

REHABILITATION AND ALIEN CLEARING MANAGEMENT PLAN

REHABILITATION AND ALIEN CLEARING MANAGEMENT PLAN FOR A SECTION OF THE BERG RIVER ALONG THE PROPOSED RESIDENTIAL DEVELOPMENT ON ERF 8892, FIRWOODS, PAARL, WESTERN CAPE.



Prepared By

Guillaume Nel Environmental Consultants

GNEC

Contact Person: Mr Christoff Dippenaar

A 45 Fabriek Street, Paarl, 7646

T 021 870 1874

F 021 870 1873

www.gnec.co.za



25 October 2021

Contents

1. INTRODUCTION.....	2
2. SITE LOCATION AND STUDY AREA.....	3
3. THE VEGETATION.....	8
3.1 VEGETATION OF STUDY AREA:.....	8
4. REHABILITATION MEASURES	10
4.1 ALIEN CLEARING MANAGEMENT PLAN	10
4.1.1 LIST OF INVASIVE SPECIES IDENTIFIED ON SITE FOR ERADICATION	10
4.1.2 CUTTING AND PAINTING OF MEDIUM SIZE INDIVIDUALS	13
4.1.3 HAND PULLING OF SMALLER INVASIVE SPECIES	14
4.1.4 RING BARKING OF LARGER SPECIES	15
4.1.5 STORAGE AND REMOVAL OF INVASIVE VEGETATION	16
4.1.6 WETLAND/WATERCOURSE MANAGEMENT MEASURES DURING ALIEN CLEARING PRACTICES.....	16
4.1.7 BURNING.....	17
4.1.8 PROTECTIVE GEAR.....	17
4.1.9 FREQUENCY OF ALIEN CLEARING.....	17
4.2 MANAGEMENT OF TOPSOIL.....	18
4.3 PREPARATION OF SOIL PRIOR TO REHABILITATION.....	19
4.3.1 RIPPING AND SHAPING.....	19
4.3.2 EMBANKMENT STABILIZATION	20
4.4 TIMING OF REHABILITATION AND SOWING	21
4.5 SEEDING PRACTISE	21
4.6 REHABILITATION OF THE EMBANKMENT OF THE BERG RIVER.....	22
4.7 CORDONING OFF REHABILITATED AREA	33
5. CONCLUSION	34

1. INTRODUCTION

Guillaume Nel Environmental Consultants (GNEC) were appointed by Arun Projects (Pty) Ltd to facilitate the Environmental Impact Assessment (EIA) process required by the

National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) for the proposed residential development on Erf 8892, Paarl (Firwoods).

As part of the Environmental Impact Assessment (Basic Assessment Process) a Rehabilitation and an Alien Clearing Management Plan needs to be compiled for the section of the Berg River extending along the eastern boundary of the proposed development.

As per Freshwater Impact Assessment's recommendation, the existing berm identified along the Western embankment of the Berg River and along the eastern boundary of the proposed development need to be removed, as removal of the berm will allow for better drainage of the area in a flood event and reduce the general constriction and hence flood width of the system. This was included in the Stormwater Management Plan and in principle support from the Department of Water and Sanitation was granted.

2. SITE LOCATION AND STUDY AREA

The study area is located to the west of the Berg River, and directly south of the N1 highway, in southern Paarl, Western Cape Province (Figures 1 and 2). Access to the site is via New Eskdale Street, running parallel to the N1 Highway, directly south of Paarl Mall.

The section of the Berg River to be rehabilitated extends along the eastern border of the proposed development.

Please refer to Figure 1 below: Digital satellite image depicting the study and investigation areas in relation to its surroundings.

Please refer to Figure 2 below: Location of study and investigation areas depicted on a 1:50 000 topographical map in relation to surrounding areas..

Please refer to Figure 3 below: Section of the Berg River extending along the eastern boundary of the proposed development to be rehabilitated.

