

PROPOSED COASTAL PROTECTION SCHEME,
ST FRANCIS BAY, KOUGA LOCAL MUNICIPALITY, EASTERN CAPE PROVINCE

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

DEDEAT REFERENCE NUMBER: EC08/C/LN2/M/01-2021

FINAL

<p>Prepared for</p>  <p>St Francis Property Owners NPC PO Box 18 St Francis Bay 6312</p>	<p>On behalf of</p>  <p>Kouga Local Municipality PO Box 21 Jeffreys Bay 6330</p>
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LIST OF ACRONYMS

CARA	Conservation of Agricultural Resources Act
CITES	Convention of International Trade in Endangered Species
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism
DEFF	Department of Environment, Forestry and Fisheries
DoL	Department of Labour
DoH	Department of Health
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
ECPHRA	Eastern Cape Provincial Heritage Resources Authority
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
EMS	Environmental Management System
ESO	Environmental Site Officer
GN	Government Notice
I&AP	Interested and/or Affected Party
IDP	Integrated Development Plan
KPIs	Key Performance Indicators
LM	Local Municipality
MS	Method Statements
MSDS	Material Safety Data Sheets
NEMA	National Environmental Management Act
NEMBA	National Environmental Management: Biodiversity Act
PNCO	Provincial Nature Conservation Ordinance
RE	Resident Engineer
S&EIR	Scoping and Environmental Impact Report
SABS	South African Bureau of Standards
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity institute
SBDM	Sarah Baartman District Municipality
SHE	Safety, Health, and Environment
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SFPO NPC	St Francis Property Owners Non-Profit Company
WULA	Water Use Licence Application

1. INTRODUCTION

This Environmental Management Programme (EMPr) Report has been compiled to provide mitigation, monitoring and institutional measures to be taken during the construction and operation of the St Francis Bay Coastal Protection Scheme Project. These measures aim to eliminate, offset and/or reduce adverse environmental and social impacts associated with the proposed project.

This EMPr informs all relevant parties, in this case, the Project Coordinator, the Contractor, the Environmental Control Officer (ECO) and all other staff employed by the Applicant at the site, as to their duties in the fulfilment of the legal requirements for the construction and operation of the St Francis Bay Coastal Protection Scheme, with particular reference to the prevention and mitigation of anticipated potential negative environmental impacts.

All parties should note that obligations imposed by the EMPr are legally binding in terms of the Environmental Authorisation (EA) granted by the relevant environmental permitting authority.

1.1. OBJECTIVES OF THE EMPr

The general objectives of the EMPr are to:

- Ensure compliance with the regulatory authority's stipulations and guidelines which could be local, provincial, national and/or international;
- Ensure that there is sufficient allocation of resources on the project budget so that the scale of EMPr-related activities is consistent with the significance of project impacts;
- Verify environmental performance through information on impacts as they occur;
- Respond to unforeseen events;
- Provide feedback for continual improvement in environmental performance;
- Identify a range of mitigation measures which could reduce and mitigate the potential negative impacts to minimal or insignificant levels;
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project;
- Identify measures that could optimize beneficial impacts;
- Create management structures that address the concerns and complaints of I&APs with regards to the project;
- Establish a method of monitoring and auditing environmental management practices during all phases of the activity;
- Ensure that safety recommendations are complied with; and
- Specify time periods within which the measures contemplated in the final environmental management programme must be implemented, where appropriate.

1.2. STRUCTURE AND FUNCTION OF THE EMPr

An EMPr is focused on sound environmental management practices, which will be undertaken to minimise adverse impacts on the environment through the lifetime of a development. In addition, an EMPr identifies measures that should be in place, or will be actioned, to manage any incidents and emergencies that could occur during the operation of the project.

As such, the EMPr provides specifications that must be adhered to in order to minimise adverse environmental impacts associated with the construction and operation of the St Francis Bay Coastal Protection Scheme Project. The contents of the EMPr, as it is defined in the 2014 Environmental Impact Assessment (EIA) Regulations (as amended) published as Government Notice (GN) No R. 326 of 7 April 2017 in terms of Chapter 5 of the National Environmental Management Act (NEMA) (Act No. 107 of 1998, as amended), are consistent with the requirements as set out in Appendix 4 of the Amended EIA Regulations tabulated below.

Table 1.1: Requirements of an EMPr as per Appendix 4 of the NEMA EIA Regulations.

REQUIREMENTS OF AN ENVIRONMENTAL MANAGEMENT PROGRAMME IN TERMS OF APPENDIX 4 OF GNR 982 OF 2014, AS AMENDED IN GNR 326 OF 2017		SECTION OF REPORT
1	An EMPr must comply with section 24N of the Act and include-	
	a. Details of: <ul style="list-style-type: none"> •the EAP who prepared the EMPr; and 	Chapter 2
	<ul style="list-style-type: none"> •the expertise of that EAP to prepare an EMPr, including a curriculum vitae. 	Annexure 3
	b. a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Chapter 4
	c. a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Annexure 4
	d. a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-	Chapter 6
	<ul style="list-style-type: none"> •Planning and design 	
	<ul style="list-style-type: none"> •Pre-construction activities 	
	<ul style="list-style-type: none"> •Construction activities 	
	<ul style="list-style-type: none"> •rehabilitation of the environment after construction and where applicable post closure; and 	
	<ul style="list-style-type: none"> •where relevant, operational activities; 	
	f. description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to -	Chapter 6
	<ul style="list-style-type: none"> •avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; 	
	<ul style="list-style-type: none"> •comply with any prescribed environmental management standards or practices; 	
<ul style="list-style-type: none"> •comply with any applicable provisions of the Act regarding closure, where applicable; and 		
<ul style="list-style-type: none"> •comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable; 		
g. the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Chapter 7	
h. the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);		
i. an indication of the persons who will be responsible for the implementation of the impact management actions;		
j. the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Chapter 7 and 8	
k. the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);		

REQUIREMENTS OF AN ENVIRONMENTAL MANAGEMENT PROGRAMME IN TERMS OF APPENDIX 4 OF GNR 982 OF 2014, AS AMENDED IN GNR 326 OF 2017		SECTION OF REPORT
l. a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;		
m. an environmental awareness plan describing the manner in which- <ul style="list-style-type: none"> •the applicant intends to inform his or her employees of any environmental risk which may result from their work; and •risks must be dealt with in order to avoid pollution or the degradation of the environment. 	Chapter 9	
n. any specific information that may be required by the competent authority. “The adverse impacts of possible acceleration of erosion, particularly regarding the northern banks of the Kromme River mouth and the northern beaches has not been satisfactorily addressed – the impact assessment, Section 7, Table 7.2 only briefly addresses this by indicating that the banks must remain intact. The method of doing so as well as mitigation measures and ongoing monitoring must be specifically addressed. The few bulleted points contained in the EMPr also do not give sufficient information besides monitoring being enacted.”		Chapter 6, Chapter 9

1.3. LEGAL REQUIREMENTS

Construction must be according to the best industry practices, as identified in the project documents. This EMPr, which forms an integral part of the contract documents, informs the Contractor and/or Applicant of their duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by the construction and operational activities associated with the St Francis Bay Coastal Protection Scheme. The Contractor and/or Applicant should note that obligations imposed by the approved EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract which pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications, then the EMPr must prevail.

The Contractor must identify and comply with all South African national and provincial environmental legislation, including associated regulations and all local by-laws relevant to the project. Key legislation currently applicable to the construction and operational phases of the project must be complied with. The list of applicable legislation provided below is intended to serve as a guideline only and is not exhaustive: -

Table 1.2: Applicable Legislation and environmental policies.

TITLE OF LEGISLATION, POLICY OR GUIDELINE:	ADMINISTERING AUTHORITY:	DATE:
The Constitution of South Africa (Act No. 108 of 1996)	Department of Justice	1996
Local Government Municipal Systems (Act 32 of 2000)	Kouga Local Municipality	2000
National Environmental Management Act (NEMA) (Act No. 7 of 1998)	Department of Environment, Forestry and Fisheries (DEFF) and/or the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (DEDEAT)	1998 and 2014 amendments
Environmental Impact Assessment (EIA) Regulations, 2014 (as amended in April 2017)	DEFF and/or DEDEAT	2014 and 2017 amendments

Environmental Management Programme

TITLE OF LEGISLATION, POLICY OR GUIDELINE:	ADMINISTERING AUTHORITY:	DATE:
The National Environment Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004)	DEFF and/or DEDEAT	2004
Conservation of Agricultural Resources Act (43 of 1983) & Subdivision of Agricultural Land Act (No. 70 of 1970)	Department of Agriculture, Forestry and Fisheries (DAFF)	1983 and 1970
National Environmental Management: Waste Act (Act No. 59 of 2008)	DEFF and/or DEDEAT	2008
National Water Act (NWA) (Act No. 36 of 1998)	Department of Water and Sanitation (DWS)	1998
National Environmental Management: Integrated Coastal Management (ICM) Act (Act No. 24 of 2008)	Department of Environmental Affairs (DEA): Oceans and Coasts	2008
National Environmental Management: Air Quality Act (Act No. 39 of 2004, as amended)	DEFF and/or DEDEAT	2004
National Heritage Resources Act (Act No. 25 of 1999)	Eastern Cape Provincial Heritage Resources Authority (ECPHRA)	1999
Occupational Health and Safety Act (Act No. 85 of 1993)	Department of Labour (DoL)	1993
Hazardous Substances Act (HS, Act No. 15 of 1973)	Department of Health (DoH)	1973
National Road Traffic Act (Act No. 93 of 1996)	Department of Transport	1996
Eastern Cape Vision 2030 Provincial Development Plan (ECDP, 2014)	DEDEAT	2014
Provincial Nature and Environmental Conservation Ordinance (No. 19 of 1974)	DAFF	1974
National Development Plan 2030 (2013).	National Government	2013
The Sarah Baartman District Municipality Integrated Development Plan (IDP) 2018/19	Sarah Baartman District Municipality	2018
Kouga Local Municipality Draft Integrated Development Plan 2017-2022	Kouga Local Municipality	2017
Kouga Municipality Spatial Development Framework (2015)	Kouga Local Municipality	2015
The South African Vegetation Map	South African National Biodiversity Institute (SANBI)	2018
The Subtropical Thicket Ecosystem Programme (STEP)	SANBI	2004
The Eastern Cape Biodiversity Conservation Plan (ECBCP)	SANBI	2007
The National Freshwater Ecosystem Priority Areas (NFEPA) project	SANBI and DWS	2011/2014

1.4. ENVIRONMENTAL AUTHORISATION

In accordance with the requirements of the National Environmental Management Act (NEMA, Act No. 107 of 1998) and relevant EIA regulations (2014 and subsequent 2017 amendments), the proposed St Francis Bay Coastal Protection Scheme was subjected to a Full Scoping and EIA Process.

In terms of the EIA process, all reports generated from the environmental studies form part of a series of documents for the project. The Environmental Impact Report (EIR) identified potentially significant environmental impacts and was the main report in the series. Additional Specialist Assessments serve to supplement the assessment contained in the EIR.

This EMPr interprets the findings of the EIR and prescribes project-specific specifications to be achieved. The EMPr is a progressive working document which will be updated based on the relevant conditions stipulated in the Environmental Authorisation (EA). The EMPr will then be submitted to DEDEAT (along with the final approved technical/design layouts) for approval prior to the commencement of construction.

2. DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

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Company Overview

CES is a South African based company, with its head office in Grahamstown, and offices in Cape Town, Port Elizabeth, East London and Johannesburg, South Africa, as well as a wholly owned subsidiary in Maputo, Mozambique (CES is registered as an Environmental Practitioner with the Mozambican authorities). Coastal and Environmental Services (Pty) Ltd was established in 1990, to service a then fledgling market in the field of Environmental Management and Impact Assessment. The Company has grown apace with the increased market demand for environmental and social advisory services, in South Africa and numerous other African countries. Our principal area of expertise is in assessing the impacts of project on the natural, social and economic environments through, among other instruments, the environmental impact assessment process, and in so doing contribute towards sustainable development. Our staff is currently comprised of a number of professional and support staff. All professional staff members are well qualified, and as many as 90% have advanced postgraduate qualifications, including PhD, MSc and MA degrees in the biological, social and environmental sciences. In addition, CES has well-developed working relationships with a number of other individual specialist and specialist consulting companies who provide us with expertise in various disciplines. We have a demonstrated ability to manage EIAs for large and complex projects. This experience was initially gained during the undertaking of integrated environmental management studies, as well as the management of large and complex environmental and social impact assessments. CES has managed numerous large EIAs from prefeasibility through to operation for international clients in six southern African countries. These have been rigorously reviewed by parties such as the World Bank, MIGA, European Investment Bank, IFC, German Investment Bank (KfW), African Development Bank, BHP Billiton international peer review team and the Dutch Development Bank (FMO).

Mr Gregory Shaw (*Role: Project Manager*)

Gregory is a Principal Environmental Consultant and Business Development Manager. Greg has 12 years' experience in conducting environmental consultancy services in the energy, transport, maritime and agricultural sectors on behalf of South African and overseas government departments and agencies, local government authorities, private developers, international funding organisations, and non-government organisations. He has a strong track record of projects completed within budget, on time and in accordance with national and/or international environmental legislation and guidelines. Greg's skills include ESIA, environmental survey development, management, execution and monitoring, report writing, project management and strategic planning.

Ms Nicole Wienand (*Role: Report Production*)

Ms Nicole Wienand is an Environmental Consultant based in the Port Elizabeth branch. Nicole obtained her BSc Honours in Botany (Environmental Management) from Nelson Mandela University (NMU) in December 2018. She also holds a BSc Degree in Environmental Management (Cum Laude) with majors in Botany and Geology from NMU. Nicole's honours project focused on the composition of subtidal marine benthic communities on warm temperate reefs off the coast of Port Elizabeth, while her undergraduate project focused on the investigation of dune movement in Sardinia Bay. Nicole's key interests include Marine and Terrestrial Ecology, GIS Mapping, the general EIA process, Public Participation Process (PPP) and Ecological Impact Assessments.

Dr Ted Avis (*Role: Report Review*)

Ted Avis is a leading expert in the field of Environmental Impact Assessments, having project-managed numerous large-scale ESAs to international standards (e.g. International Finance Corporation). Ted was principle consultant to Corridor Sands Limitada for the development of all environment aspects for the US\$1billion Corridor Sands Project. He has managed ESIA studies and related environmental assessments of similar scope in Kenya, Madagascar, Egypt, Malawi, Zambia and South Africa. Ted has worked across Africa, and also has experience in large scale Strategic Environmental Assessments in southern Africa, and has been engaged by the International Finance Corporation (IFC) on a number of projects. Ted was instrumental in establishing the Environmental Science Department at Rhodes University whilst a Senior lecturer in Botany, based on his experience running honours modules in EIA practice and environmental. He is an Honorary Visiting Fellow in the Department of Environmental Sciences at Rhodes. He was one of the first certified Environmental Assessment Practitioner in South Africa, gaining certification in April 2004. He has delivered papers and published in the field of EIA, Strategic Environmental Assessment and Integrated Coastal Zone Management and has been a principal of CES since its inception in 1990, and Managing Director since 1998. Ted holds a PhD in Botany, and was awarded a bronze medal by the South African Association of Botanists for the best PhD adjudicated in that year, entitled "Coastal Dune Ecology and Management in the Eastern Cape". Ted is a Certified Environmental Assessment Practitioner (since 2002) and a professional member of the South African Council for Natural Scientific Professionals (since 1993).

3. DEFINITIONS

For the purposes of this EMPr, the following definitions and abbreviations shall apply:

Alien Vegetation: Alien vegetation is defined as undesirable plant growth which shall include, but not be limited to all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act (CARA) regulations. Other vegetation deemed to be alien shall be those plant species that show the potential to occupy in number, any area within the defined construction area and which are declared to be undesirable. This includes plant species identified as Alien and invasive species in the National environmental Management Biodiversity Act of 2004, Alien and Invasive Species Regulations, 2014.

Contaminated water: Means water contaminated by the contractor's activities such as with hazardous substances, hydrocarbons, paints, solvents and runoff from plant, workshop or personnel wash areas but excludes water containing cement/ concrete or silt.

Construction Camp: Construction camp (site camps) refers to all storage and stockpile sites, site offices, container sites, workshops and testing facilities and other areas required undertaking construction activities.

Environment: Environment means the surroundings within which humans exist and that could be made up of:

- I. The land, water and atmosphere of the earth;
 - II. Micro-organisms, plant and animal life;
- Any part or combination of (i) and (ii) and the interrelationships among and between them; and
 - The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Aspect: An environmental aspect is any component of a contractor's construction activity that is likely to interact with the environment and pose a potential risk thereto.

Environmental Authorisation (EA): A written statement from the relevant environmental authority, with or without conditions, that records its approval of a planned undertaking to construct the proposed infrastructure and the mitigating measures required to prevent or reduce the effects of environmental impacts during the project's lifespan.

Environmental Control Officer (ECO): A suitably qualified and experienced person or entity appointed for the construction works, to perform the obligations specified in the EA.

Environmental Site Officer (ESO): An ESO is the site-based designated person responsible for implementing the environmental provisions of the construction contract and is appointed by the service provider that carries-out construction activities.

Environmental Impact: An impact or environmental impact is the change to the environment, whether desirable or undesirable, that will result from the effect of a construction activity. An impact may be the direct or indirect consequence of a construction activity.

Environmental Impact Assessment: The process of examining the environmental effects of a development. The assessment requires detailed/specialist studies of significant issues that have been identified during the scoping phase.

Environmental Management Programme (EMPr): An environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced.

Environmental Management System (EMS): A system enables companies, organizations and operations to systematically manage, prevent and reduce their environmental impacts (or footprint) and associated costs. In terms of ISO 14001 an EMS is defined as, *“that part of the overall management system includes organizational structure, planning activities, responsibilities, procedures, processes and resources for developing, implementing, reviewing and maintaining the environmental policy.”*

Environmental Policy: A statement by the organisation of its intentions and principles in relation to its overall environmental performance which provides a framework for action and for the setting of its environmental objectives and targets.

External Auditor: A suitably qualified and experienced independent environmental auditor.

His: Means his or her, as applicable.

Interested and Affected Party (I&AP): Refers to an I&AP party contemplated in section 24(4)(d) of the National Environmental Management Act - NEMA (1998, Act No. 107) and which, in terms of that section, includes –

- a) *Any person, groups of persons, organisation interested in or affected by an activity, and;*
- b) *Any organ of state that may have jurisdiction over any aspect of the activity.*

Method Statement: Is a written submission by the construction contractor to the ECO in response to the EMPr specifications, or to any request by the ECO, setting out the methods the contractor proposes using to carry out an activity. The Method Statement shall be in such detail that the ECO is able to assess whether the contractor's proposal is in accordance with the EMPr specifications.

Mitigate: The implementation of practical measures to reduce the adverse impacts, or to enhance beneficial impacts of a particular action.

No-Go Area: Areas where construction activities are prohibited.

Pollution: According to the NEMA (Act No. 107 of 1998), pollution can be defined as, *“Any change in the environment caused by (i) substances; (ii) radioactive or other waves; or (iii) noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future”*.

Potentially hazardous substance: Is a substance that can have a deleterious effect on the environment. Hazardous chemical substances are defined in the Regulations for Hazardous Chemical Substances published in terms of the Occupational Health and Safety Act.

Reasonable: Means, unless the context indicates otherwise, reasonable in the opinion of the ECO, after he has consulted with relevant parties.

Rehabilitation: To re-establish or restore to a healthy, sustainable capacity or state.

Silt laden water: Means water containing sand and silt arising from the contractor's activities and/or as a result of natural run-off.

Site: The area in which construction is taking place.

Solid waste: Means all solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

Species of Conservation Concern (SCC): Species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild, Regionally Extinct, Near Threatened, Critically Rare, Rare and Declining.

Threatened species: Threatened species are defined as: a) species listed in the endangered or vulnerable categories in the revised South African Red Data Books or listed in the globally threatened category; b) species of special conservation concern (i.e. taxa described since the relevant South African Red Data Books, or whose conservation status has been highlighted subsequent to 1984); c) species which are included in other international lists; or d) species included in Appendix 1 or 2 of the Convention of International Trade in Endangered Species (CITES).

Topsoil: The top 100 mm of soil and may include top material e.g. vegetation and leaf litter.

4. PROPOSED ACTIVITY

4.1 PROJECT OVERVIEW

The St Francis Property Owners Non-Profit Company (SFPO NPC), on behalf of the Kouga Local Municipality (Kouga LM), has proposed the implementation of a coastal protection scheme for St Francis Bay beach, located within the Eastern Cape Province. The proposed project area is situated approximately 100 km west of Port Elizabeth, within the Kouga LM, seated within the Sarah Baartman District Municipality (SBDM) (Figure 4.1).

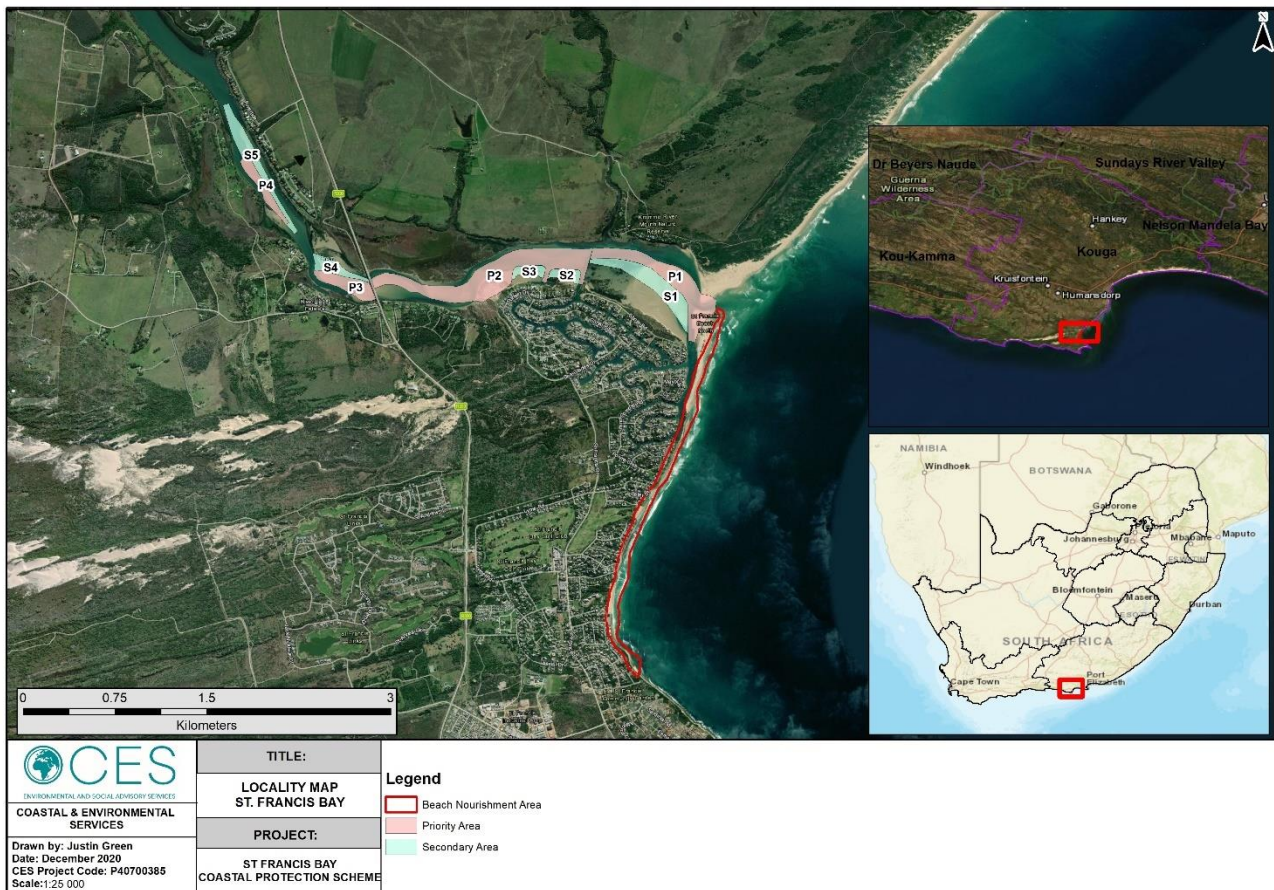


Figure 4.1: Location of the proposed project.

