Environmental Impact Assessment (EIA) for the proposed construction, operation and decommissioning of the Saldanha Regional Marine Outfall Project of Frontier Saldanha Utilities (Pty) Ltd. at Danger Bay in the Saldanha Bay region

FINAL EIA REPORT

VOLUME II
APPENDIX F

Economics

Environmental Impact Assessment of the Saldanha Regional Marine Outfall Proposed by Frontier Saldanha Utilities (Pty) Ltd, Western Cape: Economic Specialist Study

FINAL DRAFT REPORT

September 2014

Prepared for:

CSIR

Prepared by:

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EXECUTIVE SUMMARY

This report provides economic specialist inputs into the EIA of a proposed Saldanha Regional Marine Outfall (SRMO) Project and associated infrastructure at Danger Bay, Saldanha, Western Cape.

Discussions with the applicant revealed that the **financial viability** of the project has been considered at length. Essentially the project is seen as a pre-requisite for the Frontier Rare Earths Separation Plant (or Saldanha Separation Plant - SSP) to be able to proceed as planned. It is therefore somewhat artificial to view the SRMO Project and the SSP as separate projects from a financial viability point of view as the one is required in order to make the other a reality. Although Frontier Saldanha Utilities (Pty) Ltd (Frontier Utilities) will be the primary financial risk taker in the project, they are actively engaging with other partners who have expressed an interest in using and sharing the costs of the facility. These include Chlor-Alkali Holdings who are proposing a Chlor-Alkali Production Facility (CAPF) and Saldanha Bay Municipality (SBM) who recognised the potential for the outfall to service the proposed regional Waste Water Treatment Works (WWTW). Overall financial risk would be spread further if these partners and potentially others are willing to share the costs and financial risks associated with the project.

A critical aspect of economic desirability is the **compatibility of the project with key policy and planning guidance**. In this regard, it can be concluded that the SRMO Project should prove largely compatible with relevant industrial policy, infrastructure development, economic development and associated spatial planning for the area provided environmental impacts can be kept to an acceptable minimum. With regard to pipeline routing alternatives near Jacobsbaai, the Jacobsbaai Western Corridor would be slightly preferable to the Jacobsbaai Eastern Corridor as it would ensure that additional pipeline infrastructure would be confined to the areas near existing infrastructures (primarily the Main Road and electrical transmission lines).

The proposed SRMO Project would play a critical role in **facilitating industrial development** in Saldanha Bay with highly significant benefits. It would be a pre-requisite for the development of the SSP. The benefits associated with the SSP can therefore be viewed as indirect or facilitated benefits of the SRMO Project. These SSP benefits are predicted to include a total capital investment of approximately R5.8 billion, annual operational expenditure of approximately R1 billion and 182 permanent employment opportunities. The CAPF would also require effluent disposal with the SMRO Project being the preferred disposal option. The facilitated benefits of the CAPF are predicted to include a total capital investment of between R1.5 million and R2 billion, approximately 130 permanent jobs and the local provision of chemicals such as chlorine, caustic soda and hydrochloric acid thereby reducing transport costs for other industries.

From a **municipal service provision** perspective, the SRMO Project would present the opportunity to facilitate wastewater service provision by the SBM. Frontier Utilities would take the primary financial risks associated with the construction of the project to the ultimate benefit of the SBM. The option of using the facility will then be open to the SBM once the mooted new wastewater treatment works (WWTW) proceeds. The project should also represent a cost saving relative to the SBM constructing their own facility. This would support efforts by the SBM to keep future wastewater services provision costs (and therefore service charges to users) as low as possible. In addition, cost savings should result from the use of the same servitudes and outfall points as those proposed for the WCDM desalination plant. Over the medium to long term, it is also the intention of the applicant to facilitate the transfer of the facility to a steering committee consisting of all participants and potentially the SBM and /or the WCDM. Overall, the project represents an opportunity to achieve the co-ordinated provision of infrastructure and services within in a public-private partnership framework that allows for risk and costs sharing.

Risks to **mariculture and fishing** would stem from impacts on the marine environment which have been assessed in the marine ecology specialist study (Pisces, 2014) focusing on the impacts associated with effluent disposal. The key findings of this study are that, in the worst case scenario, the brine and thermal plumes (exceeding water quality guidelines) will periodically overlap with recreational and commercial rock-lobster and line fisheries within Danger Bay to varying degrees. In the majority of cases the extent of the area of overlap would be relatively small at less than 0.35 km^2. In those cases where it would be larger, such as in the case of combined discharges from the proposed SSP, CAPF, WWTW and West Coast District Municipality Desalination Plant, it is noted that a worst case scenario will only occur for very short periods under very calm weather conditions. This would also be the only case in which there is potential overlap of plume footprints with a small section of sub-tidal reef within the bay. Under no scenarios are plumes predicted to extend beyond the entrance to Danger Bay implying no risks to fishing outside the Bay or mariculture further up the coast in Jacobs Bay.

At an overall level the marine ecology specialist study found that all impacts could be mitigated relatively successfully. All impacts were rated as having a low significance level with mitigation. Consequently, overall impacts on mariculture and fishing are expected to be **low with mitigation** for all outfall alternatives.

Impacts on tourism and recreation would be driven by visual impacts, impacts on water quality and losses of conservation-worthy land. Visual impacts would relate to the relatively sensitive landscape into which the pump stations and pipeline near Jacobsbaai and Danger Bay would be introduced which has very few industrial elements. Overall the visual specialist slightly favours the use of the Jacobsbaai Western Corridor over the Jacobsbaai Eastern Corridor as it would run along an existing road and power line servitude in Jacobsbaai. However, if the power lines can be buried (which is noted as a possibility in the project description particularly depending on the width of the pipeline servitude), impacts would fall away. The impacts of changes in marine water quality could have implications for marine tourist and recreation activities such as swimming. Based on the findings of the marine ecology specialist study, however, risks in this regard are considered low. In addition, some losses of conservation worthy land would be unavoidable. This impact would, however, be reduced through the sharing of servitude areas earmarked for the proposed desalination plant and by rehabilitation of land once pipelines are laid. Overall impacts on tourism should be **low to medium with mitigation** for all pipeline and outfall alternatives. Note however that the Jacobsbaai Western Corridor along the existing road is slightly preferred given its lower visual impacts.

The plant would have a **positive impact on economic activity** in the local area and region given the size of the new spending injections associated with it. An estimated R113 million expenditure on the project is anticipated. Approximately 164 temporary construction jobs of 12 to 18 months are expected - the majority of which would be medium and low skilled positions in keeping with the nature of the construction required. A total direct labour income of R20 million would be associated with the construction phase. The annual operational expenditures would be approximately R2.6 million per year. Approximately eight permanent jobs will be associated with the operation phase of the plant resulting in a total operational labour local salary bill of approximately R1.2 million per year. In addition to the above direct employment and associated income opportunities, a number of temporary indirect opportunities would be associated with the project.

Positive impacts during the construction phase have been given a **medium significance rating with mitigation** whilst those during the operational phase have been given a **low significance rating** given jobs and income effects. With regard to benefit enhancement measures, targets should preferably be set (in tender documents) for how local sub-contractors and local labour should be used based on the needs of the proponent and the availability of existing skills and people that are willing to undergo training. Opportunities for the training of unskilled and skilled workers from local communities during the construction and operational phases should be maximized.

At an overall level, the low to moderate magnitude of risks should be exceeded by the highly significant magnitude of potential benefits from the project with adequate mitigation for all pipeline alternatives. Nevertheless, with regard to pipeline routing alternatives near Jacobsbaai, the Jacobsbaai Western Corridor would be slightly preferable to the Jacobsbaai Eastern Corridor as it would ensure that additional pipeline infrastructure would be confined to the areas near existing linear infrastructure (primarily the Main Road and electrical transmission lines). This would make more sense from an infrastructure planning perspective and would reduce visual impacts with links to tourism impacts.

