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ENVIRONMENTAL MAINTENANCE MANAGEMENT PLAN

for

THESEN ISLANDS STRUCTURAL, INFRASTRUCTURE OR EARTHWORKS MAINTENANCE

On

THESEN ISLANDS, KNYSNA DISTRICT

In terms of the

National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended & Environmental Impact Regulations 2014

Prepared for Applicant: Thesen Islands Homeowners Association

By: *Cape EAPrac*

Report Reference: KNY507/01b

Department Reference: 14/12/16/3/1/1/151/MP1

Case Officer: Constance Musemburi

Date: 28 August 2019

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EAPASA Registration: 2019/1444

PURPOSE OF THIS REPORT:

For Departmental Decision-Making

APPLICANT:

Thesen Islands Homeowners Association

CAPE EAPRAC REFERENCE NO:

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ENVIRONMENTAL MAINTENANCE MANAGEMENT PLAN

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Environmental Impact Regulations 2014

THESEN ISLANDS MAINTENANCE MANAGEMENT PLAN

Submitted for:

Departmental Review

Report Issued by:

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ENVIRONMENTAL MAINTENANCE MANAGEMENT PLAN LEGISLATIVE REQUIREMENTS

This Environmental Maintenance Management Plan (EMMP) has been compiled in such a manner as to provide enough environmental background and recommendations for maintenance of existing **'structures, infrastructure and earthworks[1]'** that falls within the tidal zone[2], as well as open space areas, under management of Thesen Islands Homeowners Association (TIHOA), as approved.

This document is to be used to ensure that the request for adopting or defining a Maintenance Management Plan (MMP) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"), Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) is undertaken to sufficient standard as defined by the competent authority, the National Department of Environmental Affairs (henceforth the Department).

This EMMP is not submitted in terms of the original Environmental Authorisation for Thesen Islands. It is submitted as a stand-alone report, seeking approval for ongoing maintenance and management of existing structures/infrastructure, to **'keep such structure(s) or system(s) functioning or in services on the same location, capacity and footprint'[3]**.

- The 2014 Environmental Regulations (as amended), allows for specific 'listed activities' to be considered by means of an EMMP.
- No new developments are required or proposed as part of ongoing maintenance, thus no new 'listed activities' are triggered that are not already actioned/commenced with maintenance.

The scope of this EMMP covers the **maintenance/reconstruction of structures/infrastructure** that are (i) **specified**, (ii) **existing** and (iii) **lawful**, occurring within the (iv) **specified geographical study area,** as defined in this document. The maintenance/reconstruction detailed in this EMMP must not result in any expansion of the existing footprint(s) of the affected relevant structure(s) and/or infrastructure(s).

Due to the time lapse since original construction of Thesen Island, as well as the office fire of CMAI who was responsible for planning and implementation of Thesen Islands, no as-built drawings are available to calculate exact footprints for maintenance activities. To address this gap, all areas where maintenance are to be undertaken within the littoral zone and as per the scope of works of this EMMP, must be measured and/or surveyed upon approval of this EMMP, so that the Environmental Control Officer (ECO) can confirm exact site footprint (which may not be increased/relocated) prior to maintenance work is undertaken.

Apart from legal compliance, the purpose of this plan is to assist Thesen Islands HoA with their response to the **ongoing and future maintenance** that may affect the estate's exiting structures and infrastructure within the littoral active zone, as specified and approved previously, and how best to ensure **responsible environmental management and control** during the necessary **maintenance/repairs** required.

This document must be interpreted and applied as a **five (5) year maintenance period** that must be followed in the event of **maintenance work for repairs and replacing**

[1] NEMA defines '**associated structures, infrastructure and earthworks'** as *"…any structures, infrastructure or earthworks, that is necessary for the development and functioning of a facility of activity'.*
[2] NEMA defines a' watercourse' as "…
[3] Regulation 983 Listing Notice 1 definition of 'maintenance'.

structures/infrastructure in the same position and scale, in a **'like-with-like scenario',** applicable ONLY to existing, approved infrastructure/structures specified in this EMMP.

Existing structure/infrastructure within Thesen Islands is exposed to tidal influences and therefore requires both ad hoc and regular maintenance and repairs. This plan addresses specific maintenance management options relevant to the maintenance of such specified, already approved structures/infrastructure only.

The geographical scope i.e. study site of this EMMP covers the following:

- *Development footprint*[4] of the *estate component* of Thesen Islands only (within the littoral active zone) and **excludes** the business/commercial node inclusive of the shops, restaurants, public parking areas as well as the Sanparks offices.
- The area owned by the **Thesen Islands Parkland Trust** (erf 13840) as open space, forms part of the study area.
- Private property i.e. homeowners' erven, is **excluded** from this EMMP as the TIHOA does not have control over such areas.
- Expansion[5] and/or relocation of any specified structures and infrastructure is **excluded** from this EMMP.
- The existing and approved structures within the study area, within the littoral active zone, subject to the lease agreement with SanParks (i.e. below the high water mark) is **included** i.e. water channels[6]/marinas[7]/artificial beaches.
- All areas *managed* by the TIHOA is therefore **included**.

NEMA defines **'maintenance'** as the "…*actions performed to keep a* [lawful] *structure, or system, functioning or in service, on the same location, capacity*[8] *and footprint'*.

The **re-development or re-instatement** of existing infrastructure/structures, by definition, is covered in terms of 'maintenance' only and not in terms of 'development'.

For this purpose, the **'maintenance management plan'** may be considered specifically for *maintenance purposes* once it has been adopted by the competent authority[9].

There is no official template yet for EMMPs for coastal projects, however the template for EMMP for working in watercourses has been used as a guideline and also the following has been relied on as per **Appendix 4 of GN No. R982 of 4 December 2014**:

1. Meet the requirements outlined in section 24N (2) and (3) of the NEMA.
2. Address the potential environmental impacts of 'the activity' throughout the project life-cycle[10].

[4] NEMA defines **'development footprint'** as *"...any evidence of physical alteration as a result of the undertaking of any activity".*

[5] NEMA defines **'expansion'** as *"…the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility, or the footprint of the activity is increased".*

[6] NEMA defines a **'channel'** as *"…an excavated hollow bed for running water, or an artificial underwater depression to make a water body navigable in a natural watercourse, river or the sea".*

[7] NEMA defines a **'marina'** as *"…a constructed waterway that is normally associated with residential or commercial use and that could include mooring facilities".*

[8] NEMA defines **'[throughput] capacity'** as *"…the design capacity, or maximum capable capacity of a facility, structures or infrastructure, whichever is the greater".*

[9] GN 983 dated 8 December 2014, as amended by GN 327 on 7 April 2017, and GN 706 dated 18 July 2018.

[10] The life-cycle of 'the activity' is determined by the scope of the activity. The scope of the activity is only for 'maintenance', as such the life-cycle is only relevant to maintenance work as defined in NEMA (DEA explanatory document for EIA Regulations & EA validity period 2018).

3. Include provision for an assessment of the effectiveness of monitoring and management arrangements after implementation.
4. Provide concise method statements of the measures or interventions to be implemented.
5. Be included in the contract documentation for all documentation for all phases of implementation.

NB: This EMPr must be adopted by the national Department of Environmental Affairs prior to further implementing any of ongoing maintenance activities for structures/infrastructure within the littorale active zone.

Appendix 4 of Regulation 982 of the 2014 EIA Regulations contains the required contents of an Environmental Management Programme (EMPr). The checklist below serves as a summary of how these requirements were incorporated into this maintenance management plan.

Table 1: EMPr compliance with Appendix 4 of Regulation 982

Requirement	Description
Details of the EAP who prepared the EMPr; and; The expertise of the EAP to prepare an EMPr, including a curriculum vitae.	This Plan was prepared by Louise-Mari van Zyl of *Cape EAPrac* who has more than 18 years' experience as an Environmental Assessment Practitioner. A company profile of *Cape EAPrac* as well as the CV of the EAP is attached in **Appendix I**. Louise-Mari van Zyl is a registered EAP with EAPASA [2019/1444]
A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	This EMP covers only **maintenance** of **existing, approved structures/infrastructure** only.
A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Site sensitivities are limited to the open space and tidal zones.
A description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process ~~for all the phases of the development including –~~ ~~(i) Planning and design;~~ ~~(ii) Pre-construction activities;~~ ~~(iii) Construction activities;~~ ~~(iv) Rehabilitation of the environment after construction and where applicable post closure; and~~ (v) Where relevant, operation/maintenance activities.	Sections 5 – 7 of this Plan.

Requirement	Description
A description and identification of impact management outcomes/actions required for the aspects contemplated above.	These are covered by the respective management recommendations in section 5 – 7 for each of the project phases.
A description of the proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated above will be achieved and must, where applicable include actions to – (i) Avoid, modify, remedy control or stop any action, activity or process which causes pollution or environmental degradation; (ii) Comply with any prescribed environmental management standards or practises; (iii) Comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.	Throughout the report.
The method of monitoring the implantation of the impact management actions contemplated above.	ECO to be appointed to oversee maintenance work on existing, approved structures/infrastructure below the HWM/within the littoral active zone.
The frequency of monitoring the implementation of the impact management actions contemplated above.	Ad Hoc and regular depending on the maintenance schedule or repairs required at the time.
An indication of the persons who will be responsible for the implementation of the impact management actions.	Thesen Islands Homeowners Association (TIHOA).
The time periods within which the impact management actions must be implemented.	Throughout the lifespan of the approved EMMP.
The mechanism for monitoring compliance with the impact management actions.	ECO to be appointed to oversee maintenance work on existing, approved structures/infrastructure below the HWM/within the littoral active zone.
A program for reporting on compliance, taking into account the requirements as prescribed in the Regulations.	ECO to report any non-compliance to the competent authority and SANParks.
An environmental awareness plan describing the manner in which –	The appointed ECO will perform Induction of the contractor and his team to ensure

Requirement	Description
(i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment.	environmental awareness and risks, especially working in proximity to the high-water mark of the sea. Likewise, the Induction will deal with avoidance of pollution and degradation of the environment.
Any specific information that may be required by the competent authority.	

NOTE: Adopting or defining this EMMP does not absolve Thesen Islands HOA from complying with any applicable legislation or the general "duty of care" set out in Section 28(1) of the NEMA that states, *"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 to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment*." (Note: When interpreting this "duty of care" responsibility, cognisance must be taken of the national environmental management principles contained in Section 2 of the NEMA).

- *Version 2* of this report was subjected to review and input from the TIHOA.
- Version 3 was submitted to the National Department of Environmental Affairs (DEFF) as a draft document;
- Version 4 of this document was available for stakeholder review and comment for a period of 30-days, extending from **9 December 2019 till 30 January 2020**[11] (excluding 15 December – 5 January) and **extended till 4 February 2020**.
- Version 5 of this document is this EMMP, inclusive of the stakeholder list, initial comments received and updates to accommodate comments received. A further 30-day commenting period is permitted extending from **9 July 2021 – 9 August 2021**.
- Comments received during this additional commenting period will be considered and included with the submission of the MMP to the DEFF for decision-making.

A copy of the report is available at the Thesen Islands HOA offices and can also be downloaded from www.cape-eaprac.co.za (click on Active Projects, find the project alphabetically).

[11] Because Knysna and Thesen Islands in particular is a known holiday destination, the decision was made to advertise the document over the December holiday of 2019 period to maximise exposure. The specified date (9 Dec – 30 Jan) is in fact 52-days, however all public holidays are excluded, as well as the period 15 December till 5 January as per the Environmental Regulations.

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FIGURES

GENERIC ABBREVIATIONS

AC	Alternating Current
Alt.	Alternative
BGIS	Biodiversity Geographic Information System
CARA	Conservation of Agricultural Resources Act (43 of 1983)
CBA	Critical Biodiversity Area
cctv	Closed Circuit Television (camera)
CDSM	Chief Directorate Surveys and Mapping
cm	Centimetre
DAFF	Department of Agriculture, Forestry & Fisheries
DEFF	Department of Environmental Affairs (national)
DEA&DP	Department of Environmental Affairs & Development Planning (Western Cape)
DEIR	Draft Environmental Impact Report
DME	Department of Minerals and Energy
DoE	Department of Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Impact Practitioner
ECA	Environmental Conservation Act (73 of 1989)
ECO	Environmental Control Officer
ECR	Environmental Control Report
EHS	Environmental, Health & Safety
EIA	Environmental Impact Assessment
EIP	Environmental Implementation Plan
EIR	Environmental Impact Report
ELC	Environmental Liaison Committee
ER	Engineer Representative
ESA	Environmental Site Agent / Ecological Support Area
EMPr	Environmental Management Programme
FPA	Fire Protection Association
GPS	Global Positioning System
ha	Hectare
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IPP	Independent Power Producer
ISO	International Organisation for Standardisation (ISO 9001)
Kl / Klt	Kilo Litre
Km	Kilometre
Km/h	Kilometres per hour
kV	Kilo Volt
LLRC	Low Level River Crossing
lt	Litre
LUDS	Land Use Decision Support
LUPO	Land Use Planning Ordinance
m	Metre

m²	Metres squared
m³	Metres cubed
MW	Mega Watt
NEMA	National Environmental Management Act (107 of 1998, as amended in 2006)
NEMBA	National Environmental Management: Biodiversity Act (10 of 2004)
NERSA	National Energy Regulator of South Africa
NFA	National Forest Act (84 of 1998)
NHRA	National Heritage Resources Act (25 of 1999)
No.	Number
NSBA	National Spatial Biodiversity Assessment
NVFFA	National Veld and Forest Fire Act (101 of 1998)
NWA	National Water Act (36 of 1998)
pH	Potential of Hydrogen
PIA	Paleontological Impact Assessment
PM	Post Meridiem; “Afternoon”
PV	Photovoltaic
PVC	Polyvinyl Chloride (piping)
REDs	Road Environmental Dust Suppressant
SAHRA	South African National Heritage Resources Agency
SANBI	South Africa National Biodiversity Institute
SANS	South Africa National Standards
SDF	Spatial Development Framework
S&EIR	Scoping & Environmental Impact Reporting
SAPD	South Africa Police Department
WULA	Water Use Licence Application

1. INTRODUCTION

Many regions along the South African coast are subject to severe coastal storms and substantial damages has resulted over the years. According to Mather AA & Stretch DD in Fugal & Rabie (2018) storm events in March 2007 caused damage to private development and public infrastructure along roughly 400km of the Kwazulu-Natal eastern seaboard that was costed at R800 million.

This experience, coupled with growing public awareness of climate change impacts and sea-level rise, elevated concern about coastal risk and how to manage public/private infrastructure within the risk areas. Thesen Islands development is situated within the Knysna Estuary and is one such area that will be affected by sea-level rise over the coming years.

Maintenance of existing structures and infrastructure situated within an estuary and/or the littoral active zone on Thesen Islands, is ongoing and will remain a necessity, especially as the effects of climate change becomes more prominent affected by tidal levels. Equally these structures/systems must be maintained to keep them functioning under normal conditions.

Their respective functions include (a) access to the coast via artificial beaches throughout the Thesen Islands estate, jetties and slipways, (b) prevent unwanted environmental damages (replacement of defunct structures/infrastructure that can cause harm to people or the environment and (c) protecting property rights (Thesen Islands is a residential property with primary rights awarded).

"estuary" means a body of surface water—

(a) that is permanently or periodically open to the sea;

(b) in which a rise and fall of the water level as a result of the tides is measurable at spring tides when the body of surface water is open to the sea; or

(c) in respect of which the salinity is higher than fresh water as a result of the influence of the sea, and where there is a salinity gradient between the tidal reach and the mouth of the body of surface water;

Figure 1: Definition taken from the Integrated Coastal Management Act (ICMA 2008).

The environmental principles in Section 2 of the National Environmental Management Act (NEMA), bind all organs of state and determine, inter alia, that environmental management must **place people and their needs first** and that development must be **socially, environmentally and economically sustainable**.

In terms of Section 24(2)(a) of NEMA an *'…activity may not commence without environmental authorisation from the competent authority"* (emphasis added).

The requirement for environmental authorisation, is *not retrospective* in that it does not apply to an activity that 'commenced' prior to the need to obtain environmental authorisation. The NEMA second amendment act of 2004 (Act No 8 of 2004 defines 'commencement' as *'…the start of any **physical activity, on the site,** in **furtherance** of a listed activity"* (own emphasis). The NEMA amendment act of 2008 (Act No 62 of 2008) amended the definition, excluding investigation and feasibility studies (on condition that such studies on their own do not require prior environmental authorisation). On 2 September 2010 Judge Baartman delivered a judgement in the case of the Joint Owners of Re Erf 5216 Hartenbos vs the Minister of DEADP, WC High Court number 23635/009) ruling that *"…..for an activity to qualify as having been 'in furtherance, of a listed activity, there must be **evidence** that it **advanced the activity** i.e. some reasonable direct connection between the physical activity and the listed activity"* (own emphasis)[12].