The coastal protection scheme will include the sourcing of sand material from the Kromme River (and any other viable sources), nourishment of St Francis Bay beach and the development of coastal structures to retard the erosion of the beach. CES has been appointed by the SFPO NPC to apply for an Environmental Authorisation (EA) by means of conducting a Scoping and EIA process.

4.2 PROJECT LOCATION

The proposed project will take place over coastal public property and within the confines of the Kromme River estuary. As a result, there are a limited number of defined farm, erf or property portions assigned to this project (Table 4.1). The proposed beach nourishment will take place over land defined by the Chief Surveyor-General as “Parks.” The areas where sand will potentially be sourced for the beach nourishment are likely to be located within or adjacent to the Kromme River estuary and the land fall under “Humansdorp Administrative Area 5.”

Table 4.1: Properties Associated with the Proposed Project (as defined by the Chief Surveyor-General).

Description of affected farm portion			
Property Name and Number	21-digit SG Code	Ward	Municipality/ Province
A portion of Humansdorp Administrative Region 5	C034	12	Kouga Local Municipality
Parks 720 1076655	C03400140000072000000	12	Kouga Local Municipality
Parks 1343 1073783	C03400140000134300000	12	Kouga Local Municipality
Parks 623 1073698	C03400140000062300000	12	Kouga Local Municipality
Parks 2257 1073784	C03400140000225700000	12	Kouga Local Municipality
Parks 185 1073697	C03400140000018500000	12	Kouga Local Municipality
Parks 53 1077075	C03400140000005300000	12	Kouga Local Municipality
Parks 184 1073696	C03400140000018400000	12	Kouga Local Municipality
Parks 625 1076606	C03400140000062500000	12	Kouga Local Municipality

4.3 PROJECT DESCRIPTION AND SCOPE

As a result of significant erosion events occurring over the past few decades the St Francis Bay beach has lost a considerable amount of sand material, and the existing dune area across the frontage. This has resulted in existing infrastructure becoming more vulnerable to loss and damage, should more significant erosion events take place.

The erosion has led to a reduction in the width of the beach. The width of beach is not only important from a recreational and tourism amenity point of view but offers significant coast protection by reducing the wave energy. A reduction in wave energy reduces the ability for sediment to be moved and therefore reduces the severity of erosion. The effects of the erosion of the beach (in both width and depth of sediment) has been realised across the full frontage, stretching from the car park at the end of Nevil Rd in the south to the Kromme Estuary mouth in the north.

Approximately 700 m of the frontage, referred to as “the spit” is particularly vulnerable. The erosion has been significant and dramatic such that over the 42-year period between 1975 and 2017, the high water mark has retreated by 75 metres. As a result, the beach has effectively been lost, and erosion of the vegetated sand spit is occurring. In 2020 the spit breached 4 times during particularly high tides and storm swell. This caused damage to infrastructure it continues to pose a risk for as long as the spit remains “unprotected”.

Consequently, various interventions including a beach nourishment scheme, revetment construction and the construction of groynes is required to arrest the rapid erosion of the beach, and ultimately restore it to its pre-erosion status, or at least to a condition that affords protection from storm attack, sea level rise and erosion events associated with these natural perturbations.

Sand Sourcing (supported by the Sand Sourcing Specialist Study)

In order for beach nourishment to be implemented, sand must first be obtained from a suitable source area. The identification of a suitable source area was based largely on finding an area where sand will consist of similar grain size to that which is required on the beach as well as being feasible to extract and place along the beach. Three potential source areas were initially identified and all were located within the Kromme River estuarine functional zone. However, as the investigations into possible sources progressed and considering feedback through the public engagement, more discreet areas were identified and classified as priority and secondary areas.

The comparisons showed that overall the particle sizes of the sediment in the estuary are slightly finer than along the beach. There are many samples (mainly in the 2018 data collection) that have median particle sizes less than 0.3 mm, of which there are none in the set of beach samples. However, there is significant overlap of the particle size envelopes from the estuary and beach, particularly between the data collected in 2019. The 2019 estuary samples have median particle sizes (0.31 mm to 0.35 mm) that are compatible with the median particle sizes of the beach (0.3 mm to 0.38 mm). Also, the compatibility at the finer and coarser ends of the envelopes is good.

Given the similarity of the particle size envelopes from the intertidal areas on the south side of the Kromme Estuary and the beach of St Francis Bay, it is concluded that the source (intertidal estuary) and receiver (beach) sites are compatible with respect to particle size distribution. The similarity of particle size distributions between the upper, middle and lower intertidal parts of the estuary indicates that, based on particle size alone, there is no preferred location for extraction of sediment. Also, it is likely that sediments in the subtidal channel, which were not sampled, would be coarser than the adjacent intertidal areas (due to higher current velocities), and so also compatible with the beach.

The proposed coastal protection scheme does not intend to remove all of the features (sand banks) of the estuary, but to rather harvest as much sand material as possible while being cognizant of the ecological and social importance of those features (Figure 4.2). The total sand that can be extracted, based on depths of 1 m in priority areas and 2m in secondary areas, equates to 1 074 000 m³ (Table 4.2). According to the engineers appointed for the development of the proposed coastal protection scheme, the required volume of sand for capital nourishment is approximately 854 000 m³. Additional sand may be required to account for losses during the nourishment process (e.g. dredging and pumping losses).

Table 4.2 Potential sand available from each source area (assuming 1m deep excavations from the channel and 2m deep excavations from the intertidal areas). See Figure 4.2 for locations.

Priority / Secondary Area	Label	Area (m ²)	Depth (m)	Volume (m ³)
Priority Area	P1	167 000	1	167 000
Secondary Area	S1	108 000	2	216 000
<i>Subtotal</i>				383 000
Priority Area	P2	296 000	1	296 000
Secondary Area	S2	19 000	2	38 000
	S3	20 000	2	40 000
<i>Subtotal</i>				374 000
Priority Area	P3	57 000	1	57 000
	P4	42 000	1	42 000
Secondary Area	S4	35 000	2	70 000
	S5	74 000	2	148 000
<i>Subtotal</i>				317 000
Priority Areas				562 000
Secondary Areas				512 000
GRAND TOTAL				1 074 000

Advisian advised that the current loss of sand material from the beach is 50 000 m³ to 100 000 m³ per annum, but that the loss after full implementation of the preferred solution can be expected to be in the order of 25 000 m³ to 50 000 m³ per annum. The analysis of the data collected for the preliminary design suggests that much of the material being transported by longshore drift (South to North) finds its way into the estuary under natural conditions. Given that the design will be such to facilitate the current longshore sediment transport, it is anticipated that the majority of the 25 000 m³ to 50 000 m³ “lost” from the nourishment will be deposited into the estuary providing suitable material for the maintenance requirements. The volume of sand required for maintenance will differ as the project progresses through the various phases, but will be limited to a maximum of approximately 25 000 m³ to 50 000 m³ per annum (Table 4.4).

Beach Nourishment

The option to artificially nourish the beach with sand from suitable borrow sources has been identified as the least environmentally intrusive method to protect the St Francis Bay coastline from further erosion. The aim of the beach nourishment will be to establish a minimum horizontal dry beach width of 40 m measured from the back of the beach. This additional sand will provide added protection from erosion as waves will dissipate their energy over this re-established sand beach before reaching the existing eroding area. Long term maintenance will be required to maintain the required beach level.

Revetment Structures

To prevent further sea breaching through the St Francis Bay beach spit during a strong storm surge event, revetment structures have been implemented by Kouga Municipality along the length of the beach spit as a temporary coastal protection to prevent further erosion of the spit. These temporary revetment needs to be integrated within the long-term coastal protection scheme consisting of stub groynes and beach nourishment. The state of the temporary revetment at the time of implementation needs to be reviewed so its suitability and long-term functionality can be assessed as the revetment would form an integral part of the long-term coastal protection infrastructure and would be the last defence against wave action, should the proposed re-nourished beach not be sufficient.

Stub Groynes

In order to retain the sand in the nearshore and beach area following the implementation of beach nourishment, and to promote increased sedimentation in the future, six (6) stub groynes will be constructed along the length of the beach. These stub groynes will extend from the back end of the beach and reach a length of between 170m and 200m offshore (Figure 4.3). The stub groynes will be angled perpendicular to the shoreline (except groyne 5 which is oblique), and will be shorter than full length groynes which are generally used for erosion prevention. The shorter (stub) groynes will allow a certain percentage of sediment (expected to be approximately 50% of the long shore drift) to pass between each groyne. This is to facilitate sand movement through the longshore drift process since it is not the intention of the project to trap all sediment moving along the coastline. Maintaining this sand movement along the coast is also anticipated to mitigate for the potential of accelerated erosion “downstream” of the groynes, particularly of the northern most groyne. In addition to the natural movement of sediment, nourishment of the shoreline in the lee of the northern most groyne will be included as part of the project. The volume of sediment will be monitored and re-nourishment will be carried out and form part of the annual maintenance regime.

A maximum of approximately 44 300 m³ of rock material will be required for the proposed stub groynes. The rock material used for the groynes will be sourced from a licenced local quarry, the details of which will be subject to availability and grading of rock material, and will become known during the implementation stage of each phase of the project.

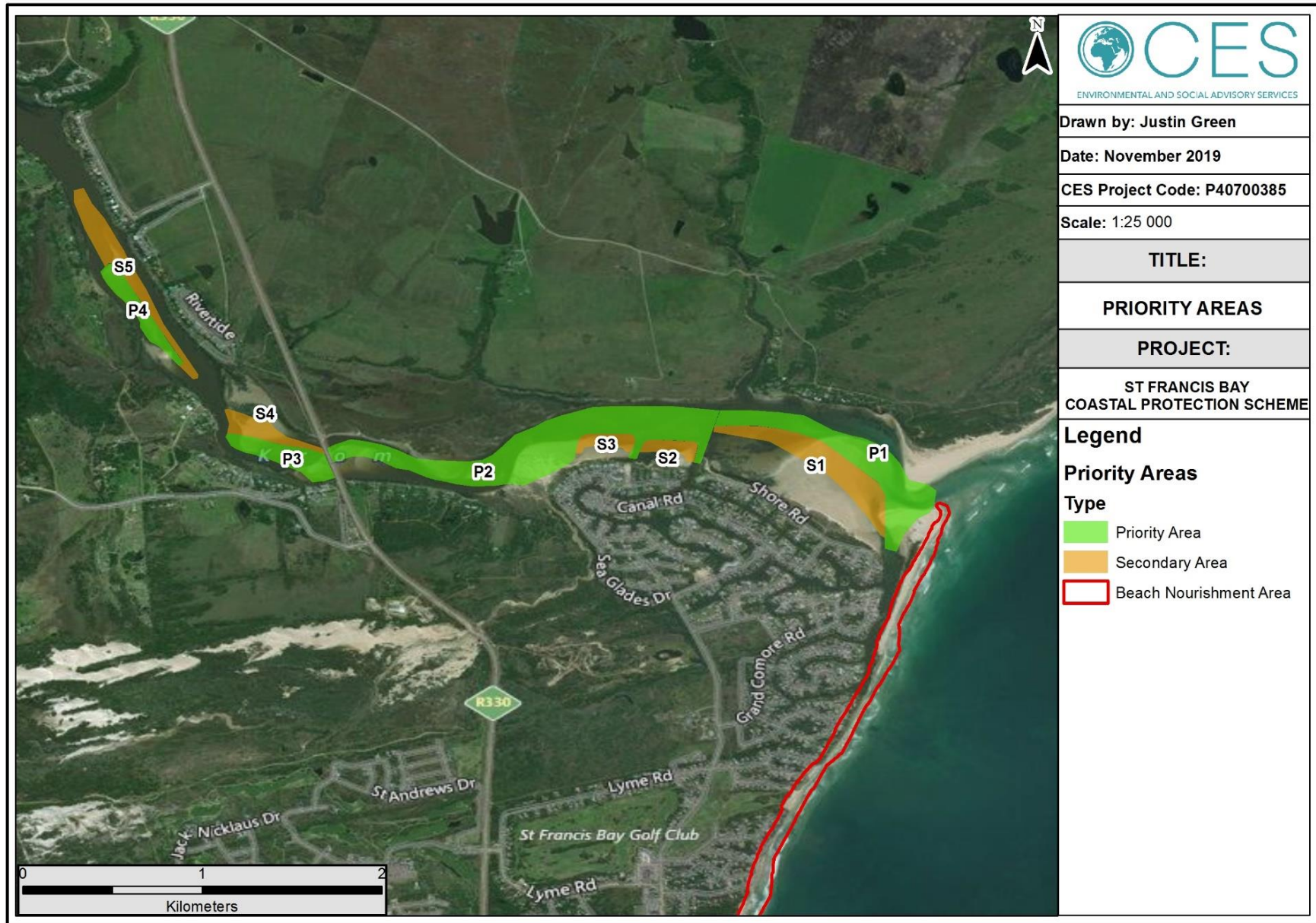


Figure 4.2: Potential areas to be used to source sand material.

A phased implementation of the abovementioned coastal beach protection infrastructure is likely to be required due to financial constraints. Should funding for the full scheme be available at the time of construction then the full scheme will be developed. However, the design of the scheme is such that each phase can be regarded as a standalone project, allowing for funding for additional phases to be sourced prior to their construction.

The advantage associated with a phased approach is that the performance of the first groyne(s) can be assessed, and any desired adjustments can be made to groynes constructed in the subsequent phases. The phased implementation is based on five (5) areas along St Francis Bay beach (Figure 4.3). Area 1 will consist of a 650 m length of beach which will undergo beach nourishment as well as the construction of two (2) 200 m long groynes, one at each end. The long shore drift is northwards, and it is therefore sensible to construct the northernmost groynes first to intercept the transported sand (Figure 4.3). Area 2 will consist of 470 m of beach with one (1) groyne at 170 m and Area 3 a 340 m length of beach with two (2) groynes of 170 m in length. Areas 4 and 5 are flanked by groynes constructed during previous phases and are 280 m and 390 m long respectively. One 170 m long groyne will be constructed in Area 5. This phased approach will ensure that construction of infrastructure in any phase will only commence when sufficient funding for that particular phase has been secured, thus negating the risk of partially constructed infrastructure.

In order to widen the beach by 40 m with the use of beach nourishment only, a total of between 850 000 to 1,2 million m³ of sand material would be required (depending on the losses and the state of the beaches at the time of nourishment). Table 4.3 presents the volume of material required for each stage.

Table 4.3 Total initial nourishment requirements of each phase of the coastal protection scheme.

Nourishment Phase	Estimated Initial Sand Volume Required (m ³)
Phase 1	259 000 - 361 000
Phase 2	166 000 -247 000
Phase 3	167 000 - 205 000
Phase 4	78 000 - 134 000
Phase 5	182 000 - 235 000

The operational phase material is considered a top up of the construction material and dependent on the erosion of material from the beach. The volume of sand required for maintenance will differ as the project progresses through the various phases, but will be limited to a maximum of approximately 25 000 m³ to 50 000 m³ per annum (Table 4.4). This material is anticipated to be available from the Kromme Estuary.

Table 4.4: Anticipated annual maintenance requirements at the completion of each phase of the coastal protection scheme.

Nourishment Phase	Cumulative maintenance requirement	
	From	To
Annual Maintenance at Completion of Phase 1	8 000	16 000
Annual Maintenance at Completion of Phase 2	13 250	26 550
Annual Maintenance at Completion of Phase 3	17 550	35 200
Annual Maintenance at Completion of Phase 4	20 350	40 850
Annual Maintenance at Completion of Phase 5	24 950	50 050

As detailed below, similar equipment and construction methodologies are anticipated for both construction and operational phases with the scale of the activity being reduced during the “operational” phase.

Construction methodology

In this section potential methodologies are described for the construction of the groynes, beach nourishment and revetment construction. Specific construction methods employed will be finalised through the

procurement of a contractor for each phase of the project. The potential methodologies described below include sourcing of material, transporting, stockpiling and the incorporation thereof into the Works.

Similarly, potential methodologies to be employed during maintenance of the infrastructure is described.

Construction stage

The following activities are envisaged during the construction stage.

Groyne construction:

Rock for the construction of groynes will be obtained from nearby commercial quarries. The rock will be transported by truck via the R330 provincial road to St Francis Bay and then along the internal road network through St Francis Bay to a potential stockpile area or to access points onto the beach at George Road Parking Area and/or a temporary access point at Aldabara Road Parking Area. The rock will be further transported along the beach to the groyne positions where it will be placed by way of back-tipping and placing the material by excavators, where needed.

This activity will most probably be affected by tides and is expected to be limited to approximately 6 to 8 hours per day. The rate of construction is expected to be in the order of 240 m³/day. Depending on the size of the trucks approximately 30 - 40 truckloads per day will be required and depending on the haul distance it is envisaged that approximately 10 trucks will be used. The expected duration of this part of the work is:

- For Phase 1: 3 Months
- For Phase 2: 2 Months
- For Phase 3: 3 Months
- For Phase 5: 2 Months
- Should the complete solution be implemented without phasing (highly unlikely): 8 Months

Beach nourishment:

Sand will be sourced from the Kromme River Estuary by way of dredging. To ensure that dredging of the estuary is undertaken in a manner which does not significantly alter the current orientation of the existing main estuarine channel, the dredging will have to be undertaken from the existing channel outwards.

A dredger or dredgers with a combined capability to deliver between 250 - 300 m³ sand per hour will be required. There are various types of dredger available (i.e. cutter suction, jet suction, bucket) that would be suitable for this type of work. The depth of the water will limit the size of the vessels since the vessels will require a shallow draft. While a suitable dredger will be decided upon by a contractor it is likely the dimensions of the dredger will be in the region of 21 m long, 4.8m wide and 1.4 m of hull. It may or may not be self-propelled and likely to have spud legs to secure it.

It is expected that in-line booster pumps will be employed when sand is transported over long distances. The discharge pipes are expected to range between 250 mm to 350 mm in diameter. Depending on the nature of the pumps it is likely that the pumps would occur at intervals of 1 000 m. The sand will be dredged through pipelines along the channel attached to buoys or in places it may be placed on sandbanks.

The noise level associated with the dredging and nourishment activity is expected to be approx. 80 dB at source. Depending on the size of the booster pumps, noise levels are expected to be 92 dB at source, reducing down to 60 dB at 500 m (ICF Jones and Stokes, 2008). To provide context normal conversation is about 60 dB, a lawn mower is about 90 dB, and a loud concert is about 120 dB.

Dredged sand may be spread along the beach using equipment such as a dozer.

Assuming that dredging for the construction phase will take place 8 hours per day, 5 days per week, the expected duration of this part of the work is:

- For Phase 1: 8 Months
- For Phase 2: 5 Months
- For Phase 3: 4 Months
- For Phase 4: 3 Months
- For Phase 5: 5 Months
- Should the complete solution be implemented without phasing (highly unlikely): 16 Months.

It may be that it becomes feasible to transport sand by truck from the upper reaches of the source area identified in the Sand Sourcing Specialist Study. In such a case it is envisaged that the sand will be dredged to a suitable point, where it will be loaded by a loader or TLB onto trucks. The trucks will then transport the sand along the internal road network of St Francis Bay onto the beach. This option is not really envisaged, and if it is employed, it is expected to be relatively limited.

It is envisaged that limited clearing of vegetation, as well as separation of vegetation and debris from the sand will be required at the mouth of the Sand River, and that this vegetation and debris will have to be spoiled at an approved spoil site. Such clearance will be done using mechanical equipment such as excavators or TLB's, and the material will have to be loaded onto trucks and transported off-site. It is foreseen that this will be a limited operation.

Revetment construction:

This activity will pertain to the revetment for the spit area. This revetment may be a rock revetment, a geotextile sand container revetment or a composite revetment (rock / geotextile sand container revetment).

Rock for the construction of a rock revetment will be obtained from nearby commercial quarries. The rock will be transported by truck via the R330 provincial road to St Francis Bay and then along the internal road network through St Francis Bay to a potential stockpile area or to an access point onto the beach at George Road Parking Area or via a temporary access point at Aldabara Road Parking Area. The rocks will be further transported along the beach to the position where it will be placed against the spit sand dune.

The activity may be affected by tides and is expected to be limited to approximately 6 to 8 hours per day. The rate of construction is expected to be in the order of 65 m³/day. Depending on the size of the trucks approximately 11 truckloads per day will be required and it is envisaged that approximately 3 trucks will be used. The expected duration of this part of the work is 3 months.

Sand for a geotextile sand container revetment will be taken from the beach or be dredged from the canal system, and this activity can take place 8 hours per day. A fairly small dredger can be employed to fill the geotextile containers should sand from the canals be used.

Storage of plant and equipment:

A suitable open area on disturbed land, available at the time of construction of any phase, should be identified prior to tender stage for the Contractor's camp. This area must be sufficient and suitable to house overnight the contractor's plant, such as trucks, loaders, TLB's and the like.

If the dozer used to spread the sand on the beach is stored on the beach overnight, then such storage area must be safely barricaded or fenced to ensure safety of the public.

Stockpiling of material:

It may be that it would be necessary to stockpile rock, should the quarry supplying the rock blast a specific rock size required for the project and removal thereof be required because of limited storage at the quarry. In such a case a suitable open area on disturbed land, available at the time of construction of any phase, should be identified prior to tender stage for such temporary stockpiling of rock. The area should be fenced off and access controlled to ensure public safety.

Maintenance:

These activities are required to deal with the following three components:

- Beach nourishment.
- Groynes
- Revetments

The maintenance activities will be similar to those carried out during the construction phases albeit with lower volumes of material. The extent and frequency of the maintenance of the beach profile through further beach nourishment, and repair work to the groynes will be informed by a monitoring and inspection programme. The requirement for maintenance will be guided by the results of this monitoring and inspection programme.

The frequency of the monitoring and inspection programme is outlined in Table 4.5 and Table 4.6. However, as this maintenance regime will need to be an adaptive process the events and frequency may change as new data is collected, and a better understanding of how the beach responds to the nourishment scheme and storm attack. It is for this reason that post storm monitoring is required. The duration of any maintenance activities will depend on the extent of maintenance required and should be assessed when the need arises.

The frequency of the general maintenance activities can be scheduled and are relatively clear, but the post storm events are less predictable. In general, an inspection or survey after a storm event should be undertaken if and when it is evident that significant sand movement and/or sand losses have occurred and/or when a known storm event threshold has been exceeded; defined as a significant storm event that exceeds a 1 in 1 year event, whether it is wave height, increased water levels, or a combination of the two.

After the initial beach placement and associated baseline surveys, the recommended monitoring regime for the beaches and the frequency of data collection are presented in Table 4.5 below.

