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DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

FOR THE

PROPOSED DANA BAY EMERGENCY ACCESS ROAD
ON REMAINDER OF PORTION 7 OF THE FARM 225
AND ERF 14797, DANA BAY, MOSSEL BAY,

WESTERN CAPE PROVINCE

APPLICATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998
(ACT NO. 107 OF 1998), AS AMENDED, AND THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014

PREPARED FOR: Mossel Bay Municipality
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-
- Environmental Impact Assessments • Basic Assessments • Environmental Management Planning
 - Environmental Control & Monitoring • Public Participation • Broad scale Environmental Planning



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DOCUMENT DETAILS

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Sharples Environmental Services cc (SES) has been actively engaged since 1998 in the fields of environmental planning, assessment and management. Clients include private, corporate and public enterprises on a variety of differing landuse applications ranging from large-scale residential estates and resorts to golf courses, municipal service infrastructure installations and the planning of major arterials. The consultants have over 20+ years of combined experience and operate in the Southern, Eastern and Western Cape regions.

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1. Introduction

Sharpley Environmental Services cc has been appointed by the *SMEC Professional Structural Engineers* on behalf of the *Mossel Bay Municipality*, to complete the Environmental Management Programme (EMPr) as part of the Basic Assessment Process for the construction of the Proposed Danna Bay Access Road on Remainder of Portion 7 of Farm 225 and erf 14797, Mossel Bay, Western Cape Province.

The proposed development will trigger listed activities in terms of the Amended Environmental Impact Assessment Regulations of 2014 (GN No. R.324 - 327 of 7 April 2017). Environmental Authorisation is therefore required from the competent authority (Western Cape Department of Environmental Affairs & Development Planning) before construction can commence.

2. About this EMPr

This document is intended to serve as a guideline to be used by the *Mossel Bay Municipality* (as the Implementing Agent) and any person/s acting on behalf of the *Mossel Bay Municipality*, during the pre-construction, construction, post-construction rehabilitation and operational (maintenance) phases of the proposed development. This document provides measures that must (where practical and feasible) be implemented to ensure that any environmental degradation that may be associated with the development is avoided, or where such impacts cannot be avoided entirely, are minimised and mitigated appropriately.

This EMPr has been prepared in accordance with the requirements of an EMPr (Appendix 4) as specified in the Amended Environmental Impact Assessment Regulations, 2014 (GN No. R. 326 of 7 April 2017), and with reference to the "Guidelines for Environmental Management Programmes" published by the Department of Environmental Affairs and Development Planning (2005).

It is important to note that the EMPr is not designed to manage the physical establishment of the development *per se*, but should rather be seen as a tool which can be used to manage the environmental impacts of the development.

The rehabilitation, mitigation, management and monitoring measures prescribed in this EMPr must be seen as binding to the *Mossel Bay Municipal* and any person acting on its behalf, including but not limited to agents, employees, associates, guests or any person rendering a service to the development site.

2.1 Important caveat to the report

In the past, some developments have had a devastating impact on the environment even though they have had Environmental Management Programmes in place, while other developments have had a low impact even though no management plans have been compiled.

The Implementing Agent and the attitude of the construction team play an integral role in determining the impact that the development will have on the environment. The ECO (**see Chapter 15.3**) needs to ensure that the all role-players are "on board" with regards to the constraints that the EMPr places on the development and construction team. The end result relies on cooperation and mutual respect and understanding of all parties involved.

3. How to use this document

It is essential that this EMPr be carefully studied, understood, implemented and adhered to as far as reasonably possible, throughout the pre – construction, construction and post - construction rehabilitation phases. The *Mossel Bay Municipality* must retain a copy of this EMPr, and another copy of

this EMPr must be kept on site at all times during the pre-construction, construction and post-construction rehabilitation phases of the development.

This EMPr must be included in all contracts compiled for contractors and subcontractors employed by the *Mossel Bay Municipality* as this EMPr identifies and specifies the procedures to be followed by engineers and other contractors to ensure that the adverse impacts of construction and maintenance activities are either avoided or reduced. The *Mossel Bay Municipality* and any appointed contractors must make adequate financial provision to implement the environmental management measures specified in this document.

This EMPr must be seen as a working document, which may be amended from time to time as needed, in order to accommodate changing circumstances on site or in the surrounding environment, or in order to accommodate requests/ conditions issued by the competent authority, the Department of Environmental Affairs & Development Planning. Amendments to this EMPr must first be approved by the competent authority.

4. Background and Location of the activity

4.1 Background and description

Due to fire safety risks associated with only having one road in and out of Dana Bay, the Mossel Bay Municipality proposes to construct an emergency access road in the western reaches of Dana Bay which will essentially upgrade the existing track road on erf 14797 and extend Flora Road across the Remainder of Portion 7 of the Farm 225 and junction with the N2 opposite the existing R327 junction. The farm portion is currently rented out and is utilised for cattle grazing. The proposed access road will be 6m wide with a reserve of 20m. Please refer to Figure 1 for the proposed Dana Bay Emergency Access Road.



Figure 1: The proposed Dana Bay Access Road

4.2 Location of the activity

The proposed development site is located in the western reaches of Dana Bay adjacent to and south of the N2 road. The access road will extend up to the N2 opposite the R327/N2 junction located south east of Mossdustria. Dana Bay is located in Mossel Bay which falls within Garden Route District Municipality in the Western Cape. Please refer to Figures 2 and 3 for the location of the proposed Access Road in Dana Bay.



Figure 2: Google earth image indicating the proposed location of the access road



Figure 3: Close - up google earth image of the proposed access road

Table 1: Summary Table: Site and Erf Details

Province	Western Cape
District Municipality	Garden Route District Municipality
Local Municipality	Mossel Bay Municipality
Ward number(s)	Ward 11
Farm name(s) / Erf number	- Remainder of Portion 7 of the Farm 225, Dana Bay, Mossel Bay - Erf 14797
Extent of property	RE/7/225: 165 250 m ² Erf 14797: 23 3281 m ²
SG Code	RE/7/225: C05100000000022500007 Erf 14797: C05100070001479700000

4.3 Site Access

The site will likely be mainly accessed from the north part of the site where it will junction with the N2, (opposite the R327 and N2 Junction), as shown in Figure 4. Alternatively, and if the site is accessed from the south, it will be along Flora Road as seen on Figure 5



Figure 4: The site will be accessed from the north side where it will junction with the N2

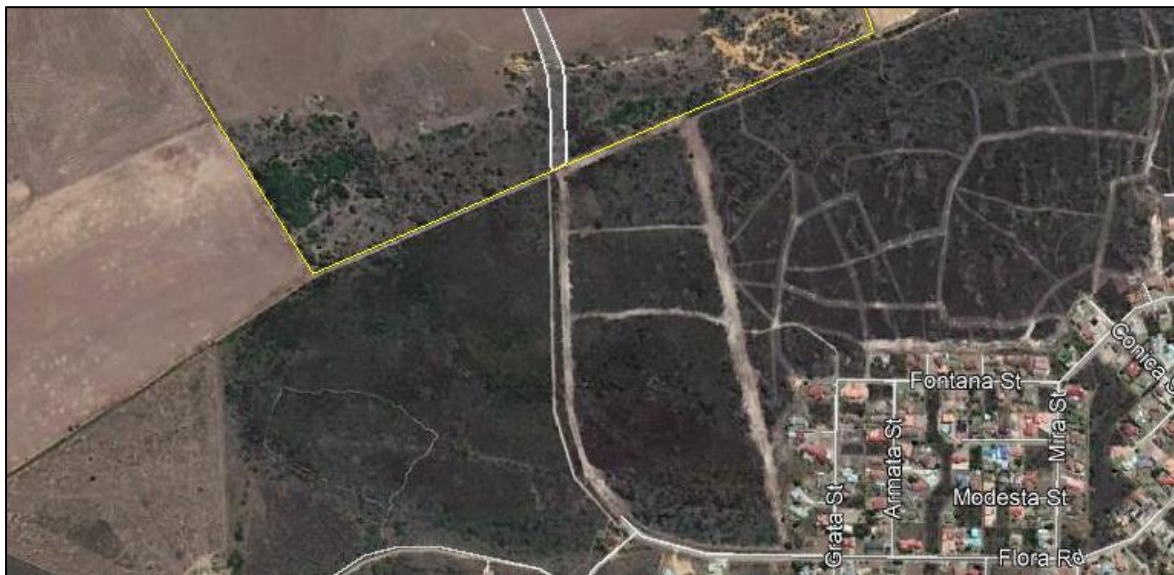


Figure 5: The site can also be accessed from Flora Road

5. Description of Environmental Setting

5.1 Vegetation description

According to the Biodiversity Survey conducted by Mark Berry Environmental Consultants dated December 2019, the proposed route (2.0 km) is located on an elevated coastal platform west of Mossel Bay between Dana Bay and the N2. The site, situated between 140 and 180 m above sea level, rises gently from its southern end over a stretch of 500 m to the top of a fynbos-covered sand dune before sloping down towards the northern end. The southern end (road reserve) is located in a fynbos setting, while the longer northern section is located on a dairy farm, a large part of which comprise a pasture and some fallow land. The coastal town of Dana Bay is situated on the south-eastern side, while Mossdustria is situated a little bit further away to the northwest (on northern side of N2).

While the coastal strip between Mossel Bay and Glentana is largely transformed by coastal developments, the coastline west of the Mossel Bay area is much better preserved. Alien infestation remains a big concern in the larger area, notably rooikrans, port jackson and spider gum. While farming activities (cattle/dairy) still prevail on the farm through which the route passes, the southern end, especially along the road reserve, is still covered with intact fynbos.

According to the National Vegetation Map (2018) Northern Langeberg Sandstone Fynbos was mapped in the northern part and Canca Limestone Fynbos was mapped in the southern part of the proposed development footprint. Hartenbos Dune Thicket, Central Coastal Shale Band Vegetation and Albertinia Sand Fynbos forms part of the larger area. According to the biodiversity survey compiled by Mark Berry Environmental Consultants, Canca Limestone Fynbos stretches across the Southern Cape lowlands from Witsand in the west to the Mossel Bay area in the east. The Northern Langeberg Sandstone is associated with the northern slopes of the Langeberg, as well as the Aasvoëlberg hills from Albertinia to Mossel Bay. The southern part of the proposed development consist of mainly of fynbos however the history of the fallow land in the northern reaches are unclear.

5.2 Geology and soil

According to the 3422 AA Mossel Bay 1:50 000 geological map, the southern part of the site is underlain by non-shelly sand (a target for sand mining activities), which changes into loam and sandy loam soil in the northern part. The base rock comprises Table Mountain Group sandstone, presumably Skurweberg Formation. These sediments typically support fynbos types.

5.3 Conservation Context

Being located on the Southern Cape coastal plain in close proximity to the coast, the site occurs in a typical coastal fynbos/thicket environment. This is confirmed by the presence of fynbos species, such as *Erica versicolor*, *Leucospermum praecox*, *Protea lanceolata* and several restio species, as well as thicket species, such as *Putterlickia pyracantha*, *Diospyros dichrophylla*, *Pterocelastrus tricuspidatus* and *Lauridia tetragona*. According to the 2012 SA Vegetation Map, the southern part of the site has been mapped as Canca Limestone Fynbos and the northern part as North Langeberg Sandstone Fynbos.

Groot Brak Dune Strandveld (along the coast), Albertinia Sand Fynbos and Central Coastal Shale Band Vegetation are also present in the larger area.

Canca Limestone Fynbos stretches across the Southern Cape lowlands from Witsand (Cape Infanta) in the west to the Mossel Bay area in the east, while North Langeberg Sandstone Fynbos is associated with the northern slopes of the Langeberg, as well as the Aasvoëlberg hills from Albertinia to Mossel Bay (Mucina, 2006). Groot Brak Dune Strandveld stretches from the Gouritz mouth in the west to Victoria Bay in the east (Mucina, 2006). The latter, which is easy to spot with its impenetrable, thorny thicket structure, occurs in more sheltered areas along the coast and along drainage lines. Albertinia Sand Fynbos is associated with deeper sand habitats commonly found on the Albertinia flats.

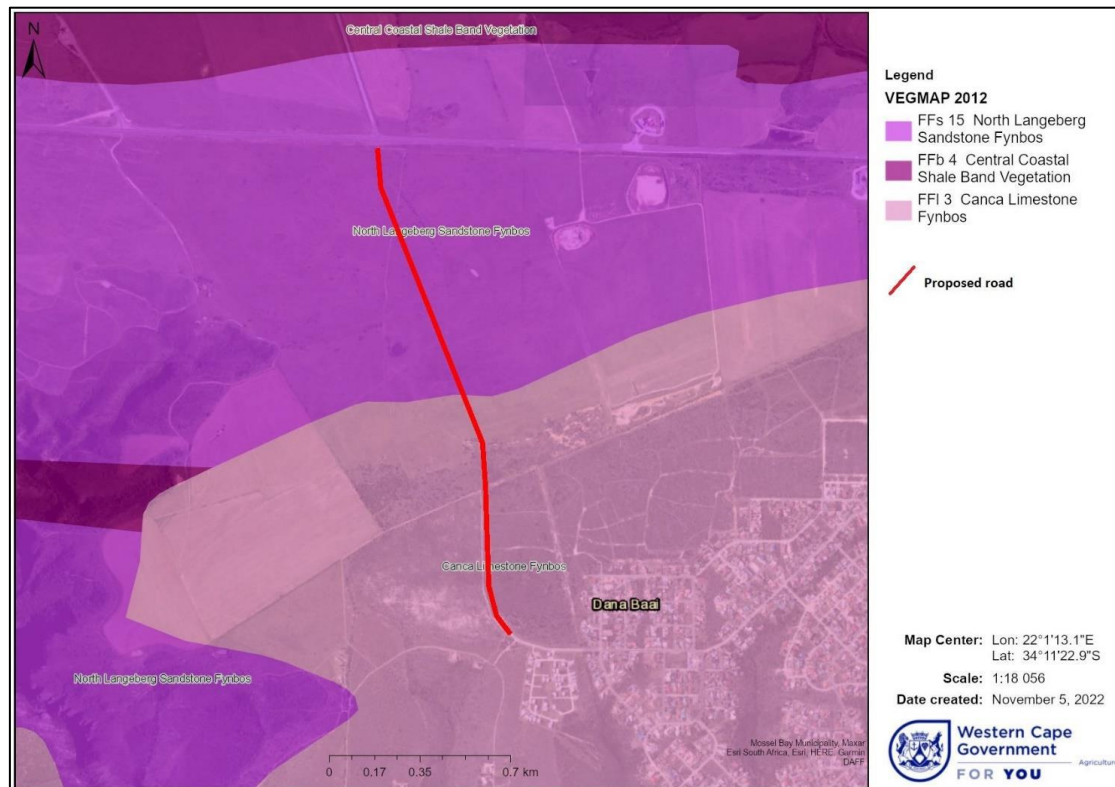


Figure 6: National Vegetation Map

During the site survey it was found that the vegetation in the southern part of the site comprises fynbos with a strong thicket influence in a few places. The latter could be the result of senescence. With regards to vegetation type, it leans more towards Albertinia Sand Fynbos, with *Erica versicolor*, *Leucospermum praecox*, *Bobartia robusta* and *Thamnochortus insignis* important taxa in the latter type. However, there is also an affinity with Canca Limestone Fynbos and North Langeberg Sandstone Fynbos, with *Protea lanceolata* an important taxon in the former, and *Erica versicolor* and *Leucadendron salignum* important in the latter. *Carissa bispinosa*, *Diospyros dichrophylla*, *Putterlickia pyracantha*, *Pterocelastrus tricuspidatus*, *Gymnosporia buxifolia* and *Lauridia tetragona* are important Groot Brak Dune Strandveld taxa.