Please refer to Figure 4 below: Berm identified along the eastern boundary of the proposed development to be removed as per Freshwater Impact Assessment Report.

REHABILITATION AND ALIEN CLEARING MANAGEMENT PLAN FOR A SECTION OF THE BERG RIVER ALONG THE PROPOSED RESIDENTIAL DEVELOPMENT ON ERF 8892,
FIRWOODS, PAARL, WESTERN CAPE.



Figure 1: Locality map; Digital satellite image depicting the study and investigation areas in relation to its surroundings.

REHABILITATION AND ALIEN CLEARING MANAGEMENT PLAN FOR A SECTION OF THE BERG RIVER ALONG THE PROPOSED RESIDENTIAL DEVELOPMENT ON ERF 8892,
FIRWOODS, PAARL, WESTERN CAPE.

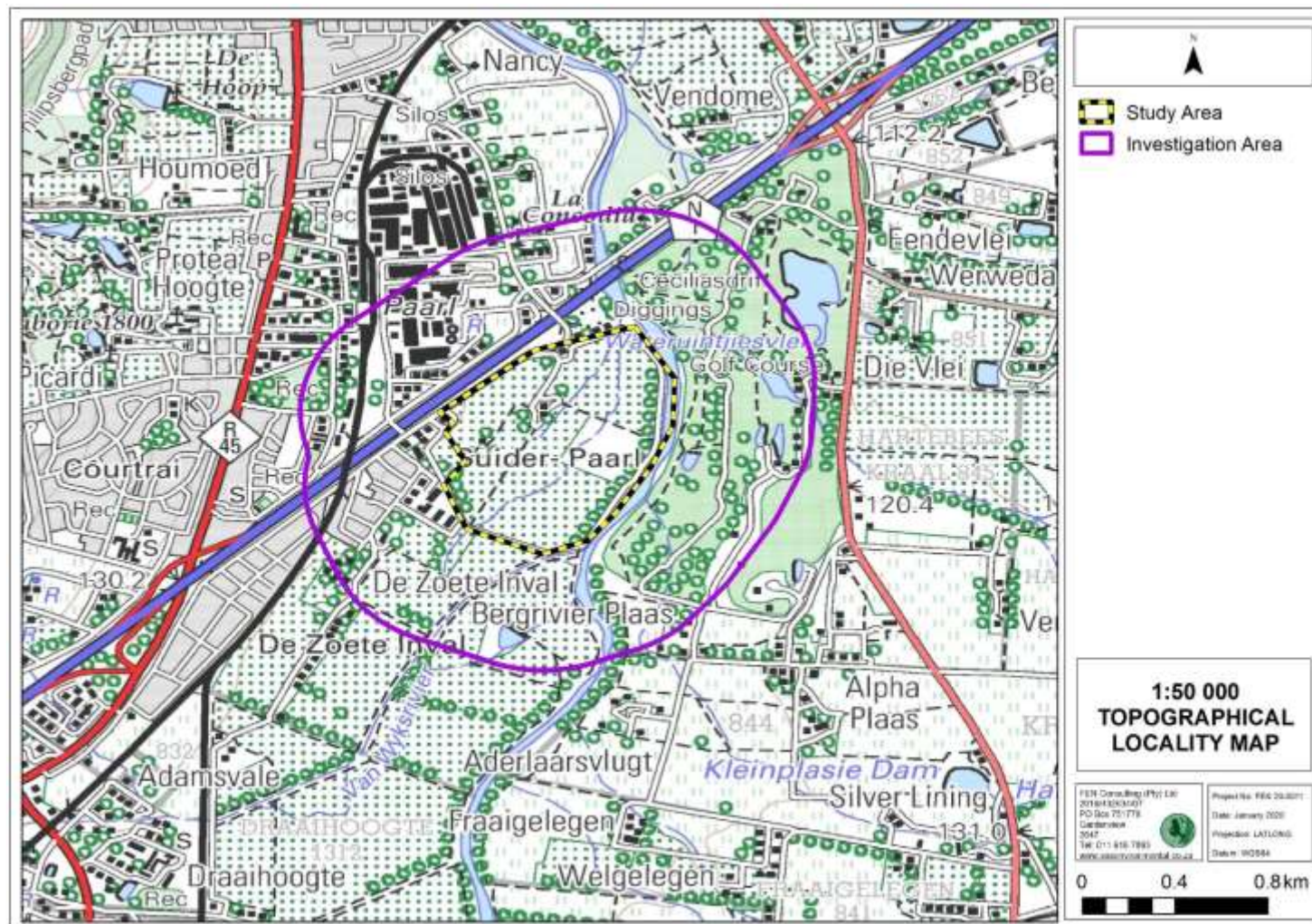


Figure 2: Location of study and investigation areas depicted on a 1:50 000 topographical map in relation to surrounding areas.

REHABILITATION AND ALIEN CLEARING MANAGEMENT PLAN FOR A SECTION OF THE BERG RIVER ALONG THE PROPOSED RESIDENTIAL DEVELOPMENT ON ERF 8892, FIRWOODS, PAARL, WESTERN CAPE.