Table 4.5: Recommended Monitoring Programme

Activity	Monitoring Intervals				
	Regular/ Continuous	Post Storm Event	Annual	2 years	5 years
On-going site inspection	✓				
Detailed Site Inspection (See Site Inspection Table 4.6)		✓	✓		
Quality of beach sand (sampling for PSD)					✓
Surveys:					
<ul style="list-style-type: none"> • Bathymetric survey of the nearshore environment ** 				✓**	✓

Activity	Monitoring Intervals				
	Regular/ Continuous	Post Storm Event	Annual	2 years	5 years
<ul style="list-style-type: none"> Topographic Survey for beach profile & beach plan 		✓	✓		
<ul style="list-style-type: none"> Aerial Photography / Satellite Imagery or Lidar 				✓	

**It is anticipated that after the first two (2) years a bathymetric survey will be undertaken to help understand the movement of the beach material. However, this is likely to be reduced to a period of approximately every five (5) years once sufficient information has been gathered.

A visual site inspection will also be conducted (Table 4.6). The data from the visual inspection should be well recorded and analysed in a systematic manner in relation to the previous inspections.

Table 4.6: Recommended Site Inspection Programme

Item	Inspection Intervals				
	Regular/ Continuous	Post Storm Event	Annual	2 years	5 years
Beach levels against groynes at trigger locations		✓	✓		
Beach levels against groynes at trigger locations (submerged area) *					✓
Beach levels at crest and against back of groyne structures at trigger points		✓	✓		
Width of beach crest from the setting out line at trigger points and remaining beach crest widths.		✓	✓		
Loss of material against structures (sink holes)		✓	✓		
Visual damage of groynes		✓	✓		
Exposure of any structure foundations		✓	✓		
Cleanliness including removal of debris/flotsam/jetsam	✓				
Environmental & pollution issues	✓				
Health & safety issues	✓				

* Part of bathymetric survey

Monitoring of the beach control structures also form part of the beach maintenance plan.

Beach Nourishment:

The Beach Nourishment Source Material Study undertaken by CES found the Kromme River Estuary to be a suitable material source for nourishment purposes. To ensure that dredging of the estuary is undertaken in a manner which does not significantly alter the current orientation of the existing main estuarine channel, the dredging will have to be undertaken from the existing channel outwards. Priority and secondary material source areas were identified.

The Kromme River Estuary is a flood tide dominant system, resulting in sediment build-up within the estuary. Once the entire coastal protection solution is implemented, the maintenance requirement of approximately 25,000 to 50,000 m³ per year would be similar to, or less than, the estimated accretion rate for the intertidal areas of the estuary, supplemented by the ongoing maintenance dredging of the marina canal system. In the interim sediment build-up is expected to continue. The material entering the estuary on a continuous basis is considered sufficient for maintenance purposes over the life span of the scheme.

The anticipated annual maintenance requirements at the completion of each phase have been quantified and are summarised in Table 4.4 above. It is recognised that a major storm event can cause a significant loss of material, in excess of the figures shown in Table 4.4.

Assuming that dredging for the operational phase will take place 8 hours per day, 5 days per week, the expected duration of this maintenance work is:

- At completion of Phase 1: Between 2 and 4 weeks
- At completion of Phase 2: Between 3 and 5 weeks
- At completion of Phase 3: Between 4 and 7 weeks
- At completion of Phase 4: Between 4 and 8 weeks
- At completion of Phase 5: Between 5 and 10 weeks

Triggers for Beach Nourishment:

The trigger locations will be at every 100m along the beach, and every 10m along the cross section of the beach. Maintenance beach nourishment will be commissioned in any of the completed phase areas whenever the following is noted:

- The minimum horizontal dry beach width reduces to less than 25 metres or, where significant overtopping of back of crest structures takes place (both temporary and permanent structures).
- Erosion up to 25 metres, measured at narrowest point.
- The beach level reduces to more than 500 mm lower than the design beach levels, or the difference in beach elevation between the updrift and downdrift profiles along each groyne is larger than 500 mm at the dry beach area.
- The difference in longitudinal profiles between updrift and downdrift profiles between groynes does exceed 5 metres. Horizontal markers will be installed on the groynes to provide visual reference points for site walkovers in order to quickly assess if maintenance is required.
- Steep underwater slopes or beach cliffing on upper slopes.

Methodology for beach nourishment:

There are two possible beach nourishment implementing agents; namely:

- St Francis Bay Riparian Homeowners Association (Riparian's); and
- A dredging contractor to undertake larger scale dredging.

The Riparian's currently maintain the marina canal system on behalf of the Kouga Local Municipality in terms of a formal agreement between the two parties.

The maintenance includes dredging the canal system to prevent sediment build-up in the canals. For this purpose, the Riparian's utilize three dredgers with a combined capacity of 138 m³ per hour. Maintenance operations continue throughout the year from the end of January until the end of November. During the holiday period of December and January dredging is discontinued, and this period is used to service the dredgers. From experience approximately 15 000 m³/annum will be available for beach nourishment. It is foreseen that the Riparian's will be able to supply sufficient material for the maintenance of beach associated with Phase 1 of the coastal protection scheme, under normal conditions.

Upon completion of Phase 2, and subsequent phases, the maintenance dredging operations will not provide sufficient sand, and it will become necessary to employ a dredging contractor to undertake the dredging operation to accommodate the additional volumes of material required to maintain the nourished beaches. Based on the anticipated annual maintenance requirements summarised in Table 4.4 and the triggers described above, the frequency of such maintenance is expected to range between once per year to once every two years.

Major storm surge events can potentially cause loss of large quantities of sand from the beach. During calmer conditions, the beach profiles typically tend to recover as the sediment is shifted back towards the shoreline and deposited on the beach. However, at St Francis Bay some of the material is permanently lost due to northward longshore drift.

A panel of suitably experienced dredging contractors will be established. For this purpose, a Request for Information (RFI) will be issued to identified dredging contractors. Interested dredging contractors will be required to provide information regarding their experience, expertise, equipment and capacity.

Depending on the maintenance requirements that are triggered through the monitoring, the work required will be scoped and the area(s) within the Kromme River Estuary from where the sand will be sourced will be identified. Primary Areas needed to be dredged to ensure navigability of the estuary will receive precedence in the source area selection process. The Kromme Joint River Committee, as the organisation responsible for managing and maintaining the river boating activities, will be engaged during this source identification process. The following mitigation measures will be adhered to:

- Only the correct size (course) material will be dredged for beach nourishment; and
- Sensitive habitats will be identified and avoided.

Tender documents will be compiled and dredging contractors on the panel will be invited to tender. Following due process a dredging contractor will be appointed to do the work. It is anticipated that the contractor would need to deliver between 100 - 150 m³ sand per hour. The depth of the water will limit the size of the vessels, since the vessels will require a shallow draft. The dimensions of the dredger are expected to be in the region of 15 m long, 4m wide and 1 m of hull. It may or may not be self-propelled and likely to have spud legs to secure it. It is expected that in-line booster pumps will be employed when sand is transported over longer distances. The discharge pipes are expected to range between 200 mm and 300 mm in diameter. Depending on the nature of the pumps it is likely that the pumps would occur at intervals of 1 000 m. The sand will be pumped through pipelines along the channel, attached to buoys, or in places placed on sandbanks. The noise level associated with the dredging and nourishment activity is expected to be approx. 80 dB at source. Depending on the size of the booster pumps, noise levels are expected to be 92 dB at source, reducing down to 60 dB at 500 m (ICF Jones and Stokes, 2008). To provide context normal conversation is about 60 dB, a lawn mower is about 90 dB, and a loud concert is about 120 dB. Placed material may be re-worked along the beach using equipment such as a dozer to ensure the required profile.

Groynes:

Groynes typically do not require frequent maintenance. It could be expected that groynes may require maintenance at time intervals divided into the following maintenance regimes, if required:

- General maintenance – typically once every 5 years.
- Detailed maintenance – typically once every 10 years.
- Special maintenance – typically after an event e.g., storm event typically equalling or exceeding design event.

Triggers for Groyne Maintenance:

The site inspection will consist of the tasks identified and at the trigger points detailed below (Table 4.7). The Coastal Engineers’ advice on when to undertake remedial or maintenance work on groynes will be followed. The trigger location will be every 5 m along the length of the groyne.

Table 4.7: Trigger Levels and Response for the groynes.

Trigger	Trigger Level		
	Concern	Intervention	Critical
Crest: Crack rocks or concrete		✓	
Primary and secondary Armour: Dislodged, missing, cracked or failing rock armour. Typically, if 2-3 No. rocks are affected in any plane.		✓	
Primary and secondary Armour: Failing of rock armour beyond damage criteria.			✓
Foundation: Settlement or local depression of the structure. Exposure of any structure foundations.		✓	
Other: Loss of material against structures (sink holes)		✓	

In addition to the advice on the groynes, the Coastal Engineers’ advice on when to undertake remedial or maintenance work on the revetment will be followed. It is anticipated that such work will be triggered when a revetment becomes:

- Unstable and/or dangerous; or
- Dysfunctional to the extent that it does not provide the necessary protection to backshore infrastructure and properties anymore.

The impacts identified in the EIR and included in this EMPr are relevant for the operational phase. Therefore, contractors completing works associated with maintenance need to ensure their Construction Environmental Management Plans (CEMP) consider the measures suggested in this EMPr.

Groynes typically require the following remedial or maintenance works:

- Remove/replace/re-pack the damaged/missing rocks and repair any concrete damage.
- Remove/replace/re-pack the damaged/missing rocks.
- Reconfigure the damaged/missing cross section.
- Evaluate stability of the structure. Instigate design and repair works if required.

The construction methodology is dependent on the maintenance that is required. For example, the removal and replacement of damaged/missing rocks will require a crane or excavator with a sling to hoist the rocks and hauling truck. Due to the phased implementation of the construction, routine or emergency maintenance if required can be included in the tender of the main construction works for the next phase.

The time to carry out the remedial works, if required, will depend on the type and extent of damage, but it is not expected to exceed three to four weeks for routine maintenance, including mobilisation and demobilisation. For replacement of material, it is likely to extend for 2 to 3 months.

Revetement:

All the existing revetments along the St Francis Bay beach have been installed to protect the backshore infrastructure (roads, parking areas, sidewalks and ablution facilities with appurtenant water supply and sewerage services) and properties, which became increasingly at risk as the beach was eroded. After the beach is restored the 40-metre-wide beach will become the primary defence, protecting the backshore infrastructure and properties. The existing revetments will then become the last defence.

Damage to these revetments caused by wave action will reduce significantly as the beach progrades. It is expected that little maintenance will be required to the revetment, and that it will happen at infrequent intervals based on the following maintenance regimes, if required:

- General maintenance – typically once every 5 years.
- Detailed maintenance – typically once every 10 years.
- Special maintenance – typically after an event e.g., storm event typically equalling or exceeding design event.

The work to be done will depend on the type and extent of damage to the revetment. In each case the Coastal Engineers will scope the work to be performed and it is likely to comprise:

- Re-pack existing rock revetment in the damaged area;
- Re-pack existing rock revetment and import and place additional rock in the damaged area; and
- Remove rock from the damaged area, place geotextile and reconstruct revetment in the damaged area.

The construction methodology is dependent on the maintenance that is required. For example, the removal and replacement of damaged/missing rocks will require a crane or excavator with a sling to hoist the rocks and hauling truck. Due to the phased implementation of the construction, routine or emergency maintenance if required can be included in the tender of the main construction works for the next phase.

The time period required to carry out the remedial works, if required, will depend on the type and extent of damage, but it is not expected to exceed three to four weeks for routine maintenance, including mobilisation and demobilisation. For replacement of material, it is likely to extend for 2 to 3 months.



Figure 4.3: Proposed layout for the stub groyne

5. LAYOUT OF THE EMPr

In order to ensure a holistic approach to the management of environmental impacts, during the planning and design, construction and operational phases of the proposed St Francis Bay Coastal Protection Scheme, this EMPr sets out the methods by which proper environmental controls are to be implemented by the Contractor and all other parties involved. The St Francis Bay Coastal Protection Scheme will not be decommissioned in the foreseeable future, and thus the decommissioning phase for this development is not discussed further. Each remaining phase of development is discussed in more detail below and has specific issues unique to that phase.

5.1 DESIGN PHASE EMPr

The Design Phase EMPr is an integral component of the project life cycle and requires interaction between the design engineers and environmental consultants to ensure that the engineers are aware of the environmental constraints that must be considered and incorporated into the final design of the project. The format of this design EMPr is checklist in nature to ensure that all specifications are included in the design phase. The design EMPr phase requires ongoing and in-depth discussions between the final design team and the Environmental Control Officer (ECO). The engineer will have to cost for, and be available for, ongoing discussions with the environmental officer at all stages of final design. While the majority of the work is undertaken at a desktop level and thus physical impacts are negligible this is an important stage of the project. During this phase the specific methodology for both the construction and operational (maintenance) phases of the project will be consolidated and clarified. This will depend on the funding available which will, in turn, determine the phases of the scheme to be implemented. Linked to the clarification of the construction and maintenance methodology will be the development of specific management and monitoring plans, which will be expected to be produced and reviewed by the competent authority prior to construction commencing.

5.2 CONSTRUCTION PHASE EMPr

The Construction Phase EMPr details the environmental management system/framework within which construction activities will be governed for the Construction Phase. The Construction EMPr consists of various actions, initiatives and systems that the contractor will have to ensure are in place and are undertaken. The Construction EMPr consists of both a management system and environmental specifications which contain detailed specifications that will need to be undertaken or adhered to by the appointed contractor. The Construction EMPr will need to be developed following the Final Design Stages. It is likely that the construction EMPr will be finalised with constructive input from the appointed contractor. Sound environmental management is orientated around a pragmatic, unambiguous but enforceable set of guidelines and specifications, and for this reason it is imperative that the contractor, while being bound by the EMPr, fully understands it and has had input into its final development. For this reason, the final Construction EMPr will need to be signed off after input from the selected contractor prior to the initiation of construction activities.

As mentioned above it is important to consider the timing and phasing of this scheme. It is likely that the scheme will be implemented in phases and therefore, it should be considered that each project phase will have discreet construction and operation activities. The operation phase of the project phases (i.e. Phase 1 to 5) may overlap with the construction of a subsequent project phase. For example: Phase 1 may be in operation for a number of years before Phase 2 is constructed.

5.3 OPERATIONAL PHASE EMPr

The Operational Phase EMPr provides specific guidance related to operational activities associated with a particular development. Operational EMPr's are sometimes referred to as Environmental Management Systems (EMS). Impacts during the operational phase of a development of this nature will be few in number and of low in intensity. By taking pro-active measures during the construction phase, potential environmental impacts emanating during the operational phase will be minimised.

6. MITIGATION AND/OR MANAGEMENT MEASURES

6.1 GENERAL CONSTRUCTION PHASE MITIGATION AND MANAGEMENT MEASURES

In addition to the mitigation and management measures which are stipulated in the EIR and included in Section 6.2 of this report, the following general Construction Phase mitigation and management measures apply. Note that maintenance activities will be similar to that of the construction phase and therefore, the measures below are relevant to all phases of the project.

The contractor/s are likely to establish construction camps within a specified and appropriate location within St Francis Bay according to their requirements. However, due to the nature of the work, much of the construction activity will take place in public areas which cannot be secured in a manner similar to that of a construction camp. Therefore, it is important that the contractor establishes suitable and appropriate method statements for managing their activities outside of what could be considered “secure” areas.

Table 6.1: General construction phase mitigation and/or management measures.

GENERAL CONSTRUCTION PHASE	
Activity	Mitigation and/or Management Measures
1 Demarcation	<p>The location, layout and method of establishment of the construction camp, including the following, must be clearly indicated and demarcated prior to the commencement of construction:</p> <ul style="list-style-type: none"> ➤ All Contractors’ offices; ➤ Lay down areas; ➤ Vehicle wash areas (if any); ➤ Workshops and drip trays; ➤ Fuel storage areas (including filling and dispensing from storage tanks); ➤ Planned working areas; ➤ Cement/concrete mixing areas (including the methods employed for the mixing of concrete and particularly the containment of runoff water from such areas and the method of transportation of concrete); and ➤ Other infrastructure required for the running of the project. <p>➤ The Contractor must erect and maintain permanent and/or temporary fences in the locations directed by the ECO. Such fences should, if so specified, be erected before undertaking designated activities; and</p> <p>➤ Should “no-go” areas exist on the site, the Contractor must ensure that, insofar as he/she has the authority, no person, machinery, equipment or materials enter the “no-go” areas at any time.</p>
2 Site Access	<p>Details, including a drawing, showing where and how the access points and routes will be located and managed must be submitted to the ECO and the Applicant. These should be supported by the following management requirements:</p> <ul style="list-style-type: none"> ➤ On the site and within such distance of the site as may be stated, the Contractor should control the movement of all vehicles, including vehicles of suppliers so that they remain on designated routes, are distributed so as not to cause an undue concentration of traffic and that all relevant laws are complied with. In addition, such vehicles should be routed and operated in a manner that minimises the disruption to regular users of the routes; ➤ On gravel or earth roads on site and within 500 m of the site, the Contractor’s vehicles as well as the suppliers’ must not exceed a speed of 45 km/h or as directed by the ECO; and ➤ The Contractor must supply the ECO with a Method Statement detailing the location and management of all access points and roads.
3 Materials Handling, Use & Storage	<ul style="list-style-type: none"> ➤ The Contractor must ensure that any delivery drivers are informed of all procedures and restrictions (including identified "no-go" areas) required to comply with this EMP; and ➤ The Contractor must ensure that these delivery drivers are supervised during offloading, by someone with an adequate understanding of the requirements of the EMP; ➤ Materials must be appropriately secured to ensure safe passage between destinations. Loads including, but not limited to, sand, stone chip, fine vegetation, refuse, paper and cement, should have appropriate cover to prevent them spilling from the vehicle during transit;

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GENERAL CONSTRUCTION PHASE		
Activity	Mitigation and/or Management Measures	
		<ul style="list-style-type: none"> ➤ The Contractor will be responsible for any clean up resulting from the failure by his/her employees or suppliers to properly secure transported materials; ➤ All manufactured and/or imported material should be stored within the Contractor's camp, and, if required by the EMPr, out of the rain; ➤ All laydown areas outside of the construction camp will be subject to the ECO's approval; and ➤ Imported gravel, fill, soil and sand materials should be free of weeds, alien invasive seed matter, plant material, litter and contaminants and must be obtained from sources approved by the ECO.
4	Stockpiling	<ul style="list-style-type: none"> ➤ Any stockpiling of sand, gravel, cut, fill or any other material including spoil must only be in areas that have been approved by the ECO within the defined working area; ➤ The Contractor should ensure that the material does not blow or wash away. If the stockpiled material is in danger of being washed or blown away, the Contractor should cover it with a suitable material, such as hessian or plastic. Stockpiles of topsoil must not be covered with plastic; and ➤ No stockpiling of any material will be allowed within 20 m of any "no-go" areas (if applicable).
5	Solid Waste Management	<ul style="list-style-type: none"> ➤ Onsite burning, burying or dumping of any waste materials, litter or refuse must not occur; ➤ The Contractor should provide vermin and weatherproof bins with lids of sufficient number and capacity to store the solid waste produced on a daily basis. The lids must be kept firmly on the bins at all times; ➤ Bins must not be allowed to become overfull and should be emptied daily; ➤ The waste from bins may be temporarily stored onsite in a central waste area that is weatherproof and scavenger proof, and which the ECO has approved; ➤ Recyclable waste should be disposed of into separate skips/bins and removed offsite for recycling; ➤ All solid waste must be disposed of offsite at an approved registered landfill site. The Contractor must supply the ECO with the appropriate disposal certificates; and ➤ The Contractor must submit a solid waste management plan, as part of the Pollution Control Method Statement, to the ECO.
6	Water Use	<ul style="list-style-type: none"> ➤ All sources of water for construction purposes must be approved by the ECO in writing before any such sources can be used to obtain water; and ➤ All wash water should be recycled for use as wash water again or for dust suppression, where applicable.
7	Hazardous substances	<ul style="list-style-type: none"> ➤ The transportation and handling of hazardous substances must comply with the provisions of the Hazardous Substances Act (Act No.187 of 1993) and associated regulations as well as SABS 0228 and SABS 0229; ➤ The Contractor must also comply with all other applicable regional and local legislation and regulations with regard to the transport, use and disposal of hazardous substances. Hazardous chemical substances (as defined in the Regulations for Hazardous Chemical Substances) used during construction must be stored in secondary containers. The relevant Material Safety Data Sheets (MSDS) must be available onsite; ➤ Procedures detailed in the MSDSs must be followed in the event of an emergency situation; ➤ The Contractor will be responsible for the training and education of all personnel onsite who will be handling hazardous materials about their proper use, handling and disposal; and ➤ If potentially hazardous substances are to be stored or used onsite, the Contractor must submit a Method Statement to the ECO detailing the substances/materials to be used, together with the transport, storage, handling and disposal procedures for the substances.
8	Cement Mixing & of Concrete	<ul style="list-style-type: none"> ➤ The proposed location of cement mixing areas (including the location of cement stores and sand and aggregate stockpiles) must be indicated on the site layout plan and approved by the ECO; ➤ All wastewater generated from the operation and cleaning of concrete mixing equipment and other sources of concrete should be passed through a concrete wastewater settlement system; ➤ The Contractor must ensure that minimal water is used for washing of concrete and cement mixing equipment; ➤ Used cement bags must be disposed of in weatherproof bins onsite to prevent the generation of wind-blown cement dust and the bags from blowing away; ➤ The Contractor must ensure that concrete is mixed on mortar boards, all visible remains of concrete are removed and disposed of as waste and that all surplus aggregate is removed; and ➤ As part of the Pollution Control and Concrete Mixing Method Statement, a plan detailing all actions to be taken to comply with the requirements must be submitted to the ECO.