Being well represented in the larger area, Canca Limestone Fynbos is currently not considered a threatened vegetation type. However, agricultural activities, alien plant infestation and coastal developments remain major threats for certain species restricted to this vegetation type. About 81% of Canca Limestone Fynbos remains (Skowno, 2019). However, due to its poor conservation status its protection in the coastal areas should remain a priority. Less than 1% is formally conserved in the Pauline Bohnen and Geelkrans Nature Reserves (Mucina, 2006). Albertinia Sand Fynbos, on the other hand, is listed as Vulnerable (DEA, 2011). About 55% of it is still left (Skowno, 2019), while only 5% is formally protected in the De Hoop, Pauline Bohnen, Geelkrans, Kleinjongensfontein, Blomboschfontein and Skulpiesbaai Nature Reserves (DEA, 2011). North Langeberg Sandstone Fynbos is not listed as threatened. About 92% of it remains, while 13% is formally conserved in the Boosmansbos Wilderness Area and an additional 45% in mountain catchment areas (Mucina, 2006).

The proposed access road runs through two areas mapped as terrestrial critical biodiversity areas (CBA's). The southern portion forms part of a biodiversity corridor that runs in an east-west direction past the northern side of Dana Bay. Apart from providing a backbone to the local biodiversity network, the latter corridor serves as an important passage along which fauna can migrate between the vegetation remnants. It is unclear what the rationale is behind the patchy CBA at the northern end of the route next

to the N2. On the ground there does not seem to be any difference between the CBA patches and the areas in between, mapped as 'other natural areas'.

There are no formally protected areas within a 20 km radius of the site, only a few private game reserves. Reasons for the importance of the above-mentioned CBA's include the presence of SA vegetation types (Canca Limestone Fynbos and North Langeberg Sandstone Fynbos), a critically endangered vegetation variant (Petrosa Fynbos-Renosterveld), threatened vertebrate habitat (bontebok) and a few wetland types.

CBA's are defined as areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure (Pool-Stanvliet, 2017). These sites are selected for meeting national targets for species, habitats and ecological processes (Pool-Stanvliet, 2017). Many of these areas support known occurrences of threatened plant species, and/or may be essential elements of designated ecological corridors. Loss of designated CBA's is therefore not recommended. With the proposed road running through the CBA corridor one can expect some impact on its functionality.

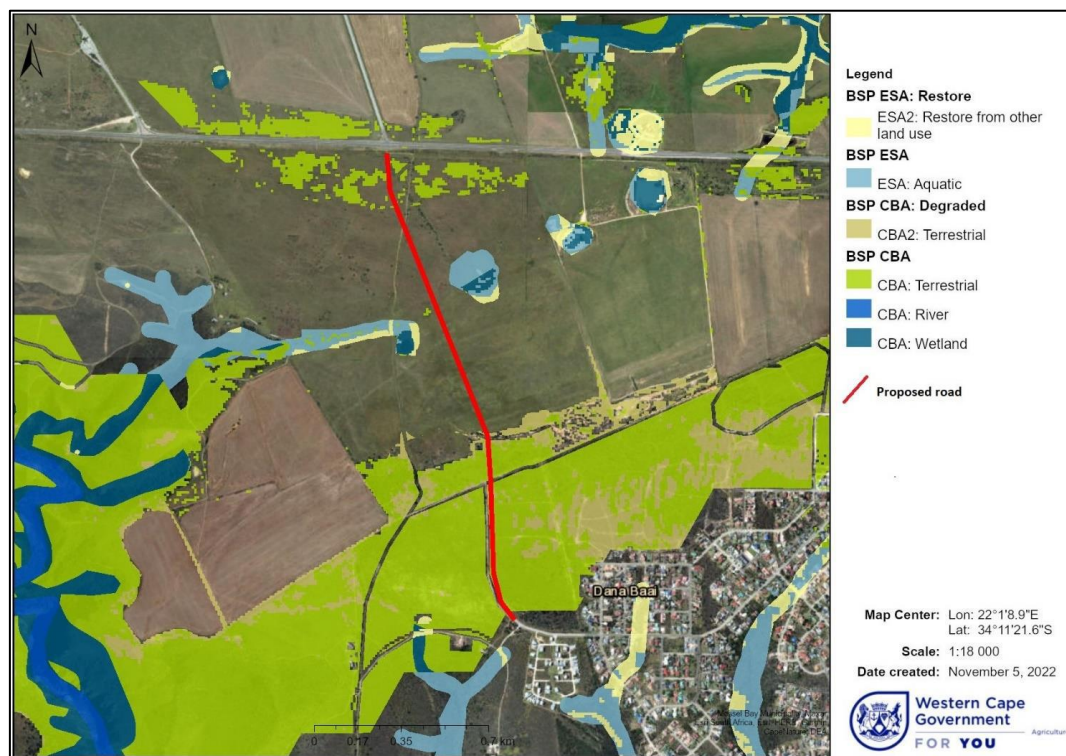


Figure 7:CBA's

Site Vegetation

The vegetation at the southern end of proposed route, especially along the road reserve, comprises a fynbos type that shows a strong affinity with Albertinia Sand Fynbos. There is also a bit of influence from Groot Brak Dune Strandveld and Canca Limestone Fynbos. Structurally, it can be described as a low to mid-high (0.5-2 m) closed shrubland following Campbell's classification (Campbell, 1981). It is low (<1 m) along the road reserve and somewhat taller (1-2 m) in the strip between the road reserve and pasture. Dominant species include *Helichrysum patulum*, *Osteospermum moniliferum*, *Searsia lucida* and *Passerina corymbosa*. The fynbos along the road reserve is generally of a good quality. The presence of

a two-track dirt road, some *Acacia cyclops* (rooikrans) and a few disturbed patches do not detract from its value or quality.

The strip of vegetation between the road reserve and pasture shows clear signs of disturbance by cattle grazing and alien infestation, notably *A. cyclops* and some *Opuntia ficus-indica* (prickly pear). It was also noted to be senescent (very woody) and in need of a fire. Fire is an important trigger for germination in fynbos and it can also be used in an integrated manner to control invasive aliens.

The history of the old (fallow) land is not clear, but a fair bulb population was noted here, notably *Albuca* cf. *acuminata*, *Ornithogalum dubium*, *Drimia capensis*, *Haemanthus coccineus*, *Crossyne guttata* and *Boophone disticha*. The shrub component (<0.4 m high) comprises a few scattered *Elytropappus rhinocerotis* (renosterbos), *Metalasia acuta*, *Athanasia quinqueidentata*, *Delosperma neethlingiae*, *Lampranthus elegans*, *Muraltia ericoides* and *Crassula nudicaulis*. It shows some potential to revert back to the original vegetation (presumable North Langeberg Sandstone Fynbos), but only if further farming activities in the area are ceased. The pasture is significantly degraded or devoid of indigenous vegetation. It is currently used for grazing purposes. Figure 8 shows the vegetation attributes of the site.



Figure 8: Vegetation attributes of the site. The untuned area(s) are devoid of significant vegetation

Plant Species

Shrub species recorded along the road reserve include *Protea lanceolata*, *P. repens*, *Leucospermum praecox*, *Leucadendron salignum*, *Erica versicolor*, *Osteospermum moniliferum*, *Tarchonanthus littoralis*, *Metalasia densa*, *M. acuta*, *M. brevifolia*, *Seriphium plumosum*, *Helichrysum patulum*, *H. teretifolium*, *H. rugulosum*, *H. cymosum*, *Senecio ilicifolius*, *Osteospermum imbricatum*, *Cullumia carlinoides*, *Berkheya carlinoides*, *Ursinia anthemoides*, *U. discolor*, *Chrysocoma ciliata*, *Aspalathus crassiseppala*, *A. quinquefolia*, *Searsia lucida*, *S. glauca*, *Diospyros dichrophylla*, *Carpobrotus edulis*, *C. muirii*, *C. acinaciformis*, *Crassula subulata*, *Passerina corymbosa*, *Gnidia chrysophylla*, *G. squarrosa*, *Struthiola striata*, *Agathosma apiculata*, *A. imbricata*, *Euchaetis burchellii*, *Muraltia* cf. *ericoides*, *G. Gymnosporia buxifolia*, *Lauridia tetragona*, *Pterocelastrus tricuspidatus*, *Euclea crispa*, *Pittosporum viridiflorum*, *Grewia occidentalis*, *Carissa bispinosa*, *Hermannia salviifolia*, *H. lavandulifolia*, *Trichocephalus stipularis*, *Cliffortia stricta*, *Anthospermum aethiopicum*, *Leonotis ocymifolia*, *Pelargonium capitatum*, *P. fruticosum*, *P.*

betulinum, *Chironia baccifera*, *Asparagus rubicundus*, *Lobelia tomentosa* and *Rhoicissus digitata*. Restios and geophytes recorded here include *Thamnochortus muirii*, *T. insignis*, *Elegia stipularis*, *Staberoha distachyos*, *Restio triticeus*, *Mastersiella spathulata*, *Drimia capensis*, *Aristea africana* and *Bobartia robusta*.

Additional shrub species recorded (inside the fynbos strip north of the road reserve and on old land) include *Elytropappus rhinocerotis*, *Athanasia quinqueidentata*, *Felicia aethiopica*, *Berkheya rigida*, *Gerbera tomentosa*, *Indigofera nigromontana*, *Rhynchosia caribaea*, *Searsia rosmarinifolia*, *Delosperma inconspicuum*, *Ruschia tenella*, *Delosperma neethlingiae*, *Lampranthus elegans*, *Crassula nudicaulis*, *Aloe maculata*, *Gnidia nodiflora*, *Asparagus aethiopicus*, *Hermannia flammula*, *Salvia africana-lutea*, *Phyllis cf. imberbis*, *Solanum rigescens*, *Wahlenbergia desmantha*, *Putterlickia pyracantha* and *Cynanchum obtusifolium*. Grasses and extra bulbs recorded inside fynbos strip and on old land include *Eragrostis curvula*, *Albuca juncifolia*, *A. cf. acuminata*, *Ornithogalum dubium*, *Haemanthus coccineus*, *Crossyne guttata*, *Boophone disticha* and *Moraea bulbifera*.

Most of the recorded species are widespread and fairly common in the Mossel Bay area. *Leucospermum praecox* (VU), *Cullumia carlinoides* (NT), *Carpobrotus muirii* (NT), *Gnidia chrysophylla* (NT), *Hermannia lavandulifolia* (VU) and *Thamnochortus muirii* (VU) are listed SCC. Other regional endemics recorded on site include *Protea lanceolata* and *Bobartia robusta*. A few *Pittosporum viridiflorum* trees, a protected tree species in terms of the National Forests Act (Act 84 of 1998), were recorded in the fynbos in close proximity to the proposed road. No milkwoods (*Sideroxylon inerme*), another protected tree species common in the area, were recorded. The removal of these trees requires a permit from the Department of Forestry.

Only a few woody and succulent exotic species were recorded, namely *Acacia cyclops* (rooikrans, category 1b), *A. saligna* (port jackson, 1b) and *Opuntia ficus-indica* (prickly pear, 1b). As indicated above, all three species are Category 1b invaders. In terms of the National Environmental Management: Biodiversity Act (NEMBA) (Act 10 of 2004) Alien and Invasive Species List (2016), category 1b invasive species require compulsory control as part of an invasive species control programme.



Figure 9: Recorded SCC and protected tree species.

The impact on plant species, especially SCC and protected species, is also of some concern and needs to be managed during the construction phase. Most of the recorded species are widespread and fairly common in the Mossel Bay area. Six SCC were recorded, including three which are listed as Vulnerable, namely *Leucospermum praecox*, *Hermannia lavandulifolia* and *Thamnochortus muirii*. Fortunately, they are still frequently encountered in similar habitats in the Mossel Bay area. Literally, hundreds of *L. praecox* are present on the large undeveloped property directly north of Dana Bay. With regards to protected tree species, three *Pittosporum viridiflorum* trees were recorded in the fynbos close to the proposed road. They can potentially be avoided during the construction phase. If not, a permit will be needed for their removal.

Search and rescue

Due to a considerable presence of bulbs in the fallow land portion, it recommended that the affected bulbs be searched and rescued and replanted in the adjacent fallow land area. Search and rescue should be done at an appropriate time of the year, preferably when the soil is wet during the raining season(s). Ideally, bulbs should be salvaged during leaf fall, but before or after flowering.

The probability of SCC listed in the Screening Report to occur in the vicinity of the site is indicated in Table 2. Given their habitat preferences, five species have a medium or higher probability to occur on the property. Those with a lesser probability to occur here have not been recorded in Mossel Bay or were recorded in different habitats or vegetation types.

Table 2: Threatened plant species as listed in the Screening Report.

Sensitivity	Feature(s)	Probability of occurring on site
Medium	<i>Lampranthus ceriseus</i>	Low
Medium	<i>Lampranthus diutinus</i>	Low
Medium	<i>Lampranthus fergusoniae</i>	Low
Medium	<i>Lampranthus pauciflorus</i>	Low
Medium	<i>Ruschia leptocalyx</i>	Low
Medium	<i>Argyrolobium harmsianum</i>	Low
Medium	<i>Aspalathus campestris</i>	Low-medium
Medium	<i>Aspalathus obtusifolia</i>	Low-medium
Medium	<i>Lebeckia gracilis</i>	Low-medium
Medium	<i>Leucadendron galpinii</i>	Low
Medium	<i>Leucospermum muirii</i>	Low
Medium	<i>Leucospermum praecox</i>	Recorded on site
Medium	<i>Wahlenbergia polyantha</i>	Low-medium
Medium	<i>Selago glandulosa</i>	Low-medium
Medium	<i>Selago villicaulis</i>	Low-medium
Medium	<i>Erica unicolor</i> ssp. <i>mutica</i>	Low
Medium	<i>Hermannia lavandulifolia</i>	Recorded on site
Medium	Sensitive species 153	Low-medium
Medium	Sensitive species 268	Low
Medium	<i>Thamnochortus muirii</i>	Recorded on site
Medium	Sensitive species 1024	Low-medium
Medium	<i>Athanasia cochlearifolia</i>	Low-medium

Medium	<i>Agathosma eriantha</i>	Low-medium
Medium	<i>Agathosma muirii</i>	Low
Medium	<i>Agathosma riversdalensis</i>	Low
Medium	<i>Euchaetis albertiniana</i>	Medium
Medium	<i>Muraltia cliffortiifolia</i>	Low
Medium	<i>Muraltia knysnaensis</i>	Low
Medium	<i>Polygala pubiflora</i>	High
Medium	<i>Nanobubon hypogaeum</i>	Low-medium
Medium	<i>Sensitive species 516</i>	Low
Medium	<i>Drosanthemum lavisii</i>	Low
Medium	<i>Sensitive species 800</i>	Low-medium
Medium	<i>Sensitive species 500</i>	Low-medium
Medium	<i>Sensitive species 654</i>	Low-medium
Medium	<i>Agathosma microcarpa</i>	Low

Botanical Assessment Mitigation Measures

The following mitigation measures are required to ensure that the impact on terrestrial biodiversity and plant species is minimised:

- During the construction phase, demarcate/fence off the development footprint. Restrict all construction activities, such as stockpiling and parking, to already disturbed areas away from natural vegetation. The contractor(s) must be made aware of the sensitive surroundings. The fynbos and old land areas outside the road footprint must be declared a 'no-go' area and not be disturbed in any way.
- Remove topsoil and/or seedbearing plant material from fynbos and old land areas to be disturbed for use in the rehabilitation of disturbed areas after construction.
- The contractor(s) must be made aware of the presence of SCC and protected tree (*Pittosporum viridiflorum*) species. Removal of the latter requires a permit from the Department of Forestry in terms of the National Forests Act.
- During the staking out of the construction footprint take cognisance of the presence of recorded SCC and protected trees. Try and avoid these as far as practically possible. It is recommended that a botanist be involved during this process.
- Search and rescue bulbs from the construction footprint for replanting in the adjacent areas or rehabilitation of disturbed areas after construction. Topsoil, cuttings and seedbearing plant material can also be salvaged for this purpose, especially cuttings from *Carpobrotus* and *Pelargonium* species. Bulbs should be removed along with some soil, placed in gel, bagged and then taken to a nursery for temporary storage or transplanted directly in the receiving area.
- Engage in alien clearing, focussing on invasive species such as rooikrans, port jackson and prickly pear. In terms of the NEMBA (Act 10 of 2004) Alien and Invasive Species List (2016), these species are category 1b invaders that require compulsory control as part of an invasive species control programme. This will become a long-term maintenance requirement. One-year old seedlings can be hand-pulled, preferably when soil is wet after a rainfall. If left to grow, removal becomes more difficult and costly. The use of heavy plant, such as bush cutters or D9 Caterpillar, for alien clearing is not recommended. Port jackson stumps must also be treated with herbicides to prevent coppicing.
- Allow 24 months for the monitoring of rehabilitation success and alien infestation post construction. In this regard, a rehabilitation plan should be compiled and submitted before the start of construction work. This plan will also detail the search and rescue of plants, which are to be used for rehabilitation process.