Thesen Islands is an existing residential township with prior authorisation. Included with the approval are structures i.e. **slipways, artificial beaches** as part of **the artificial canal system**, and infrastructure i.e. **jetty poles/gabions** below the highwater mark/within the littoral active zone of the Knysna Estuary.

These structures/infrastructures, legally commenced, through physical activity, when Thesen Islands was constructed, on the sites (areas set apart for specific purposes) and although the installation of structures/infrastructure within 100m from the highwater mark of the sea/littoral active zone, would typically require prior environmental authorisation, it does not for the purposes of maintenance, as it continues in furtherance of the approved activity(s) in question.

Cape EAPrac has been appointed by **Thesen Islands Homeowners Association (TIHOA)**, as the independent **Environmental Assessment Practitioner** (EAP) responsible for compilation of the **Environmental Maintenance Management Plan (EMMP)** for the necessary maintenance activities they must undertake under their management, for **existing, lawful structures, infrastructure and groundworks, on the same site and without increasing capacity.**

The original Environmental Authorisation did not contain any clauses requiring a maintenance management plan as it is only recently with the 2014 Regulations (as amended) that 'maintenance management plans' was introduced for specified listed activities.

Thesen Islands (previously known as Paarden Island) is situated in the **Knysna Estuary**. Historically, the island was only accessible at low tide. In 1883 a jetty was built on the south western side which also necessitated the construction of a causeway that traversed the western side of the island before joining the mainland. In 1922 **Thesen & Co.** established a timber processing plant on the island which **Barlow World** then purchased in the 1980s. In the early 1990s the island was earmarked for and developed (from September 1999), into what is today known as **Thesen Islands**.

[12] NEMA EIA Circular 1 0f 2013. *Interpretation of 'commencement' ito the NEMA.*

Considering its location in the sensitive Knysna Estuary, which is rated 1st in South Africa in terms of its overall conservation value, Thesen Islands is subject to an array of environmental legislation including, but not limited to the **National Environmental Management Act (NEMA), the National Environmental Management Protected Areas Act (NEMPAA) and the National Environmental Management Integrated Coastal Management Act (NEMICMA)**.

Noticeably the NEMPAA ***Regulations for the proper administration of the Knysna Protected Environment*** (dated 11 December 2009) governs what is referred to as the **'development control area'** which, by definition, includes land 50m inland from the 'water area' and the highest line to which the water may rise from the 'water area' as a result of tides or the most stormy period of the year, excluding exceptional or abnormal floods. Chapter Three of these Regulations prescribe that any form of development, the moving of sand/soil or rock, depositing or dumping of any material or harmful substances within the 'development control area' must first be considered by the Management Authority (in this case the **South Africa National Parks Board**) before it may be implemented. Likewise, the implementation of any so-called 'listed activity' stipulated in the **2014 Environmental Regulations** (as amended 2017) must also be permitted by the competent Authority (the **National Department of Environmental Affairs**) before it may be undertaken.

In 1999 Thesen Islands obtained its Environmental Authorisations[13]. Section 50 of Regulation 326 of the 2014 Environmental Regulations states that (1) *any actions undertaken in terms of the ECA regulations and which can be undertaken in terms of a provision of these Regulations must be regarded as having been undertaken in terms of the provision of these Regulations*.

The 2014 Environmental Regulations requires specified maintenance activities to be considered in terms of **Environmental Maintenance Management Plans** (EMMP). This EMMP serves *only* to address the various **maintenance[14] activities** that are 'listed' in terms of NEMA. The following 'listed activities' have been considered:

- **Listing Notice 1, Activity 19A:** *The infilling or depositing of any material of more than 5 cubic metres or more into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from (ii) the littoral active zone, an estuary or a distance of 100m inland of the high-water mark of the sea or an estuary, excluding (g) where it is for maintenance purposes undertaken in accordance with a maintenance management plan.*
    - The movement of material is associated with all six (6) of the 'specified maintenance activities'.
- **Listing Notice 1, Activity 27**: *The clearance of an area of 1ha or more, but less than 20ha of indigenous vegetation, except where such clearance of ingenious vegetation is required for (ii) maintenance purposes undertaken in accordance with a maintenance management plan.*
    - The clearance of vegetation is associated with 'specified maintenance activities' #1, #3 & #4.
- **Listing Notice 3, Activity 12:** *The clearance of an area of 300sq metres or more of indigenous vegetation, except where such clearance is required for maintenance purposes undertaken in accordance with a maintenance management plan (i)(iii) within the littoral active zone or 100m inland from the high-water mark of the sea or estuarine functional zone;*

[13] Environmental Authorisation issued on 26 November 1999 under the Environment Conservation Act (ECA). Source EMP (Badenhorst 2000).
[14] Maintenance is defined as '*actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint'* (2014 Environmental Regulations).

- The clearance of vegetation is associated with 'specified maintenance activities' #1, #3 & #4.

The following six (6) 'specified maintenance activities' are covered in this EMMP:

1. **Reinstatement and revegetation of portions of the Ecobelt;**
2. **Repairs and maintenance of numerous gabions at the waterway interface/boardwalk;**
3. **The moving and depositing of sea sand at the three (3x) artificial beaches within the residential development;**
4. **Maintenance of the existing seawall;**
5. **Replacement of jetty infrastructure throughout the estate (i.e. poles, pontoons, woodwork);**
6. **Repairs and maintenance of numerous existing slipways throughout the estate.**

Various other aspects such as cleaning and monitoring of the salt marsh, boating activities, general conservation goals, pond maintenance[15], stormwater management, waste management, landscaping, renovations, alien clearing and pollution control are all relevant to ongoing operations of Thesen Islands. Although these actions are not 'listed' in terms of the NEMA, they do require attention in terms of NEMAs 'Duty of Care Principles' as well as NEMPAAs provisions.

Irrespective of this EMMP, all NEMPAA/NEM:ICMA authorisations must still be obtained from the South African National Parks Board (SanParks) and DEFF respectively where applicable.

This EMMP does not aim to replace the approved CSIR *Environmental Management Plan framework for Thesen Islands* (approved on 25 April 2000), neither will it replace the summary *EMP Easy Reference Manual* (Badenhorst, August 2000) or the *Operational Management Plan* (Badenhorst, September 2002).

The 2014 Environmental Regulations, as amended, provide for the undertaken of several 'listed activities' should they involve maintenance of *existing* structures/infrastructure on condition that such maintenance be undertaken in accordance with an adopted/approved **EMMP**.

The following are overarching principles to be used by TIHOA when considering the development and implementation of this MMP:

1) The anticipation and prevention of negative impacts and risks, then minimisation, rehabilitation or 'repair', where a sequence of possible mitigation measures to avoid, minimize, rehabilitate and/or remedy negative impacts is explicitly considered;
2) Avoid and reduce unnecessary maintenance;

[15] A number of artificial ponds were originally developed as landscaping features to assist in the removal of stormwater runoff during periods of heavy rainfall and were not installed as part of the approved remediation design. These ponds are therefore not lined and the water level in the ponds is expected to vary with seasonal rainfall fluctuation. When full the ponds overtop to a drainage channel which discharges into the pond at the bird hide. The latter forms part of the original Poleyard Protocol as pollution control requirements for the historically contaminated Thesen Islands Parkland Trust property (erf 13840). This system is not considered to be a natural watercourse. The cleaning, clearing and infilling of such ponds therefore do not require prior environmental authorisation in terms of the NEMA.

3) Maintenance and management of coastal infrastructure must be informed by the condition of the physical and ecological processes that drive and maintain marine ecosystems, relative to the desired state of the affected system;
4) Management actions must aim to prevent further deterioration to the condition of affected estuary and overall, be guided by a general commitment to improving and maintaining ecological infrastructure for the delivery of ecosystem services;
5) A process of continuous management improvement be applied, namely Planning; Implementing; Checking (monitoring, auditing, determine corrective action) and Acting (management review).

2. OVERSIGHT OF THE AFFECTED COASTAL AREA

The Garden Route Management Plan describes the Knysna Estuary as an S-shaped stretch of water with a surface area of approximately 1633ha. The main channel is approximately 19km long and up to 2km wide. It has a tidal reach of +/-17km. Measured along the main channel within the Estuary, Thesen Island is approximately two (2) kilometres from the Heads. This deep, wide connection with the Indian Ocean effectively makes the Knysna Estuary a costal embayment, ensuring a continuous exchange of 'fresh' seawater into the estuarine system under tidal forces (CSIR in Barwell 2017).

The Knysna basin is structurally controlled with Thesen Islands and Leisure Isle inferred to be located on half graben structures forming topographical high points within the lagoon. According to Maree (2000) the intertidal wetlands associated with the Knysna Estuary cover an area of 1 000ha extending landward of the mid-tide level. Fifty-four (54) plant species have been collected in the Knysna saltmarshes of which 27 occur exclusively in this habitat. Day (1981) described the benthic macrofauna in the Knysna Estuary to be diverse with approximately 310 estuarine species. Mudprawn is abundant and is not the most widely used bait species in the Estuary. The Knysna Estuary is also known for being home to three (3) indigenous oyster species namely the South African yester, 'weed oyster' and the Red Oyster. The Pacific Oyster was introduced as a commercial species in the 1970s and today forms the basis of the local oyster market.

In excess of 200 species of fish have been recorded in the Knysna Estuary (Bulpin 1978) which can be attributed to the permanently open estuary that enables unobstructed access to the typical marine species. This helps explain why there are species in the Knysna Estuary which do not typically occur in estuaries. The Knysna Estuary is also well-known for the presence of the Knysna seahorse classifies as Endangered. Although this species occurs throughout the estuary is not abundant and the TIHOA works closely with SanParks to protect and conserve the species.

Because the estuary is on the urban fringe, it is easily accessible and hence subject to fishing pressure from recreational anglers and subsistence fishers. As the number one rated estuary in |South Africa, the Knysna Estuary is ecologically important since it acts as a nursery for juvenile fish and feeding grounds for adults of several species (many which supports the recreational and commercial marine line-fisheries).

In terms of management of the estuary, SanParks manages the system as a Protected Environment in terms of Section 55 of the National Environmental Management Protected Areas Act (No 57 of 2003). The NEMPAA repealed the Lakes Area Development Act under which the Knysna system was managed as a National Lake Area.

With the anticipated rising of sea levels and increases in the frequency and intensity of storm surges coastal structures/infrastructure will be affected. As a result, regular maintenance is required and in the case of Thesen Islands, such infrastructure all falls within 100m from the high-water mark of the sea/estuary and some below the high-water mark.

Maintenance/repair activities may therefore require the following:

- **removal of natural vegetation i.e. reinstatement of existing geofabric /gabions/reno mattresses within the ecobelt;**
- **excavation, moving, removal or infilling of soil, sand, shells, shell grit, pebbles or rock of more than five (5) cubic metres i.e. infill of existing artificial beaches, replacement of defunct jetties poles, replacement of damaged slipways and reinstatement of existing geofabric/gabions/reno mattresses within the ecobelt; and / or**
- **the reinstatement of existing structures/infrastructure i.e. gabions / seawall / slipways, for replacing like-with-like scenarios on structures/infrastructure within the littoral active zone within the Thesen Island development footprint i.e. study site.**

2.1 THE STUDY SITE

The study area is described in terms of the areas that require maintenance in terms of this EMMP. Each section describes the affected area and provides a short overview of the measures that must be taken to repair or maintain the existing systems/structures/infrastructure (note that the Harbour Town is excluded).

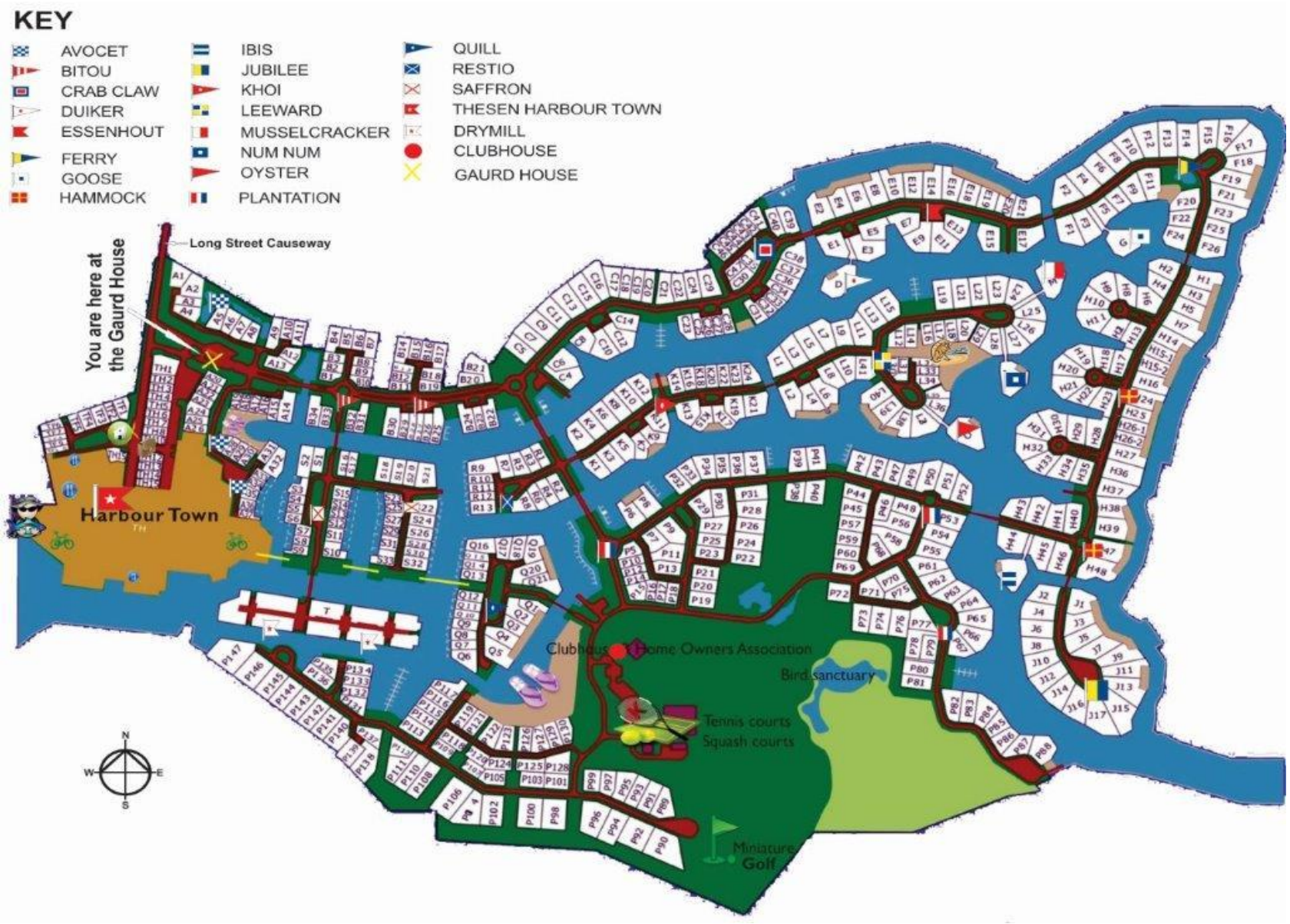

Figure 2: Site orientation map of Thesen Island showing open spaces, houses and internal channels (note that Harbour Town is excluded from the study area) (Source: TIHOA 2019).

Figure 2 shows the identifiable area (Thesen Islands) as it was set aside and approved for development. The advanced state of development of Thesen Islands is already clearly visible in the 2000 aerial photograph from Surveys & Mapping that shows the completed artificial canal system, compared to the 1991 aerial image that still shows the historic Knysna sawmill/timbers on the property.

Figure 3: 1991 Aerial image of Thesen Islands with historic Knysna Sawmill/Timbers clearly visible still (source Surveys & Mapping).