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ABBREVIATIONS

BBBEE	Broad Based Black Economic Empowerment
BEE	Black Economic Empowerment
CAH	Chlor-Alkali Holdings (Pty) Ltd
CAPF	Chlor-Alkali Production Facility
DEA	Department of Environmental Affairs
DM	District Municipality
DR	District Road
EIA	Environmental Impact Assessment
GDP	Gross Domestic Product
GRP	Gross Regional Product
HCl	Hydrochloric acid
HDSA	Historically Disadvantaged South African
IDP	Integrated Development Plan
IDZ	Industrial Development Zone
LED	Local Economic Development
LM	Local Municipality
MV	Medium Voltage
NaCl	Sodium Chloride
NaOH	Sodium Hydroxide
NPV	Net Present Value
OHL	Overhead Lines
PGWC	Provincial Government of the Western Cape
PICC	Presidential Infrastructure Coordinating Commission
REE	Rare Earth Element
SBM	Saldanha Bay District Municipality
SBM	Saldanha Bay Municipality
SBIDZ	Saldanha Bay Industrial Development Zone
SDF	Spatial Development Framework
SRMO	Saldanha Regional Marine Outfall
SSP	Saldanha Separation Plant
WCDM	West Coast District Municipality
WWTW	Wastewater Treatment Works

Suggested citation

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1 INTRODUCTION

1.1 Background and brief

Frontier Saldanha Utilities (Pty) Ltd (Frontier Utilities) proposes to construct and operate a marine outfall and associated infrastructure in Danger Bay near Saldanha Bay. The CSIR have been appointed as the lead consultant by the applicant to conduct the Environmental Impact Assessment (EIA) process for the proposed project. This report contains an economic specialist study that forms part of the assessment phase of the EIA process. Its brief is to:

- Describe the existing economic characteristics/context of the local area and broader region.
- Identify and assess potential economic impacts at local as well as wider scales as relevant. These are expected to include the following:
    - Broad level review of the need and financial viability/risks associated with the project.
    - Degree of fit with local, regional and national economic development visions and plans including water supply plans.
    - Impacts on overall economic development potential in the area including impacts on commercial enterprises nearby the site (incl. tourism, agriculture, mariculture, fisheries and others).
    - Impacts associated with project expenditure on direct and indirect employment and household incomes.
    - Impacts associated with environmental impacts that cannot be mitigated and have economic implications. This would focus on potential negative impacts on neighbouring land owners should they be relevant drawing on the findings of the other specialist studies forming part of the EIA and other relevant sources.
- Propose and implement additional ToR, if required, based on professional expertise, experience and compliance with the relevant specialist study guidelines and best practice.

1.2 Approach and methodology

The approach adopted involved the following steps in line with accepted EIA practice:

1. Investigate the existing economic context within which the project would be established.
2. Identify economic impacts.
3. Assess economic impacts without mitigation measures.
4. Recommend mitigation measures.
5. Re-assess economic impacts with mitigation measures.

Guidance on the approach was taken from the Department of Environmental Affairs and Development Planning (Western Cape) guidelines on economic specialist input to EIA processes (van Zyl *et al*., 2005). This included guidance on the appropriate level of detail required for the assessment in order that it be adequate for informing decision-making without going into superfluous detail (i.e. superfluous detail in this report as well as superfluous detail when the briefs of other specialist studies forming part of the EIA are taken into account).

Information was gathered from the following sources in order to investigate the existing economic situation that would be affected by the project:

- Information generated during consultations with the public and authorities.
- Census data from the Statistics South African database.
- Local Economic Development and planning documents.

Assessment focused on impacts during the construction and operational phases but also considered the impacts associated with the decommissioning phase where relevant.

Details on the approaches used to assess impacts are contained in the individual sections dealing with the impacts.

1.3 Assumptions and limitations

- All technical, financial (i.e. market surveys, business plans and costs) and other information provided by the applicant, the applicant's project team, other official sources and other specialists involved in the EIA is assumed to be correct unless there is a clear reason to suspect incorrect information.
- The quantification of economic impacts in order to inform the assessment of the significance of impacts was not possible, nor considered necessary, for all impacts. Where possible, quantification focused on impacts considered to be most important in the overall assessment. Assessments of impact significance made without quantification (and based on a consideration of the likely magnitudes of impacts and/or expert judgements) are, however, considered adequate unless otherwise specified.
- All impacts are assessed individually and then as a whole to the degree possible and appropriate. An overall assessment and discussion of net impacts (i.e. whether overall benefits exceed costs) was undertaken to the degree thought appropriate and justifiable combining quantifiable and unquantifiable impacts. Given uncertainties and the potentially subjective nature of comparisons between impact categories, the emphasis in the report is on presenting assessments of impact categories with less emphasis on trying to reconcile them in an overall assessment of net effects. To a large degree this role of comparing and weighing up different (and hard to reconcile) impacts is the ambit of the relevant decision-making authorities.
- The findings of the assessment reflect the best professional assessment of the author drawing on relevant and available information within the constraints of time and resources thought appropriate and made available for the assessment. See Appendix 2 for the disclaimer associated with this report.

1.4 Declaration of independence

SPECIALIST DECLARATION

I, Dr Hugo Van Zyl, as the appointed independent specialist hereby declare that I:

act/ed as the independent specialist in this application;

- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Signature of the specialist:	
Name of Company:	Independent Economic Researchers
Professional Registration (Incl. number):	N/A
Date:	26 September 2014

2 PROJECT DESCRIPTION[1]

A number of different technological alternatives were assessed before deciding that disposal of effluent to sea would be the most feasible for this project. In this regard, Frontier Utilities appointed an independent engineering consultant, Process Projects, to investigate a number of alternatives for the disposal of brine produced by the proposed Saldanha Separation Plant (SSP) and the proposed Chlor-Alkali Production Facility (CAPF). Process Projects subsequently completed a desktop trade-off study, dated August 2013, in which the following brine effluent disposal options were investigated:

a. disposal of brine effluent to the Saldanha or Vredenburg existing local waste water treatment works;
b. the construction of evaporation ponds to generate salt for disposal at a licensed disposal facility;
c. evaporating and crystallising processes to generate waste salt for disposal at a licensed disposal facility or to be re-used by the CAPF;
d. evaporating and crystallising processes to generate salt to be re-used as feed by the CAPF; and
e. marine disposal (i.e. disposal to sea) of the effluent.

The criteria used to identify the preferred disposal option were primarily technical and financial, but some environmental criteria were also considered, e.g. visual impacts, ground water contamination, land sterilisation, air emission impacts etc. This led to the marine disposal alternative being selected as the only option considered feasible at this point.

The proposed pipeline transfer system (referred to as the Saldanha Regional Marine Outfall (SRMO) Project) will discharge approximately 8 - 9 Mega litres per day (Mℓ/day) of treated effluent. The proposed SRMO Project will be located near the town of Saldanha Bay, as presented in Figure 1. The proposed outfall pipeline will be constructed from the proposed SSP and will align with the Jacobsbaai Road (R85) south-west of the SSP before turning south to the discharge point at Danger Bay. Effluent would be generated from the following three sources:

- A Rare Earth Element (REE) Separation Plant (referred to as the SSP) proposed by Frontier Separation (Pty) Ltd (EIA in progress undertaken by AGES, Application Ref No. 16/3/1/2/F4/17/3004/13);
- A CAPF proposed by Chlor-Alkali Holdings (Pty) Ltd (CAH) (EIA in progress undertaken by MEGA, Application Ref No. 16/3/1/2/F4/17/3053/12); and
- A regional Waste Water Treatment Works (WWTW) proposed by the Saldanha Bay Municipality (SBM) (EIA not yet commissioned).