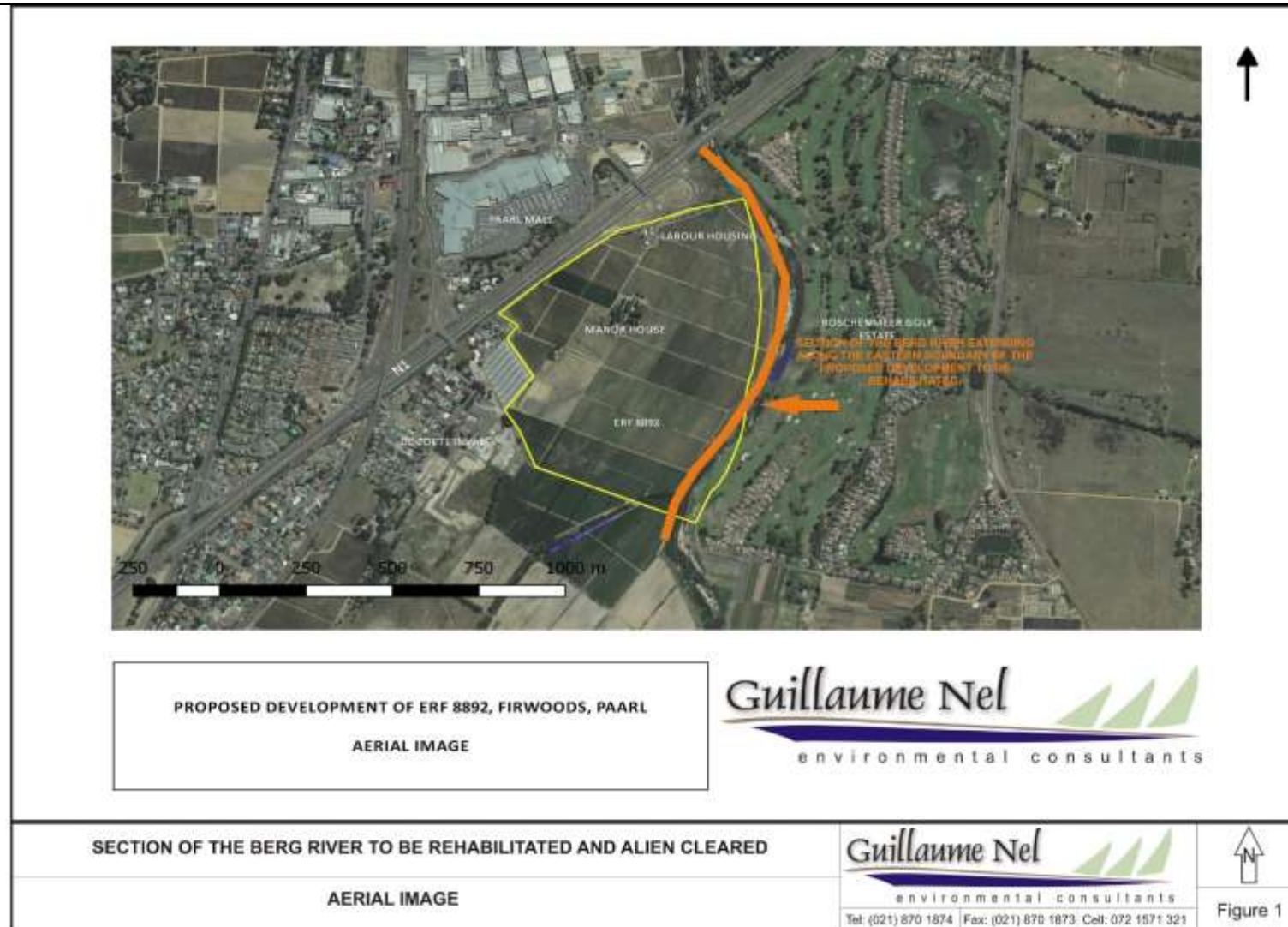


Figure 3: Section of the Berg River extending along the eastern boundary of the proposed development to be rehabilitated.



Figure 4: Berm identified along the eastern boundary of the proposed development to be removed as per Freshwater Impact Assessment Report.

3. THE VEGETATION

3.1 Vegetation of study area:

According to the Vegetation map of South Africa, Lesothos, and Swaziland (Mucina, Rutherford & Powrie 2005; SANBI 2012; 2018), the vegetation that originally would have occurred at the site is Swarland Alluvium Fynbos. (Endangered)

It is evident that this berm has been previously disturbed and degraded with no significant indigenous vegetation remaining. The berm consist mainly of invasive vegetation.

Please refer to Figure 5 below: Vegetation map of the study area.

REHABILITATION AND ALIEN CLEARING MANAGEMENT PLAN FOR A SECTION OF THE BERG RIVER ALONG THE PROPOSED RESIDENTIAL DEVELOPMENT ON ERF 8892,
FIRWOODS, PAARL, WESTERN CAPE.