5.4 Aquatic Environment

A Freshwater Habitat Risk Assessment Report was compiled by SES (Debbie Fordham) dated 11 March 2020 for the Dana Bay Access Road in Mossel Bay, Western Cape.

According to the Freshwater Habitat Risk Assessment Report (FHRAR), the area has a moderate climate with annual mean temperature of 17°C. The annual rainfall in the area is 430mm with the highest rainfall occurring in October and March and the lowest in December. The site is located within the DWS Quaternary catchment K10A and falls within the Breede Gouritz Water Management Area. The catchment has fairly short rivers that drain the coastal area into the Indian Ocean. The Blinde River is one of the largest rivers in this catchment and are located west of the study area.

The Freshwater Habitat Risk Assessment Report indicates that the NFEPA projects identified wetlands within close proximity to the proposed road as seen from Figure 9. In the northern section of the road a FEPA wetland was identified on the eastern side of the road and a non – FEPA wetland on the western side. Both wetlands are approximately 90m from the road. In the southern portion of the road there are also FEPA wetlands identified. These wetlands are approximately 230m and 320m away from the road. The wetlands identified, as shown in Figure 10, are in similar locations as the NFEPA identified wetlands. The two wetlands in the south and the wetland to the west of the study area are all classified as seep wetlands that are located within Albany Thicket. The wetlands east of the study area are classified as a depression occurring in the Southern Fynbos Region. The wetland vegetation group is classified as Southern Sandstone Fynbos according to the National Wetland Map 5 (2019). This unit is listed by the dataset as critically endangered and lacking protection. The wetland areas east and west of the proposed road contained wetland CBA and the remainder of the aquatic habitat identified in proximity to the study area are classified as Ecosystem Support Area, and the CBA's directly adjacent to the road are all classified as terrestrial CBA as identified by the NFEPA project and the National Wetland Map 5.

According to the Freshwater Habitat Risk Assessment Report, the depressions on either side of the proposed development are artificial wetlands. The wetlands are past excavations dug for drinking water and potentially irrigation water. It is likely that the depressions were connected to the nearby drainage network but have become disconnected by the small impoundments. Due to the depression being artificial and no longer connected to the drainage network they were not assessed in further detail. A very small and shallow depression on the plateau between the N2 road and Dana Bay will be infilled during the construction of the proposed access road in Dana Bay. The wetland identified is not connected to the river network and the water source is likely to be rainfall dominant and prolonged flooding from restricted infiltration by a sub – surface clay layer. There is only temporary wetness and thus it is dominated by grass species. Soil augering within the depression showed evidence of periods of soil saturation with presence of mottles within 50cm of the surface. The wetland can be classified as a geochemical depression. The wetland is undated, temporary and located in a highly disturbed area and there is possibility that is artificial and has formed as a result of some agriculture activity however this cannot be confirmed. The depression can be defined as wetland however there is no wetland plant indicator species and the depression is isolated within the landscape. There are some rocks within the depression which are most probably placed here in the past by the farmer. There is a high density of burrows within the circular depression and the grass is shorter. It is impossible that it is home to the Cape Gerbil and the density of burrows appears to be highest within the depression. The PES was determined to be within the 'B' ecological category indicating that the wetland is near natural state. It has a low to moderate level of ecological importance and sensitivity, as it seems to provide refuge for local biota on the coastal plain. However, it has limited habitat diversity and is in a disturbed landscape and has little research potential. It lacks functional importance in the form of direct services to society and provides limited indirect ecological benefits. It is suggested that the wetland be avoided to prevent any habitat loss and to maintain the system in its current state. However the loss of the habitat will not result in any irreplaceable ecosystem functions.

The Freshwater Habitat Risk Assessment Report also indicates that all of the tributaries are small systems with ephemeral flow. The systems are of a similar ecological integrity as they share biophysical characteristics and have been similar impacted by land use and cover changes. Although land clearance and some infrastructure encroachment has resulted all of the tributaries remain functional. The riparian zone is dominated by indigenous vegetation (shrubs and thicket) but alien invasive plant

species have also encroached into the riparian zone. The tributaries scored a 'C' for PES as they are in a fair condition. However the ecological importance and sensitivity category of the tributaries were determined as being 'Low'. The systems do not have a high sensitivity as they are only episodically inundated with no significant diversity of habitat along the reach. The species associated with these riparian systems are likely very tolerant of increases and decreases in flow. A very low proportion of the biota is expected to be only temporarily dependent on flowing water for the completion of their life cycle. The systems have a limited ability to provide refuge to biota during times of environmental stress. This is due to the limited diversity of habitat and low flows. The streams have habitat types rarely sensitive to water quality change related to flow decreases and increases. The tributaries are a moderately important link in terms of connectivity for the survival of biota upstream and downstream and are moderately sensitive to modification.

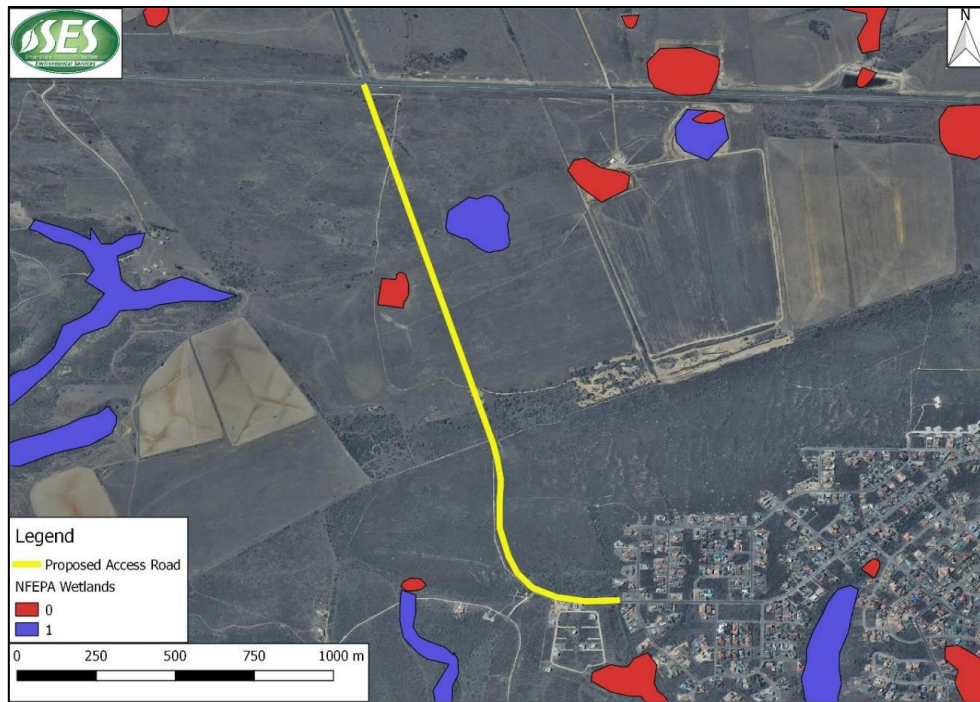


Figure 10: Map of NFEPA project identified aquatic area in relation to the study area

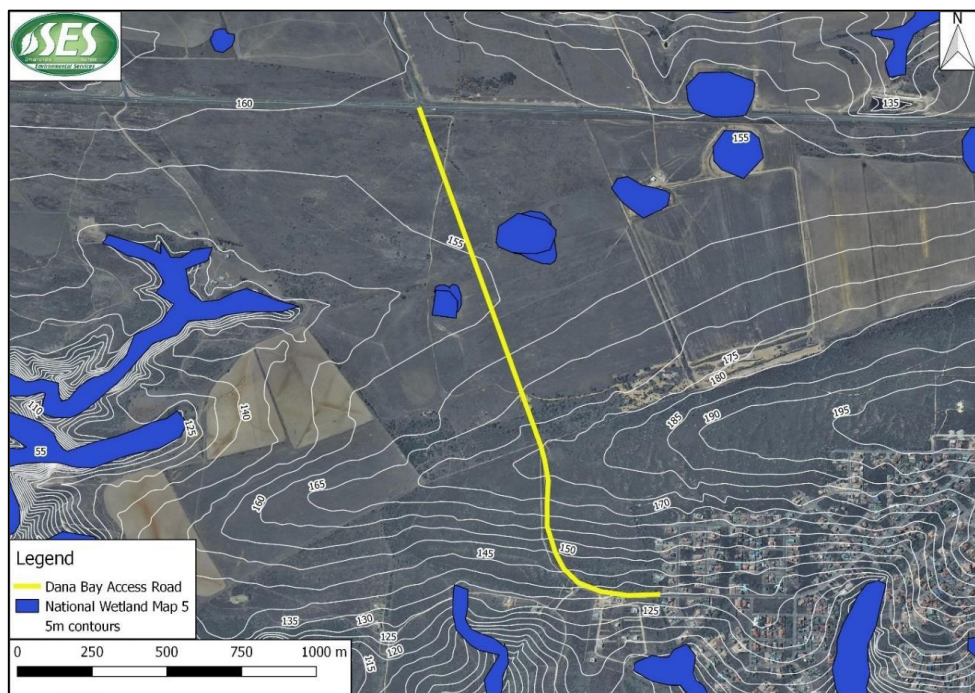


Figure 11: Wetlands surrounding the road as identified by the Wetland Map 5

According to the Freshwater Habitat Risk Assessment Report a wetland offset investigation was undertaken to determine if such an approach is required to mitigate the residual impacts of loss of the depression. It was determined that due to the negligible size and importance of the depression there would not in fact be any remaining significant residual. The need and desirability of biodiversity offsets are still to be confirmed by regulating authority, in this regard, a preliminary investigation of potential offset requirements was undertaken through the rapid application of available wetland offset guidelines and tools. The potential loss of the wetland area was assessed using the DWS Wetland Calculator and included in the 2017 Draft National Offset Guidelines to determine the wetland targets that would need to be achieved by the proposed wetland offset. The offset calculation is based on the loss of the 0.465 of depression wetland. It was determined that no functional wetland offsets are required. The small depression does not provide significant ecological functions at any scale and therefore there is a negligible loss. In this regard, it was also determined that the loss of the wetland may require ecosystem conservation offsets of 0.2 habitat hectare equivalents. To conclude, the loss of the depression wetland will not influence any biodiversity conservation targets or compromise water resource protection in any way or any scale. There is no need for wetland offsets to be implemented. According to Freshwater Habitat Risk Assessment Report voluntary compensation is encouraged to achieve net gain. Activities to improve the nearby watercourses, such as the Blind River or engaging with Cape Nature and the Dana Bay Conservancy regarding planning would be an example of such voluntary compensation for wetland loss. Due to the non – significant offset targets, protection and management of the downslope watercourses through sustainable urban drainage systems could be seen as appropriate measures.

Mitigation measures extracted from the Freshwater Habitat Risk Assessment Report dated 11 March 2020 compiled by SES (Debbie Fordham):

Construction phase:

- The construction footprint must be kept to a minimum for the duration of construction activities and all areas outside the construction footprint must be regarded as “No – go” areas. Any intrusion into these areas is prohibited. Where intrusion is required, the working corridor must be kept to a minimum and demarcated before any construction commences to minimize the impact
- All watercourses outside the development footprint must be protected and considered as “No – go” areas for the duration of the construction phase
- Runoff generated by the road activities must be well manage and stormwater flows must enter the drainage areas in a diffuse flow pattern without pollutants
- Appropriate contingency plans for high rainfall events must be in place for the duration of construction phase
- Excavated rock and sediments stockpiles, including any foreign material should not be placed within the delineated riparian areas in order to reduce the possibility of material being washed downstream. In addition, no stockpiling to occur within the floodplain of any watercourses on site
- An integrated waste management system must be adopted on site for plastic, rubble, metals etc. All solid waste/spoil material generated during the construction phase must be disposed of at appropriate registered sites.
- Vegetation clearance within the riparian zone must be kept to an absolute minimum. Where required pruning of trees must be undertaken instead of grubbing/uprooting
- The area /all nearby watercourse must be protected from direct and indirect pollutants such as sediments, refuse, sewage, cement, oils, fuels, chemicals and wastewater etc. Should any spills occur on site it must be cleaned immediately , and if the spill is a major threat to the environment, the local authority, the Department of Mineral Resources or the Department of Water and Sanitation must be informed in accordance with Section 30 of the National Environmental Management Act (Act 107 of 1998) within 48 hours.
- Concrete mixing/decanting of hazardous substances and all chemicals must take place over a tray, shutter boards or on an impermeable surface and protected stormwater. The concrete batching plant must be located in an area of low environmental sensitivity away from any watercourses. In addition, concrete batching must be undertaken within a bunded/sealed surface above riverbanks

- Contaminated water containing fuel, oil or other hazardous substances must never be released into the environment and disposed of at an appropriate registered facility
- Stormwater exit points must include a best management practice approach to trap any additional suspended solids and pollutants originating from the proposed development

Post – construction phase:

- All disturbed areas beyond the construction site or within the proposed development site must be rehabilitated immediately or upon completion of construction activities
- All erosion features that has generated from the construction site must be stabilize and rehabilitated
- The contractor must continuously monitor the area for any newly alien infestations during the construction and post construction phases. Removal of these species must be undertaken with care to prevent any damage to the surrounding indigenous vegetation. The ECO must inspect any use of herbicides in removing alien plant species for necessity, type proposed to be used, effectiveness and impacts of the product on the aquatic biota on site
- Compliance with the mitigation recommendations must be monitored by a suitably qualified individual. Monitoring for non – compliance must be undertaken on a daily basis by the contractors. Photographic records of all non – compliance must be retained to ensure that the impacts on the aquatic habitat are adequately managed and mitigated and rehabilitated of any disturbed areas within any system occurs
- A monitoring programme shall be in place, not only to ensure compliance with the EMPr throughout the construction phase, but also monitor any post – construction environmental issues and impacts. The monitoring should be regular and additional visits must be undertaken when there is potential risk to freshwater habitat

The aim of the rehabilitation is to ensure the necessary procedures are appropriately implemented in the natural environment that may be negatively affected by the developments. The plan will promote the re-establishment of the ecological functioning of any area disturbed by construction activities.

5.5 Terrestrial Animal (Invertebrate) Species

As a result of the Fauna Compliance statement's recommendations that a Terrestrial Animal Species Assessment be undertaken, Dr. Jonathan Colville was appointed to undertake the Terrestrial Animal (invertebrate) Assessment.

According to the assessment:

The access road will fall mainly (~70% of its length) over degraded old fallow land. The remaining ~30% falling along the southern areas of the project will fall over high-quality fynbos habitat. From a faunal (invertebrate) perspective, the overall impact of the proposed development along the degraded section is considered of low significance. The impact along the fynbos habitat is considered medium, but of low significance once mitigation is considered. Of higher concern for the invertebrate SCC is the presence of alien plant encroachment into the good quality fynbos habitat. The overall footprint of the access road is relatively small in relation to the potential high negative impact of continued alien plant encroachment across the high-quality fynbos habitat. Removal of these plants from the development area would have a positive impact on local invertebrate SCC populations.

