SHELL AND BP REFINERIES PTY. LTD.

SAPREF SINGLE BUOY MOORING (SBM) PIPELINE

ENVIRONMENTAL MAINTENANCE MANAGEMENT PLAN

13 FEBRUARY 2020

DRAFT

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WAIVER

Purpose and basis of preparation of this Report.

This SBM Pipeline Environmental Maintenance and Management Plan has been prepared by WSP Environmental Proprietary Limited (WSP) on behalf and at the request of Shell and BP Refineries (Pty) Ltd, to provide the Client an understanding of the Relevant Documents.

Unless otherwise agreed by us in writing, we do not accept responsibility or legal liability to any person other than the Client for the contents of, or any omissions from, this Report.

To prepare this Report, we have reviewed only the documents and information provided to us by the Client or any third parties directed to provide information and documents to us by the Client. We have not reviewed any other documents in relation to this Report and except where otherwise indicated in the Report.

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LIST OF ACRONYMS

ACRONYM	DESCRIPTION
AMSOL	African Marine Solutions
AHT	Anchor Handling Tug
BA	Basic Assessment
BMSL	Below Mean Sea Level
CLF	Community Liaison Forum
DEA	Department of Environmental Affairs
DMA	Dead Man Anchor
DPOs	Dynamic Positioning Operators
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EDTEA	Environmental Department of Tourism and Environmental Affairs
EIA	Environmental Impact Assessment
ESI	Environmental Sensitivity Index
GVI	General Visual Inspection
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IDMS	Inspection Data Management System
IMCA	International Marine Contractors Association
MDC	Marine Data Consultants
MFE	Mass Flow Excavation
MMP	Maintenance and Management Plan
MUCH	Marine Underwater Cultural Heritage
NAL	National Action List
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEM:ICMA	National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008)
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NHRA	National Heritage Resources Act, 1999
NOAA	National Oceanic and Atmospheric Administration
NWA	National Water Act, 1998 (Act No. 36 of 1998)
OGP	International Association of Oil and Gas Producers
OHSA	Occupational Health and Safety Act
PAHs	Poly-aromatic hydrocarbons

PLEM	Pipeline End Manifold
PPE	Personal Protective Equipment
ROV	Remotely Operated underwater Vehicle
SAHRA	South African National Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SAMSA	South African Maritime Safety Authority
SAPREF	South African Petroleum Refineries
SBM	Single Buoy Mooring
SPM	Scour Protection Mattress
TOC	Total Organic Compounds
TSS	Total Suspended Solids
VLCC's	Very Large Crude Carriers
WSP	WSP Environmental (Pty) Ltd.

GLOSSARY OF TERMS

TERM	DESCRIPTION
Can Buoy	Cylindrical, unlighted buoy used as a marker at sea.
Cross-Hauled	Loading device consisting of a chain having each end fastened to opposing sides of a vehicle.
Dead man anchor	Anchor with 76mm Chain connected to a 65m 28mm Pennant wire connected to a Floating Can Buoy.
Deck Winch	Deck winch is an important deck machinery designed for different purposes, such as anchoring, mooring, towing as well as lifting and pulling heavy objects onto the boats. As the name suggests, it is installed on decks of sea going vessels (Smit Siyanda – Siyakhula - Sibanya. The Dolphin.).
Hawsers	15inch Lankhorst mooring hawsers for tanker mooring.
Hydraulic winch	Lebus 10 ton hydraulic winch on the SBM for anchor leg tensioning.
Moorings	Either 76mm Mooring Rope for Smit Siyanda 4-point mooring Spread or The “SBM Mooring Hawsers”.
Over boarded	From a ship into the water.
Payout	Slacking rope or chain in a controlled manner.
Pennant	65m of 28mm Pennant wire.
Pigging	In pipeline transportation, pigging is the practice of using devices known as pigs or scrapers to perform various maintenance operations. This is done without stopping the flow of the product in the pipeline.
ROV	Remotely operated underwater vehicle - a tethered underwater mobile device with cameras or tools if required.
ROV Shackle	Hydraulic release shackles are used for lifting and positioning structures both subsea as. It can be remotely operated via a Hydraulic powerpack or by ROV.
Sheave	Roller on the SBM 15 Ton Sheave Block for anchor leg tensioning.
Sheave Block	SBM 15 Ton Sheave Block for anchor leg tensioning.
Winch wire	110m 28mm SBM Winch wire.

1 INTRODUCTION

1.1 BACKGROUND

Crude oil is imported to South Africa via the Single Buoy Mooring (SBM) which is located in the Indian Ocean about 2.5km east of the SAPREF Refinery, Isipingo, South Durban. It is connected the refinery storage tanks by a subsea pipeline 48" in diameter and 2.5 km in length. The SBM is attended by an average of 36 Very Large Crude Carriers (VLCC's) (2 million barrels of crude oil) and 60 LR3 (1 million barrels of crude oil) oil tankers on an annual basis that offload their cargo to be processed by participating refineries. The area around the SBM and pipeline is a designated Restricted Area for vessels and there is strict control over vessels approaching and departing the SBM (national key point). The SBM is co-owned by 5 parties; Shell (26%), Engen (26%), BP (26%), Sasol Oil (16%) and Total (6%). Shell and BP South African Petroleum Refineries (SAPREF) manages and operates the SBM system on behalf of the SBM owners. African Marine Solutions (AMSOL) provides the day-to-day services to the SBM such as pilotage, diving and execution of maintenance activities.

Inspections of the SBM subsea pipeline undertaken by SAPREF since October 2006 identified a trend of seabed erosion by approximately 2m and sand migration as the root cause of uneven pipeline settlement and localised pipeline bending over a span of approximately 600m between 1.4 and 2km from the Pipeline End Manifold (PLEM). This has resulted in an increased risk that the pipeline could fail as a result of high stresses.

WSP Environmental (Pty) Ltd. (WSP) was appointed by SAPREF to facilitate the necessary environmental authorisation (EA) for proposed stabilisation of the SBM pipeline. The Environmental Department of Tourism and Environmental Affairs (EDTEA) requested that a motivation be submitted to confirm interpretation that the proposed stabilisation activities can proceed on approval of a Maintenance and Management Plan (MMP); and, as such would not trigger a listed activity as per the 2014 Environmental Impact Assessment (EIA) Regulations in effect at the time. The motivation was accepted in writing by the EDTEA on 31 July 2017 and the MMP authorised by EDTEA on the 2 May 2018 (MMP/001/2017) (**Appendix A**).

WSP has been appointed by SAPREF to update the MMP and facilitate environmental authorisation for the replacement of chain and anchors securing the SBM. The MMP application was accepted by EDTEA on 9 September 2019 and registered under the reference number DM/MMP/0002/2019 (**Appendix B**).

1.2 SITE LOCATION

The subtidal pipeline enters the sea approximately 1 km north of Isipingo and is used to facilitate the transfer of crude oil between tanker vessels and the shore. The location of the undersea pipeline and sections requiring stabilisation as approved by EDTEA in May 2018 (MMP/001/2017) is shown in **Figure 1**. The location of the undersea pipeline and SBM Buoy 3 where replacement of chains and anchors has been proposed is shown in **Figure 2**. This will take place at water depth of 49m with the following coordinates for Buoy 3 (also referred to as SBM3): 30°00' 28" South; and 30°58' 24" East.

1.3 NEEDS AND DESIRABILITY

The SBM is a national key point with strategic importance. It is the access point/route of approximately 80% of all crude oil imported in South Africa supplying three refineries; SAPREF, Engen and Sasol. Failure to implement measures to stabilise the SBM and replace old chains and anchors will result in increased risk to South Africa's petroleum based energy supply.

A proactive approach to ensuring pipeline integrity is required to avoid environmental damages and health risks.

1.4 PURPOSE OF THE ENVIRONMENTAL MAINTENANCE MANAGEMENT PLAN

A "maintenance and management plan" is defined by the National Environmental Management Act (107 of 1998) 2014 Environmental Impact Assessment (EIA) Regulations, as amended, as "a management plan for maintenance purposes defined or adopted by the competent authority". Similarly, Maintenance is defined as "actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint".

The objectives of this Environmental MMP are to:

- Identify the environmental aspects for the stabilisation of the SBM pipeline (as per the current proposal) as well as for future stabilisation activities;
- Identify the environmental aspects for replacement of anchor and chains (as per the current proposal) as well as for future anchor replacement activities;
- Define the mitigation measures necessary to manage the environmental aspects and/or mitigate potential impacts as far as is reasonably practicable; and,
- Describe the governance framework for the implementation of the MMP and the monitoring of performance.

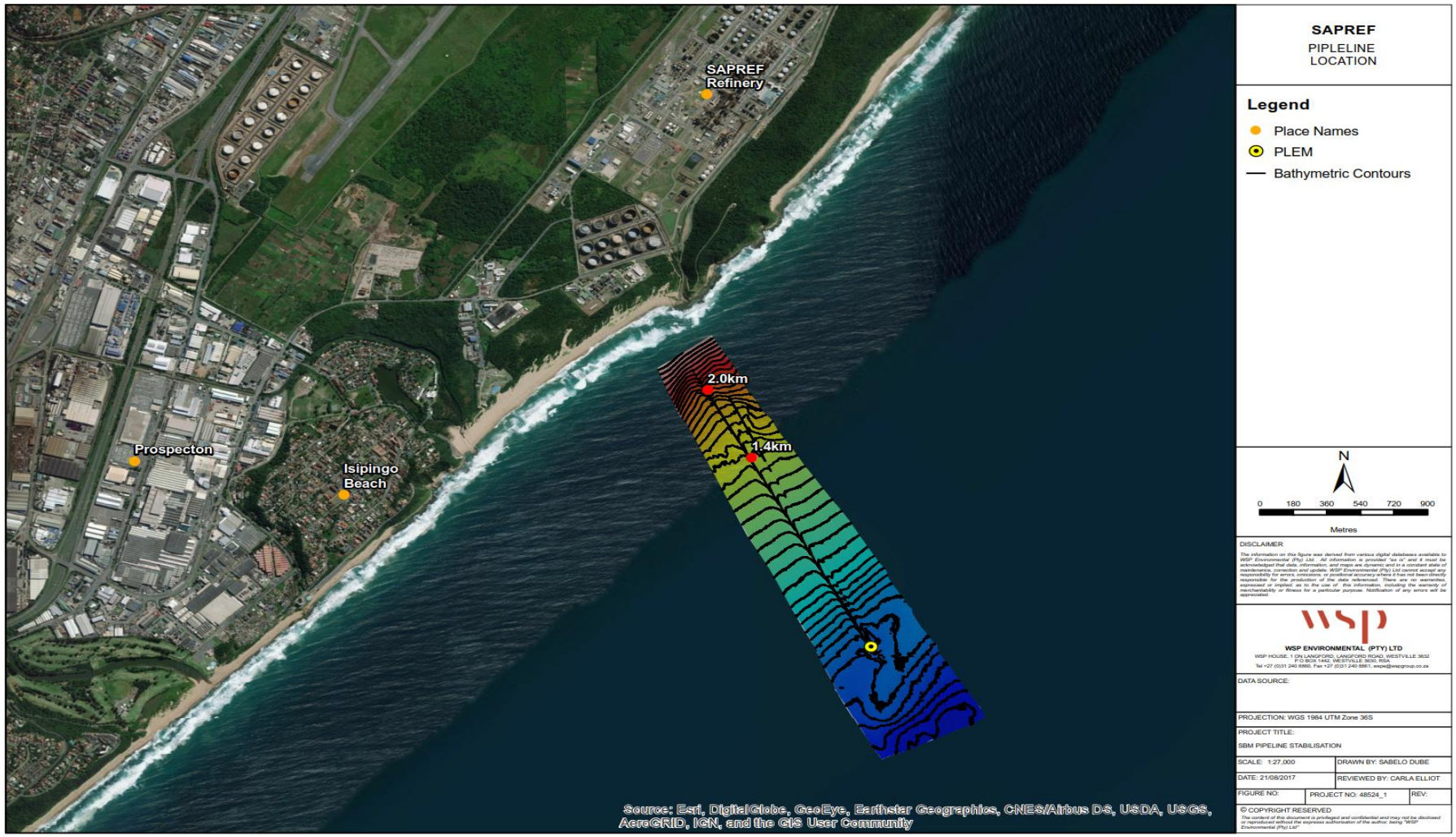


Figure 1: SBM Pipeline Location illustrating 600m section requiring stabilisation between 1.4km and 2km from PLEM (Source: SAPREF, 2017).

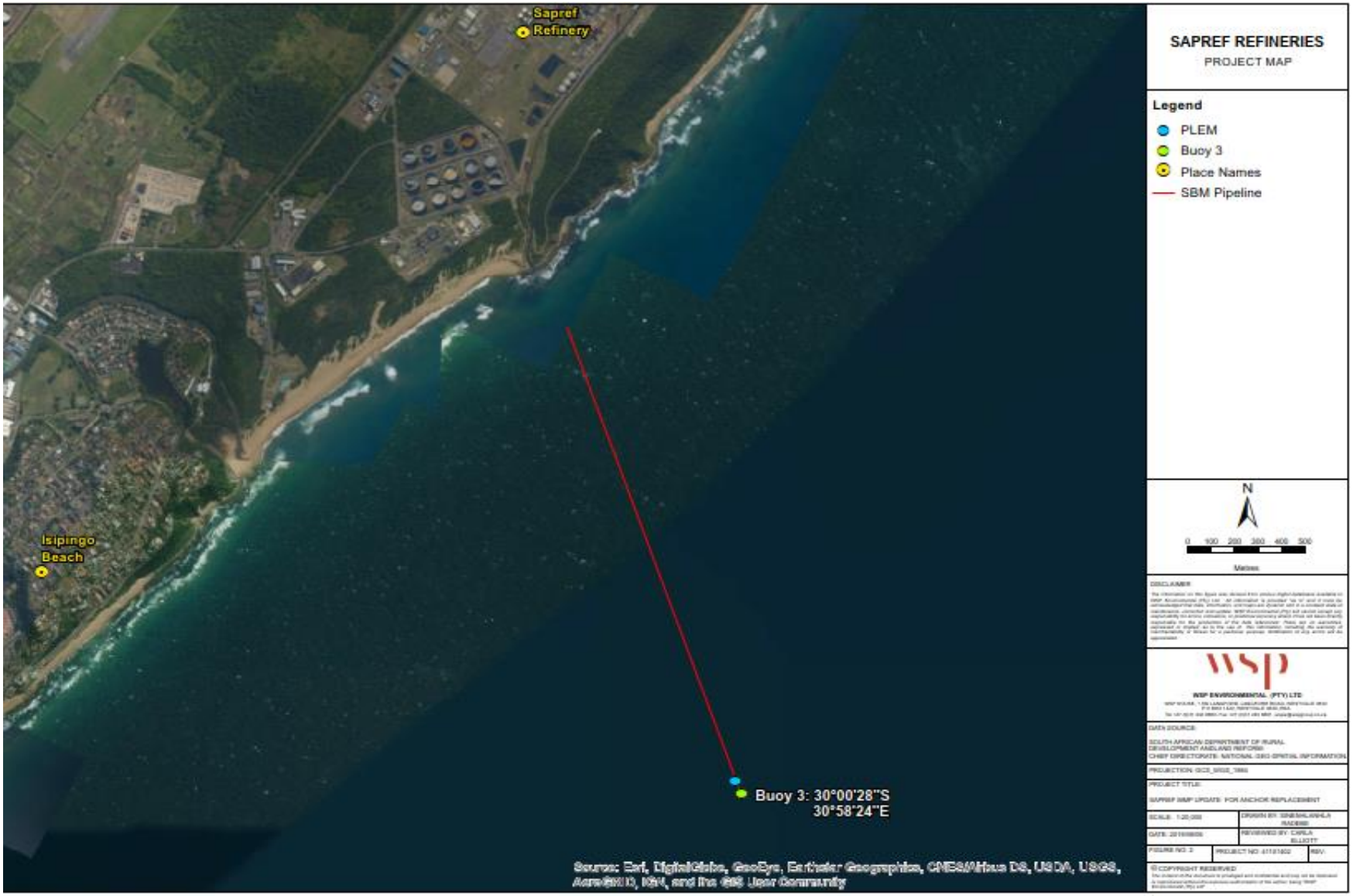


Figure 2 SBM Pipeline Location illustrating location of Buoy 3 where chains and anchors are proposed for replacement (Source: WSP, 2019)

2 DESCRIPTION OF MAINTENANCE AND MANAGEMENT ACTIVITIES

2.1 DESCRIPTION OF THE SBM STABILISATION ACTIVITIES

Section 2.1.1 below describes the prevailing conditions at the time of preparing the MMP, which warrant the stabilisation of a section of the pipeline between 1.4 and 2km from the Pipeline End Manifold (PLEM); as well as the proposed technical method for stabilisation.

It is conceivable that additional stabilisation of the SBM may be required in the future. This MMP applies to such future activities on the basis that the same technical method is adopted.

2.1.1 SITUATIONAL ANALYSIS

During November 2016 Marine Data Consultants (MDC) was contracted by SAPREF to conduct a geophysical investigation of the two pipelines connecting the SBM south of Durban to the SAPREF refinery. The geophysical data showed that the southern (new) pipeline is exposed for approximately 96% of its length. In the nearshore zone from approximately -12m and shallower, the pipeline is buried at an average depth of 0.67m (Rigg et al. 2016). An accretionary mound has accumulated on the southern side of the pipeline, while a pronounced scour moat has developed along the northern side. Although no breakages or unsupported sections were observed, these may result should the pipeline be left in its current state.

Figure 3 depicts sediment erosion in blue and accretion in brown shading. There are two notable zones along the southern pipeline where up to 1.5m of sediment has accumulated immediately adjacent to the erosion of 2m of sediment. The other notable trend is the linear zone of erosion immediately adjacent to the northern margin of the inshore southern pipeline and to a lesser extent the northern pipeline.

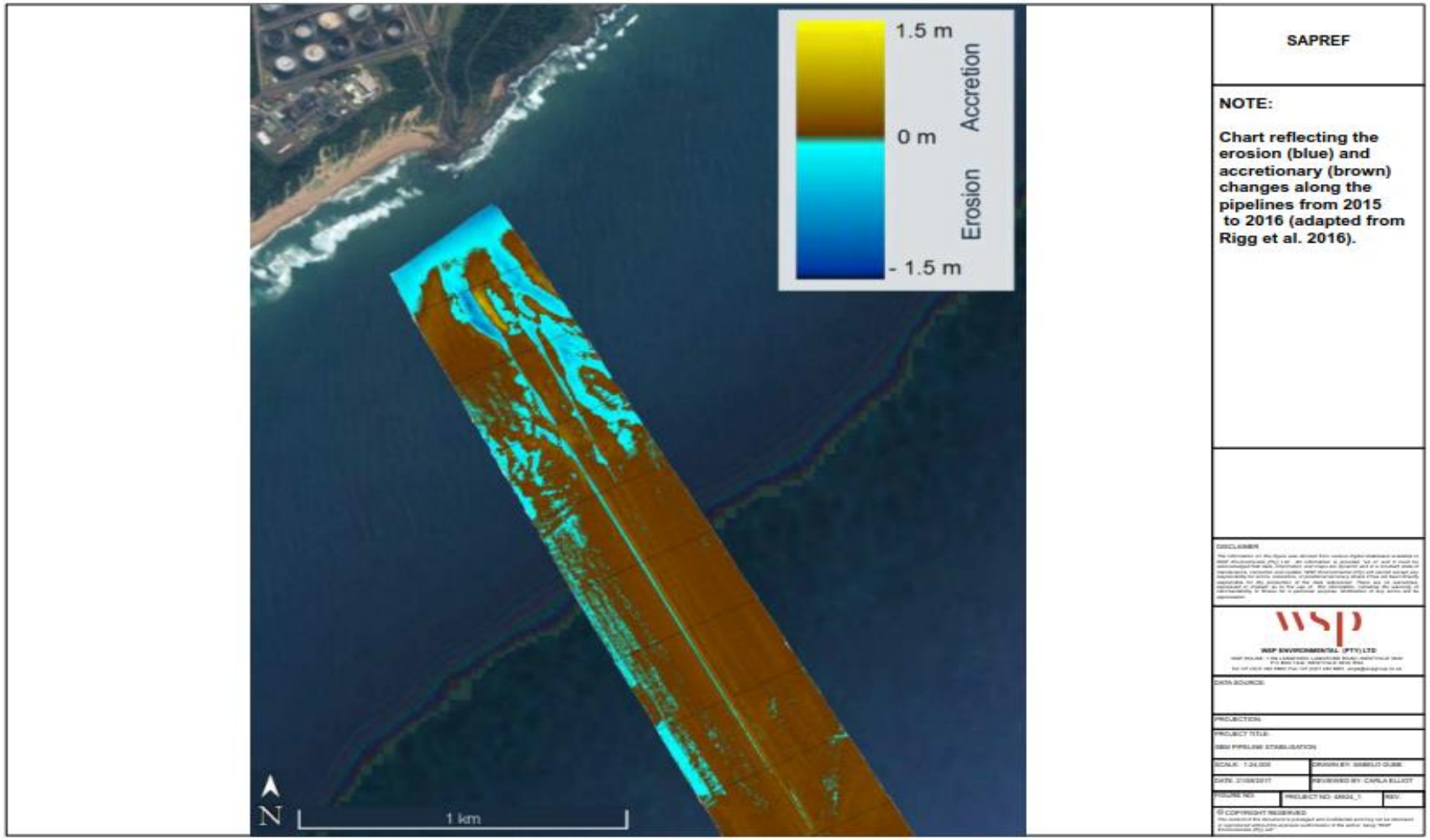


Figure 3: Erosion and Accretion along the SBM Profile (2015-2016) (Source: SAPREF, 2017)

2.1.2 ALTERNATIVE TECHNICAL METHODS CONSIDERED

The objective of the proposed interventions was to ensure that pipeline integrity remains intact for the remaining duration of the life of the pipeline (i.e. until 2030). A number of alternatives were investigated by Shell (**Table 1**) which resulted in the identification of the preferred option entailing trenching / sand jetting. The trenching will entail lowering the profile of the pipeline to -2 m below current depth. This long-term solution is expected to reduce the stresses currently acting on the pipeline (light blue graph) to below that of the maximum allowable stress load (yellow graph) as indicated in **Figure 3**. A hotspot with high combined stress values from approximately 1 800 to 1 880 m from the PLEM was identified within the 600 m zone earmarked for maintenance. This area is indicated on the graph by the magenta rectangle (**Figure 4**).