GENERAL CONSTRUCTION PHASE	
Activity	Mitigation and/or Management Measures
9	Fuel and Oil
	<p><u>Fuel Storage</u></p> <ul style="list-style-type: none"> ➤ All construction materials including fuels and oil should be stored in demarcated areas that are contained within berms/bunds. Washing and cleaning of equipment should also be done in berms or bunds, in order to trap any contaminated material and prevent excessive soil erosion; ➤ All necessary approvals with respect to fuel storage and dispensing must be obtained from the appropriate authorities. Symbolic safety signs depicting “No Smoking” and “Danger”, conforming to the requirement of SABS 1186, must be prominently displayed in and around the fuel storage area. There must be adequate fire-fighting equipment at the fuel storage area; ➤ The Contractor must ensure that all liquid fuels and oils are stored in tanks with lids, which are kept firmly shut and under lock and key at all times. The capacity of the tank should be clearly displayed, and the product contained within the tank clearly identified using the emergency information system detailed in SABS 0232 part 1. Fuel storage tanks capacity must not exceed 9 000 litres and must be kept on site only for as long as fuel is needed for construction activities, on completion of which they must be removed; ➤ Tanks onsite should not be linked or joined via any pipe work, but should remain as separate entities. The tanks must be situated on a smooth impermeable base with a bund. The volume inside the bund should be 110% of the total capacity of the largest storage tank. The base may be constructed of concrete, or of plastic sheeting with impermeable joints with a layer of sand over to prevent perishing. The impermeable lining should extend to the crest of the bund. The floor of the bund should be sloped to enable any spilled fuel and/or fuel-contaminated water to be removed. Appropriate material, approved by the ECO that absorbs / breaks-down or encapsulates minor hydrocarbon spillage and which is effective in water should be installed in the sump; ➤ The tanks and banded areas should be covered by a roofed structure, taken offsite to a disposal site approved by the ECO, and the material that absorbs / breaks-down or encapsulates minor hydrocarbon spillage should be replenished; ➤ Adequate precautions should be provided to prevent spillage during the filling of any tank and during the dispensing of the contents. The dispensing mechanism for the fuel storage tanks should be stored in a waterproof container when not in use; and ➤ As part of the required site layout for the construction camp, a plan must be submitted to the ECO detailing the design, location and construction of the fuel storage area as well as for the filling and dispensing from storage tanks and for the type of absorbing / breaking-down or encapsulating material to be used. <p><u>Refuelling</u></p> <ul style="list-style-type: none"> ➤ Where reasonably practical, the plant should be refuelled at a designated re-fuelling area/depot or at a workshop as applicable. If this is not reasonably practical, then the surface under the refuelling area must be protected and appropriately banded against pollution to the reasonable satisfaction of the ECO prior to any refuelling activities; ➤ If fuel is dispensed from 200 litre drums, the proper dispensing equipment must be used, and the drum should not be tipped in order to dispense fuel. The Contractor should ensure that the appropriate fire-fighting equipment is present during refuelling operations; and ➤ The Contractor must ensure that there is always a supply of absorbent material readily available to absorb / breakdown or where possible, be designed to encapsulate minor hydrocarbon spillages. The quantities of such materials should be able to handle a minimum of 200 ℓ of hydrocarbon liquid spill. Prior to any refuelling or maintenance activities, the ECO must approve this material. <p><u>Used oil and hydrocarbon contaminated materials</u></p> <ul style="list-style-type: none"> ➤ Used oil should be stored at a central location onsite prior to removal offsite for disposal at an approved disposal or recycling site; and ➤ Old oil filters and oil, petrol and diesel-soaked material must be treated as hazardous waste. The Contractor should remove all oil, petrol, and diesel-soaked sand immediately and should dispose of it as hazardous waste or treat it onsite with material that breaks-down or encapsulates such spillages as approved by the ECO.
10	Workshop, Equipment
	<ul style="list-style-type: none"> ➤ The Contractor should ensure that in his workshop and other plant maintenance facilities, including those areas where, after obtaining the ECO's approval, the Contractor carries out emergency plant

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GENERAL CONSTRUCTION PHASE		
Activity	Mitigation and/or Management Measures	
Maintenance & Storage	<p>maintenance, there is no contamination of the soil or vegetation. The workshop must have a smooth impermeable (concrete or thick plastic covered with sand) floor;</p> <ul style="list-style-type: none"> ➤ The floor should be bunded and sloped towards an oil trap or sump to contain any spillages. When servicing equipment, drip trays should be used to collect the waste oil and other lubricants. Drip trays should also be provided in construction areas for stationary plant (such as compressors) and for "parked" plant (such as scrapers, loaders, vehicles); ➤ All vehicles and equipment must be kept in good working order and serviced regularly. Leaking equipment must be repaired immediately or removed from the site; ➤ All vehicle and equipment washing must be undertaken in the workshop or maintenance areas, and these areas must be equipped with a suitable impermeable floor and sump/oil trap. The use of detergents for washing should be restricted to low phosphate and nitrate products and low sudsing-type detergents; and ➤ As part of the site layouts, a plan must be submitted to the ECO detailing the design of the bunding of the workshop and how run-off from the workshop will be managed as well as how drip trays used under plant will be managed. 	
11 Ablution facilities	<ul style="list-style-type: none"> ➤ Washing, whether of a person or of personal effects, and acts of excretion and urination are strictly prohibited other than at the facilities provided. The Contractor must provide the necessary ablution facilities for all his/her personnel prior to the commencement of work; ➤ Ablution facilities must be supplied by the Contractor for the workers at a ratio of at least 1 toilet per 20 workers in areas approved by the ECO. Toilets should be situated within 200 m of any area where work is taking place in numbers sufficient to meet the ratio depicted above for the workers in the area; ➤ The facilities should be maintained in a hygienic state and serviced regularly. Toilet paper must be provided. Temporary/portable toilets should be secured to the ground to prevent them toppling due to wind or any other cause, to the satisfaction of the ECO; and ➤ Discharge into the environment and burial of waste is strictly prohibited. The Contractor must ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from the site. Toilets must be emptied before any temporary site closure. 	
12 Eating Areas	<ul style="list-style-type: none"> ➤ The Contractor should designate eating area(s), subject to the approval of the ECO. No cooking is allowed outside of the Contractor's camp area onsite; ➤ At meal times, all workers must eat in designated eating areas. These areas should have shade for the workers; ➤ Sufficient bins must be present in these areas. All disposable food packaging must be disposed of in the bins after every meal; and ➤ The feeding- or leaving of food for animals is strictly prohibited. 	
13 Site Structures	<ul style="list-style-type: none"> ➤ All site establishment components (as well as equipment) should be positioned to limit visual intrusion on neighbouring areas and the size of the land area disturbed. The type and colour of roofing and cladding materials of the Contractor's temporary structures should be selected to reduce reflection; and ➤ The Contractor should supply and maintain adequate and suitable sheds for the storage of materials. Sheds for the storage of materials that may deteriorate or corrode if exposed to the weather should be weatherproof, adequately ventilated and provided with raised floors. 	
14 Lighting	<ul style="list-style-type: none"> ➤ The Contractor should ensure that any lighting installed on the site for his/her activities does not cause a reasonably avoidable disturbance to neighbouring residents or the naturally-occurring fauna. 	
15 Noise	<ul style="list-style-type: none"> ➤ The Contractor should take precautions to minimise noise generated on site (e.g. install and maintain silencers on machinery); ➤ The Contractor must comply with the Noise Induced Hearing Loss Regulations published under the Occupational Health and Safety Act; ➤ Appropriate directional and intensity settings are to be maintained on all hooters and sirens; ➤ Work should be limited to daylight hours – between 06:00 and 18:00; and ➤ No amplified music must be allowed on site. The Contractor must not use sound amplification equipment on site unless in emergency situations. 	
16 Dust Control	<ul style="list-style-type: none"> ➤ The Contractor will be responsible for the continued control of dust arising from his/her operations. The Contractor must take all reasonable measures to minimize the generation of dust as a result of construction activities to the satisfaction of the ECO. Appropriate dust suppression measures include 	

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GENERAL CONSTRUCTION PHASE	
Activity	Mitigation and/or Management Measures
	<p>spraying or dampening with water, using a commercial dust binder (such as Hydropam or Dustex), rotovating straw bales, planting of open cleared space and the scheduling of dust-generating activities. If the conditions are such that the Contractor cannot satisfactorily dampen the dust, then the ECO may halt operations until such time as the conditions are more suitable for lower dust generating construction activities;</p> <ul style="list-style-type: none"> ➤ Areas that are to have the topsoil stripped for construction purposes must be limited and only stripped when work is about to take place; ➤ Other activities and situations that may result in a dust nuisance include site clearance and other earth moving operations, open cleared space, stockpiles of topsoil or sand and activities associated with concrete mixing; and ➤ The appropriate health and safety equipment (e.g. dust masks) should be worn by workers during the phases of dust-producing construction activity.
17	<p>Environmental Awareness Training</p> <ul style="list-style-type: none"> ➤ Environmental awareness training courses should be run for all personnel onsite (See Annexure 2 for a proposed Basic Environmental Education Course). Two courses should be run, one for the Contractor's and Subcontractor's management and one for all site staff and labourers. Courses should be run in the morning during normal working hours at a suitable venue provided by the Contractor. All attendees should remain for the duration of the course and sign an attendance register on completion, that clearly indicates participant's names, a copy of which must be handed to the ECO; ➤ The size of each session should be limited to a maximum of 30 people. The Contractor should allow for sufficient sessions to train all personnel. Subsequent sessions should be run for any new personnel coming onto site. A Method Statement with respect to the organisation of these courses should be submitted; and ➤ Notwithstanding the specific provisions of this clause it is incumbent upon the Contractor to convey the sentiments of the EMPr to all personnel and Subcontractors involved with the Works.
18	<p>Fire Control</p> <ul style="list-style-type: none"> ➤ The Contractor must take all the necessary precautions to ensure that fires are not started as a result of site activities; ➤ No open fires must be permitted on the site; ➤ Smoking must not be permitted in areas where there is a fire hazard. Such areas include the workshop and fuel storage areas and any areas where the vegetation or other material is such as to support the rapid spreading of an initial flame; ➤ The Contractor should appoint a Fire Officer who will be responsible for ensuring immediate and appropriate actions in the event of a fire and will ensure that employees are aware of the procedures to be followed. The Contractor must forward the name of the Fire Officer to the ECO for approval within 7 days of being on site; ➤ The Contractor must ensure that there is basic firefighting equipment available onsite at all times. This should include at least rubber beaters when working in urban open spaces and natural areas, and at least one fire extinguisher of the appropriate type when welding or other "hot" activities are undertaken; and ➤ The Contractor will be liable for any expenses incurred by any organisations called to assist with fighting fires that were started as a result of his/her activities or personnel, and for any cost relating to the rehabilitation of burnt areas, or consequential damages.
19	<p>Emergency Procedures</p> <ul style="list-style-type: none"> ➤ Emergency procedures, including the names and contact details of responsible personnel and emergency services must be made available to all staff and should be clearly displayed at relevant locations at the site. The Contractor should advise the ECO of any emergencies onsite, together with a record of action taken, within 24 hours of the emergency occurring; and ➤ The Contractor must submit a Method Statement covering the procedures for the following emergencies: <p><u>Fire</u></p> <ul style="list-style-type: none"> ➤ The Contractor should advise the relevant authority of a fire as soon as one starts and must not wait until it is out of control; and ➤ The Contractor must ensure that all employees are aware of the procedures to be followed in the event of a fire. <p><u>Accidental leaks and spillages</u></p>

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GENERAL CONSTRUCTION PHASE	
Activity	Mitigation and/or Management Measures
	<ul style="list-style-type: none"> ➤ The Contractor must ensure that all employees are aware of the procedures to be followed for dealing with spills and leaks, which must include notifying the ECO and the relevant authorities. The Contractor must ensure that all the necessary materials and equipment for dealing with spills and leaks are available onsite at all times. Treatment and remediation of the spill areas must be undertaken to the reasonable satisfaction of the ECO; ➤ In the event of a hydrocarbon spill, the source of the spillage must be isolated, and the spillage contained. The area should be cordoned off and secured. The Contractor should ensure that there is always a supply of absorbent material readily available to absorb / breakdown or where possible, be designed to encapsulate minor hydrocarbon spillages. The quantities of such materials should be able to handle a minimum of 200 ℓ of hydrocarbon liquid spill; and ➤ Any spills must be cleared, and the contaminated soil or sludge disposed of in an appropriate manner, approved by the ECO, or at a licensed hazardous waste disposal site; ➤ It is possible that a leak or spillage may occur in an aquatic/marine environment. Contractors need to ensure that appropriate training and materials are available to deal with a spillage in this environment.
20	Protection of Natural features
	<ul style="list-style-type: none"> ➤ The Contractor must not deface, paint, damage or mark any natural features (e.g. rock formations or trees) situated in or around the site for survey or other purposes unless agreed upon beforehand with the ECO. Any features affected by the Contractor in contravention of this clause must be restored/rehabilitated to the satisfaction of the ECO; and ➤ The Contractor and onsite staff must not at any stage enter dense, intact vegetation without written approval from the ECO.
21	Protection of Flora & Fauna
	<ul style="list-style-type: none"> ➤ A Botanist should identify the need for plant search and rescue (prior to construction) to identify Species of Conservation Concern (SCC) to be relocated (if necessary); ➤ Protected plant species identified as having to be removed should then be removed from the designated construction footprint and relocated to adjacent areas of similar habitat that should not be affected by construction activities. The plants should be used in landscaping once construction is complete (if applicable); ➤ Except to the extent necessary for the carrying out of the works, flora should not be removed, damaged or disturbed; ➤ The removal and stockpiling of topsoil must also be carried out in accordance with this EMPr; ➤ Trapping, poisoning and/or shooting of animals is strictly forbidden; ➤ The use of chemicals of all forms should be carefully controlled and monitored to avoid contamination of surrounding areas; and ➤ Construction phases should allow for education of staff as to the significance of SCC.
22	Protection of Heritage Features
	<ul style="list-style-type: none"> ➤ Construction managers and/or foremen must be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites; ➤ If concentrations of palaeontological and/or archaeological heritage material and human remains are uncovered during construction, all work must cease immediately and be reported to the Eastern Cape Provincial Heritage Resources Authority (ECPHRA) and/or the South African Heritage Resources Agency (SAHRA) (021 642 4502) so that systematic and professional investigation/ excavation can be undertaken; and ➤ Any person who causes intentional damage to archaeological or historical sites and/or artefacts could be penalised or legally prosecuted in terms of the National Heritage Resources Act 25 of 1999.
23	Vegetation Clearance
	<ul style="list-style-type: none"> ➤ Vegetation clearing and trampling should be avoided in areas demarcated as “no-go” areas (if any); ➤ Temporary infrastructure such as the site camp, lay down areas and storage areas must not be placed in any other area than the area approved by the ECO; ➤ The Contractor must work according to a plan, which demarcates areas to be cleared. The plan should be part of the Project Layout Plan developed in the Site Design Phase; ➤ The minimum amount of vegetation clearance must take place; and ➤ Collection of, or wilful damage to, any habitats outside of the areas demarcated for clearing is not allowed.
24	Topsoil
	<ul style="list-style-type: none"> ➤ Topsoil, if present, should only be stripped from the areas as indicated below: <ul style="list-style-type: none"> ○ Any area which is to be used for temporary storage of materials; ○ Areas which could be polluted by any aspect of the construction activity; and ○ Areas designated for the dumping of soil.

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GENERAL CONSTRUCTION PHASE	
Activity	Mitigation and/or Management Measures
	<ul style="list-style-type: none"> ➤ Stripping of topsoil should be undertaken in such a manner as to minimise erosion by wind or runoff; ➤ Outside of the development footprint, topsoil will be stripped to a depth not exceeding 150 mm from the original ground level; ➤ Areas from which the topsoil is to be removed must be cleared of any foreign material which could form part of the topsoil during removal including bricks, rubble, any waste material, litter, excess vegetation and any other material which could reduce the quality of the topsoil; ➤ The Contractor must ensure that subsoil and topsoil are not mixed during stripping, excavation, reinstatement and rehabilitation; ➤ If mixed with clay sub-soil the usefulness of the topsoil for rehabilitation of the site will be lost; ➤ Soils should be exposed for the minimum time possible once cleared; ➤ Topsoil should be temporarily stockpiled, separately from (clay) subsoil and rocky materials; ➤ Topsoil should only be stockpiled in areas designated by the ECO; ➤ Stockpiles will either be vegetated with indigenous grasses or covered by a suitable fabric to prevent erosion and invasion of weeds; and ➤ Stockpiled topsoil must not be compacted.
25	Stormwater Management
	<ul style="list-style-type: none"> ➤ Stormwater should be managed using suitable structures such as swales, gabions and rock rip-wrap so that any run-off from the development site is attenuated prior to discharge. Silt and sedimentation should be kept to a minimum, through the use of the above-mentioned structures by also ensuring that all structures don't create any form of erosion; and ➤ Natural run-off must be diverted to stormwater drains where these are available.
26	Erosion & Sedimentation Control
	<ul style="list-style-type: none"> ➤ The Contractor must take all reasonable measures to limit erosion and sedimentation due to construction activities and must comply with such detailed measures as may be required by the EMPr; ➤ Revegetate areas that have been disturbed as soon as possible; ➤ Where erosion and/or sedimentation occur, whether on or off the site, despite the Contractor complying with the aforementioned, rectification should be carried out in accordance with details specified by the ECO. Where erosion and/or sedimentation occur due to the fault of the Contractor, rectification must be carried out to the reasonable requirements of the ECO and at the expense of the Contractor; and ➤ Actions must also be taken in the event of heavy rains and potential flooding, whereby diversion barriers must not cause excessive erosion.
27	Aesthetics
	<ul style="list-style-type: none"> ➤ The Contractor must take reasonable measures to ensure that construction activities do not have an unreasonable impact on the aesthetics of the area.
28	Community Relations
	<ul style="list-style-type: none"> ➤ The Contractor must keep a "Complaints Register" onsite. The Register should contain all contact details of the person who made the complaint, and information regarding the complaint itself as well as the date and time that the complaint was resolved; ➤ The ECO will be responsible for responding to queries and/or complaints and may request assistance from the Contractor's Management Staff; and ➤ Construction materials and other purchases relating to the project should be done, where possible, within the nearby community and at local shops.
29	Temporary Site Closure
	<p>If the Site is closed for a period exceeding 5 days, the Contractor's Safety, Health and Environment (SHE) Officer, in consultation with the ECO, should carry out the following checklist procedure and ensure that the following conditions pertain and report on compliance with this clause:</p> <p><u>Fuels / flammables / hazardous materials stores</u></p> <ul style="list-style-type: none"> ➤ Fuel stores are as low in volume as practicable; ➤ The bund is empty and there are no leaks; ➤ The outlet is secure and locked; ➤ Fire extinguishers are serviced and accessible; ➤ The area is secure from accidental damage through vehicle collision and the like; ➤ Emergency and contact numbers are available and displayed; and ➤ There is adequate ventilation in enclosed spaces. <p><u>Safety</u></p> <ul style="list-style-type: none"> ➤ Check that site safety checks have been carried out in accordance with the Occupational Health and Safety Act (No. 85 of 1993) prior to site closure;

GENERAL CONSTRUCTION PHASE	
Activity	Mitigation and/or Management Measures
	<ul style="list-style-type: none"> ➤ An inspection schedule and log for use by security or contracts staff is developed; ➤ All trenches and manholes are secured; ➤ Applicable notice boards are in place and secured; ➤ Emergency and Management contact details are prominently displayed; ➤ Security personnel have been briefed and have the facilities to contact or be contacted by relevant management and emergency personnel; ➤ Night hazards such as reflectors, lighting, traffic signage etc. have been checked; ➤ Fire hazards identified and the local authority notified of any potential threats e.g. large brush stockpiles, fuels etc.; ➤ Pipe stockpiles are wedged / secured; ➤ Scaffolds are secure; and ➤ Structures vulnerable to high winds are secure. <p><u>Erosion</u></p> <ul style="list-style-type: none"> ➤ Wind and dust mitigation measures such as straw, brush packs, irrigation etc. are in place; ➤ Excavated and filled slopes and stockpiles are at a stable angle; ➤ Re-vegetated areas have a watering schedule and the supply to such areas is secured; and ➤ There are sufficient detention ponds or channels in place. <p><u>Water contamination and pollution</u></p> <ul style="list-style-type: none"> ➤ Hazardous fuel stores are secure; ➤ Cement and materials stores are secure; ➤ Toilets are empty and secured; ➤ Refuse bins are empty and secured; ➤ Bunding is clean and treated with appropriate material that will absorb / breakdown and where possible be designed to encapsulate minor hydrocarbon spillage; and ➤ Drip trays are empty and secure.

6.2 MITIGATION AND MANAGEMENT MEASURES IDENTIFIED IN THE EIA PHASE

In order to identify the appropriate methods required to manage and mitigate environmental disturbance during the proposed development, the impacts and risks that need to be avoided must first be identified. This has been conducted via an EIA process and the details of the impacts and risks associated with the proposed development are included in the EIR. The aim of the EMPr is to ensure that the impacts which have been identified are properly mitigated to ensure that their significance is reduced (in the case of negative impacts) in order to protect the environment. Table 6.2 below illustrates the significance of the impacts before and after mitigation is taken into:

Table 6.2: Summary of the significance of the impacts associated with the St Francis Bay Coastal Protection Scheme as well as their residual risk following the implementation of mitigation measures.

IMPACT	SIGNIFICANCE	RISIDUAL RISK
CONSTRUCTION PHASE IMPACTS		
Estuarine Physical Characteristics – Change in hydrodynamics	LOW –	LOW –
Estuarine Physical Characteristics – Alteration of water channel due to scour	LOW –	LOW –
Estuarine Physical Characteristics - Erosion of the Kromme riverbanks and beach spit (also applicable for operation phase)	LOW-	LOW-
Surface Water Pollution (machinery)	MODERATE –	LOW –
Estuarine Ecology – Suspended sediment / turbidity (also applicable for maintenance dredging during operation phase)	MODERATE –	LOW –
Estuarine Ecology – Flora (Direct loss of estuarine floral species) (also applicable for maintenance dredging)	MODERATE –	LOW –
Estuarine Ecology – Estuarine Functional Zone (also applicable during operation phase)	MODERATE-	MODERATE-
Estuarine Ecology – Fauna (Direct loss of faunal) (also applicable for maintenance dredging)	MODERATE -	LOW –
Estuarine Ecology – Fauna (Loss of sandbank habitat)	MODERATE-	LOW-
Estuarine Ecology – Fauna (Impacts on bird species)	LOW –	LOW –
Dune Ecology – Loss of dune vegetation (Sand River)	MODERATE-	MODERATE-
Dune Ecology – Impacts on foredunes due to site access	LOW -	LOW-
Dune Ecology – Impacts on nearshore and beach ecology	MODERATE-	MODERATE -
Marine Ecology – Flora (Loss of nearshore reef)	MODERATE-	LOW-
Marine Ecology – Flora (Increased hard substrate/habitat for attachment of benthic species)	MODERATE+	MODERATE+
Marine Ecology – Fauna (Increased hard substrate/habitat for attachment of benthic species)	MODERATE+	MODERATE+
Local Amenity – Estuary (Temporary restricted access in areas)	MODERATE-	LOW-
Local Amenity – Estuary (Decreased area available for bait digging)	MODERATE-	LOW-
Local Amenity – Beach (Restricted access to areas during construction)	MODERATE-	LOW-
Visual Impact – Dredging and construction machinery	MODERATE-	LOW-
Loss of Archaeological Resources	LOW –	LOW +
Loss of Cultural Heritage (built environment)	NO SIGNIFICANCE	NO SIGNIFICANCE
Loss of Cultural Landscape	LOW–	LOW-
Loss of graves	MODERATE-	LOW-
Loss of marine archaeological / heritage resources	LOW -	LOW -
Solid Waste Pollution (Relevant to all project aspects) (also relevant to operation phase)	LOW –	LOW –
Dust Pollution (Implementation of coastal protection infrastructure)	LOW –	LOW –
Increased Traffic (Relevant to sand sourcing should the option of truck transportation be implemented) and vehicle movements related to groyne and revetment construction and material transportation	MODERATE –	LOW –
Noise Disturbance (Relevant to all project aspects)	MODERATE –	LOW –
Employment Creation and Economic Benefits (Relevant to all project aspects)	MODERATE +	MODERATE +
OPERATIONAL PHASE IMPACTS		
Estuarine Physical Characteristics (Increased erosion due to boat traffic)	MODERATE-	LOW-
Dune Ecology (Restoration of beach habitat)	MODERATE+	MODERATE+
Marine Hydrodynamics - Impact (erosion) as a result of the infrastructure and dredging	MODERATE-	LOW-
Marine Hydrodynamics - Impact (reduction of sediment supply) to the northern beaches	MODERATE-	LOW-
Local Amenity – Estuary (Increased boat access during all tidal cycles)	MODERATE+	MODERATE+
Local Amenity – Estuary (Potential increased tourism)	MODERATE+	HIGH+
Local Amenity – Beach (Increased recreational use)	VERY HIGH+	VERY HIGH +
Visual Impact – Presence of groynes	MODERATE -	LOW -
Protection of Coastal Public Property (Relevant to all project aspects)	VERY HIGH +	VERY HIGH +
Public Health and Safety	MODERATE-	LOW-
CUMULATIVE IMPACTS		
Erosion of the banks of the estuary through increased boating activity	MODERATE-	LOW-

The following table sets out the potential environmental, social and specialist issues that could occur during the lifespan of the proposed St Francis Bay Coastal Protection Scheme project, as per the Draft EIR for the Proposed Coastal Protection Scheme, St Francis Bay, Kouga Local Municipality, Eastern Cape Province, (CES, December 2020). The EIR provides mitigation measures and recommendations in an effort to reduce the significance of potential negative impacts and enhance potential benefits for the Construction and Operational Phases of the St Francis Bay Coastal Protection Scheme.

