ENVIRONMENTAL MAINTENANCE MANAGEMENT PLAN

PEARL VALLEY GOLF AND COUNTRY ESTATE, PAARL, WESTERN CAPE.

Prepared By

Guillaume Nel Environmental Consultants

GNEC

Contact Persons

Mr Christoff Dippenaar

A 45 Fabriek Street, Paarl, 7646

T 021 870 1874

F 021 870 1873

E christoff@gnec.co.za / guillaume@gnec.co.za

Guillaume Nel environmental consultants

28 April 2022

Contents

E-mail to: christoff@gnec.co.za
Tel: 021 870 1874 Fax: 021 870 1873 www.gnec.co.za

List of Figures

E-mail to: christoff@gnec.co.za
Tel: 021 870 1874 Fax: 021 870 1873 www.gnec.co.za

1. INTRODUCTION

Guillaume Nel Environmental Consultants have been appointed to compile An Environmental Maintenance Management Plan and Alien Clearing Plan for various 'semi-natural areas, dams/lakes, storm water channels, and Renosterveld open space areas within Pearl Valley Golf and Country Estate.

This report will therefore divide the various areas where maintenance is required. These areas were divided into manageable areas.

The report was also compiled in such a manner to indicate normal/general management of areas and what is planned in each of these areas.

Freshwater Ecologist Network (FEN) Consulting (Pty) Ltd was appointed in February 2022 to assist with freshwater specialist inputs as part of the Maintenance and Management Plan (MMP).

Freshwater Ecologist Network (FEN) Consulting (Pty) Ltd was also appointed to assist with a detailed faunal specialist assessment that forms part of the maintenance management plan as an additional specialist addendum.

As such the contents of the Freshwater Specialist report and Faunal Specialist report must be read in conjunction with the relevant MMP compiled by GNEC (2022).

Please refer to Figure 1 below, indicating the areas to be maintained by Guillaume Nel Environmental Consultants (GNEC).

E-mail to: christoff@gnec.co.za
Tel: 021 870 1874 Fax: 021 870 1873 www.gnec.co.za

FIGURE 1: AREAS MAINTAINED BY GUILLAUME NEL ENVIRONMENTAL CONSULTANTS

2. MAINTENANCE OF INDIVIDUAL AREAS

2.1 DAMS WITHIN THE ESTATE

2.1.1 REMOVAL OF INVASIVE WETLAND VEGETATION

Invasive wetland vegetation identified within dams to be gradually eradicated:

- *Cyperus papyrus*
- *Cyperus prolifer*

Cyperus papyrus is an AIP which is commonly utilised as a nursery ornamental plant, however, it does escape into open waterbodies. Like Typha capensis, C. papyrus has rhizomes that form mats of floating vegetation within waterbodies as a result of rhizomes and the floating stems of other aquatic plants become intertwined. These mats can become extensive, outcompeting other indigenous species and reducing light penetration and oxygenation of water.

FIGURE 2: PHOTO OF CYPERUS PAPYRUS AND CYPERUS PROLIFER

- Due to the size of the clumps within the dams, initial removal need to be done mechanically to scoop out the clumps and the rhizomes.
- Thereafter maintenance can be done by manual labour.
- The rhizomes that will re-shoot will be cut and carefully painted with a systemic herbicide. Glyphosate and Triclopyr can be used to control C. papyrus effectively when used properly. Application includes foliar treatment as well as cut stem treatment where plants are cut to at least waist height and one drop of herbicide is applied to the stems with a squirt bottle or syringe.
- Controlling of Papyrus species will be an ongoing process.
- It is not recommende to fully eradicate all the Paprus within the dams, as they provide important breeding habitat for birds.