Table 1 Alternative Stabilisation Methods Considered

METHOD	DESCRIPTION
Trenching	The pipeline will eventually settle on underlying stable sediment. Unstable sediment is >6m deep underneath the pipeline. Taking no action may erode too much soil away and overstress it due to the ends of the pipeline being held fixed. Hence the do nothing approach is not an option. Trenching will accelerate this process in a controlled manner. This should result in the pipeline being buried under sediment and remove the obstruction of natural sediment pathways. Backfilling can be either natural or artificial.
Mass Flow Excavation (MFE)/sand jetting	Re-alignment of the pipeline by removing sediment beneath the pipe at hotspot areas to accelerate pipeline settlement in a controlled manner. A low pressure, high volume water column is jetted from the MFE tool, which is suspended from a vessel. This will displace sediment around the pipeline to adjacent sandy areas, allowing the pipeline to settle in a controlled manner. Natural sand movement will result in sediment gradually backfilling the trench over time. Local disturbance effects will be experienced around the pipeline.
Mechanical Excavation	Not identified as a feasible option due to the high risk of damaging the pipeline under prevailing metocean conditions.
Rock dumping	Quarried rock or coarse gravel dredged from offshore banks will be dropped over the pipeline for scour protection. These may or may not be contained in large bags called filter units. Filter units and geotextile Filter units are textile nets filled with stones that provide multi-layer protection that reduces local hydrodynamic load on the seabed to protect from scouring and liquefaction. No seabed levelling is required as the units adapt to seabed changes. Synthetic fibres have a high resistance against UV rays with an operational life of greater than 30 years, although the filter unit may become damaged in stormy weather. These structures will provide a habitat for marine life.
Tyre mats/Scour Protection Mattress (SPM)	Recycled car tyres are linked together using polypropylene ropes and placed over the pipeline. The mats trap sediment, preventing lowering of the seabed and enhancing the sediment deposition process. Installed using small vessels and cranes and maintenance free but can become dislodged during severe storm events. Leaching of toxic substances may occur (i.e. zinc and organic substances). Increased zinc concentrations may result in the accumulation of epibiotic organisms.
Frond mats	These mattresses are secured on the seabed by means of rocks or anchors to represent a type of artificial vegetation. Fronds reduce local water particle velocity and turbulence, preventing further erosion and trapping sediments between the fibres to create a sediment bank. Installed using small vessels with cranes and attached to the seabed by divers. Thereafter the structures are maintenance free. These structures are not sufficient to remediate excessive stresses and must be used in conjunction with local dredging.
Granular filter	The area around the pipeline will be dredged and then filled with coarse sediment. A rock/gravel layer is then laid over the top of this to provide scour protection. The introduction of foreign matter may raise additional environmental concerns. This intervention is costly and may require periodic maintenance.
Geo-hook	These are hooks constructed using biodegradable composite. When dumped, they interlock to form a strong framework that reduces local current velocity and accumulates sediment. Hooks may wash away if a big storm event occurs before hooks are properly settled. This technology has to be imported from the Netherlands and poses a potential fishing hazard

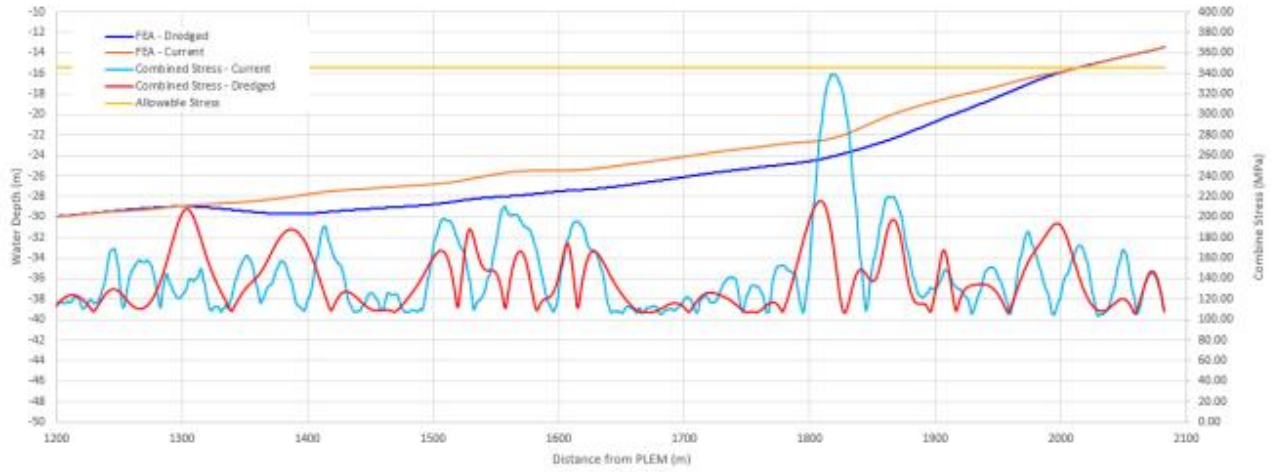


Figure 4: **Combined and allowable stress for the SBM pipeline (adapted from Shell International 2017)**

2.1.3 SELECTION OF THE PREFERRED TECHNICAL METHOD - MASS FLOW EXCAVATION

In the evaluation of the above options by Shell, rock dumping was considered inadvisable as the pipeline will likely keep sinking with the seabed and the rocks could potentially trigger erosion on either side of the berm. Similarly, installation of a frond or tyre mattress will not prevent further sinking and was not considered further. Most alternative options do not remove the hot spot at KP1.8 which is a key priority for remediation activity.

MFE was identified as the most plausible option. It is approximated that a 2m deep and 5-10m wide channel with very gradual slopes (less than 30 degree) will be required on both sides of the pipe. For remedying the entire 600m long section plus two 100m transitions, the volume of sediment disturbed equates to approximately 7000m^3. This will rapidly back fill (within a few months) due to natural mechanism of sand migration in NE direction along the coast.

In response to a concern raised by eThekwini (**Appendix G**), the MMP has been updated to include a 'limits of project' layout which indicates the maximum distance from the pipeline that disturbance of the sea-floor may take place. This includes the area of direct influence / affected zone (5m-10m either side of the affected portion of pipeline).

SAPREF is in the process of evaluating vendor proposals all of which propose MFE using low pressure water jets as the method of excavation. The low pressure jets result in the liquefaction of the sand in the target area which results in the controlled settling (sinking) of the pipeline under its own weight. Some sand is also removed by hydrodynamic forces. This method does not involve any physical contact of equipment with the pipeline or the seabed.

TECHNICAL RISKS

The following two key technical risks were identified as needing to be considered within the MMP. The following section provides rationale on why these potential risks are not considered significant.

CHANGE TO COASTAL PROCESSES

The plan is to introduce no foreign structures or foreign materials on the seabed. The pipeline will naturally lower into the trench created without need for cover or backfill as natural sediment movement shall create a natural backfill.

Should a need be identified to create the backfill during the detailed engineering with the vendor, then only natural material around the pipeline shall be utilised

HAZARDOUS EVENT RISKS

The pipeline shall be flushed clean and sea water filled during the trenching and depressurised in order to avoid potential pollution risks. Diving isolation will then be issued by SAPREF.

Detailed engineering shall be done to define allowable lowering steps per each trench pass.

Real time survey shall be utilised as much as possible to monitor the pipeline during the trenching and assure no local exceedances above the allowable stresses.

After trenching the pipeline shall be pressure tested between the SBM buoy and the tank farm, before re-introducing Hydrocarbons.

Over and above the implementation of the SAPREF SBM Oil Spill Contingency Plan (January 2017) (which complies with the Shell Control Framework), an emergency response plan is required to be prepared within the Method Statement by the execution vendor.

2.1.4 TRIAL AREA

Following the distribution of the draft MMP, SAPREF highlighted the requirement for trial areas:

- The initial trial area (**Figure 5**):
  - The initial trial area is located ~ 300m southwest of the pipeline.
  - To provide for tool set up away from the pipeline in order to avoid accidental damage the pipeline while the tool is being setup (i.e. not dredging the seabed). The proposed location was selected based on representative soil conditions of the actual project area (i.e. pipeline). The Phase II work confirmed the soil conditions are identical over a wide area (including the initial trial area).
  - The trial will disturb the top layer of the seabed, of the order of 0.5m depth. Several runs will be undertaken within the trial area (**Figure 5**). Each run will make a channel of ~2-5 meters wide and around 50m in length by blowing water. The disturbed sand will naturally re-settle nearby. Several of these runs are done as required within the allowed zone. The propose size of the trial area aimed to reduce footprint to a minimum but at the same time not compromise execution as per tool set up requirements.
- The second trial pass on the pipeline itself but away from the stress hot spot regions approximately at KP 1.0.
  - This would be small local excavation, not creating a 2m deep trench. The intent is to confirm response of the combined pipeline and soil system after fluidisation with the MFE tool.

The ecological and Marine Underwater Cultural Heritage (MUCH) specialists, which assessed the potential impacts of the pipeline stabilisation activities, were subsequently informed.

The ecological specialist, Anchor Environmental Consultants, indicated that an additional marine ecology assessment is not required. Location recommendations were provided and included in **Section 5.2**.

The MUCH specialist, Vanessa Maitland recommended that a magnetometer survey of the affected area and diver searches on any magnetic anomalies be undertaken in order to identify potential MUCH sites within the designated initial trial area. SAPREF commissioned Vanessa to undertake the recommended investigation (**Appendix E-2**). Findings and recommendations have been considered in **Section 5.3**.

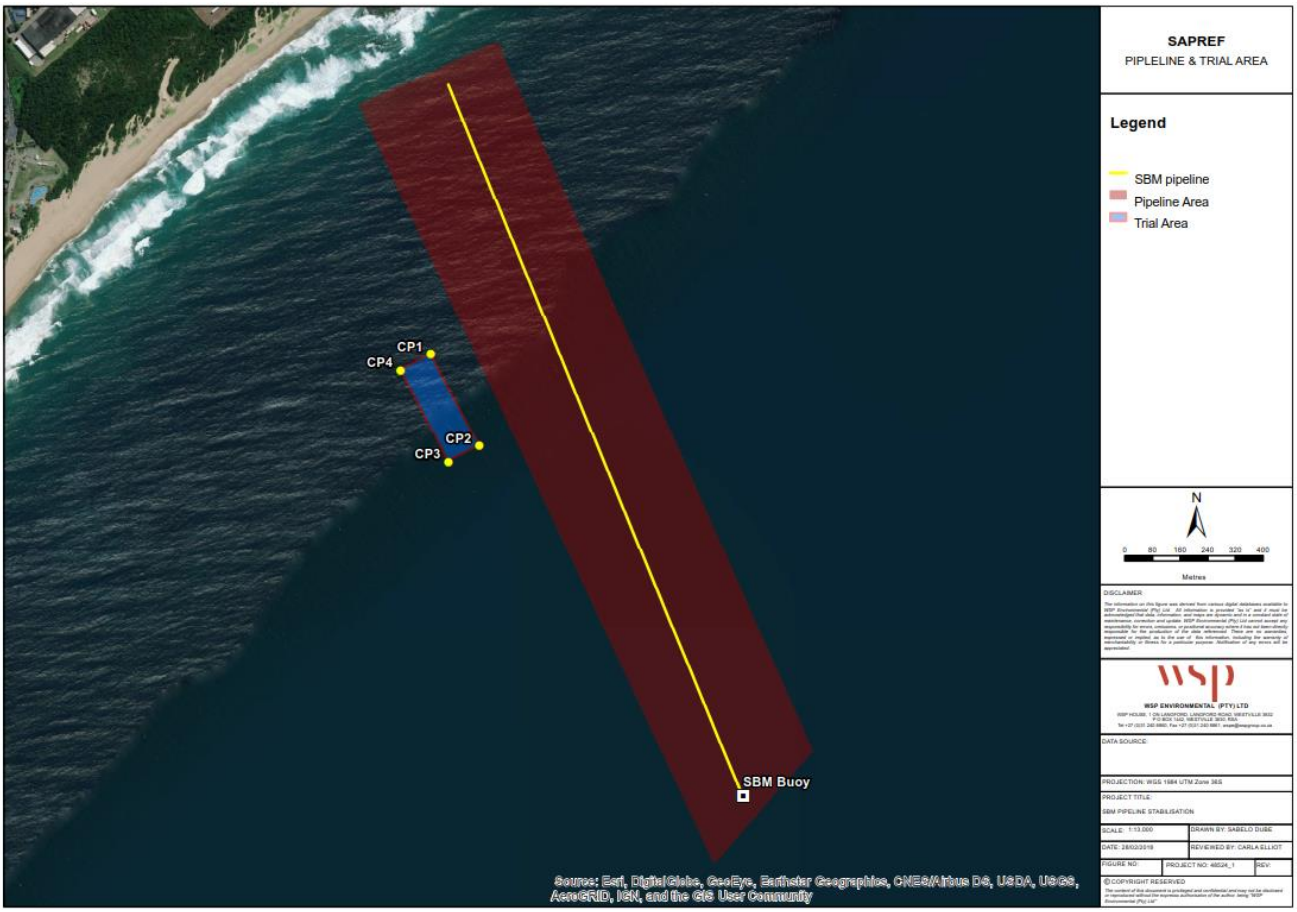


Figure 5 Location of Initial Trial Area for Equipment Testing (WSP, 2018)

2.1.5 ONGOING MAINTENANCE

Due to the possibility that this issue could re-occur at the same or other points along the line due to natural sea processes, a Maintenance and Inspection Strategy has been prepared by SAPREF (Maintenance and Inspection Strategy – SBM Pipeline, Document ID: ASSET.PR.0148, REV. 0, Effective Date 1 August 2017 (**Appendix C-1**)).

The Maintenance and Inspection Strategy outlines the ongoing surveys that will continue to be carried out to provide information about the physical condition of the pipeline with respect to pipeline profile, free-spans and breakages, depth of pipeline burial, and any third party interference. In terms of the Maintenance and Inspection Strategy, surveys will take place every 2 years unless assessment of results indicate frequency change is required. Reports issued from specialised service providers shall be reviewed by the Pipeline Supervisor and Marine Team. If remedial actions are required, these will be planned and executed in a timeframe based on the risk assessment (**Table 2**). All findings will be documented in the SAPREF Annual Report and Inspection Data Management System (IDMS).

Table 2 Maintenance Risk Assessment Guideline

FINDING	ACTION
Scouring of seabed around pipeline	No action. Continue to monitor area in bi-yearly surveys.
Excessive scouring leading to spanning or uneven seabed leading to pipeline instability	Investigate further using Remotely Operated underwater Vehicle (ROV) and determine whether span is within acceptable limits. Otherwise mitigate by dredging or other suitable mitigation option.
Third party interference	Assess damage to pipeline and mitigate as required.

A ROV general visual inspection (GVI) was undertaken in December 2018 by Marine Data Consultants and findings contained in the ROV Installation and Visual Inspection Report of the SAPREF Pipeline and SBM Chains and Anchors, Durban. The ROV GVI (Marine Data Consultants, December 2018) of the active pipeline showed the overall condition of the pipeline to be good, with little marine growth, no free-spans and no exposed coating damage. There were two

bandit straps (and anodes) that may need replacing. Debris and fouling along the length of the active pipeline is negligible, with evidence of backfill from natural marine processes (since the May 2018 trenching) successfully covering the pipeline.

2.2 DESCRIPTION OF CHAIN AND ANCHOR REPLACEMENT

2.2.1 SITUATIONAL ANALYSIS

SAPREF have identified the need to replace the chains and associated anchors that secure the SBM at Buoy 3 (**Figure 6**). The buoy is secured to the seabed by means of eight anchor legs of 3.5" studlink chains. The anchor chains are secured on the SBM buoy by means of manual chain stoppers.

Records show that these chains were last replaced in 1991 – these chains have exceeded their lifespan and there are concerns regarding their integrity. Details regarding the chains are as follows:

— Eight chains ranging between 290 – 340m in length.
— Chains attached to the buoy, and run to the seabed.

Approximately 30% of the chain is visible; the remaining 60 - 70% is buried in the seabed. Each chain is secured by two anchors, which are buried 6 m to 7 m below the seabed.

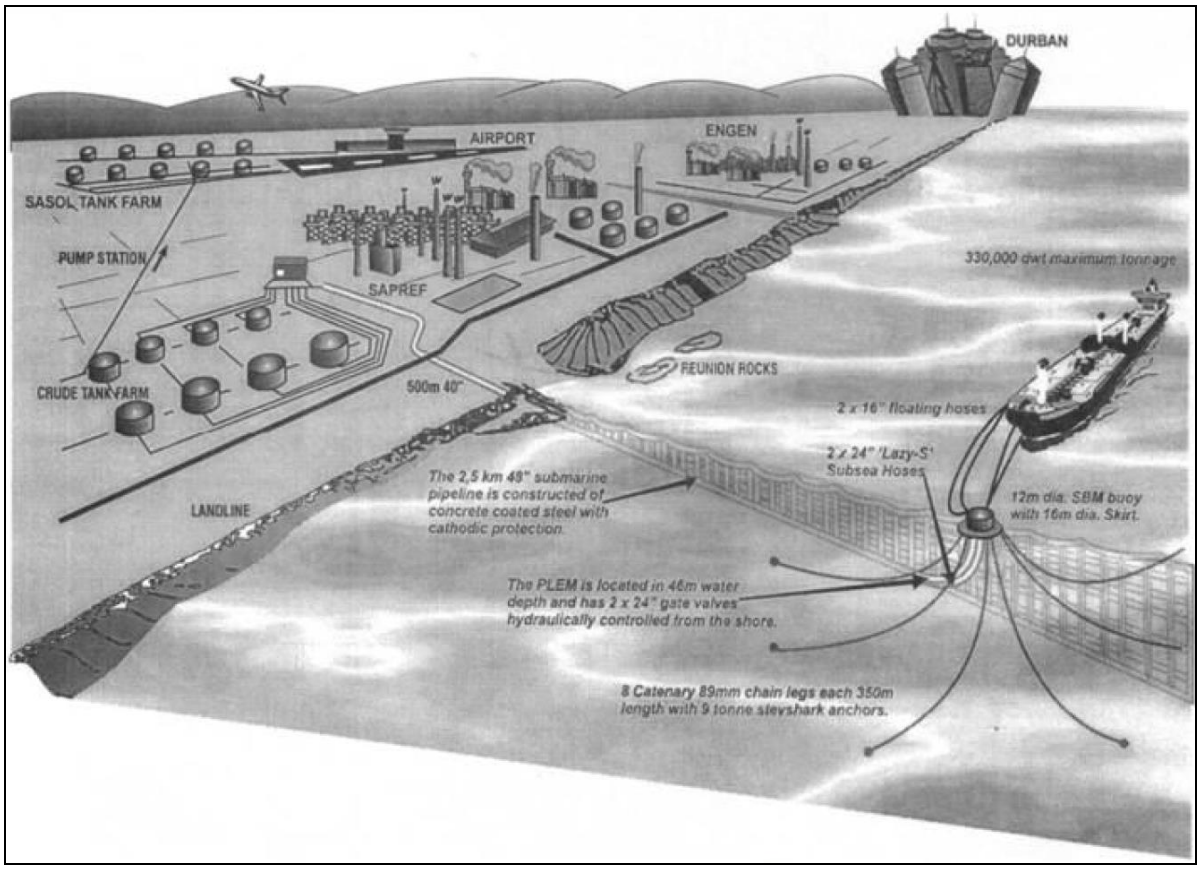


Figure 6 Schematic Layout of the SBM Buoy and Pipeline to the Refinery (SAPREF, 2019)

The eight off mooring chains are equally distributed and connected to Buoy 3 on the dedicated chain stopper (**Figure 7**). A phased approach is proposed in respect of the chain replacement. All eight chains have passed the recommended lifespan but SAPREF will change four at a time due to time required to complete the work. Work has to be completed in three weeks to avoid disruption to supply of crude supply to the country. The intention is to replace the most highly

stressed chains first (ROV GVI, December 2018):

- In ~May 2020, Anchor Legs 1, 4, 5 and 8 will be replaced. These are considered the most affected by prevailing environmental conditions of wind, wave and current (ROV GVI, December 2018).
- In 2021, Anchor Legs 2, 3, 6 and 7 will be replaced during the biennial refinery shut down.

