitor alien plant invasion on the property

Alien vegetation encroachment is considered significant on site. Alien plants encountered: *Acacia saligna* (Port Jackson), *Acacia cyclops* (Rooikrans), *Acacia Mearnsii* (Black Wattle).

The landowner/ applicant is responsible for the removal of alien invasive plant species on their properties. Dasberg Bewarea, (owners of Remaining Extent 234 on which the weir will be rehabilitated) appoint a company to conduct the clearing annually. It is suggested that the Applicant and beneficiaries of the weir should contribute to the cost of clearing of alien invasive plant species on Remaining Extent 234 as well as do alien eradication on Portion 3 & 5 of Farm Van der Wattskraal No. 394.

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 wetland/ aquatic environments by an independent testing authority may be considered.
- As per the freshwater specialist recommendations, removed alien plant material should be covered when transported to prevent it from being blown away.
- Cape Nature recomment 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 E1).

Objective: Mitigate alteration of hydrology during maintenance activities.

Large boulders may cause damage to the weir during flash floods. The repair activities of the weir can result in disturbance to the hydrology of the watercourses as well as wetland habitat disturbance.

Surface water within the channel of the watercourses 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 watercourses and the diversion of surface water will result in the temporary alteration of aquatic habitat and hydrological flow patterns through the

watercourse. The disturbance of soils during excavation activities may also result in the sedimentation of portions of the watercourse downstream of the coffer dam.

Mitigation Action:

- Demarcate the working area and put up signage to ensure maintenance activities only remain within the dedicated area **(Please refer to section 7.10.4 of the EMPr & Method statements from Sarel Bester Ingenieurs Appendix E6 & E7)**
- 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.
- Any surface water conveyed by watercourses must be collected upstream of the site and rerouted to areas downstream of the site. Rerouted surface flow must be returned at a similar rate as the rate that it enters the diversion.
- Vegetation removal should be limited as far as practically possible. Topsoil management should be implemented for the clearing of vegetation and stripping of soil **(Please refer to section 7.10.8 of the EMPr & Method statements from Sarel Bester Ingenieurs Appendix E6 & E7).**
- 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.
- Construct temporary bunds where cement is to be cast in-situ (**Please refer to Section 7.10 of the EMPr Appendix 11 of the EIR for Standard Operating Procedures that will apply**)

Please refer to Method Statement 2: MS02 Hydrology management (Appendix E2).

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 wetland vegetation and the compaction/ disturbance of soil located up and down stream of the proposed dam and weir site. 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 **(Please refer to section 7.10.4 of the EMPr & Method statements from Sarel Bester Ingenieurs Appendix E6 & E7)**
- 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 unchanneled valley bottom wetland 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 32m from the border of the unchanneled valley bottom wetland.
- Prohibit dumping of excess excavated material within the unchanneled valley bottom wetland.
- 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 E3).

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 (particularly watercourse 1 where the weir will be rehabilitated) 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 weir and dam should be undertaken during the dry summer months.
- Limit sedimentation at the outflow side (downstream of the works) by way of ponding or cascading with stone formed berms and filters made up of hay bales in combination with bidum to suite.
- Erosion control measures must be implemented to prevent erosion and sedimentation of downstream wetland areas. These methods can include the strategic placement of straw bales (not Lucerne or hay) which will divert stormwater away from the areas susceptible to erosion.
- 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 wetland 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 E4)

Objective: Mitigate water quality impairment of the wetland habitat during maintenance activities

The movement of vehicles through the unchanneled valley bottom wetland increases the possibility of the contamination of the wetland by hydrocarbons which may leak from vehicles duirig maintenance activities. Runoff cement could also cause contamination of the wetland.

Mitigation Action:

- Avoid the use of infill material or maintenance material with pollution / leaching potential.
- Clean up any spillages (e.g. concrete, oil, fuel), immediately. Remove contaminated soil and dispose of it appropriately.
- Store fuel, chemicals and other hazardous substances in suitable secure weather-proof containers with impermeable and bunded floors to limit pilferage, spillage into the environment, flooding or storm damage.
- Inspect all storage facilities and vehicles daily for the early detection of deterioration or leaks.
- Dispose of used oils, wash water from cement and other pollutants at an appropriate licensed landfill site. Disposal of any of these within the valley bottom wetland should be strictly prohibited.
- Dispose of concrete and cement-related mortars in an environmental sensitive manner (can be toxic to aquatic life). Washout should not be discharged into the valley bottom wetland.
- Provide portable toilets where work is being undertaken. These toilets must be located at least 32m from the boundary of the valley bottom wetland and must be serviced regularly in order to prevent leakage/spillage.