[1] Project description sourced from the project Final Scoping Report (CSIR, 2014).

Figure 1: Locality map of the pipeline alternatives

The liquid effluent produced at the proposed facilities (SSP, CAPF and WWTW) will predominantly be brine *i.e*. a solution of sodium chloride (NaCl) in water, with trace levels of other elements. At the SSP, sodium hydroxide (NaOH) and hydrochloric acid (HCl) will be used for pH adjustment for process requirements. These chemicals will be produced in an adjacent CAPF owned and operated by CAH. It is currently planned that the effluent will be disposed via the brine return disposal infrastructure of the proposed West Coast District Municipality (WCDM) seawater reverse osmosis desalination plant, planned to be located at Danger Bay (EIA was undertaken by CSIR; Application Ref No. E12/2/4/2-F4/16-3037/11; Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) granted Environmental Authorisation on 13 August 2013). However, the possibility exists that the planned construction of the WCDM desalination plant might be delayed. Consequently, the EIA for the proposed SRMO pipeline transfer system will investigate an alternative sea disposal option for the interim marine disposal (Scenario 1) until the WCDM desalination plant is commissioned (Scenario 2).

It is proposed that the SRMO transfer pipeline will follow to a large extent the same terrestrial corridor as that proposed in the EIA for the proposed WCDM desalination plant potable water pipeline leading to the Besaansklip reservoir. The proposed SRMO transfer system will consist of a pipeline with transfer pump stations located along the pipeline route.

The pump stations will mainly consist of a brine transfer tank, mechanical pumps (duty and standby) located in a bunded area, an electrical distribution and control centre and a diesel standby generator to supply power to the system during electrical power outages (approximately 4 hours). Approximately 600 ℓ of diesel will be stored at the pump stations for the standby electrical generators. The pump stations and pipeline route will be accessible via existing or new gravel service roads; where access will be limited to monitoring and maintenance functions (all gravel roads will follow existing dirt roads and

tracks). The pump stations will be remotely monitored and controlled via a centralized off site control room.

The project will thus consist of the following infrastructure:

- A terrestrial pipeline corridor. This corridor will be approximately 27 km long from the SSP to the outfall in Danger Bay. The pipeline will have a diameter of approximately 900 mm and will be constructed out of high density polyethylene (HDPE) or will be a glass reinforced plastic (GRP) pipe;
- Electrical corridors connecting to the pump stations. Either Medium Voltage (MV) cabling — which will be buried depending on the width of the pipeline servitude — will be utilised or Medium Voltage Overhead Lines (OHL) in traditional Delta A-Frame positions (wooden poles), at a height of 12 m, will be used;
- Five pump stations including brine transfer tanks, mechanical pumps, electrical distribution networks and standby generator located within the servitude located at positions A, B, C, D and E (see Figures 2 and 3);
- Gravel service roads to the pumps stations along existing dirt roads and tracks; and
- A marine outfall and with diffuser design system in Danger Bay.

The required width of the servitude was estimated to be approximately 20-30 m, however will be confirmed after the positioning of the SRMO pipeline has been finalised.

The pipeline servitude will not require rezoning, however, the pump stations sites may require rezoning. The preferred option would be to position the pump stations along the pipe route within the 20-30 m servitude area.

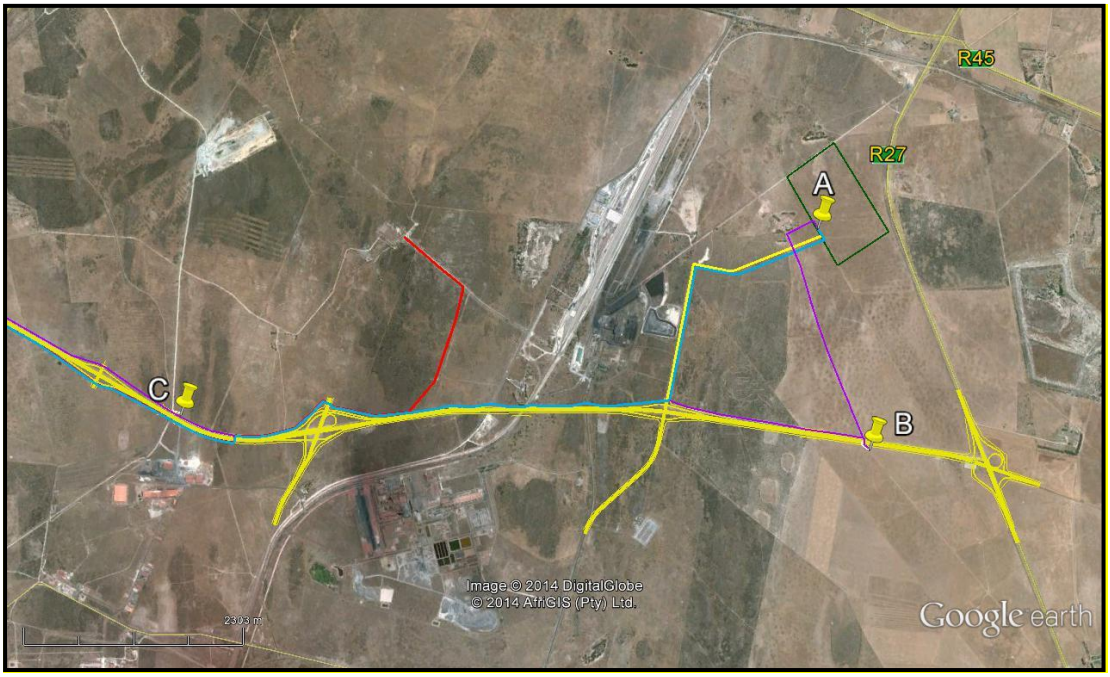


Figure 2: Locality map of pump stations A, B and C

Figure 3: Locality map of pump stations D and E

2.1 Project alternatives

Two pipeline routing alternatives are being considered near Jacobsbaai. The preferred corridor option will be referred to as the Jacobsbaai Western Corridor (blue route) and the alternative route as the Jacobsbaai Eastern Corridor (purple route) as per Figures 1 and 2. The pipeline section leading to the discharge point will traverse degraded areas along road verges and farms previously used for agriculture and sand mining activities (along the Jacobsbaai Eastern Corridor) and more sensitive vegetation through the road reserve along the Jacobsbaai Western Corridor.

A comprehensive screening study (Concept Options Trade-off Study) was undertaken by WorleyParsons and CSIR to identify suitable marine pipeline routing alternatives and associated marine discharge points for Scenario 1. The study aimed to identify specific environmental, technical and financial constraints associated with the alternative pipeline routings and associated marine discharge points. Three potential marine outfall routing alternatives were identified i.e. Options 1, 2 and 3 illustrated in Figure 4 and described below.