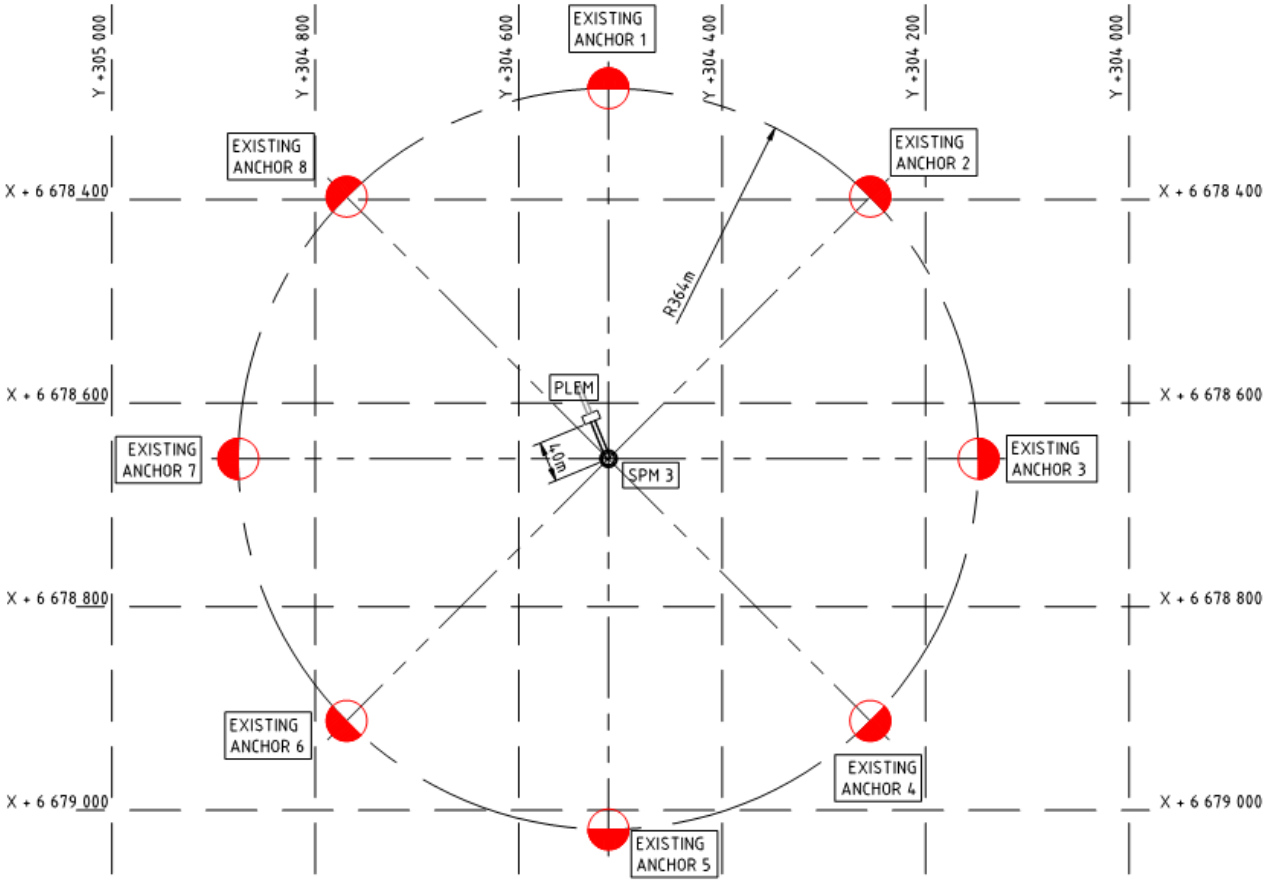


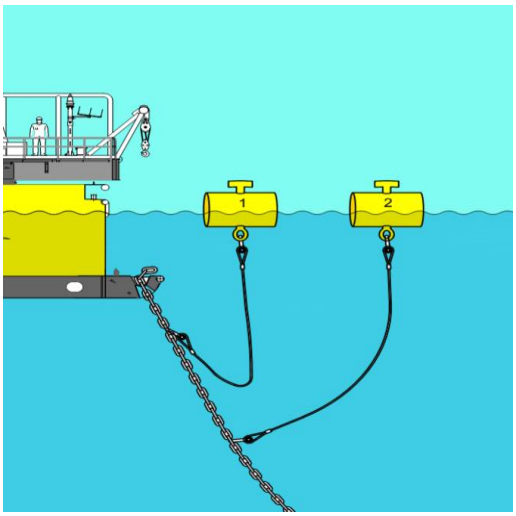
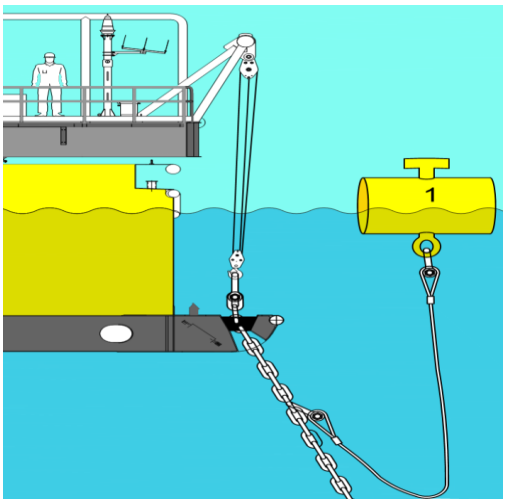
Figure 7 Anchor Leg Pattern

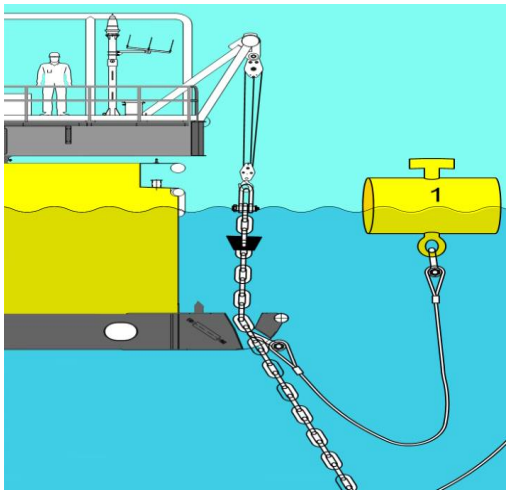
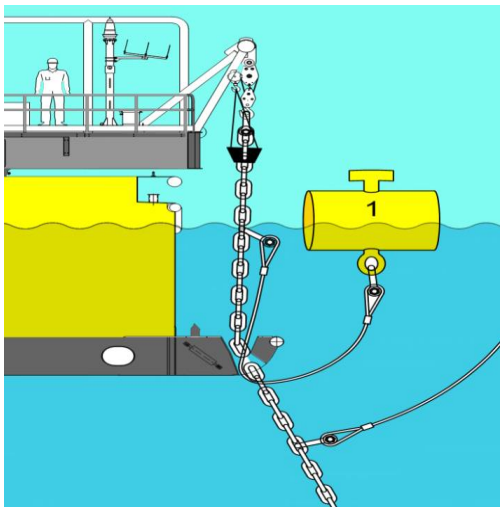
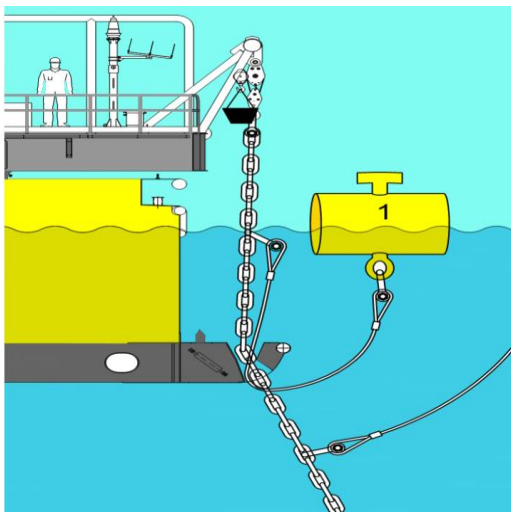
2.2.2 NON-TECHNICAL DESCRIPTION OF PREFFERED ANCHOR REMOVAL AND REPLACEMENT

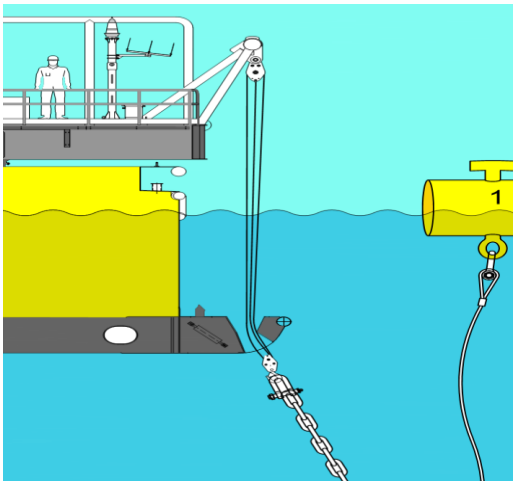
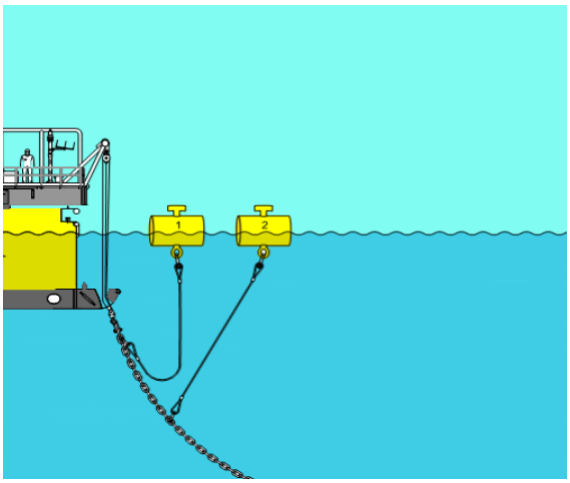
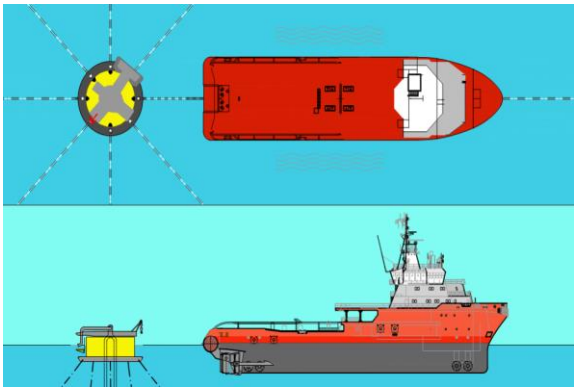
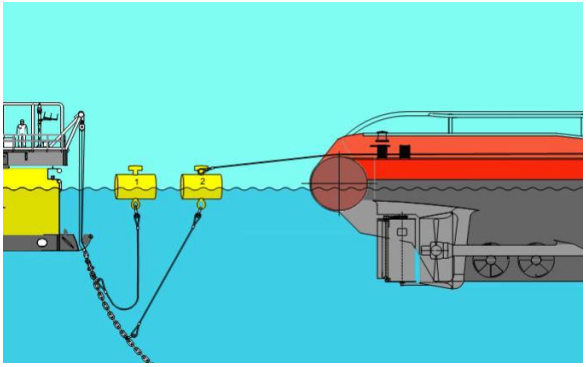
AMSOL, the preferred marine contractor, has been invited to provide the solution to replace eight anchor legs in a phased progression, and to provide a methodology conducive for minimal impact at SAPREF's intake terminal. The methodology is designed to complete four anchor leg replacements in 2020, followed by the remaining five in 2021, in order to minimize the likelihood of any disruption to production at the refineries. The anchor legs will be removed and re-installed in a like-for-like regime, resulting in the new chain and anchors being laid along the existing seabed corridors.

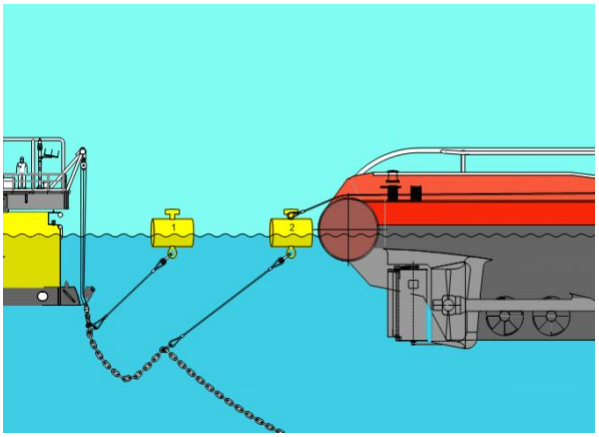
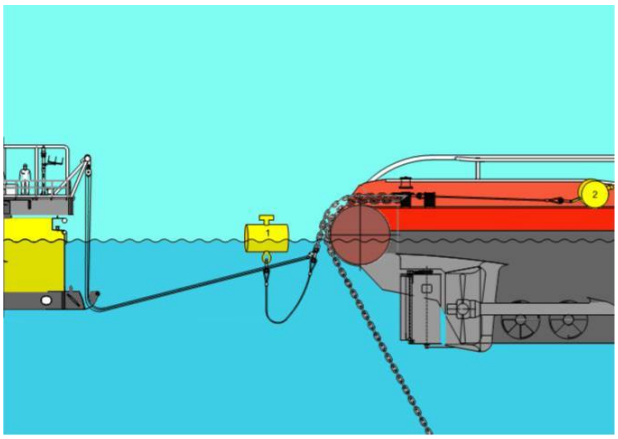
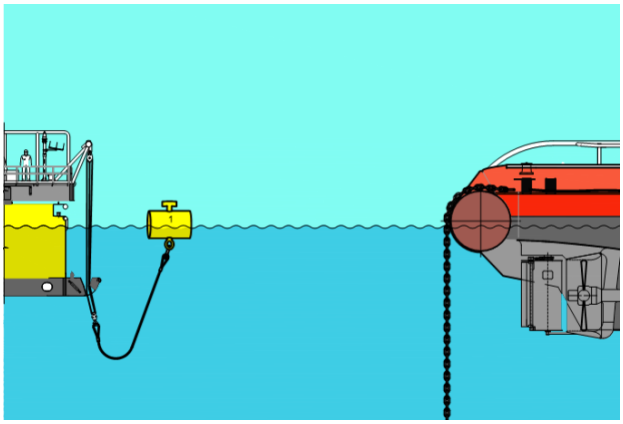
All operations will be undertaken in accordance with our Company Management System, which comprises Safety, Health, Environmental and Quality instructions. All operations undertaken will be in accordance with International Marine Contractors Association (IMCA) and International Association of Oil and Gas Producers (OGP) guidelines and recommendations. An illustration of the proposed method for anchor replacement is outlined in **Table 3**.

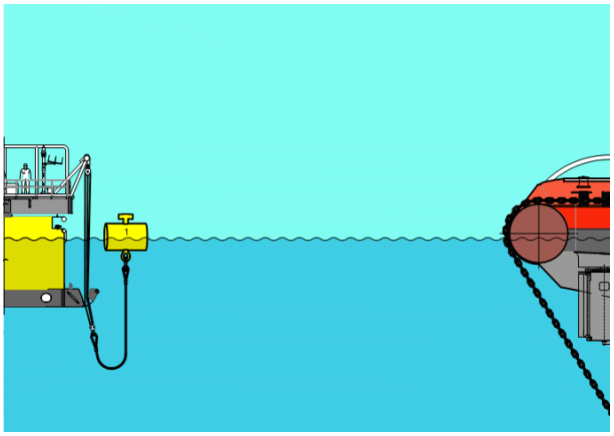
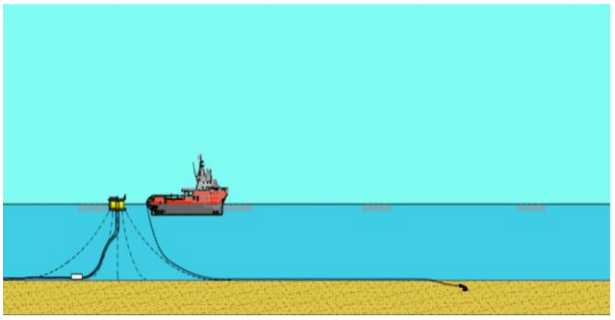
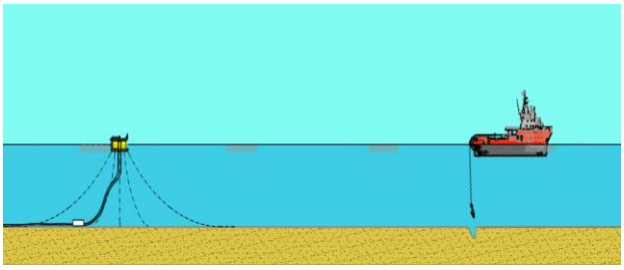
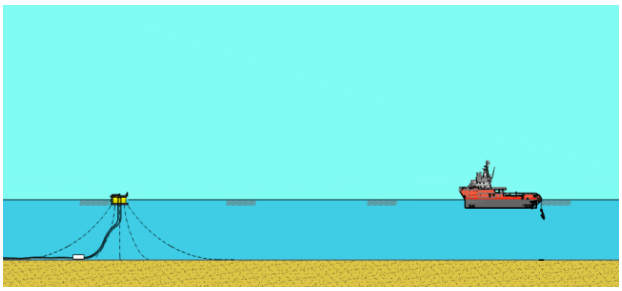
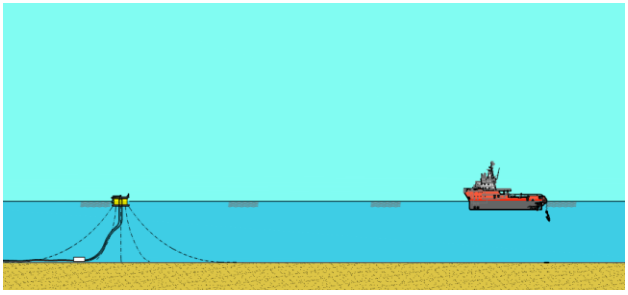
Table 3 Non-Technical Description (SAPREF Anchor Leg Replacement Storyboard Rev C, 2019)

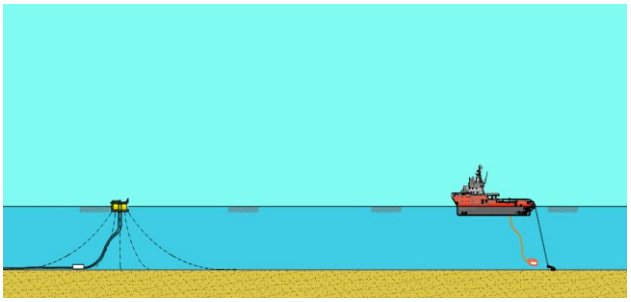
Phase	Illustration	Additional description
Connecting Can Buoys		The Buoy ops team connect two Can buoys to the anchor leg to aid the Anchor Handling Tug (AHT) in gathering the chain and for the buoy winch to transfer the load from the buoy to the AHT.
Buoy Winch Connect to Chain		The buoy winch block is connected to the anchor chain bitter end. The buoy winch block is the smaller unit that will pass through the chain hawse pipe.

Hoisting the Chain		The chain is hoisted using the buoy winch breaking free the chain stopper
Rigging onto Chain Stopper		Rigging is attached to the chain stopper to remove the chain stopper from the anchor leg chain.
Chain Stopper is Removed		The chain stopper gate is removed, and the chain stopper removed from the anchor leg chain and hoisted to the buoy deck.

Anchor Chain Lowered		The anchor leg chain is lowered with the winch block passing through the chain hawse pipe.
Ready for Handover to AHT		
AHT Vessel Approaches Buoy for Operations		-
Hauling Chain onto AHT Deck		The AHT deck winch is connected to the #2 Can buoy

Taking Up the Chain		The #2 Can buoy is hauled toward the AHT stern roller taking up the weight of the anchor chain
Anchor Chain onto AHT Deck		The chain is recovered onto the AHT deck and secured using the AHT deck shark jaws. The #2 Can buoy is disconnected from the chain and the AHT deck winch wire connected to the #1 Can buoy. The chain bitter end and buoy winch block are secured on the AHT deck The chain and block are disconnected. The #1 Can buoy is connected to the buoy winch block.
Separating Buoy and AHT		The #1 Can buoy and winch block are released back into the water. The anchor chain leg and all rigging are now disconnected from the buoy allowing for the AHT to retrieve the anchor leg from the seabed.

Anchor Leg Retrieval		The AHT starts the anchor leg retrieval operations
Anchor Chain Retrieval		Buoy winch lowered, releasing the chain through the hawse pipe. Pennant used to pull up over the stern roller onto the deck (cross-hauled from the SBM onto the AHT).
Anchor Tripping and Recovery		Project AHT picks up chain and transferring it into the locker. Old anchor will be tripped and recovered to deck, where it will be securely stowed.
Anchor Position over Drop Zone		ROV deployed to ensure the correct orientation of the anchor, and the AHT will then lay away the new chain towards the SBM. Chain will be laid on the original anchor leg route.
Lowering Anchor to Seabed		Deck personnel shall overboard the new anchor and chain to the seabed.

ROV Observation to Confirm Orientation of Anchor		ROV to capture the catenary path of the new anchor legs until its burial location.

2.2.3 ALTERNATIVE TECHNICAL METHODS CONSIDERED

ANCHOR LEG SETTING

Four Options were assessed by SAPREF for tension setting of the anchor legs. These included:

- **Option 1 - Tension inline (1a) / off centre (1b):** The project vessel is positioned between the anchor position and the buoy and applies the required tensioning force on the anchor. A variation on this is to run the vessel alongside the buoy which will induce a small offset which can be rectified by recovering the chain and relaying in the correct orientation post tensioning.
- **Option 2 - Using the Stevtensioner:** The Stevtensioner is basically a chain shortening clutch with the mooring chain connected on one side and a reaction chain running through it. A vertical pull can induce more than double that pull in the horizontal leg. Heaving up builds up the load in the mooring chain until the required tension is achieved
- **Option 3 - Using a static moored barge**: A statically moored barge utilising a linear winch on deck is used to tension the anchor leg. This method eliminates the risk of a dynamic vessel run away and damaging any terminal assets.
- **Option 4 - Removing the Buoy:** In order to eliminate all risks to the terminal assets the buoy is removed from site and the anchor laying operations are carried out after which the buy is reinstalled.

Option 1, Tension inline / off centre (1a/b), was selected as the preferred option.

The key rationale for the selection of Option 1a/b is the fact that the Anchor Handling Tug (AHT) bow is ~110m from buoy resulting a zero probability of collision probability zero, and the uplift loads are <50% of anchor weight. In addition cost and timing implications associated with Options 2, 3 and 4 are listed below:

- Option 2: High additional cost of added technology; significant extra time to carry out the works
- Option 3: High additional cost of added marine spread; significant extra time to carry out the works
- Option 4: High additional cost of extra work to remove and reinstate the buoy; Additional diving work introduced into project-related activities; significantly longer time to do the works

WORKSCOPE

The initial plan (during October-November 2018) was to undertake chain and anchor replacement at Leg #4 and #5. However, the workscope was increased to include all eight legs to allow for more competitive day rates for tug use etc. The October-November 2019 Plan involved the mobilisation of vessels from both Cape Town and Durban. This has been reduced to just the Durban Port due to the replacements of vessels (i.e. MV Peridot with Project AHT). Other options explored are outlined in **Table 4.**

Table 4 Project Options / Alternatives

ACTIVITY	ALTERNATIVE OPTIONS (OCTOBER- NOVEMBER 2018 PLAN)	PREFERRED OPTION (OCTOBER – NOVEMBER 2019 PLAN)

Preparatory Work for Chain Recovery (hold back arrangement)	Upon installation of the cable on the Buoy end, project will attach the other thimble end to a 10T Dead Man Anchor (DMA). The DMA to be attached to the deck winch and overboarded. The DMA shall be placed onto the seabed in a taut configuration and tension is introduced into the hold back arrangement. — Option 1: The deck winch interface may be released by ROV shackle. In the instance where ROV shackles or hooks are applied, a semi work class ROV may be required. — Option 2: The deck winch interface may be released by means of 16mT acoustic release shackle. — Option 3: Dependant on depth at the DMA location, a diver may be deployed to release the deck winch interface.	A can buoy shall be connected with a pennant by diver to the chain leg approximately 10m below the buoy skirt. This will be used to recover the chain to the deck of the Project AHT. The 10Te winch will be rigged into a 2-part 20Te sheave in the davit, and the chain leg to be disconnected will be joined at the tail to the sheave block.
Old Anchor Removal (cross haul with use of winches)	Payout on the deck winch to abandon the anchor leg on the seabed.	Winch wire is to be recovered onto deck with the old anchor tripped and recovered to deck, where it will be securely stowed.
New Anchor Leg Installation / Connection to Buoy	MV Peridot to move into proximity for recovery of the anchor leg. Main wire onboard the Peridot to be deployed. ROV to advise positioning in proximity to the chain end. — Option 1: Latching by means of 25mT ROV hook. — Option 2: Latching by means of diver intervention.	The 20Te sheave block from the SBM (Buoy 3) hawse pipe will be passed across to the AHT, where the chain tail shall be connected. Release the chain over the roller on board the AHT as the SBM winch hauls it in.

2.2.4 ONGOING MAINTENANCE

An Anchor Leg Chain Angle and Wear Down Measurements procedure (January 2020) (**Appendix C-2**) has been prepared by SAPREF for ongoing maintenance and management of anchors. The purpose of the procedure is to measure and assess the angels of the anchor chains on a quarterly basis.

3 COASTAL RECEIVING ENVIRONMENT

It is important to gain an understanding of the physical, biological, and socio-economic attributes of the Refinery complex and surrounding areas; and marine environment within which the SBM is located. This allows a better understanding of the environment in which the project is being considered, which is a requisite for the identification of potential environmental impacts.