Please refer to Section 7.10 of the EMPr Appendix 11 of the EIR for Standard Operating Procedures that will apply

Objective: Ensure discharge points do not become blocked with sediment, debris, driftwood/nuisance vegetation

Mitigation Action:

- Removal of blockages must be conducted by hand wherever possible
- Use of machinery should only be as a last resort
- All debris, sediment and nuisance vegetation should be removed and properly disposed off
- If vegetation does not establish after maintenance, revegetate discharge areas with wetland species indigenous to the area. Vegetation will aid in dispersing concentrated flows and will decrease the velocity and erosive potential of flows. Furthermore, the roots of vegetation will aid in binding the soils thereby reducing the possibility of erosion

Please refer to Method Statement 5: MS05 Removal of sediment, debris, driftwood/ nuisance vegetation at discharge points (Appendix E5)

Please also refer to Appendix E6 & E7 for Sarel Bester Ingenieurs for Method Statements for general maintenance activities which will require reconstruction of the proposed weir and Hut dam and weir rehabilitation, respectively.

8. 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

  The applicant, Sangasdtfit Trust represented by Mrs Olivia Jonker is and land owner of Farm Portion 3 & 5 van der Wattskraal 394, the property on which Hut dam is proposed. Dasberg Bewarea is the owners of Remaining Extent of Farm 234, the property where the weir is to be rehabilitated. The applicant, Mrs Olivia Jonker will be held responsible for the correct implementation of the river maintenance management plan.

- **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 City of Cape Town. 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.

8.1 CONTACT DETAILS OF APPLICANT/ CLIENT

Relevant parties	Sangasdrift Trust
Maintenance Proponent	Mrs Olivia Jonker and her son Nicholaas Jonker
RSA Identity no.	6201100020088
Landowner	Sangasdrift Trust (dam site) Dasberg Bewarea (weir site)
Address:	P.O. Box 15 Bonnievale 6730
Tel:	023 616 2143
Fax:	023 616 2675
Cell:	082 575 3831
Email:	olivia@mooiuitsig.co.za

9. 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 he understands his 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
- Water Quality degradation due to siltation and debris.

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.

10. 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.

11. 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 E1** 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 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.

12. 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 wetland 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 wetland habitat up and down stream of the dam must be monitored. S34° 05' 27.99" E20° 01' 55.64" (Approximately 50m upstream from the weir site S34° 05' 29.99" E20° 01' 59.04" (Approximately 50m downstream from weir site) S34° 05' 29.10" E20° 02' 09.13" (Approximately 50m upstream from the dam toe S34° 05' 35.33" E20° 02' 21.55" (Approximately 50m downstream from weir site)	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 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.

12.1 MONITORING REPORT

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. Form A and B below must also be sent to the Provincial Department of Agriculture, Directorate: Sustainable Resource Management.

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 (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.**	**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 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:**				

13. APPENDICES TO THE MMP

Appendices to the MMP has been included as part of the appendices of the larger EMP. Please refer to the following as reference to the applicable appendices:

- Locality maps (Appendix A)
- Layout Plans (Appendix B)
- Sensitivity Maps (Appendix C)
- Site photographs (Appendix D)
- Method statements pertaining to the MMP (Appendix E1 – E7)
  - 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
  - MS05 Sedimention, Debris, nuisance vegetation control at discharge points
  - MS06 Method Statement from Sarel Bester Ingenieurs BK for Hut dam
  - MS07 Method Statement from Sarel Bester Ingenieurs BK for weir

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

APPENDIX A: LOCALITY MAPS

APPENDIX B LAYOUT PLANS

Figure 1	Layout plan for the proposed Hut dam, weir and pipeline route on the dedicated properties
Figure 2	Map indicating the disturbed area earmarked for parking of vehicles near the weir site in yellow
Figure 3	Preliminary design for the dam
Figure 4	Preliminary design for the proposed rehabilitation of the weir

APPENDIX C SENSITIVITY MAPS

Figure 1	Map indicating that the proposed development will fall within a CBA and ESA2
Figure 2	CBA/ ESA map from the Botanical Specialist indicating that the proposed dam site
Figure 3	Image from freshwater report delineating the freshwater habitat in relation to the weir, pipeline and Hut dam
Figure 4	Vegetation map
Figure 5	Crop census map

APPENDIX D: SITE PHOTOGRAPHS

APPENDIX E: METHOD STATEMENTS

Appendix E1	MS01 Alien invasive plant eradication plan
Appendix E2	MS02 Hydrology management during maintenance activities
Appendix E3	MS03 Mitigate disturbance of habitat and compaction of soils due to maintenance activities
Appendix E4	MS04 Runoff, erosion, sedimentation control during maintenance activities
Appendix E5	MS05 Sedimention, Debris, nuisance vegetation control at discharge points
Appendix E6	MS06 Method Statement from Sarel Bester Ingenieurs BK for Hut dam
Appendix E7	MS07 Method Statement from Sarel Bester Ingenieurs BK for weir

APPENDIX F: DECLARATION OF UNDERSTANDING