2.1.2 CONTROL OF WATER LILIES WITHIN DAMS

Control of water lilies:

FIGURE 3: PHOTO OF NYMPHOIDES SPP WITHIN THE DAMS

Nymphoides spp. and *Nymphaea spp.* are indigenous to South Africa (with exception of *Nymphaea Mexicana* which is considered an alien species originating from Mexico) and are often found in freshwater ponds and dams. If left unmanaged they can form large, dense spreading colonies to a depth of 3 m and large leaves dominate the water surface, restricting light penetration and impacting other attached, floating-leaved5 species and can cause silting up of dams.

- These water lilies tend to take over if not controlled.
- If the lilies are still small and the roots are not too tangled it is possible to rack the lilies by hand, pulling them towards the shoreline and then easily removing them by hand.
- In instances where more established larger individuals have taken hold, they will not be as easy to remove and may need to be pulled with some force to remove.
- For lilies within 1 m of the shoreline, a rack or personnel wading in the water can access the lily pads and pull them towards the shoreline. It is important that the lilies be removed with their roots.
- For deeper individuals, a small boat or barge (shoal-draft flat-bottomed boat) will be made use of, and personnel can pull the lily out by grabbing hold of the leave and pulling it free from the substrate. It is important that the lilies be removed with their roots.
- Any other floating mats of plant material, especially where sub-surface plant material has come loose and floated to the surface will be manually removed with a rake (or from a small boat in deeper water) and not left on the dam surface as this material can rot causing undesirable odours to arise and cause eutrophication of the water which could impact aquatic species.

- All removed plant material will be removed from the water and disposed of at a suitable composting site.
- Not all water lilies should be removed as these plants provide both aesthetic value to the dams as well as habitat for various aquatic species (aquatic avifauna and amphibians) and thus indigenous species should be maintained in smaller clusters in shallower water (near the edges of the dams). Any AIP species (Nymphaea Mexicana – Yellow water Lily) should be removed.
- Clearing suggested on 6 month intervals.

2.1.3 CONTROL OF SURFACED WATER PLANTS AND RELATED ALGAE

FIGURE 4: PHOTO OF SURFACED PLANT MATERIAL AND ALGAE TO BE REMOVED FROM DAMS

FIGURE 5: PHOTO OF SURFACED PLANT MATERIAL AND ALGAE TO BE REMOVED FROM DAMS

- There is a rapid growth of underwater vegetation due to mineral rich water, probably due to fertilizers flowing into the dams. (eutrophication)
- The underwater vegetation growth also act as a very important breeding habitat for fish species.
- The underwater growth will never be fully removed and is not recommended to do so.
- As soon as these growth surface and start to float on the water, they start to rot and negatively impacting the water quality.
- The surfaced vegetation with related algae will be removed manually by entering the dams with a boat and scooping the plant material out.
- It is recommended that this be done on 6 monthly intervals. Additional removal might be necessary, but will be monitored.

E-mail to: christoff@gnec.co.za
Tel: 021 870 1874 Fax: 021 870 1873 www.gnec.co.za

2.1.4 CONTROL OF TYPHA CAPENSIS REEDS WITHIN DAMS

Typha capensis is an adaptable "opportunist" species (although not considered an AIP) that can become an aggressive encroacher of disturbed systems, specifically within areas of elevated nitrogen availability, such as the dams within the Pearl Valley Golf Estate. The species is adapted to increased water depths and extended hydroperiods resulting in dense monotypic stands which outcompete other species.

FIGURE 6: PHOTO OF TYPA CAPENSIS TO BE MAINTAIND WTIHIN THE 2M BUFFER OF THE DAMS

- Although Typa capenis is an indigenous water reed they tend to take over dams and wetlands if not controlled.
- It is recommended that a 2m buffer of reeds are allowed around the dams, limiting the reeds to encroach further.
- These reeds are an important breeding habitat for birds and cannot be entirely eradicated.
- The reeds need to be controlled manually by cutting them back to maintain the 2m buffer.