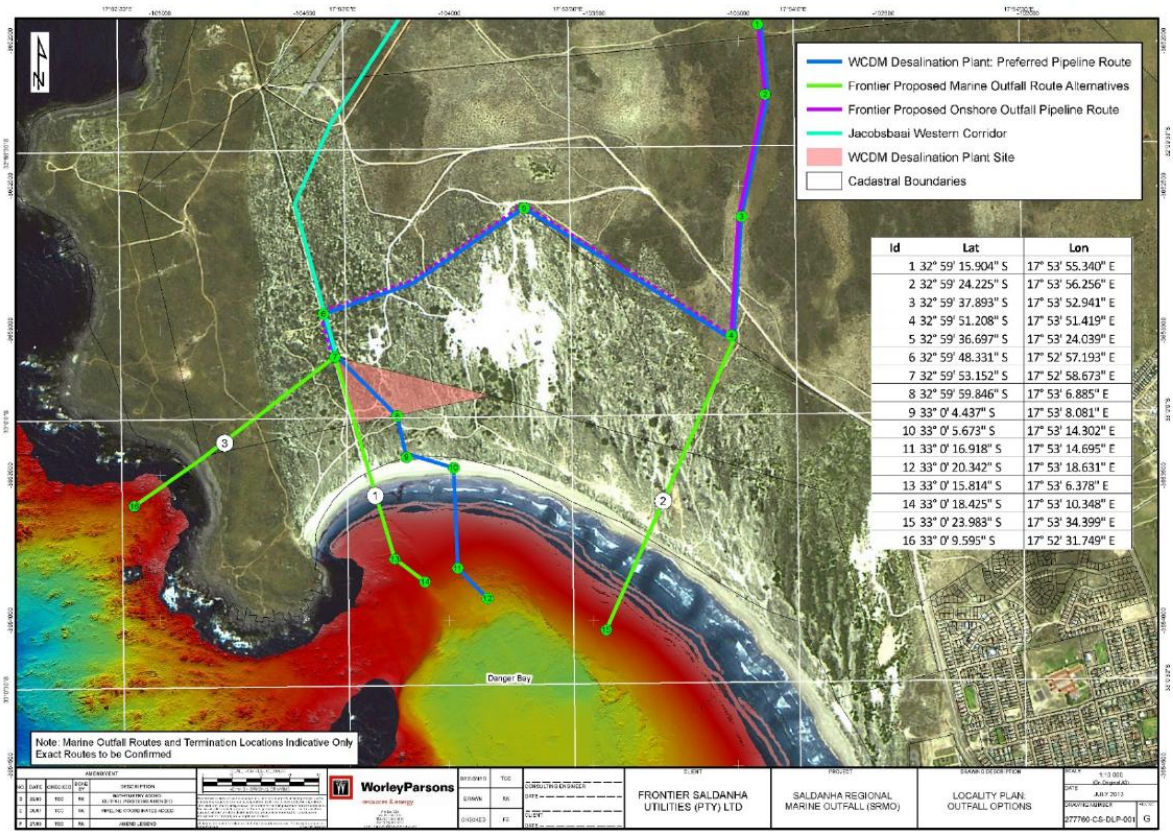


Figure 4: Locality Map of the marine outfall pipeline alternatives

Marine outfall route: Option 1

The Option 1 route connects to the onshore pipeline at the northern corner of the proposed WCDM's desalination plant site. The pipeline then follows a route south along and just inside the western boundary of the desalination plant footprint and through the dunes to the sea. It is proposed that the pipeline will continue along the same alignment through the surf zone to deeper water, however at some point it would likely be necessary for the pipeline to turn southeast to a discharge point in a less sheltered part of the bay for adequate dispersion of the effluent. The principal philosophy behind the initial selection of this route as an option was:

- By following the boundary of the desalination plant site the potential disruption to/from the desalination plant construction would be reduced;
- The northwest end of the bay represents the most sheltered area for ease of construction of the pipeline; and
- The route represents the shortest direct route to the sea from the connection point.

Marine outfall route: Option 2

The connection point for the Option 2 route would form an effective continuation of the desalination plant proposed pipeline route directly to the sea, southeast of the desalination plant site. The principal philosophy behind the initial selection of this route as an option was:

- The total length of pipeline to be constructed (onshore and offshore combined) at this stage would be significantly reduced;
- A route avoiding the desalination plant and associated pipelines would minimise the potential disruption to/from the desalination plant construction; and

- Discharging the effluent into a significant distance from the desalination plant intake pipeline would reduce any potential recirculation issues for the desalination plant intake.

Marine outfall route: Option 3

The connection point for the Option 3 route to the onshore pipeline is the same as for Option 1. The pipeline would follow a westerly route to enter the small rocky bay to the west of Danger Bay. The principal philosophy behind the initial selection of this route as an option was:

- A route avoiding the desalination plant and associated pipelines would minimise the potential disruption to/from the desalination plant construction; and
- Discharging the effluent into a separate bay would avoid any potential recirculation issues for the desalination plant intake.

Following the completion of the Concept Options Trade-Off Assessment it was concluded that only Option 1 (Preferred) and Option 2 (Alternative) would be considered within the scope of this EIA. Marine outfall Option 3 was not deemed feasible, as the pipeline would need to cross a rocky coast, cobble terrace just above the high water mark and exposed granite east of this. The area has a very high sensitivity for both fauna and flora with low rehabilitation potential. The pipeline would traverse highly sensitive Saldanha Granite Strandveld. The marine outfall Option 3 was thus considered as a “no go” option and therefore not further assessed as part of this study.

3 DESCRIPTION OF THE AFFECTED ECONOMIC ENVIRONMENT

The significance of impacts is often highly dependent on the economic environment or context within which they occur. For example, job creation or loss in a small local community with a stagnating economy will be far more significant than it would be in a larger community with a healthy economy. With this in mind, this section describes the economic environment focusing on the local area and region where the majority of impacts are likely to be felt. The main information sources used were Census data, Integrated Development Plans (IDPs), Spatial Development Frameworks (SDFs) and Demarcation Board data.

Given the scale of the project, the economic context includes information on the Western Cape, the West Coast District and the Saldanha Bay Municipal area. It also includes information on the key individual towns or areas within these areas which will potentially be impacted the most, namely: Saldanha Bay, Vredenburg, Jacobsbaai and Diazville.

3.1 Surrounding land uses

From its starting point until it crosses the R399, the pipelines and associated infrastructure would be surrounded mostly by industrial facilities (such as the AcelorMittal Steel Works, Dufreco and Salcor), vacant land earmarked for industrial use and infrastructure. Between the R399 and entrance to Jacobsbaai the dominant land use is agriculture. Thereafter, between Jacobsbaai and the marine outfall, the pipeline route would mostly pass through areas of natural vegetation.

The marine outfall would be located along the coastline between Jacobsbaai and the Diazville area of Saldanha Bay. The surrounding area is mostly characterised by coastal vegetation which has been disturbed in some places by activities such as sand mining. A

gravel road links Jacobsbaai and Diazville and there are a number of 4X4 tracks in the area leading to the coast. The 4x4 tracks are used primarily by fishermen and other recreational users. The character of the area is primarily that of a rugged and largely undeveloped coastline, but with human settlements and activities relatively nearby.

3.2 Demographics

According to the 2011 Census, the total population in the SBM was 99,170 (see Table 1). This is up from roughly 70,261 in 2001 and represents a relatively high annual growth rate of 3.45% over the period. The 2011 population of Saldanha Bay was 28,135 and approximately 16,983 for Diazville. Jacobsbaai had a population of 415 in keeping with its smaller size.

Table 1: Population in the study area (2011)

Population group	Western Cape	West Coast District	Saldanha Bay Municipality	Saldanha	Vredenburg	Jacobs Bay	Diazville
Black African	1,912,470	64,101	24,292	8,404	11,026	2	5,839
Coloured	2,840,214	260,826	55,333	15,279	21,397	14	10,766
Indian or Asian	60,760	2,181	772	391	248	4	203
White	914,918	61,506	17,850	3,811	5,302	395	13
Other	93,964	3,098	923	250	408	0	162
Total	**5,822,326**	**391,712**	**99,170**	**28,135**	**38,381**	**415**	**16,983**

Source: Census 2011

3.3 Employment

As with the rest of the country, unemployment is a major challenge in the area. This situation continues to be exacerbated by the current difficult economic climate characterised by relatively low levels of economic growth. Based on Census 2011, the SBM had an increased unemployment rate of approximately 23.4% compared to 21.5% in 2001 (Table 2). This was higher than the rate for the West Coast District (14.6% unemployment) and somewhat lower compared to Saldanha Bay and Vredenburg (approximately 26% unemployment for both) as well as for Diazville (33% unemployment).