Table 6.3: Summary of the mitigation measures (adverse impact management actions) as outlined in the EIR.

CONSTRUCTION PHASE		
Impact	Description	Mitigation Measures
1	<p>Estuarine Physical Characteristics</p> <p>Removal of large volumes of sediment from the Kromme Estuary has the potential to change the physical (hydrodynamics) and sedimentary processes within the estuarine system. The dredging of the river will increase the tidal prism, and the area around the river mouth will allow the water to drain out more effectively.</p> <p>The removal of sand from the intertidal areas, together with the subsequent changes to the hydrodynamics of the Kromme Estuary and mouth, could result in the realignment of the main estuarine channel. While the modification of the course of the main channel is not planned, the dredging activity could result in it changing its current orientation or 'straight-lining' its path.</p> <p>Any increase in current velocities, as a result of the change to hydrodynamics, have the ability to transport sediment. With current velocities increasing in the mouth under certain conditions, the integrity of the northern end of the spit could be put at risk through erosion. The project is anticipating nourishing the spit area which is also protected by revetments and future groyne infrastructure.</p> <p>Advisian's (2020) modelling indicates that none of the dredging scenarios they tested led to any substantial changes in current velocities within the estuary under normal and/or flood conditions. This indicates that erosion of the banks of the river, as a result of the dredging, is unlikely.</p>	<ul style="list-style-type: none"> ➤ Maintain the current main sand bank adjacent to Area S1 to act as a sand sink (i.e. a place for sand to accumulate); and ➤ Avoid sensitive areas identified in the EIR.
2	<p>Surface water Pollution (relevant to sand sourcing along the Kromme River)</p> <p>There will be disturbance of beach sand during the sand sourcing and ongoing operations, and during the construction of the hard infrastructure required for coastal protection. Substances such as oil and diesel may enter the Kromme River and/or the ocean, if spillages are not effectively managed and/or prevented.</p>	<ul style="list-style-type: none"> ➤ Construction vehicles and equipment should be maintained, and daily checks should be done for leaks; ➤ Spill kits and drip trays must be readily available and utilised during refuelling. This includes spill kits and equipment to contain, manage and remediate any spillages in aquatic/marine environments. ➤ Refuelling procedures for aquatic based craft must be included in a method statement, reviewed and approved by the ECO; ➤ No storage of fuel or chemicals close to the shore or estuary must be permitted. The exact distances will need to be determined for each of the Project Phases; ➤ If required, it is recommended that ready mixed cement is used. No cement mixing close to the shore or estuary must be permitted;

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			<ul style="list-style-type: none"> ➤ Servicing of machinery and vehicles must occur off site unless this is done in a bunded area; and ➤ All stationery plant must be equipped with drip trays.
3	Estuarine Ecology – Flora	The methodology of extracting the sediment may result in the physical loss of estuarine floral species.	<ul style="list-style-type: none"> ➤ Where possible, sediment should be taken from areas where there is low abundance of estuarine vegetation; and ➤ Do not remove or disturb salt marsh habitat.
		<p>The extraction of sediment from the estuary may result in suspended sediment resulting in potential smothering of macrophytes.</p> <p>The estuarine functional zone (EFZ) includes the lateral boundaries of an estuary up to the 5 m contour, with the downstream boundary taken as the estuary mouth and the upstream boundary taken as the limits of tidal variation or salinity penetration, whichever penetrates furthest. Protection/rehabilitation of the estuarine functional zone is considered essential for protection of estuarine biodiversity and associated ecological processes. The proposed project is likely to impact on the estuarine functional zone both directly and indirectly:</p> <ul style="list-style-type: none"> ➤ The loss of habitat (direct removal of <i>Zostera capensis</i>, sandbanks and benthic habitat) ➤ Increases in turbidity (direct impact) which may result in further loss of habitat as a result of smothering (indirect impact). ➤ Altering the nutrient dynamics of the system as a result of releasing trapped nutrient from sediments. Previous authors who have studied water quality in the Kromme have concluded that due to the influence and constant flushing of the system through the tidal cycle, water quality is generally good. 	<ul style="list-style-type: none"> ➤ Limit extraction of material to areas where sediment particle size is what is required for the beach nourishment. These larger grain sizes are less likely to become suspended in the water column; ➤ Only the required volume of sediment will be dredged; ➤ Sensitive habitats (<i>Zostera. sp</i>) have been identified in the EIR and will be annotated on a map and avoided where possible; ➤ Associated equipment will be placed in areas of low sensitivity only; and ➤ Monitoring of sand bank habitats in close proximity to dredging activities must be implemented during both the construction and operational phases of the project.
4	Estuarine Ecology – Fauna	Direct physical loss would be attributed to the removal of material directly by dredging. Given the type of material required for the project the habitat lost would be that associated with a sandy benthic substrate. Important species in this habitat include sand prawn (<i>Callinassa kraussi</i>), pencil bait <i>Solen capensis</i> and bloodworm <i>Arenicola loveni</i> .	<ul style="list-style-type: none"> ➤ Limit dredging in habitats where high biodiversity / abundance of benthic species exist; and ➤ Do not remove or disturb salt marsh habitat.
		The extraction of sediment may result in suspended sediment either smothering biota or affecting their biology (e.g. filter feeders).	<ul style="list-style-type: none"> ➤ Only the correct size material (course) will be dredged for beach nourishment; ➤ Only the required volume of sediment will be dredged; ➤ Associated equipment will be placed in areas of low sensitivity only; and ➤ Maintaining the sand bank adjacent to Area S1 will ensure that suitable habitat is maintained in a natural state.
		The presence of excavators / dredgers working in the intertidal areas may result in disturbance to wading bird species. While wading species would be temporarily displaced the works would not take place in all intertidal area allowing foraging in other parts of the estuary. Some species may be drawn to the dredger as it would be disturbing the sediment and facilitate foraging.	<ul style="list-style-type: none"> ➤ Avoid working in areas where bird species may nest. Especially during the breeding season; ➤ Restrict activity to discreet sections of the sand banks and channel; and ➤ Encourage owners of dogs to keep their dogs on leashes while on the sandbanks to ensure those water birds using the sandbank are not disturbed unnecessarily.

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5	Dune Ecology	Loss of dune vegetation on the vegetated sand banks at the mouth of the Sand River.	➤ It is not possible to mitigate this impact.
		The construction of the groynes, as well as activities associated with beach nourishment will require access over the foredunes in selected areas, and damage to the foredunes and the loss of some vegetation is inevitable. However, the breaching of the sand spit has already resulted in substantial loss of vegetation, which reduces the severity of this impact.	<ul style="list-style-type: none"> ➤ Enforce all provisions contained in the Construction EMPr; ➤ Do not allow any laydown areas within the sensitive foredune area; ➤ Limit access across the foredunes to four access points in total, where each groyne will be located. The access point where the sand spit starts (possibly at the Aldabara Road parking area) will need to serve the first two groynes. The second two will require access from Peter Crescent and at George road; and the final one at the Ralph Road parking area. These parking areas must also be used as laydown areas; ➤ Limit pedestrian access to these same points; and ➤ Disallow workers from accessing the foredune areas.
		During the construction phase ecological impacts on the beach and nearshore areas are likely to be moderately significant, and will be difficult to mitigate. However, the beach and nearshore ecosystems are resilient to natural perturbations.	
6	Marine Ecology – Flora	The placement of sand and / or rock material on or near the nearshore reef structures will result in localised smothering, leading to a loss of individuals and habitat. This is particularly relevant for algal species since they are unable to move from these areas. It should be noted that these reefs would have been covered in sediment in the past.	<ul style="list-style-type: none"> ➤ Design and orientate groyne structures to avoid smothering the nearshore reefs as far as possible. ➤
		The development of groyne structures of rock material may provide additional hard substrate for benthic species	➤ None required.
7	Marine Ecology – Fauna	The placement of sand and / or rock material on or near the nearshore reef structures may result in localised smothering leading to a limited loss of individuals and habitat. However, the development of groyne structures of rock material is anticipated to provide additional hard substrate for benthic species.	➤ None required.
8	Marine Hydrodynamics	Development of the groynes will alter the hydrodynamic regime through the refraction of waves and altering of local currents. This impact is expected to be limited to the area immediately north of the northern-most groyne. The design of the beach nourishment is to nourish this area as part of the maintenance activity. Similarly, the short groyne does not extend sufficiently into the marine environment to have an effect on the northern bank.	<ul style="list-style-type: none"> ➤ Ensure that the adaptive management plan is developed to recognise and mitigate for any accelerated erosion; ➤ Place sand material immediately north of the northern most groyne to act as sacrificial material; and ➤ Maintain nourishment of at least 6,000 m³/year for each of the embayments south of the spit and 10,000 m³/year for the remaining embayment at the spit on a regular basis.
		Development of the groynes will restrict the longshore drift that transports sediment to the north. However, even with the restriction at least 50% of the material will pass through the scheme and the beach nourishment and maintenance introduces a new source of sediment which is able to be transported to the north.	
9	Local Amenity – Estuary	The presence of excavators / dredger may result in some areas of the estuary having restricted access for public safety.	<ul style="list-style-type: none"> ➤ Reduce, where possible, the extraction of material during times of peak tourist activity; ➤ Ensure that signage is clear, and areas are made safe during excavation / dredging; and ➤ Ensure that newly excavated / dredged areas are safe for use.
		The removal of sand banks and specifically the fauna within the sandbanks may result in reduced areas available for bait digging – a popular activity in the Kromme Estuary	➤ Reduce dredging activity in popular bait digging areas (i.e. sand bank near the mouth of the estuary) during peak tourist season;

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			<ul style="list-style-type: none"> ➤ Ensure areas of the sandbanks are available to bait diggers during construction; ➤ Dredging from the channels initially will ensure that sand bank habitat is maintained for a longer period; and ➤ Inform bait diggers of construction schedule to allow digging in areas that are due to be dredged.
10	Local Amenity – beach	The presence of construction vehicles accessing the beach for the construction of the groynes, delivery of material and reworking of the sediment for nourishment may result in restricted access to certain parts of the beach (and carparks).	<ul style="list-style-type: none"> ➤ Reduce, where possible, the placement of material during times of peak tourist activity; ➤ Ensure that signage is clear, and areas are made safe during placement / levelling of the beach; and ➤ Ensure that newly nourished areas are safe for use.
11	Visual	Visually, the presence of vessels on the estuary are unlikely to be considered to be out of the ordinary. However, should the preferred method be via excavator then this may not fit with the current expectation of “normal” activity on the estuary. The presence of pumps and pipes may also not be considered to be “normal”. However, their visibility is expected to be of low significance and will likely only be visible to those in close proximity to dredging activities.	<ul style="list-style-type: none"> ➤ Only absolutely necessary equipment required for the dredging to be at the work site. All other equipment to be stored in an area less intrusive; and ➤ Pumps and pipe placement should take visual disturbance into account for placement during the works.
		The establishment of revetment structures and the presence of groynes may result in limited views from certain positions along the frontage. The groynes will also be a newly introduced feature and therefore may alter the seascape.	<ul style="list-style-type: none"> ➤ Only absolutely necessary equipment required for the dredging to be at the work site. All other equipment to be stored in an area less intrusive.
12	Loss of Archaeological Resources (relevant to sand sourcing along the Kromme River)	Dredging activities could damage or destroy potentially significant archaeological or cultural heritage sites, should such sites occur within the river. The study did not identify archaeological sites or features in the project area but the project is situated in the larger archaeological coastal sensitivity zone of St Francis where shell middens and other archaeological sites/materials are found. As such, care should be taken not to destroy previously undetected heritage remains.	<ul style="list-style-type: none"> ➤ Should any archaeological or cultural sites or objects be located during the construction of the proposed project, it should immediately be reported to the National Heritage Council and the ECPHRA.); and ➤ All construction site staff should be briefed to immediately report any sites or objects of heritage significance located during the construction phase. In the event of finding what appears to be an archaeological site or a cultural and/or historic site or object, work within that area should be stopped until a qualified archaeologist or historian can examine the item or find.
13	Loss of Cultural Landscape (relevant to the beach nourishment)	The larger area comprises a rich cultural horizon and the natural landscape surrounding the proposed project encompasses vast coastlines and river valleys, typical of the Eastern Cape coast. The cultural landscape holds Herder, Iron Age remains and a Colonial Period frontier which embraces a regional history, represented in a number of significant archaeological sites. However, the proposed project is unlikely to result in a significant impact on the general cultural landscape of this area.	<ul style="list-style-type: none"> ➤ n/a
14	Loss of Graves / Human Burial sites	No burial sites were located in the study area. It should be noted that graves and cemeteries often occur within settlements or around homesteads in the rural areas of the Eastern Cape, and they are also randomly scattered around archaeological and historical settlements. The probability of informal human burials encountered during development should thus not be excluded.	<ul style="list-style-type: none"> ➤ If any human bones are found during the course of Construction work then they should be reported to an Archaeologist and work in the immediate vicinity should cease until the appropriate actions have been carried out by the archaeologist; ➤ Where human remains are part of a burial they would need to be exhumed under a permit from SAHRA (for pre-colonial burials as well as burials later than about AD 1500);

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			<ul style="list-style-type: none"> ➤ Should any unmarked human burials/remains be found during the course of construction, work in the immediate vicinity should cease and the find must immediately be reported to the archaeologist, or the South African Heritage Resources Agency (SAHRA); and ➤ Under no circumstances may burials be disturbed or removed until such time as necessary statutory procedures required for grave relocation have been met.
15	Loss of Marine Archaeological and/or Cultural Heritage Resources (relevant to dredging, nourishment and groyne infrastructure)	<p>In terms of Marine and Underwater Cultural Heritage (MUCH), the dredging, beach nourishment and construction of the groynes pose a risk to maritime features in the area. The risk of damage or complete removal from the site is possible given the scale and nature of the activities.</p> <p>However, the target areas for dredging occur largely to river-side of the Kromme River estuary and areas within the river system to the west. In addition, the beach infrastructure (i.e. groynes) are expected to be constructed on top of the existing beach sand and level without the need for excavation. The revetment at the spit will be installed on a nourished beach level, which will be approximately 1 m higher than the existing beach level. Therefore, no intersection with submerged items and artefacts are anticipated.</p>	<ul style="list-style-type: none"> ➤ A 50 m buffer around the river mouth should be implemented. This buffer includes the beach and coastal dune strips around the river mouth which could potentially hold the washed-up remains of wreckage, artefacts as well as possible survivor camp remnants; ➤ The exclusion of a portion of dredging target area P1 which falls within this proposed buffer zone is recommended. The extent of this proposed exclusion area is approximately 1.1ha; ➤ Bi-weekly monitoring and reporting to SAHRA MUCH Unit by an informed and trained Environmental Control Office (ECO) of the dredging of target areas P1 and S1 and the placing of the northern groyne and revetment; and ➤ A suitably qualified MUCH specialist should be appointed during initial stages of the development in order to provide training to the assigned project ECO.
16	Solid Waste Pollution (relevant to all project aspects)	<p>The construction phase of the activity will produce construction waste in the form of building rubble, excavated soil as well as general waste (e.g. litter from workers on site).</p>	<ul style="list-style-type: none"> ➤ Construction material should be reused or recycled where possible; ➤ Waste that cannot be reused or recycled should be disposed of in the correct manner at the nearest registered waste disposal site; ➤ Any hazardous materials (e.g. paint, fuel, oil) must be disposed of immediately and in the correct manner; ➤ General good house-keeping should be practiced on site; ➤ If rubble is stored onsite it should be stored on designated portions of land. Designated areas for storage of rubble should be set aside at the onset of construction; ➤ Litter must be controlled during construction e.g. adequate bins must be made available on site at all times; and ➤ Construction materials stored as part of the project must be secured (i.e. plastics must be covered to prevent being blown off site). Skips must be regularly emptied and must be covered.
17	Dust Pollution (implementation of coastal protection infrastructure)	<p>The construction of the rock revetments and stub groynes increases the potential for dust within the coastal area. During the construction phase of the activity, materials will be moved to and from the project site and this could result in dust pollution not only from the materials, but also from the construction vehicles which will be operating on site. The effects of dust will be exacerbated during high wind conditions.</p>	<ul style="list-style-type: none"> ➤ Construction activities that result in dust generation should preferably cease during period of high winds; ➤ Exposed surfaces should be wet down where required to avoid dust emissions; and ➤ Vehicles transporting material such as sand should remain at a speed limit of 30km/h and, if required, cover their loads with a tarpaulin to avoid dust emissions.
18	Traffic (relevant to sand sourcing should the option of truck)	<p>During construction, there will be an increase in the number of vehicles using the roads in and around St Francis Bay, including heavy construction vehicles. This may result in damage</p>	<ul style="list-style-type: none"> ➤ Appropriate warning signs must be erected, in accordance with the requirements of the District Road Engineer;

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	transportation be implemented) and vehicle movements related to groyne and revetment construction and material transportation	to the road as well as increased potential for road accidents. The construction vehicles could also impede traffic at certain sections of St Francis Bay if not adequately managed and controlled. As a result of the proposed project, there is likely to be an increase in the use of the roads within the adjacent area (e.g. the R330 and St Francis Bay internal roads).	<ul style="list-style-type: none"> ➤ Vehicles must be roadworthy and serviced and must abide by the standard traffic laws; ➤ Any abnormal Loads must be approved with the traffic authorities and must comply with any conditions imposed by the authorities; ➤ The contractor must employ flag staff if deemed necessary in order to prevent accidents; ➤ Speed limits on site must not exceed 30km/h and the speed limits along the public roads must be adhered to at all times; and ➤ Manage the travelling times of the delivery trucks so as to allow them to depart and arrive at spaced out time intervals, thus reducing the intensity of traffic and avoiding the formation of convoys of heavy vehicles.
19	Noise Disturbance (relevant to all project aspects)	<p>It can be expected that there will be an increase in noise levels during the site preparation and construction phase of the project. The increase in noise will be associated with the operation of construction vehicles, dredging and other equipment and labourers.</p> <p>The noise level associated with the dredging and nourishment activity is expected to be approx. 80 dB at source. Depending on the size of the booster pumps, noise levels are expected to be 92 dB at source, reducing down to 60 dB at 500 m (ICF Jones and Stokes, 2008). To provide context normal conversation is about 60 dB, a lawn mower is about 90 dB, and a loud concert is about 120 dB.</p>	<ul style="list-style-type: none"> ➤ All construction vehicles and equipment to be properly serviced in order to meet the necessary noise level requirements; ➤ Restriction of work to daylight hours where possible; ➤ Restriction of any unnecessary noise e.g. portable radios, vehicle radios, whistles etc.; ➤ Machinery should be fitted with the required mufflers, and notice given to surrounding residents prior to the commencement of construction; and ➤ Adhering to the municipal by-laws relating to noise.
OPERATIONAL PHASE			
20	Estuarine Physical Characteristics	The increase in boat traffic as a result of the ability for the estuary to be used on more states of the tide may result in an increased risk of erosion of the banks of the estuary.	<ul style="list-style-type: none"> ➤ Reduce speed (i.e. no wake zones) of vessels in sensitive areas of the estuary; and ➤ Impose stricter control of boat traffic during peak tourist season.
21	Marine Hydrodynamics	Development of the groynes may alter the hydrodynamic regime through the refraction of waves and altering of local currents, potentially leading to accelerated erosion north of the structures.	<ul style="list-style-type: none"> ➤ Place sand material immediately north of the northern most groyne to act as sacrificial material; and ➤ Ensure that the adaptive management plan is developed to recognise and mitigate for any accelerated erosion.
23	Visual	The establishment of revetment structures and the presence of groynes.	<ul style="list-style-type: none"> ➤ Where possible ensure the design of the groynes does not impede the open seascapes view; and ➤ Where possible ensure the design of the groynes are compatible and blend in.
24	Solid Waste Pollution	During the operational phase, the ongoing maintenance activities may produce solid waste. The incorrect management of this waste will have a negative impact on the environment as it can cause unnecessary pollution and also have a detrimental effect on the aesthetics of the proposed site.	<ul style="list-style-type: none"> ➤ Waste that cannot be reused or recycled should be disposed of in the correct manner at the nearest registered waste disposal site; ➤ Any hazardous materials (e.g. paint, fuel, oil) must be disposed of immediately and in the correct manner; and ➤ General good house-keeping should be practiced during maintenance operations.
26	Public health and safety	Groyne structure will not be designed to be used by the public (i.e. walking, climbing). Groyne structures tend to create rip currents in proximity to the groynes themselves	<ul style="list-style-type: none"> ➤ Ensure that appropriate and visible signage is erected warning the public of the dangers of climbing the structures and the rip currents; and ➤ Local lifeguards must ensure that swimming areas are clearly demarcated.

Table 6.4: Summary of the beneficial impact that requires mitigation to enhance the benefits.

CONSTRUCTION PHASE		
Impact	Description	Mitigation Measures
Employment Creation and Economic Benefits (Beneficial Impact)	The construction phase of the proposed project is expected to create approximately thirty (30) temporary jobs.	<ul style="list-style-type: none"> ➤ As far as possible, local labour should be used during construction; and ➤ Purchase materials locally, where possible, in order to support the local communities.

7. ADMINISTRATION AND REGULATION OF ENVIRONMENTAL OBLIGATIONS

7.1 MANAGEMENT STRUCTURE

In line with this EMPr, the Contractor must prepare a document clearly outlining and demonstrating the environmental responsibilities, accountability and liability of the Contractor's employees. The Contractor must assign responsibilities for the following:

- Reporting structures;
- Actions to be taken to ensure compliance;
- Overall design, development and implementation of the EMPr;
- Documenting the environmental policy and strategy;
- Implementing the EMPr in all stages/phases of the project; and
- All the aspects which require action under the other core elements and sub-elements of the EMPr.

All official communication and reporting lines, including instructions, directives and information, need to be channelled according to the organisation structure.

7.2 ROLES AND RESPONSIBILITIES

7.2.1 THE APPLICANT

The St Francis Property Owners Non-Profit Company (SFPO NPC), on behalf of the Kouga Local Municipality (Kouga LM), is the responsible entity for monitoring the implementation of the EMPr and compliance with the Environmental Authorisation (EA). However, if the SFPO NPC appoints a Contractor to implement the project, then the Contractor is responsible for implementing the proposed mitigation measures documented in this EMPr on behalf of the SFPO NPC. The successful Contractor's responsibilities are outlined in the Sections that follow. The Applicant will also be responsible for stipulating and enforcing fines and penalties to the Contractor for contravention of any non-compliances against the EMPr, EA, and other approved plans.

7.2.2 THE CONTRACTOR

The successful Contractor will:

- Be responsible for the finalisation of the EMPr in terms of methodologies which are required to be implemented to achieve the environmental specifications contained herein and the relevant requirements contained in the EA;
- Be responsible for the overall implementation of the EMPr in accordance with the requirements of the proponent and the EA;
- Ensure that all third parties, who carry out all or part of the Contractor's obligations under the contract, comply with the requirements of this EMPr; and
- Ensure that the appointment(s) of the ESO are subject to the approval of the developer.