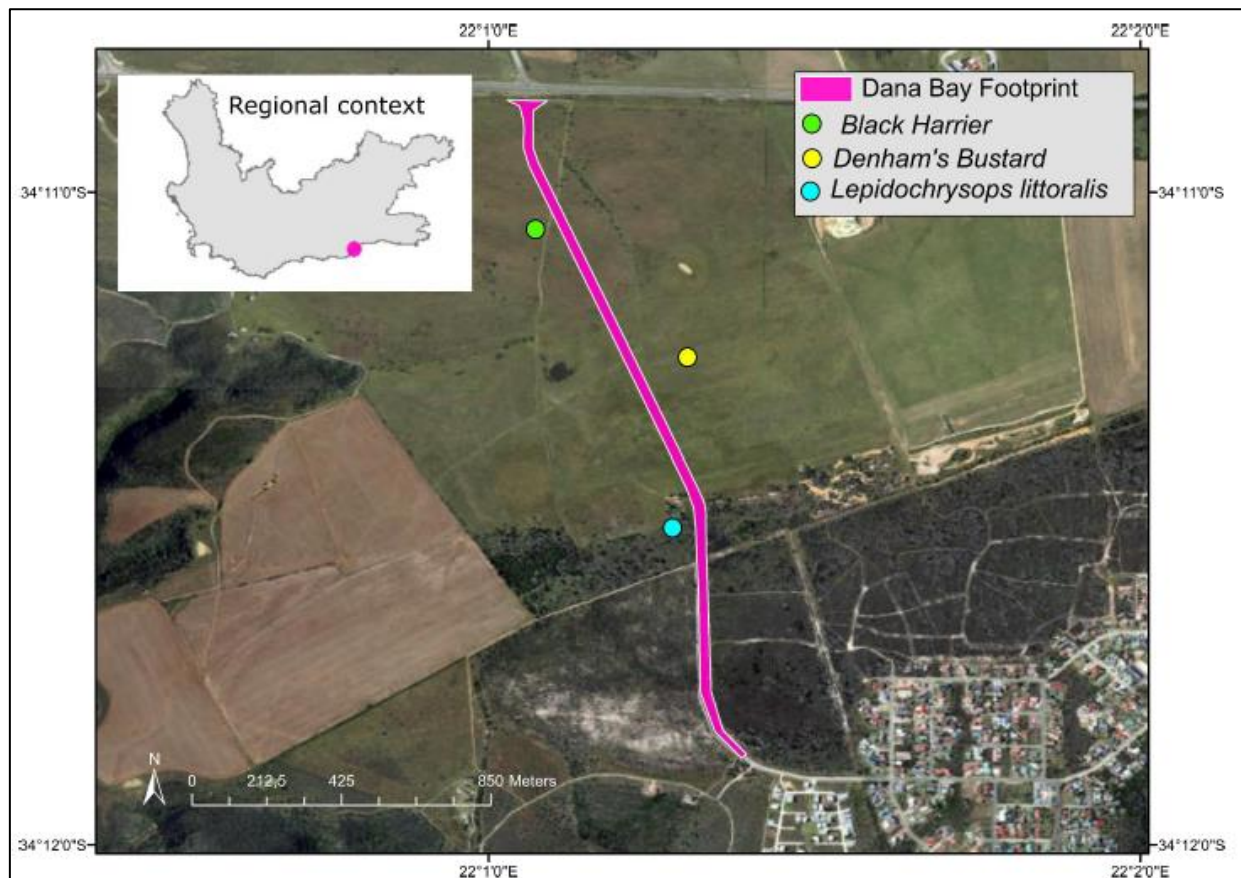


Figure 12: The proposed project development area on the remainder of portion 7 of the Farm 225, Mossel Bay, Western Cape Province. Three animal species of conservation concern, including one of the butterfly SCC flagged by the screening tool for this project, were recorded during the field site visit. (Figure 1 of the Terrestrial Animal (Invertebrate) Species Impact Assessment)

Species of Conservation Concern

- The only invertebrate SCC listed by the screen tool for this project located during the site visit was the butterfly SCC *Lepidochrysops littoralis*; a female was collected approximately 50m from the proposed road. This record confirms that potentially two of the butterfly SCC flagged by the screening tool for this project occur within the project area (see faunal assessment report by chepri (Pty) Ltd (2022)).
- Several other butterfly species were also observed at the project area:
 - *Zizeeria knysna knysna* (African Grass Blue)
 - *Capys alphaeus alphaeus* (Protea Scarlet)
 - *Vanessa cardui* (Painted Lady)
 - *Pseudonympha magus* (Silver-bottom Brown)
 - *Cassionympha detecta* (Cape Dull Brown)
 - *Colias electo electo* (African Clouded Yellow)
- Denham's Bustard (*Neotis denhami*), a bird SCC flagged by the screening tool for this project, was also recorded in the fallow fields close to the northern parts of the project area, with two individuals flushed
- A Black Harrier (*Circus maurus*), another bird species of high conservation concern, although not flagged by the screening tool for this project, was also recorded near the northern section of the project area

Construction Phase Impacts

Relatively small areas of invertebrate SCC habitat (natural vegetation) will be negatively affected during the construction phase. The 'No-Go' or 'leave as is' option would potentially see the high-quality fynbos habitat of the project area becoming overgrown with invasive alien trees if no alien plant management plan is earmarked for future implementation. The encroachment of alien plants would have significant long-term negative impacts and implications for the invertebrate SCC. The mitigation measure of removal and future monitoring of these alien plants would solve this issue.

Operation Phase Impacts

Considering that the access road will only be used in an emergency and that access will be controlled through locked gates, the impact significance during the operational phase of the proposed access road development is considered low. It should only have a very small and localised impact on populations of invertebrate SCCs and not affect their long-term viability and persistence in the area. Continued monitoring and removal of alien plants would, however, be a key mitigation measure to be implemented after the construction phase.

Cumulative Impacts

Although the development is considered of low significance for the four invertebrate SCC, it may become more significant if added to existing or future impacts from other activities in the area. Habitat loss in the south coastal areas of the Western Cape Province is considered the main threat faced by the three butterfly SCC flagged for this project. The proposed development will occur in a broader area within a mosaic of vegetation and habitat that is highly fragmented and disturbed through coastal development and agriculture, and alien plant infestations.

Currently, it seems unlikely that the addition of the proposed access road will contribute to a cumulative negative impact on the long-term viability of any of the populations of the SCC and their persistence. Mitigation measures would help to further reduced any cumulative negative impacts, particularly in terms of alien plant removal and monitoring. In this regard, removal and monitoring of alien plants would potentially have a larger long-term positive impact offsetting any smaller short-term negative impacts from the access road development.

Impact Statement

The proposed access road development is unlikely to generate significant negative impacts on any of the invertebrate SCC flagged for this project once mitigation is followed. It is the specialist's opinion that the proposed development will have an overall low significance on the four invertebrate SCC and therefore the proposed development can be approved in terms of the specific theme of this terrestrial animal species assessment.

Mitigation measures

- Clearing of natural vegetation should be prevented or to be kept to a minimum where necessary.
- The smallest possible working corridor, particularly along the southern fynbos habitats, must be used.
- No off-road driving should be allowed by construction vehicles.
- All temporary/permanent fences to be erected will need to be of sufficient low height and mesh size to allow fauna (small rodents, antelope, etc.) to move freely through and to not act as a barrier to dispersal. The southern parts of the access road will bisect an area of fynbos and must not impede migration of the local fauna from and across the project area.
- Any drainage/water run-off trenches required to be built alongside the road should be shallow and broad with low-angle sides (<30 degrees) so as not to trap fossorial invertebrates (e.g. dung beetles) and small vertebrates (e.g. snakes, tortoises).
- Several arboreal ant nests of *Crematogaster peringueyi* were found at along the proposed road. Considering the importance of these ant nests for the larvae of certain butterflies, the nests could

potentially be translocated through search-and-rescue to the immediate vicinity outside the road footprint. Some success has been achieved with this strategy in other parts of the Western Cape. A specialist (such as the author of this report) would need to be contracted for this.

- Any alien vegetation found on the project area, particularly in the southern fynbos areas, should be removed by an alien plant clearing team during the construction phase; invasive alien plants are seen as a significant threat to the habitat of the invertebrate SCC (Hochkirch et al., 2018; Mecenero et al., 2013).
- Removal and future monitoring of alien plants, particularly from southern fynbos habitats.

5.6 Cultural and Heritage Resources

A notice of intend to develop for the Proposed Dana Bay Access Road on Remainder of Portion 7 of Farm 225, Mossel Bay was submitted to Heritage Western Cape in terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999). Heritage Western Cape confirmed that the proposal will not impact on any heritage resources. A site visit was conducted by Jonathan Kaplan from Agency for cultural Resources Management on 7 February 2020 and confirmed that there are no heritage resources to be concerned about, which will be affected by the proposed development. The specialist also indicated that the pile of stones identified by the Engineer as potential graves, were likely removed from the surrounding fields by the farmer in historical times.

6. Legal Framework

6.1 Environmental Impact Assessment Regulations (2017)

The following listed activities, in terms of the amended Environmental Impact Assessment Regulations, 2017 (GN No. R. 324 – 327) will be triggered by the proposed development:

Table 3: Listed activities in terms of the amended Environmental Impact Assessment Regulations (2017)

Listed Activity No(s):	Describe the relevant Basic Assessment Activity(ies) in writing as per Listing Notice 1 (GN No. R. 327)
12	The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; — excluding— (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; [or] (ee) where such development occurs within existing roads, [or] road reserves or railway line reserves; or

	(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving— (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or (e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.
24	The development of a road— (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road— (a) which [are] is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.
27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.
Listed Activity No(s):	Describe the relevant Basic Assessment Activity(ies) in writing as per Listing Notice 1 (GN No. R. 324)
4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. i. Western Cape i. Areas zoned for use as public open space or equivalent zoning; ii. Areas outside urban areas; (aa) Areas containing indigenous vegetation; (bb) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined; or iii. Inside urban areas: (aa) Areas zoned for conservation use; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority.

6.2 National Water Act

According to the Freshwater Habitat Risk Assessment Report the proposed road activity will require water use authorisation in terms Section 21(c) and (i) of the National Water Act (Act 36 of 1998). The Risk Matrix which is specified in the Government Notice R509 of 2016 for section 21(c) and (i) water uses diverting flow or changing the bed, banks or characteristics of a watercourse) as defined under the National Water Act of 1998. Furthermore, the according to the aquatic risk matrix assessment show that due to

development risk being calculated as "Moderate" the development cannot be authorised in terms of General Authorisation for Section 21 (c) and (i) water use under this scenario and requires a full license application.

6.3 Other applicable legislation

The *Mossel Bay Municipality* is responsible for ensuring that all contractors, labourers and any other appointed person/entity acting on their behalf, remain compliant with the conditions of the received environmental authorisation and water-use authorisations, as well as the provisions of all other applicable legislation, including *inter alia*:

- National Environmental Management Act (NEMA) (Act No 107 of 1998, as amended);
- National Environmental Management Biodiversity Act (Act 10 of 2004);
- National Environmental Management: Waste Act (Act 59 of 2008);
- National Forest Act (Act No 84 of 1998);
- National Heritage Resources Act (Act No 25 of 1999);
- The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)
- Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)
- Spatial Planning and Land Use Management Act, 2013 (Act 16 of 2013) (SPLUMA)

The above listed legislation have general applicability to most development applications, and it is the *Western Cape Government: Department of Transport and Public Works* responsibility to ensure that all contractors and employees are aware of their obligations in terms of these Acts. This EMPr does not detract from any other legal requirements.

7. Scope of this EMPr

This EMPr describes the measures that must be implemented in order to avoid, minimise, manage and monitor the potential environmental impacts of the development, during all phases of the project life cycle, namely:

- Planning and Design Phase
- Pre-construction Phase
- Construction Phase
- Post-Construction Rehabilitation
- Operational (Maintenance) Phase

General environmental management measures that must be applied throughout the project lifecycle (as and where applicable) are described in Chapter 8 below. Additional management measures that must be implemented to address specific impacts that may arise during each phase are provided in **Chapters 8-13** of this EMPr.

8. General Environmental Management

The following general management measures are intended to protect environmental resources from pollution and degradation during all phases of the project life cycle. These measures must be implemented as and where applicable, reasonable and practicable during the pre-construction, construction and post-construction rehabilitation and operational (maintenance) phases of the proposed development.

8.1 Traffic management

In general, all construction vehicles need to adhere to traffic laws. The speed of construction vehicles and other heavy vehicles must be strictly controlled to avoid dangerous conditions for other road users. As far as possible care must be taken to ensure that the local traffic flow pattern is not too significantly disrupted and all vehicle operators therefore need to be educated in terms of "best-practice" operation to minimise unnecessary traffic congestion or dangers. Construction vehicles must therefore not unnecessarily obstruct the access point or traffic lanes used to access the site. Construction vehicles also need to consider the load carrying capacity of road surfaces and adhere to all other prescriptive regulations regarding the use of public roads by construction vehicles. Adequate signage that is both informative and cautionary to passing traffic (motorists and pedestrians) warning them of the construction activities. Signage would need to be clearly visible and need to include, among others, the following:

- Identifying the working area as a construction site;
- Cautioning against relevant construction activities;
- Prohibiting access to construction site;
- Clearly specifying possible detour routes and / or delay periods;
- Possible indications of time frames attached to the construction activities, and;
- Listings of which contractors are working on the site.

Other mitigation measures include:

- ECO to do Environmental Awareness Training with the construction team and ensure appropriate behaviour of operators of construction vehicles.

8.2 Site demarcation

The following areas must be clearly demarcated on site during the pre-construction or construction phases of the development, as appropriate.

Construction working area

Prior to the commencement of any land-clearing or construction activities, the outer boundary of the development area must be surveyed and pegged. The demarcation boundary must be tight around the site, typically allowing a working area of no more than 2.5m around the development footprint. This demarcation boundary is to ensure that land clearing and construction activities are restricted to only that area strictly required for the proposed development, and to prevent unnecessary disturbance of soil surfaces and vegetation outside of the development footprint.

No-go areas

Prior to the commencement of any land-clearing or construction activities, all sensitive areas (as identified by the ECO), must be demarcated and must not be disturbed during the construction phase. No-go areas must be off-limits to all construction workers, vehicles and machinery during all phases of the development. No vegetation may be cleared from within the no-go areas, and no dumping of any material (waste, topsoil, subsoil etc.) may occur in these areas. Construction/ maintenance workers must be informed of the no-go areas, and if necessary appropriate signage and/or temporary fencing (e.g. droppers with danger tape) can be used to enforce the no-go areas. In addition, all freshwater habitats outside the working corridor must be considered as "No – go" areas.

Temporary storage areas

Temporary storage areas must be demarcated for the duration of the construction phase to ensure that all materials are contained within these areas. The ECO would need to regularly inspect the conditions of the temporary laydown areas.

Demarcation of the site camp

The area chosen for the site camp and associated facilities must be the minimum area reasonably required to accommodate the site camp facilities, and which will involve the least disturbance to the environment. It is recommended that easily accessible, transformed areas are used for the site camp. Site selection must be done in consultation with the ECO. The proposed site camp area must be stripped of all topsoil before construction equipment is stored within the site camp.

8.3 Site camp and associated facilities

The site camp must be established away from all riparian zones/watercourses. The following general management measures pertaining to the set – up, operation and closure of a site camp must be applied where appropriate, reasonable and practicable:

Fencing & Security: The site camp area must be secured to prevent any un-authorised individuals from entering the site camp and possibly getting injured or posing a safety and/or security risk. Adequate signage must be displayed, designating the site office / camp as a restricted area to non-personnel. If necessary the site camp and associated areas may be fenced off along the demarcated boundaries of these areas, preferably with 2m high fence and shade netting or similar.