<u>Preferred control method for Typha capensis:</u>

<u>1. Mechanical/Manual removal</u>

Mechanical removal is difficult because of the depth and volume of the rhizomes, but it can be effective in reducing the size of infestations. Manual removal works best on small seedlings when they can be easily pulled out of the damp soil.

The best way to control larger Typha capensis is through physical cutting at the end of the growing season (when the highest level of nutrients in the shoots towards the end of the productive (growing) period in the late summer period, i.e. during February) and when water levels are lowest in the associated dams in conjunction with flooding.

Cutting must be undertaken to maximise nutrient depletion by removal of above-ground biomass prior to the translocation of nutrients from shoots to rhizomes, which occurs in late summer (February) but must be done before seeds/flowers blow over the area.

If the reeds are cut when water levels are low, and then flooded, growth is considerably inhibited but NOT stopped. Two clippings about a week or two apart will achieve best results but then the cut area must be submerged as soon after in at least 8 to 10 cm of water when water levels rise again.

(Initial cut treatment involves the classification of three different management zones associated with the dams/channels:

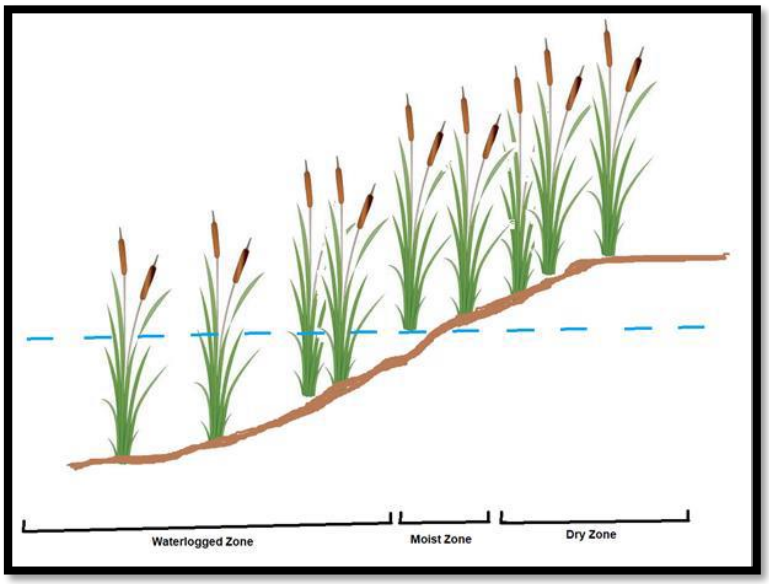


FIGURE 7: DIFFERNET MANAGEMENT ZONES IDENTIFIED WITHIN THE DAMS

The following method statement for mechanical reed cutting is described below:

- Dedicated access paths must be marked (the entrance to these access paths indicated by a flag and pole or something similar) to allow workers to access the reed beds at specific points only and to avoid trampling of other (indigenous) vegetation species and disturbing potential nesting avifauna;
- Use can also be made of small boats to access the waterlogged zones;
- Reed shoots must be cut at ground level across the three zones identified, and thus below water in the wet zone. This can either be done with the use of:
- Rotary brush cutter, mechanical reed cutter or chainsaws or sickles must be used, as no heavy machinery within the dams should may be permitted as this could result in additional sediment and turbidity of the dams (small four stroke motorised boats may be permitted); or
- An aquatic mower2, which is an underwater reciprocating mower that mounts to a small boat or a hand saw can be used to cut reeds below the water level.

- A small barge (shoal-draft flat-bottomed boat) can be made use of to transport the cut reeds from the waterlogged zone to the shore or a wheelbarrow can be used (in the dry zone);
- Cut reeds must be stockpiled in a designated area to allow the reeds to dry out and be compacted for eventual transport, outside the dams for composting/burning.