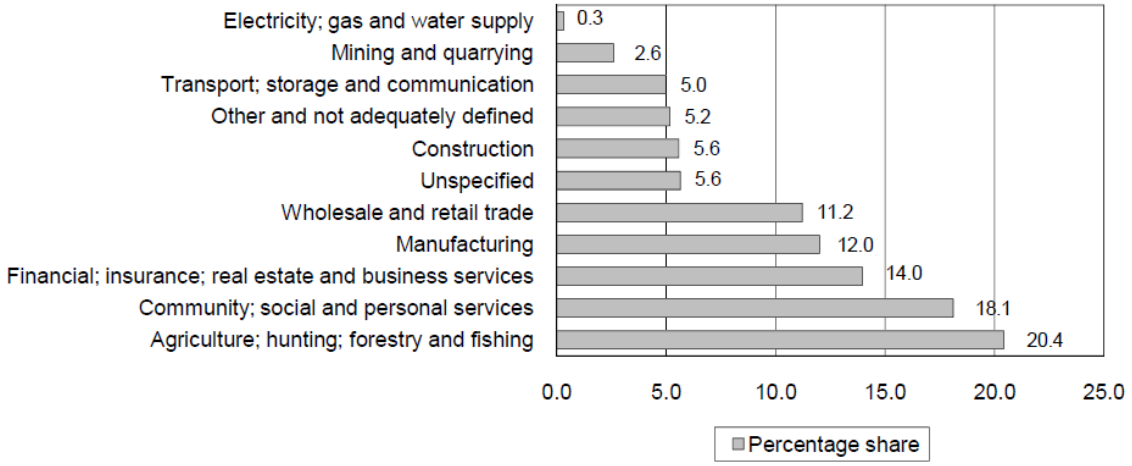
Table 2: Unemployment by area and population group (2011)

Employment status	Western Cape	West Coast District	Saldanha Bay Municipality	Saldanha	Vredenburg	Jacobs Bay	Diazville
Employed	2,010,533	141,097	34,351	8,938	13,303	225	5,033
Unemployed	552,711	24,204	10,470	3,072	4,665	13	2,474
% unemployed	21.6%	14.6%	23.4%	25.6%	26.0%	5.5%	33.0%

Source: Census 2011

The Community Survey 2007 results indicate that the sectoral composition of employment has largely remained the same since 2001 albeit with greater emphasis on services and a decrease in manufacturing (see Figure 5 below (Shown as Figure 3 1 in the PGWC,

2010). Within the manufacturing sector, the food and beverage (46.6%) and the metals (32.5%) sub-sectors contributed the most to employment (Demacon, 2009). This primarily reflects the presence of large companies such as Sea Harvest, AcelorMittal and Dufreco.



Source: Stats SA, Community Survey 2007

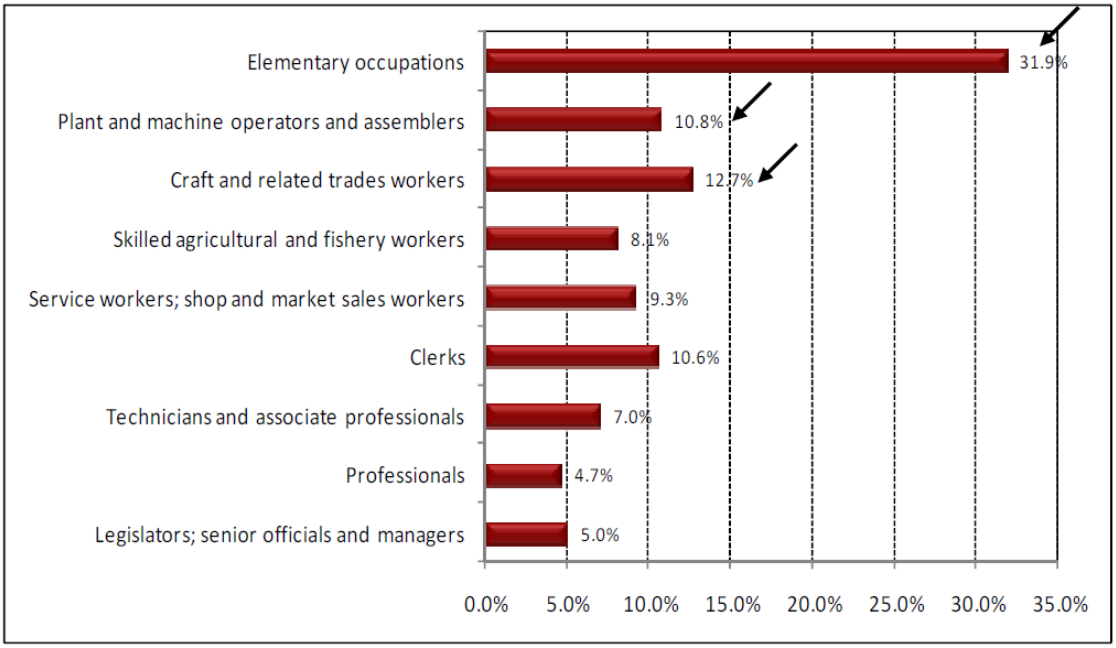
Figure 5: Jobs per sector for Saldanha Bay Municipality in 2007

Unfortunately it is not possible to get an accurate estimate of current jobs in the tourism sector on the basis of Census statistics as they do not have a separate category for tourism. Tourism is however recognised as a key sector in the local area and region, contributing significantly to employment. As a general rule, the tourism sector is reflected primarily in the transport, retail trade, personal services and business services sectors. These sectors have shown robust growth which is probably at least partially attributable to growth in the tourism sector.

Figure 6 illustrates the dominant occupation groups in the Saldanha Bay municipal area:

- Elementary occupations (31.9%),
- Craft and related trades workers (12.7%),
- Plant and machine operators and assemblers (10.8%), Clerks (10.6%) and
- Service workers; shop and market sales workers (9.3%).

This profile reflects a predominant blue collar occupation profile with a high proportion of middle to low income level workers (Demacon, 2009).



Source: Demacon, 2009

Figure 6: Jobs per occupation group for Saldanha Bay Municipality in 2007

3.4 Household incomes

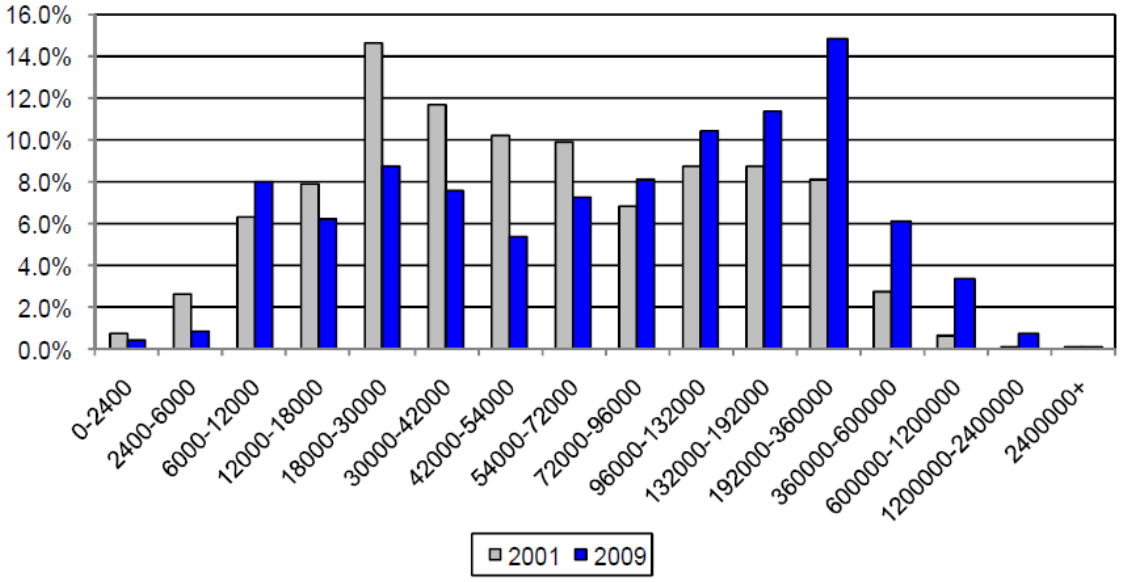
Table 3 reports on household income levels in the study area for 2011. Approximately 30% of households in the West Coast District and 33% of households in Saldanha Bay had incomes below R19 600 per year. Household incomes in Vredenburg were substantially higher with only 9% of households in this income category whilst incomes in Diazville were lower with 39% of households earning below R19 600.