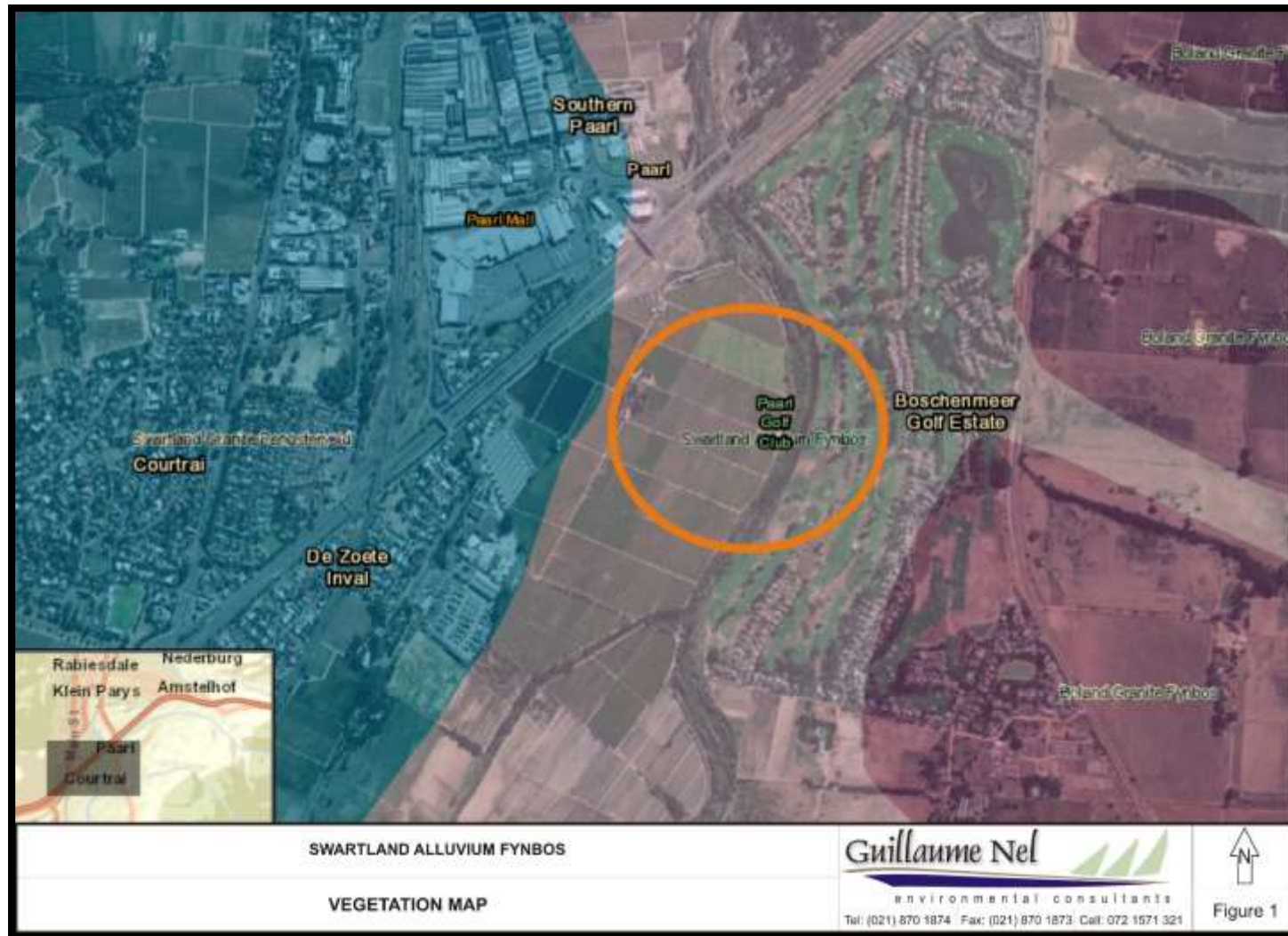


Figure 5: Portion of the Vegetation map of South Africa, Lesotho, and Swaziland (Mucina, Rutherford & Powrie 2005; SANBI, 202; 2018) showing that the study area lies within Swarland Alluvium Fynbos.

4. REHABILITATION MEASURES

4.1 Alien Clearing Management Plan

An alien clearing management plan need to be implemented for at least 3 year after rehabilitation to manage the aliens that might germinate within the rehabilitated area. It is suggested that follow up alien clearing practices be conducted every 6 months for at least one year after rehabilitation.

Alien clearing practices that can be implemented according to the sizes of invasive species:

4.1.1 List of invasive species identified on site for eradication

Invasive species identified for alien clearing:

Acacia saligna



Acacia mearnsii



Euclaptus sp



Salix sp



Populus canescens



Melianthus major



Melia azedarach



Phragmites australis



Pennisetum clandestinum



4.1.2 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 6: Example of a cut down stem treated with a coloured systemic herbicide.

4.1.3 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 7: Example of smaller species ideal for hand pulling.

4.1.4 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 8: Example of ring barking larger invasive trees.

4.1.5 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 to prevent seeds from entering and spreading along the watercourse;
- 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 identified stockpile area once clearing has been completed;
- 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 bidden material during transport;
- The invasive vegetation at the stockpile area needs to be removed on a regular basis and be disposed to the nearest licensed landfill site; and
- No burning of invasive vegetation on site allowed.