2.1.5 GRADUALLY INTRODUCING INDIGENOUS SPECIES TO THE DAMS; MOIST BED PLANTING

It is recommended that following indigenous wetlands species be gradually introduced within the moist zones of the dam for the following reasons:

- Improve the ecological and biodiversity value of the dams;
- Ensure effective wetland functioning and natural filtration of water;
- Act as natural areas for faunal species;
- Eradicate invasive vegetation that threatens endemic species, and poses a fire hazard;
- Prevent/minimise further invasive vegetation infestation as the invasive species will be removed prior to planting; and
- Enhance the visual and aesthetic appearance of the dams.

Trees:

Salix mucronata "Indigenous Willow"

Halleria lucida

Shrubs:

Ischyrolepsis subverticillata

Cyperus textilis

Elegia capensis

Berzellia lanuginosa

Fillers:

Zanthedeschia aetiopica

Wachendorfia thyrsiflora

2.1.6 INTRODUCING INDIGENOUS SPECIES TO THE DAMS; DRY BED PLANTING

Plants have been carefully selected for the dry bed planting with the following characteristics:

- Indigenous;
- Fast growing;
- Water wise and relatively drought resistant once stabled;
- Easy to be maintained; and
- Colour, textures and variation in heights.

Shrubs

Leonotus leonurus

Salvia Africana lutea

Salvia chamelaeagnea

Coleonema album

Coleonema sunset pink

Euryops virgineus

Euryops pectinatus

Elegia tectorum

Pelargonium cucullatum

Plumbago auriculata

Portulacaria afra

Tecomaria capensis

Fillers:

Carissa green carpet

Dietes grandiflora

Dietes bicolor

Tubagia violacea

Bulbine frutescens

Groundcovers

Crassula multicava

Delopspermum cooperri

Plectranthus neochilus

Lampranthus aureus

Lampranthus coccineus

Gania rigens yellow

Gazania rigens uniflora pink

2.1.7 TIMING OF PLANTING AND SEEDING

Planting:

The best time for planting will be at the beginning of the rainy season. This will help the plants to settle and preparing them for the summer to follow. All plants (even water wise plants) need water in the establishment phase. Should planting be done during the summer months the planted areas need to be watered.

Seeding:

Seeding needs to be done directly after the surface has been ripped to ensure effective infiltration.
Seeding needs to be done during late Summer to Autumn (January to March). The seeds will start to germinate in time to receive the winter rain to strengthen and prepare them for the following summer.

2.2 OPEN SPACE AREAS (RENOSTERVELD)

The open space areas are well established with Renosterveld species. Due to the fact that this areas are seen a natural areas, maintenance within these sections will be less.

Maintenance activities within the open space area include:

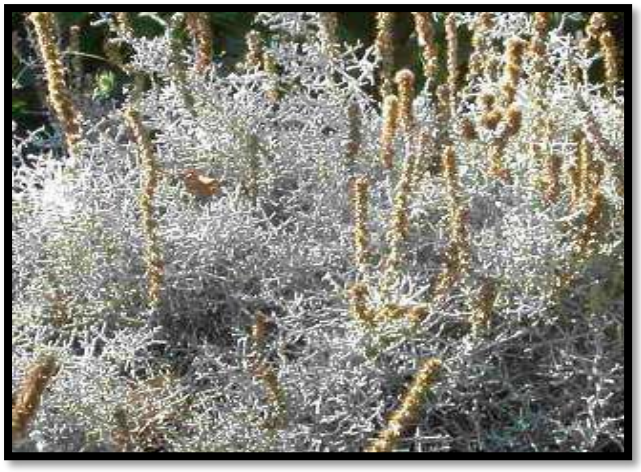
2.2.1 SEED COLLECTION WITHIN THE RENOSTERVELD AREAS

- The team will continuously collect Renosterveld seed as they are ready.
- Bare area, or areas low in density and diversity will be identified in which additional Renosterveld seeds will be sown to improve the overall diversity of vegetation.