Table 3: Household income by area and population group (2011)

Annual household income level	*Western Cape*	*West Coast District*	*Saldanha Bay Municipality*	*Saldanha*	*Vredenburg*	*Jacobs Bay*	*Diazville*
No income	13.3%	10.7%	13.9%	15.3%	7.7%	13.1%	16.3%
R 1 - R 4800	2.6%	1.9%	2.4%	2.9%	0.6%	2.3%	3.1%
R 4801 - R 9600	3.9%	3.1%	4.0%	4.7%	0.0%	3.8%	5.2%
R 9601 - R 19 600	11.8%	14.0%	10.7%	10.1%	0.0%	11.2%	14.8%
R 19 601 - R 38 200	17.6%	21.6%	17.4%	18.8%	6.0%	18.0%	23.0%
R 38 201 - R 76 400	15.7%	19.3%	16.7%	16.8%	9.5%	17.1%	19.1%
R 76 401 - R 153 800	12.8%	13.2%	15.2%	14.4%	13.1%	15.3%	12.8%
R 153 801 - R 307 600	10.8%	9.4%	11.5%	10.4%	25.6%	11.4%	4.4%
R 307 601 - R 614 400	7.5%	5.0%	6.1%	5.1%	23.2%	5.9%	1.3%
R 614 001 - R 1 228 800	2.9%	1.2%	1.5%	1.0%	10.7%	1.2%	0.1%
R 1 228 801 - R 2 457 600	0.7%	0.4%	0.4%	0.2%	0.6%	0.4%	0.0%
R 2 457 601 or more	0.4%	0.3%	0.3%	0.3%	3.0%	0.2%	0.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Census 2011

Figure 7 compares annual household income levels within Saldanha Bay Municipality for 2001 and 2009. In 2001, 43.8% of all households had annual incomes of between R0 to R42 000 whilst in 2009, 32% fell into this category. In 2001, households with an annual income of R18 000 - R30 000 accounted for the largest concentration (14.6%) of households within an income category. In 2009, households with an annual income of R192 000 - R360 000 accounted for the largest concentration (14.8%) of households within an income category (PGWC, 2010).



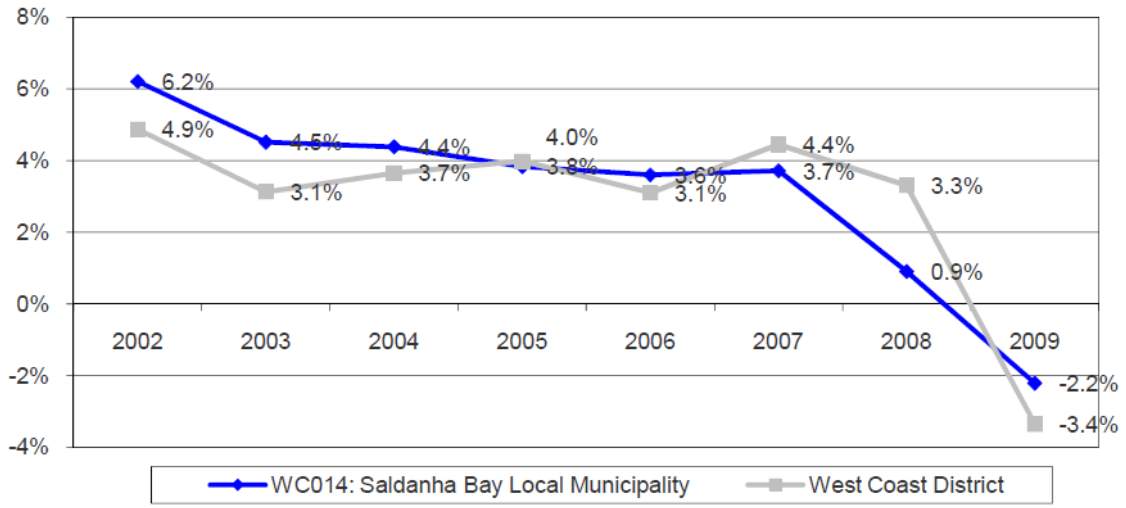
Source: Global Insight

Figure 7: Household income for Saldanha Bay Municipality (2001 and 2009)

3.5 Economic growth and development trends

The Saldanha Bay Municipality's regional gross value added figure (GVA)[2] amounted to R3.326 billion in 2009 accounting for 35.1% of the total value added of the West Coast District of R9.480 billion. Figure 8 presents the economic growth rate of the Saldanha Bay municipal area in comparison to the West Coast District's growth rate for the period 2001 to 2009. It shows that Saldanha Bay's economy grew at an annual average rate of 3.1% over the period 2001 to 2009 compared to the District's annual average growth rate of 2.9%. Growth in individual years was also higher for Saldanha Bay with the exception of 2007 and 2008. In 2008, Saldanha Bay was particularly severely impacted on by the global recession and economic growth lowered to 0.9% (PGWC, 2010).

[2] GVA and GDP are very similarly related concepts. GVA excludes taxation and subsidies, but GDP includes it.



Source: Western Cape Provincial Treasury calculations based on Global Insight

Figure 8: Economic growth in the local area and district between 2001 and 2009

Table 4 from PGWC (2010) shows the sectoral contribution to Saldanha Bay's GVA-R in 2001 and 2009 of nine key sectors in the SBM. The construction sector experienced the highest average annual growth rate over the 2001 to 2009 period at 9.5%. This was followed by finance & business services, catering & accommodation at 7.8% and electricity services at 4.4%. In their pre-feasibility study for the Saldanha Bay Industrial Development Zone (SBIDZ), Demacon (2009) notes that the regional economy and specific local economies have become increasingly diversified over the past two decades. The implication is that consumer demand and favourable local market conditions have created numerous investment opportunities for services sector based activities.