7.2.3 THE RESIDENT ENGINEER (RE)

The Resident Engineer (RE) should be appointed by the Applicant and will be required to oversee the construction programme and construction activities performed by the Contractor. The RE is expected to liaise with the Contractor and ECO on environmental matters, as well as any pertinent engineering matters where

these may have environmental consequences. The RE will oversee the general compliance of the Contractor with the EMPr and other pertinent site specifications. The RE should also be familiar with the EMPr specifications and further monitor the Contractor's compliance with the environmental specifications on a daily basis, through a Site Diary, and enforce compliance.

7.2.4 THE ENVIRONMENTAL SITE OFFICER (ESO)

The Contractor should appoint a nominated representative of the Contractor as the ESO for the contract. The ESO must be site-based and should be the responsible person for implementing the environmental provisions of the construction contract. The approved ESO must be onsite at all times.

The ESO's duties will include, *inter alia*, the following:

- Ensuring that all the environmental authorisations and permits, required in terms of the applicable legislation, have been obtained prior to construction commencing;
- Reviewing and approving construction Method Statements (MS) with input from the ECO and RE, where necessary, in order to ensure that the environmental specifications contained within the construction contract are adhered to;
- Assisting the Contractor in finding environmentally responsible solutions to problems;
- Keeping accurate and detailed records of all activities on site;
- Keeping a register of complaints onsite and recording community comments and issues, and the actions taken in response to these complaints;
- Ensuring that the required actions are undertaken to mitigate the impacts resulting from noncompliance;
- Reporting all incidences of non-compliance to the ECO and Contractor; and
- The ESO must submit regular written reports to the ECO, not less frequently than once a month, during the construction phase of the St Francis Bay Coastal Protection Scheme.

The ESO must have:

- The ability to manage public communication and complaints;
- The ability to think holistically about the structure, functioning and performance of environmental systems;
- The ESO must be fully conversant with the EIR, EMPr, relevant environmental legislation and any other relevant documents relating to the St Francis Bay Coastal Protection Scheme; and
- The ESO must have received professional training, including training in the skills necessary to be able to amicably and diplomatically deal with the public as outlined in the first bullet point above.

The ECO should be in the position to determine whether or not the ESO has adequately demonstrated his/her capabilities to carry out the tasks at hand and in a professional manner. The ECO will therefore have the authority to instruct the Contractor to replace the ESO if, in the ECO's opinion, the appointed officer is not fulfilling his/her duties in terms of the requirements of the construction contract. Such instruction must be in writing and must clearly set out the reasons why a replacement is required and within what timeframe. The ECO must visit the development site and, in addition to the responsibilities listed in section 7.2.5 below, review the performance of the ESO and submit regular performance reviews to SFPO NPC and the Kouga LM.

7.2.5 ENVIRONMENTAL CONTROL OFFICER (ECO)

For the purpose of implementing the conditions contained herein, the Proponent must appoint an ECO for the contract. The ECO will be the responsible person for ensuring that the provisions of the EMPr as well as the EA are complied with during the Construction Phase. The ECO will be responsible for issuing instructions to the Contractor and where environmental considerations call for action to be taken. The ECO must submit regular written reports to the Applicant and the DEDEAT *as required*. The ECO will be responsible for the monitoring, reviewing and verifying of compliance with the EMPr and the conditions of the EA by the Contractor. The ECO's duties in this regard will include, *inter alia*, the following:

- Confirming that all the EAs and permits required in terms of the applicable legislation have been obtained prior to construction commencing;
- Monitoring and verifying that the EMPr, EA and Contract are adhered to at all times and taking action if specifications are not followed;
- Monitoring and verifying that environmental impacts are kept to a minimum;
- Reviewing and approving construction Method Statements with input from the ESO and RE, where necessary, in order to ensure that the environmental specifications contained within this EMPr and the EA are adhered to;
- Inspecting the site and surrounding areas on a regular basis to monitor compliance with the EMPr, EA and Contract;
- Monitoring the undertaking by the Contractor of environmental awareness training for all new personnel onsite;
- Ensuring that activities onsite comply with all relevant environmental legislation;
- Undertaking a continual internal review of the EMPr and submitting any changes to the Applicant and authority for review and approval, as applicable;
- Checking the register of complaints kept onsite and maintained by the ESO and ensuring that the correct actions are/were taken in response to these complaints;
- Checking that the required actions are/were undertaken to mitigate the impacts resulting from noncompliance;
- Reporting all incidences of non-compliance to SFPO NPC and the Kouga LM;
- The ECO must also submit compliance audit reports to DEDEAT, in accordance with the requirements of the EA. Such reports must be reviewed by the SFPO NPC prior to submission;
- Keeping a photographic record of progress onsite from an environmental perspective. This can be conducted in conjunction with the ESO, because the ESO will be the person that will be onsite at all times and can therefore take photographic records weekly. The ECO should ensure that the ESO understands the task at hand;
- Recommending additional environmental protection measures, where necessary; and
- Providing feedback on any environmental issues during the site meetings.

The ECO must have:

- A good working knowledge of all relevant environmental policies, legislation, guidelines and standards;
- The ability to conduct inspections and audits and to produce thorough, readable and informative reports;
- The ability to manage public communication and complaints;
- The ability to think holistically about the structure, functioning and performance of environmental systems; and

- Proven competence in the application of the following integrated environmental management tools:
 - Environmental Impact Assessment;
 - Environmental Management Plans/Programmes;
 - Environmental auditing;
 - Mitigation and optimisation of impacts;
 - Monitoring and evaluation of impacts; and
 - Environmental management systems.

The ECO must be fully conversant with the EIA Process, the St Francis Bay Coastal Protection Scheme EIR, EA (if/when issued), this EMPr and all relevant environmental legislation for the project. The Proponent will have the authority to replace the ECO if, in their opinion, the appointed officer is not fulfilling his/her duties in terms of the requirements of the EMPr or this specification. Such instruction will be in writing and must be clearly set out, with reasons why a replacement is required, and within what timeframe.

7.3 COMPLIANCE MONITORING AND CORRECTIVE ACTION

Non-compliance with the conditions of the EMPr must be viewed as a breach of appointment Contract for which the construction contractors will be held liable. The latter is deemed NOT to have complied with the EMPr if:

- There is evidence of contravention of the EMPr, its environmental specifications or the Method Statements developed by the Contractor within the boundaries of the construction site or areas of Contractor responsibility;
- Construction related activities take place outside the defined boundaries of the site;
- Environmental damage ensues due to negligence;
- The Contractor fails to comply with corrective or other instructions issued by the ECO within a specific time; or
- The Contractor fails to respond adequately to complaints from the public or authorities.

The Applicant and the construction contractors are liable for any construction rehabilitation costs associated with their non-compliance with this EMPr. This rehabilitation will be undertaken to the satisfaction of the ECO. The construction contractors will have the right to appeal any punitive action undertaken by the ECO or the Applicant.

An Oversight Committee will be established to fulfil an oversight role. Representatives of the following organisations will serve on the Oversight Committee:

- SFPO NPC
- Kouga Local Municipality
- Kromme Joint River Committee
- St Francis Bay Riparian Homeowners Association
- Kromme Enviro-Trust

The Oversight Committee can co-opt persons with specific engineering, environmental or other specialised skills as and when required. The function of the Oversight Committee will be to perform a maintenance management oversight role that will ensure:

- The scheme continues to perform as envisaged and designed.

- The condition of the elements of the scheme are monitored in accordance with this maintenance management plan.
- Maintenance is carried out as and when required.
- The Environmental Authorisation is fully complied with.
- All environmental mitigation measures are adhered to.
- Environmental issues arising after the Environmental Authorisation has been issued are identified and are receiving the necessary attention.
- All maintenance work is performed in such a way that it serves the interests of the St Francis Bay community.

7.4 REPORTING AND REVIEW

The EMPr reporting and documentation requirements must be based on best practice principles, e.g. ISO 14001, which must take the following requirements into account:

- Documents associated with the EMPr must be reviewed regularly and updated by all environmental management parties;
- Audits performed by the ECO, of the environmental performance, of the construction phase of the project will be undertaken on a monthly basis in fulfilment of likely conditions of EA in this regard;
- The findings of external, internal and informal environmental reviews will be recorded and items requiring action will be identified from the recommendations made;
- The construction contractors will be contractually obliged to fulfil any reasonable recommendations, and implementation of these actions will be assessed in the above audit; and
- Monitoring and inspection reporting will include the following considerations:
 - Weather conditions at the time of inspections;
 - Surveys;
 - Type of remedial/maintenance works proposed;
 - Estimated cost of inspection and maintenance works;
 - Condition of control structures;
 - Photographs;
 - Comparison with previous works if any; and
 - Comparison with design profiles.

Meetings, where required, should take place onsite. Internal auditing and reporting should be subject to external review by the ECO during the monthly compliance audits.

7.5 MONITORING

Construction activities have the potential to impact on a range of biophysical habitats as well as neighbouring communities. The monitoring programme which requires development by the Applicant, ECO and Contractor should, *inter alia*, allow for analysis of:

1. Air quality (such as dust);
2. Hydrocarbon pollution;
3. Success of local labour employment;
4. Success of local procurement policies;
5. Ambient and workplace noise;
6. Health and safety (including spillages) incidents;

7. Success of traffic management measures;
8. Contamination and soil erosion;
9. Success of avoidance of sensitive habitats (directly) and monitoring changes to habitats as a result of the works (indirect); and
10. Monitoring of habitats to inform the adaptive management plan.

Refer to Chapter 9 for more detail on the monitoring and evaluation aspects.

7.6 EMERGENCY PREPAREDNESS

The Contractor must develop environmental emergency response procedures to ensure that there are appropriate responses to unexpected or accidental actions or incidents that will cause environmental impacts during the construction phase. Such activities include, *inter alia*:

- Accidental discharges to water and land;
- Accidental exposure of employees to hazardous substances;
- Accidental fires;
- Accidental spillage of hazardous substances; and/or
- Specific environmental and ecosystem effects from accidental releases or incidents.

The Contractor and Subcontractors must comply with the emergency preparedness incident reporting requirements that must be developed and be in place prior to the commencement of the construction phase.

7.7 ENVIRONMENTAL INCIDENT MANAGEMENT

The construction contractors must adhere to the hazard and incident reporting protocols to be developed by the Contractor. A report must be completed for all incidents, and appropriate action taken where necessary to minimise any potential impacts. DEDEAT must be informed of any environmental incidents, in accordance with legislative requirements, should this be necessitated by a major environmental incident.

7.8 MANAGEMENT REVIEW

A formal management review should be conducted in which the internal audit reports, written by the ESO and based on frequent inspections and interactions with the ECO and review of the periodic reports, including audit reports by the independent external auditor - will be reviewed. The purpose of the review is to critically examine the effectiveness of the EMPr and its implementation and to decide on potential modifications to the EMPr as and when necessary. The process of management review will be to keep to the principle of continual improvement. Management review should take place when the liaison committee, consisting of representatives from the Contractor, construction Subcontractors (as appropriate), ECO and other Stakeholders or I&APs deem them necessary or on a monthly basis. The purpose of these monthly meetings will be to review the progress of the Contractor in implementing and complying with their obligations in terms of this EMPr for the duration of the project. Where necessary, management review will take place more frequently than the required monthly meetings.

8. REQUIRED DOCUMENTATION AND DOCUMENT CONTROL

8.1 METHOD STATEMENTS

Method Statements must be completed by the Contractor, an individual that is competent with the tasks to be undertaken, for each activity which requires a Method Statement as specified in the EMPr or as requested by the ECO. Each Method Statement must be submitted to the Resident Engineer (RE), ECO and the Applicant for approval. For the purposes of the environmental specification, a Method Statement is defined as: *“A written submission by the Contractor to the ECO setting out the plant, materials, labour and method the Contractor proposes to carry out an activity, in such detail that the ECO is enabled to assess whether the Contractor’s proposal is in accordance with the EMPr and/or will produce results in accordance with EMPr.”* The Method Statement must include details of the:

- Construction procedures, timings and work areas;
- Public notification of the works;
- Materials and equipment to be used;
- Transportation of the equipment to- and from site;
- How the equipment and/or material will be moved while on site;
- How and where material will be stored;
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur, especially to the aquatic and marine environment;
- Timing and location of activities;
- Compliance and non-compliance with the specifications; and
- Any other information deemed necessary by the Engineer.

Method Statements can be for once-off tasks or a series of tasks which are often repeated. The risks are identified during the various work stages when a Method Statement is prepared. Steps taken to reduce the potential risk associated with these stages can then be determined. The sequential steps and actions to be followed by the persons carrying out the works are written down. This sequence of steps should include all environmental and safety aspects relevant to the task being executed. As a minimum, the Contractor should produce the following method statements:

- Site Dust Management;
- Solid Waste Management;
- Hazardous Material Management;
- Hydrocarbon Management;
- Site Clearing and Topsoil Management;
- Erosion and Stormwater Management;
- Fire Management;
- Noise Management;
- Concrete Mixing (if applicable);
- Pollution Control;
- Dredging management;
- Beach nourishment, maintenance and management;
- Groyne construction, maintenance and management;
- Revetement maintenance and management;
- Site Access and Traffic Management; and

➤ Incident and Emergency Response Management.

The Method Statements should be submitted to the RE, ECO and the Applicant not less than twenty (20) days prior to the intended date of commencement of the activity, or as directed by the ECO. The Contractor must not commence an activity until all required Method Statements have been approved by the RE, ECO and the Applicant. The ECO should provide comment on the methodology and procedures proposed by the Contractor, but the ECO will not be responsible for the Contractor's chosen measures of impact mitigation and emergency/disaster management systems. Approval of the Method Statements should not be withheld unreasonably.

All control measures detailed in the Method Statement must be the subject of "tool box" talks prior to the initiation of works. By introducing or reaffirming these measures during the "tool box" talk, everyone involved should have a clear understanding of the work to be carried out, as well as the safe work method sequences and equipment required.

Please refer to Appendix 1 for an example of a Method Statement Layout.

8.2 GOOD HOUSEKEEPING

The Contractor must undertake "good housekeeping" practices during the construction phase. This will help avoid disputes on responsibility and allow for the smooth running of the contract as a whole. Good housekeeping extends beyond the wise practice of construction methods to include the care for and preservation of the environment within which the construction is situated.

8.3 RECORD KEEPING

The ECO must continuously monitor the Contractor's adherence to the approved impact prevention procedures and the ECO must issue the Contractor with a notice of non-compliance whenever transgressions are observed. The ECO should document the nature and magnitude of the non-compliance in a designated register, the actions taken to discontinue the non-compliance, the actions taken to mitigate its effects and the results of the actions. The non-compliance should be documented and reported to the Applicant in the monthly reports. These reports must be made available to the DEDEAT when requested.

8.4 DOCUMENT CONTROL

The Contractor is responsible for establishing a procedure for electronic document control. The document control procedure should comply with the following requirements:

- Documents must be identifiable by organisation, division, function, activity and contact person;
- Every document should identify the personnel and their position(s), who drafted and compiled the document(s), who reviewed and recommended approval, and who finally approved the document for distribution; and
- All documents should be dated, provided with a revision number and reference number, filed systematically, and retained for a five (5) year period.

The Contractor must ensure that documents are periodically reviewed and revised, where necessary, and that current versions are available at all locations where operations, essential to the functioning of the EMPr, are performed. All documents must be made available to the ECO and other independent external auditors.

9. MONITORING AND EVALUATION

The key to a successful EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. The overall monitoring of the implementation of the EMPr and compliance with the EA is the responsibility of the SFPO NPC. However, if the SFPO NPC appoints a Contractor to implement the project, then it is the responsibility of the Contractor, on behalf of the SFPO NPC, to implement the mitigation measures specified in the in the EMPr. The Contractor must appoint an ESO and the Proponent, an ECO, for the duration of the contract. The ESO must be site based and should be the responsible entity / person for implementing the environmental provisions of the construction contract. The ECO will be responsible for the monitoring, reviewing and verifying of compliance with the EMPr and the conditions of the EA by the Contractor. The monitoring protocol which must be adhered to for the proposed development is included in Table 9.1 below.

9.1 BASELINE DATA COLLECTION

Before construction commences, baseline data of the estuary will need to be collected. The objective of baseline data collection is to provide a statistically robust baseline data set that adequately describes the ambient environment as it stands prior to construction. This data set can be used for comparative purposes during the future phases of the project. The baseline data for estuary must be collected over a period of at least one year (once during the wet season).

The following baseline data must be collected and reviewed by the relevant authority *prior* to construction:

- **Beach profiles:** the modelling carried out on the beaches to the north of the proposed scheme and within the estuary suggested that no accelerated erosion will occur as a result of the construction of the groynes and the extraction of material from the estuary. However, to ensure this is monitored, baseline data must be collected.
- For the St Francis Bay beach and the beaches to the north, profile locations should be placed at the same locations that have been measured in the past (Advisian, 2020). The beach profiles on the northern beaches must start at the Kromme River mouth and extend northwards, for 250m. The results of the surveys will be compiled into a report which will include comment on the nature of the profiles, their build up/erosion and the likely causes for the observations.
- These measurements should also include the northern bank of the estuary. Estuary bank profiles, should be completed at regular spacing (minimum of 200 m apart) along the length of the estuary adjacent to the priority dredging areas and specifically adjacent to sensitive habitats.
- Both the beach and estuary profile surveys should be carried out once per quarter, for at least one calendar year prior to construction. This will determine the extent of “natural” erosion compared to anthropogenic influence (i.e. peak holiday season).
- The findings will be submitted to DEDEAT upon completion and prior to construction.
- **Sediment contaminant testing:** while it is anticipated that the sediment suitable for dredging is unlikely to contain harmful contaminants, testing of the sediment is required to establish this. Having collected data prior to construction, sediment testing during the dredging would allow comparison to a pre-dredge condition. It is anticipated that samples be taken from those areas to be dredged. A sample of surface and depth should be taken and analysed for *E. coli* and heavy metals. This is anticipated to be carried out by the dredging contractor periodically throughout the dredging process.

- **Water quality:** dredging activities may result in an increase of suspended sediment. In order to monitor the extent of the potential plume initial water quality (physico-chemical) parameters should be tested. Data can be collected from a multi-probe along a number of pre-defined locations within the estuary. The exact location and frequency will be determined following the confirmation of the dredging methodology by the preferred contractor.
- **Ground truthing:** Pre-construction distribution and percentage cover data of the salt-marsh and *Zostera* habitats will be collected using an appropriate scientific methodology (e.g. quadrat and fixed-point photography methods, or geo-referenced drone imagery). This should include all habitats deemed to be sensitive, adjacent to the proposed dredging area, with the identification of suitable control sites for both the salt-marsh and *Zostera* habitats. This should be completed and submitted to DEDEAT at least 1 year prior to construction. Following this initial data collection, ongoing monitoring requirements can be determined and implemented.

9.2 CONSTRUCTION AND OPERATIONAL PHASE MONITORING PARAMETERS

In addition to the monitoring and evaluation programme detailed in Table 9.1 below, the following should be included in the monitoring protocol as a minimum:

- Beach profiles surveys will continue into the construction and operational phases with the frequency determined by the results of the pre-construction survey. A minimum of one year of quarterly beach profiles is recommended following the completion of the construction phase. Following this annual monitoring is recommended.
- Sediment contaminant testing must be carried out periodically during the construction period to ensure that contaminants are not entering or being released into the water column of the estuary. The frequency will be determined based on the risk identified through the analysis of the pre-construction baseline samples. The testing requirements will be developed in a monitoring plan prepared and presented to DEDEAT prior to construction starting and following confirmation of the dredging methodology;
- Water quality testing during dredging should be carried out regularly. The frequency will be determined by the duration of dredging for each Project Phase. However, it is important that monitoring occurs while the dredging activity is progressing. The monitoring locations will be determined by the location of the dredger and extend at intervals from the dredger (i.e. 50m, 100m, 150m) while dredging activity progresses. It is not necessary for this monitoring to be continuous but needs to provide data to describe the extent of suspended sediment during construction;
- Regular bathymetric surveys of the lower estuary area should be undertaken once dredging commences. It is likely that the contractor would carry out pre- and post-dredging surveys to calculate the volume of material transported. Monitoring of the bathymetry during maintenance dredging is also recommended. This monitoring data will provide valuable information on the sediment distribution, accumulation and transport within this dynamic estuarine system, which can be used to assess the volumes of sediment entering this flood-dominated system and any future modifications to the dredging scheme that need to be implemented. The monitoring surveys could be carried out using a fish finder from a ski boat with reference to a fixed datum. However, it should be provided to a suitably qualified and experienced ecological/environmental expert, in a format that can be easily interpreted, to be able to verify whether the impacts identified in the EIR have occurred. It is recommended that this monitoring takes place at least annually;
- A detailed log of sediment discharge quantities must be maintained by the dredging contractor in order to track the volume of sediment that is removed from the estuary;

- Monitoring the sensitive habitats in close proximity to the dredging activities should be carried out during construction and operation to determine die-back as a result of smothering, dredging and loss of habitat. Should these areas be determined to be reducing, correction measures must be implemented. Corrective measures could include modification to the dredging method and timing of the works and/or alteration of the proposed dredging areas. This should be carried out by a suitably qualified specialist with the emphasis being on the ability to accurately replicate the methodology activity carried out during the construction phase. It is recommended that annual post-construction monitoring be established for those sensitive habitats; and
- An invasive species monitoring, control and eradication plan for land/activities under the control of the Proponent should be developed as part of the Construction EMP in accordance with CARA.

The outcome of the pre-construction, construction and operation monitoring must be compiled into an annual monitoring report. The report must include sections on the comparison of the construction and operation surveys against the baseline (i.e. pre-construction). In addition, there must be comment on whether the observations are in line with the impacts identified during the EIR. Should the impacts observed through the monitoring differ from that of the EIR and particularly if adverse, additional mitigation measures must be implemented.

The operational phase of the proposed development is predicted to continue for perpetuity. Therefore, it is recommended that adaptive management plans are developed for the estuary and northern beaches and reviewed regularly based on the findings of the monitoring. Adaptive management is a structured approach to decision making and is commonly used in scenarios involving dynamic natural environments. The plans would be compiled to set out the possible management measures required should particular observations be made. For example: if erosion to the banks of the estuary was observed to be accelerating as a result of the dredging then an appropriate management measure may be to move the dredging activity, or replace some of the sediment in the area, or extend the time period between dredging operations. These plans can only be developed following the appointment of a contractor and confirmation of the detailed dredging and nourishment procedures.

It is recommended that an ECO is appointed to conduct monthly monitoring during construction. Construction is considered to be discreet activities associated with the dredging, nourishment and groyne construction for each Project Phase. See Section 4 for detail on the components for each phase.

Subsequent monitoring, as outlined above, must be carried out by a suitably qualified expert. It is important that this expert is appointed and their appointment confirmed with the competent authority.

Table 9.1 below lists the impact management actions (mitigation measures) for the proposed development. Each impact management action must undergo a monitoring method (e.g. visual inspections), at a specific frequency (e.g. daily), by a specific role player (e.g. the ECO), at a particular phase or at particular phases of the development (e.g. construction) and will need to be reported via a specific reporting mechanism (e.g. an ECO audit report). Certain mitigation measures will only be relevant during certain phases of the development, while others will remain applicable in perpetuity. In some cases, the FBDM will be required to appoint an external service provider to oversee the management actions where the FBDM is the responsible entity (e.g. water quality monitoring).