Species identified for seed collection:

Athanasia trifurcata

Stoebe plumosa



Diospyros glabra

Searsia angustifolia

Metalasia densa

Protea repens

Leucandendron salignum

2.3 MAINTENANE OF STORM WATER CHANNELS WITH RELATED EMBANKMENTS

Channels:

- Section of the channels is overgrown with Typha capensis and other woody species.
- These channels need to be maintained on yearly intervals to ensure adequate flow and to prevent blockages and erosion.
- Maintenance within these channels will be done by brush cutting, and not total removal as these species prevent further erosion of the channel bottom and related embankments.

Embankments:

- Sections of the embankments are bare and prone to erosion and siltation of the drainage channels.
- Should an embankment be too steep for planting, erosion control, along with preservation of the topsoil would be very important for rehabilitation. Stabilization should be done by ensuring that the velocity of surface runoff is reduced through naturally aligned terracing. Terracing can be done by using hand labour to create natural horizontal terraces.
- It is recommended that the bare embankments be planted with Carpobrotus edulis which is a fast grower and ideal to secure the soil on the embankments.
- This will stabilize the soil, ensure better topsoil on the embankments, and will make rehabilitation of the bare embankments possible.
- Additionally these embankments can be seeded with the collected Renosterveld species to improve the ecological and biodiversity value of the embankment. Additional seeding will also positively contribute to the visual and aesthetic value of the embankments.

Embankments to be planted with Carpobrotus edulis:

FIGURE 8: STEEP EMBANKMENTS TO BE PLANTED WITH CARPOBROTUS EDULIS

3. SUMMER AND WINTER PRUNING:

Summer pruning:

Light pruning includes:

- Removal of dead branches and shoots from shrubs;
- Removal of dead flower heads after flowering;
- Keeping shrubs in shape;
- Prevent shrubs from overgrowing and become woody; and
- Ensure general neatness.

Winter Pruning:

Harder pruning once a year includes:

- Pruning back certain species to ensure that shrubs remain bushy and in shape;
- Pruning shrubs to prevent them from becoming woody;
- Pruning back to ensure new and healthy re-growth; and
- Pruning of shrubs to maintain them at the required height.

4. COMPOSTING AND FERTILIZING:

Composting:

It is recommended that the areas surrounding the dams receive compost once a year. The ideal time for composting will be in the beginning of the rainy season. Compost to be sourced from the compositing facility in Pearl Valley.

Compost need to be:

- Free of weeds;
- Free of invasive vegetation; and
- Sterilized.

Fertilizing:

It is recommended that the landscape area around the dams be fertilized once a year. The ideal time for fertilizing will be in the beginning of the rainy season to ensure that fertilizer dissolve into soil and be effectively absorb by the plants.

Bounce back fertilizer is recommended, as Bounce Back is a unique blend of organic materials specially formulated for all your fertilising needs. Bounce Back is a highly concentrated natural product that promotes faster, healthier, and sustained growth for all plants.

FIGURE 9: RECOMMENDED FERTILIZER

5. ERADICATION OF WEEDS

Eradication of weeds will be a continuous operation throughout the year, with more weeding to be done during the winter. Weeding will be done manually by forking the soil and manually removing the weeds.

6. ALIEN CLEARING MANAGEMENT PLAN

This alien clearing management plan act as a starting point explaining the alien clearing practices to be used for sustainable clearing, but also act as an ongoing maintenance plan for continuous alien clearing.

Reasons for continuous alien clearing:

- Due to the disturbance of the soil during the initial clearing activities, invasive seeds within the seedbank of the soil will start to germinate. These germinated species need to be removed before they produce seed to prevent ongoing infestation.
- Cut down and treated trees also tend to re-sprout. A 2nd application of herbicide will be necessary for these species.
- Kikuyu grass is a strong grower, and tends to re-shoot. A few systemic herbicide applications are recommended.