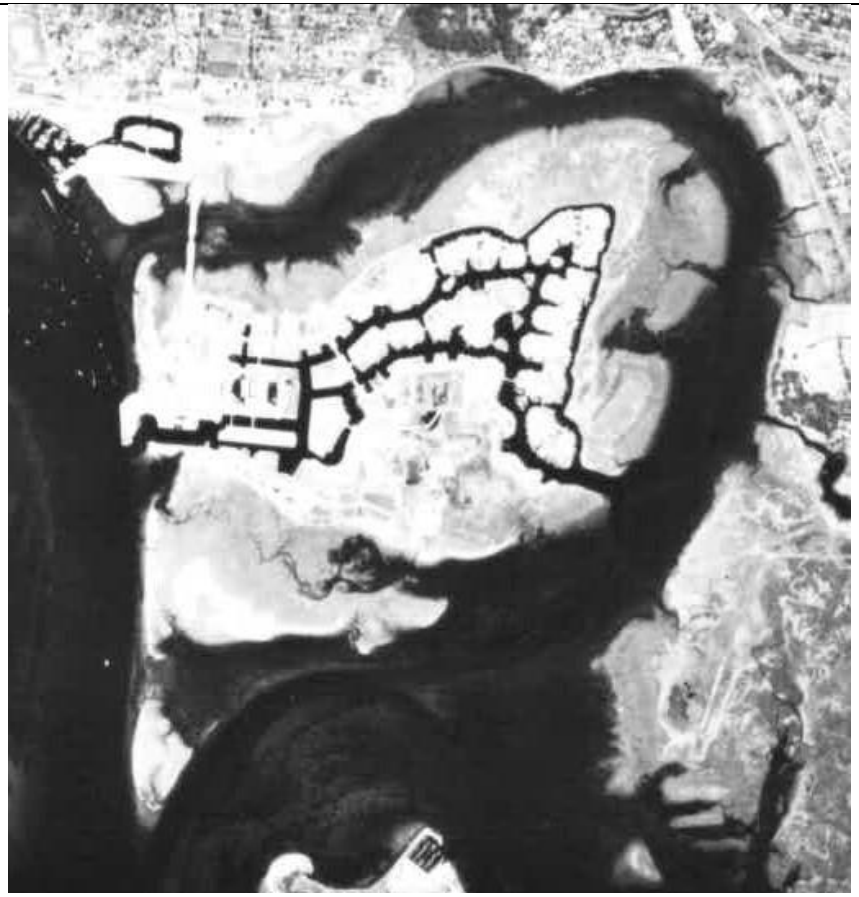

Figure 4: 2000 Aeirial image of Thesen Islands with the artificially dredged canal system and township layout as approved (source: Surveys & Mapping).

2.1.1 The Eco-Belt

The ecobelt effectively forms the interface between the residential units on the outskirts of the Thesen Islands development and the Estuary. This area serves as an ecological buffer and natural coastal erosion protection measure. Specific care was taken during the design and planning of Thesen Islands to ensure that the percentage coverage of different plant species and species diversity and its elevation remains constant with no change in plant cover and canopy height.

Any evidence of erosion within the ecobelt must be repaired to prevent unwanted scouring. Regular **visual inspections** are undertaken by the TIHOA to identify areas in need of maintenance and in such areas the vegetation cover is removed and set-aside before a layer of geofabric and 20kg/50kg rip-rap is reinstated. Thereafter the vegetation cover is put back to re-establish.

The 2002 version of the approved Operational Environmental Management Plan (OEMP) addresses the various designs and specifications for the eco-belt. **Notably, no 'ornamental landscaping' or gardening is permitted below 2.2MSL.**

For maintenance purposes it is important to understand that the eco-belt was partially designed and therefore include four (4) different as-built substrate infrastructure types (as depicted in the approved 2002 OEMP).

A typical example of one of these designs (Design B which includes both gabions as well as reno-mattresses) is depicted in Figure 5. As can be seen in this image, the **ecobelt effectively sits on-top of existing, sub-surface, large-scale, coastal erosion protection infrastructure.**

In order to **maintain** this existing sub-surface, large-scale, coastal erosion protection infrastructure, the removal of surface vegetation, excavation, moving and infilling of material within the littoral active zone, is required in order to reach/replace failed structures/infrastructure **situated below surface level** i.e. below the existing, established ecobelt. Once repairs are completed, the surface area will be **re-instated and re-vegetated** to resemble the current ecobelt once more (refer to Figure 6).

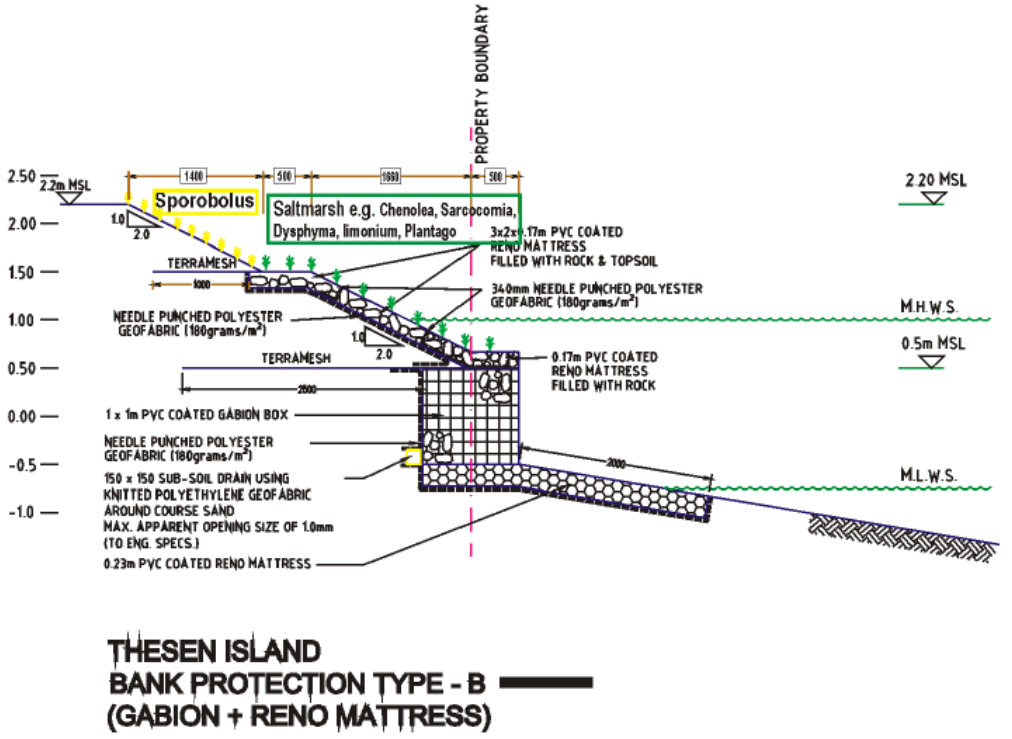

Figure 5: Typical design of sub-surface structures/infrastructure in the eco-belt (OEMP, Badenhorst 2002).

Figure 6: This image depicts a section of the existing ecobelt separating the residential estate from the open estuary. Existing coastal erosion protection structures and infrastructure are buried below the vegetation cover that must be removed and excavated in order for the sub-surface infrastructure to be repaired/maintained when necessary, and to be reinstated again as vegetated ecobelt.

2.1.2 Gabions & Reno Mattresses along waterways

TIHOA has an ongoing gabion management system in place whereby consulting engineers monitor the structural performance of the gabion system in Thesen Islands. The island has numerous existing, approved channels/waterways that have been excavated and stabilised (during 1999/2000), with gabion type erosion protection/stabilising structures, against the marine tidal conditions.

Visual inspections surveys are conducted from **land and by boat** by the gabion maintenance teams on a regular basis. The life expectancy of the existing gabion system is estimated at 50 years, (subject to rigorous product performance requirements'). Nieuwoudt & Kie (2018) who conducted the most recent inspection confirmed that both gabions and reno mattresses appear to be intact with no significant loss of rock or deformation of mattresses despite

the structures being exposed to considerable tidal flow/current. Their **underwater visual inspections** also confirmed that marine growth on the reno mattresses are well established.

Repairs thus far have concentrated on repairing damaged wire mesh panels. However, should considerable undercutting or destabilisation of gabion sections occur in future, maintenance work will have to be undertaken at low tide with demarcation and dewatering at the affected section(s). Under such circumstances qualified engineers and independent Environmental Control Officer (ECO) must supervise the work to ensure that '**as-built surveys or records' are captured before maintenance and that repairs are done in a like-for-like scenario.**

Figure 7: Example of existing gabions forming the stabilising edges of existing artificial channels (Nieuwoudth & Kie, 2018).

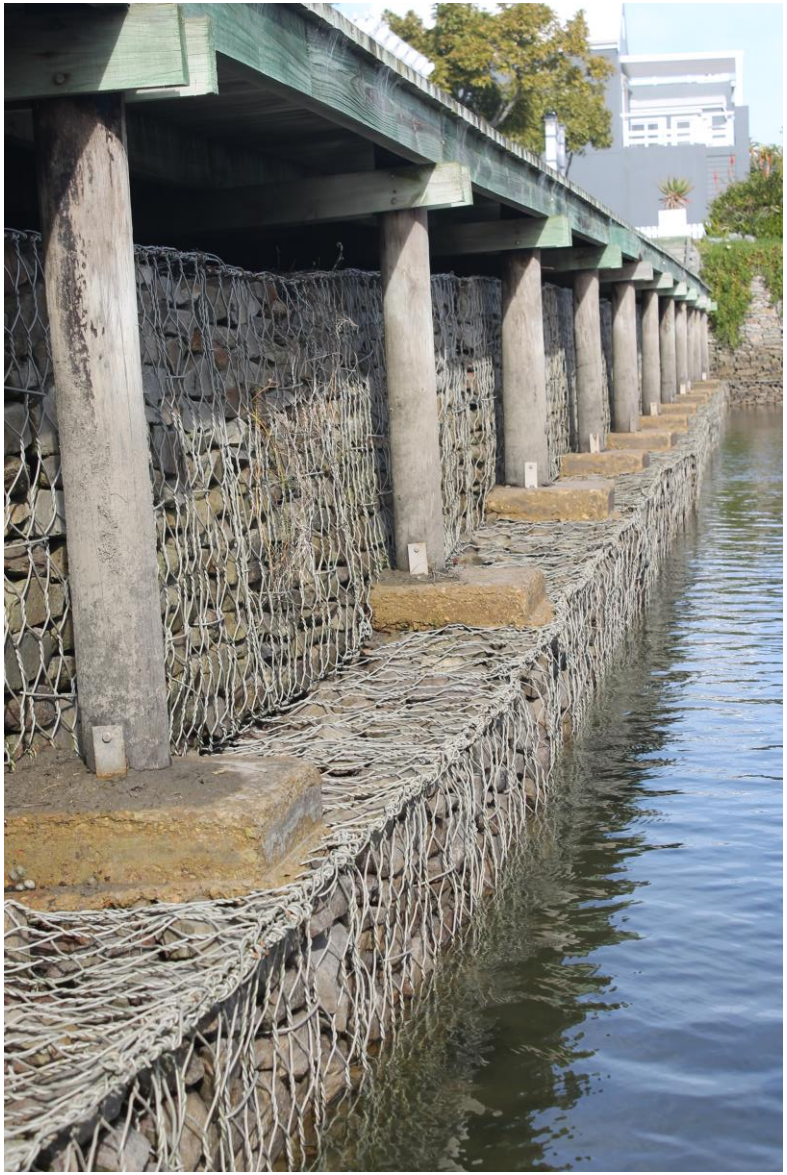

Figure 8: Examples of where existing gabions support existing walkways that extend along the artificial waterways.

Figure 9: Example of stormwater stilling basins found within the open space (eco-belt) with existing gabions extending into the soil, covered by vegetation (that must be removed and excavated for maintenance purposes when it is required).

Since the sub-surface and surface structures and infrastructures associated with walkways, stormwater management, bridges and canals throughout Thesen Islands, form part of the original approved development infrastructure, maintenance thereof is considered **in-furtherance of 'listed activities' that were authorised and had been commenced with previously.**

2.1.3 Artificial beaches

As part of the original Environmental Authorisation, **three (3) artificial beaches** were approved within the residential area. These beaches were created when the artificial canal system for Thesen Island development was established (1999/2000 – refer to Figures 3 & 4).

These beaches are mostly surrounded with residential units and/or bordered by existing roads. Residents have access to these beaches for recreational use and to access the canals for canoeing or swimming. The beaches are all linked via the existing, approved, artificial waterways/marinas that channel water from the estuary through the development. The main beach closest to the Thesen Islands Clubhouse, is the largest of all three beaches and unlike the other two smaller beaches, it is accessible by a slipway.

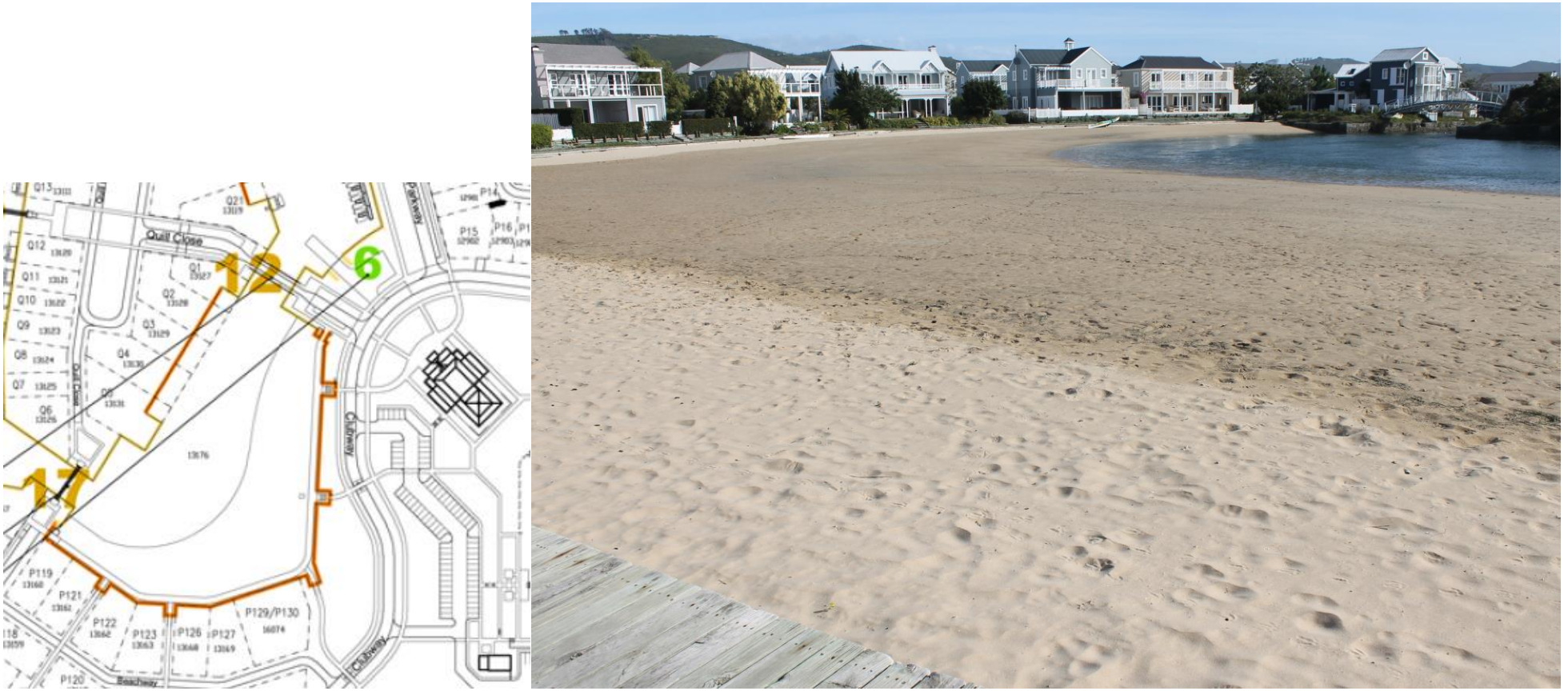

Figure 10: Main artificial beach where the tidal influence is clearly visible by the darker shade of saturated sand (adjacent diagram indicates surrounding land use as residential and roads).

The artificial beaches comprise of a thin **layer of sand** over a **compacted foundation** that was established in 1999/2000 when the artificial cannal/waterway system was developed (refer to Figures 3 & 4 for historic aerials). As can be seen from the above figure, the beach(es) gets partially inundated with water during high tide, resulting in large parts thereof not accessible to residents for extended periods of time.

Barwell (2017) conducted a study in response to concerns that the waterways and beach areas are affected by sediment movement possibly resulting in silting up (becoming shallower) of the channels and the beach areas becoming thinner as a result. In this study it was confirmed that the beaches function as a typical 'pocket beach' with no net loss or gain of sediment due to prevailing hydrodynamic processes. It remains a dynamic system and therefore seasonal changes are to be expected.

However, stormwater runoff draining onto the beaches however, increases the **saturation levels** resulting in a more rapid dispersing of the thin layer of sea sand above the original compacted foundation profile. The sediment is re-distributed *within* the pocket-beach system and does not migrate to adjacent channels. Beach filling of the three artificial features, to ensure that it remains accessible during high tides, will therefore not result in siltation of the channels.

However areas of the artificial beaches become so thin at times that the **underlying compacted material is exposed.** Evidence of wind surge, wave energy and incoming tidal currents entering the beach channels, effectively counters the leaking of beach sand beyond its adjacent channels. As a result of the design of these beaches, with **compacted surface** beneath the imported sea sand, the beaches **drain insufficiently**. This leaves saturated areas on the artificial beaches in the form of a layer of sea sand between 20mm and 100mm thick.