Fire Fighting Equipment: No less than 2 fire extinguishers must be present in the site camp. The extinguishers must be in a working condition and recently serviced. A fire extinguisher must always be present wherever any “hot works” (e.g. welding, grinding etc.) are taking place. It is recommended that all construction workers receive basic training in fire prevention and basic fire-fighting techniques, and are informed of the emergency procedure to follow in the event of accidental fires (also see Chapter 13). No open fires may be made on site during any phase of the project. No smoking must be allowed on the construction site. In the case of accidental fires, the contractor shall alert the Local Authority's Fire Department as soon as a fire starts and not wait until the fire can no longer be controlled.

Waste Storage Area: Sufficient bins for the temporary storage of construction related waste must be provided inside the site camp and/or at the working area. Construction-related waste must be managed as specified in Section 8.6.

Hazardous Substances Storage Area: Fuels, chemicals, lubricants and other hazardous substances must be stored in a demarcated, secured and clearly sign-posted area within the site camp away from the riparian zone. Refer to Section 8.7 for further recommendations relating to the storage of hazardous substances and fuels.

Potable Water: An adequate supply of potable water must be provided to construction workers at the site camp.

Ablution Facilities: Chemical toilet facilities or other approved toilet facilities (at least 1 toilet for each sex and for every 30 workers) must be provided and located on the site in such a way that the toilets will not cause any form of pollution of the site. Toilets must be placed within the site camp and must be well outside any riparian zone. The chemical toilets must be placed on a level surface and secured to prevent them from toppling over during high winds. The portable chemical toilets must be serviced regularly and kept in an orderly state. The contractor must ensure that no spillages occurs when the toilets are cleaned, serviced or moved. Performing ablutions outside of the provided toilet facilities are strictly prohibited.

Eating Area & Rest Area: A dedicated area within which construction workers can rest and eat during breaks must be provided within the site camp. Seating and shade should be provided.

Vehicle & Equipment Maintenance Yard: Where possible, construction vehicles and equipment that require repair must be removed from site and taken to a workshop for servicing. If emergency repairs and/or basic maintenance of construction vehicles or equipment are necessary on site, such repair work must be undertaken within the designated maintenance yard area away from the riparian zone. Repairs must be conducted on an impermeable surface, and/or a tarpaulin and/or drip trays must be laid down prior to emergency repairs taking place, to prevent any fuel, oil, lubricant or other spillages from contaminating the environment.

Housekeeping: the site camp and related site camp facilities must be kept neat and orderly at all times, to prevent potential safety risks and to reduce the visual impact of the site during construction.

8.4 Vegetation clearing

Where vegetation must be cleared the following measures must be implemented where applicable, reasonable and practical:

- Where feasible vegetation must simply be trimmed to facilitate access/ construction, rather than being completely cleared or removed.
- Vegetation clearing/trimming must be cleared by hand (i.e. brush cut) and stockpiled for use as mulch/ brush-packing during rehabilitation of the site. Any alien vegetation that is cleared must be disposed of in consultation with the ECO, unless the cleared alien vegetation does not contain seeds in which case it may be retained for use in site rehabilitation.
- No bulldozing must be undertaken for the purpose of vegetation clearing.
- Only the areas required to accommodate the construction activities and access to the construction site must be cleared/trimmed of vegetation.
- Vegetation outside of the construction footprint and beyond any No-Go areas must not be cleared.

8.5 Topsoil and subsoil management

It is recommended that topsoil be removed from any area where physical disturbance of the surface will occur, including within the footprint of the development site (working area) and possibly within the site camp, ablution area, vehicle maintenance yard, refuelling area and temporary waste storage area. Topsoil removal and stockpiling must be undertaken only after consultation with the ECO.

- Removed topsoil and subsoil must be stockpiled for the duration of the active construction period, and utilised for the final landscaping and rehabilitation of the disturbed areas on site.
- The removed topsoil must be stockpiled in a berm, in a demarcated area as agreed with the ECO.
- Removed subsoil must be stockpiled separately from topsoil.
- The topsoil & subsoil storage area must be located on a level area outside of any surface drainage channels, outside the riparian zone, and at a location where it can be protected from disturbance and river flow/floods during construction and where it will not interfere with construction activities.
- Where applicable topsoil and subsoil stockpiles must be adequately protected from being blown away or eroded by storm water. If necessary, shade cloth or other suitable measures must be used to stabilise and protect the stockpile from wind/water erosion. Topsoil stockpiles must not be covered with tarpaulin, as this may smother and decrease the virility of topsoil.
- Handling of topsoil must be minimised as much as possible, and the location of the topsoil berm must be chosen carefully to avoid needing to relocate the topsoil berm at a later date. The ECO must be consulted with regards to the placement of the stockpiles, to ensure that the selected location is in compliance with this EMP and EA (once granted).

- Ideally, topsoil is to be handled twice only, once to strip and stockpile, and once to replace, level, shape and scarify.
- If soil stockpiles will be stored for an extended period of time, the stockpiles must be kept clear of weeds and alien vegetation growth by regular weeding, (or application of herbicides if agreed with the ECO).
- Soil material that will not be re-utilised on site may be removed from site and taken to an appropriate site for re-use or disposal. In addition, contaminated topsoil must be disposed of at an appropriate registered facility
- Note that the topsoil must be the final layer applied to a rehabilitated/ re-landscaped site, after subsoil/ spoil material has been placed and shaped on the site.

8.6 Integrated waste management approach

It is recommended that an integrated waste management system is adopted on site. The system must be based on waste minimisation and must incorporate reduction, recycling, re-use and disposal where appropriate. Waste bins for the different categories of recyclable waste (i.e. paper, plastic, metal) must be provided on site. These bins must be emptied and the waste must be taken to a registered recycling facility. The receipts from the facility must be kept on file and must be available on request. Images 1 and 2 show two such systems within a construction site. Overflowing of bins on site and within the site camp is strictly prohibited.



Image 1: Recycling system implemented on a construction site. Skips provided for general waste, plastic, cardboard and metal.



Image 2: Recycling system implemented on a construction site. Lidded bins provided for general waste, plastic, cardboard and metal.

The non-recyclable and non-reusable waste (e.g. builder's rubble, etc.) generated on site must be stored and disposed of at a landfill site licensed in terms of the applicable legislation.

8.7 Hazardous substances and fuels

If hazardous substances and fuels such as diesel, oil, lubricant, detergents etc. are to be stored on site for construction purposes, a designated area must be set aside for this within the site camp.

- All hazardous substances must be stored in the designated area within the site camp.
- The area selected for storage of hazardous fuels must be located on a level area, well outside of any water courses, water bodies or surface drainage channels.
- The designated area must be clearly demarcated and secured by use of fencing and/or cages, to prevent access by un-authorised persons and/or animals.
- Access to the hazardous material storage area must be restricted to authorised personnel only and must be treated as a no-go zone to unauthorised personnel.
- Appropriate hazard signage indicating the nature of the stored materials must be prominently displayed at the storage area.
- Those persons tasked with handling any hazardous substances must be equipped with the knowledge, equipment and safety gear necessary to handle the substance/s safely.
- Material Safety Data Sheets (MSDSs) must be available on site for all hazardous chemicals and hazardous substances to be used on site. Where possible and available, MSDSs must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes
- Storage vessels of hazardous substances must be situated in an impermeable bunded area large enough to accommodate at least 110% of the capacity of the tank in question. If plastic sheeting is used to line the bunded area, care must be taken to ensure it is not punctured in any way during the course of the construction period.
- Fuel tanks must ideally be elevated so that leaks can easily be detected.
- No smoking may be permitted at or surrounding the area where fuels and hazardous substances are stored.
- Firefighting equipment must be located in close proximity to the storage area.

8.8 Cement and concrete batching

A designated batching area must be established above the riverbanks of all watercourses, and may only take place on designated impermeable, bunded surfaces as agreed with the ECO. The following mitigation measures must be strictly adhered to when batching activities are undertaken:

- Cement/ concrete must not be mixed on bare ground.
- Cement/concrete must not be mixed within any riparian zone.
- The impermeable/ bunded area must be established in such a way that cement slurry, runoff and cement water will be contained and will not flow into the surrounding environment or
- Cement run-off and excess cement slurry must be collected in the designated impermeable area, allowed to dry and then disposed of at an appropriate facility. Alternately, the contaminated water can be collected in sealed tanks and transported to an appropriate disposal site for disposal.
- Empty cement bags generated from the site must be placed within the nearby bins or disposed of at an appropriate registered facility.

8.9 Erosion control and stormwater management

Appropriate measures must be implemented to control the flow of storm water across the construction site, to prevent possible flooding, soil loss and dispersion of pollutants. All exposed earth surfaces must also be protected from wind and water erosion. Stripped areas must not remain uncovered for extended periods of time and must be provided with a suitable cover (vegetation, mulch, brush-packing) as soon as possible.

The scale and nature of the erosion and storm water control measures implemented on site must be appropriate to the conditions on site, and sufficient to achieve the desired outcomes (soil preservation, prevention of flooding, storm water control) to the satisfaction of the ECO and consulting engineer.

It may be necessary to implement small-scale erosion protection measures at the construction site, to prevent soil erosion. Such measures may include the use of shade netting, geo-fabric, brush-packing, logs and stakes or similar barriers in areas susceptible to erosion and along exposed slopes. The netting/fabric is placed directly across the path of flow of storm water. Poles and logs, staked in along the contours of a slope susceptible to erosion may also be used. All excavated stockpiles, including any foreign material must not be stored within any drainage lines during the construction phase in order to reduce the possibility of material being washed downstream.

8.10 Construction in or near the watercourses

The following measures recommended by the Freshwater Habitat Risk Assessment Report must be undertaken when working near, within or on the banks of the watercourses:

- The construction footprint must be kept to an absolute minimum during the project. The construction footprint must be clearly demarcated and all watercourses outside the working area must be considered as No - go areas
- Silt or sediment fences must be installed where necessary to control sediment/silt on site
- Excavated material and foreign material from the construction site should be placed away from the riparian areas in order to reduce the possibility of material being washed downstream. Stockpiles should be restricted to level areas
- All waste and spoil material generated on site must be disposed of at an appropriate registered facility for the duration of the construction period
- No bins must be allowed to overflow within site camp area and on site
- Portable chemical toilets must be surfaced on a regular basis
- Clearing of riparian vegetation must be kept to a minimum and pruning of top of vegetation instead of grubbing/uprooting
- The contractor must monitor the site on a regular basis for alien vegetation. When removing the alien vegetation care must be taken to ensure that no overall damage is caused to the nearby vegetation
- Any use of herbicides for the clearance of alien vegetation must be investigated and approved by the ECO
- The entire construction area must be protected from indirect and direct spills, the contaminated soil must be removed and disposed of at an appropriate registered facility
- All mixing of concrete and hazardous substances must be undertaken over impermeable layers or mortar boards. In addition, the area must be established away from river channels. The concrete batching should be restricted to a bunded/sealed surface above the river banks
- Erosion which may have occurred within the aquatic habitat as a result of construction must be stabilised as soon as practically possible
- All disturbed areas related to the project must be rehabilitated upon completion of construction activities

8.11 Excavations and Earthworks

Any major earthworks with heavy machinery must be under constant supervision and operators are to be aware of all the environmental obligations, as there is always the potential to inflict damage to the sensitive areas. Any unnecessary or excessive heavy machinery movement must be kept to a minimum i.e. only what is absolutely necessary. Areas to be excavated must be clearly demarcated. It may be necessary to demarcate excavations or earthworks along busier haulage routes with orange barrier netting (or a similar product). All excavated material must be stored on a flat surface away from any

drainage line or area susceptible to erosion. The location must be decided upon in consultation with the ECO. Stored material must be protected from wind and water erosion and this may entail covering the material with suitable shade cloth material or similar (when necessary). The shade cloth may need to be weighed down by logs (or similar material) in such a manner that any stream flow is directed away from the stockpile, reducing the risk of erosion.

8.12 Site closure and rehabilitation

Upon completion of the construction phase, all disturbed areas, including the working area (disturbance corridor), temporary access roads, and all areas utilised for the site camp and associated site camp facilities will require rehabilitation as follows:

- On completion of the construction operations, the site camp area must be cleared of all site camp facilities, ablution facilities, fencing, signage, waste and surplus material.
- All areas within the working area and site camp that have become devoid of vegetation or where soils have been compacted due to construction activities must be scarified or ripped to improve filtration and reduce run-off.
- All demarcation fencing, including all droppers, wires, netting and barrier tape must be removed from site and taken to an appropriate site for re-use or disposal.
- Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the ECO. Any soil contaminated with oil, fuel or other hazardous substance must be collected and disposed of as hazardous waste.
- All construction waste, litter and rubble is to be removed from the site and disposed of at an appropriate facility. Burying or burning of waste or rubble on site is prohibited.
- Topsoil that was removed and stockpiled before construction/ maintenance, must be replaced by spreading it evenly over the areas from which it was removed. This topsoil (and the seedbank it contains) will facilitate the re-vegetation of the site.
- Disturbed areas, especially areas where excavations have taken place, must be shaped as appropriate (original topography must be restored where possible), and covered with a layer of stockpiled topsoil as soon as possible.
- Any topsoil, subsoil or other excavated material that cannot be utilised during site rehabilitation must be removed from the site and disposed of at an appropriate disposal site.
- The disturbed, newly rehabilitated surfaces (particularly steeper slopes and areas recently covered with topsoil) must be protected from wind & water erosion using mulch, brush packing or other appropriate erosion protection measures. Brush-packing/ mulching is done by covering the exposed surface with organic plant material such as branches, plant cuttings and leafy material. Ideally the vegetation removed from site at the start of the construction must be utilised. Brush-packing/ mulching plays a valuable role in erosion control, while also promoting re-vegetation of the site by retaining moisture in the soil, introducing seeds and/or trapping wind-blown seeds and providing organic material (compost) to promote new plant growth.
- Final rehabilitation of the site must be done to the satisfaction of the ECO, and must adhere to all conditions/ requirements of the Environmental Authorisation.

9. Environmental Impact Management Planning and design phase

No direct environmental impacts are associated with the planning and design phase. However, poor planning or inappropriate design decisions in this phase may result in environmental impacts arising during subsequent phases of the project.

Planning and design activities must therefore take into account the environmental constraints and opportunities identified during the Environmental Impact Assessment process, in order to avoid or minimise the potential future impacts of the development. Proper planning is also essential to ensure that adequate provision is made to implement the environmental requirements of this EMPr, and to ensure that the development remains compliant with the received Environmental Authorisation.

The environmental management objectives (goals) during this phase are to:

- Appoint an Environmental Control Officer.
- Complete the detailed design of the structures and detailed site layout plan.
- Update the EMPr (if necessary).

These environmental management objectives, as well as the management actions that must be implemented in order to achieve the desired objective and avoid/minimise potential impacts are discussed in more detail below.

OBJECTIVE 1: APPOINTMENT OF AN ENVIRONMENTAL CONTROL OFFICER

<i>Impact Management Objective: To appoint a suitably qualified and experienced Environmental Control Officer.</i>			
Potential impact to avoid	Failure to appoint an ECO will result in non-compliance with the Environmental Authorisation and the requirements of the EMPr.		
Impact Management Outcome	The conditions of Environmental Authorisation and the requirements of the EMPr are implemented and monitored during all phases of the development, which will promote sound environmental management on site.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
• A suitably qualified and experienced Environmental Control Officer must be appointed before any activities commence on site. • The appointed ECO must adhere to the requirements stated in Chapter 17 of the EMPr and any other requirements specified in the Environmental Authorisation. • The appointed ECO must be advised of the construction start date, before any activities commence on site so that the ECO can perform a pre-commencement inspection and plan for environmental awareness training of construction workers.		Mossel Bay Municipality	During design phase
Performance Indicator	A qualified ECO is appointed prior to the commencement of any construction activities (including pre-construction set-up activities) on site.		