3.1 CLIMATE

3.1.1 TEMPERATURE AND RAINFALL

Durban falls within a sub-tropical climate zone characterised by warm to hot and humid weather. This climatic region is one of the wettest areas within Southern Africa with the average annual rainfall ranging from 760mm in the northern interior to 1250mm along the coast which falls predominantly in the summer months (October - March) and is primarily derived from atmospheric instability. Most of this region's winter rainfall is generally associated with frontal systems, moving from the southwest to the northeast. The winter weather is typically drier and is influenced

by the dominant anticyclone over most of South Africa.

Sea temperatures are relatively stable, averaging 21^{0}C all year. Due to the warm Mozambique current along the KwaZulu-Natal coast, the sea temperature rarely falls below 17^{0}C even during winter. The occurrence of fog on the KwaZulu-Natal coast is rare, but S.A.N. charts of the area carry the following caution: 'Abnormal waves of up to 20 metres in height, preceded by a deep trough, may be encountered in the area between the edge of the continental shelf and 20 miles seawards thereof. These can occur when a strong south-westerly wind is blowing, the sea is rough, and the barometric pressure is low.

3.1.2 WIND PATTERNS

Most of the surface and inshore currents along the coast of South Africa are strongly influenced by wind direction and speed. In both summer and winter months wind velocity is greatest in the afternoon, while the effect of land and sea breezes have a strong influence on wind direction. In addition to diurnal variations there is a seasonal variation in both frequency and velocity, with winter months typically experiencing calm conditions with moderate to light north-easterly winds. Wind speeds range between 0 m/s and 8.2 m/s with majority of strong winds emanating from a west south westerly and east north easterly direction. Northerly winds area also prevalent in the region which are typically gentle wind speeds of less than 3.1 m/s. Winds do emanate from other directions but under lower frequencies. Design wind conditions are outlined in **Table 5**.

Table 5 Wave Return Period Conditions

RETURN PERIOD (YEAR)	1 YEAR	10 YEAR	100 YEAR
1 hourly mean wind speed (m/s)	21	23	25
1 minute sustained wind speed (m/s)	27	30	33

3.2 OCEANOGRAPHY

The physical oceanography of an area, particularly water temperature, nutrients, oxygen levels, and wave exposure, are the principal driving forces that shape marine communities.

3.2.1 CURRENTS

The marine ecosystems off the south-east coast of Africa are influenced by the warm Agulhas Current, which originates off the northern Mozambique coast and sweeps south-west. The influence of the current varies along the coast chiefly due to changes in bottom topography (Schumann 1998). The proposed maintenance site is located on the 'Durban Shelf', which is a transition region extending southwards as far as Park Rynie.

Inshore currents are predominantly north-east and swing gradually to south-west about 50 km offshore, although current reversals are common in the inshore region. A semi-permanent cyclonic eddy exists approximately 55% of the time off Durban and is associated with a well-defined northward coastal current between Park Rynie and Ballito Bay (Roberts et al. 2010, Guastella and Roberts 2016). Current-reversals depend mainly on the presence of the Durban Eddy and, less frequently, the Natal Pulse, which extends further offshore. Local winds can also contribute to current reversals in near-surface waters.

3.2.2 BATHYMETRY

The generalised bathymetric trend is that the seafloor deepens seaward with evenly spaced isobaths orientated parallel to the coastline. Rigg et al. (2016) divided the survey area into three distinct zones based on small-scale changes in seafloor morphology. The inner zone occurs from the inshore shallow region to approximately 27 m Below Mean Sea Level (BMSL) and is characterised as being very undulated, indicating a relative shoaling bathymetry. The middle zone (27 to 45 m BMSL) consists of coast perpendicular bedforms abutting against the pipeline and represents a flat, featureless seafloor, while the outer zone consists of coast-parallel wave ripples. Here sediment grains are transported along the seafloor as opposed to suspended in the water column (Rigg et al. 2016). Sediment build-up is

evident on the south-western margin of the pipelines (where they are exposed) and a scour moat is visible on the north-eastern margin).

3.3 GEOLOGY

The geology of the Natal continental shelf was described by Flemming (1981) who classified areas into three sedimentary zones that run parallel to the coast: an inshore "wave dominated nearshore sediment wedge", an intermediate "current controlled central-shelf sand stream" and an offshore "sand depleted outer-shelf gravel pavement". The SBM is located within the nearshore sediment wedge. Riverine sediment is initially dispersed by wave action and is distributed within the nearshore zone, where a dynamic equilibrium between wave energy and the sediment profile is reached. Sediment transport occurs from both the north-east and the south-west. Inshore sand movement is principally derived from the strong north-easterly winds prevalent during the summer months, while offshore sand movement (±100 to 20 m water depth) is attributable to a combination of an Agulhas Current eddy that flows to the north coupled with longshore drift that generates large-scale sand ridges in the unconsolidated shelf sediment (Rigg et al. 2016). Coupled with the Agulhas Current is the presence of inshore cyclonic eddies, which form during inshore current reversals (Lutjeharms 2006).

South of Durban in the study area, the shelf is dominated by the influence of the clockwise gyre resulting in a northward-migrating dune field (Rigg et al. 2016). The geophysical investigation revealed sub-bottom geology consisting of basal Cretaceous strata (bedrock) overlain by Pleistocene sediment (a stable clay and gravel foundation) and Holocene marine gravels. These layers were overlain by bioclastic (loose) sand. Recent shore face sediments, which represent a suitably stable base for the pipeline structure, are found inshore (Rigg et al. 2016).

The bathymetry shoals at a faster rate between -16 and -28 m and is reflective of the wave base. The relative hydrodynamic energy regime of the seafloor around the pipeline increases inshore with fair weather wave base, seafloor currents and littoral drift processes all effecting the sediment transport and erosion. Deeper than -28 m, storm waves and bottom currents have an effect on sediment transport (Rigg et al. 2016).

3.4 SEDIMENT AND WATER QUALITY

Water quality characteristics in the inshore waters off Durban are strongly influenced by the prevailing currents. Higher temperatures up to 22 °C are associated with flow from the north-east, while currents from the south-west are generally accompanied by a drop in temperature of around 5 °C. Nutrient concentrations in the shelf water off Durban are reported to be low, with nitrates, silicates and phosphates averaging 3.33, 3.71 and 0.62 µM/L respectively (Carter and d'Aubrey 1988).

3.4.1 TURBIDITY AND TOTAL SUSPENDED SOLIDS

High turbidity and total suspended solids (TSS) can influence ecological functioning, example:

- A high concentration of particulates can reduce light penetration and decrease photosynthesis, which in turn will reduce food and oxygen availability.
- High TSS can clog the gills of fish and alter benthic community composition by impeding feeding efficiency by filter feeders.
- High turbidity and TSS can also influence predator-prey interactions by reducing visibility.

In June 2017 TSS values were measured from six water samples collected in the vicinity of the SBM pipeline **(Table 6)**. A single water sample was collected from the surface at each site, filtered to extract all suspended solids, and the filtrate weighed to determine TSS content. Average background TSS concentrations at the pipeline were calculated at 35.8 mg/L.[1]

[1] There is no standard against which to compare offshore marine TSS values as they fluctuate so much (e.g. in response to algal blooms, wind and sea conditions etc.), although 35.8 mg/L could be considered to be relatively low. The existing Water Quality Guidelines merely state that "the concentration of suspended solids should not be increased by more than 10 % of the ambient concentration". Therefore the measurement provided in this report is a snapshot of the average surface TSS over a week in winter and was measured for the purposes of obtaining a baseline to which TSS values can be compared if measured during construction (if applicable).

Table 6 TSS Measured at Six Sites adjacent SBM Pipeline (June 2017)

RETURN PERIOD (YEAR)	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	SITE 6
TSS (mg/L)	30.8	40.1	33.2	37.2	42.3	31.4

No standard exists against which to compare offshore marine TSS values as they fluctuate according to the marine environment (e.g. surf zone versus offshore), in response to the proliferation of phytoplankton and algal blooms, and due to wind and sea conditions. Through long-term monitoring, the CSIR developed a rating system for Durban Harbour but this is not applicable to the marine environment offshore of Durban. The existing South African Water Quality Guidelines state: "the concentration of suspended solids should not be increased by more than 10 % of the ambient concentration". Therefore, the average value of 35.8 mg/L provides a snapshot of the average surface TSS at the site over a week in winter and was measured for the purposes of obtaining a baseline to which TSS values measured during maintenance operations can be compared (if applicable).

As the timeframe of the operation is very short and minimum disturbance is expected, no further TSS measurements are required and monitoring is not warranted.

3.4.2 SEDIMENT GRAIN SIZE

The quantity and distribution of different sediment particle sizes shapes biological communities and largely determines the extent of organic loading. This is because contaminants such as metals are predominantly associated with fine sediment particles, which present a larger surface area for the adsorption and binding of pollutants.

Samples were collected from surface sediments at Sites 1 to 6 from the 13th to 16th of June 2017. Particle size ranges between 62 and 2000 µm and comprised predominantly sand. A small proportion of fine gravel was found at all sites with the exception of one of six sites sampled. Comparable sediment characteristics are expected at the site of the SBM anchors.

3.4.3 TRACE METALS

Trace metals occur naturally in marine environments and are important in fulfilling key physiological roles. An increase in metal concentrations above established safety thresholds can result in negative impacts on marine organisms. The National Oceanic and Atmospheric Administration (NOAA) published a series of sediment screening values that are used to assess the toxicity of sediments (NOAA 1999). All sediment samples analysed for trace metals in June 2017 showed concentrations far below those outlined in the NOAA, indicating that sediment quality should not be of concern during the application of intervention procedures.

3.4.4 ORGANICS

Apart from providing increased surface area for the attachment of contaminants, organic content in the sediment can influence macrofaunal distribution and diversity (Martins et al. 2013). The introduction of organic matter from marine and terrestrial origins provides an essential food source for benthic macrofaunal communities and contributes to the ecological health of the system as a whole. However, stirring up of sediment loaded with organic matter can have deleterious effects through bacterial breakdown, which can reduce the amount of dissolved oxygen available. Average Total Organic Compounds (TOC) within the site earmarked for maintenance was calculated as 2.2% of the total sediment. As this value is low and the sediment is not nutrient enriched. The same is expected at the site of SBM3.

3.4.5 HYDROCARBONS

Poly-aromatic hydrocarbons (PAHs) (also known as polynuclear or polycyclic-aromatic hydrocarbons) are present in significant amounts in fossil fuels (i.e. natural crude oil and coal deposits), tar and various edible oils. AHs are one of the most wide-spread organic pollutants and they are of particular concern as some of the compounds have been identified as carcinogenic for humans (Nikolaou et al. 2009). PAHs are introduced to the marine environment by anthropogenic (e.g. oil spills) and natural means (e.g. products of biosynthesis). The highest values of PAHs recorded in the marine environment have been in areas with intense vessel traffic and oil treatment (Nikolaou et al. 2009). Sediment results from samples collected at the proposed maintenance site in June 2017 showed that PAHs were well

below the NOAA guidelines. This indicates that the marine sediments within the proposed maintenance site are uncontaminated by crude oil and suggests that no leakage has taken place. This conclusion is in agreement with the bathymetry survey which detected no seepages or breaks along the pipeline (Rigg et al. 2016).

3.5 ONSHORE ECOLOGICAL AND SOCIAL SENSITIVITIES

The KwaZulu-Natal corridor takes up 7.6% of South Africa's total land area. The KwaZulu-Natal coast supports extensive sandy beaches, mangroves, estuaries and lagoons.

The Environmental Sensitivity Index (ESI) system is an international scheme that classifies and ranks the overall sensitivity of different coastal habitats to oil spills. Several factors are used to determine the sensitivity of the coast including: substrate type (sand, mud, rock, mixed, etc.), exposure to wave action, slope of the shore, general biological productivity and ease of cleanup. Key to the rankings is an understanding of the relationships among physical processes, substrate type and associated biota that produce predictable patterns in oil behaviour persistence and biological impact.

ESI maps are comprised of three general types of information (NOAA, 2002):

- Shoreline Classification–ranked according to a scale relating to sensitivity, natural persistence of oil, and ease of cleanup.
- Biological Resources–including oil-sensitive animals and rare plants; and habitats, which are used by oil-sensitive species or are themselves sensitive to oil spills, such as submersed aquatic vegetation and coral reefs.
- Human uses resources–specific areas that have added sensitivity and value because of their use such as beaches, parks, marine sanctuaries, water intakes and archaeological sites.

The ranking scale ranges from 1 to 10. A rank of 1 represents shorelines with the least susceptibility to damage by oiling. Examples include steep, exposed rocky cliffs and banks. The oil cannot penetrate into the rock and will be washed off quickly by the waves and tides. A rank of 10 represents shorelines most likely to be damaged by oiling. Examples include protected, vegetated wetlands, such as mangrove swamps and saltwater marshes. Oil in these areas will remain for a long period of time, penetrate deeply into the substrate, and inflict damage to many kinds of plants and animals.

The KwaZulu-Natal coast has more than 70 estuaries, ranging from very small streamlets to the largest at St Lucia, approximately 200 km north of Durban. Three important estuaries within close proximity to the study area include: Isipingo; Mbokodweni; and Manzimtoti. The Isipingo being located closes- less than 2 km south of the study area. This is described as a temporarily open / closed estuary 40ha in extent. It is currently highly degraded. Threats include (eThekwini Municipality, 2008): loss of habitat as a consequence of intense urbanisation and inappropriate urban planning, sedimentation, freshwater deprivation as a result of diversion to the uMlazi Canal and Mbokodweni; and chemical / organic pollution. Similarly, the Isipingo Mangroves represent a sensitivity ecosystems in close proximity to the study area. Once oil has entered a mangrove it may remain there for tens of years due to inaccessibility, limited clean up options, lack of water movement and the slow rate of microbial degradation. These habitats would be considered sensitive as per ESI ranking.

Human use of the above habitats also places importance on them. Reunion Park is a 2ha reserve protecting the mangrove forest and estuary of the Isipingo River. Of interest is the boardwalk through the mangroves. Other facilities include: Picnic areas; Braai facilities; Cafe; Paddling pools. The Island Hotel is a historical landmark steeped in the rich, diverse cultural heritage that is unique to Isipingo, Durban. The Isipingo and Reunion beaches also attract much human activity for recreational purposes and subsistence fishing.

3.6 INSHORE ECOLOGY

The following ecological aspects are described in detail within the Marine Impact Assessment for the Maintenance of the SAPREF Offshore Pipeline prepared by Anchor Environmental Consultants (Anchor) (July 2017) (**Appendix D-1**):

- Soft bottom benthic macrofauna
- Marine life associated with artificial habitat
- Fish
- Cetaceans and birds
- Phytoplankton and zooplankton

Table 7 provides a summary of the site-specific baseline description prepared with reference to existing databases of the area and surrounds; and sampling which took place over a one week period in May 2017 (**Appendix D-1**).

Table 7 Summary of Site Specific Ecological Baseline Description

ECOLOGICAL ASPECT	ROLE IN MARINE ENVIRONMENT	SITE SPECIFIC FINDINGS
Soft bottom benthic macro fauna	— Promote exchange of oxygen and nutrients — Important food source for fish and other invertebrate species. — Benthic macrofauna are the biotic component most frequently monitored to detect changes in the health of a marine environment (short lived and respond rapidly to environmental change) — Tend to be directly affected by pollution	There were very low numbers of macrofauna found at the site with an average of 128 individuals/m^2 and 6 species/m^2. The low diversity of benthic organisms along the pipeline is likely related to the gravelly surface sediment found in this area.
Marine life associated with artificial habitat	Colonisation of the silt covered pipeline	Marine life is able to grow through this layer without difficulty, which suggests that the thickness of the layer is dynamic and fluctuates with current strength and direction. These included: hydroids, sponges, feather stars, East Coast Rock Lobster, crabs, urchins, cleaner shrimps, oysters and molluscs. Algae was also present.
Fish	Indo-Pacific fish fauna constitute about 74% of the ~1 192 species found in KwaZulu-Natal waters (van der Elst 1988). These species inhabit tropical reefs, shallow intertidal areas, soft sediment habitat, pelagic waters and/or deeper shelf waters.	— Shoals of baitfish commonly observed shoaling near the pipeline attracting bigeye kingfish. — Lizardfish (abundant) found resting mainly along the pipe and on the sandy bottom where they were camouflaged from predators. — Catface rockcod (moderately abundant) were found sheltering in scour holes beneath the pipe. Note: catface rockcod are classified as near threatened — Subtropical reef fish observed along the pipe. — A baardman, a slow-growing fish targeted by spear fishers observed swimming over the sandy bottom. — A resident moray eel found living in the space where the pipeline meets the sand. — An African angel shark was resting on the sandy bottom within two meters of the pipeline.
Cetaceans and birds	Common species of whales, dolphins and ocean birds that are known to utilise the area or be found along the KZN Coast are listed in **Appendix D**.	Four humpback whales spotted during survey

3.7 MARINE UNDERWATER CULTURAL HERITAGE

There are two known wrecks in the Isipingo area that fall within the NHRA's 60-year boundary. In addition, there are at least five wrecks that are recorded as being wrecked "off Port Natal". Based on the review of ROV footage undertaken by SAPREF, possible cultural heritage objects identified in the vicinity of the pipeline include:

— Possible porthole which may be linked to the wreck of the County of Pembroke (1903);

— Possible bollard which may be linked to the wreck of the Karin (1927); and,

— Ropes (x 2) which may be linked to shipwrecks.

Due to the limitations of the study (i.e. desktop) the specialist could not make a definitive statements regarding the age or significance of these possible cultural heritage objects.

4 REGULATORY FRAMEWORK

There are a number of regulatory requirements at local, provincial and national level that impose requirements or general duties with respect to environmental management during the implementation of the Environmental MMP. The key statutes and their requirements are described below:

4.1 THE CONSTITUTION OF SOUTH AFRICA, 1996 (ACT NO. 108 OF 1996)

Since 1994 South African legislation has undergone a large transformation and various laws and policies having been promulgated with a strong emphasis on environmental concerns and the need for sustainable development. The constitution of South Africa (Act No. 108 of 1996) (the Constitution) provides for environmental rights in the Bill of Rights (Chapter 2, Section 24) stating: "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 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.

The Constitution cannot manage environmental resources as a stand-alone piece of legislation hence additional legislation has been promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated Act and associated Regulations are designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld on an on-going basis throughout the country. In terms of Section 7 of the Constitution, a positive obligation is placed on the State to give effect to the environmental rights.

4.1.1 REQUIREMENTS

SAPREF has a general duty to ensure that all aspects of its operations respond to this context by addressing environmental management and protection as an integrated part of its operations and activities.

4.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998), AS AMENDED

The National Environmental Management Act (Act No. 107 of 1998) (NEMA) provides the environmental legislative framework for South Africa and establishes a set of principles, which all authorities have to consider when exercising their powers. These include the following:

- Development must be sustainable;
- Pollution must be avoided or minimised and remedied;
- Waste must be avoided or minimised, reused or recycled;
- Negative impacts must be minimised; and
- Responsibility for the environmental consequences of a policy, project, product or service applies throughout its life cycle.

Section 28(1) states that "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". If such degradation/pollution cannot be prevented, then appropriate measures must be taken to minimise or rectify such pollution. These measures may include:

- Assessing the impact on the environment;
- Informing and educating employees about the environmental risks of their work and ways of minimising these risks;
- Ceasing, modifying or controlling actions which cause pollution/degradation;
- Containing pollutants or preventing movement of pollutants;
- Eliminating the source of pollution; and
- Remedying the effects of the pollution.

4.2.1 REQUIREMENTS

SAPREF has a general duty of care and a responsibility to take actions to prevent pollution or degradation of the environment in terms of Section 28 of NEMA, and to ensure that the environmental impacts associated with maintenance are considered and mitigated where possible.

4.3 ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014, AS AMENDED

Sections 24 and 44 of NEMA make provision for the promulgation of regulations that identify activities that may not commence without an Environmental Authorisation (EA) being issued by the competent authority. In this context the NEMA EIA Regulations, 2014, which came into effect on 8 December 2014, govern the process, methodologies and requirements for the undertaking of EIAs in support of applications for EA.

On 7 April 2017 the Minister of Environmental Affairs Gazetted amendments to the EIA Regulations, 2014 and Listing notices in GNR 324, 325, and 327. GNR 326 defines two alternative authorisation processes that are to be undertaken depending on the type of activity that is proposed, these are either a Basic Assessment (BA) process or a Scoping and EIA process. Listing Notice 1 (GNR 327) and Listing Notice 3 (GNR 324) list activities that require a BA process, while Listing Notice 2 (GNR 325) lists activities that require Scoping and Environmental Impact Assessment process.

4.3.1 REQUIREMENTS

The proposed SBM stabilisation activities were evaluated in terms of the 2014 EIA Regulations, as amended prior to the development of the MMP. Specifically listed activity 19(A) of GN. R327 presented below:

> The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from:
>
> I. the seashore;
> II. the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater
> III. the sea
>
> but excluding where such infilling, depositing, dredging, excavation, removal or moving-
>
> a) will occur behind a development setback;
> b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or
> c) falls within the ambit of Activity 21 in this Notice, in which case that activity applies; falls within the ambit of activity 21 in this Notice win which case that activity applies;
> d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or where such development is related to the development of a port or harbour, in which case activity 26 in Listing 2 of 2014 applies.

The introduction of the "sea" within Activity 19A as a location requiring environmental authorisation for dredging activities or movement of material (i.e. soil, sand, shells, shell grit, pebbles) results in the need for a Basic Assessment (BA) process to apply for EA. However, EDTEA confirmed in writing on 31 July 2017) that the activity is exempt from receiving EA on the basis that an MMP is prepared and complied with.

Listed activity 19(A) is also triggered by the proposed chain and anchor replacements. Given that the activity proposed is considered maintenance of existing infrastructure, WSP sought confirmation from EDTEA that the activity can commence without a BA if included in the existing MMP.

** **Note**: Any activities not expressly described in this MMP must be reviewed by the SAPREF Environmental Manager to determine whether an EA is required.

4.4 NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998)

Water use in South Africa is governed by the National Water Act, 1998 (Act No. 36 of 1998) (NWA) with the executive authority being the Department of Water and Sanitation (DWS). The NWA recognises that water is a scarce and unevenly distributed national resource in South Africa. Its provisions are aimed at achieving sustainable and equitable use of water to the benefit of all users and to ensure protection of the aquatic ecosystems associated with South Africa's water resources, along with discouraging pollution and wastage of water resources.

Promulgation of the NWA served to repeal the Water Act, 1956 (Act No. 54 of 1956) and granted formal control over effluent disposal to the marine environment, recognising the marine environment formally as a "resource". Prior to 1998 the coastal and marine environments were not regulated by any formal legislation or authorities. With the introduction of the NWA in 1998, a licence or permit was required from DWS for any identified water uses, however; the focus remained largely on land based water resources and allowed for exemption for the discharge of wastewater to sea.