4.1.6 Wetland/Watercourse management measures during alien clearing practices

- The contractor needs to make sure that excessive quantities of sand and silt do not enter the wetland/watercourse 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 habitat, need to be done by manual labour, no heavy machinery allowed;
- All potential pollutants should be kept away from the wetland/watercourse habitat including:
 - Oil, diesel or petrol used for machinery during alien clearing activities;
 - Any chemicals for the control of alien vegetation; and
 - Sanitation structures.
- No spoil material should be placed in close proximity to the wetland/watercourse habitat, dumped on riparian or bank habitats, spread out around trees, used to fill hollows and other irregularities in the wetland/watercourse, or be used for erosion control, but must be removed to approved dumping site; and
- No spraying of herbicide allowed in close proximity to any water bodies.

4.1.7 Burning

Burning of cleared invasive vegetation on site is strictly prohibited. Cleared invasive vegetation needs to be taken to the nearest licensed landfill site. Should burning of invasive vegetation on example a farmers land 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.

4.1.8 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;
- Reflector vests to ensure visibility; and
- PPE for chainsaw operators.

4.1.9 Frequency of Alien Clearing

Prior to commencement for rehabilitation the entire study area must be cleared of invasive vegetation.

This alien clearing management plan must be implemented for at least three years after rehabilitation to manage the aliens that might germinate in the rehabilitated areas. Follow-up alien clearing practices must be conducted every 6 months for three years after rehabilitation.

Reasons for follow up:

- Due to the disturbance of soil, 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.

4.2 Management of topsoil

Topsoil is the most crucial element for rehabilitation for the following reasons:

- Act as growing medium for planted species.
- Act as germination medium for endemic species.

Prior to commencement of activities:

- 200mm of topsoil needs to be carefully stripped;
- The topsoil needs to be safely windrowed/stored outside the construction footprint in the exact location it was stripped from. This will ensure that the correct topsoil be placed back in the correct location after construction;
- The topsoil needs to be clearly seen as no go areas and protected;
- The topsoil needs to be clearly demarcated with danger tape as well as the necessary signage erected;
- ECO needs to inspect and monitor the topsoil and include the findings within the ECO audit reports;
- Topsoil may not be higher than 2m; and
- Topsoil needs to be monitored for invasive vegetation and cleared as required.

It was found that windrow of topsoil is the most effective for the following reasons:

- It limits the handling of topsoil;
- Ensure that topsoil is replaced within the exact location it was removed from; and
- Prevent the mixing of different topsoil from different sections.

4.3 Preparation of soil prior to rehabilitation

Prior to planting/rehabilitating all the disturbed and affected areas of the embankment of the Berg River, soil preparation is crucial for effective rehabilitation.

4.3.1 Ripping and shaping

All compacted areas need to be ripped/loosened, protected topsoil need to be spread, and area needs to be shaped in such a way that it blends in with the natural contour and drainage lines of the site.

Ripping and shaping will ensure:

- That all compacted areas be loosened and aerated;
- Will ensure better infiltration of precipitation and less erosion;
- Will make planting during rehabilitation easier;
- Will stimulate natural rehabilitation by means of seed germination; and
- Will positively contribute to the visual and aesthetic value of the site.



Figure 9: Example of a previously compacted area that has been ripped, shaped and topsoil spread over the affected area prior to rehabilitation.

4.3.2 Embankment Stabilization

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. If necessary biodegradable sausages can be placed within the created naturally aligned terraces to help with slope stabilization.



Figure 10: Example of horizontal terracing to reduce down slope erosion.



Figure 11: Example of horizontal terracing with biodegradable sausages to reduce down slope erosion.

4.4 Timing of rehabilitation and sowing

Planting:

Due to the fact that there will be no irrigation to help the plants to settle and strengthen, 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 water at least once a week.

Seeding:

Hydro seeding or hand sowing needs to be done directly after the surface has been ripped to ensure effective infiltration as explained above.

Hydro-seeding or hand sowing 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 preparing them for the following summer to follow.

4.5 Seeding practise

Seeding is an accepted source to result in the diversity of plants required as part of the rehabilitation process.