OBJECTIVE 2: DETAILED DESIGN AND SITE LAYOUT PLAN

<i>Impact Management Objective: To compile a detailed design and site layout plan that adheres to the conditions of the Environmental Authorisation.</i>			
Potential impact to avoid	Substantial deviation from the conceptual layout plan may result in: • Non-compliance with the Environmental Authorisation during construction. • Triggering of additional listed activities not authorised in the Environmental Authorisation. • An increase in the severity of the impacts identified and assessed in the EIA or may result in new impacts not previously assessed and not provided for in the EMPr, resulting in environmental degradation.		
Impact Management Outcome	Development is compliant with Environmental Authorisation and the EMPr.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
• The final detailed design & layout must adhere to the conceptual layout assessed in the Environmental Impact Assessment (EIA) process. • The final detailed design & layout must adhere to the conditions of the Environmental Authorisation (EA). • If the final detailed design differs from that assessed during the EIA, the revised layout must be assessed by an Environmental Consultant and the received EA must be amended by the Competent Authority before proceeding. • Interested & Affected Parties may need to be provided with an opportunity to comment on any proposed amendment to the EA.		Mossel Bay Municipality	During design phase
Performance Indicator	Detailed designs and site layout plans adhere to the conditions of the EA and EMPr are finalised prior to the commencement of construction		

OBJECTIVE 3: UPDATE ENVIRONMENTAL MANAGEMENT PROGRAMME

The Environmental Authorisation issued for the development may require certain amendments to be applied to the EMPr. In addition, the final site layout and detailed design may also necessitate the amendment of the EMPr, in order to ensure that the development is accommodated in the EMPr.

<i>Impact Management Objective: To ensure the EMPr adheres to the requirements of the Environmental Authorisation and makes provision for the final detailed site layout.</i>	
Potential impact to avoid	• Failure to update the EMPr in accordance with conditions specified in the EA may result in non-compliance with the EA.

Environmental Management Programme

	Failure to update the EMPr to accommodate the final detailed site layout may result in non-compliance with the EA.		
Impact Management Outcome	Good environmental management is promoted on site.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
- An independent Environmental Consultant must be appointed to amend the EMPr. - All amendments to the EMPr specified in the EA must be applied to the EMPr unless agreed otherwise in writing with the Competent Authority. - Amendments to the EMPr must be approved in writing by the Competent Authority. - Public participation may be required on the proposed EMPr amendments. The Competent Authority must be consulted for clarity on these requirements.		Mossel Bay Municipality	During design phase
Performance Indicator	An updated EMPr that adheres to the conditions of the EA and that reflects the requirements of the final detailed site layout is approved by the Competent Authority		

10. Environmental Impact Management Pre-Construction Phase

Proper set-up during the pre-construction phase can set the foundation for good environmental management during the active construction phase to follow and can avoid potential impacts from arising at a later date.

The Impact Management Objectives for this phase of the project relate to:

- Demarcation of no-go areas and working areas.
- Establishment of site camp and associated site facilities.
- Pre-construction ECO visit.

OBJECTIVE 1: IDENTIFY & DEMARCAT NO-GO AND WORKING AREAS

<i>Impact Management Objective: Identify and demarcate no-go areas, working areas and site facilities.</i>			
Potential impact to avoid	• Insensitive location of working areas and site facilities may result in environmental impacts during construction phase. • Failure to accurately demarcate working areas may result in increased disturbance footprint. • Failure to demarcate no-go areas may result in disturbance to these areas during construction.		
Impact Management Outcome	Future construction activities will be restricted to within the designated areas & environmentally sensitive areas (no-go areas) will be protected from disturbance.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
• The environmentally sensitive areas must be identified and be designated as no-go areas. • Demarcation of working area and no-go areas must be done in accordance with Section 8.2 of this EMPr. • Site camp facilities must be situated as far away from the No-Go areas as possible. • The construction team to remain within the working corridor for the duration of construction activities to avoid unnecessary negative impacts to the surrounding environment		Identifying: ECO/ Engineer Demarcating: Contractor	Pre – construction phase and Construction phase
Performance Indicator	No-go areas, working areas and areas for site camp facilities have been identified and appropriately demarcated to the satisfaction of the ECO, before construction activities commence on site.		

OBJECTIVE 2: ESTABLISH ENVIRONMENTALLY SENSITIVE SITE CAMP & SITE FACILITIES

<u>Impact Management Objective:</u> To set up and equip the site camp and associated site facilities in a manner that will promote good environmental management.			
Potential impact to avoid	• Inappropriate siting of site camp facilities may result in impacts to sensitive resources (e.g. contaminated run-off from refuelling area may flow into river). • Failure to properly demarcate and set up site facilities may result in disorganised construction activities and unnecessary disturbance to the site. • Failure to provide the necessary site facilities and/or failure to equip these facilities with the necessary equipment/materials may impede good environmental management & compromise ability to respond to emergencies.		
Impact Management Outcome	Site camp facilities do not impact significantly on the environment. The equipment required to implement the provisions of the EMPr are provided on site.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
• The site camp and site facilities described in Section 8.3 of this EMPr must be provided on site. • The site camp and associated site facilities must be set-up and managed in accordance with the general environmental management measures specified in Chapter 8 of this EMPr.		Contractor	Pre-construction phase (prior to start of construction activities)
Performance Indicator	Appropriate, well organised and properly equipped site facilities are available on site prior to commencement of construction activities. The location and set up of the facilities does not impact on the natural resources.		

OBJECTIVE 3: PRE-CONSTRUCTION ECO INSPECTION

It is essential that the appointed ECO be advised of the intended construction start date before construction activities commence on site, so that the ECO can conduct an initial site inspection to assess the pre-commencement condition of the site. The ECO can also advise on the appropriate siting and demarcation of the site facilities, and the identification and demarcation of the no-go areas. The ECO may also conduct the first round of environmental awareness training at this stage, if the construction workers are present on site.

<u>Impact Management Objective:</u> Environmental Control Officer to conduct an inspection prior to the commencement of construction activities on site.	
Potential impact to avoid	Failure to appoint ECO or to notify ECO of commencement prior to commencement may result in non-compliance with the EA.

Environmental Management Programme

	If a pre-commencement ECO inspection is not performed, the Applicant may be held liable for environmental degradation that took place prior to the Contractor commencing work on site.		
Impact Management Outcome	- Good environmental management is promoted and enforced by the ECO during the full pre-construction and construction phases. - Site facilities are appropriately located on site. - Construction workers receive environmental awareness training before commencing work on site.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
The appointed ECO must be advised of the construction start date, before any activities commence on site so that the ECO can perform a pre-commencement inspection and plan for environmental awareness training of construction workers.		Contractor	Start of construction phase
Performance Indicator	A pre-commencement site inspection is conducted by the appointed ECO before construction activities commence on site.		

11. Environmental Impact Management Construction Phase

A number of potential environmental impacts may arise during the construction phase of the development of the Dana Bay Access Road. These impacts have been identified and assessed during the Environmental Impact Assessment process. Environmental Management objectives and actions that will prevent the identified potential impacts from arising – or where avoidance is not possible, that will minimise and mitigate the impact – are provided in this section.

The environmental management actions and mitigation measures prescribed in this section must be implemented throughout the construction phase, and must be implemented in conjunction with the general management measures specified in Chapter 8 of this EMPr as well as any other conditions stated in the Environmental Authorisation. The Environmental Control Officer (ECO) must monitor and enforce the implementation of the relevant environmental management measures, and may provide guidance on the implementation of these environmental management measures as and when required.

The environmental management objectives (goals) for the Construction phase are:

- Prevent soil erosion
- Prevent pollution of the surrounding watercourses
- Minimise disruption to natural river flow
- Noise impact management
- Prevent alien invasive plant species establishment
- Traffic Management
- Job creation
- Capital influx for supporting service and goods providers

The environmental management actions that must be implemented in order to achieve the desired objectives and avoid/minimise potential impacts are discussed in more detail in the sections below.

OBJECTIVE 1: PREVENT SOIL EROSION

<i>Impact Management Objective: To prevent soil loss on site and prevent increased turbidity / sediment load in watercourses.</i>	
Potential impact to avoid	• Areas disturbed and/or cleared of vegetation (work corridor) during construction may be vulnerable to increased water and wind erosion. • Stockpiles of soil (topsoil/subsoil) at the site may be vulnerable to wind/water erosion. • Increased soil erosion may increase turbidity/sediment load in watercourses, which may impact on aquatic biota and habitats • Formation of rills and gullies from increased concentrated runoff

Impact Management Outcome	Soil erosion in and near watercourses is kept to a minimum and the aquatic systems are not impacted significantly as a result of soil erosion.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
- Cleared areas and any other area susceptible to erosion must be provided with a suitable cover as soon as possible and/or stabilised via the implementation of appropriate erosion control measures, as described in Section 8.9. This may include use of cut-off drains, temporary drainage channels, brush-packing, mulching, planting or sodding, use of environmentally benign soil binders, use of geo-textile or other coverings. The appropriate measures must be selected by the contractor in consultation with the ECO. - Stockpiles of topsoil & spoil material must be protected from wind & water erosion as described in Section 8.5 (e.g. covering with shade cloth or similar) and stored away from the river. - Stockpiles of earth material may not be located within the watercourses or any storm-water drainage pathways and must be outside of the reach of potential flood waters. - Only the minimum area required to accommodate construction may be cleared of vegetation, to limit unnecessary exposure of surfaces. - Site camps, material stockpiles and other facilities must be located on already transformed/ disturbed areas on surrounding agricultural land (e.g. at existing shed/ storage facilities). - All disturbed areas must be rehabilitated after construction to the satisfaction of the Environmental Control Officer (ECO), as described in Section 8.12 (e.g. ripping hardened surfaces, infilling of any erosion gullies, brush packing, reseeding etc.). Once the hardened surfaces are ripped and raked, a topsoil layer must be applied to the disturbed areas to encourage vegetation growth.		Contractor	Construction phase
Performance Indicator	No erosion occurring on site or surroundings as a result of construction activities.		

OBJECTIVE 2: MINIMISE DISRUPTION TO NATURAL WATER FLOW

<i>Impact Management Objective: To ensure that construction activities do not significantly impact the natural flow regime or water quality of the watercourses.</i>			
Potential impact to avoid		Construction activities may impede/alter water flow and impact downstream ecosystems, biota and water users.	
Impact Management Outcome		Construction activities and the manner in which water flow is diverted do not significantly impede or alter the natural flow of water in the watercourses at this point.	
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
• All excavated materials must be removed as speedily as possible. If this is not possible, storm water must be re-routed around excavated materials using temporary measures such as sandbags, retaining walls, pumps, silt curtains, cut-off trenches and PVC pipes. • All stockpiled material must be used in backfilling or removed from the site. • Vigilance must be maintained regarding the passage of storm water in and around construction areas. • Water backing up behind stockpiled material must be re-routed into natural drainage lines. • Prior to construction, a method statement indicating how the water flow will be temporarily diverted (or excluded from the working area) must be submitted to the appointed ECO. • On completion of the construction phase, restore and re-contour all construction areas to conform to the original drainage system. • Rubble and debris from construction activities must be removed after construction is complete so as not to impede flow in the river. • No dumping of soil and / or any other material must take place within the watercourses. The footprint of disturbance must be kept to a minimum.		Contractor	Construction phase
Performance Indicator		The natural flow of water in the watercourses is not impeded during the construction phase.	

OBJECTIVE 3: PREVENT POLLUTION AND SOIL/ WATER CONTAMINATION

<i>Impact Management Objective: To prevent environmental pollution and contamination of soil and Maalgate River</i>	
Potential impact to avoid	- Fuel, oil, lubricant or other pollutants may leak from vehicles/ machinery and contaminate soil, surface water and/or ground water. - Spills of hazardous substances may contaminate environment.

	• Chemical toilets may leak. • Contaminated run-off from the site or site camp facilities may pollute soil or water resources. • Waste (solid or liquid) from the construction site may be blown or washed into surrounding environment. • Contamination of soil or water may impact surrounding and downstream land/water users, biota and livestock.		
Impact Management Outcome	The environment (including soil, surface water and groundwater) is not contaminated.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure	Responsible party	Time period	
• Vehicles and machinery must be in good working order and must be regularly inspected for leaks. • If a vehicle or machinery is leaking pollutants it must be removed from the riparian zone and taken to an appropriate location for repair. • Repairs to vehicles/ machinery must not take place in the riparian zone, except in emergencies. • Drip trays must be utilised for vehicle/ machinery maintenance on site, where there is a risk of fuel/ oil/ lubricant spillage. • Drip trays must be placed underneath generators (if used on site) water pumps and any other machinery on site that utilises fuel/ lubricants. • A spill kit to neutralise/treat spills of fuel/ oil/ lubricants must be available on site. • Soil contaminated by spilled oil/ fuel/ lubricant must be excavated and disposed of in the hazardous waste bin. • Vehicles/ machinery must not be permitted to enter watercourses unless strictly required for construction and only after consultation with the ECO. • Vehicles and machinery must be kept in the site camp (out of riparian zone) when not in use. • Waste bins (with secure lids) for hazardous waste and general waste must be provided on site. These must be kept at the site camp on an impermeable surface out of the riparian zone. • Waste (including litter, building waste, oily rags etc.) must be placed in the appropriate bins. • Construction workers must be instructed not to litter and to place all waste in the appropriate waste bins provided on site. • Waste may not be buried on site. • Bins must be emptied regularly and the waste disposed of at an appropriate, licensed facility. Bins must not be allowed to overflow. • Cement batching must take place on an impermeable surface large enough to retain any slurry or cement water run-off. If necessary, bitem lined detention ponds (or similar) must be	Contractor	Construction phase	

constructed to catch the runoff from batching areas. Once the water content of the cement water/slurry has evaporated or filtered into the ground, the dried cement must be scraped out of the detention pond and disposed of at an appropriate disposal facility. • Cement batching must take place on already transformed areas at the site or site camp (ideally outside of riparian zone), or at another location of low environmental sensitivity as agreed with the ECO. • Unused cement bags must be stored in such a way that they will be protected from the rain. Empty cement bags must not be left lying on the ground and must be disposed of in the appropriate waste bin. • Washing of excess cement/concrete into the ground is not allowed. All excess concrete/ cement must be removed from site and disposed of at an appropriate location. • Materials, fuels and other chemicals and hazardous substances required during construction must be stored according to the manufacturer's product-storage requirements, which may include a covered, waterproof bunded housing structure. • Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible and available, MSDSs must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases. • Hazardous chemicals and fuels must be stored outside of the riparian zone on bunded, impermeable surfaces with sufficient capacity to hold at least 110% of the capacity of the storage tanks. • A dedicated area for the storage of hazardous materials and waste must be provided for in the site camp as per Section 8.7. • Ablution facilities provided for construction workers must be placed outside the riparian zone and prevented from blowing over. The ablution facilities must have a closed system and must not be linked to the river in any way. The ablution facilities must also be serviced regularly. Care must be taken to prevent spillages when moving or servicing chemical toilets.		
Performance Indicator	The natural flows of the watercourses are not impeded during the construction phase.	