The proximity of the Isipingo, Mbokodweni and Manzimtoti estuaries has been noted. The Applicant must adhere to the following requirements during maintenance activities and, in case of incidents, must be mitigated. The prevention and remedying of the effects of pollution and the control of emergency incidents as contemplated under Section 19 and Section 20 of the NWA, respectively, with respect to water resources are applicable thereto.

4.4.1 REQUIREMENTS

Not applicable.

4.5 NATIONAL ENVIRONMENTAL MANAGEMENT: INTEGRATED COASTAL MANAGEMENT ACT, 2008 (ACT NO. 24 OF 2008)

The National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) (NEM: ICMA) was adapted from the White Paper for Sustainable Coastal Development in South Africa, April 2000. The purpose of the NEM: ICMA is to establish the statutory requirements for integrated coastal and estuarine management in South Africa.

4.5.1 REQUIREMENTS

Of relevance to the SBM, Chapter 7 of the NEM: ICMA provides measures for protecting the coastal environment as well as assessing and regulating detrimental activities. It requires that reasonable measures be taken by users of coastal public property, owners and occupiers of land, coastal managers and other responsible persons to avoid causing adverse impacts on the coastal environment in accordance with Section 28 of NEMA.

The SBM is located within the coastal public property and as such falls within the remit of NEM: ICMA. As such, SAPREF has a duty of care to avoid causing adverse impacts on the coastal environment during maintenance activities – the implementation of the MMP is considered *inter alia* a reasonable measure.

In terms of Section 71 of the ICMA, a permit is required for the dumping of waste or other material at sea. The ICMA

definition of dumping at sea specifically excludes the lawful depositing of any substance or placing or abandoning of anything in the sea for a purpose other than mere disposal of it. The purpose of trenching is to transfer the material from one location to another to alleviate the stress caused by erosion on the pipeline. No material moved will be disposed elsewhere at sea and therefore does not require a permit in terms of the ICMA. In addition, the replacement of the anchors and chai will not require the disposal of seabed material moved during the installation process.

South Africa is a signatory to the 'London Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter' (1972) (the London Convention) and to the 1996 'Protocol to the London Convention' (the London Protocol). These documents regulate the disposal of waste materials in the marine environment and are applicable if natural sediments are to be disturbed. In South Africa, the NEM: ICMA gives effect to the provisions of the London Convention and the London Protocol. Oceans and Coasts, a branch of the Department of Environmental Affairs (DEA), is mandated with the responsibility of regulating the deposition of waste material in the marine environment in South Africa and uses a National Action List (NAL) to make decisions as to whether the disturbance of sediment is likely to harm the environment. Should dumping be required for this project (e.g. in the case of dredging), ICMA will be triggered and dumped sediment will be required to fall below the prohibited NAL concentrations. It is however noted that dumping of sediment within the sea is not required for maintenance activities seeking approval.

4.6 NATIONAL HERITAGE RESOURCES ACT (NO. 25 OF 1999)

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act, 1999 (NHRA). The enforcing authority for this Act is the South African National Heritage Resources Agency (SAHRA). In terms of the Act, historically important features such as graves, trees, archaeological artefacts/sites and fossil beds are protected. Similarly, culturally significant symbols, spaces and landscapes are also afforded protection. The Act is also applicable to Maritime and Underwater Cultural Heritage (including underwater and land maritime heritage) (MUCH).

Section 38 of the NHRA requires that any person who intends to undertake certain categories of development must notify SAHRA at the very earliest stage of initiating such a development and must furnish details of the location, nature and extent of the proposed development. SAHRA has designed the South African Heritage Resources Information System (SAHRIS) database to assist the developer in providing the necessary information to enable SAHRA to decide whether a Heritage Impact Assessment (HIA) will be required. Section 38(1) of the NHRA lists the categories of development that trigger the need for SAHRA to be notified, which include "(a) Construction of a road, wall, power line, canal or other similar form of linear development or barrier over 300 m in length." Section 38 also makes provision for the assessment of heritage impacts as part of an EIA process and indicates that, if such an assessment is deemed adequate, a separate HIA is not required. There is however the requirement, in terms of Section 38(8), for the consenting authority (in this case the EDTEA) to ensure that the evaluation of impacts on the heritage resources fulfils the requirements of the relevant heritage resources authority (SAHRA), and that the comments and recommendations of the heritage resources authority are taken into account prior to the granting of the consent.

4.6.1 REQUIREMENTS

Within the scope of this project, Section 38 of the NHRA (25 of 1999), states that an assessment of potential heritage resources in the development area needs to be done. This is the purpose of the desktop study undertaken which surveyed existing shipwreck databases in the area and reviewed remotely operated underwater vehicle (ROV) footage of the undersea pipeline in 2017 prior to pipeline stabilisation; and a magnetometer survey of the pipeline, PLEM and associated anchor legs in 2019. The assessment of visible objects allows for the identification of possible MUCH sites. If a potential MUCH site is uncovered during the work, a maritime archaeologist needs to be contacted to assess the find. Thereafter, in conjunction with SAHRA, a decision will be made regarding the significance of the site. If it is deemed to be culturally significant, the contractor can apply to the Maritime Unit of SAHRA for a permit for removal, excavation or destruction in terms of Section 35 of the NHRA.

4.7 NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT (NO. 59 OF 2008)

The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA) is subsidiary and supporting legislation to NEMA. The NEM:WA is a framework legislation that provides the basis for the regulation of waste management in South Africa. The Act also contains policy elements and gives a mandate for further regulations to be

promulgated. Subservient Regulations and Norms and Standards under the NEM:WA include:

- Waste Classification and Management Regulations (Government Notice 634 of 2013, GN 634),
- National Norms and Standards for the Assessment of Waste to Landfill Disposal (Government Notice 635 of 2013, GN 635)
- National Norms and Standards for Disposal of Waste to Landfill (Government Notice 636 of 2013, GN 636)
- National Norms and Standards for the Storage of Waste (Government Notice 926 of 2013, GN 926)
- Revised definitions of waste contained in the National Environmental Management Waste Amendment Act 26 of 2014 (Government Notice 449, GN 449)
- List of activities that have, or are likely to have, a detrimental effect on the environment (Government Notice 921 of 2013 as amended, GN 921).

4.7.1 REQUIREMENTS

Waste generated by the project is likely to be limited to small quantities generated on the vessels and returned to port for onward management / disposal. In this regard several of the Regulations and Norms and Standards under the NEM:WA may apply – the specific requirements are discussed in **Section 6** (Environmental Action Plan).

4.8 SOUTH AFRICAN MARITIME SAFETY AUTHORITY ACT (1998)

The South African Maritime Safety Authority (SAMSA) was established in terms of The South African Maritime Safety Authority Act (1998) (SAMSA Act) as a juristic person.

Its objectives are to:

- Ensure safety of life and property at sea;
- Prevent and combat pollution of the marine environment by ships; and
- Promote the Republic's maritime interests.

In terms of section 2 of the Act, SAMSA is responsible to administer the following pieces of legislation:

- Merchant Shipping Act, 1951
- Marine Traffic Act, 1981
- Marine Pollution (Control and Civil Liability) Act, 1981
- Carriage of Goods by Sea Act, 1986
- Marine Pollution (Prevention of Pollution from Ships) Act, 1986
- Marine Pollution (Intervention) Act, 1987
- Maritime Zones Act, 1994
- Wreck and Salvage Act, 1996
- SAMSA Act, 1998
- SAMSA Levies Act, 1998
- Ship Registration Act, 1998

4.8.1 REQUIREMENTS

SAMSA may perform a function itself, in co-operating with another person or by delegating or assigning the power or duty concerned to another person. "Person" includes the state, a province, the government or an agency of the government of a foreign country or any juristic or natural person. Certain functions of SAMSA are performed by the DEA. SAMSA, or the authority delegated by SAMSA must receive the MMP as a commenting authority.

5 ENVIRONMENTAL IMPACT ASSESSMENT

In this section the potential environmental impacts associated with the following activities are identified and their significance determined:

— Proposed stabilisation of the SBM pipeline using the MFE method
— Replace of chains and associated anchors at SBM Buoy 3

High-level mitigation recommendations are provided, which are further elaborated in **Section 6** (Environmental Action Plan).

5.1 IMPACT ASSESSMENT METHODOLOGY

The significance of the impacts that would result from the proposed maintenance activities have been determined in order to assist decision-makers.

The significance of an impact is defined as a combination of the consequence of the impact occurring and the probability that the impact will occur. The significance of each identified impact was thus rated according to the methodology set out below:

Step 1 – Determine the **consequence** rating for the impact by determining the score for each of the three criteria (A-C) listed below and then adding them. The rationale for assigning a specific rating, and comments on the degree to which the impact may cause irreplaceable loss of resources and be irreversible, must be included in the narrative accompanying the impact rating:

RATING	DEFINITION OF RATING	SCORE
A. **Extent** – the area over which the impact will be experienced		
Local	Confined to project or study area or part thereof	1
Regional	The region (e.g. the KZN coastline)	2
(Inter)national	Significantly beyond KZN coastline	3
B. **Intensity** – the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered	1
Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and/or social functions or processes are severely altered	3
C. **Duration** – the time frame for which the impact will be experienced and its reversibility		
Short Term	Up to 2 years	1
Medium Term	2 to 15 years	2

Long Term	More than 15 years (state whether impact is irreversible)	3

The combined score of these three criteria corresponds to a Consequence Rating, as follows:

COMBINED SCORE (A+B+C)	**3-4**	**5**	**6**	**7**	**8-9**
Consequence Rating	Very Low	Low	Moderate	High	Very High

Step 2 – Assess the **probability** of the impact occurring according to the following definitions:

PROBABILITY– THE LIKELIHOOD OF THE IMPACT OCCURRING

Improbable	< 40% chance of occurring
Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

Step 3 – Determine the **overall significance** of the impact as a combination of the consequence and probability ratings, as set out below:

SIGNIFICANCE (QUANTIFIER)	**DESCRIPTION (QUALIFIER)**
Insignificant	The potential impact is negligible and will not have an influence on the decision regarding the proposed activity.
Very Low	The potential impact is very small and should not have any meaningful influence on the decision regarding the proposed activity.
Low	The potential impact may not have any meaningful influence on the decision regarding the proposed activity.
Moderate	The potential impact should influence the decision regarding the proposed activity.
High	The potential impact will affect a decision regarding the proposed activity.
Very High	The proposed activity should only be approved under special circumstances.

Step 4 – Note the **status** of the impact (i.e. will the effect of the impact be negative or positive?)

Step 5 – State the level of **confidence** in the assessment of the impact (high, medium or low). Depending on the data available, a higher level of confidence may be attached to the assessment of some impacts than others. For example, if the assessment is based on extrapolated data, this may reduce the confidence level to low, noting that further ground-truthing is required to improve this.

Step 6 – Identify and describe practical **mitigation and optimisation measures** that can be implemented effectively to reduce or enhance the significance of the impact. Mitigation and optimisation measures must be described as either:

— Essential: must be implemented and are non-negotiable; and
— Optional: must be shown to have been considered and sound reasons provided by the proponent if not implemented.

Essential mitigation and optimisation measures must be inserted into the completed impact assessment table. The impact should be re-assessed with mitigation, by following Steps 1-5 again to demonstrate how the extent, intensity, duration and/or probability change after implementation of the proposed mitigation measures.

	EXTENT	INTENSITY	DURATION	CONSEQUENCE	PROBABILITY	SIGNIFICANCE	STATUS	CONFIDENCE
Without Mitigation	Regional 2	Medium 2	Long-Term 3	High 7	Probable	HIGH	-ve	High
Essential Mitigation Measures								
With Mitigation	Local 1	Low 1	Long-Term 3	Low 5	Improbable	VERY LOW	-ve	High

Whilst the above detailed impact assessment methodology was followed the findings presented in the sub-sections below are summarised in terms of the overall significance and confidence (detailed impact assessment tables are contained in the specialist reports).

5.2 MARINE ECOLOGICAL IMPACTS

The Marine Impact Assessment for Maintenance of the SAPREF Offshore Pipeline was undertaken by Anchor in 2017 and 2018 (**Appendix D**). The 2017 study included a baseline marine survey to determine the habitat types and species assemblages that could potentially be affected by pipeline maintenance; and to compile an impact assessment of the proposed remediation alternatives. Data collected in 2017, along with existing sediment data, was used to inform the assessment of impacts for the follow up desktop study for the anchor and chain replacement activities.

Proposed maintenance activities will result in a range of impacts on the offshore environment, details of which are described below. Existing habitat types that may be impacted as a result include subtidal benthic habitat and pelagic habitat. Each of the impacts assessed is likely to affect the associated biota in different ways and at varying intensities depending on the nature of the affected habitat and the sensitivity of the biota and duration of disturbance.

In the marine environment, a disturbance can be relatively short-lived (e.g. mobilised sediment that may stabilise within hours) but the effect of such a disturbance may have a much longer lifetime (e.g. smothering). The assessment and rating procedure applied in this MMP addresses the effects and consequences (i.e. the impact) on the environment rather than the cause or initial disturbance alone. To reduce negative impacts, precautions referred to as 'mitigation measures' are set and attainable mitigation actions are recommended. Interventions to alleviate the severity / intensity of the impacts identified were divided into two categories: required and best practice depending on the severity of the impact.

The Marine Impact Assessment for Maintenance of the SAPREF Offshore Pipeline (Anchor, July 2017) (**Appendix D-1**) assesses the impacts of maintenance trenching for a 600 m length of pipeline over a period of approximately a week, extending to a month depending on sea conditions. The maintenance footprint is defined as the total area earmarked for trenching.

The Marine Impact Assessment for the SAPREF Anchor Replacements (Anchor, December 2018) (**Appendix D-2**) assesses the impacts of SBM anchor and chain replacements over a period of two months[2] with occasional disturbance expected during the replacement of each of the eight chains. Each disturbance event is anticipated to last for three days at a time depending on sea conditions. The maintenance footprint is defined as the area around the SBM, including the spread of the anchors and chains (~355m radius) and constitutes a total area of approximately 0.4 km^2.

[2] This is considered to be a conservative approach as the expected timeframe for anchor replacements is three weeks for each phase.

5.2.1 IMPACT ASSESSMENT FINDINGS

DISTURBANCE OF DEEP SUBTIDAL SOFT SEDIMENT HABITAT

PIPELINE STABILISATION AND ANCHOR REPLACEMENT

It is reported that recovery times for heavily disturbed benthic communities consist of an initial recovery phase of 12 months, followed by a period of several years before the population structure returns to pre-disturbance conditions (Newell et al. 1998). Recovery time varies according to sediment particle size and the prevailing current strength, with a longer recovery period expected for coarse sediments and a stronger prevailing current. Recolonization of the benthos usually takes place through the migration of adults from neighbouring populations by currents and tides (Newell et al. 1998). Following the termination of the disturbance, the impacted area usually recolonises rapidly as opportunistic taxa associated with disturbed environments (e.g. surface deposit feeders) settle. As the community reaches equilibrium, short-lived species are succeeded by long-lived taxa (e.g. plough shells and peanut worms). Physical disturbance of the substratum may result in habitat loss and mortality of resident infauna.

The proposed maintenance site for both the stabilisation of the pipeline and anchor replacement represent a ubiquitous sandy-bottom habitat which is fairly tolerant to disturbance when compared to reef and bioclastic sediments. Furthermore, the size of the area impacted is negligible in comparison to the size of the adjacent area of the same habitat type. In this instance, infauna are expected to rapidly recolonise the disturbed area after maintenance operations cease, as disturbance will be extremely localised and short-lived. Benthic disturbance should be limited to the maintenance footprint; however, no mitigation is necessary. The significance of the potential environmental impact was rated as **VERY LOW** (negative) with a **HIGH CONFIDENCE.** The best practice mitigation measure is to confine disturbance to the maintenance footprint.

DISTURBANCE OF MOBILE ORGANISMS

PIPELINE STABILISATION

During trenching, the fast swimming mobile fish and elasmobranchs (sharks, rays and skates) will be able to move to adjacent areas. Most slow swimming fish, crabs and benthic infauna are unlikely to be able to move out of the path of the jet/suction during pipeline stabilisation activities. Mortality of these animals is possible but not definite as sediment will remain at depth and will be dumped adjacent to the maintenance site. A negligible impact on avifauna is expected as birds are able to temporarily move away from the already busy shipping area if necessary. Most fish fauna associated with the sandy habitats off Durban are expected to be displaced from the maintenance area. Larger fish and elasmobranchs are mobile and will probably swim away from the area, escaping entrainment in the equipment. Consequently, the anticipated impact for larger mobile fish is disturbance rather than mortality. Smaller cryptic species that shelter on or in the sediment (e.g. lizzardfish and blennies) may experience mortality due to entrainment. Post trenching, fish are likely to be attracted to the disturbed area in search of food that may have been stirred up. Larger species, such as baardman and rays that use the soft sediment areas as feeding grounds, should continue to utilise accessible food resources in the area. Given the dynamic nature of soft benthic habitats in depths shallower than 30m on exposed coasts, full recovery of the mobile fauna should take place within the time frame of benthic invertebrate community recovery, resulting in the impact being **VERY LOW** (negative) with a **HIGH CONFIDENCE**, with no mitigation necessary.

ANCHOR REPLACEMENT

It is anticipated that most slow swimming fish, crabs and benthic infauna will also move away from the disturbance either by swimming or by burying deeper into the sediment. Consequently, the anticipated impact for larger mobile fish is disturbance rather than mortality. Smaller cryptic species that shelter on or in the sediment (e.g. lizzardfish and blennies) may experience mortality if crushed by a descending anchor. On the other hand, fish and invertebrates may be attracted to the disturbed area in search of food that may have been stirred up. Larger species, such as baardman and rays that use the soft sediment areas as feeding grounds, are expected to continue utilizing accessible food resources in the area during replacement activities. Given the dynamic nature of soft benthic habitats in depths shallower than thirty meters on exposed coasts, full recovery of the mobile fauna should take place within a month or less. Cetaceans may become entangled in the chains during replacement, although this risk is highly unlikely as they are expected to move away from the disturbance. It must also be considered that the risk of entanglement is

perpetual due to the permanent nature of the structure and is more likely to occur outside of maintenance activities. Although the significance of the potential environmental impact was rated as **INSIGNIFICANT** (negative) with a **HIGH CONFIDENCE**, best practice mitigation includes ensuring that the area is clear of cetaceans before the commencement of maintenance operations.

TURBIDITY PLUME CREATED BY DREDGING

PIPELINE STABILISATION AND ANCHOR REPLACEMENT

The physical removal of substratum during trenching; and the removal and deployment of anchors, have the potential to temporarily increase turbidity near the maintenance footprint. The resulting impacts largely depend on the extent of the turbidity plume as well as the biology of the species affected. For example, increased turbidity levels can impair prey capture in piscivorous fish that rely on visual prey detection methods, and autotrophic microphytobenthos and phytoplankton production may decrease due to reduced light penetration.

The likely magnitude of the turbidity plume associated with the proposed maintenance activity is small and likely comparable to the degree of disturbance created during a storm event. Material disturbed on the bottom and/or released into the water column during trenching; and small turbidity plume associated anchor replacement, will not be brought up to the surface and will be distributed over the sandy benthic environment by the predominant current at the time. As sediment is relatively coarse, it is expected to settle quickly out of the water column. As a result, the significance of increased turbidity on marine life is considered **INSIGNIFICANT** (negative) with **MEDIUM CONFIDENCE** (Pipeline Stabilisation) and **HIGH CONFIDENCE** (Anchor Replacement), with no mitigation necessary.

SMOTHERING OF BENTHIC MARINE ORGANISMS

PIPELINE STABILISATION AND ANCHOR REPLACEMENT

The physical removal of benthic sediment during pipeline stabilisation, and physical removal of anchors is associated with the suspension and the resultant deposition of particles that can smother marine organisms in the impacted area. Benthic invertebrates, particularly those that filter-feed, are susceptible to these effects as many lack the mobility inherent to fishes. They generally ingest high levels of inorganic material filtered from the water, resulting in lower growth rates, starvation and, in the worst cases, mortality. Particle size analysis reveals that surficial marine sediments within the maintenance area were composed of sand and gravel. No patches of reef were encountered during the 2017 marine survey, thus smothering of this habitat type is not of concern. Given that strong currents naturally move sediment through this section of the coastline, the impacts of benthic smothering is considered to be **VERY LOW** (negative) (Pipeline Stabilisation), and **INSIGNIFICANT** (negative) (Anchor Replacement) with a **HIGH CONFIDENCE**, with no mitigation necessary.

MOBILISATION OF CONTAMINANTS AND NUTRIENTS

PIPELINE STABILISATION AND ANCHOR REPLACEMENT

Trenching and benthic disturbance during anchor replacement may stir up subtidal marine sediments containing contaminants (e.g. trace metals, hydrocarbons) and excess nutrients, which can negatively impact marine biota in the maintenance footprint. Harmful substances can cause mortality of invertebrates, while excess nutrients can cause algal blooms, decreased dissolve oxygen concentrations and local eutrophication. According to law, sediment requires testing for contaminants before being mobilised and should not be disturbed if trace metal levels exceed those listed in the National Action List[3] (see Section 2.4.2, Table 2.3 contained in the Marine Impact Assessment for Maintenance of the SAPREF Offshore Pipeline (Anchor, July 2017) (**Appendix D-1**)). The sediment collected around the SAPREF pipeline in 2017 was found to be free from contaminants and does not contain high levels of nutrients. Consequently, this impact is rated as **INSIGNIFICANT** (negative) with a **MEDIUM CONFIDENCE** (Pipeline Stabilisation) and **HIGH CONFIDENCE** (Anchor Replacement), with no mitigation necessary.

[3] National Action List for the Screening of Dredge Material Proposed for Marine Disposal in Terms of Section 73 of the NEM:ICM (GN 635 of 2012)

DISPOSAL OF SOLID WASTE AND SPILLAGE OF HAZARDOUS SUBSTANCES

PIPELINE STABILISATION AND ANCHOR REPLACEMENT

The problem of litter entering the marine environment has escalated dramatically in recent decades, with an ever-increasing proportion of litter consisting of non-biodegradable materials. Objects which are particularly detrimental to marine fauna include plastic bags and bottles, pieces of rope and small plastic particles (Wehle and Coleman 1983). Large numbers of marine organisms are killed or injured daily by becoming entangled in debris (Wallace 1985) or as a result of the ingestion of small plastic particles (Shomura and Yoshida 1985). As a result, all domestic and general waste generated must be disposed of responsibly. Maintenance crew must be regularly reminded about the detrimental impacts of pollution on marine species and suitable handling and disposal protocols must be clearly explained and sign boarded.