Table 4: Saldanha Bay Municipality Gross Value Added (GVA) trends from 2001 to 2009

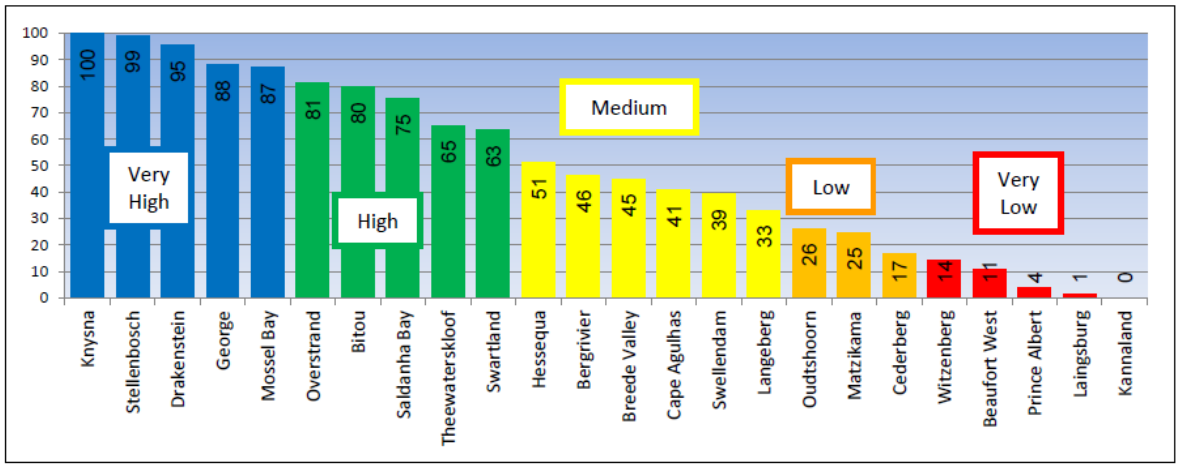
Sector	2001 GVA-R Constant 2005 prices (R million)	2009 GVA-R Constant 2005 prices (R million)	2001-2009 Annual Average Growth Rate
1 Agriculture	248,329	295,271	2.2%
2 Mining	22,510	9,901	-9.8%
3 Manufacturing	832,445	886,895	0.8%
4 Electricity	13,776	19,369	4.4%
5 Construction	113,133	234,178	9.5%
6 Trade	202,832	221,732	1.1%
7 Transport	406,125	462,690	1.6%
8 Finance	353,315	645,886	7.8%
9 Community services	416,009	551,060	3.6%

Source: Western Cape Provincial Treasury calculations based on Global Insight

3.6 Economic development potential

The Saldanha Bay area has long been recoginsed as an area of significant economic opportunity. The Provincial Growth and Development Strategy of 2006 identified the Saldanha- and Mossel Bay areas as the two 'regional motors' in the province (PGWC, 2006). Van der Merwe *et al*. (2005) found Saldanha Bay and Vredenburg to have a very high growth potential in their survey of the growth potential of towns in the Western Cape. This study is in the process of being updated and the draft version also classifies Saldanha Bay as an area with high growth potential (see Table 5). The growth potential of the Saldanha Bay municipal area with its proximity to Cape Town and natural deep water harbour have also resulted in it being recognised as a Presidential Development Growth Node.

Table 5: Growth potential of municipal areas in the Western Cape



Source: DEA&DP, 2013

4 IDENTIFICATION OF ISSUES AND IMPACTS

The following impacts or issues were identified as relevant for assessment based on the guidelines for economic specialist input (van Zyl *et al*., 2005), I&AP inputs and nature of the project and receiving environment:

1. Financial viability and risks;
2. Compatibility with key policy and planning imperatives;
3. Impacts on industrial development opportunities;
4. Impacts on municipal services provision and costs;
5. Impacts on mariculture and fishing;
6. Impacts on tourism and recreation; and
7. Impacts associated with expenditure linked to the construction and operation of the development.

These impacts were rated where appropriate using accepted EIA conventions for determining their significance. An assessment of cumulative impacts, reversibility and irreplaceability is also provided. Note that the majority of the potential negative environmental externalities or costs are captured in the sections dealing with impacts on mariculture and fishing and on tourism and recreation.

5 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

This section provides an assessment of the impacts identified above and suggests management and mitigation actions to avoid or reduce negative impacts or to enhance positive benefits. A summary table of impacts is provided at the end of the section containing all impact ratings.

5.1 Financial viability and risks

Long term positive economic impacts can only flow from a project that is financially sustainable (i.e. financially viable in the long term with enough income to cover costs). With this in mind the viability of the project is considered in this section.

Discussions with the applicant revealed that the financial viability of the project has been considered at length. In their view, the expected rewards of the project outweigh risks, making it financially viable to make the necessary investment (D. Janse van Rensburg, Frontier Utilities, pers com). Essentially the project is seen as a pre-requisite for the Frontier Rare Earths Separation Plant (or SSP) to be able to proceed as planned. It is therefore somewhat artificial to view the SRMO and the SSP as separate projects from a financial viability point of view as the one is required in order to make the other a reality. Although Frontier Utilities will be the primary risk taker in the project, they are actively engaging with other partners who have expressed an interest in using and sharing the costs of the facility. These include CAH who are proposing a CAPF and SBM who recognised the likely potential for the outfall to service the proposed regional WWTW. The overall financial risk would be spread further if these partners and potentially others are willing to share the costs and financial risks associated with the project.

Financial viability is never a certainty and market conditions can change. As a rule, applicants can only assess expected risks and use these to make an informed decision. The available information gives no reason to anticipate financial failure that would argue against the project. In essence, there are more factors that support financial viability than there are indications that the project would not be viable.

5.2 Compatibility with key policy and planning guidance

The proposed project's key strategic objectives can be summarised as providing additional effluent and sewage disposal capacity for industrial and municipal purposes. With this in mind, this section outlines the project's fit or compatibility with key policy and planning guidance including industrial policy, infrastructure planning, local economic development and spatial development planning objectives.

5.2.1 Industrial policy

The Department of Trade and Industry (dti) is responsible for leading industrial policy in South Africa and strives for alignment with the National Development Plan and The New Growth Path. In this regard, the Industrial Policy Action Plan (IPAP), first published by the dti in 2008 and updated annually since then, plays a central role in setting the direction for industrial policy. The IPAP identifies a number of sectors and types of projects that show promise in terms of their potential to deliver economic growth and job creation. The majority of these involve increased local value addition in some form particularly within the manufacturing sector. Downstream minerals beneficiation and value addition has been

identified as an area with promise and has become a key focus of dti efforts. In addition, the Department of Mineral Resources (DMR) has also increasingly focused on the need to add value to raw materials mined within South Africa.

Aside from the IPAP, the Special Economic Zones (SEZs) programme is also one of the key pillars of industrial policy. This programme was developed to promote the creation of a regionally diversified industrial economy by establishing new industrial hubs in underdeveloped regions of the country. The overall aim is to establish SEZs that can achieve the following:

- Increased foreign and domestic investment;
- Increased beneficiation of mineral and agricultural resources;
- Increased export of beneficiated products;
- World-class infrastructure;
- Increased employment opportunities; and
- Regional industrial development.

The wider SEZs programme includes the establishment of Industrial Development Zones (IDZs) including the SBIDZ. After a period of planning and feasibility testing, this IDZ was given the go-ahead in 2012. In 2013 the IDZ Licencing Company Pty (LiCO) was established adding further impetus to the Zone which has earmarked the following sectors as focus areas (WESGRO, 2011):

- Renewable energy production and manufacturing cluster;
- Oil supply base/hub servicing the oil and gas industry;
- Maritime ship-building and repair cluster; and the
- Steel and minerals production and manufacturing cluster.

Industrial policy, primarily through the vehicle of the IDZ, is thus focused on encouraging greater industrial activity and local value addition in Saldanha Bay. This can include plants such as the Frontier Rare Earths Separation Plant and the CAPF. It also implies support for the provision of the necessary infrastructure to facilitate such industrial activity.

5.2.2 Infrastructure development and planning

At a national level, South Africa has adopted an infrastructure development plan that is intended to transform the economic landscape of South Africa. It intends to create a significant number of new employment opportunities, strengthen the delivery of basic services and support the integration of African communities. The Presidential Infrastructure Coordinating Commission (PICC) was established in order to coordinate and support this plan. Key outputs of the PICC have focused on assessing infrastructure gaps and identifying and formulating 18 Strategic Integrated Projects (SIPs) to support economic development and address service delivery. SIP 5 focuses on the 'Saldanha-Northern Cape Development Corridor' and has the following key elements (PICC, 2012):

- Integrated rail and port expansion;
- Back-of-port industrial capacity (including an IDZ);
- Strengthening maritime support capacity for oil and gas along African West Coast; and
- Expansion of iron ore mining production and beneficiation.