OBJECTIVE 4: PROTECTION OF AQUATIC ECOSYSTEM

Impact Management Objective: To ensure that the aquatic ecosystem is not significantly impacted on.		
Potential impact to avoid	- Physical disturbance to aquatic ecosystems during the construction phase. - Construction activities may increase sedimentation/turbidity in the watercourses, which may impact on the biota and instream habitats. - Run-off (erosion) from denuded/ disturbed surfaces may increase sediment load and turbidity in the river.	
Impact Management Outcome	Construction activities do not significantly impact on the aquatic ecosystem.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
- Construction personnel, equipment and materials must be limited to the minimal practical working distance. - The area outside of the working area must be treated as a 'No-go' Area. - All equipment and materials storage areas must (if practical, reasonable and feasible) be located at a minimum distance of 50m from the watercourses. The appointed ECO must be consulted in this regard. - Construction must be avoided during rainy days, to prevent excessive turbidity. - Manual labour must be favoured over mechanical methods. Heavy machinery may only be used as a last resort if manual methods are not feasible or practical. - Construction work must be well-planned and well-managed so that construction work proceeds quickly and efficiently, thus minimising the duration of disturbance. Disturbance / loss of aquatic vegetation and habitat - Excepting the minimal space needed for the working corridor, all water resources are to be considered No-Go areas and a 32 m construction buffer must be adhered to. Any unnecessary intrusion into these areas is prohibited. Where intrusion is required, the working corridor must be kept to a minimum and identified and demarcated clearly before any construction commences to minimise the impact. - Existing access routes must be utilised during construction. - The construction zone must be clearly demarcated (e.g. via pegs / barrier tape) prior to the commencement of construction activities. Site supervisors must ensure that impacts are confined to the construction zone. - Designated areas for stockpiling of raw materials must be identified before material is brought onto site. No stockpiling is to occur on or near slopes or water resources. All stockpiling areas must be approved by the ECO before stockpiling occurs.	Contractor	Construction phase

Flow modification • All excavated materials must be removed as speedily as possible. If this is not possible, storm water must be re-routed around excavated materials using temporary measures such as sandbags, retaining walls, pumps, silt curtains, cut-off trenches and PVC pipes. • All stockpiled material must be used in backfilling or removed from the site. • Vigilance must be maintained regarding the passage of storm water in and around construction areas. • Water backing up behind stockpiled material must be re-routed into natural drainage lines. • Prior to construction, a method statement indicating how the water flow will be temporarily diverted (or excluded from the working area) must be submitted to the appointed ECO. Water pollution • A spill kit to neutralise/treat spills of fuel/ oil/ lubricants must be available on site. • Soil contaminated by spilled oil/ fuel/ lubricant must be excavated and disposed of in the hazardous waste bin. • Vehicles/ machinery must avoid entering the river unless strictly required for construction. • Waste bins (with secure lids) for hazardous waste and general waste must be provided on site. These must be kept at the site camp on an impermeable surface out of the riparian zone. • Waste (including litter, building waste, oily rags etc.) must be placed in the appropriate bins. • Construction workers must be instructed not to litter and to place all waste in the appropriate waste bins provided on site. • Waste may not be buried on site. • Unused cement bags must be stored in such a way that they will be protected from rain. Empty cement bags must not be left lying on the ground and must be disposed of in the appropriate waste bin. • Washing of excess cement/concrete into the ground is not allowed. All excess concrete/ cement must be removed from site and disposed of at an appropriate location.		
Performance Indicator	• Impacts to the aquatic ecosystems are avoided or minimised to acceptable levels. • No excessive turbidity is observed.	

OBJECTIVE 6: ALIEN CLEARING

Impact Management Objective: To create habitat free of alien vegetation		
Potential impact to avoid	The proliferation of alien vegetation once construction has been completed.	
Impact Management Outcome	The level of alien infestation decreases over time.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
• The ECO must be informed in advance of any vegetation that will be removed, irrespective of whether or not the vegetation is alien or indigenous. • Vegetation clearing/trimming must be cleared by hand (i.e. brush cut) and stockpiled for use as mulch/ brush-packing during rehabilitation of the site. Any alien vegetation that is cleared must be disposed of in consultation with the ECO, unless the cleared alien vegetation does not contain seeds in which case it may be retained for use in site rehabilitation. • Alien invasive plant species must be cleared off the total development footprint (if possible). • Alien clearing must be done in such a way not to cause damage to indigenous vegetation. • No bulldozing must be undertaken for the purpose of vegetation clearing. • Only the areas required to accommodate the construction and access to the construction site must be cleared/trimmed of vegetation. • Vegetation outside of the construction footprint and beyond any No-Go areas must not be cleared. Work within the river channel must be limited (in time and extent) as far as possible and rehabilitated immediately afterwards.	Contractor	Construction phase
Performance Indicator	No alien invasive species are observed in areas that have been disturbed.	

OBJECTIVE 7: JOB CREATION

<i>Impact Management Objective: To create employment opportunities with potential for skills transfer, for members of the local community.</i>			
Potential impact to be promoted	• New job opportunities will be created for the local community during the construction phase • There may be opportunities to transfer skills from more experienced workers to less experienced workers.		
Impact Management Outcome	The local community benefits from the employment opportunities created during the construction phase.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period

- No mitigation required for this positive benefit. However, where practical preference must be given to previously disadvantaged individuals from the local community when appointing contractors/ workers. - Skills transfer between members of the workforce should be encouraged		Contractor	Construction phase
Performance Indicator	The majority of the construction team is from the local community, with preference given to historically disadvantaged individuals. Skills transfer from experienced to less experienced workers is actively encouraged on site.		

12. Environmental impact management post construction rehabilitation phase

After all construction activities have ceased, the sites must be cleared of all construction related equipment, materials, facilities and waste. In addition all disturbed surfaces – including disturbed areas around the structures and all areas utilised for site facilities – must be stabilised, rehabilitated and provided with a suitable cover. All temporary access roads constructed must be rehabilitated and access must be restricted from the public.

The environmental management objective (goal) for this phase is to:

- Rehabilitate & stabilise disturbed areas and ensure environmentally sensitive closure of the construction sites.

OBJECTIVE 1: SITE CLOSURE & REHABILITATION

Impact Management Objective: To rehabilitate all areas disturbed by construction activities in an environmentally sensitive manner.			
Potential impact to avoid	- Failure to remove all construction related waste and materials may result in environmental pollution. - Failure to remove all construction related equipment, machinery and site facilities may pose an impact to the natural environment specifically the watercourses. - Failure to stabilise disturbed surfaces may result in soil erosion and increased storm water run – off, which may limit successful revegetation of the site.		
Impact Management Outcome	- The site is neat and tidy, and all exposed surfaces are suitably covered/ stabilised. - There is no construction-related waste or pollution remaining on site.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
On completion of the construction operations, the site camp area must be cleared of all site camp facilities, ablution facilities, fencing, signage, waste and surplus material.		Contractor	Construction phase

• Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the ECO. • Any contaminated soil must be collected and disposed of as hazardous waste. • All construction waste, litter and rubble are to be removed from the site and re-used elsewhere, or recycled/disposed of at an appropriate facility. • Burying or burning of waste or rubble on site is prohibited. • All areas within the working area and site camp that have become devoid of vegetation or where soils have been compacted due to construction activities must be scarified or ripped. • Topsoil removed during the establishment of the site camp and the working area must be spread evenly over the entire site camp area and all other disturbed/ exposed areas after those areas have been ripped, scarified, shaped and contoured (as required). • Where necessary seeding and planting of vegetation can take place after the replacement of the topsoil. Hardy, drought tolerant, non-invasive plant species must be selected. If needed, a layer of mulch can be applied to the newly shaped/ landscaped and top soiled areas. The mulch will serve to limit erosion and will promote the re-vegetation of the site by retaining moisture in the soil and providing organic material (compost) for new plant growth. Mulched material must be spread to a depth of $\pm 50\text{mm}$ – a thinner layer is likely to be ineffective in protecting the site, while thicker layers may suppress plant growth. • All exposed soils and recently top soiled areas are to be re-vegetated or stabilised to the satisfaction of the ECO, to protect these areas from wind and water erosion. No areas are to be left exposed to erosive forces. Erosion protection measures that can be applied include mulching (described above), the placement of geotextile, onion bags filled with wood chips, brush-packing or other similar measures. • Any topsoil, subsoil or other excavated material that cannot be utilised during site rehabilitation must be removed from the site and reused elsewhere on the property or disposed of at an appropriate disposal site. • Where necessary disturbed soils must be revegetated with the local indigenous vegetation such as that which occurs at the site or provided with other suitable cover. • It is recommended that follow-up alien clearing be conducted before the site audit, within 3 months after construction is complete.		
Performance Indicator	• All construction-related materials, equipment, facilities, waste and contaminated soils have been removed from the site.	

	• Compacted soils have been scarified/ ripped and stabilised. • All disturbed/exposed surfaces have been provided with a suitable covering and/or stabilised. • No alien vegetation is evident on site.
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13. Emergency Preparedness

13.1 Emergency response procedures

The potential environmental risks that may arise as a result of construction activities, or during the maintenance of structures must be identified, and appropriate emergency response procedures must be compiled for each emergency scenario. Potential environmental emergencies that require an emergency response include – but are not limited to – unplanned fires, sewage spills, spills of hazardous chemicals, snake bites etc.

- The construction contractor is responsible for identifying potential significant environmental risks that may arise as a result of pre-construction, construction and rehabilitation activities, and the contractor must formulate emergency response procedures for these potential incidents.
- The Applicant (or Maintenance Contract team) is responsible for identifying the environmental risks that may arise during the operational (maintenance) phase of the development, and must formulate emergency response procedures for these potential incidents.
- The ECO, the contractor and the Applicant are responsible for ensuring that all construction workers are aware of the emergency procedures, and are properly trained on how to identify and respond to an emergency incident during construction.
- Depending on who is managing/ undertaking maintenance activities, the Applicant is responsible for ensuring that all members who form part of the maintenance team during the operational phase are aware of the emergency procedures to be followed in response to an emergency incident during the undertaking of maintenance of the structure.
- An emergency procedure must clearly indicate who will take charge during an emergency, and the roles and responsibilities of workers and authorities during an emergency.
- The construction contractor is responsible for ensuring that the requirements of the Occupational Health & Safety Act (OHSA) are adhered to during the construction phase. The Applicant is responsible for ensuring compliance with the OHSA during the undertaking of maintenance activities.

13.2 Emergency preparedness

The following measures must be implemented, as appropriate, to ensure effective responses to emergencies:

- All workers on site during the construction and maintenance phase must be properly educated about possible emergency incidents that may arise, how to avoid such incidents and how to respond in the event of an incident. "Refresher" training sessions on emergency procedures must be held if needed.
- All workers must ideally be given basic fire-awareness training, and advised on basic firefighting and safety techniques. Fire-fighting equipment must be made available on site during construction activities (see section 8.3).
- All workers must be trained on how to respond in the event of a spill of a hazardous substance (fuel, chemicals etc.), if hazardous substances are to be used on site.
- A spill kit for containing and/or neutralising spills of hazardous substances (e.g. hydrocarbons) must be available on site at all times, when hazardous substances are present.
- Any incidents of pollution or spillage of hazardous materials during the construction phase must be reported to the ECO as soon as possible. The ECO must then (depending on the nature of the spill) notify the relevant authorities, if needed. During the operational phase of the development, the Applicant is responsible for notifying the relevant authorities of any pollution incidents that arise as a result of maintenance activities.
- A first aid kit must be available on site at all times.

- Emergency contact numbers (including the fire department, police and ambulance) must be displayed on site at all times and regularly updated.
- All emergency incidents must be recorded in a site incident log. The cause of the incident, the measures taken in response to the incident and the efficacy of those measures must also be recorded. This information must be used to inform future emergency preparedness planning, and to avoid or prevent similar incidents from arising again.

14. Method statements

The Competent Authority and/or the ECO may require the Applicant or Construction Contractor to submit Method Statements for one or more construction-related activity, or any aspect of the management of the site, before the activity is undertaken or during the performance of the activity, if the activity is causing or may cause significant environmental damage, or pose a health and safety risk.

Method Statements need not be complex and lengthy, but must clearly state **how**, **when** and **where** the activity concerned will be undertaken, and must specify **who** will be responsible for undertaking each component of that activity. Method Statements must be prepared by the Construction Contractor and submitted to the ECO for approval before undertaking the activity concerned.

The ECO and / or Competent Authority have the authority to request method statements for other activities, including but not limited to:

- Establishment of site camps and stockpile areas.
- Cement/ concrete batching, disposal and emergency contingencies.
- Topsoil and sub-soil storage/ stockpiling.
- Storage of fuels and hazardous chemicals and emergency contingencies.
- Waste management system.
- Storm water management and control.
- Emergency preparedness plan / emergency response procedure (see Chapter 13).
- Temporary spoil sites to be used during the construction phase

The ECO has the authority to prevent activities from being undertaken until such time as a satisfactory Method Statement has been submitted to the ECO and approved by the ECO.

15. Roles and Responsibilities

This EMPr, once approved by the competent authority (DEADP), should be seen as binding to the Applicant, and any person acting on the Applicant's behalf, including but not limited to agents, employees, associates, contractors and service providers.

The Applicant and all other persons who may be directly involved in the development are also bound by their general Duty of Care, as stated in Section 28 of the National Environmental Management Act, 1998:

Duty of Care:

"Every person who causes, has caused, or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm cannot reasonably be avoided or stopped, to minimize and rectify such pollution or degradation of the environment"

15.1 Duties and Responsibilities of the Applicant

The Applicant is ultimately responsible for ensuring that the environmental management measures specified in this EMPr, as well as any other conditions specified by the competent authority, are implemented and adhered to during the construction and operational phase (maintenance activities) of the proposed development. The Applicant or party delegated by the applicant is responsible for monitoring and maintenance during the operational phase. The Applicant must ensure that all appointed service providers, contractors and maintenance workers are capable of complying with all statutory requirements of this EMPr and the conditions of the Environmental Authorisation. The Applicant is responsible for ensuring that this EMPr and the conditions of the Environmental Authorisation are implemented and adhered to during maintenance activities undertaken by the Applicant.

The Applicant or appointed consultant is responsible for identifying emergency situations that may arise during operational and maintenance activities undertaken by the Applicant, and must formulate appropriate emergency response procedures for these emergency scenarios.

15.2 Duties and Responsibilities of the Contractor

The "Construction Contractor" is the entity responsible for undertaking the physical upgrade of the Dana Bay Access Road. The contractor is responsible for ensuring that all environmental management measures specified in this EMPr and in the EA are implemented during the pre – construction, construction and post – construction rehabilitation phases, unless agreed otherwise with the Applicant. The contractor will be responsible for all cost incurred in the rehabilitation of the site and for ensuring effective environmental management during construction. The contractor must therefore make adequate financial provision for the implementation of all prescribed measures.

The Contractor must appoint a Dedicated Environmental Officer (DEO) in accordance with Part C of the project specifications, who will act as the Contractor's representative to monitor and enforce compliance with the conditions of this EMPr, throughout all phases of construction.

In addition to the above, the Construction Contractor is responsible for the following:

- Identify emergency situations that may arise as a result of construction activities, and formulate appropriate emergency response procedures (see Chapter 13).
- Ensure that all construction workers, including sub-consultants and service providers, undergo environmental awareness training prior to commencing work on site, or as soon as possible thereafter (see Chapter 16).
- Compile the required method statements, which must be to the satisfaction of the ECO, before commencing with the activity to be governed by the method statement (Chapter 14).
- Respond to concerns or issues identified by the ECO, as relates to environmental management, and implement the appropriate management or remediation measures, at the Contractor's own expense (unless agreed otherwise)
- Should third parties be called to the site to perform clean up and rehabilitation procedures, the Construction Contractor will be responsible for all associated costs.

Note that failure to comply with the requirements and conditions of this EMPr and the Environmental Authorisation may result in fines or other penalties being levied against the Construction Contractor by the Competent Authority.

15.3 Duties and Responsibilities of the ECO

The appointed Environmental Control Officer (ECO) is responsible for undertaking regular site visits to monitor and report on the implementation of the EMPr and adherence to the conditions of the Environmental Authorisation during the pre-construction, construction and post-construction

rehabilitation phases. The ECO is not required to monitor the site during the operational (maintenance) phase of the development.