6.1 INVASIVE SPECIES TO BE REMOVED

Alien invasive species are species that spread aggressively and threaten indigenous ecosystems functioning and biodiversity. These species are controlled by the national Environmental Management Biodiversity Act 10 of 2004 – Alien and invasive species regulations. These regulations apply to four categories of invasive species that must be managed, controlled or eradicated.

Category 1a:

Invasive species requiring compulsory control. Remove and destroy. Any specimen of Category 1a listed species need, by law, to be eradicate from the environment. No permits will be issues.

Category 1b:

Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be places under a government sponsored invasive species management programme. No permits will be issues.

Category 2:

Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Cat 2 plants to exist in riparian zones.

Category 3:

Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

Dominant invasive trees species to be removed:

Larger invasive trees where owls are nesting need to remain.

Acacia saligna (Port Jackson Willow)

Acacia mearnsii "Black Wattle"

Eucalyptus sp

Pinus pinaster

Casuarina cunninghamiana

Larger invasive trees to be removed need to be gradually replaced with the following indigenous trees:

Olea europaea subsp Africana

Kiggelaria africana

Syzygium guineense

Dodonaea angustifolia

6.2 CUTTING AND PAINTING OF MEDIUM SIZE INDIVIDUALS

Applicable where the invasive species are too difficult for hand pulling. Invasive trees need to be cut leaving a stem of 10cm. The remaining stem needs to be painted using a brush with a systemic herbicide. The systemic herbicide need to be coloured to ensure that all the cut stems be treated. Care should be taken not to spill systemic poison when painting the stems. The systemic poison will infiltrate the stem killing the roots, and prevent the invasive tree from re-sprouting again. Cut down invasive trees need to be removed from site to the nearest licensed landfill site to prevent the spread of seeds.

Systemic Poison, Enviro - Glyphosate; 2% Application. (Registered for use near waterbodies)

FIGURE 10: PICTURE OF A CUT DOWN STEM TREATED WITH A COLOURED SYSTEMIC HERBICIDE

6.3 HAND PULLING OF SMALLER INVASIVE SPECIES

It is suggested that smaller invasive species be hand pulled with manual labour. This is the most effective and environmental friendly way to eradicate smaller invasive vegetation.

FIGURE 11: PICTURE OF SMALLER SPECIES IDEAL FOR HAND PULLING/REMOVAL

6.4 RING BARKING OF LARGER SPECIES

Ring barking is a technique that involves removing a ring of bark around a tree trunk. Ring barking interferes with the circulation of the tree and results in it slowly dying. Remove a 30 to 40 cm strip of bark around the base of the tree trunk to ground level. Ring-barking removes the cambium/phloem, a layer just beneath the bark, which carries food from the leaves down to the roots. The roots will eventually die thereby killing the tree. The ring barked area can then be painted with a systemic poison.

FIGURE 12: EXAMPLE OF RING BARKING INVASIVE TREES

6.5 SPOT SPRAYING

Spot spraying only allowed to control Pennisetum clandestinum "Kikuyu Grass".

Kikuyu grass needs to be treated with a systemic poison to infiltrate the Kikuyu grass and kills the sods and roots, as Kikuyu grass tends to re-shoot with a contact poison.

Systemic Poison; Glyphosate.

The systemic poison needs to be prepared at a two percent solution.

Spot spraying of Kikuyu grass can only be done when:

- The Kikuyu grass is not surrounded by endemic vegetation;
- Surrounding endemic vegetation will not be impacted by the draft;
- The Kikuyu grass in not within the watercourse, as spraying within a watercourse will not be allowed;
- There is dense growth of Kikuyu grass that cannot be manually removed due to the density or the difficulty to successfully remove the grass without leaving sections that will re-shoot;
- In absolute wind still condition to prevent herbicide draft negatively impacting upon adjacent areas; and
- On a sunny day, when the invasive vegetation dry and not wet from morning dew or rain.