Spillage of hazardous substances such as fuel also poses a risk to the environment. Disposal of any substance into the marine environment is strictly prohibited. After implementation of mitigation, the significance of these impacts are **LOW** (negative) pre-mitigation and **VERY LOW** (negative) post-mitigation with a **HIGH CONFIDENCE**. The necessary mitigation includes:

- Suitable handling and disposal protocols must be clearly explained and sign boarded.
- Implement the 'reduce, reuse, recycle' ethos.
- All fuel and oil must be stored with adequate spill protection and equipment must be checked for leaks.
- A rigorous environmental management and control plan (effectively this Environmental MMP) must be available.
- Disposal of any substance into the marine environment is strictly prohibited.
- Accidental spillages must be immediately contained and reported.

SUMMARY OF MARINE ENVIRONMENTAL IMPACTS

A summary of the marine environmental impacts because of the maintenance activities is provided in **Table 8**. Cumulative marine environmental impacts emanating from the proposed project are primarily related to soft-bottom benthic habitat, turbidity and smothering. The results of this study indicate that the sections of soft-bottom benthic habitat that will be disturbed during maintenance are in no way limited to the maintenance site and are not unique in terms of species composition, biomass or abundance. Furthermore, the benthic environment is already highly disturbed by constant sand movement and organisms are accustomed to such disturbance. In light of this, negligible impacts on macrofaunal communities along the pipe and SBM Buoy 3 are anticipated, and any effects that may be experienced will be temporary.

Table 8 Summary of Marine Environmental Impacts

IMPACT	MAINTENANCE ACTIVITY	SIGNIFICANCE	MITIGATION REQUIRED	CONFIDENCE
Disturbance of subtidal sediment	Pipeline Stabilisation	Very Low	Yes (Best practice)	High
	Anchor Replacement	Very Low	Yes (Best practice)	High
Disturbance of mobile organisms	Pipeline Stabilisation	Very Low	No	High
	Anchor Replacement	Insignificant	Yes	High
Turbidity	Pipeline Stabilisation	Insignificant	No	Medium
	Anchor Replacement	Insignificant	No	High
Smothering	Pipeline Stabilisation	Very Low	No	High
	Anchor Replacement	Insignificant	No	High
Mobilisation of contaminants	Pipeline Stabilisation	Insignificant	No	Medium
	Anchor Replacement	Insignificant	No	High
Hazardous substances (without mitigation)	Pipeline Stabilisation	Low	Yes	High
	Anchor Replacement	Low	Yes	High
Hazardous substances (with	Pipeline Stabilisation	Very Low	Yes	High

mitigation)	Anchor Replacement	Very Low	NA	High

PROPOSED TRIAL AREAS FOR SBM PIEPLINE STABILSAITION

The ecological specialist confirmed that the potential ecological impacts associated with the trial area will likely be of low significance as per all impacts associated with the proposed stabilisation activity, provided that the test area does not include any hard substratum (reef) habitat (included in **Section 6.2**). SAPREF have confirmed that there is no reef at the proposed location based on the borehole mapping of the area around the pipeline and trial area. Boreholes suggest a minimum 6m sediment of sand of various consistency underneath the present seabed.

5.3 MARINE ARCHAEOLOGY IMPACTS

Maritime archaeology specialist Vanessa Maitland undertook a Maritime Heritage Desktop Survey (including review of ROV footage for pipeline stabilisation in 2017 and a magnetometer survey of the pipeline, PLEM and associated anchor legs in 2019 (**Appendix E**). The impact assessment outlined in this section is based on the 2017 and 2019 surveys.

IMPACTS ON POSSIBLE CULTURAL HERITAGE OBJECTS

PIPELINE STABILISATION

The potential impacts associated with the maintenance activities relate to the loss or damage of MUCH objects along the 600m stretch of pipeline to be stabilised and the 100m transitions on either side; as well as other objects which may be uncovered as the trenching activities progress. The loss of cultural heritage resources extends nationally and is non-reversible; however the probability is low as the potential MUCH objects are not located within the 600m span to be stabilised. An impact of **MEDIUM** (negative) significance with **MEDIUM CONFIDENCE** pre-mitigation (**Appendix E-1**).

Mitigation measures recommended in the Marine Archaeology Desktop Survey Report (**Appendix E-1**) will allow for intensity of impact (loss of MUCH resources) to be better understood; and reduce probability of impact occurring during potential future stabilisation requirements. Confidence will also increase once more detailed assessment is done of the MUCH objects located outside the 600m span.

Investigation into the possible MUCH sites should be undertaken during the annual maintenance dives, in the following manner:

— SAPREF divers should take detailed photographs of the possible porthole and bollard (with a scale), fanning away the sand in order to capture detail;

— Divers should perform a 30m circular search for the possible MUCH resources, taking video. This footage can be assessed in order to make a recommendation that will fulfil the requirements of the NHRA.

Thereafter a maritime archaeologist should assess their potential significance.

The potential outcomes of the significance assessment are as follows:

— Resources that cannot be avoided and could be directly impacted by the future stabilisation (i.e. stretch of pipeline where possible MUCH objects are located) should be excavated / recorded and a management plan developed for future action.

— Resources that will not be directly impacted on by the proposed maintenance area (i.e. located within 30m of the pipeline) should still be considered in a management plan to allow for future care and management.

Should additional MUCH objects be identified during stabilisation – the identification and reporting measures as outlined in **Section 6.3** must be followed (i.e. Chance Find Protocol).

Mitigation measures will reduce the impact significance to **Low** (negative) with **HIGH CONFIDENCE (Table 10)**.

PROPOSED TRIAL AREAS FOR SBM PIPEPLINE STABILSAITION

The MUCH specialist review findings of previous investigation contained in Marine Archaeology Desktop Survey

Report (**Appendix E-1**) to assess likelihood of potential impacts associated with the secondary trial area long the pipeline. A possible porthole approximately 150m landside of KP 1.0 was identified. This was not identified as a fatal flaw; however, a recommendation for trenching/excavating in the offshore direction at KP 1.0 was made.

The additional study, "Maritime Heritage Phase 1 Archaeological Survey for Durban Oil Import Pipeline Lowering Trial Area" **(Appendix E-2**) concludes that the magnetometer survey revealed no large magnetic anomalies (which would indicate the presence of potential MUCH resource). Hence, no diver searches were deemed necessary to be undertaken. The additional study reduce the probability of chance finds. Recommendations are included in **Section 6.3.**

ANCHOR REPLACEMENT

A magnetometer survey was conducted in November 2018 along the length of the pipeline with approximately 400 m study area on either side of the pipeline and to some extent around the anchor legs. A survey in the immediate vicinity of the PLEM was not possible due to the presence of vessels at the PLEM at the time of Findings and recommendations are contained in the SAPREF Maritime Heritage Desktop Field Survey Report (Vanessa Maitland, February 2019) (**Appendix E-3**). The magnetic signature of the PLEM and vessel completely "drowned" out other anomalies. Therefore, it was decided to avoid the PLEM. Therefore, there may be small MUCH resources that are "hiding" within the magnetic signature of the pipeline. The magnetometer survey should therefore still be able to discern a shipwreck lying in the vicinity. All "hits" may not be MUCH sites, in addition, searches may not find the cause. Their status may only be revealed during the maintenance activities. The process however provides SAPREF with an idea of where MUCH sites may be uncovered.

Analysis of the magnetometer survey displays a number of anomalies in the study area (**Figure 8**).

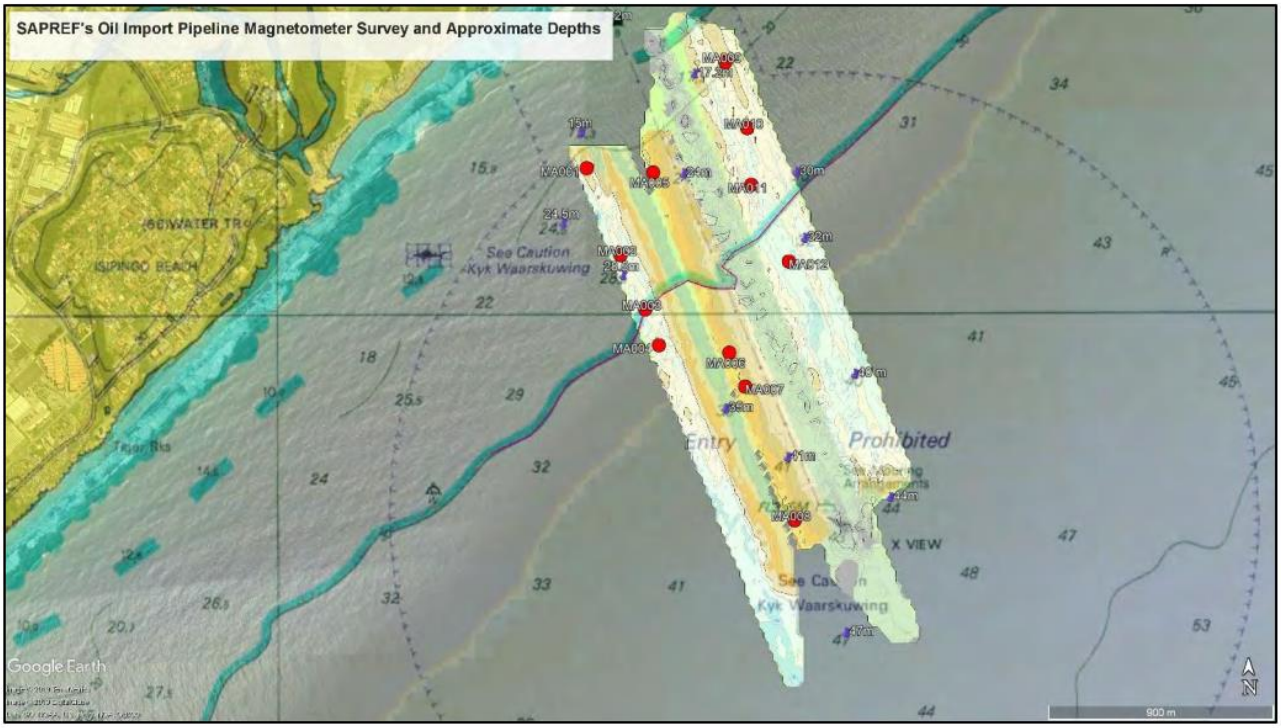


Figure 8 Magnetometer Survey with the Marine Chart Overlay (Google Earth 2019; SAN 1029 1971)

However, it is noted by the MUCH specialist that pipelines can emit a similar magnetic signature. Therefore, some of these anomalies may well be left over from the construction of the pipeline. However, there is a possibility of MUCH resources being found during maintenance of the pipeline in which case the chance find procedure must be followed.

The largest anomaly is MA001, it is near the coastline and therefore may be shipwreck material. Shipwrecks and the associated debris field generally has much larger, more complex magnetic signatures. It is 430m from the pipeline and should not be impacted by future maintenance work (i.e. outside maintenance footprint). The closest anomaly to to

the PLEM is MA008. However, it is 240m from the PLEM and 150m from the pipeline (i.e. outside maintenance footprint as anchor legs are buried approximately 70m from the PLEM).

The ROV GVI (Marine Data Consultants, December 2018) identified a potential shipwreck site located ~324m from the PLEM. With reference to **Figure 7,** it the estimated distance of the chains from the PLEM is ~364m. This indicates that a potential MUCH resource is located in close proximity to Anchor 4. SAPREF plan to avoid the potential MUCH but will stop work and consult a MUCH specialist if it cannot be avoided during actual execution. In the interim, it is recommended that SAPREF provide additional information (photos / ROV footage) of this area to the MUCH specialist, to make an assessment on its historical significance to inform most suitable mitigation and management measures (**Section 6.3**).

An impact of **MEDIUM** (negative) significance is anticipated with **MEDIUM CONFIDENCE** pre-mitigation (**Appendix E-4**). Sites that are not impacted must be written into the MMP for future avoidance and care. MA001 should be written in as a potential shipwreck site and if SAPREF divers get a chance to investigate the site, they should take video for inspection by a MUCH specialist. If it is a shipwreck, it should be marked as a no-go site, until its significance can be ascertained. Resources that cannot be avoided and that are directly impacted by the proposed activities require assessment by a MUCH specialist prior to execution of proposed activities. The significance of the shipwreck in close proximity to Anchor 4 must be recorded and management measures developed for future action.

Mitigation measures will reduce the impact significance to **Medium** (negative) with **HIGH CONFIDENCE** (**Table 9**).

Table 9 Summary of Marine Archaeological Impacts

IMPACT		SIGNIFICANCE	MITIGATION REQUIRED	CONFIDENCE
Loss of MUCH Resources (without mitigation)	Pipeline Stabilisation	Medium	Yes	Medium
	Anchor Replacement	Medium	Yes	High
Loss of MUCH Resources (with mitigation)	Pipeline Stabilisation	Low	NA	High
	Anchor Replacement	Low	NA	High

6 ENVIRONMENTAL ACTION PLAN

In this section the legal requirements identified in **Section 4** and the high level mitigation recommendations provided in **Section 5** are further elaborated in the form of 'management actions'. In order to support their implementation, the following additional information is provided in the tables:

- Responsible party for implementing the management actions;
- The timeframe and/or frequency for implementation; and,
- Monitoring and performance assessment measures.

6.1 GENERAL LEGAL COMPLIANCE

POTENTIAL ISSUES / IMPACTS	MANAGEMENT ACTIONS	RESPONSIBLE PARTY	TIMEFRAME
Objective: — To ensure compliance with general duty and specific legal compliance requirements outlined in **Section 4** of the MMP			
Compliance with the General Duty requirements in NEMA — SAPREF has a general duty to ensure that all aspects of its operations respond to this context by addressing environmental management and protection as an integrated part of its operations and activities. — SAPREF has a responsibility to take actions to prevent pollution or degradation of the environment in terms of Section 28 of NEMA, and to ensure that the environmental impacts associated with maintenance are considered and mitigated where possible.	a. The implementation of this MMP is regarded as being *inter alia* a reasonable measure. b. No specific additional actions are required.	SAPREF	Ongoing
Compliance with the General Duty requirements in NEM:ICMA — SAPREF has a duty of care to avoid causing adverse impacts on the coastal environment during maintenance activities. — SAPREF is responsible to avoid causing adverse impacts on the coastal environment in accordance with Section 28 of NEMA.			
Compliance with the EIA Regulations	a. Any maintenance activities not expressly described and assessed in this MMP must be reviewed by the SAPREF Environmental Manager to determine whether EA is required.	SAPREF	Ongoing
Compliance with section 38 of the NHRA	a. See **Section 6.3** (Protection of Cultural Heritage Objects)	-	-
Compliance with the NEM:WA and subservient Regulations	a. See **Section 6.4** (Management of Vessel Wastes (Solid))	-	-

6.2 AVOIDING AND MINIMISING MARINE ECOLOGICAL IMPACTS

POTENTIAL ISSUES / IMPACTS	MANAGEMENT ACTIONS	RESPONSIBLE PERSON	TIMEFRAME
Objective: – To avoid and/or minimise the potential impacts on the Marine Ecology caused by the maintenance process			
Testing of the MFE Equipment	The trial area must not include any hard substratum (reef) habitat. It should be possible to confirm this from a side scan or even bathymetry survey.	SAPREF Environmental Manager Contractor	Prior to MFE equipment commencement
The trenching activities and replacement of anchors have the potential to cause disturbances and impacts on subtidal benthic habitat and pelagic habitat.	The following actions are based on the recommendations in the Marine Impact Assessment for Maintenance of the SAPREF Offshore Pipeline (Anchor, July 2017): a) The contractor must confine disturbance to the approved maintenance footprint – it is recommended that this allow the area of direct influence to extend 5-10m from affected portion of pipelines. b) The maintenance footprint area must be defined in the method statement and authorised by the SAPREF Environmental Manager.	SAPREF Environmental Manager Contractor	Prior to Commencement
Disturbance of mobile organism during anchor and chain replacement.	Ensure as far as practically feasible that the area is clear of cetaceans before the commencement of maintenance operations (i.e. sufficient period is allowed for cetaceans to move from chains to be replaced). Cetaceans are larger marine mammals (e.g. whales and dolphins). Presence can be noted via visual observation.	SAPREF Environmental Manager Contractor	Prior to chain and anchor removal.
Accidental spillage of hazardous substances and waste has the potential to pollute the marine environment, and for marine organisms to become entangled in debris.	See **Section 6.4**: Management of Vessel Waste (Solid); **Section 6.5** Management of Vessel Waste (Effluent) and **Section 6.6**: Handling Small Quantities of Dangerous Goods / Contaminants.		

Monitoring and Performance Assessment	a. Live footage will be fed to the vessel during tool set up and pipeline stabilisation / trenching. b. Contractor to be able to provide evidence on request that footprint was adhered to: — Stabilisation excavation area to be confined to the area immediately around the pipeline and not exceeding 800m in length (including 2 x 100m transitions zones which will be gently sloped but will not be excavated by ~2m). — Anchor replacement maintenance footprint is defined as the area around the SBM, including the spread of the anchors and chains (~355m radius) and constitutes a total area of approximately 0.4 km2.	SAPREF Environmental Manager Contractor	Ongoing during stabilisation activities Post stabilisation / anchor replacement

6.3 PROTECTION OF CULTURAL HERITAGE OBJECTS

POTENTIAL ISSUES / IMPACTS	MANAGEMENT ACTIONS	RESPONSIBLE PERSON	TIMEFRAME
Objective: — To protect MUCH resources in terms of NHRA			
Testing of the MFE Equipment	a. The preservation and appropriate management of new discoveries in accordance with the NHRA, should these be discovered during trial area activities: b. The Environmental Manager should be given a short induction, by the heritage practitioners, on archaeological site and artefact recognition. c. The contractors and workers should be notified that archaeological sites might be exposed during the construction activities. d. Should any heritage artefacts be exposed work on the trial area where the artefacts were discovered, shall cease immediately and the Environmental Manager shall be notified as soon as possible. e. All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Manager will advise the necessary actions to be taken: f. Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and g. Contractors shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA (Act No. 25 of 1999), Section 51. (1).	SAPREF Environmental Manager Contractor	During MFE equipment testing

Trenching and anchor replacement has the potential to cause disturbance to MUCH objects identified in the vicinity of the pipeline.	Investigation into the possible MUCH sites should be undertaken during the annual maintenance dives, in the following manner: a. Detailed photographs of the possible porthole and bollard (with a scale) to be taken to capture detail for assessment by MUCH specialist. b. 30m circular search (video) of the possible MUCH resources for assessment to make specialist recommendations that will fulfil the requirements of the NHRA.	SAPREF Project Team	Prior to Commencement
	Resources that cannot be avoided and that are directly impacted by the proposed maintenance will require assessment by a MUCH specialist to determine historical significance, record on relevant SAHRA database and update of the MMP action plan.	SAPREF Project Team MUCH specialist	Pre-anchor replacement
Duty of Care and preservation of possible MUCH resource	Sites that are not directly impacted must be written into the MMP for future avoidance and care (e.g. MA001 and shipwreck in close proximity to Anchor 4). Potential and confirmed shipwreck sites need to be further investigated during maintenance and monitoring investigations, and ROV video made available for inspection by MUCH specialist. If it is a shipwreck, it should be marked as a no-go site, until its significance can be ascertained.	SAPREF Project Team	During internal maintenance and monitoring investigations
Identification of possible MUCH resources.	a. Should additional MUCH objects be identified during stabilisation and anchor replacement – the following identification and reporting measures should be followed: — Internal and contractor staff should be warned that archaeological sites might be exposed during stabilisation activities; — Internal and contractor staff should be provided a short induction by the heritage practitioners, on archaeological site and artefact recognition; — Should any heritage artefacts not previously identified and assessed be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Manager shall be notified immediately; — All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Manager will advise the necessary actions to be taken; — Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and — Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA (Act No. 25 of 1999), Section 51. (1).	SAPREF Environmental Manager Contractor	Ongoing during stabilisation activities and chain / anchor replacement at SBM Buoy 3.

Monitoring and Performance Assessment	a. Record of more detailed assessment by MUCH specialist of potential MUCH objects. b. Updated MMP including management measures for MUCH resources.	SAPREF Project Team SAPREF Environmental Manager MUCH specialist	Prior to Commencement
	a. Proof of induction including protocol for chance finds of MUCH resources b. Record of Heritage Authority contact details on file: – SAHRA Tel: 021 4624502 Fax: 021 462 4509 Email: info@sahra.org.za	SAPREF Environmental Manager Contractor	Ongoing during stabilisation activities and anchor replacement and SBM Buoy 3.

6.4 MANAGEMENT OF VESSEL WASTE (SOLID)

POTENTIAL ISSUES / IMPACTS	MANAGEMENT ACTIONS	RESPONSIBLE PERSON	TIMEFRAME
Objective: – To prevent pollution of the marine environment – To comply with the legal requirements of the NEM:WA			

Generation of non-hazardous and hazardous wastes by the offshore vessels undertaking the maintenance work.	a. At a minimum, waste materials should be segregated offshore into non-hazardous and hazardous wastes and returned to shore for reuse, recycling, or disposal. b. Temporary storage of waste offshore must be within clearly labelled sealed receptacles. c. Waste consignments returned to the vessels must be onwardly managed in terms of the South African Waste Management Legislation, as follows: — At the quay, hazardous waste (including used oils and material containing oils, solvents, empty chemical containers etc.) should be stored in a sealed and lidded waste skip or other appropriate storage container. — The hazardous waste skip or container must be labelled as HAZARDOUS WASTE and the Material Data Sheet (MSDS) or Safety Data Sheet (SDS) must accompany the consignment when it is collected by the waste disposal contractor. — The waste contractor(s) appointed for the removal of the hazardous waste must comply with the waste manifest requirements as per Chapter 5 of GN.R.634 (Waste Classification and Management Regulations) – Record Keeping and Waste Manifest System (**Appendix F**) . — The waste contractor(s) appointed for the removal of the hazardous waste must provide information to SAPREF on the third party waste management facility (e.g. disposal sites, recycling facilities etc.) to which the consignment is being despatched, together with waste facility registration (e.g. the Waste Management License. Permit to operate / proof that facility does not require these) for the facility.	Contractor	Ongoing during stabilisation activities
Monitoring and Performance Assessment	a. The following must be retained on file ("Environmental File") by SAPREF for a minimum period of 5 years for inspection by the Authorities if required: — Photographs of the waste reception facilities at the quay demonstrating adequate hazardous waste storage facilities — Copies of the waste manifest documents (e.g. safe disposal certificates signed by generator, transporter and receiving waste facility) provided by the waste contractor(s) — Evidence of Waste Management License(s) for third party waste management facilities. — Above to be placed in Environmental File maintained by SAPREF.	Contractor SAPREF Environmental Manager	Ongoing during stabilisation activities

6.5 MANAGEMENT OF VESSEL WASTE (EFFLUENT)

POTENTIAL ISSUES / IMPACTS	MANAGEMENT ACTIONS	RESPONSIBLE PERSON	TIMEFRAME

Objective: — To prevent pollution of the marine environment — To comply with the legal requirements of the NEM:WA			
Generation of effluent on vessels undertaking the maintenance work.	a. No oily water from deck washing, drainage systems, bilges etc. or sewage may be released to the marine environment. Such effluents must be contained and disposed of in accordance with the National Ports Authority requirements on return to the port.	Contractor	Ongoing during stabilisation activities
Monitoring and Performance Assessment	a. Contractor to retain evidence of transfer of effluents for management / disposal at the port b. Above to be placed in Environmental File maintained by SAPREF.	Contractor SAPREF Environmental Manager	Ongoing during stabilisation activities

6.6 HANDLING OF SMALL QUANTITIES OF DANGEROUS GOODS / ENVIRONMENTAL CONTAMINANTS

POTENTIAL ISSUES / IMPACTS	MANAGEMENT ACTIONS	RESPONSIBLE PERSON	TIMEFRAME
Objective: — To prevent pollution of the marine environment			
Small quantities of hazardous substances / environmental contaminants (typically oil and greases used for mechanical equipment) stored and handled on the maintenance vessel(s) has the potential to be accidental spilt into marine waters.	a. The following actions are applicable to the storage and handling of dangerous goods on the vessel(s) undertaking the maintenance: — Quantities stored must be limited to the minimum level required for operational purposes. — MSDS for all hazardous substances are to be kept in the storage area. — Ensure that materials are stored on the vessel in containers / designated areas that meet the specifications in the MSDS. — Facilities / equipment for spill containment / clean-up measures as recommended in the MSDS must be available on the vessel. As a minimum requirement all storage areas must have secondary containment (bund, drip tray etc.) and an appropriate absorbent material / spill kit must be available on the vessel.	Contractor	Ongoing during stabilisation activities
Monitoring and Performance Assessment	a. Compliance with the provisions of the above management actions must be assessed and authorised by the SAPREF Environmental Manager. b. Inclusion of relevant MDSs in Environmental File.	SAPREF Environmental Manager	Prior to commencement.