Competency of the ECO

The ECO must be independent of the Applicant, Engineer, Construction Contractor and their service providers. The appointed ECO must be suitably qualified and experienced and must be able to demonstrate that he/she is of sufficient competency to undertake the required task. The ECO should preferably be a resident in close proximity to the development area to ensure quick response if required. The ECO must work in close co – operation with the Construction Contractor, Resident Engineer or DEO (where applicable) and all contractors in order to identify potential problems before they occur, and provide suitable guidance as to how the identified problems (environmental impacts) can be avoided

Duties of the ECO

The duties of the ECO include, but are not limited to:

- Conduct a pre-construction site inspection to ascertain the pre-commencement condition of the site (i.e. the status quo) and determine whether faunal search-and-rescue is required;
- Conduct environmental awareness training (see Chapter 16);
- Undertake regular site visits to monitor compliance with all mitigation, monitoring and management measures contained in the EMPr and the Environmental Authorisation, during the pre-construction, construction and rehabilitation phases of the development (see section below regarding frequency of ECO visits).
- Evaluate the achievement of the performance indicators associated with each impact management objective specified in this EMPr (Chapters 9-13)
- Liaise with site contractors, engineers and other members of the development team with regard to the requirements of the EMPr;
- Provide guidance as and when required regarding the implementation of the environmental management measures contained in the EMPr and EA, so as to assist the Applicant and contractor in remaining compliant with these measures;
- Assist in finding environmentally acceptable solutions to construction problems;
- Ensure that the working area, site camp facilities, access roads and no-go areas are properly demarcated;
- Ensure that proper topsoil management practices are adhered to on site;
- Ensure that proper waste management & pollution prevention strategies are practised on site;
- Examine method statements;
- Recommend additional environmental protection measures, should this be necessary;
- Furnish contractors with verbal warnings in case of contravention of the EMPr;
- Recommend that the competent authority furnish errant contractors with predetermined fines, when verbal and / or written warnings are ignored;
- Ensure satisfactory rehabilitation of disturbed areas on site, after construction is completed;
- Keep detailed records of all site activities that may pertain to the environment, and produce compliance-monitoring reports (ECO Reports) for submission to the Applicant, and the Competent Authority on a monthly basis during the construction phase;
- Submit a final post-construction monthly report (completion report), The audit report must detail the rehabilitation measures undertaken, describe all major incidents or issues of non-compliance and any issues or aspects that require attention or follow-up.
- All ECO Reports and Inspection Reports must be submitted to the Applicant and Competent Authority.

Frequency of ECO visits

The appointed ECO must monitor the site on a weekly basis (2 or 4 times per month), thereafter the frequency may be reduced to the discretion of the appointed ECO, to check compliance with the conditions of the EA and mitigation measures and recommendations of this EMPr. The ECO has the discretion to undertake additional visits if he/she feels this is justified due to the actions of the contractors, and to make *ad hoc* visits in order to ensure compliance.

Authority of the ECO

The ECO has the authority to recommend that the Engineer suspend all works (or part thereof) occurring on site, should any action being undertaken on site not comply with the environmental requirements, and where such actions pose a serious threat to any element of the surrounding environment.

The ECO has the authority to recommend measures to the Engineer, regarding measures that must be implemented on site in order to ensure compliance with the EMPr and Environmental Authorisation, and/or to prevent environmental degradation or pollution from occurring.

The ECO has the authority to issue verbal and written warnings to contractors. Should verbal and written instructions and/or warnings be ignored, the ECO has the authority to request the Engineer to issue pre-determined fines or other penalties.

16. Environmental Awareness Plan

Environmental Awareness Training must be conducted prior to the commencement of construction activities. It is the applicant's responsibility to familiarise himself/herself with the content and requirements of this EMPr. The applicant is also responsible to ensure that the contractor and all labourers working on site during the construction phase are familiar with the content of this EMPr.

The following actions must be taken to ensure that all relevant parties are aware of their environmental role and duties:

1. The EMPr and Environmental Authorisation must be kept on site at all times.
2. The provisions of this EMPr and the conditions of the Environmental Authorisation must be explained in detail to all staff during Awareness Training.
3. Training booklets will be handed out to all labourers and must be explained to them.
4. Weekly checks to be done by the Applicant's environmental representative (where available) and must be available on site at all times
5. The ECO to do frequent site visits, as recommended in Section 15.3 of the EMPr.
6. Monthly monitoring reports to be compiled by the ECO. These reports will be circulated to all parties involved (including the applicant, contractor and the competent authority).

The Construction Contractor must make allowance for all construction site staff, including all subcontractors that will be working at the site, to attend environmental awareness training sessions (undertaken by the ECO) before commencing any work on site. During this training, the ECO will explain the EMPr and the conditions contained therein. Attention will be given to the construction process and how the EMPr fits into this process. Other items relating to sound environmental management which must be discussed and explained during the environmental awareness training sessions include:

- The demarcated "No-Go" areas;
- General do's and don'ts of the site;
- Making of fires;
- Waste management, use of waste receptacles and littering;

- Use of the toilets provided;
- Use and control of construction materials and equipment etc.;
- Control, maintenance and refuelling of vehicles;
- Methods for cleaning up any spillage;
- Access and road safety;
- Emergency procedures (e.g. in case of fire, spillage etc.)
- General “best practice” principles, with regards to the protection of environmental resources.

Environmental awareness training and education must be ongoing throughout the construction phase, and must be undertaken regularly if deemed necessary (especially if it becomes apparent that there are repeat contraventions of the conditions of the EMPr), or as new workers come to site. Translators must be utilised where necessary. An environmental awareness guideline has been compiled and attached to the EMPr.

17. Monitoring, Record Keeping and Reporting

17.1 Environmental Auditing

In accordance with the requirements of the Amended Environmental Impact Assessment Regulations of 2014 (GN No. R.327 of 7 April 2017), the holder of the Environmental Authorisation (i.e. the Applicant) must, for the period that the Environmental Authorisation is valid, appoint a suitably qualified independent person to conduct an environmental audit, to audit compliance with the conditions of the Environmental Authorisation and the EMPr.

The Applicant is responsible for appointing, managing and remunerating the appointed auditor. The auditor may be the appointed Environmental Control Officer (ECO), provided the ECO is sufficiently qualified and experienced to fulfil the auditing requirements specified below.

The appointed auditor must undertake regular environmental audits according to the frequency specified in the Environmental Authorisation. Following each audit the environmental auditor must submit an audit report to the Competent Authority (in this instance the DEA&DP).

- Environmental auditing and environmental audit reports must adhere to the requirements of the Environmental Impact Assessment Regulations, in particular Section 34 (*Auditing of Compliance with Environmental Authorisation, Environmental Management Programme*) and Appendix 7 (*Objective and Content of Environmental Audit Report*)
- The audit report must provide verifiable findings on the level of compliance with the provisions/ conditions of the Environmental Authorisation and the EMPr, and must also comment on the ability of the measures contained in this EMPr to sufficiently avoid, manage and mitigate environmental impacts.
- Where the findings of the audit report indicate that the impact management measures stated in the EMPr are insufficient to adequately address environmental impacts, recommendations as to how the EMPr must be amended so as to address the identified shortcomings must be made and submitted to the competent authority together with the audit report.

17.2 Construction phase monitoring, reporting and record keeping

The appointed Environmental Control Officer (ECO) is responsible for monitoring the site at regular intervals during the construction phase, in order to ensure that the provisions of this EMPr and the Environmental Authorisation are adhered to and that sound environmental management is ensuing on site. The ECO should visit the site (2 to 4 times per month) for the duration of the construction activities. The site visits may be reduced or increased to the discretion of the appointed ECO. The ECO will be required to attend the monthly site meetings, which can be combined with one of the site inspections.

The ECO must compile a monthly ECO report detailing the ECO's observations on site, any instances of non-compliance and any issues or aspects that require attention, follow-up or remedial action. The ECO reports must be submitted to the Applicant, and to the Competent Authority if so requested by that authority. The ECO inspection reports must include both photographic and written records.

ECO Inspections - Photographic Records

The condition of the surrounding natural environment must be monitored regularly in order to ensure that construction and management activities are not impacting negatively on the condition of the landscape and any sensitive ecosystems. The most effective way to achieve this is by means of a detailed photographic record. In this way, a record of any shift in ecosystem condition can be maintained and potential impacts be detected at an early stage. It is thus recommended that fixed-point photo-monitoring sites could be set up, and photographs should be taken at these sites during each ECO inspection. Where necessary, the entire working area should be well documented and photographed.

ECO Inspections - Written Records

The following record-keeping during the pre-construction, construction and rehabilitation phases of the development is recommended:

- The ECO should complete an ECO Checklist after each ECO site visit.
- The ECO must compile an ECO monitoring report and submit this to the Applicant, the Contractor and the Competent Authority (the latter only if required by the Competent Authority). The monthly reports must be a summary of the ECO inspections from the preceding month, and must highlight the key concerns/ issues on site, instances of non-compliance with the EA and EMPr, all instructions issued to the contractor, actions taken and aspects that still require attention.
- All ECO reports and ECO instructions must be retained on file by the Applicant at least for the duration of the construction period (retaining reports for a period of at least 5 years is recommended, in the event that the Competent Authority should request information).
- A record (minutes) of construction site meetings, liaison site meetings between the ECO and resident engineer or contractor, monitoring reports, ECO instructions and ECO observations should be clearly documented and filed on a master file off-site for safe keeping.
- It is recommended that a site register (incident register) should be kept on site at the site office for the recording of any environmental incidents (e.g. fires, spills etc.), observations which are contrary to the stipulations within the EMPr and any other contravention deemed necessary for the attention of the resident engineer. Actions taken to remedy the incidents should also be recorded.
- A complaints register should be kept on site in which complaints by any member of the public should be logged.

Construction Phase Record Keeping

A copy of the approved EMPr, the Environmental Authorisation, Water Use Authorisation and any relevant construction method statements must be kept on site at all times during pre-construction, construction and rehabilitation activities. The ECO Reports must be retained by the Applicant for a period of at least 5 years, and must be provided to the Competent Authority upon request.

17.3 Corrective Action Procedure

Correction actions need to be followed in the event where there is non-compliance with a condition of the EA and any recommendation and mitigation measures as stipulated in this EMPr in order to rectify the non-compliance and to prevent reoccurrence.

The ECO will be responsible for reporting non-compliance with any condition of the EA and the recommendations and mitigation measures as included in this EMP. The ECO will also be responsible for the compilation of non-compliance reports and identifying steps to correct the non-compliance.

The ECO must report all non-compliance issues to the contractor whose responsibility it is to correct. A timeframe for the completion of the corrective actions must be agreed to by ECO. Once the corrective actions have implemented the contractor must notify the ECO. The ECO must review the effectiveness of the corrective actions and if it is found to be inadequate, additional measures must be implemented. Only once the corrective actions have been completed to the satisfaction of the ECO will the matter be considered as closed.

Where there are repeated instances where the requirements and conditions of this EMP and the Environmental Authorisation are contravened or not fully complied with, the Construction Contractor may be liable for financial penalties. Penalties shall be issued by the Engineer, in accordance with the Schedule of Fines contained in the table below. Penalties may be issued at the Engineer's discretion, and/or upon the request/ recommendation of the ECO or Competent Authority.

Depending on the nature of transgression, the Engineer and/or ECO may issue one or more warnings to the Contractor prior to the issuing of a fine. Warnings may be given in writing or orally, but oral warnings must be followed up with written confirmation of the warning within 48 hours of the oral warning. The Engineer has the discretion to issue a fine without first issuing a warning, if the severity of the transgression is judged by the Engineer and/or ECO and/or Competent Authority to warrant such action.

The Engineer must ensure that the levying of fines/penalties forms part of the contract between the Construction Contractor and the Engineer, and is subject to the provisions of South African contract law.

The table below specifies the transgressions for which the Construction Contractor may incur financial penalties, and the amount of the fines that may be levied. Levying of fines/ penalties is subject to alignment with South African Contractual Law. For repeat offences of the same/ similar transgression by the same party, the value of the fine shall be doubled for each subsequent repeat offence to a maximum value of **R50 000.00** per offence.

Note: "Provisions", as stated in the table below, relates to the requirements specified in this EMP and any requirements or conditions specified in the EA, as well as any other requirements governing the environmental management aspects of the development, which the Contractor is responsible for implementing.

#	Finable Transgression	Min Fine	Max Fine
1	Failure to notify the ECO of the commencement of construction or pre-construction activities, prior to the commencement of such activities	R1 000	R2 000
2	Failure to comply with the provisions relating to the demarcation of the working area, site camp and associated facilities, and the maintenance of the demarcated boundaries.	R1 000	R5 000
3	Failure to comply with the provisions relating to the demarcation of all "no-go" areas, and the maintenance of the demarcated boundaries.	R2 000	R5 000
4	Failure to provide secured ablution facilities (1:30 ratio) on site.	R500	R15 000
5	Failure to comply with the provisions relating to the clearance of vegetation on site.	R2 000	R5 000
6	Clearance of indigenous vegetation (regardless of the density of alien vegetation present) outside of the demarcated boundaries of the working area and site camp.	R2 500	R15 000

7	Damage to indigenous vegetation in the river bed and surrounding areas within No-Go areas	R2 000	R10 000
8	Failure to apply herbicide to alien vegetation when required to do so.	R500	R2 000
9	Failure to adhere to designated access routes and/or the driving of vehicles through undeveloped vegetation outside of the demarcated working area or site camp.	R1 000	R5 000
10	Movement of vehicles and/or construction workers in no-go areas;	R1 000	R10 000
11	Movement of construction vehicles within the river flow without approval from the ECO and Engineer	R5 000	R15 000
12	Parking or storage of vehicles, machinery, tools and other materials or equipment related to the Contractors operations, within designated "no-go" areas.	R1 000	R10 000
13	Parking or storage of vehicles, machinery, tools and other materials or equipment related to the Contractors operations, outside of the areas demarcated for such parking/storage.	R500	R5 000
14	Failure to comply with the provisions relating to the management of topsoil and subsoil.	R1 000	R5 000
15	Excessive excavation of material in areas not depicted for such purpose / activity on the approved design plans.	R2 500	R10 000
16	Failure to comply with the provisions relating to waste management on site i.e. recycling of	R500	R5 000
17	Failure to comply with the provisions relating to the storage, use and management of hazardous substances and fuels on site and/or the spillage of hydrocarbons or hazardous substances on site.	R1 000	R10 000
18	Mixing cement or concrete on bare ground and/or failure to comply with any other provision regarding cement/ concrete batching	R1 000	R5 000
19	Failure to provide adequate fire-fighting equipment (in working order) on site at all times and/or failure to comply with the provisions relating to fire prevention and/or the occurrence of unattended or out of control fires.	R500	R5 000
20	Refuelling of vehicles, machinery or equipment outside of the designated refuelling area.	R500	R2 000
21	Maintenance of vehicles, machinery or equipment outside of the designated maintenance yard, except in emergencies	R500	R2 000
22	Failure to undertake refuelling or repairs over a drip tray or other impermeable bunded surface to collect spilled hydrocarbons (fuels, lubricants, oils etc.) and other hazardous substances; failure to provide drip trays under fuel burning equipment (including pumps and generators) where there is a risk of hydrocarbon leakage.	R500	R2 000
23	Storing / placing fuel containing equipment (i.e. bowsers and other fuel containers) within the river bed.	R2 500	R10 000
24	Failure to produce a required method statement/s to the engineer's and ECO's satisfaction prior to undertaking the activity concerned and/or failure to adhere to an approved method statement	R1 000	R5 000

18. CONCLUSION

The recommendations and mitigation measures prescribed in this EMPr have been formulated with the intention of addressing potential pre-construction, construction and operational phase impacts on the environment. It is likely that if the conditions, requirements and recommendations of the above EMPr are implemented as described and the relevant stakeholders adhere to the various mitigation measures, then the project will be completed without unforeseen negative environmental impacts. Familiarity with the contents of this EMPr by the contractors and other individuals involved in the development project

will assist in achieving “environmental best-practice”, which ultimately ensures that the project arrives at a sustainable outcome.