Figure 11: One of the two smaller beaches also surrounded by homes with no vehicular access.

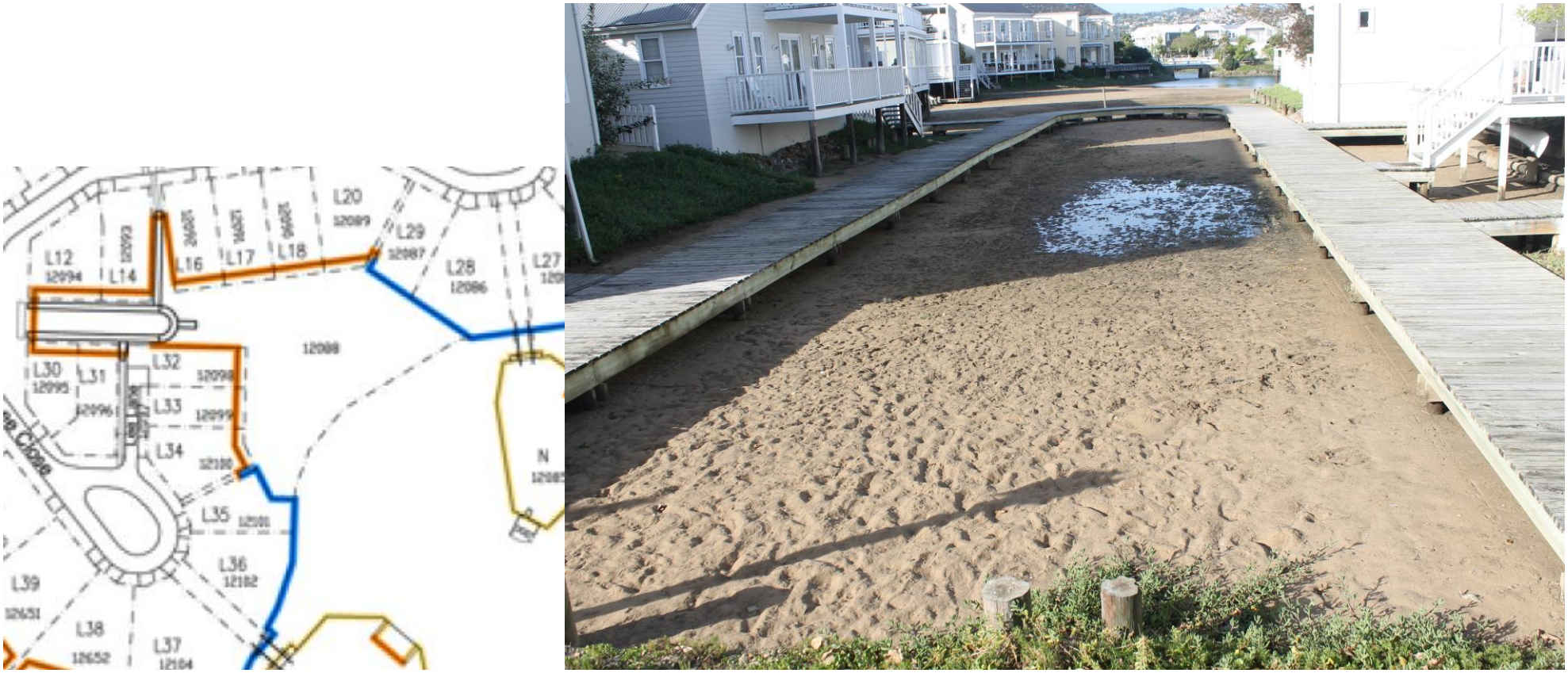

Figure 12: The third small beach with internal boardwalk extending onto the beach (notice saturated patches).

Barwell (2017) deducts that as sea level rises in response to climate change, the saturation zones will extend across the entire beach sections with little if any dry upper beach left by 2030 (even by low tide). **Refilling sand (also referred to a beach filling) to the middle and upper beach areas** will address this issue without impacting on the location of the beaches, their capacity, footprint or the functioning thereof as 'pocket beaches', whilst allowing the featured system to remain accessible and useful to residents and waterfowl that visit the beaches.

Considering the predicted timespan when rising levels will inundate the entire beach areas (by 2030), the TIHOA will need to implement **short-medium term** as well as **long term maintenance measures**:

- **Short – Medium** term maintenance measures will be to **bring in beach sand** and deposit it on the upper and middle sections of the beach areas in order to create elevated areas that will remain dry (2020 – 2030); and

- **Long term** maintenance measures will be to **create 'perched' beaches** by inserting retaining structures similar to the existing walkways at the main beach, along the high-water mark (2030 – 2050+). It must be noted that SanParks is in support of this long-term provision as beach filling material can be contained better which reduces the risk of contamination of the estuary with unwanted organic compounds.

For the **long-term** implementation strategy Barwell (2017) recommends that a pole retaining structure be inserted parallel to the high-water mark (within the existing footprint of the artificial beaches) to form a 'perched' dry beach with a concentration of sand within the 'boxes'. Because individual houses are built facing directly onto the beach areas, the level of these beaches can only be raised to the point where it does not impact on private property. Future sea level rise will eventually necessitate this approach to help protect properties.

Importantly, the already **contained footprint** and **capacity of the beaches** will not be increased since all of the artificial beaches are **surrounded** with existing developments/roads therefor its **location, capacity and footprint remains fixed and cannot be enlarged despite beach filling**.

- Deposit of material on the artificial beaches must be **monitored by a coastal engineer** and **environmental control officer** (ECO).
- For beach areas that is going to be inundated with the tides, SANParks specifically insist on **sea sand as the only materials** to be used for beach filling i.e. short-medium term.
- If it is on a perched beach (long-term) then SANParks confirmed that they will not be prescriptive on the material type, on condition that the **material may not be contaminated with any compounds** (e.g. high concentration of organics) that could leach out into the channel and potentially negatively affect water quality.
- Sand deposited onto the artificial beaches may be **done by hand** and with **small vehicles** for the two smaller beaches with no vehicular access and dump **trucks** on the main beach where there is an existing slipway that will enable vehicular access.

Due to design specifications for bridges throughout Thesen Islands, the maximum size vehicle that can be accommodated on the large residential islands is 30 tons. The maximum length is 10 meters, the maximum wheelbase is 7.5 meters and the maximum track is 2.6 meters. The maximum size vehicle that can be accommodated on the single residential islands is 10 tons with a maximum wheelbase of 4.0 meters and the maximum track is 2.0 meters.

Infrastructure leading onto the beaches such as boardwalks also require maintenance and the replacement of poles/boardwalks on these beaches are included under this EMMP for their removal/replacement will result in the movement of sand on the beaches (refer to Figure 12 for an example of existing boardwalk structure positioned on the artificial beach).

Existing boardwalks/infrastructure on the existing artificial beaches that require maintenance may only be replaced in the exact same location with the exact same footprint in a **like-for-like scenario**. Where excavations are required for replacing poles, such are permitted by hand or small excavator i.e. Bobcats.

- Excavations must be closed directly after opening, alternatively they must be demarcated to avoid injury.
- Materials i.e. poles may not be stored on the artificial beaches.

The study conducted by Barwell (2017) concluded that no significant sedimentation of adjacent channels has taken place with the bottom levels of the channels being at the design level of -1.5m MSL. Therefore, no dredging of channels is required for the purpose of this EMMP. However, should future

high-definition, drone-based aerial survey data of the whole Thesen Islands reveal the need for sediment removal within the channels, this EMMP must be amended to accommodate such maintenance actions.

Since the three artificial beaches with boardwalks and stabilising infrastructure, form part of the original approved development with waterways/access to the lagoon, maintenance thereof is considered in-furtherance of 'listed activities' that were authorised and had been commenced with previously. The beaches are not natural and were created, along with the artificial waterways and channels that form an integral part of the estate.

2.1.4 Artificial Seawall

The area historically polluted as a result of sawmill activities has been incorporated as an open space area with restrictions ito development to ensure that contaminated areas are not exposed. The bird hide pond was constructed as part of the remediation design to act as a 'pre-filter pond' to prevent any run-off from the Contaminated Core Zone (CCZ) directly entering the reedbed. This pond was originally considered necessary in order to protect the system against silt or nutrient loading on the existing reed bed.

The **bird hide pond** is lined and designed with shallow zones suitable for **establishment of reed beds** that are considered integral to the filtering function of the pond. When the pond overtops on occasion it discharges into the reed bed. This **reed bed** has been in existence since the operation of the old timber treatment plant even before establishment of Thesen Islands and was preserved during the subsequent site re-development. The pond system provides effective photostabilisation of contaminants and prevents contaminant migration to the neighbouring saltmarsh and estuary (WSP 2019).

The artificial **seawall**, located on the southern boundary of Thesen Islands, separates the **reed bed system** from the **Knysna Estuary** and it is considered an important feature that must be maintained and repairs to this feature is therefore considered essential.

Landward storm water erosion and tidal surges during spring tide has caused damage to the seawall previously which then affects the integrity of the reed bed filtering system.

- Breaches that occur along the artificial seawall must be **backfilled with clean fill material** to protect the Estuary from pollution that may emanate from the Core Contamination Zone (CCZ);
- The exposed seawall section must be **rehabilitated in a 'like-for-like' scenario**.

Since the seawall forms part of the original approved development with waterways/access to the lagoon, maintenance thereof is considered in-furtherance of 'listed activities' that were authorised and had been commenced with previously. The artificial seawall is not natural and was created, along as a condition to prevent long-term contamination of the lagoon.

Figure 13: The artificial seawall is visible as a berm used for hiking/cycling separating the reed bed (right-side of the image) from the estuary (left side of the image).

2.1.5 Replacement of existing jetty/mooring infrastructure

Thesen Islands has a total of 17 communal and 317 private moorings along the artificial canal systems.

These moorings consist of fixed and floating structures constructed on treated wooden poles/pontoons. Rot occurs on portions of these structures that are exposed to water for extended periods of time, compromising the structure and safety of residents using these facilities. This level of damage is noted through regular visual inspections by the TIHOA. To remove and replace the damaged infrastructure TIHOA uses selected contractors to gather the poles/pontoons/woodwork, using high pressure water jets/barges.

Figure 14: Floating jetties located within a designated mooring space (fixed with poles jetted into the substrate).

Figure 15: Floating jetty with movable ramp accommodating tidal fluctuations (fixed with poles that are inserted into the substrate).

Figure 16: Example of how jetty poles are recovered from the water after being removed from the substrate.

Using high pressure water jets, damaged structures are removed from their standing location and tied to a barge that pulls them along the channel to the closest slipway from where they can be removed. New treated poles/pontoons etc are inserted in the same location using the high-pressure water jets again. Damaged structures are removed to the on-site composting yard.

- Replacement poles must be marine treated poles.
- Such poles are required to have minimum chemical leaching that could contaminate the Estuary.

Figure 17: Example of the barge used to conduct visual inspections and remove/replace jetty structures (high water jet visible on barge).

2.1.6 Repairs and maintenance of existing slipways

Across the area under management of TIHOA there are a total of seven (7) slipways that enable residents/visitors to launch and recover boats. These slipways extend into the artificial waterways and were constructed using cement and timber. Maintenance on these structures is associated mainly with railings and supporting structures but can also include damaged pieces of the concrete slipways that must be replaced.

Figure 18: Slipway 1 closest to the exit into the estuary.

Cement slab slipways extends into the water channels by approximately five (5) meters and can be accessed at all tides.

- Structures extending below the high-water mark must be **surveyed/measured prior to maintenance** is conducted to ensure that the **same footprint and size/capacity** is ensured pre- and post-maintenance;
- Maintenance work must be undertaken at **low tide** when work is required on submerged sections.

Figure 19: Slipway 6 closest to the main beach (full extend of the submerged cement slab indicated by vertical poles jutting out of the waterway).

3. SPECIFIC INFRASTRUCTURE / STRUCTURES REQUIRING MAINTENANCE

The following provides an overview of the maintenance that is required to the identified structures/infrastructure/features covered in Section 2.

3.1 ARTIFICIAL ECO-BELT

For all instances where repairs and maintenance must be undertaken within the eco-belt, the following requirements apply:

- All work below the high-water mark must be monitored by an independent ECO;
- Photographic record of pre-maintenance and post-maintenance must be kept by ECO;
- The appointed contractor or TIHOA representative must compile a method statement detailing the following DO WHAT, DO IT WHERE, DO IT HOW, DO IT WHEN and by BY WHOM;
- The method statement must contain technical specifications where necessary detailing the area to be worked in, the materials to be used, the process of accessing the site and environmental protection measures;
- The method statement must be submitted to the ECO for approval;
- Work affecting tidal areas must only be undertaken at low tide;
- Work area must be demarcated prior to maintenance work taking place;
- Natural vegetation must be removed by hand if possible and either put aside or removed to a temporary nursery if work will be longer than 2-days;
- No foreign plant material may be introduced;
- Geofabric and rip-rap must be installed as per design/pre-maintenance survey
- Topsoil must be stockpiled separately for re-use later;
- Plant material must be reinstated and watered if necessary, to ensure establishment.

3.2 EXISTING GABIONS & RENO-MATTRESSES

For all instances where repairs and maintenance must be undertaken to replace/repair gabions/reno mattresses, the following requirements apply:

- All work below the high-water mark must be monitored by an independent ECO;
- Photographic record of pre-maintenance and post-maintenance must be kept by ECO;
- The appointed contractor or TIHOA representative must compile a method statement detailing the following DO WHAT, DO IT WHERE, DO IT, HOW, DO IT WHEN and by BY WHOM;
- The method statement must contain technical specifications where necessary detailing the area to be worked in, the materials to be used, the process of accessing the site and environmental protection measures;
- The method statement must be submitted to the ECO for approval;
- Dewatering of area must be done in a manner that ensures that unnecessary silt does not enter the Estuary;
- Work area must be demarcated prior to maintenance work taking place;
- No foreign plant material may be introduced;
- Loose rocks from gabions/reno-mattresses may not be dumped into the Estuary/waterways;
- Topsoil must be stockpiled separately for re-use later;

- Work to be undertaken at low tide should any low-level gabions/reno mattresses require maintenance;

3.3 ARTIFICIAL BEACHES

For all instances where maintenance must be undertaken to infill the artificial beach areas, the following requirements apply:

- All work below the high water mark must be monitored by an independent ECO;
- Photographic record of pre-maintenance and post-maintenance must be kept by ECO;
- The appointed contractor or TIHOA representative must compile a method statement detailing the following DO WHAT, DO IT WHERE, DO IT, HOW, DO IT WHEN and by BY WHOM;
- The method statement must contain technical specifications where necessary detailing the area to be worked in, the materials to be used, the process of accessing the site and environmental protection measures;
- The method statement must be informed by an estuarine specialist and/or a coastal engineer;
- The method statement must be submitted to the ECO for approval;
- Because of the size of the artificial beach areas and the fact that it is already confined, work areas need not be demarcated;
- Beach restoration must be done at low tide;
- Beach restoration must be done under supervision of an estuarine specialist / coastal engineer or suitably qualified ECO;
- Only sea sand from local sources may be used as material since the artificial beaches are inundated during high tide[16];
- Should sea sand not be available SANParks must give formal permission for using sand from any other sources;
- No foreign plant or organic material may be introduced in the process;
- The necessary record of where the sea sand originates from, as well as the volume must be recorded and approved by the ECO and SanParks before any beach restoration may take place;
- The point of access onto the artificial beaches must be identified on a map and approved by the ECO and SanParks prior to any beach restoration taking place;
- The necessary ORV permits must be obtained should vehicles be used to transport the sea sand onto the artificial beaches.

3.4 ARTIFICIAL SEAWALL

For all instances where repairs and maintenance must be undertaken along the seawall, the following requirements apply:

- All work below the high-water mark must be monitored by an independent ECO;
- Photographic record of pre-maintenance and post-maintenance must be kept by ECO;
- The appointed contractor or TIHOA representative must compile a method statement detailing the following DO WHAT, DO IT WHERE, DO IT HOW, DO IT WHEN and by BY WHOM;
- The method statement must contain technical specifications where necessary detailing the area to be worked in, the materials to be used, the process of accessing the site and environmental protection measures;
- The method statement must be submitted to the ECO for approval;

[16] The source for sea sand must be lawful taking of material.

- Work area must be demarcated prior to maintenance work taking place;
- Natural vegetation must be removed by hand if possible and put aside/removed to a temporary nursery if work will be longer than 2-days;
- Topsoil must be stockpiled separately for re-use later;
- Slopes must be trimmed along any embankment to assist with compaction;
- Backfill of breach in seawall with imported clay material and dress with topsoil;
- Plant material must be reinstated and watered if necessary, to ensure establishment.