6.7 PREVENTION AND MANAGEMENT OF POTENTIAL SBM PIPELINE RELEASES TO ENVIRONMENT

POTENTIAL ISSUES / IMPACTS	MANAGEMENT ACTIONS	RESPONSIBLE PERSON	TIMEFRAME
Objective: — To prevent pollution of the marine environment			
Spills from the SBM has the potential to occur due to leaks, equipment failure, accidents, or human error. It is noted that the SBM pipeline will not be in service and will not contain crude oil when the project is undertaken.	a. Contractor to prepare a detailed HAZOP study for sign off by SAPREF to identify potential hazards in this regard and the associated mitigation requirements.	Contractor SAPREF Environmental Manager	Prior to commencement.
	a. SBM Oil Spill Contingency Plan (January 2017).	Contractor SAPREF Environmental Manager	Prior to commencement.
Monitoring and Performance Assessment	a. SBM Oil Spill Contingency Plan (January 2017) to be included in tender requirements for contractors to plan for inclusion of mitigation measures b. SBM Oil Spill Contingency Plan (January 2017); and signed off version of the Contractor HAZOP study kept within Environmental File.	SAPREF Project Team	Prior to commencement.

7 ENVIRONMENTAL MANAGEMENT GOVERNANCE

7.1 ENVIRONMENTAL METHOD STATEMENTS

The contractor must prepare method statement(s) that describe how the work will comply with the Environmental Action Plan contained in the MMP. The method statement(s) must be authorised by the SAPREF Environmental Manager prior to the commencement of maintenance activities.

7.2 ENVIRONMENTAL AWARENESS

SAPREF has the responsibility to ensure that all persons involved in maintenance activities are aware of, and are familiar with, the environmental requirements of the project. All project personnel, including contractors and sub-contractors are required to receive training of a type and level of detail that is appropriate for the environmental aspects of their work. As a minimum, all personnel are required to complete the training requirements stipulated in **Table 10**.

All senior and supervisory staff members shall familiarise themselves with the full contents of the MMP. They are required to understand the specifications of the MMP and be able to assist other staff members in matters relating to the MMP.

Table 10 Training and Induction Requirements

AWARENESS INITIATIVE	PURPOSE	FREQUENCY
Project Induction	The purpose of the induction is to ensure that, as a minimum, all project personnel understand the MMP in terms of: — Key environmental issues relating to the project. — Potential impacts and their mitigation. — Relevant conditions laid down by the Authorities e.g. EDTEA or SAHRA (if applicable). — Location and protection of environmentally sensitive areas. — SBM Oil Spill Contingency Plan. — Incident reporting procedures. — Roles and responsibility relating to environmental management. — Approved method statements.	Prior to commencement of work by staff and / or contractors.
Toolbox Talks	Toolbox talks are intended to deliver specific training in an aspect of work or control including: — Personal Protective Equipment (PPE) requirements. — Waste handling procedures. — Ad hoc training and awareness as required to promote compliance with the MMP. — Refresher on applicable method statements.	As and when required.
Pre-Start Meeting	Pre-start meetings should be undertaken prior to commencement of a shift or the commencement of a new activity in order to discuss the planned work and operational aspects of the tasks. HSE issues and controls should be discussed and understood.	As and when required.

Attendance records must be completed after each training session for the above and retained by the SAPREF Environmental Manager in the Environmental File.

7.3 STAKEHOLDER ENGAGEMENT

7.3.1 STAKEHOLDER IDENTIFICATION AND NOTIFICATION

Initial stakeholder engagement aims to include the following pre-identified stakeholders:

— Other SBM Owners
— SAPREF Community Liaison Forum (CLF)
— Ratepayers Association and Ward Councillor
— Commenting Authorities (DWS, KZN Wildlife, WESSA /; SAHRA, eThekwini Municipality; EDTEA Coastal; DEA Oceans & Coast; SAMSA)
— Known interest groups and community representatives (SDCEA; Groundwork; Coastwatch)

PIPELINE STABILISATION

Stakeholders were notified of the maintenance works and provided detail on the availability of the Draft MMP for a 30-Day comment period 26 September 2017 to 26 October 2017. Comments received from stakeholders have been included in a Comment and Response Report (**Appendix G**).

The stakeholders will be notified on the submission of the Final MMP to EDTEA and availability for further review over a 21-day comment period while EDTEA review and prior to issue of a decision. The addition of the trial area will be highlighted in the covering letter. A request will be made that all further comments be provided to the EDTEA assessing officer within the 21-day period.

ANCHOR REPLACEMENT

Stakeholders will be notified via email / written notice of the maintenance works and provided detail on the availability of the updated MMP for a 30-Day comment period **14 February 2020 to 14 March 2020.** Comments received from stakeholders will be included in a Comment and Response Report for consideration by EDTEA.

7.3.2 PRIOR NOTIFICATION TO STAKEHOLDERS OF MAINTENANCE ACTIVITIES

SAPREF must notify stakeholders of planned maintenance activities (remedial work only). Stakeholders must include:

— The existing SAPREF Community Liaison Form database; and,
— Interested and Affected Parties (I&APs) that registered as part of the MMP stakeholder engagement process.

Evidence of the notifications must be retained on file by the SAPREF Environmental Manager.

7.3.3 ENQUIRIES AND COMPLAINTS

Enquiries or complaints should be able to be received from adjacent land-users and / or the community (i.e. stakeholders) through the following channels:

— Telephone number: 0 800 33 0090
— Email: francism@sapref.com

Community enquiries or complaints must be brought to the attention of the SAPREF Environmental Manager who should ensure corrective action and close-out. As a minimum the following information should be recorded:

— Time, date and nature of enquiry or complaint.
— The means by which the enquiry or complaints was made.
— Personal details of the person / party lodging the enquiry or complaint (subject to privacy considerations).
— Actions taken to investigate and close-out the complaint as well as complainant feedback.

All complaints received will be investigated and a response (even if pending further investigation) will be given to the complainant within 7 days.

Any actions that cannot be managed immediately should be assigned to the appropriate personnel and will become an outstanding action. The action remains outstanding until it is closed off by the SAPREF Environmental Manager.

7.4 INCIDENT MANAGEMENT AND MITIGATION

Table 11 itemises the requirements for incident management and mitigation:

Table 11 Incident Management and Mitigation Steps

ASPECT	REQUIREMENT
Reporting of HSE Incidents	— Any HSE incident should be reported immediately to the SAPREF HSE representative. — Immediate correspondence should be taken with the relevant staff members to determine mitigation and close-out requirements. — All significant incidents are to be reported to the relevant Authority as per the legal requirements. — Health and safety related incidents are to be reported as per regulations under the Occupational Health and Safety Act (OHSA) viz. General Administrative Regulations (GN. R929 of 2003).
Contents of Environmental incident records	Environmental incident reporting and recording should include the following information: — Time, date and nature of the incident. — Response and investigation undertaken. — Actions taken and by whom.

Continual Improvement	— Corrective and preventative action requests should be forwarded to the responsible person so that corrective action can be taken. Open non-conformances should only be closed on verification by the Project Manager / Environmental Manager that the corrective action has been implemented effectively in order to meet the MMP requirements. — The cause of all incidents should be investigated to determine root cause and to ensure that corrective action is able to be implemented to ensure that there is no repeat of the incident. — A summary and review of incidents recorded during the maintenance activities should be included within a report by the SAPREF Environmental Manager. — If required following an incident, a review of the efficacy of the MMP should be undertaken by the SAPREF Environmental Manager in order to identify possible areas of improvement or updating or amendment required within the MMP.

7.5 MMP REVISIONS

Revisions to the MMP may be made by SAPREF or an external Environmental Assessment Practitioner (EAP). The revisions are to be submitted to the EDTEA for approval. It is noted that conditions of the EDTEA approval may require that stakeholder engagement is undertaken, the timeframes for which must be factored into project planning by SAPREF.

7.6 ROLES AND RESPONSIBILITIES

Table 12 provides a high-level outline of the various roles and responsibilities of SAPREF's representatives and the Contractor(s).

Table 12 MMP Roles and Responsibilities

DESIGNATION	ROLES AND RESPONSIBILITY
Maintenance Project Team	— Oversee and verify corrective and preventative action requests. — Facilitate inclusion of recommended heritage investigations to take place in first maintenance and integrity survey post pipeline stabilisation (i.e. 2018/2019).
SAPREF Environmental Manager	— Prepare MMP amendments / updates if required. — Review future maintenance activities to ensure conformance with the MMP; evaluate potential EA requirements or MMP amendments where deviations exist. — Authorise environmental method statements as per **Section 7.1** of the MMP. — Environmental awareness training as per **Section 7.2** of the MMP. — Stakeholder engagement in conjunction with SAPREF communications representatives as per Section 7.4 of the MMP. — Maintain Environmental File and keep on record for a minimum of 5 years. — Maintain environmental incidents and stakeholder complaints register. — HSE incident management in conjunction with the SAPREF HSE Manager, and SAPREF Project Manager. — Effect designated Environmental Actions detailed in **Section 6** of the MMP.
Contractor(s)	— Prepare environmental method statements as per **Section 7.1** of the MMP — Effect / comply with designated Environmental Actions detailed in Section 7 of the MMP
Competent Authority (EDTEA)	— Authorise MMP amendments / updates.

8 CONCLUSION

In terms of NEMA, everyone (i.e. all persons engaging in any component of this project) is required to take reasonable measures to ensure that they do not pollute the environment. The reasonable measures' include informing and educating employees about the environmental risks associated with their work and training them to operate in an environmentally responsible manner.

SAPREF and its contractors must also recognise that, in terms of NEMA, the cost to repair any environmental damage will be borne by the person responsible for the damage. If the above-mentioned environmental management actions are adopted, it is anticipated that negative environmental impacts will be mitigated.

APPENDIX

A APPROVAL OF THE MAINTENANCE MANAGEMENT PLAN (MMP) FOR SAPREF SBM PIPELINE STABILISATION, ISIPINGO

edtea
Department :
Economic Development, Tourism and Environmental Affairs
PROVINCE OF KWAZULU-NATAL

Enquiries	: Mr. Sabelo Ngcobo	**Telephone**	: 033 264 2500	**Private Bag**	: X54321
Imibuzo	:	**Ucingo**	:	**Isikhwama Seposi:**	Durban
Navrae	:	**Telefoon**	:	**Privaat Sak**	: 4001
Reference	: MMP/0001/2017	**Fax**	: –	**Date**	:
Inkomba	:	**iFeksi**	:	**Usuku**	:
Verwysing	:	**Faks**	:	**Datum**	: 02/05/18

Directorate: Environmental Services

Shell and BP South African Petroleum refineries (SAFREF)
P.O. Box 26312
Isipingo Beach
4115

Attention: Ms. Melanie Francis
Tel : 031 480 1911
Cell : 082 556 1609
E-mail : francium@sapref.com

RE: APPROVAL OF THE MAINTENANCE MANAGEMENT PLAN (MMP) FOR THE SAPREF SINGLE BUOY MOORING (SBM) PIPELINE STABILIZATION, ISIPINGO, WHICH IS LOCATED WITHIN THE ETHEKWINI MUNICIPALITY.

Dear Madam,

Please be advised of the following:

1) The following has reference:

   a) The SBM Oil Spill Contingency Plan dated 25 January 2017;
   b) The correspondence from the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs with reference no. 0011/July 2017 issued on 31 July 2017;
   c) The Maritime Archaeology Report prepared by Vanessa Maitland, dated July 2017;
   d) The Maintenance and Inspection Strategy – SMB Pipeline, reference no. Document ID: Asset.PR.0148, Rev 0, effective date 01 August 2017;
   e) The application for Approval of a Maintenance Management Plan (MMP) received by the Department on 29 September 2017; and,
   f) The MMP with reference no. MMP/0001/2018 prepared by WSP Environmental (Pty) Ltd dated 05 March 2018 for the SAPREF single buoy mooring (SBM) pipeline stabilization in Isipingo, which is located within the eThekwini Municipality.

2) The KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs hereby **grants approval of the MMP** subject to the following conditions:

a) The mitigations measures and method statement as presented in the approved MMP compiled by WSP Environmental (Pty) Ltd dated 05 March 2018 for the SAPREF single buoy mooring (SBM) pipeline stabilization must be implemented and adhered to.

b) In the event of a spill incident occur, the measures prescribed in the SBM Oil Spill Contingency Plan dated 25 January 2017 must be implemented.

c) Further to the above, the following actions must be taken into account in the event of a spillage of chemicals, fuel, or other hazardous substances during the replacement of the pipeline:

i. Stop the source of the spill;
ii. Contain the spill;
iii. Provide measures to prevent any pollution which could impact on soil, surface and ground water during leaks and ruptures from equipment and pipes;
iv. All significant spills must be reported to this Department: Pollution and Waste Management and other mandated authorities such as the Department of Water and Sanitation (DWS);
v. Provide mitigation measures in terms of soil, groundwater or other environmental impacts; and,
vi. The incident must be documented.

d) In the event of a spillage which poses a serious threat to the environment, the following Departments must be informed within forty-eight (48) hours of an incident and/or emergency situation:

i. The eThekwini Municipality;
ii. DWS;
iii. KZN Department of Economic Development, Tourism & Environmental Affairs: P&W component;
iv. The Local Fire Department; and,
v. Any other mandated department.

e) An Environmental Control Officer (ECO)[a] must be appointed **prior** to the commencement of the pipeline replacement to monitor the implementation of the approved MMP.

f) The ECO must conduct one (02) site visits per month during the replacement of the SBM pipeline.

g) The responsibilities of the ECO must include inter alia:

i. Performing all tasks assigned to the ECO;
ii. Keeping a record of all activities on site, problems identified and transgressions noted;
iii. Assisting the applicant in ensuring/enforcing implementation of the approved MMP; and,
iv. Providing guidance/advice that ensures implementation of appropriate environmental management measures and adherence with environmental legislation/regulations.

h) Records relating to monitoring and auditing must be kept on site during the replacement phase of the SBM pipeline of the development and must be made available for inspection to this Department and other relevant authorities.

[a] The ECO have the necessary experience and qualifications to understand, interpret, monitor, audit and implement the MMP. Feedback must be given in the form of an audit report which must address any non-compliance that may have risen from the audit.

i) All monitoring/audit reports must be completed by the environmental control officer (ECO) on a monthly basis to the Control Environmental Officer: Compliance, Monitoring and Enforcement (CME) Component, as per following contact details:

Control Environmental Officer: CME Component
Attention: Mr. Nazeer Jamal
eThekwini District
Department of Economic Development, Tourism and Environmental Affairs
Private Bag X54321
Durban
4000
E-mail: Nazir.Jamal@kznedtea.gov.za

j) All non-compliances and any deviation from the conditions set out in the MMP must be reported within **fourteen (14) days** of occurrence. This correspondence must be sent to the Control Environmental Officer: CME Component as per contact details stipulated in 2 (i) above.

You are further reminded of the following:

3) This Department reserves the right to review the MMP of the above-mentioned activity and amend/add any condition as it is deemed necessary.

4) The Department brings to your attention your obligations to ensure that compliance with the provisions for *Duty of Care and remediation of environmental damage* contained in Section 28 of the National Environmental Management Act, Act 107 of 1998, where the determination of environmental degradation and the need for remediation will be decided by this Department.

5) The development must comply with relevant local bylaws.

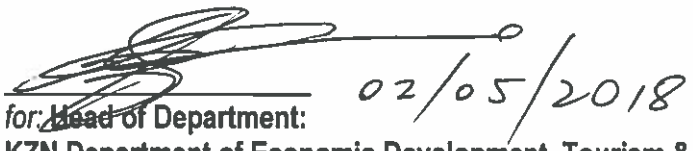
6) Any form of waste material and rubble generated during the any phase of the development must be disposed of at a facility registered in terms of section 20(b) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), if it cannot be responsibly re-used or recycled on site or off-site. No waste material of any kind may be buried (for the sole purpose of final disposal) or burnt on the site. The contractor responsible for the removal of the waste during any phase of the stabilization of the SBM pipeline must supply the applicant with a certificate indicating safe disposal and be made available to this Department upon request.

7) Kindly note that should there be any other activity associated with the above-mentioned development, which is identified as a listed activity in terms of Listing Notice 1, 2 or 3 the EIA Regulations, December 2014, and as amended on 07 April 2017, is subject to approval by the Department prior to any physical commencement of the activity being undertaken on site.

8) This Department retains the right to inspect the property at any time during its development and operational phases, and reserves its rights in terms of Section 28(4) of the National Environmental Management Act, 1998 to ensure that reasonable measures are taken to prevent, minimise or rectify pollution or degradation to the environment.

9) Please don't hesitate to contact the Department should you have any enquiries.

Yours faithfully



02/05/2018

for: ~~Head of~~ **Department:**
KZN Department of Economic Development, Tourism & Environmental Affairs
Signed by: Mr. Sabelo Ngcobo
Senior Manager: South Region

cc: Ms. Carla Elliott, WSP Environmental (Pty) Ltd., Tel: 031 240 8874, E-mail: carla.elliott@wsp.com

APPENDIX

B EDTEA ACCEPTANCE OF MMP UPDATE APPLICATION

APPENDIX

edtea
Department :
Economic Development, Tourism and Environmental Affairs
PROVINCE OF KWAZULU-NATAL

Enquiries: Ms. Zama Mbanjwa
Reference:DM/MMP/0002/2019
Date: 08 October 2019
Physical Address: 270 Jabu Ndlovu Street, PMBurg 3200
Tel: (033) 264 2898,
Postal Address: Private Bag X9152, PMBurg, 3200
www.kznded.gov.za

Email Transmission

WSP Environmental (Pty) Ltd
P.O. Box 1442
Westville
3630

Attention: Mr. Carla Elliot
Email:Carla.elliott@wsp.com

Dear Sir/ Madam

DM/MMP/0002/2019: ACKNOWLEDGEMENT OF RECEIPT FOR THE MAINTENANCE MANAGEMENT PLAN FOR **SAPREF SINGE BUOY MOORING (SBM) ANCHORS AND CHAINS REPLACEMENT (MOORING SYSTEM)**.

1. Receipt of maintenance management plan application has been accepted by this Department and registered under the reference number **DM/MMP/0002/2019** dated **09 September 2019**. Kindly quote this reference number in any future correspondence in respect of the application.

2. Enquiries regarding this application may be directed to the Impact Assessment Manager: **Ms. Natasha Brijlall / Yugeshnie Govender, Tel No: 031 366 7317: at Durban District Office.**

Yours faithfully

For: **Head of Department:**
Department of Economic Development, Tourism & Environmental Affairs.
Cc:Mr. Melanie Francis. Shell and BP South African Petroleum Refineries (SAPREF): francium@sapref.com

APPENDIX

C SAPREF INTERNAL MAINTENANCE AND INSPECTION STRATEGY

APPENDIX

C-1 *SBM Pipeline, Document ID: ASSET.PR.0148, REV. 0 (August 2017)*

APPENDIX

C-2 *Anchor Leg Chain Angle and Wear Down Measurements procedure (January 2020)*

APPENDIX

D

MARINE IMPACT ASSESSMENT

APPENDIX

D-1 *MARINE IMPACT ASSESSMENT FOR MAINTENANCE OF THE SAPREF OFFSHORE PIPELINE (ANCHOR ENVIRONMENTAL CONSULTANTS, JULY 2017)*

APPENDIX

D-2 *Marine Impact Assessment for SAPREF Anchor Replacement (Anchor Environmental Consultants, December 2018)*

APPENDIX

E MARITIME ARCHAEOLOGY ASSESSMENT

APPENDIX

E-1 *Maritime Heritage Desktop Survey (VANESSA MAITLAND, JULY 2017)*

APPENDIX

E-2 *SAPREF Maritime Heritage Phase 1 Survey -Trial Area (Vanessa Maitland, February 2018)*

APPENDIX

E-3 *SAPREF Maritime Heritage Desktop Field Survey (VANESSA MAITLAND, FEBRUARY 2019)*

APPENDIX

E-4 *MUCH Impact Significance Rating*

APPENDIX

POTENTIAL LOSS OF MARINE UNDERWATER CULTURAL HERITAGE RESOURCES - IMPACT SIGNIFICANCE RATING

LOSS OF MUCH RESOURCES	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without Mitigation	National 3	Medium 2	Long-Term 3	Very High 8	Improbable	Medium	-ve	Medium
Essential Mitigation Measures: — Resources that cannot be avoided and that are directly impacted by the proposed maintenance will require assessment by a MUCH specialist to determine historical significance (prior to commencement), record on relevant SAHRA database and update of the MMP action plan. — Sites that are not directly impacted must be written into the MMP for future avoidance and care (e.g. MA001 and shipwreck in close proximity to Anchor 4). Potential and confirmed shipwreck sites need to be further investigated during maintenance and monitoring investigations, and ROV video made available for inspection by MUCH specialist. If it is a shipwreck, it should be marked as a no-go site, until its significance can be ascertained. — Resources that will not be directly impacted on by the proposed maintenance area (i.e. located within 30m of the pipeline) should still be considered in a management plan to allow for future care and management. Should additional MUCH objects be identified during maintenance activities – the following identification and reporting measures should be followed : — Internal and contractor staff should be warned that archaeological sites might be exposed during maintenance activities; — Internal and contractor staff should be provided a short induction by the heritage practitioners, on archaeological site and artefact recognition; — All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Officer will advise the necessary actions to be taken; — Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and — Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA (Act No. 25 of 1999), Section 51. (1).								
With Mitigation	National 3	Low 1	Long-Term 3	High 7	Improbable	Low	-ve	High

APPENDIX

F

HAZARDOUS WASTE MANIFEST GUIDELINE

APPENDIX

GUIDELINE - HAZARDOUS WASTE MANIFEST REQUIREMENTS

Summary from GN: R.634 (2013) – Waste Classification and Management Regulations

INTRODUCTION

According to the Waste Classification and Management Regulations (GNR 634 of 2013), a generator, transporter or manager of waste classified as hazardous in terms of SANS 10234 will need to be in possession of a waste manifest document. Where waste cannot be classified, the stream may need to undergo a waste classification process. Waste transporters may not accept hazardous waste unless a waste manifest document is provided by the generator. The waste transported/ contractor will need to provide the generator with a completed waste manifest document, indicating that the hazardous waste was correctly transported and disposed of at a licensed facility. This ensures that the hazardous waste is managed in an environmentally sound manner.