- Hydro-seeding or hand sowing needs to be done by a professional hydro-seeding company;
- The seed ratio and seed mixes for hydro-seeding or hand sowing needs to be supplied to the seeders by the Botanist/Rehabilitation Specialist/Horticulturist; and
- The smoke water solution to enhance seed germination needs to be supplied to the seeders by the Botanist/Rehabilitation Specialist/Horticulturist.

4.6 Rehabilitation of the embankment of the Berg River.

The embankment of the Berg River needs to be rehabilitated for the following reasons:

- Enhance the visual and aesthetic appearance of the disturbed areas;
- Will re-introduce endemic species to the previously disturbed area;
- Improve the ecological and biodiversity value and functioning of the disturbed watercourse;
- Will stabilize bare soil and prevent further erosion of the disturbed area; and
- Will stabilize bare soil and prevent siltation of the watercourse.

Plants for rehabilitation has been carefully selected using the following criteria:

- An on-site survey has been conducted to identify the locally indigenous vegetation naturally occurring on site and surrounding areas;
- The national vegetation Book (Mucina *et al.* 2005, Mucina & Rutherford 2006) has been consulted and species carefully selected for rehabilitation which naturally occur in areas under discussion; and
- The botanical and freshwater reports compiled by the specialists have been consulted.

Rehabilitation must take place with endemic species from the Swartland Alluvium Fynbos vegetation type.

Rehabilitation practices must be done by a qualified Botanist/Horticulturist/Rehabilitation specialist.

Please refer to Figure 11 below: Rehabilitation plan for the Berg River embankment.

Rehabilitation needs to be done with a selection of the following endemic species:

Shrubs: x1 per square meter.

Fillers; x2 per square meter.

Ground covers; x3 Plugs per square meter.

Sowing

Zone 1; Dry Bed Planting:

Trees

Olea europaea subs *Africana*



Shrubs

Osteospermum chrysanthemoides



Metalsia densa



Passerina corymbosa



Leucadendron salignum



Salvia chamelaeagnea



Diospyros glabra



Dodonaea viscosa var angustifolia



Searsia angustifolia



Protea repens



Eriosephalus africanus van africanus



Searsia crenata



Salvia lanceolata



Leonotus leonurus



Fillers

Watsonia borbonica



Helichrysum petiolare



Felicia filifolia



Ground Covers:

Helichrysum cymosum



Helichrysum crispum



Carpobrotus acinaciformis



Zone 2: Water edge planting:

Shrubs

Cyperus textilis



Ischrolepsis subverticillata



Elegia capensis



Fillers:

Zantedeschia aethiopica



Wachendorfia thyrsiflora



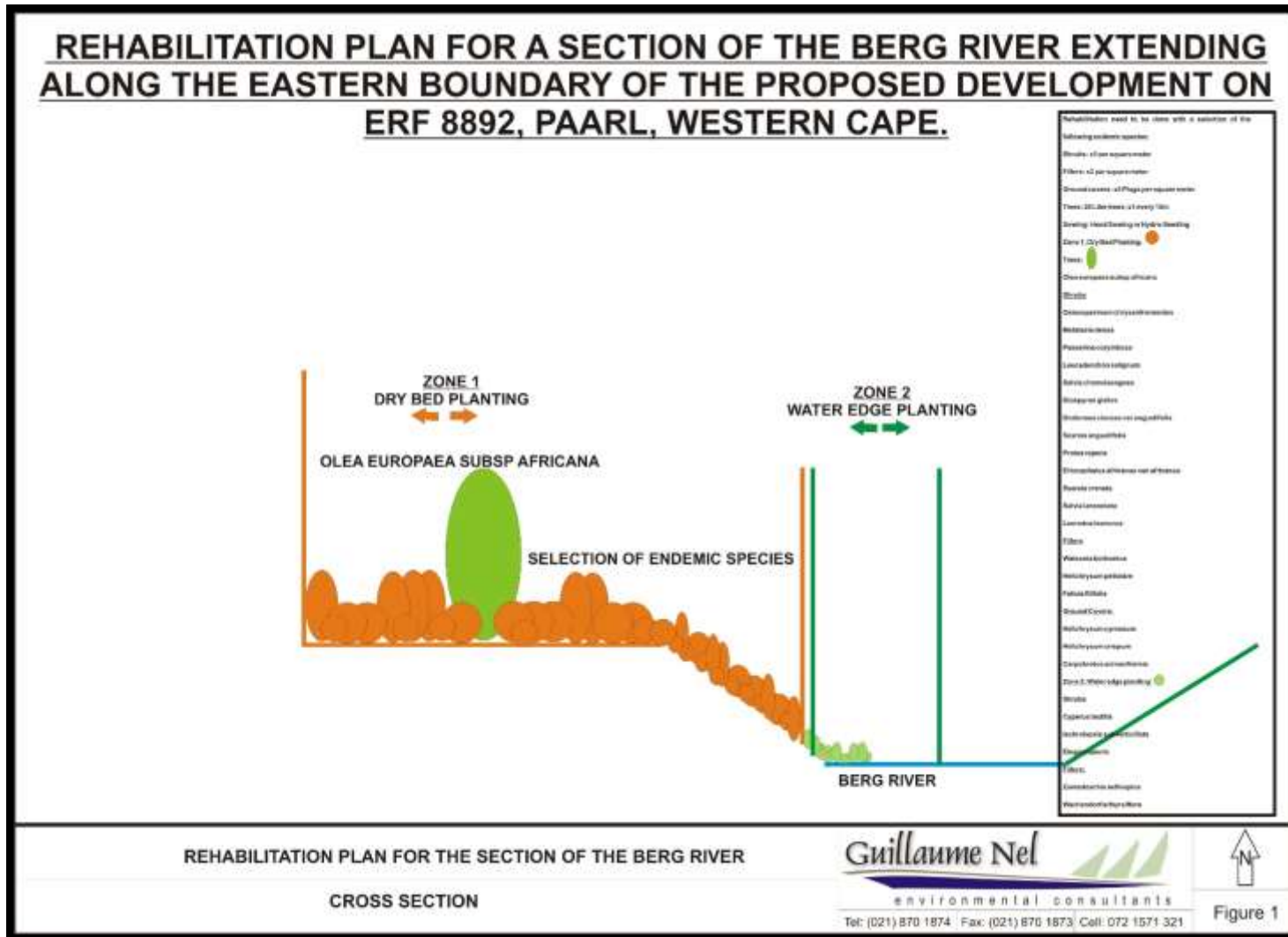


Figure 12: Rehabilitation Plan for the section of the Berg River along the eastern boundary of the proposed development.

4.7 Cordoning off rehabilitated area

After rehabilitation the area need to be clearly cordoned off to ensure that no damage is done to the rehabilitated area. Trampling of the areas will:

- Inhibit the successful growth and germination of plants.
- Lead to compaction of soil, poor water infiltration and erosion.

The area can be staked and cordoned off with danger netting



Figure 13: Example of a rehabilitated area cordoned off with danger netting.

5. CONCLUSION

GNEC in our professional capacity as rehabilitation specialists strongly feel that the above mentioned rehabilitation will:

- Enhance the visual and aesthetic appearance of the disturbed areas;
- Will re-introduce endemic species to the highly degraded and disturbed areas;
- Will stabilize bare soil and prevent/minimise further erosion of the disturbed areas;
- Improve the ecological and biodiversity value and functioning of the disturbed areas;
- Will help to reduce/minimise any further loss of topsoil;
- Will help to reduce/minimise any further loss of endemic vegetation; and
- Will ensure effective flow for the peak storm water flow through these culverts.

Rehabilitation must take place with endemic species.

No species, plant material and seed from areas outside the study area must be introduced to the study area.

Rehabilitation practices must be done by a qualified Botanist/Horticulturist/Rehabilitation specialist.