3.5 REPLACEMENT OF EXISTING JETTY/MOORING INFRASTRUCTURE

For all instances where repairs and maintenance must be undertaken on jetties, the following requirements apply:

- All work below the high-water mark must be monitored by an independent ECO;
- Photographic record of pre-maintenance and post-maintenance must be kept by ECO;
- The appointed contractor or TIHOA representative must compile a method statement detailing the following DO WHAT, DO IT WHERE, DO IT HOW, DO IT WHEN and by BY WHOM;
- The method statement must contain technical specifications where necessary detailing the area to be worked in, the materials to be used, the process of accessing the site and environmental protection measures;
- The method statement must be submitted to the ECO for approval;
- Work area must be demarcated prior to maintenance work taking place (where possible);
- The minimum jetting must be undertaken to loosen existing infrastructure;
- Either stack poles/pontoons onto the barge or tie them behind the barge for safe removal;
- Minimum jetting must be undertaken to install the new infrastructure;
- Replacement poles/pontoons must be positioned as close as possible to the position of the pole that is to be removed;
- Rotten or broken poles/material to be re-used on the estate or disposed of at a registered landfill, it may not be burned
- Replacement of any CCA / Creosote treated timber poles (in moorings/jetties) with improved alternative structures is highly recommended for all installations below the high water mark (SANPark guidelines must be followed at all times).

3.6 REPAIRS OF EXISTING BOAT LAUNCH SLIPWAYS

For all instances where repairs and maintenance must be undertaken on existing boat launch slipways, the following requirements apply:

- All work below the high-water mark must be monitored by an independent ECO;
- Photographic record of pre-maintenance and post-maintenance must be kept by ECO;
- The appointed contractor or TIHOA representative must compile a method statement detailing the following DO WHAT, DO IT WHERE, DO IT HOW, DO IT WHEN and by BY WHOM;
- The method statement must contain technical specifications where necessary detailing the area to be worked in, the materials to be used, the process of accessing the site and environmental protection measures;
- The method statement must be submitted to the ECO for approval;
- Work area must be demarcated prior to maintenance work taking place (where possible);
- Dewatering must be undertaken in such a manner as to avoid unnecessary silt entering the Estuary/waterways;

- Cement batching may not take place on the slipway;
- Cement batching area must be approved by the ECO and must be bunted before any mixing takes place;
- Cement bags must be stored and removed from site daily;
- It is recommended that quick-dry cement be used for all repairs below the high tide level.

3.7 RISK FACTORS

Because of climate change, it was predicted that the Western Cape would experience, *inter alia*, changes in temperature, decrease in rainfall and an increase in the frequency and magnitude of storm surges along the coast.

The Garden Route District Coastal Management Lines conducted in 2013 (updated 2018) the 1:20, 1:50 and 1:100 year risk lines for the coastal area, however estuaries are not covered, however Laurie (2017) investigation confirms that Thesen Islands will be exposed to sea level rise and therefore risk management must be applied.

The structures and infrastructure dealt with in this EMMP will continue to be exposed to coastal erosion and storm surges which puts an obligation on TIHOA as well as the competent Authorities to **apply reasonable measures to protect property, lives as well as the environment** (albeit modified).

This Environmental Maintenance Management Plan (EMMP) does not cover the sections where significant interventions are required by means of new structures/infrastructure, because such interventions will require separate Environmental Authorisations from the Department of Environmental Affairs (DEFF) and SanParks respectively.

Instead, this Plan focuses only on the **repair and maintenance** of **existing structures/infrastructure** that can be done through minimal intervention i.e. **low risk areas** within a reasonably short reaction time that qualify as **like-for-like scenarios**.

Table 2: Risk Assessment of coastal infrastructure at Thesen Islands.

SECTION	RISK CATEGORY	QUALIFICATION
1 (Eco-belt)	LOW	The eco-belt is largely well-established and vegetated. Since there is little human intervention along the eco-belt it is less likely to require regular maintenance.
2 (Gabions)	MODERATE	The gabions/reno-mattresses have settled within industry standards. The annual survey (2018) has not noted any rock displacement/bulging/overlaying, straining, breaking or deformation, implying that the rock within the gabions is forming a stable unit in itself. Marine growth is well-established and helps to stabilise these structures. The existing gabion management system will continue to be enforced with qualified inspections every three years as a minimum. Failure of any of the gabions/reno-mattresses can put properties at risk and expose critical infrastructure such as sewage pipelines. Failure thereof will create a risk for residents and the receiving environment.

3 (Beaches)	HIGH	All three beaches are likely to be inundated ten years from now (2030). As water levels rise, so will the risk for sand to move around and along the beaches. The frequency of beach restoration is therefore likely to increase until such time as the long-term maintenance recommendations for 'perched beaches' is implemented.
4 (Seawall)	HIGH	The seawall is largely well-established and vegetated, however failure of the seawall has already been witnessed and future breaches has the potential to contaminate the Estuary from the CBZ that will result in detrimental impacts on the receiving environment. Continued use for hiking/cycling may result in unnecessary erosion alongside normal coastal erosion. Regular visual inspection form part of the ongoing pollution monitoring protocol. Breaches in the seawall will therefore be identified at an early stage and must be rectified without delay.
5 (Jetties)	LOW	Replacement of jetty poles is an ongoing maintenance activity across the residential area and trained contractors are familiar with the removal/replacement process. All CAA/Creosote treated poles must be replaced with environmentally friendly (improved) structures (as they require replacement).
6 (Slipways)	MODERATE	The slipways are used regularly. Due to the nature of its usage (vehicles and boats driving up and down) the slabs are likely to require infilling/repairs over time. Because there are only seven (7) distributed across Thesen Islands it is imperative that all of them are functional at all times.

4. METHOD STATEMENT & SANPARKS APPLICATION

The following template must be used for all method statements.

All method statements must be compiled by the contractor and as a minimum be approved by the ECO appointed to oversee the maintenance activities. The necessary application form must also be submitted to SanParks alongside the method statement (refer to appendix for copy of the SanParks form).

METHOD STATEMENT for

Project:

Date:

Rev #:

Prepared by:	**Reviewed By:**	**Authorised by:**
Date:	**Date:**	**Date:**

ABBREVIATIONS:

ECO	Environmental Control Officer
EMP	Environmental Management Plan
EMMP	Environmental Maintenance Management Programme
RE	Resident Engineer
SDP	Site development plan

Precursor:

A Method Statement is a “live document” in that modifications are negotiated between the Contractor and the ECO or project management team, as circumstances unfold. All Method Statements will form part of the EMP documentation and are subject to all terms and conditions contained within the EMP.

Note that a Method Statement is a 'starting point' for understanding the nature of the intended actions to be carried out and allows all parties to review and understand the procedures to be followed in order to minimise risk of harm to the environment.

Changes to, and adaptations of Method Statements, can be implemented once prior consent has been received / confirmed by all parties (e.g. ECO, RE, Client etc.).

A Method Statement describes the scope of the intended work in a step-by-step description in order for the ECO and the RE to understand the Contractor's intentions. This will enable them to assist in devising any mitigation measures, which would minimise environmental impact during these tasks. For each instance, where it is requested that a Method Statement is to be provided, the format should clearly answer / indicate the following:

o **WHAT** - a brief description of the work to be undertaken;

o **HOW** - a detailed description of the process of work, methods and materials;

o **WHERE** - a description / sketch map of the locality / alignment of work (if applicable);

o **WHEN** - the sequencing of actions with due commencement dates and completion date estimates; and

o **WHO** – the person responsible for undertaking the works described in the Method Statement.

A. Activity / Action to be Undertaken *(Functional Requirements, SDP, Layouts, Alignments, Design, Alternatives/Options etc.)*
[*Provide a broad description of what the activity entails that is to be undertaken. This description must be expanded in below Tables for all of the alternatives*].

B. Relevant Site Characteristics
[Provide the reader with information about the site conditions, including that of the surrounding land uses, in order to provide sufficient context].

TABLE 01	**Activity 1: i.e. Infilling of main beach area.**
1. **Specific Location:** *Refer to above / Layout …… / Sketch…./Photographs.*	
2. Description of Works / Actions: Key characteristics of this option are shown in the figure/sketch/photograph:	
3. **Specific Actions / Methodology:** (what, where, how, when etc.): i. ii. iii. iv.	
4. Timing / Sequence (programme):	**5. Supervisory Party/ies (who?):**
6. Access (entering & exiting the site):	
7. **Staff** *(skills & responsibilities?)*, **plant & equipment to be used**:	

8. Environmental Risks:	9. Preventative Mitigatory Actions / Controls / Protocols:
i. -	i. -
ii. –	ii. –
iii. –	iii. –
iv. –	iv. –
v. –	v. –
vi. –	vi. –
vii. –	vii. –
viii. –	viii. –
ix. -	ix. -
Other:	

5. STAKEHOLDER ENGAGEMENT

The need for this EMMP was raised and discussed with the National Department of Environmental Affairs & Tourism, the Provincial Department of Environmental Affairs & Development Planning and the SanParks Knysna officials during a meeting that took place on **7 March 2019**. At this meeting, a list of potential maintenance/operational aspects were discussed out of which the **six (6) dealt with in this EMMP were pre-selected**.

The remainder of actions are mostly operational and can be dealt with in terms of the approved operational Environmental Management Plan (OEMP).

A further meeting took place with Mr Owen Govender from SanParks on **5 June 2020** where their protocol for activities within the protected area (Estuary) was discussed.

This EMMP does not replace any additional approvals requirements by SanParks in terms of NEMPAA. As representative of the Protected Area, SanParks did provide a written consent for all maintenance work that may be undertaken along the waterways or below the high-tide of the sea/Estuary[17].

Furthermore, the Thesen Islands Parkland Trust provided their consent as owner of Erf 13840 within the development. Copies of the consent forms are attached to this EMMP.

This EMMP (Version 4) was made available for public review and comment with a 30-day commenting period that extended from 9 December 2019 – 4 February 2020. Due to the COVID pandemic and subsequent timelapse when Government Departments could not accept formal submissions, as well as the timespan between the draft and final versions of this MMP the competent authority requested that a public participation plan be submitted for their review and approval prior to undertaking another round of public participation from 9 July 2021 – 9 August 2021.

The following steps were taken as part of the initial stakeholder engagement process and are repeated once more for this round of stakeholder engagement:

- The EMMP advertised in the ***Knysna Plett Herold*** (local newspaper) to allow the general public to comment
- The **TIHOA circulate the EMMP to all of its howeowners**
- **Site notice** to be placed at the Thesen Islands HOA offices
- Key authorities were notified and requested to comment on the EMMP
    - Knysna Municipality
    - National DEFF: Conservation & Biodiversity
    - SanParks
    - Provincial Department of Environmental Affairs & Development Planning: IEM
    - Provincial Department of Environmental Affairs: Coastal Management

The following is a summary of the comments received during the stakeholder engagement of 2019-2020:

South African National Parks Board	Beach filling below high-tide level must only be done with beach sand to avoid contamination of the Estuary.	Noted and reflected in this EMMP. ECO to verify the source of fill material prior to beach fill taking place.

[17] TIHOA has an existing lease agreement with SANParks dated July 2010 relating to work below the tidal area and in the waterways (copy attached with Consent Form).

	Beach filling above the high-tide level (preferable and more sustainable in the long term) not prescribed, but must not result in contamination of estuary with any compounds i.e. high concentration of organics.	Noted and reflected in this EMMP. Raised artificial beaches is recommended and supported by SanParks for long-term solution of potential sea level rise.
	Sea sand can be sourced from locations where dune sand blows onto road/municipal parking area i.e. Swartvlei Beach, Buffalo Bay or alternatively construction sites on dunes such as Myoli Beach.	Noted. Municipality must be contacted for possible locations to source sea sand prior to contractor selecting source.
	Knysna Estuary Management Plan not adopted yet.	Noted. EMMP is a dynamic document that must be updated every five (5) years. Should the Knysna Estuary Management Plan be adopted in future the Thesen Islands EMMP must be aligned with it.
Lauren Molsen (homeowner Thesen Island)	Concerned about the potential for contamination using treated poles for jetty replacements.	As a minimum, the type of poles for replacement in jetties must adhere to SanParks's standards as they are the competent authority for Knysna Estuary and they manage all jetty/mooring related maintenance conditions. Only marine treated poles may be used because of their reduced levels of chemical leaching. The ECO must be provided certificates by the Contractor confirming that replacement poles are marine treated.
Roger Venn (homeowner Thesen Island)	Include the public beach next to C28 on Thesen Island with the EMMP.	The Thesen Islands EMMP can only address the three (3) beaches within the approved Thesen Islands development as the HOA only has jurisdiction over the approved development area. Other public facilities on Thesen Islands are the responsibility of the local Municipality and/or SanParks.
Philip Caveney (homeowner Thesen Island)	Include the public beaches next to C28 / C31 and F11 / F20 on Thesen Island with the EMMP.	The Thesen Island EMMP can only address the three (3) beaches within the approved Thesen Islands development as the HOA only has jurisdiction over the approved development area. Other public

		facilities on Thesen Islands are the responsibility of the local Municipality and/or SanParks.
Oceans & Coast DEADP	Acknowledge receipt of MMP. No comment submitted	No further response.
Danie Swanepoel DEADP, George (comment recorded from Authority meeting held on 7 March 2019)	DEA will be the decision-making authority on the EMMP. Must adhere to Regulations on EMPs. Must ensure that no new listed activities are triggered – consult 'commencement' circulator in this regard.	Noted. There is no guideline for MMP yet, however the EMMP will be written to comply with the EMP guideline where relevant. Maintenance only on approved structures/infrastructure. Circulate considered for replacing 'like-with-like' only as well as remaining at capacity and location. ECO to ensure compliance during maintenance.
Danie Smith, DEFF (comment recorded from Authority meeting held on 7 March 2019)	EMMP will be good to have since maintenance activities are required below the highwater mark within the Estuary. Local Municipality must take note since there are also public beaches/launch sites not included. SanParks must be involved with permitting for maintenance where relevant ito NEMPAA.	Noted. TIHOA follows a voluntary process. Municipality will be offered opportunity to comment on EMMP. SanParks will be offered opportunity to comment on EMMP.

Below figure is a copy of the legal advert that appeared in the *Knysna-Plett Herold* newspaper for the 2019/2020 public participation.

KNYSNA-PLETT HERALD

INCORPORATING AREAS FROM SEDGEFIELD TO BITOU

Thursday 5 December 2019 www.knysnaplettherald.com R4.00

ENVIRONMENTAL MAINTENANCE MANAGEMENT PLAN
for
THESEN ISLANDS HOME OWNERS ASSOCIATION

This notification serves to inform stakeholders of the intention of Thesen Islands Home Owners Association (THOA) to submit their Maintenance Management Plan for consideration and decision-making.

Background: THOA is responsible for regular maintenance of existing structures and infrastructure associated with the residential estate (inclusive of existing jetties, moorings, artificial beaches, seawall, ecobel, gabions/rockwalks and slipways) for safety, accessibility and to address rising sea levels. Amongst others such maintenance may result in the removal and/or rehabilitation of exposed sand, as well as the moving, infilling or removal of material from within the littoral active zone/estuary within the boundaries of the estate (private properties and the business/retail portion of Thesen Islands are excluded).

DEA Reference number: 14/12/16/3/1/1/15/1/MP1

Environmental consultant: Cape Environmental Assessment Practitioners (Pty) Ltd

Applicant: Thesen Islands Home Owners Association (THOA)

Proposal: The 2014 Environmental Regulations introduced 'maintenance' of existing structures/infrastructures within estuaries/100m from the high water mark of the sea, as well as measures to stabilise sand within the same areas, as 'listed activities' that can be considered through means of a Maintenance Management Plan. It is the intention of the THOA to have the EMMP approved by the National Department of Environmental Affairs to enable them to conduct regular maintenance of existing structures/infrastructure. The EMMP does not include any expansion, or development of new structures/infrastructure.

Property location: Thesen Islands residential estate, situated within the Knysna Estuary.

Documentation available for information/comment: Environmental Maintenance Management Plan (digital copy can be downloaded from www.cape-eaprac.co.za (listed under 'active projects' in alpha-betical order). Hard copy available at the THOA offices.

How to participate: Interested & Affected parties are invited to register their details with Cape EAPrac, review the EMMP and submit comments, in writing, to below address by no later than 29 January 2020.

Responding time period: 9 December 2019 - 29 January 2020.

Cape EAPrac (Attention: Louise-Mari van Zyl)
PO Box 2070 George 6530 Tel: 044 874 0365 Fax: 044 874 0432
Email: lvz.sec@cape-eaprac.co.za

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Figure 20: Newspaper advert for public participation in 2019/2020.

None of the comments received in response to the first request for comment on the MMP, raised any objections to Thesen Islands implementing a Maintenance Management Plan for maintenance on existing, approved structures and infrastructure within the littoral active zone.

6. EMMP APPROVAL & REVISIONS

This EMMP, once accepted by the National Department of Environmental Affairs, becomes a legally binding document and contravention with this document will constitute an unlawful activity.