A waste manifest system tracks each load of a specific waste stream from generation to recycle/ disposal. A waste manifest system will allow the generator to reconcile waste generation/ collection data with waste disposal data and in so doing, will be able to verify safe disposal of specific waste streams, which is considered a key risk management requirement.

RESPONSIBILITIES

The legal compliance requirements for generators, transporters and managers of hazardous waste are summarised below:

ENTITY	REQUIREMENT
Generators of hazardous waste	– Complete a waste manifest document for each consignment of waste transported to a waste manager.
Transporters of hazardous waste	– Must not accept hazardous waste for transport, unless the waste manifest document accompanies the waste. complete a waste manifest document for each consignment of waste transported; – Must provide the information to the generator before the waste is transported from the premises of the generator; and – Provide the information to the waste manager at the time of delivery of the waste to the facility for a waste management activity.
Waste managers	– Must not accept hazardous waste unless the waste manifest document accompanies the waste. – Complete the waste manifest document confirming that the waste load has been accepted and that the waste has been managed.

WASTE MANIFEST CONTENTS

The information specified below must be reflected in the waste manifest document

A: INFORMATION TO BE SUPPLIED BY THE WASTE GENERATOR (CONSIGNOR):

i)	Unique consignment identification number
ii)	If applicable, the SAWIS Registration number in terms of the National Waste Information Regulations, 2012
iii)	Generator's contact details (contact person, physical & postal address, phone, fax, email
iv)	Physical address of the site where the waste was generated (if different from (iii))
v)	Contact number in case of an incident or after hours

Block A, 1 on Langford
Langford Road, Westville
Durban, 3629
South Africa

Tel.: +27 31 2408874
Fax: +27 31 240 8861
wsp.com

vi)	Origin / source of the waste (process or activity)
vii)	Classification of the waste and Safety Data Sheet
viii)	Quantity of waste by volume (m^3) or weight (tons)
ix)	Date of collection / dispatch
x)	Intended receiver (waste manager)
xi)	Declaration (content of the consignment is fully and accurately described, classified, packed, marked and labelled, and in all respects in proper condition for transportation in accordance with the applicable laws and regulations)
B: INFORMATION TO BE SUPPLIED BY THE WASTE TRANSPORTER-	
i)	Name of transporter
ii)	Address and telephone number of transporter
iii)	Declaration acknowledging receipt of the waste
C: INFORMATION TO BE SUPPLIED BY THE WASTE MANAGER (CONSIGNEE)-	
i)	Name, address and contact details
ii)	Receiving waste management facility name, address and contact details (where different)
iii)	Waste management facility licence number
iv)	Date of receipt
v)	Quantity of waste received by weight (tons), and volume (m^3) if applicable
vi)	Type of waste management applied (re-use, recycling, recovery, treatment, disposal)
vii)	Any discrepancies in information between the different holders of the waste (related to waste quantity, type, classification, physical and chemical properties)
viii)	Waste management reporting description and code in terms of the National Waste Information Regulations, 2012;
ix)	Certification and declaration of receipt and final management of the waste

APPENDIX

G

SBM PIPELINE STABILISATION COMMENT AND RESPONSE REPORT

APPENDIX

	COMMENT	RESPONSE
eThekwini Municipality (26 October 2017)		
	Electricity Department — With reference to the abovementioned Environmental Maintenance Management Plan, please be advised that various Municipal Departments have had sight of the proposal and the following comments are submitted for your attention:-Further please note: — The applicant must consult eThekwini Electricity's mains records (held in the drawing office at eThekwini Electricity Headquarters, 1 Jeff Taylor Crescent, for the presence of underground electrical services. In addition should any overhead line and/or servitude be affected, the specific permission of the Head: Electricity must be sought regarding the proposed development.	- No response necessary. - The work will be undertaken on a section of the undersea pipeline between 500m from the shoreline out to ~1.1km from the shoreline. There are no anticipated underground services within this project area. Thus, SAPREF does not consider it necessary to consult the records as suggested.
	— The relocation of MV/LV electrical services, if required in order to accommodate the proposed development, will be carried out at the expense of the applicant.	- As above, the work will be undertaken offshore. No MV/LV services are anticipated to be present.
	— This Department has reviewed the Maintenance Plan and has no issues or objections.	- No response necessary.
	Land Use Management Branch. — This Branch has no objection to this proposal provided relevant mitigation measures are complied with.	- No response necessary.
	Strategic Spatial Planning Branch. — This Branch has no objections to the above mentioned Environmental	- No response necessary.

APPENDIX

	Maintenance Management Plan for SAPREF single buoy stabilization for the existing sub tidal pipeline. — This Branch's support is subject to the applicant meeting all sector requirements. — This support should not be deemed to be an approval of the eThekwini Municipality. — This Branch reserves the right to comment further should the need arise.	
	Coastal, Stormwater and Catchment Management. — No comment from this Department.	- No response necessary.
	Parks, Leisure and Cemeteries. — No comment received.	- No response necessary.
	Pavement and Geotechnical Engineering. — No geotechnical comment.	- No response necessary.
	eThekwini Transport Authority. — This Department has no comment.	- No response necessary.
	Environmental Health Department. With reference to the above mentioned document dated September 2017, this Department would like to comment as follows; — 2.4.1, Page 14-Hazardous Event Risks: It is stated that the pipeline will be flushed clean during maintenance to avoid potential pollution risks, indicate the fate of the waste water from the pipeline	- Sea water flush is carried out from tanker at the SBM of approx. 10000 – 12000 cu.m. at a good rate which clears the line up to the refinery manifolds. In the past this has proved to be very effective with no oil residue left in the pipes. On completion of the outage this water is received in the tank farm onshore and sent through site effluent treatment.
	2.4.1, Page 15 / Hazardous Event Risks: — Submit the Sapref SBM Oil Spill Emergency Plan to the authority for review.	- The document has been provided to the Environmental Health Department as requested on 29 November 2017. See Proof on overleaf.

APPENDIX

	2.4, Page 14, Selection of the preferred technical method / Mass Flow Excavation: — It is not clear how the movement of the pipeline will be restricted to avoid the pipeline from resurfacing to its current state.	- Pipeline lowering (trenching) will lower the pipeline below the mean seabed level. Natural sediment migration perpendicular to the pipeline will backfill the trench. Hence future scouring is not expected. Possible recurrence will be managed through periodic inspection and repeat type intervention.
	2.5, Page 15-On going Maintenance: — The Maintenance and Inspection Strategy document must be updated to include more frequent monitoring in terms of the sub-sea pipeline survey due to risk posed by the pipeline especially at the area of concern. — In addition, consideration should be given for carrying out Intelligent Pigging more frequently than 5 years considering the harsh environment the pipeline is exposed to.	- The 2 years frequency stated in the Maintenance and Integrity Procedure is currently considered to be the minimum frequency for which SAPREF will complete inspection of the seabed. As stated, if results indicate that there is a problem, the frequency will be revised based on result from assessment of findings. Please note that frequency may also be relaxed if subsequent surveys (after the proposed pipeline lowering activity) indicate that pipeline is no longer at risk. The subsea survey is a requirement for safe operation of subsea pipeline and decision to relax the frequency will be done with the key Shell/ SAPREF experts and stakeholders. - Increasing the frequency of intelligent pigging will not help manage any future pipeline scour incidents. Intelligent pigging is used to detect internal and external corrosion (wall loss) but is not expected to detect pipeline over bending due to seabed scour. These are separate damage mechanisms. The 5 years' frequency is also the typical time based frequency used for major transportation subsea pipelines in the North Sea area.
	Section 6, Page 31, Environmental Action Plan: — During maintenance, there must be no repair of equipment on the vessel.	- A blanket statement prohibiting any repair work on the vessel is impractical as it could prevent repairs with no environmental implications from being undertaken, which could unnecessarily impact on project timeframes. The MMP provides that a HAZOP will be undertaken by the contractor – it is suggested that this HAZOP should be reviewed by the Environmental Manager to identify if any repair works could result in releases to the environment, and that only these repair activities should be prohibited. Alternatively, time permitting, repair works should be subject to development of a method statement by the contractor, which must be authorised by

		the Environmental Manager.
	— A buffer in terms of width must be decided by the authority to prevent the activity from extending into unaffected areas.	- The MMP currently recommends that in order to avoid and/or minimise the potential impacts on the Marine Ecology caused by the MFE process, the maintenance footprint area (described as 600m length of pipeline must be maintained). To meet the request of the eThekwini Municipality i.e. that EDTEA essentially authorises the project footprint, the MMP has been updated (**Section 2.4**) to include a 'limits of project' layout which indicates the maximum distance from the pipeline that disturbance of the sea-floor may take place. This includes the area of direct influence / affected zone (5m-10m either side of the affected portion of pipeline). - On selection of preferred vendor, SAPREF will need to authorise the area required for trials (~200m from pipeline located away from possible MUCH objects as identified in the Maritime Heritage Desktop Survey).
	Risk Assessment — The applicant will need to develop a full documented risk assessment that will identify all potential occupational risks associated with the proposed activity. The risk assessment should include any mitigatory measures required to deal with any impacts identified.	- It is WSP's opinion that occupational hazards identification and risk assessment (HIRA) is an important requirement, but falls outside of the remit of the MMP which deals with environmental matters. This said, SAPREF imposes strict Occupational Health and Safety requirements on its contractors, and will require the undertaking of a HIRA as part of the contract management process.
	Marine Impact Assessment — Recommendations as suggested in the above report must be adhered to by applicant.	- The recommendations from the Marine Impact Assessment are contained in the MMP, which will have a legally binding status once approved by EDTEA. As such SAPREF will be legally required to adhere to the MMP.
	Waste — The applicant will be required to develop and maintain a Waste Management Plan to effectively manage all waste generation from the proposed activity.	- It is WSP's opinion that the MMP Sections 6.4 (Management of Vessel Waste - Solid), and Section 6.5 (Management of Vessel Waste – Effluent) sufficiently constitute a waste management plan and that no further documentation is necessary in this regard.
	eThekwini Water and Sanitation Department	- Noted – However effluent from vessels (no oily water from deck

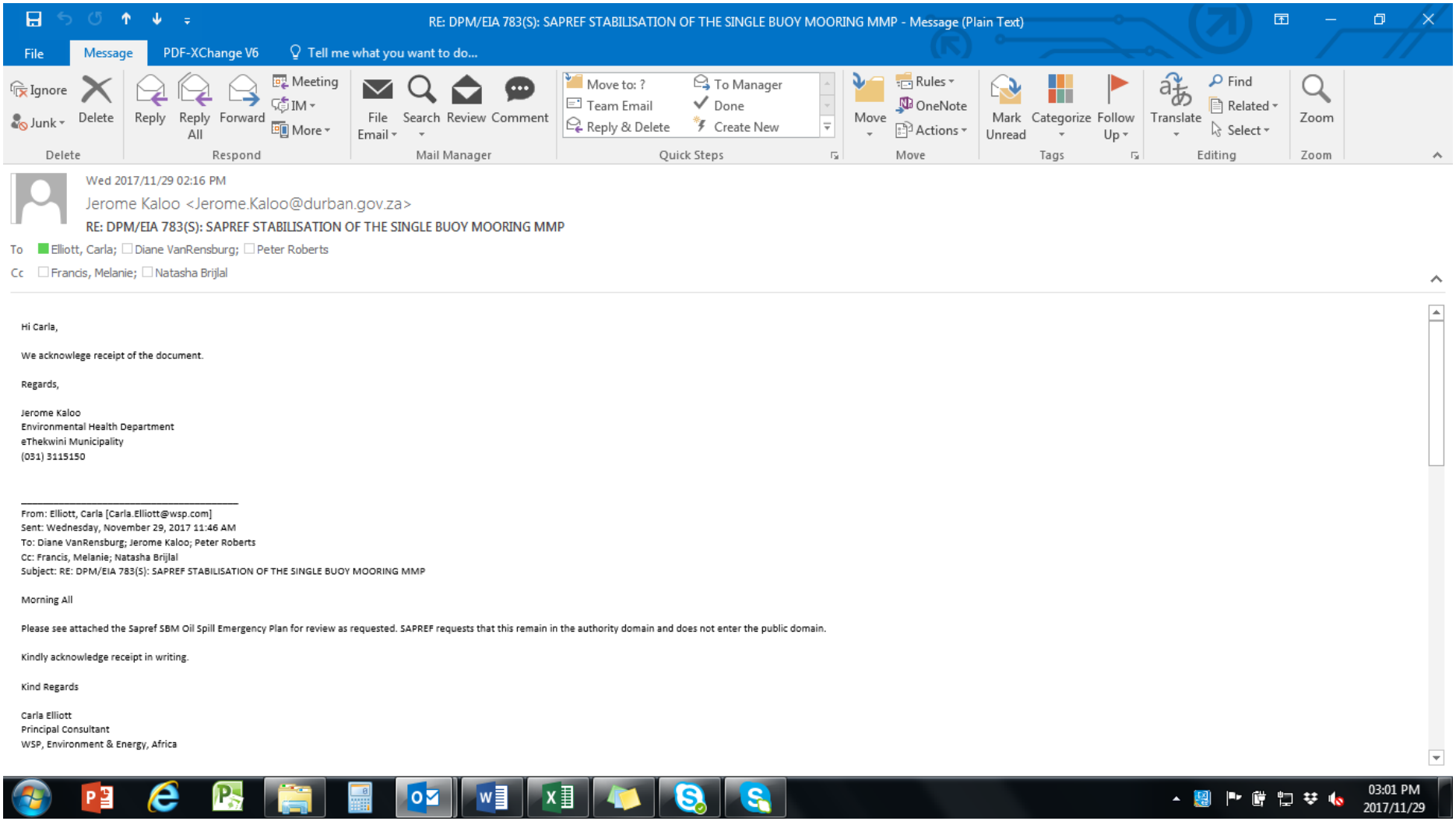
	Sanitation Planning Branch — No objection. — Should there be wastewater emanating due to this project that will impact on the Municipality's sewer system, then the applicant must consult this Department for approval.	washing, drainage systems, bilges etc. or sewage etc.) will be discharged in the port effluent management system in accordance with relevant acceptance criteria. As such approval is not anticipated to be necessary from the eThekwini Municipality.
	Water Design Branch — No objection.	- No response necessary.
	Durban Solid Waste — This Department has no requirement for this proposal.	- No response necessary.
	Disaster Management — No comment from this Department.	- No response necessary.
	Fire Safety. This Department has no objection to the above application subject to the following: — Full compliance with Major Hazard Installation Regulations since the site will be storing quantities of petroleum products.	- There will be no storage of large quantities of petroleum products specifically associated with the maintenance activities. Notwithstanding, the SAPREF refinery is fully compliant with the MHI regulations. An MHI Study has been completed in 2017.
	— The site complying with the Interim Code Relating to Fire Prevention and Flammable liquids and Substances.	- The project will be undertaken offshore via a marine vessel. The code indicated does not apply.
	— The site complying with the servitude requirements for underground gas and petroleum product pipelines in close proximity to the site.	- The work will be undertaken on a section of the undersea pipeline between 500m from the shoreline out to ~1.1km from the shoreline. With the exception of the SBM pipeline itself, there are no anticipated underground gas and petroleum product pipelines in close proximity to the site.

	— Full compliance with the road closure procedures and requirements to allow emergency services to respond in cases of emergency.	- Not applicable – see above
	— Full compliance with other applicable Legislative requirements.	- No response necessary.
South African Heritage Resources Agency (SAHRA) (17 October 2017)		
	The site was subject to geophysical survey and an ROV (Remotely Operated Underwater Vehicle) survey, the latter survey footage was provided to the Maritime Archaeologist to form part of the desk top study. SAHRA has reviewed the Maritime Heritage Desktop Survey and has the following comments and recommendations: — The desk based study conducted as part of the HIA concluded that 2 ships were reportedly wrecked in the vicinity of the pipeline, one is less than 60 years old so falls outside the remit of the NHRA and the other wrecked roughly 1km from the pipeline. However the exact location of the wreck is hard to ascertain due in part to the high volume of shipwrecks in the Durban area and poor historical reporting. While there are no specific shipwrecks sites identified within the study area, there is always the potential for maritime heritage to become uncovered during the proposed works.	- The possibility of additional MUCH sites being identified is acknowledged in the MMP and provided for in the Action Plan Section 6.3 (Protection of Cultural Heritage Resource Objects) which the procedure to be followed in this event.
	— The ROV survey conducted along the length of the exposed pipeline section was provided to the Maritime Archaeologist for review. The survey focussed on assessing the condition of the pipe itself and as such limitations were noted regarding general survey of the seabed within the vicinity of the pipeline. Two possible heritage sites were noted on the ROV footage, namely a possible porthole and a possible bollard, however they were not fully exposed and the significance of these objects could not be verified. The seabed is a very dynamic place and as such it cannot be determined if these object lie in situ as part of a wider heritage site or have merely come to rest here. The heritage report states that these objects lie just outside of the stabilisation area and therefore will not be directly impacted. However any future projects that may impact upon these heritage objects must be submitted to SAHRA and a Maritime	- No comment necessary, the MMP is being paraphrased.

	Archaeologist must review the objects to fully assess their significance.	
	— The conclusions and mitigation measures recommended in the report are supported by SAHRA and as such there are no objections to the proposed project.	- No response necessary.
	— SAHRA would like to advise that should any structures or shipwreck remains older than 60 years be uncovered during the proposed works, we must be notified immediately so that further advise can be given regarding complying with heritage legislation. — Should you have any further queries, please contact the designated official using the case number quoted above in the case header	- The inclusion of this requirement into the conditions of authorisation of the MMP is supported. - No response necessary.
Department of Water and Sanitation (DWS) (25 October 2017)		
	This Department has the following comments with regard to the proposed project: — This Department has reviewed the report titled "SAPREF Single Bouy Mooring (SBM) Pipeline Stabilization Environmental Maintenance Management Plan", date September 2017" and has no objections to the contents thereof.	- No response necessary.
	— The contents of the report titled "Marine Impact Assessment for Maintenance of the SAPREF Offshore Pipeline, Durban, KwaZulu-Natal", dated July 2017, are hereby acknowledged.	- No response necessary.
	— This Department further notes that the scope of work for the activities associated with the maintenance is confined to the marine environment and does not directly impact on any water resources as defined in the National Water Act, 1998 (Act 36 of 1998) (NWA).	- No response necessary.
	— This Department understands that the impact assessment for the preferred option of Mass Flow Excavation (MFE) with respect to the mobilisation of contaminants and nutrients and turbidity plumes created by dredging indicated that these impacts will be insignificant.	- No response necessary.

	— The proximity of the Isipingo, Mbokodweni and Manzimtoti estuaries has been noted. The Applicant must adhere to the following requirements during maintenance activities and, in case of incidents, must be mitigated. The prevention and remedying of the effects of pollution and the control of emergency incidents as contemplated under Section 19 and Section 20 of the NWA, respectively, with respect to water resources are applicable thereto.	- The legal section of the MMP (Section 4.4 – National Water Act) has been updated to include this general duty.
	— The hydrological functioning of the water resources must be maintained and restored after any disturbance	- No response necessary. It is understood this refers to any potential impacts on the Isipingo, Mbokodweni and Manzimtoti estuaries, which are highly unlikely.
	— Notwithstanding the above, the responsibility rests with the Applicant to identify all sources or potential sources of pollution from his undertaking and to take appropriate measures to prevent any pollution of the environment. — This reply does not grant any exemption from the requirements of any applicable Act, Ordinance, Regulation or Bylaw.	- The MMP is deemed to have fulfilled this requirement.

APPENDIX



RE: DPM/EIA 783(S): SAPREF STABILISATION OF THE SINGLE BUOY MOORING MMP - Message (Plain Text)

File | Message | PDF-XChange V6 | Tell me what you want to do...

Ignore | Junk | Delete | Reply | Reply All | Forward | Meeting | IM | More | File Email | Search | Review | Comment | Move to: ? | Team Email | Reply & Delete | To Manager | Done | Create New | Move | Rules | OneNote | Actions | Mark Unread | Categorize | Follow Up | Translate | Find | Related | Select | Zoom

Delete | Respond | Mail Manager | Quick Steps | Move | Tags | Editing | Zoom

Wed 2017/11/29 02:16 PM

Jerome Kaloo <Jerome.Kaloo@durban.gov.za>

RE: DPM/EIA 783(S): SAPREF STABILISATION OF THE SINGLE BUOY MOORING MMP

To Elliott, Carla; Diane VanRensburg; Peter Roberts

Cc Francis, Melanie; Natasha Brijlal

Hi Carla,

We acknowlege receipt of the document.

Regards,

Jerome Kaloo
Environmental Health Department
eThekwini Municipality
(031) 3115150

From: Elliott, Carla [Carla.Elliott@wsp.com]
Sent: Wednesday, November 29, 2017 11:46 AM
To: Diane VanRensburg; Jerome Kaloo; Peter Roberts
Cc: Francis, Melanie; Natasha Brijlal
Subject: RE: DPM/EIA 783(S): SAPREF STABILISATION OF THE SINGLE BUOY MOORING MMP

Morning All

Please see attached the Sapref SBM Oil Spill Emergency Plan for review as requested. SAPREF requests that this remain in the authority domain and does not enter the public domain.

Kindly acknowledge receipt in writing.

Kind Regards

Carla Elliott
Principal Consultant
WSP, Environment & Energy, Africa

03:01 PM
2017/11/29

APPENDIX