Table 9.1: Monitoring and Evaluation Programme for the proposed St Francis Bay Coastal Protection Scheme.

Aspect/Impact	Mitigation Measures	Mitigation Target/Objective	KPI	Monitoring Method, Frequency and Responsibility	Reporting Output	Reporting Frequency (D-W-M- Q-A-AR)	
Construction Phase							
1	Estuarine Physical Characteristics	<ul style="list-style-type: none"> ➤ Give preference to extraction from primary areas as far as possible. 	<ul style="list-style-type: none"> ➤ No damage to infrastructure, estuary banks, sensitive habitats as a result of altered hydrodynamics. 	<ul style="list-style-type: none"> ➤ Method Statements relating to Construction Procedures, Timing and location of activities, and relevant specifications, to be compiled by the Contractor and submitted by to the ECO for approval prior to the commencement of construction activity. 	<ul style="list-style-type: none"> ➤ Daily visual inspections by the ESO, and monthly inspections by the ECO, to observe and confirm whether any erosion is occurring. ➤ Beach survey data to be included in monthly reporting with comment on whether the data suggests significant erosion. ➤ Should significant erosion be observed and considered to be requiring specialist expertise and input, the ESO and/or ECO will communicate the need for this to the Resident Engineer (RE) for actioning. Any actions will be detailed in the adaptive management plan to be approved by the competent authority prior to construction commencing. 	<ul style="list-style-type: none"> ➤ Incident Reporting (including relevant specialist inputs as is necessary) ➤ Monthly ESO reports ➤ Monthly ECO reports ➤ Construction Close-Out Report 	<ul style="list-style-type: none"> ➤ Daily (incidents) ➤ Monthly ➤ As Required
2	Surface water Pollution (relevant to sand sourcing along the Kromme River)	<ul style="list-style-type: none"> ➤ Daily checks should be done for leaks/spillages; ➤ Spill kits and drip trays must be readily available; and ➤ It is recommended that ready mixed cement is used. No cement mixing close to the shore or estuary must be permitted. 	<ul style="list-style-type: none"> ➤ No hydrocarbon spills or leaks of any nature or volume in/within 100m of the river or beachfront over the construction period. ➤ Spills must be limited to construction camp/workshop areas. ➤ No mixing of concrete outside of the construction camp 	<ul style="list-style-type: none"> ➤ Number of spills (type, substance location) within 100m of the river or beachfront during the construction phase. ➤ Presence and number of spill kits observable on site. ➤ Number of personnel trained in the use of spill kits (training attendance registers are required). ➤ Number of reported incidents of concrete mixing outside of the construction camp. ➤ Method statement relating to pollution control to be compiled and submitted by the Contractor to the ECO for approval prior to the commencement of construction activity. 	<ul style="list-style-type: none"> ➤ Daily site inspections by the ESO and Contractor personnel of areas that are potentially at risk of spills or leaks. ➤ All spill/leak events to be subject to Incident Reporting and a description of the corrective and close-out actions undertaken by the ESO/ Contractor. 	<ul style="list-style-type: none"> ➤ Incident Reporting ➤ Weekly and Monthly ESO reports ➤ Monthly ECO reports ➤ Construction Close-Out Report 	<ul style="list-style-type: none"> ➤ Daily (incidents) ➤ Weekly ➤ Monthly
3	Estuarine Ecology – Flora and Fauna	<ul style="list-style-type: none"> ➤ Limit dredging in habitats where high biodiversity / abundance of benthic species exist; ➤ Where possible, sediment should be taken from areas where there is low abundance of estuarine vegetation. ➤ Sensitive habitats (including the salt marsh areas) will be identified and avoided where possible; ➤ Avoid working in areas where bird species may nest. Especially during the breeding season; and ➤ Associated equipment will be placed in areas of low sensitivity only; 	<ul style="list-style-type: none"> ➤ No infringement on identified sensitive areas by either dredging or other associated construction activities for the duration thereof. This includes construction camps and designated material stockpile areas. 	<ul style="list-style-type: none"> ➤ Production of final construction camp and targeted dredging area plans that are overlaid on known areas of sensitivity (Annexure 4) prior to the commencement of construction activity. ➤ Number and physical extent of disturbances to be known and identified sensitive areas during the construction phase. 	<ul style="list-style-type: none"> ➤ Daily inspections by the ESO, and monthly inspections by the ECO, to observe and confirm whether disturbances have occurred. ➤ All sensitive area disturbance events to be subject to Incident Reporting and communicated to the relevant authorities if necessary or required. 	<ul style="list-style-type: none"> ➤ Incident Reporting ➤ Weekly and Monthly ESO reports ➤ Monthly ECO reports ➤ Construction Close-Out Report 	<ul style="list-style-type: none"> ➤ Daily (incidents) ➤ Weekly ➤ Monthly
4	Dune Ecology	<ul style="list-style-type: none"> ➤ Do not allow any laydown areas within the sensitive foredune area; ➤ Limit access across the foredunes to four access points in total, where each groyne will be located. The access point where the sand spit starts (possibly at the Aldabara Road parking area) will need to serve the first two groynes. The second two will require access from Peter Crescent and at George road; and the final one at the Ralph Road parking area. These parking areas must also be used as laydown areas; ➤ Limit pedestrian access to these same points; and ➤ Disallow workers from accessing the foredune areas. 	<ul style="list-style-type: none"> ➤ No laydown areas to be established within sensitive foredunes areas. ➤ Restrict access over the foredunes to only four (4) access points. ➤ No access within sensitive foredunes areas, whether by pedestrians, construction staff or plant, to be permitted outside of the four (4) predetermined access routes. 	<ul style="list-style-type: none"> ➤ Establishment of laydown areas and access route plans prior to the commencement of construction. ➤ Demarcation of access routes prior to construction to prevent encroachment on sensitive foredune areas. ➤ Physical extent of dune area anticipated to be disturbed to be determined. ➤ Proof of employee, and any third party, attendance of environmental awareness training. 	<ul style="list-style-type: none"> ➤ Daily inspections by the ESO, and monthly inspections by the ECO, to observe and confirm whether disturbances to sensitive foredune areas have occurred. ➤ All sensitive area disturbance events to be subject to Incident Reporting and communicated to the relevant authorities if necessary or required. 	<ul style="list-style-type: none"> ➤ Incident Reporting ➤ Weekly and Monthly ESO reports ➤ Monthly ECO reports ➤ Construction Close-Out Report 	<ul style="list-style-type: none"> ➤ Daily (incidents) ➤ Monthly
5	Marine Ecology – Fauna and Flora	<ul style="list-style-type: none"> ➤ The placement of sand and / or rock material on or near the nearshore reef structures may result in localised smothering, leading to a potential loss of individuals and habitat; and ➤ The development of groyne structures of rock material may provide additional hard substrate for benthic species. 	<ul style="list-style-type: none"> ➤ Alter the location of the groynes to avoid known and exposed reef structures. 	<ul style="list-style-type: none"> ➤ Limit the footprint of the works to those proposed (i.e. ensure that groynes to not exceed design footprint) 	<ul style="list-style-type: none"> ➤ Daily monitoring of construction activities in the marine environment by the ESO and Contractor. ➤ Monthly monitoring by ECO. 	<ul style="list-style-type: none"> ➤ Weekly ESO reports ➤ Monthly ECO reports 	<ul style="list-style-type: none"> ➤ Daily (incidents) ➤ Monthly ➤ As required
6	Local Amenity – Estuary	<ul style="list-style-type: none"> ➤ Reduce, where possible, the extraction of material during times of peak tourist activity; ➤ Ensure that signage is clear, and areas are made safe during excavation / dredging. ➤ Reduce dredging activity in popular bait digging areas (i.e. sand bank near the mouth of the estuary) during peak tourist season; ➤ Ensure areas of the sandbanks are available to bait diggers during construction; 	<ul style="list-style-type: none"> ➤ No dredging during peak tourist season. ➤ Avoidance of popular bait digging areas. ➤ No safety hazards to be created as a consequence of dredging. ➤ Clear signage indicating dredging/construction activities within affected areas. ➤ All bait diggers and regular users of the estuary to be informed and up to date 	<ul style="list-style-type: none"> ➤ Physical extent of disturbance and amount of sand required to be determined prior to the construction phase. ➤ Comprehensive monitoring and recording of dredging during construction. ➤ Number of safety incidents or risks reported to the Contractor/ECO. ➤ Number of signs or notice boards erected within the affected areas. 	<ul style="list-style-type: none"> ➤ Daily visual inspections by the ESO, and monthly inspections by the ECO, to observe and confirm areas under excavation/dredging. ➤ Monthly monitoring by a Health and Safety Agent. ➤ All health and safety risks or issues to be subject to Incident Reporting and communicated to the relevant authorities if necessary or required. 	<ul style="list-style-type: none"> ➤ Incident Reporting ➤ Monthly HSE Reports ➤ Monthly ECO Reports ➤ Construction Close Out Report 	<ul style="list-style-type: none"> ➤ Daily (incidents) ➤ Monthly ➤ As required.

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Aspect/Impact	Mitigation Measures	Mitigation Target/Objective	KPI	Monitoring Method, Frequency and Responsibility	Reporting Output	Reporting Frequency (D-W-M- Q-A-AR)	
	<ul style="list-style-type: none"> ➤ Dredging from the channels initially will ensure that sand bank habitat is maintained for a longer period; and ➤ Inform bait diggers of construction schedule to allow digging in areas that are due to be dredged. 	regarding dredging activities, including details on the areas to be dredged.					
7	Local Amenity – beach	<ul style="list-style-type: none"> ➤ Reduce, where possible, the placement material during times of peak tourist activity; ➤ Ensure that signage is clear, and areas are made safe during placement and levelling; and ➤ Ensure that newly nourished areas are safe for use. 	<ul style="list-style-type: none"> ➤ No placement of material during peak tourist season. ➤ No safety hazards to be created as a consequence of beach nourishment. ➤ Clear signage indicating nourishment /construction activities within affected areas. ➤ All regular users of the beach and frontage to be informed and up to date regarding dredging and beach nourishment activities, including details on the areas to be worked in/on. 	<ul style="list-style-type: none"> ➤ Physical extent of disturbance and amount of sand required to be determined prior to the construction phase. ➤ Comprehensive monitoring and recording of sand placed on the beach during construction. ➤ Number of safety incidents and/or risks reported to the Contractor/ECO. ➤ Number of signs or notice boards erected within the affected areas. 	<ul style="list-style-type: none"> ➤ Daily visual inspections by the ESO, and monthly inspections by the ECO, to observe and confirm areas under excavation/dredging. ➤ Monthly monitoring by a Health and Safety Agent. ➤ All health and safety risks or issues to be subject to Incident Reporting and communicated to the relevant authorities if necessary or required. 	<ul style="list-style-type: none"> ➤ Incident Reporting ➤ Monthly HSE Reports ➤ Monthly ECO Reports ➤ Construction Close Out Report 	<ul style="list-style-type: none"> ➤ Daily (incidents) ➤ Monthly ➤ As required.
8	Loss of Archaeological and/or Cultural Heritage Resources (relevant to sand sourcing along the Kromme River)	<ul style="list-style-type: none"> ➤ Should any archaeological or cultural sites or objects be located during the construction of the proposed project, it should immediately be reported to the National Heritage Council and the ECPHRA.; and ➤ All construction site staff should be briefed to immediately report any sites or objects of heritage significance located during the construction phase. In the event of finding what appears to be an archaeological site or a cultural and/or historic site or object, work within that area should be stopped until a qualified archaeologist or historian can examine the item or find. ➤ A 50 m buffer around the river mouth should be implemented. This buffer includes the beach and coastal dune strips around the river mouth which could potentially hold the washed-up remains of wreckage, artefacts as well as possible survivor camp remnants. 	<ul style="list-style-type: none"> ➤ No damage to or loss of archaeological/cultural heritage sites or objects. ➤ All staff educated and informed of potential archaeological or cultural heritage sites or objects. 	<ul style="list-style-type: none"> ➤ Proof of employee, and any third party, attendance of environmental awareness training which includes information on possible archaeological/cultural heritage remains within the area. ➤ Number of archaeological/cultural heritage remains (if any) unearthed during excavation and/or dredging. ➤ Limited dredging within the buffer zone identified. 	<ul style="list-style-type: none"> ➤ Daily visual inspections by the ESO, and monthly inspections by the ECO, to observe and confirm whether any archaeological/cultural heritage remains are present on site. ➤ Any objects or sites of cultural heritage significance to be reported to ECPHRA. ➤ A suitably qualified MUCH specialist should be appointed during initial stages of the development in order to provide training to the assigned project ECO. ➤ Bi-weekly monitoring and reporting to SAHRA MUCH Unit by an informed and trained Environmental Control Officer (ECO) of the dredging of target areas P1 and S1 and the placing of the groyne and revetment. 	<ul style="list-style-type: none"> ➤ Any findings reported to ECPHRA, SAHRA MUCH ➤ Bi-weekly and Monthly ECO Reports ➤ Construction Close Out Report 	<ul style="list-style-type: none"> ➤ Monthly ➤ As required.
9	Loss of Archaeological and/or Cultural Heritage Resources (relevant to the beach nourishment)	<ul style="list-style-type: none"> ➤ Excavations must be monitored, either by a palaeontologist or by an ECO trained by and in correspondence with a palaeontologist. This should be discussed between the palaeontologist, ECO and site engineer prior to the commencement of work. 					
10	Solid Waste Pollution (relevant to all project aspects)	<ul style="list-style-type: none"> ➤ Construction material should be reused or recycled where possible; ➤ Waste that cannot be reused or recycled should be disposed of in the correct manner at the nearest registered waste disposal site; ➤ Any hazardous materials (e.g. paint, fuel, oil) must be disposed of immediately and in the correct manner; ➤ General good house-keeping should be practiced on site; and ➤ If rubble is stored onsite it should be stored on designated portions of land. Designated areas for storage of rubble should be set aside at the onset of construction. 	<ul style="list-style-type: none"> ➤ No pollution of the surrounding natural environment. ➤ Correct storage and disposal of solid waste. ➤ No incorrect disposal of hazardous waste. ➤ Correct storage and disposal of hazardous waste on site. ➤ Appoint a hazardous waste disposal company (e.g. Enviro Serve) to removed hazardous waste from site. ➤ Maintain proof of solid and hazardous waste disposal on site, preferably within an environmental site file. ➤ No disposal of recyclable or reusable solid waste. ➤ Designated laydown/stockpile areas within the construction site. 	<ul style="list-style-type: none"> ➤ Number of waste disposal bins within the construction site. ➤ Contract of appointment of a solid and hazardous waste removal company. ➤ Number of bins available for recycled material within the construction site. ➤ Contract of appointment of recycling company to collect recyclable and reusable material from site. ➤ Proof of employee, and any third party, attendance of environmental awareness training which must include details pollution and the consequences of incorrect waste disposal. ➤ Penalties or fines for employees who do not adhere to the correct procedure for waste disposal. ➤ Method statement relating to pollution control to be compiled and submitted by the Contractor to the ECO. ➤ Method statement relating to Solid Waste Management and Hazardous Material Management to be compiled and submitted by the Contractor to the ECO. 	<ul style="list-style-type: none"> ➤ Daily visual inspections of the site by the ESO, and monthly inspections by the ECO, to observe general housekeeping conditions and litter on site. ➤ Monthly auditing of environmental file and waste disposal slips by the ECO. ➤ Any reports of complaints of litter emanating from construction activities to be recorded by the ESO in a complaints register and presented to the ECO during the monthly site audit. 	<ul style="list-style-type: none"> ➤ Complaints register ➤ Daily record of waste disposal ➤ Weekly and Monthly ESO reports ➤ Monthly ECO reports ➤ Construction Close-Out Report 	<ul style="list-style-type: none"> ➤ Weekly ➤ Monthly ➤ As required.
11	Dust Pollution (implementation of coastal protection infrastructure)	<ul style="list-style-type: none"> ➤ Construction should preferably cease during periods of high winds; ➤ Exposed surfaces should be sprayed down with water where required to avoid dust emissions; and ➤ Vehicles transporting material such as sand should remain at a speed limit of 30km/h and, if required, cover their loads with a tarpaulin to avoid dust emissions. 	<ul style="list-style-type: none"> ➤ Prevent dust pollution, as far as practically possible. ➤ Cease construction/dredging/excavation during windy conditions. ➤ Spray down or cover exposed surfaces during windy conditions. ➤ Delivery or transport vehicles not to exceed recommended speed limits. 	<ul style="list-style-type: none"> ➤ Number of complaints submitted relevant to dust impacts. ➤ Signage displaying speed restrictions erected on site. ➤ Presence, number and use of tarpaulin(s) available at the site camp and material stockpile areas. ➤ Method statements relating to Site Dust Management compiled and submitted by the Contractor to the ECO. 	<ul style="list-style-type: none"> ➤ Daily visual inspections of the site by the ESO, and monthly inspections by the ECO, to observe potential dust pollution. ➤ Any complaints emanating from dust pollution to be recorded by the ESO in a complaints register which must be presented to the ECO during the monthly site audit. 	<ul style="list-style-type: none"> ➤ Complaints register ➤ Monthly ECO reports 	<ul style="list-style-type: none"> ➤ Daily (incidents) ➤ Monthly ➤ As required.

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Aspect/Impact	Mitigation Measures	Mitigation Target/Objective	KPI	Monitoring Method, Frequency and Responsibility	Reporting Output	Reporting Frequency (D-W-M-Q-A-AR)	
		<ul style="list-style-type: none"> ➤ Loads of transport vehicles to be covered during transit. 					
12	Traffic (relevant to sand sourcing should the option of truck transportation be implemented) and vehicle movements related to groynes and revetment construction and material transportation	<ul style="list-style-type: none"> ➤ Appropriate warning signs must be erected, in accordance with the requirements of the District Road Engineer; ➤ Vehicles must be roadworthy and serviced and must abide by the standard traffic laws; ➤ Any abnormal Loads must be approved with the traffic authorities and must comply with any conditions imposed by the authorities; ➤ The contractor must employ flag staff if deemed necessary in order to prevent accidents; ➤ Speed limits on site must not exceed 30km/h and the speed limits along the public roads must be adhered to at all times; and ➤ Manage the travelling times of the delivery trucks so as to allow them to depart and arrive at spaced out time intervals, thus reducing the intensity of traffic and avoiding the formation of convoys of heavy vehicles. 	<ul style="list-style-type: none"> ➤ Erect appropriate warning signs and speed restrictions on affected roads. ➤ No congestion on public or gravel roads. ➤ No road accidents. ➤ Maintain and service vehicles regularly. ➤ No exceedances of speed limits. ➤ No transport or delivery of unauthorised abnormal loads. ➤ No transport or delivery outside of designated transport times. 	<ul style="list-style-type: none"> ➤ Number of complaints relating to traffic congestion. ➤ Number of speeding fines issued to contractor vehicles. ➤ Number of road accidents involving contractor vehicles. ➤ Number of traffic/road safety signs erected around work areas of frequent or regular vehicle movements. ➤ Daily records for vehicle checks and maintenance thereof recorded in a dedicated vehicle maintenance register. ➤ Number of flag staff employed. ➤ Method statements compiled by the Contractor relating to the transportation of the equipment to and from site. 	<ul style="list-style-type: none"> ➤ Daily visual inspections of vehicles and recording of vehicle maintenance and servicing in onsite file by ESO/Contractor. ➤ Daily visual inspection of signage by ESO/Contractor. ➤ Constant monitoring of vehicle speeds during transit by ESO/Contractor. ➤ Any complaints emanating from traffic congestion, speeding, etc, to be recorded by the ESO in a complaints register which must be presented to the ECO during the monthly site audit. 	<ul style="list-style-type: none"> ➤ Complaints register. ➤ Daily vehicle inspections. ➤ Monthly ECO reports. ➤ Construction Close-Out Report. 	<ul style="list-style-type: none"> ➤ Daily ➤ Weekly ➤ Monthly ➤ As required.
13	Noise Disturbance (relevant to all project aspects)	<ul style="list-style-type: none"> ➤ All construction vehicles and equipment to be properly serviced in order to meet the necessary noise level requirements; ➤ Restriction of work to daylight hours where possible; ➤ Restriction of any unnecessary noise e.g. portable radios, vehicle radios, whistles etc.; and ➤ Machinery should be fitted with the required mufflers, and notice given to surrounding residents prior to the commencement of construction. 	<ul style="list-style-type: none"> ➤ No unnecessary noise emanating from construction equipment/activities. ➤ Noise levels to be within acceptable standards of SABS 1200A Sub-Clause 4.1 regarding 'built-up' areas. ➤ Appropriate directional and intensity settings applied to all hooters and sirens. ➤ No work after daylight hours. ➤ Implementation of municipal by-laws relating to noise. 	<ul style="list-style-type: none"> ➤ Method statements relating Noise Management compiled and submitted by the Contractor to the ECO. ➤ Number of complaints emanating from noise pollution. 	<ul style="list-style-type: none"> ➤ Any complaints emanating from noise disturbances to be recorded by the ESO in a complaints register which must be presented to the ECO during the monthly site audit. 	<ul style="list-style-type: none"> ➤ Complaints register. ➤ Daily vehicle and noise generating equipment inspections. ➤ Monthly ECO reports. 	<ul style="list-style-type: none"> ➤ Daily (incidents) ➤ Weekly ➤ Monthly ➤ As required.
14	Employment Creation and Economic Benefits	<ul style="list-style-type: none"> ➤ As far as possible, local labour should be used during construction; and ➤ Purchase materials locally, where possible, in order to support the local communities. 	<ul style="list-style-type: none"> ➤ Creation of employment for local labourers. ➤ No outsourcing of labour. ➤ Secure local suppliers for materials. 	<ul style="list-style-type: none"> ➤ Number of individuals employed. ➤ Value of local goods and services spends over the construction period. 	<ul style="list-style-type: none"> ➤ Monthly monitoring of these KPI by the ECO. 	<ul style="list-style-type: none"> ➤ Monthly ECO reports. ➤ Construction Close-Out Report. 	<ul style="list-style-type: none"> ➤ Monthly ➤ As required
Operational Phase							
15	Estuarine Physical Characteristics	<ul style="list-style-type: none"> ➤ KJRC are custodians mandated to manage vessel activity on the Kromme River. It is important that the committee take responsibility for the management of vessel use on the estuary; and ➤ Reduce speed of vessels in sensitive areas of the estuary. 	<ul style="list-style-type: none"> ➤ No infringement on identified sensitive areas (i.e. salt-marsh) as a result of vessel activity. ➤ Signage indicating sensitive areas. 	<ul style="list-style-type: none"> ➤ Number of warning and speed signs erected within sensitive areas. ➤ Penalties for those in breach of local river regulations. ➤ No loss/damage to the physical extent of the sensitive areas that is deemed outside of natural variation. 	<ul style="list-style-type: none"> ➤ Quarterly monitoring by ECO within the first year of operation. 	<ul style="list-style-type: none"> ➤ Quarterly ECO audits ➤ KJRC to report on management activities during their regular meetings and AGM and provide reports to Kouga Municipality as required. 	<ul style="list-style-type: none"> ➤ Quarterly; and ➤ As required by KJRC, Kouga Municipality.
16	Dune Ecology	<ul style="list-style-type: none"> ➤ None Required. 	<ul style="list-style-type: none"> ➤ Increased width of beach. ➤ Restoration of previously eroded/lost dune habitats. 	<ul style="list-style-type: none"> ➤ Physical extent of beach width expansion. 	<ul style="list-style-type: none"> ➤ Quarterly monitoring by ECO within the first year of operation. 	<ul style="list-style-type: none"> ➤ Quarterly ECO audits 	<ul style="list-style-type: none"> ➤ Quarterly ➤ As required
17	Marine Hydrodynamics	<ul style="list-style-type: none"> ➤ Place sand material immediately north of the northern most groyne to act as sacrificial material; ➤ The scheme will not result in significant erosion to the northern bank of the Kromme River mouth and the northern beaches; ➤ The scheme will be designed to maintain the longshore sediment transport; and ➤ Ensure that the adaptive management plan is developed to recognise and mitigate for any accelerated erosion. 	<ul style="list-style-type: none"> ➤ No significant downstream erosion of the northern beaches as a consequence of groyne construction. ➤ No significant adverse alternation of marine hydrodynamics and long-shore drift and sediment transport. ➤ Compilation and availability of Adaptive Management Plan. 	<ul style="list-style-type: none"> ➤ Physical extent of disturbance or volume of sand lost from northern beaches. ➤ As defined by the Adaptive Management Plan. 	<ul style="list-style-type: none"> ➤ Quarterly monitoring by ECO within the first year of operation. 	<ul style="list-style-type: none"> ➤ Quarterly ECO audits 	<ul style="list-style-type: none"> ➤ Quarterly ➤ As required
18	Local Amenity – Estuary	<ul style="list-style-type: none"> ➤ The extraction of sediment from the navigation channels in the estuary will allow vessels access during all tidal cycles. This will improve safety and increase the recreational use of the estuary ➤ The Kromme Estuary supports many recreational activities. As a result, tourism is viewed as an important income generator in the area. 	<ul style="list-style-type: none"> ➤ Increased depth and width of navigation channels in the estuary. ➤ Increased access and recreational use of the Kromme River Estuary. ➤ Increased tourism. 	<ul style="list-style-type: none"> ➤ Physical width and depth of the navigation/water channel. ➤ Number of recreational users. 	<ul style="list-style-type: none"> ➤ Quarterly monitoring by ECO within the first year of operation. 	<ul style="list-style-type: none"> ➤ Quarterly ECO audits 	<ul style="list-style-type: none"> ➤ Quarterly ➤ As required
19	Local Amenity – beach	<ul style="list-style-type: none"> ➤ Ensure that, where possible, groynes are maintained as designed. 	<ul style="list-style-type: none"> ➤ Increased number of surf breaks. ➤ Increased beach width. 	<ul style="list-style-type: none"> ➤ Physical increase in the width of the beach. ➤ Number of additional wave breaks. 	<ul style="list-style-type: none"> ➤ Quarterly monitoring by ECO within the first year of operation. 	<ul style="list-style-type: none"> ➤ Complaints register ➤ Quarterly ECO audits 	<ul style="list-style-type: none"> ➤ Quarterly ➤ As required