The supplementary plans annexed to this EMMP must be read in conjunction with this EMMP.

The EMMP may however require amendment at certain stages through the lifespan of the project that may be associated with changes in technology, monitoring or best practice principles. Should a significant amendment to this EMMP be required, an application for amendment of this EMMP must be submitted to the competent authority and approved before such changes are implemented.

Any future updates must be reflected and subsequent EMP documents labelled in sequence to ensure transparency.

7. CONTRACTUAL OBLIGATION

This EMMP must be included in ALL tender and contract documentation associated with this project. A copy of this EMMP must be kept on-site and the appointed Contractor(s) must familiarise themselves with the contents of this document.

7.1 ORGANISATIONAL REQUIREMENTS

In order to ensure effective implementation of the EMMP, it is necessary to identify and define the organisational structure for the implementation of this document.

The proposed organisational structure during **construction** is as follows:

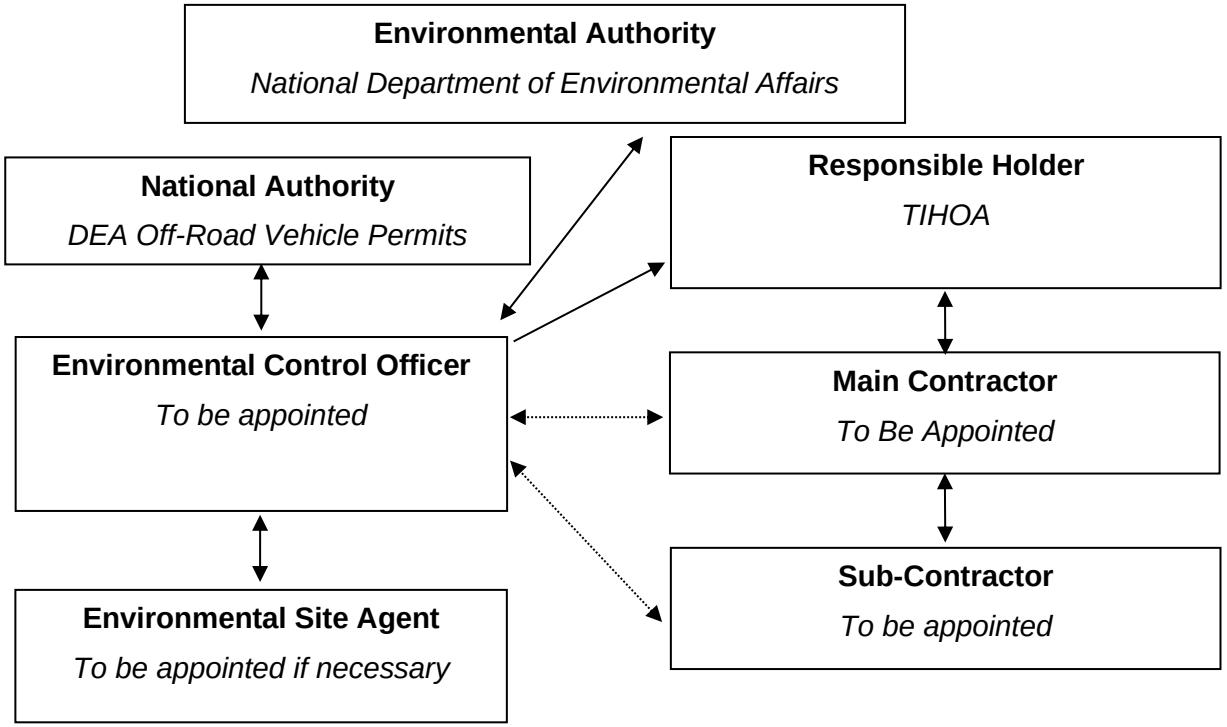

Figure 21: EMMP organisational structure during the maintenance phase.

Details regarding the roles and responsibilities of the various parties in these organisational structures are included in below section.

7.2 EMMP APPLICABILITY TO PROJECT LIFESPAN

This EMMP focuses only on **maintenance requirements** associated with the specified structures and infrastructure as described in this EMMP only.

No new structures/infrastructure is covered in this EMMP unless it is for **replacing like-with-like**, with the **same footprint** and the **same capacity**.

Any new infrastructure/structures that do not conform to this scenario, may be subject to *prior* Environmental Authorisation.

7.3 GENERAL MAINTENANCE ACTIVITIES

In the event that damages to specified infrastructure result in loose debris (rocks / concrete blocks / wood), such material must be removed from site and either re-used, composted or disposed of at landfill that accept such materials.

Considering the location at which the structures/infrastructure is located, it is advised that repairs and maintenance be done in such a way to endure the impacts of physical coastal processes including coastal erosion.

All working areas must be clearly demarcated to draw the attention of members of the public and avoid potential injuries as well as to contain the maintenance activities. Working areas must be kept to the minimum, not exceeding 3 meters on either side of the area where maintenance activities are to take place.

Maintenance activities specified in this EMMP must be implemented under supervision of an ECO (for all work below the high-water mark) and with the necessary permission from SanParks.

General requirements:

- Contractors must undergo Environmental Induction prior to any maintenance/repair work (most notably for work under the high-water mark);
- Sensitive areas must be demarcated by the TIHOA/ECO before any repair/maintenance work is to be undertaken;
- The ECO must ensure photographic record of all repair/maintenance work below the high-water mark;
- An ECO must be appointed to oversee all repair and maintenance work in the tidal zone/below the high-water mark;
- In the event that cement works are required the Contractor must aim to use cement that sets under wet conditions;
- Concrete must not be mixed in the intertidal area and cement bags must be immediately placed in refuse bins a soon as they are used. Refuse bins must be available on site and in proximity to the working area.

- Use safety equipment and comply with all safety procedures.
- Clear the work area of litter.
- Prevent contamination or pollution of the coastal zone and surrounding area.
- Prevent any excessive noise.
- Do not make any fires or burn any waste.
- Use only the chemical toilets provided on site.
- Chemical toilets must be cleaned on a regular basis and contents must be disposed of at the sewage works.
- Contractor must provide record of any material disposal not re-used.
- Work must be scheduled to take place during low tide;
- All construction personnel must be briefed through an environmental induction which can be given by the Resident Engineer or EAP as required, prior to commencing work on site.
- No vehicles may be permitted on the beach areas without the necessary Off-Road Vehicle Permit (ORV) – where applicable.
- All working areas must be clearly demarcated and marked as construction areas.
- Controlled rubbish and litter from the construction site to prevent it from impacting on sensitive coastal features.
- A copy of the EMMP must be available at the offices of the TIHOA at all times.

7.4 APPROACH TO THE EMMP

This EMPr addresses the environmental management for **repair/maintenance** and operation of existing infrastructure/structures/features only. The other phases namely design / preconstruction, construction and decommissioning are excluded.

Typically, the four phases can be generally categorised as follows:

7.4.1 Pre-construction Phase

The pre-construction phase of the development refers to the final layout design considerations and the site preparation (fine-scale design and placement, obtaining the necessary permits i.e. ORV permits, survey of development site and associated infrastructure, demarcation of no-go areas, establishment of site camp).

7.4.2 Construction Phase

The construction phase of the development refers to the earthworks and the actual installation of the infrastructure/structures.

7.4.3 Operation/Maintenance Phase

Damages that can occur to the boardwalks, pedestrian footpaths, jetties, ecobelt and seawall due to storm surges or coastal erosion require repairs and maintenance. Such activities involve replacement of broken infrastructure, repairs of existing concrete / wooden protection measures and reinstatement of existing features.

7.4.4 Closure and Decommissioning Phase

Closure and decommissioning refer the removal of the interventions which are unlikely.

8. ENVIRONMENTAL IMPACTS

Key impacts related to the construction and operation of the existing coastal infrastructure include **potential erosion**, **scaring and/or siltation**, removal or damaging of **fauna and flora** along the sensitive eco-belt, **materials entering the estuary** during maintenance, **waste generated during maintenance** and **spillage/contamination** as a result of spills.

Table 3: Assessment of potential impacts associated with maintenance.

Phase / Impact identified	Severity	Probability	Significance	Status	Confidence
Impact 1: Potential erosion	Low	Probable	**LOW**	Negative	High
With mitigation	Very Low	Definite	**INSIGNIFICANT**	Neutral	High
Impact 2: Scaring / siltation	Medium	Definite	**LOW**	Negative	High
With mitigation	Low	Probable	**LOW**	Neutral	High
Impact 2: Damage to fauna/flora	Medium	Definite	**LOW**	Negative	High
With mitigation	Low	Probable	**VERY LOW**	Negative	High
Impact 3: Waste generation and disposal	Low	Probable	**VERY LOW**	Negative	High
With mitigation	Very Low	Improbable	**INSIGNIFICANT**	Neutral	High
Impact 4: Materials entering the estuary	Medium	Probable	**MEDIUM**	Negative	High
With mitigation	Low	Improbable	**VERY LOW**	Negative	High
Impact 5: Pollution of soil/water as a result of spills	Low	Probable	**LOW**	Negative	High
With mitigation	Very Low	Possible	**VERY LOW**	Negative	High

The implementation of this EMMP will mitigate impacts that may occur as a result of ongoing maintenance at Thesen Islands. It is important that records be kept, most notably (photographic) record and ECO reports to ensure that the recommendations are implemented correctly.

9. ROLES AND RESPONSIBILITIES

Throughout the lifespan of this project, several individuals and entities will fulfil various roles and responsibilities to ensure the effective implementation of this EMMP. The key roles and responsibilities are detailed in the table below.

Table 4: Roles and responsibilities with regards to the implementation of this EMMP:

Role	Responsibility
Environmental Authority – National Department of Environmental Affairs.	
The Provincial Department of Environmental Affairs & Development Planning is the **competent / delegated authority** responsible for compliance with the relevant environmental legislation.	• Review this document and any revisions thereof. In compliance. • Undertake site audits at their discretion. • Review ECO Reports. • Review Audit Reports • Review Incident Reports. • Enforce legal mechanisms for contraventions of this EMMPr
Thesen Islands Homeowners Association	
Responsible entity of the EMMP	• Compliance with the requirements set out in this EMMP. • Ensuring all other permits, permissions and licences from all other statutory departments are in place.
Environmental Control Officer (ECO) – To be appointed for all work in the tidal zone / below the high-water mark	
The ECO fulfils an advisory role to monitor, guide and report compliance with the EMMP.	• Revise, update and amend the EMMP if necessary and submit the amendments to the competent authority for consideration. • Ensure all relevant persons have a copy of the EMMP and any amendments thereof. • Advise the employer's representative on any additional environmental authorisations and permits that may be required. • Facilitate the Environmental Education / Induction Training with the contract staff. • Review and comment on Method Statements relevant to environmental management and make recommendations to the employer's representative. • Report any non-compliance with the EMMP to the employer's representative and competent authority if necessary. • Undertake regular site inspections in compliance with this EMMP. • Monitor that earthworks/installation of structures/infrastructure to comply with the EMMP.

Role	Responsibility
	• Keep record of EMMP implementation, monitoring and audits, including a full photographic record of works. • Comply and submit regular Environmental Control Reports to the competent authority, as well as employer's representative • Report any environmental incidents or environmental impacts immediately to the employer's representative and the competent authority if necessary. • Assist the contractor and employer's representative planning for and implementing environmentally sensitive problem solving. • Advise the employer's representative on suggested "stop work" orders.
Environmental Site Agent (ESA) – Not Applicable	
To assist the ECO with the day to day implementation and monitoring of the environmental management actions that are taking place on site.	• Due to the scope of works that form part of this EMMP, a site officer (from TIHOA) can oversee all maintenance not below the high-water mark of within the tidal zone.
Employers Representative – To be Confirmed	
The Employer's representative role is likely to be fulfilled by the **project engineer** and assumes overall delegated responsibility for compliance with this EMMP and all applicable legislation for the duration of the construction phase.	• Issue site instructions to the contractor based on the advice of the ECO. • Ensure that all detailed design incorporates the requirements of the EMMP. • Ensure that the EMMP is included in all tender documents issued to prospective contractors and sub-contractors. • Ensure the EMMP is included in final contract documents. • Ensure that the Tenderers/Contractors adequately provide for compliance with the EMMP in their submissions. • Ensure that the EMMP is fully implemented by the relevant persons. • Ensure the contractor provides the necessary method statements. • Be accountable, to the competent authority for any contravention or non-compliance by the Contractor. • Assist the contractor with input from the ECO in finding environmentally responsible solutions to problems. • Undertake regular site audits, site visits and inspections to ensure that the requirements of the EMMPr are implemented • Give instructions on any procedures and corrective actions on advice from the ECO. • Report environmental incidents or non-compliance with the EMMP to the environmental authority. • Issue spot fines, penalties or 'stop-work' orders for contravention of the EMMP and give instructions regarding corrective action.

10. LEGISLATIVE FRAMEWORK

Several pieces of legislation were considered during the development of this EMMP. TIHOA must ensure compliance with all relevant legislation including those detailed below and any others that may be relevant to the works to be undertaken.

10.1 THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA

The Constitution of the Republic of South Africa (Act 108 of 1996) states that everyone has a right to a non-threatening environment and that reasonable measures are applied to protect the environment. This includes preventing pollution and promoting conservation and environmentally sustainable development, while promoting justifiable social and economic development.

Furthermore, all administrative actions must be lawful, reasonable and procedurally fair. In this regard the competent authority must acknowledge that the Island is historically transformed through human interaction and protection of property rights and infrastructure alongside ecosystem services, are necessary to protect and mitigate damages.

10.2 THE DISASTER MANAGEMENT ACT (2002)

Amendments to the Disaster Management Act in 2015 include measures to reduce disaster risk and adapt to climate change. Disaster management, and planning therefore, will invariably become more pronounced in coming decades as rising sea levels and climate change impacts become more evident at the land-sea interface.

10.3 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA, ACT 107 OF 1998, AS AMENDED)

The National Environmental Management Act (NEMA, Act 107 of 1998, as amended), makes provision for the identification and assessment of activities that are potentially detrimental to the environment and which require authorisation from the competent authority (in this case, the national Department of Environmental Affairs) based on the findings of an Environmental Impact Assessment (EIA). It also embraces the notion of sustainable development as contained in the Constitution of South Africa (Act 108 of 1996) in that everyone has the right:

- to an environment that is not harmful to their health or well-being; and
- to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures.

NEMA requires that measures are taken that "*prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*." In addition:

- That the disturbance of ecosystems and loss of biological diversity are avoided, or where they cannot be altogether avoided, are minimised and remedied;

- That a risk-averse and cautious approach is applied, which considers the limits of current knowledge about the consequences of decisions and actions; and
- Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

Section 2 of the NEMA contains **principles** with which a project or development must comply with to achieve sustainable development. These principles are listed below and must be used as a guideline for environmental maintenance management:

- Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably;
- Development must be socially, environmentally and economically sustainable;
- Sustainable development requires the consideration of all relevant factors including the following:
  (i) That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
  (ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
  (iii) that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;
  (iv) that waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;
  (v) that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;
  (vi) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;
  (vii) that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions;
  (viii) that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied;
- Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option;
- Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons;

- Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination;
- Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle;
- The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured;
- Decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge;
- Community wellbeing and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means;
- The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment;
- The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected;
- Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law;
- There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment;
- Actual or potential conflicts of interest between organs of state should be resolved through conflict resolution procedures;
- The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage;
- The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment;
- Global and international responsibilities relating to the environment must be discharged in the national interest;
- The vital role of women and youth in environmental management and development must be recognised and their full participation therein must be promoted.
- Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

Overall, NEMA aims to provide for co-operative environmental governance by establishing principles for decision-making on all matters relating to the environment and by means of Environmental Implementation Plans (EIP) and Environmental Management Programmes (EMMP).

The 'listed activities' that are covered by this EMMP, include the following:

Listing Notice 1

Activity #19A:

The infilling or depositing of any material of more than 5m^3 into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5m^3 from (ii) the littoral active zone, an estuary or a distance of 100m inland of the high-water mark of the sea or an estuary, but

excluding where such infilling, depositing, dredging, excavation, removal or moving (g) is for maintenance purposes undertaken in accordance with a **maintenance management plan**.

The design for Thesen Islands provides for three (3) **artificial beaches** that serves to allow pedestrian access to the waterways and is used for recreational purposes. These beaches are quite shallow and are mostly inundated during high tide making it inaccessible to residents. The TIHOA wishes to replenish these beaches with sea sand within the confines of their existing location and capacity.

All of the **artificial waterway** interfaces, through the Island are stabilised with **gabions, including jetties, detention ponds, pedestrian boardwalks, slipways, and bridges** (both pedestrian and vehicular). Although the gabions have a reasonable lifespan, corrosion and damage i.e. by boats, necessitates maintenance which include replacing rock baskets or refilling of baskets.