6.6 STORAGE AND REMOVAL OF INVASIVE VEGETATION.

- During alien eradication an area needs to be identified for temporary stockpiling of the invasive vegetation;
- Only one area to be identified to prevent the spread of seeds and to prevent contamination of adjacent natural areas;
- The area identified should not be in close proximity of a watercourse/wetland/Dam to prevent seeds from entering and spreading;
- Invasive vegetation left on site is a fire hazard;
- Invasive vegetation left on site inhibit the germination of Fynbos seeds;
- All invasive vegetation to be removed immediately from site to the composting area; and
- Alien vegetation to be transported in preferably a closed truck to prevent the seeds from spreading along the road. Alternatively the alien vegetation can be covered with a biddem material during transport.

6.7 WETLAND/WATERCOURSE/DAM MANGEMENT MEASURES DURING ALIEN CLEARING PRACTICES.

- The contractor needs to make sure that excessive quantities of sand and silt do not enter the wetland/watercourse/dam habitat;
- The contractor needs to take cognisance of weather forecast. No clearing activities allowed during times of high rainfall;
- Alien clearing to be conducted within wetland/watercourse/dam habitat, need to be done as far as possible by manual labour, no heavy machinery allowed;
- All potential pollutants should be kept away from the wetland/watercourse/dam habitat including:

    - Oil, diesel or petrol used for machinery during alien clearing activities; and
    - Any chemicals for the control of alien vegetation.

- No spoil material should be placed in close proximity to the wetland/watercourse/dam habitat, dumped on riparian or bank habitats, spread out around trees, used to fill hollows and other irregularities in the wetland/watercourse/dam, or be used for erosion control, but must be removed to composting site or approved dumping site; and
- No spraying of herbicide allowed in close proximity to any water bodies.

6.8 BURNING

Burning of cleared invasive vegetation on site is strictly prohibited. Cleared invasive vegetation needs to be taken to the composting area of the nearest licensed landfill site. Should burning of invasive vegetation be considered, the necessary permits need to be applied for and in place. Burning without the necessary permits are a criminal offence and a fire hazard.

6.9 PROTECTIVE GEAR

Working in a dangerous environment, operators need to have the necessary protective gear:

- Safety boots, steel cap;
- Safety gloves;
- Face mask to prevent herbicide inhalation;
- Safety glasses for eye protection; and
- Reflector vests to ensure visibility.

6.10 FREQUENCY OF ALIEN CLEARING

An alien clearing management plan need to be implemented. After the initial alien clearing of the identified patches, follow ups need to be conducted every 3 months.

Reasons for follow up:

- Due to the disturbance of the soil during the initial clearing activities, invasive seeds within the seedbank of the soil will start to germinate. These germinated species need to be removed before they produce seed to prevent ongoing infestation.
- Cut down and treated trees also tend to re-sprout. A 2nd application of herbicide will be necessary for these species.
- Kikuyu grass is a strong grower, and tends to re-shoot. A few systemic herbicide applications are recommended.

7. FAUNAL ASSESSMENT:

Please refer to the detailed Faunal Assessment as an additional addendum to the maintenance management plan.

Freshwater Ecologist Network (FEN) Consulting (Pty) Ltd was appointed to assist with faunal specialist inputs to be considered as part of the Maintenance and Management Plan (MMP) compiled for the Pearl Valley Golf Estate Dams, southern Paarl, Western Cape Province.

The faunal assessment has been prepared specifically to address concerns on the well-being of various faunal species that utilise the Pearl Valley Golf Estate dams and open areas for breeding and foraging.

8. CONCLUSION:

GNEC, in our professional capacity as rehabilitation specialist, strongly feel that the above mentioned maintenance management plant will:

- Improve the ecological and biodiversity value of the of areas;
- Eradicate invasive species and re-introduce indigenous species;
- Improve natural areas for faunal species;
- Prevent and minimise erosion on disturbed areas and bare areas;
- Improve the visual and aesthetic appearance of the estate.