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Aspect/Impact	Mitigation Measures	Mitigation Target/Objective	KPI	Monitoring Method, Frequency and Responsibility	Reporting Output	Reporting Frequency (D-W-M- Q-A-AR)
		<ul style="list-style-type: none"> ➤ No further erosion of beaches. 	<ul style="list-style-type: none"> ➤ Increased number of tourists. ➤ Feedback from local surfers. 	<ul style="list-style-type: none"> ➤ Any complaints relating to changes in wave regime/wave breaks to be reported to the ECO, the SFPO NPCV, and the Kouga LM. 		
20	Solid Waste Pollution	<ul style="list-style-type: none"> ➤ Waste that cannot be reused or recycled should be disposed of in the correct manner at the nearest registered waste disposal site; ➤ Any hazardous materials (e.g. paint, fuel, oil) must be disposed of immediately and in the correct manner; and ➤ General good house-keeping should be practiced during maintenance operations. 	<ul style="list-style-type: none"> ➤ No pollution of the surrounding environment due to maintenance activities. ➤ Correct disposal of solid waste arising from maintenance activities. 	<ul style="list-style-type: none"> ➤ Number of waste bins available during maintenance activities. ➤ Waste disposal slips from a registered landfill. ➤ Number of complaints emanating from pollution due to maintenance activities. 	<ul style="list-style-type: none"> ➤ Daily inspections by appointed maintenance Contractor. 	<ul style="list-style-type: none"> ➤ Quarterly ECO audits ➤ Quarterly ➤ As required.
21	Public health and safety	<ul style="list-style-type: none"> ➤ Ensure that appropriate and visible signage is erected warning the public of the dangers of climbing the structures and the rip currents; and ➤ Local life guards must ensure that swimming areas are clearly demarcated. 	<ul style="list-style-type: none"> ➤ No use/access of groynes by the public. ➤ Adequate safety and warning signage displayed on the beach near groyne structures. ➤ Appointment and presence of local life guards. 	<ul style="list-style-type: none"> ➤ Number of safety incidents or risks reported to the ECO/Developer. ➤ Number of safety boards and signs erected on and around the site. 	<ul style="list-style-type: none"> ➤ Quarterly monitoring by ECO within the first year of operation. 	<ul style="list-style-type: none"> ➤ Quarterly ECO audits ➤ Quarterly ➤ As required

10. ENVIRONMENTAL AWARENESS

10.1 ENVIRONMENTAL AWARENESS TRAINING

The Contractors must ensure that their employees and any third party, who carries out all or part of the Contractors' obligations, is adequately trained with regard to the implementation of the EMPr and the general environmental legal requirements and obligations.

Environment and health awareness training programmes should be targeted at three (3) distinct levels of employment, i.e. the executive, middle management and labour. Environmental awareness training programmes should contain the following information:

- The names, positions and responsibilities of personnel to be trained;
- The framework for appropriate training plans;
- The summarised content of each training course; and
- A schedule for the presentation of the training courses.

The ECO must ensure that records of all training interventions are kept in accordance with the record keeping and documentation control requirements as set out in this EMPr. The training records must verify each of the targeted personnel's training experience.

The Applicant must ensure that adequate environmental training takes place. All employees must be given an induction presentation on environmental awareness and the content of the EMPr. The presentation should be conducted in the language of the employees to ensure it is understood. The environmental training must, as a minimum, include the following:

- The importance of conformance with all environmental policies;
- The environmental impacts, actual or potential, of their work activities;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirement of the proponent / contractor's environmental management systems, including emergency preparedness and response requirements;
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities;
- Environmental legal requirements and obligations;
- Details regarding floral and faunal Species of Conservation Concern and protected species, and the procedures to be followed should these be encountered during the construction;
- The importance of not littering;
- The importance of using supplied ablution facilities;
- The need to use water sparingly;
- Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible; and the
- Details regarding archaeological and/or historical sites which may be unearthed during construction and the procedures to be followed should these be encountered.

Please refer to Appendix 2 for recommended Environmental Education Material.

10.2 MONITORING OF ENVIRONMENTAL TRAINING

The Contractor must monitor the performance of construction workers to ensure that the points relayed during their induction have been properly understood and are being followed. If necessary, the ECO and/or a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended.

11. CLOSURE PLANNING

The Contractor must clear and clean the site and ensure that all equipment and residual materials, not forming part of the permanent works, are removed from site before issuing the completion certificate or as otherwise agreed.

11.1 POST-CONSTRUCTION AUDIT

A post-construction audit must be carried out and submitted to DEDEAT at the expense of the Applicant. Objectives should be to audit compliances with the key components of the EMPr, to identify main areas requiring attention and recommend priority actions. The Post-Construction Audit (or Close-Out report) should be submitted to DEDEAT within 3 months of completion of the development and/or Project Phase in this case and prior to the operational phase.

Note that this EMPr also recommends the appointment of an ECO / suitably qualified expert to be responsible for the reporting as specified in the Monitoring Plan and Adaptive Management Plan that still require development. This is to ensure that all commitments are met and that suitable monitoring continues during the operational phase.

Results of the audits should inform changes required to the specifications of the EMPr or additional specifications to deal with any environmental issues which arise on site and have not been dealt with in the current document.

11.2 GENERAL REVIEW OF EMPr

The EMPr will be reviewed by the ECO on an on-going basis. Based on observations during site inspections and issues raised at site meetings, the ECO will determine whether any procedures require modification to improve the efficiency and applicability of the EMPr on site.

Any such changes or updates will be registered in the ECO's record, as well as being included as an annexure to this document. Annexures of this nature must be distributed to all relevant parties.

12. CONCLUSIONS

All foreseeable actions and potential mitigations and/or management actions have been (to date) and should be contained in this document. The EMPr should be seen as a day-to-day management document. The EMPr sets out the environmental and social standards, which would be required to minimise the negative impacts and maximise the positive benefits of the St Francis Bay Coastal Protection Scheme. The EMPr could therefore change daily, and, if managed correctly, lead to successful phases of development.

It should be noted that each Project Phase will have a discreet construction and operation phase and that Project Phases may overlap.

The importance of the development of the Construction Phase EMPlan, the Environmental Monitoring Plans and Adaptive Management Plan for the estuary should not be underestimated and needs to form part of the environmental management suite of documents. These need to be prepared and approved by the competent authority prior to construction commencing.

All attempts should be made to have this EMPr available, as part of any tender documentation, so that the Contractors are made aware of the potential cost and timing implications needed to fulfil the implementation of the EMPr, thus adequately costing for these.

ANNEXURE 1: METHOD STATEMENTS

METHOD STATEMENT

CONTRACT:..... DATE:.....

PROPOSED ACTIVITY (give title of method statement and reference number from the EMPr):

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works):

WHERE ARE THE WORKS TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

Start Date:	End Date:

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:

HOW ARE THE WORKS TO BE UNDERTAKEN (provide as much detail as possible, including annotated sketches and plans where possible):

* Note: please attach extra pages if more space is required

DECLARATIONS

1) ENVIRONMENTAL CONTROL OFFICER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactorily mitigated to prevent avoidable environmental harm:

(Signed)

(Print name)

Dated: _____

2) PERSON UNDERTAKING THE WORKS

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to other signatories and that the ECO will audit my compliance with the contents of this Method Statement

(Signed)

(Print name)

Dated: _____



<http://www.webweaver.nu/clipart/environmental.shtml>

Reasons why should we look after the environment

- ✦ We have a right to a clean environment
- ✦ A clean environment is essential to healthy living
- ✦ All our basic needs come from the environment
- ✦ A contract has been signed – development vs the environment
- ✦ Penalties / fines could be issued

How to look after the environment

- 🌿 Report issues
- 🌿 Teamwork
- 🌿 Follow the set rules and guidelines (EA, EMPr, Method statements etc.)
- 🌿 Conserve, reuse and recycle

Tips and Guidelines

- 🌿 Workers and equipment should not be allowed outside demarcated areas
- 🌿 No swimming or polluting of water bodies allowed
- 🌿 No damage / disturbance to vegetation or water bodies without consent / permits
- 🌿 No disturbance allowed in no-go areas
- 🌿 No hunting of animals
- 🌿 Report all fires
- 🌿 No burning or burying of waste
- 🌿 No smoking near hazardous materials
- 🌿 Training on fire fighting equipment
- 🌿 Hazardous materials to be stored in designated and bunded areas
- 🌿 Spill kits and drip trays a must
- 🌿 Report all spills
- 🌿 Control dust and Noise
- 🌿 Maintain construction vehicles
- 🌿 Availability and maintenance of sanitation facilities



Tips and Guidelines

- 🌿 Only eat in designated areas
- 🌿 Do not litter
- 🌿 Vehicles to remain on approved tracks and adhere to speed limit
- 🌿 Ensure emergency phone numbers are available
- 🌿 Ensure PPE is worn
- 🌿 Report fires, leaks and injuries
- 🌿 Ask if unsure



ANNEXURE 3: CURRICULM VITAE

ANNEXURE 4: SENSITIVITY MAPS

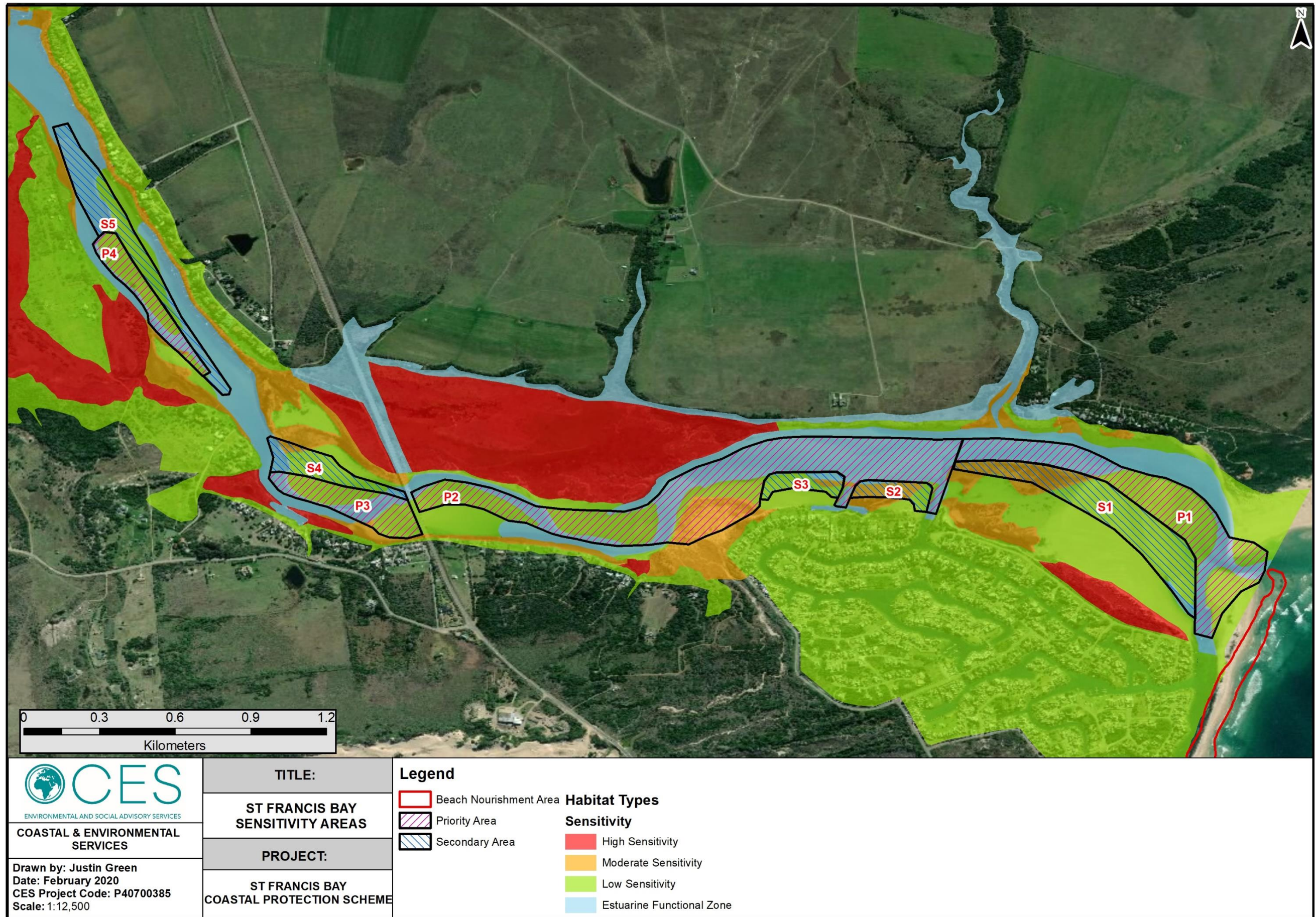


Figure A1: Map of the Habitat Sensitivity for the Kromme River Estuary.

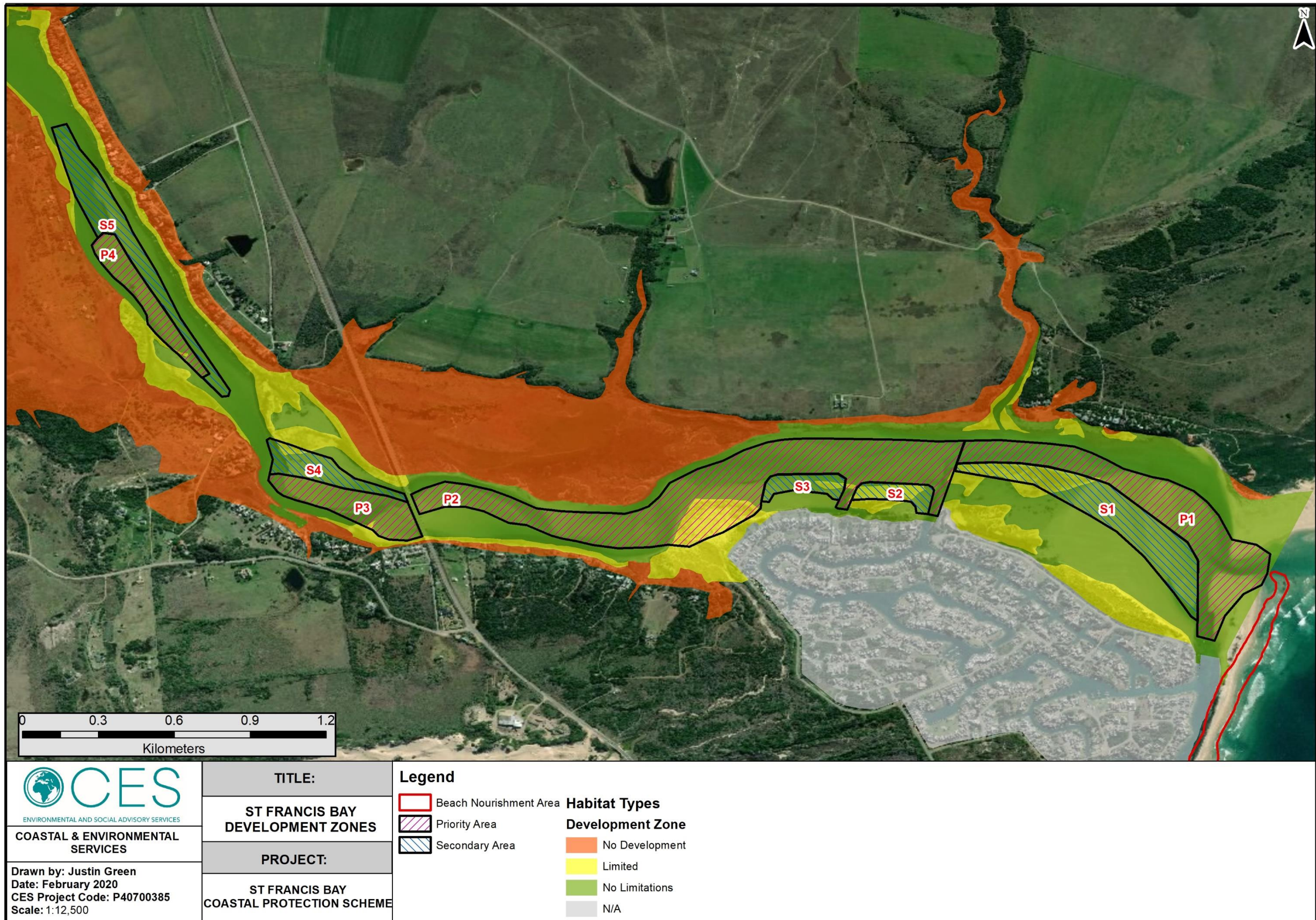
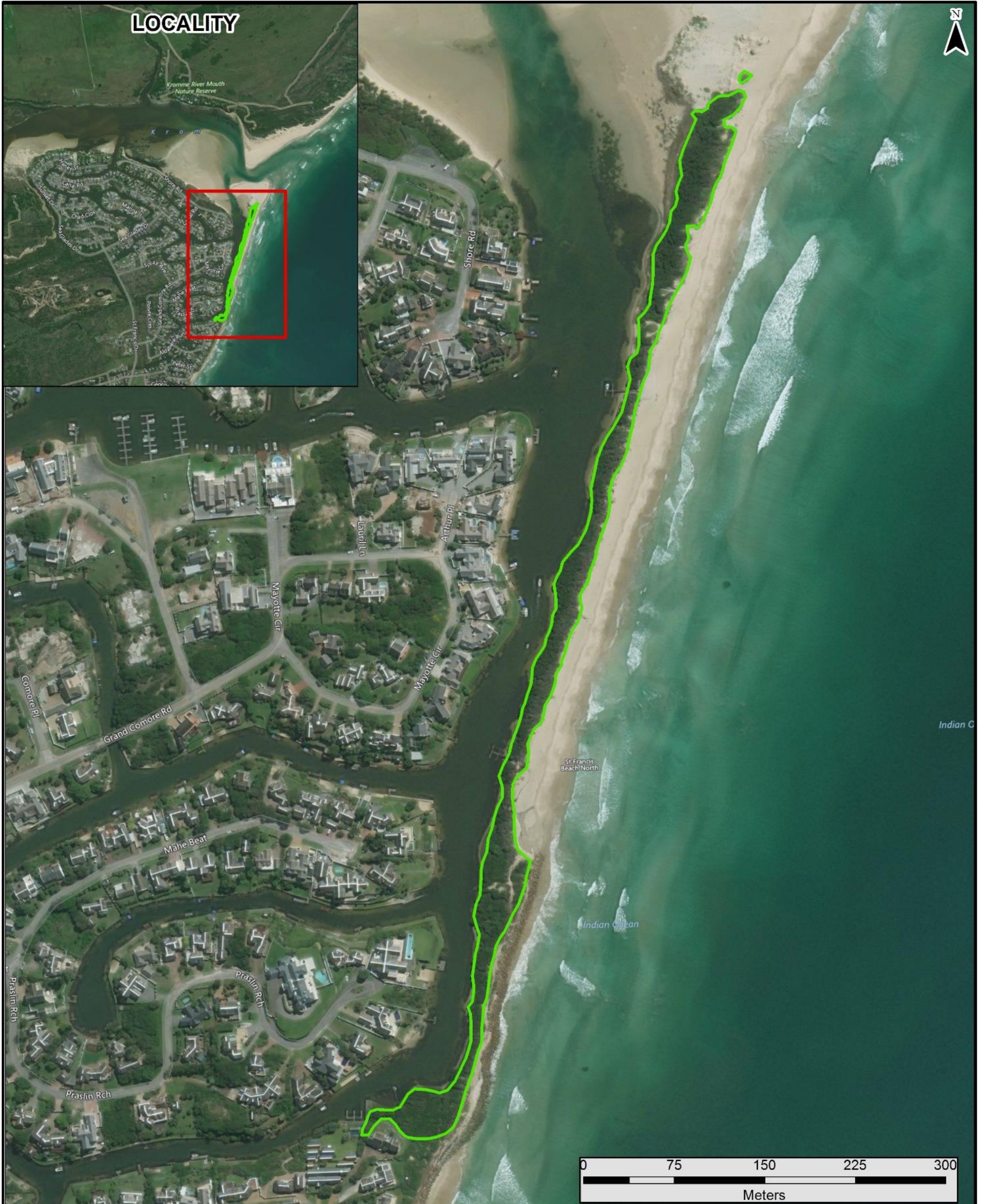


Figure A2: Map of the Development Zoning for the Kromme River Estuary.





 ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES COASTAL & ENVIRONMENTAL SERVICES	TITLE:	LEGEND  Dune Vegetation
	ST FRANCIS BAY DEVELOPMENT ZONING	
Drawn by: Justin Green Date: December 2019 CES Project Code: P40700385 Scale: 1:2 750	PROJECT:	
	ST FRANCIS BAY COASTAL PROTECTION SCHEME	

Figure A3: Map of the extent of the dune vegetation – limited development.