Work within the **artificial eco-belt**, along the **artificial seawall** and on **existing jetties** will entail the movement of material within the coastal zone and must be undertaken to ensure protection of property as well as prevention of contamination.

Listing Notice 1

Listing Notice 1, Activity 27: *The clearance of an area of 1ha or more, but less than 20ha of indigenous vegetation, except where such clearance of ingenious vegetation is required for (ii) maintenance purposes undertaken in accordance with a **maintenance management plan**.*

- The clearance of vegetation is associated with specified maintenance activities #1, #3 & #4.

Listing Notice 3:

Activity #12:

The clearance of an area of 300m^2 or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken ito a **maintenance management plan** (iii) within littoral active zone or within 100m from the high-water mark of the sea or an estuarine functional zone.

According to the approved EMP (Badenhorst 2000 & 2002), the artificial ecobelt that surrounds Thesen Islands along property boundaries, must be maintained with natural **saltmarsh vegetation** and these plants may not be replaced with plants not endemic to the environment. The cover of different plant species and species richness, elevation and density of mudprawn/marsh crab burrows must **remain the same** and specific care must be taken to avoid erosion. The *Sprobolus* fringe **must be maintained**. Any reinstatement of the artificial ecobelt (level 1.5m to 2.3m above mean sea level) must be done using a layer of geofabric and 20kg -50kg rip-rap to protect the edge from scour.

Importantly, the 2014 Environmental Regulations define 'development' as *the "…building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a 'listed' or 'specified' activity*, *but* ***excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and excluding the re-development of the same facility in the same location, with the same capacity and footprint".***

As such, the **re-development or re-instatement** of existing infrastructure/structures, by definition, is covered in terms of 'maintenance' only and not in terms of 'development'.

Furthermore, Thesen Island HOA is bound by "Duty of Care", as described in **Section 28** of NEMA (107 of 1998, as amended), which "…*obliges every person who causes, has caused or may cause significant environmental degradation to take reasonable measures to prevent such degradation from occurring, continuing or recurring*".

All mitigation measures recommended in this EMMP and by any relevant authorities must be implemented to avoid occurrence, continuation or repeat of environmental degradation.

10.4 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (NEMBA) (ACT 10 OF 2004)

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The Draft National List of Threatened Ecosystems (Notice 1477 of 2009, Government Gazette No 32689, 6 November 2009) has been gazetted for public comment.

The list of threatened terrestrial ecosystems supersedes the information regarding terrestrial ecosystem status in the NSBA 2004.

NEMBA also deals with endangered, threatened and otherwise controlled species. The Act provides for listing of species as threatened or protected, under one of the following categories:

- **Critically Endangered**: any indigenous species facing an extremely high risk of extinction in the wild in the immediate future.

- **Endangered**: any indigenous species facing a high risk of extinction in the wild in the near future, although it is not a critically endangered species.
- **Vulnerable**: any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future; although it is not a critically endangered species or an endangered species.
- **Protected species**: any species which is of such high conservation value or national importance that it requires national protection. Species listed in this category include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Certain activities, known as Restricted Activities, are regulated by a set of permit regulations published under the Act. These activities may not proceed without environmental authorization.

The vegetation types found along the Estuary Seashore has a conservation status of Endangered. The coastal structures/infrastructure subject to repairs and maintenance all fall within sensitive vegetation types and although for the most part the coastal section is indicated as an Ecological Support Area (ESA), there is not Critical Biodiversity Areas (CBA) affected.

10.5 NATIONAL HERITAGE RESOURCES ACT (NHRA) (ACT 25 OF 1999)

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act (Act No. 25 of 1999). Heritage Western Cape is the enforcing authority in the Western Cape and is registered as a Stakeholder for this environmental process.

The National Heritage Resources Act requires relevant authorities to be notified regarding this proposed development when the following activities are relevant:

- *Section 38(1)a - the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- *Section 38(1)c - any development or other activity which will change the character of a site (i) exceeding 5000m^2 in extent; or*
- *Section 38(1)d – the rezoning of a site exceeding 10 000m^2 in extent.*

Furthermore, in terms of Section 34(1), no person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit issued by the SAHRA, or the responsible resources authority, namely, the infiltration canal.

Nor may anyone destroy, damage, alter, exhume or remove from its original position, or otherwise disturb, any grave or burial ground older than 60 years, which is situated outside a formal cemetery administered by a local authority, without a permit issued by the SAHRA, or a provincial heritage authority, in terms of Section 36 (3).

In terms of Section 35 (4), no person may destroy, damage, excavate, alter or remove from its original position, or collect, any archaeological material or object, without a permit issued by the SAHRA, or the responsible resources authority.

Since this EMMP covers existing infrastructure maintenance it is unlikely that any heritage/archaeological artefacts will be affected by maintenance work.

Nonetheless it is advised that should any human remains or distinguishable artefacts be identified during maintenance that the ECO notify the Heritage Western Cape (HWC) immediate and obtain their advice prior to proceeding with construction.

10.6 INTEGRATED COASTAL MANAGEMENT AREAS (2008)

No person may discharge effluent that originates from a source on land into coastal water except in terms of General Authorisation (GA) or a Coastal Water Discharge Permit (CWDP). Under such circumstances the Minister must consider the following:

- The interest of the community
- The socio-economic impact of the activity
- Applicable coastal and estuarine management programmes
- The impact of the activity on the estuarine environment
- Factors listed ito Section 27 of the National Water Act (i.e. the efficient and beneficial use of water in the public interest, applicable catchment management strategy, the likely impact of the water use on the water resource and its users, the strategic importance of the water use to be authorised, the probable duration of undertaking of the activity).

No pollutants may be spilled into coastal waters therefore maintenance of the existing sewage line is a requirement.

The ICMA sets out to manage the nation's coastal resources, promote social equity and best economic use of coastal resources whilst protecting the natural environment. The ICMA established the coastal protection zone in order to manage, regulate and restrict the use of land adjacent to coastal public property, or land that plays a significant role in the coastal ecosystem for the purposes of, *inter alia*, protecting the ecological integrity and natural character of the coast and to protect people, property and economic activities from the risks or threats which may arise from dynamic coastal processes.

The National and Provincial Coastal Management Plans (Western Cape dated 2016) prioritises climate change, dynamic coastal processes and building resilient communities. Its goal is to promote resilience to the effects of dynamic coastal processes, environmental hazards and natural disasters through effective planning for coastal vulnerability to global change (Fugal & Rabie's, Third ed, 2018).

According to the Control of Use of Vehicles in the Coastal Areas Regulations (GN 496 of 27 June 2014), herein referred to as the ORV Regulations (off road vehicle regulations), provision is made for 'permissible use' as it is stated in Regulations, however TIHOA must obtain a ORV should vehicles be required for any maintenance work on the beaches. The conditions set down by the competent Authority must be implemented by TIHOA should any such permits be required.

10.7 NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT (ACT NO 57 OF 2003)

This act provides for the declaration and management of specifically identified areas in South Africa. The Act must be read in conjunction with the NEMBA. The register for protected areas includes the Knysna Estuary for which an Environmental Management Plan must still be compiled. The South African National Parks (SANParks) is the national agency responsible for managing the area under the jurisdiction of the Department of Environmental Affairs.

It is noted that the NEMPAA specifies that prior authorisation is required for flying of any aircraft within 2500ft of a protected area. Should the TIHOA ever require aerial surveys to be undertaken for maintenance purposes or otherwise it must ensure compliance with Section 47 of the Act.

Prior authorisation is required from SANParks for water-based maintenance and repairs in terms of the NEMPAA as well as the Regulations for Proper Administration for the Knysna Protected Environment (GN 1175 December 2009).

10.8 GUIDELINES & STRATEGIC DOCUMENTS

The following guidelines and strategic documents were considered during the compilation of this EMPr.

- Development and implementation of the Western Cape Estuary Management Programme, 2017
- Guideline for determining the scope of specialists involvement in EIA processes, June 2005
- Guidelines for the review of specialist input in the EIA process, June 2005;
- Guideline for involving biodiversity specialists in the EIA process, June 2005;
- Guidelines for Environmental Management Plans, June 2005;
- Guidelines on Alternatives, March 2013;
- Guideline on Need & Desirability, March 2014
- Guideline & Info Document Series, March 2013

- Guideline on Public Participation, 2017
- Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape, 2016
- Knysna Estuary Management Plan: Situation Assessment, 2007
- Western Cape Biodiversity Spatial Plan, 2017
- Eden Coastal Risk Management Lines, 2013 (updated 2018)
- Garden Route National Park Management Plan, 2012
- Circular EADP 0028/2014: One Environmental Management Systems.

11. PRE-MAINTENANCE / REPAIR ACTIVITIES

The following generic management considerations are to be adopted and implemented during the planning phase for repair/maintenance activities[18].

- ECO must be appointed for all maintenance within the tidal zone/below the high-water mark.
- All maintenance structures/infrastructure below the high-water mark/within the tidal zone must be surveyed/measures to the satisfaction of the ECO prior to maintenance being undertaken to ensure that it is done within the same footprint, repaired to the same capacity and same size/area;
- The Environmental Control Officer (ECO) must be present for the **site preparation** and correct **demarcation of no-go areas**.
- The ECO must facilitate **environmental induction** with construction staff and supervise any flora relocation and faunal rescue activities that may need to take place (vegetation clearing for the pipelines will be minimal, as such, opportunities for plant rescue are also likely to be minimal). The following people must be present during the environmental induction:
    - The ECO;
    - The Main Civil Contractor (including contract manager, site agent and foreman);
    - The Consulting Engineers (electrical, civil, coastal and structural, whichever applicable);
    - Project Management
    - TIHOA

  As a minimum, induction training must include:

[18] Refer to the description of ECO responsibilities for when an ECO is required (Section 5.2).

- Explanation of the importance of complying with the EMMP;
- Discussion of the potential environmental impacts of maintenance activities;
- The benefits of improved personal performance;
- Employees' roles and responsibilities, including emergency preparedness (this should be combined with this induction, but presented by the contractors Health and Safety Representative);
- Explanation of the mitigation measures that must be implemented when carrying out their activities;
- Explanation of the specifics of this EMMP and its specification (no-go areas, etc.);
- Explanation of any other relevant permits/licenses applicable to the activity; and
- Explanation of the management structure of individuals responsible for matters pertaining to the EMMP;
- Induction training must ensure that construction workers/staff understand that no form of wildlife poaching, collecting (plant or animal) or other form of disturbance will be permitted on the construction site or the adjacent areas.
- Contract workers are also to be directed that under no circumstances may they access outside of their demarcated work area for any purposes.

- Sensitive areas where repair work is required, as well as any sensitive areas in proximity to the working areas must be **demarcated** by the ECO/ESO as part of the pre-maintenance activities for the site. The process for this is as follows:
  - The exact footprint of the maintenance area is to be demarcated not exceeding 3m on either side;
  - All maintenance structures/infrastructure below the high-water mark/within the tidal zone must be surveyed/measures to the satisfaction of the ECO prior to maintenance being undertaken to ensure that it is done within the same footprint, repaired to the same capacity and same size/area;
  - The contractor, in conjunction with the ECO, must walk the areas determined and mark the full extent of the area to be disturbed (allowing sufficient space for the repair activities not exceeding 3m on either side);
  - All areas beyond these demarcated areas (not exceeding 3m wide on both sides of an activity) are considered as "no-go" areas; and
  - Construction staff must be briefed as part of the environmental induction on the requirements regarding the no-go areas
- In addition, the ECO must undertake a **preconstruction visual survey** of the footprint to ascertain the identity and assess areas that may be prone to coastal erosion to ensure that the appropriate **erosion mitigation measures** are put in place prior to construction.
- TIHOA must inform the DEFF Oceans & Coast of the type and number of vehicles that will be used, as well as the date and time period during which vehicles will be used for the installation of the intake and discharge infrastructure and all vehicles must adhere to the **ORV Code of Conduct** contained in this EMMP.

- TIHOA must provide the appointed contractor responsible for using **vehicles within the coastal area**, with a written contract that must specify the type of vehicle(s), the registration number of the vehicle(s), the driver(s) license, the scope of works and the time period during which the vehicle(s) may be used in the area.
- The ECO/ESO must keep photographic record of all areas to be affected pre-maintenance as well as post-maintenance for comparative purposes.

11.1 ESTABLISHMENT OF CONTRACTORS SITE CAMP

The contractor can make use of existing transformed areas i.e. parking / road surfaces / pavement areas or establish a small fenced area in the transformed areas for materials, machinery, containers and waste areas with prior approval of the ECO.

11.2 ENVIRONMENTAL CONTROL OFFICER

An Environmental Control Officer (ECO) must be appointed for maintenance work **within the tidal zone/below the high-water mark** that will require:

- earthworks (i.e. moving/removal/infill of material along the artificial beaches)
- work that will affect sensitive areas
- where pollution/contamination may take place and
- in all events where machinery will be required to access below the high-water mark.

General maintenance i.e. painting / fixing of railings/bridges **does not require ECO supervision** and can be monitored by the ESO of Representing Agent.

Appointment of the ECO must take place during the pre-maintenance phase before maintenance within the littoral active zone.

The ECO will be responsible for monitoring, reviewing and verifying compliance by the Contractor with the environmental specifications of this EMMP.

The appointed ECO must be independent of the contractor and must be suitably qualified and have experience of environmental monitoring and control on similar scale projects within sensitive environments. The holder must provide the name and contact details of the ECO to the Director: Compliance and Monitoring at DEFF.

The responsibilities of the ECO include but are not limited to the following:

- Approve the Method Statement for maintenance work to be undertaken;
- Provide environmental induction training to contractors on site prior to commencing of maintenance/repair work;
- Review, maintenance and update of the EMMP;
- Liaison between the Project Proponent, Contractors, Authorities and other lead stakeholders on all environmental concerns, including the implementation of the EMMP;
- Compilation of Environmental Control Report/s (ECR) to ensure compliance with the EMMP. Reports should be submitted to the relevant authority on completion of specific repair/maintenance activities;
- Monitor compliance with this EMMP;
- Monitor implementation of the mitigation and rehabilitation measures and recommendations referred to in Approved Method Statements, participating specialists and this EMMP.
- Recommend the issuing site instructions to the Contractor for corrective actions required (formal site instructions are to be issued by the Engineers Representative with input from the ECO);
- The ECO must inspect the site during site establishment and preparation.
- ECO site inspections must be undertaken regularly;
- Attendance of monthly contractors site meetings (if applicable);
- Maintain a record of environmental incidents (e.g. spills, impacts, legal transgressions etc.) as well as corrective and preventative measures taken. This information must also be included in the ECR;
- Maintain a public complaint register in which all complaints and action taken / responses must be recorded. This information must also be included in the ECR;
- Keep Record of all activities on site, problems identified, transgressions noted, and a task schedule of tasks undertaken by the ECO; and
- Engineers Representative on advice from the ECO, has the authority to stop work on site if he / she consider that any actions of excessive non-compliance of the EMMP, or General Duty of Care are taking place.

11.2.1 ECO competency

The ECO must have a minimum of a tertiary level qualification in the natural sciences field, as well as at least 3 years' experience and proven competency as an ECO, preferably with experience on similar work experience on coastal areas. The ECO may be supported by an environmental site officer (ESO) if sufficient experience working in estuarine environment is established by the ECO.

11.2.2 Frequency of ECO inspections

- All maintenance work that will impact on **tidal zone** must be monitored by a suitably experienced ECO on a **daily basis**.
- Maintenance work that does not involve working within the tidal zone must be monitored by a suitably experienced ECO on a **weekly basis**.

12. GENERAL MAINTENANCE PHASE ENVIRONMENTAL MANAGEMENT

12.1 WATER SUPPLY

The contractor must ensure a legitimate supply of water is available on site for sanitation, drinking, dust suppression etc.

12.2 TRANSPORT & TRAFFIC MANAGEMENT

The additional construction traffic associated with the interventions will be minimal. All construction vehicles must access the site via the existing road network.

The contractor is responsible for ensuring that the access roads are maintained and restored to the pre-construction condition once construction is complete.

12.3 CONCRETE MANAGEMENT

Proper concrete management is of utmost importance. Concrete works are likely to be limited, however, the following requirements in terms of concrete management should take place.

Cement powder has a high alkaline pH that may contaminate and adversely affect both soil pH and water pH negatively. A rapid change in pH can have consequences on the functioning of soil and water organisms, as well as on the botanical component.

Mass batching of concrete on site should be limited as far as possible and may under no circumstances take place within 60m of the estuary.

Where small batching of concrete or plaster takes place on site, the following must be implemented:

- Concrete batching may only take place in areas approved by the ECO (preferably in the Site Camp);
- Mobile cement mixers may be used on condition that the ECO approves the site-specific conditions;
- Concrete mixing areas must have bund walls or a settling pond in order to prevent cement run off;
- Once the settling ponds dry out, the concrete must be removed and dispatched to a suitable disposal site.

- If an area outside of the site camp is identified for batching it must first be approved by the ECO and all topsoil must be stripped and stockpiled for re-use.

12.4 MANAGEMENT OF ARCHAEOLOGICAL RESOURCES

Should any archaeological and/or paleontological remains, including (but not limited to) fossil bones, fossil shells, coins, indigenous ceramics, colonial ceramics, marine shell heaps, stone artefacts, bone remains, rock art, rock engravings and any antiquity be discovered during construction, the ECO should safeguard these (preferably *in situ*) and report the find immediately to the South African Heritage Resources Council (SAHRA) and Heritage Western Cape, so that they are not disturbed further until the necessary guidance and approval have been obtained and the appropriate action (*e.g.* recording, sampling or collection) can be taken by a professional archaeologist or palaeontologist.

12.5 NOISE MANAGEMENT

Although maintenance noise is likely to be limited, the following noise management requirements are applicable to the construction phase of the interventions.

- It is recommended that noise generation be kept to a minimum and that construction activities be confined to normal working hours (08:00 - 17:00 on workdays). Should the Contractor / Engineer wish to deviate from these work hours, this must be discussed during the Pre-Construction / Initial Environmental Compliance Workshop with the ECO and recorded in the necessary Method Statements;
- Provide baffle and noise screens on noisy machines as necessary;
- Provide absorptive linings to the interior of engine compartments;
- Ensure machinery is properly maintained (fasten loose panels, replace defective silencers);
- Switch off machinery immediately when not in use; and
- Reduce impact noise by careful handling.

12.6 STORM WATER AND EROSION MANAGEMENT

Best practice in terms of stormwater and erosion management must be adopted and implemented by the contractor.

- Precautions should be taken to avoid excessive disturbance and re-vegetation must take place as soon as possible after construction to avoid water and wind erosion;
- The concentration of storm water run-off must be avoided at all costs and the necessary engineering provisions must be kept in place throughout the maintenance and installation phases to prevent erosion;
- Any erosion channels that develop during the maintenance period must be backfilled and compacted and the areas restored to a proper condition within one month of installation/maintenance being completed.

12.7 FIRE MANAGEMENT AND PROTECTION

The following points must be considered with regards to fire protection on site:

- Fires should only be allowed within fire-safe demarcated areas within the site camp (which is situated away from the vegetated area);
- No fuel wood collection is be allowed on-site;
- Cigarette butts may not be thrown around but must be disposed of correctly. The contractor, with input from the ECO, must designate smoking areas (in compliance with the Tobacco Products Control Amendment Act 63 of 2008) with suitable receptacles for disposal;
- In case of an emergency, the contact details of the local fire and emergency services must be readily available;
- Contractors must ensure that basic firefighting equipment and suitably qualified/experienced personal are available on site at all times, as per the specifications defined by the health and safety representative / consultant;
- The fire risk on site is a point of discussion that must take place as part of the pre-construction compliance workshop and the environmental induction training prior to commencement of construction; and
- The contractor must also comply with the requirements of the Occupational Health and Safety Act with regards to fire protection.

12.8 SANITATION DURING CONSTRUCTION

Portable chemical ablution facilities must be made available for the use by construction staff for the duration of the maintenance works. The following must be implemented in this regard:

- Toilet and washing facilities must be available to the site personnel at all times;
- These facilities must be situated within the site camp off the beach and above the high-water mark;
- One toilet for every 15 personnel is required or in the event that work areas are isolated a toilet must be provided at such isolated areas irrespective of the number of people that work at that particular location at any one time;
- The facilities must be serviced on a regular basis to prevent any overflow or spillage;
- The servicing contractor must dispose of the waste in an approved manner (e.g. via the waste water treatment system);
- The ECO must be provided with the service providers' details and the service schedule for the site;
- The toilets must be secured to ensure that they do not blow over in windy conditions;
- In the event of any potential flooding the portable toilet(s) closest to the intake/discharge work locations must be removed and reinstalled once the runoff has subsided;

- All toilet facilities must be removed from site on completion of the contract period, and;
- Should the construction period be interrupted by a builder's break, the toilets must be emptied prior to the break and where necessary removed from site.

12.9 FUEL STORAGE

The above ground storage of fuel is subject to authorization in terms of the National Environmental Management Act (NEMA EIA regulations) if more than 30m³ is stored on site at any one time.

No fuel may be stored within the work area. Fuel may be stored in a site camp, but subject to the following:

- Temporary fuel storage must take place within the contractors site camp in an area approved by the ECO;
- No storage of fuel may take place on any other portion of the site;
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up immediately in the appropriate manner, as related to the nature of the spill.
- Mobile fuel units used to refuel plant on site must make use of drip trays when refuelling;
- Storage facilities may not be located within 60m of the watercourse or where there is a potential for any spilled fuel to enter a watercourse or groundwater;
- Fuel storage facilities must be located on flat ground. No cut and fill may take place immediately on or adjacent to fuel storage areas;
- All storage tanks must be double lined and be ISO 9001 certified;
- All storage tanks must be enclosed by bund walls;
- Bund walls must be constructed to contain at least 110% of the total capacity of the storage tanks;
- Bund walls must be constructed of impermeable material or lined to ensure that petroleum products cannot escape;
- A suitable material must be placed in the base of the bund walls to soak up any accidental spillages;
- The tanks must be locked and secured when not in use;
- Automatic shut-off nozzles are required on all dispensing units;
- Storage tanks must be drained within one week of completion of activities (only unused fuel can be used by the contractor on other work sites or returned to the supplier). If the construction program extends over the builder's shutdown, the contractor must ensure that storage tanks are emptied prior to this period;
- All storage tanks, containers and related equipment must be regularly maintained to ensure safe storage and dispensing of material. The Engineer is to sign off on the condition and integrity of the storage tanks;
- Defective hoses, valves and containment structures must be promptly repaired;

- Vehicle and equipment fuelling must be undertaken on a hard-impermeable surface, over drip pans or bund walls to ensure spilled fuel or toxic liquids is captured and cleaned up, and;
- The area must be totally rehabilitated on completion of the contract and all contaminated material must be carefully removed and disposed of at a licensed dumping site for that purpose.

12.10 WASTE MANAGEMENT

12.10.1 Litter management

Wind and scavenger proof bins must be installed at the Contractor Site Camp and if necessary, at the site close to the intake and discharge positions, and must be emptied on a weekly basis.

12.10.2 Rubble and Waste

Due to the nature of the works, maintenance rubble will be minimal. All rubble must be disposed of at an approved site established and registered for this purpose.

12.10.3 Hazardous Waste

No hazardous waste may be temporarily stored or disposed of on site.

12.11 ALIEN PLANT MANAGEMENT

The alien vegetation management plan compiled by Credo Environmental Services (copy attached) must be implemented as part of ongoing maintenance.

13. CLOSURE & DECOMMISSIONING PHASE ENVIRONMENAL MANAGEMENT

It is unlikely that the existing infrastructure will be decommissioned.

Appendix 5 of Regulation 982 of the 2014 EIA Regulations contains the required contents of a Closure Plan. The table below shows the minimum requirements for a closure plan. TIHOA must ensure that the closure plan complies with these requirements as well as any other legislative requirements that may come into effect during the lifecycle of the project.

Table 5: Legislative requirements for a closure plan.

Requirement
(1) A closure plan must include -
(a) Details of - (i) The EAP who prepared the closure plan; and (ii) The expertise of that EAP.
(b) Closure objectives.
(c) Proposed mechanisms for monitoring compliance with and performance assessment against the closure plan and reporting thereon.
(d) Measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity and associated closure to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development including a handover report, where applicable.
(e) Information on any proposed avoidance, management and mitigation measures that will be taken to address the environmental impacts resulting from the undertaking of the closure activity.
(f) A description of the manner in which it intends to – (i) Modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation during closure; (ii) Remedy the cause of pollution or degradation and migration of pollutants during closure. (iii) Comply with any prescribed environmental management standards or practises; or (iv) Comply with any applicable provisions of the Act regarding closure.
(g) Time periods within which the measure contemplated in the closure plan must be implemented.
(h) The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of closure.
(i) Details of all public participation processes conducted in terms of regulation 41 of the Regulation, including – (i) Copies of any representations and comments received from registered interested and affected parties; (ii) A summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments; (iii) The minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants; (iv) Where applicable, an indication of the amendments made to the plan as a result of public participation processes conduction in terms of regulation 41 of these Regulations.

Requirement
(j) Where applicable, details of any financial provisions for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts.

14. MONITORING AND AUDITING

- A completion report must be compiled and submitted to the DEFF 30-days after repairs works have been concluded.
- Compliance with the EMMP must be audited annually and the report submitted to the Department of Environmental Affairs & Development Planning.
- Each non-compliance incident report must be issued to the relevant person(s), so that the appropriate corrective and preventative action is taken within an agreed upon timeframe.

Appendix 7 of Regulation 982 of the 2014 EIA Regulations contains the required contents of an Environmental Audit Report. The table below shows the legislated requirements of an audit reports, and all relevant environmental audits undertaken as part of this development (during construction and operation) should comply with these requirements.

Table 6: Contents of an audit report

(1) An Environmental audit report prepared in terms of these Regulations must contain:
(a) Details of – (i) The independent person who prepared the environmental audit report; and (ii) The expertise of independent person that compiled the environmental audit report.
(b)Details of – (i) The independent person who prepared the environmental audit report; and (ii) The expertise of independent person that compiled the environmental audit report.
(c) A declaration that the independent auditor is independent in a form as may be specified by the competent authority.
(d) An indication of the scope of, and the purpose for which, the environmental audit report was prepared.
(e) A description of the methodology adopted in preparing the environmental audit report.
(f) An indication of the ability of the EMPr, and where applicable the closure plan to –

(i) Sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an on-going basis; (ii) Sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the closure of the facility; and (iii) Ensure compliance with the provisions of environmental authorisation, EMPr, and where applicable, the closure plan.
(g) A description of any assumptions made, and any uncertainties or gaps in knowledge.
(h) A description of a consultation process that was undertaken during the course of carrying out the environmental audit report.
(i) A summary and copies of any comments that were received during any consultation process
(j) Any other information requested by the competent authority.

15. HEALTH AND SAFETY

The Occupational Health and Safety Act (No. 85 of 1993) aims to provide for / ensure the health and safety of persons at work or in connection with the activities of persons at work and to establish an advisory council for occupational health and safety.

The main Contractor must ensure compliance with the Occupational Health and Safety Act, as well as that all subcontractors comply with the Occupational Health and Safety Act.

The following is of key importance (Section 8 of the aforesaid Act):

General duties of employers to their employees

(1) *Every employer shall provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of his employees.*

(2) *Without derogating from the generality of an employer's duties under subsection (1), the matters to which those duties refer include in particular-*

(a) *the provision and maintenance of systems of work, plant and machinery that, as far as is reasonably practicable, are safe and without risks to health;*

(b) *taking such steps as may be reasonably practicable to eliminate or mitigate any hazard or potential hazard to the safety or health of employees, before resorting to personal protective equipment;*

(c) *making arrangements for ensuring, as far as is reasonably practicable, the safety and absence of risks to health in connection with the production, processing, use, handling, storage or transport of articles or substances;*

(d) *establishing, as far as is reasonably practicable, what hazards to the health or safety of persons are attached to any work which is performed, any article or substance which is produced, processed, used, handled, stored or transported and any plant or machinery which is used in his business, and he shall, as far as is reasonably practicable, further establish what precautionary measures should be taken with respect to such work, article, substance, plant or machinery in order to protect the health and safety of persons, and he shall provide the necessary means to apply such precautionary measures;*

(e) *providing such information, instructions, training and supervision as may be necessary to ensure, as far as is reasonably practicable, the health and safety at work of his employees;*

(f) *as far as is reasonably practicable, not permitting any employee to do any work or to produce, process, use, handle, store or transport any article or substance or to operate any plant or machinery, unless the precautionary measures contemplated in paragraphs (b) and (d), or any other precautionary measures which may be prescribed, have been taken;*

(g) *taking all necessary measures to ensure that tire requirements of this Act are complied with by every person in his employment or on premises under his control where plant or machinery is used;*

(h) *enforcing such measures as may be necessary in the interest of health and safety;*

(i) *ensuring that work is performed and that plant or machinery is used under the general supervision of a person trained to understand the hazards associated with it and who have the authority to ensure that precautionary measures taken by the employer are implemented; and*

(j) *causing all employees to be informed regarding the scope of their authority as contemplated in section 37 (1) (b).*

16. NON-COMPLIANCE

Should any person commit an action of non-compliance he/she may be convicted of an offence, in terms of Sub-regulation (1) of the National Environmental Management Act, to imprisonment for a period not exceeding two years or to a fine not exceeding an amount prescribed in terms of the Adjustment of Fines Act, 1991 (Act No. 101 of 1991).

Apart from a fine resulting from any legal mechanism, the ECO may advise the ER to impose a penalty for non-compliance in terms of this Environmental Management Programme (EMMP). The procedure detailed below is for a spot fine in terms of this EMMP and does not detail the procedure for fining in terms of any other legal mechanism.

16.1 PROCEDURES

The contractor shall comply with the environmental specifications and requirements of this EMMP, and Section 28 of NEMA, on an on-going basis and any failure on his part to do so will entitle the ER to impose a penalty.

In the event of non-compliance the following recommended process shall be followed:

- The ECO shall issue a notice of non-compliance to the ER, stating the nature and magnitude of the contravention. A copy shall be provided to the Project Developer / Proponent.
- The ER will issue this notice to the Contractor.
- The Contractor shall act to correct the transgression within the period specified by the ER.
- The Contractor shall provide the ER with a written statement describing the actions to be taken to discontinue the non-compliance, the actions taken to mitigate its effects and the expected results of the actions. A copy shall be provided to the Project Developer / Proponent.
- In the case of the Contractor failing to remedy the situation within the predetermined time frame, the ER shall impose a monetary penalty (spot fine) based on the conditions of contract.
- Should the transgression be a blatant disregard of conditions of the EMMP or CWDP, the ER (on advice from the ECO) can at their discretion immediately issue a fine and require the remediation (without first giving the contractor a chance to remediate)
- In the case of non-compliance giving rise to physical environmental damage or destruction, the ER shall be entitled to undertake or to cause to be undertaken such remedial works as may be required to make good such damage and to recover from the Contractor the full costs incurred in doing so.
- In the event of a dispute, difference of opinion, etc. between any parties in regard to or arising out of interpretation of the conditions of the EMMP, disagreement regarding the implementation or method of implementation of conditions of the EMMP or CWDP etc. any party shall be entitled to require that the issue be referred to specialists for determination.
- The ER on advice from the ECO shall at all times have the right to stop work and/or certain activities on site in the case of non-compliance or failure to implement remediation measures.

16.2 OFFENCES AND PENALTIES

Any avoidable non-compliance with the conditions of the EMPR shall be considered sufficient ground for the imposition of a penalty by the Engineer

Possible offences, which should result in the issuing of a contractual penalty, include, but are not limited to:

- Unauthorised entrance into no-go areas;

- Catching and killing of wild animals, and removal or damage to conservation-worthy plant species;
- Open fires outside of the contractor camp site and insufficient fire control;
- Unauthorised damage to natural vegetation;
- Unauthorised camp establishment (including stockpiling, storage, etc.);
- Hydrocarbons / hazardous material: negligent spills / leaks and insufficient storage;
- Ablution facilities: non-use, insufficient facilities, insufficient maintenance;
- Insufficient solid waste management (including clean-up of litter, unauthorised dumping etc.;
- Erosion due to negligence / non-performance;
- Excessive cement / concrete spillage / contamination;
- Non-induction of staff.

17. CONCLUSION

This EMMP is submitted as a voluntary maintenance management play by the Thesen Islands Homeowners Association (TIHOA). The overall development has prior Environmental Authorisation (EA) and ongoing maintenance involves working below the high tide level within the Knysna Estuary.

TIHOA wishes to obtain approval from the DEFF for continued maintenance work on structures and infrastructure that are already implemented in terms of the EA. None of the maintenance activities will trigger any 'listed activities' as they are all in furtherance of authorised activities that commenced in 1999.

The specific maintenance activities stipulated in this EMMP stems forth from an Authority Meeting held between SanParks, the DEFF and the Provincial DEADP, held at the outset of the process. The EMMP has been subjected to public participation and input received during the stipulated commenting period has been noted and reflected in this document albeit that no objections were received.

This EMMP does not replace any of the other environmental approvals/plans applicable to Thesen Islands development, but rather serves as an additional measure to ensure environmental best practice.

The maintenance activities are not invasive in nature and will be supervised and monitored by an Environmental Control Officer (ECO) for all work within the littoral active zone.

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