SIP infrastructure planning remains relatively broad and does not specifically mention the need for effluent disposal facilities in Saldanha Bay. However, as mentioned, encouraging industrial development in the SBIDZ implies the need for adequate supporting infrastructure of this nature.

5.2.3 Local economic development and spatial planning

Economic development imperatives inform spatial planning imperatives. A critical aspect of economic desirability is thus whether the proposed development complements economic planning as reflected in spatial development planning. Spatial Development Frameworks in particular are central to economic development planning and are drawn up in order to guide overall development in a direction that local and provincial authorities see as desirable. Indeed, the basic purpose of an SDF is to specify the spatial implications of IDPs designed to optimise economic opportunities.

The proposed development thus ideally needs to be broadly compatible with what is envisaged in SDFs, structure plans and other planning documents in order for it to clearly 'fit' with the optimal distributions of economic activity as envisaged in these plans. Or, if the development does not fit inwith existing planning, there need to be compelling reasons why a deviation should be considered.

The following provincial and regional planning documents were found to be of relevance and were reviewed:

- WCDM Draft IDP (2012 – 2016) (WCDM, 2012).
- SBM IDP 2012 to 2017, Revision 2 (SBM, 2014).
- SBM SDF (SBM, 2011).

In terms of forward planning, the IDP of the SBM outlines the following strategic objectives (SBM, 2014):

1. To diversify the economic base of the municipality through industrialization, whilst at the same time nurturing traditional economic sectors.
2. To develop an integrated transport system to facilitate the seamless movement of goods and people within the municipal area and linkages with the rest of the district and the City of Cape Town.
3. To develop safe, integrated and sustainable neighbourhoods.
4. To maintain and expand basic infrastructure as a catalyst for economic development.
5. To be an innovative municipality on the cutting edge in respect of the use of technology and best practice.
6. An effective, efficient and sustainable developmental oriented municipal administration.
7. To develop and use a multi-platform communication system to ensure swift and accurate dissemination of information.
8. To provide ethical and effective leadership that engenders trust in the municipality amongst its stakeholders.
9. To ensure compliance with the tenets of good governance as prescribed by legislation and best practice.

Considered as a whole these documents recognise the importance of the availability of adequate infrastructure in order to facilitate economic development as mentioned above.

They also recognise the importance of protecting the sensitive environment in the area and nurturing traditional economic sectors such as mariculture and fishing.

With regard to specific spatial imperatives affecting the project, the SDF of the SBM is most relevant. The start of the SRMO pipeline would be within the IDZ at the proposed SSP. Its industrial nature would thus be in keeping with the industrial surroundings. It should be noted that at the start of the pipeline route near the SSP, servitude negotiation is likely to be necessary with selected land owners regardless of the pipeline routing choice. The pipeline would then largely use the servitude for the proposed WCDM desalination plant pipeline from the IDZ to the marine outfall point at Danger Bay. It is the intention that both of these projects would essentially use the same routing and associated servitude as well as the same outfall point. This should ensure that infrastructure is grouped and confined to specific and appropriate areas outside of the IDZ.

For pipeline routing alternatives near Jacobsbaai, the Western Corridor would be slightly preferable to the Eastern Corridor as it would ensure that additional pipeline infrastructure would be confined to the areas near existing linear infrastructure (primarily the Main Road and electrical transmission lines).

5.2.4 Discussion

Based on the findings above, it can be concluded that the SRMO is largely compatible with relevant industrial policy, infrastructure development, economic development and associated spatial planning for the area provided environmental impacts can be kept to an acceptable minimum. The need for the project is clear as it will be facilitating industrial development of specific projects planned for the IDZ. It will also provide municipal wastewater infrastructure particularly over the medium to long term. These two aspects are assessed further in the sections to follow.

5.3 Impacts on industrial development opportunities

The proposed SRMO Project would be a pre-requisite for the development of the SSP as the latter would only be technically feasible if process effluent can be legally disposed of. The benefits associated with the SSP can therefore be viewed as indirect or facilitated benefits of the SRMO Project. Indeed, it is more sensible to consider them effectively as one project from an economic impact perspective.

The SPP is currently the subject of a separate EIA process which includes a Draft Economic Impact Assessment. This report provides an indication of the benefits of the SSP including the following (UrbanEcon, 2014):

- The construction of the SPP over eight years would entail a total investment of approximately R5.8 billion creating 15,034 person years on employment throughout the country;
- Total annual operational expenditure on the SSP would be approximately R1 billion and 182 permanent employment opportunities would be created during operations; and
- It is expected to increase the size of the provincial economy by about 0.42%, stimulating growth in the Saldanha Bay manufacturing sector in line with the government objectives for the area and IDZ in particular.

In addition to the SSP, the CAPF would also require effluent disposal. The SMRO Project would be the preferred disposal option in this regard. The SRMO Project is thus likely to

play a key role in unlocking the benefits associated with the CAPF which is also undergoing an EIA process. Economic benefits associated with facility would include:

- A construction phase capital injection of between R1.5 million and R2 billion;
- Approximately130 permanent jobs once the facility is fully operational; and
- The local provision of chemicals such as Cl, caustic soda and HCl hereby reducing transport costs for other industries.

5.3.1 Overall impacts and impact significance

Given the above, impacts in terms of facilitating industrial opportunities would be highly significant during operations for all pipeline and outfall alternatives (see summary table of impacts in Section 5.8 for details).

The no-go alternative would result in the industrial opportunities outlined above being foregone.

Mitigation:

No mitigation measures would be needed beyond approval of the project.

5.4 Impacts on municipal service provision and associated costs

From a municipal service provision perspective, the SRMO Project would facilitate wastewater service provision by the SBM. Frontier Utilities would take the primary financial risks associated with the construction of the project to the ultimate benefit of the SBM. The option of using the facility will then be open to the SBM once the mooted new WWTW proceeds. The project would also allow for the sharing of its overall costs between all proposed users (i.e. the SSP, CAPF, WWTW and other potential users) thereby representing a cost saving relative to each user providing their own facility. This would support efforts by the SBM to keep future wastewater services provision costs (and therefore service charges to users) as low as possible. In addition, cost savings should result from the use of the same servitudes and outfall points as those proposed for the WCDM desalination plant. Over the medium to long term, it is also the intention of the applicant to facilitate the transfer of the facility to a steering committee consisting of all participants and potentially the SBM and /or the WCDM. Overall, the project represents an opportunity to achieve the co-ordinated provision of infrastructure and services within in a public-private partnership framework that allows for risk and costs sharing.

As discussed further in Section 5.7 the applicant has generated preliminary estimates of the financial costs associated with the construction of the proposed SRMO Project and associated infrastructure. These indicate overall project costs of R113 million regardless of the selected pipeline route provided the majority of the pipeline uses the servitude of the pipeline of the planned WCDM desalination plant. The operational costs for the project would also be approximately equivalent regardless of pipeline route selected.

5.4.1 Overall impacts and impact significance

Given the above, impacts in terms of facilitating municipal services provision would be of medium significance during operations for all pipeline and outfall alternatives (see summary table of impacts in Section 5.8 for details).

The no-go alternative would result in no facilitation of municipal infrastructure and an increased likelihood that wastewater services provision would entail greater costs relative to the project going ahead as planned.

Mitigation:

No mitigation measures would be needed beyond approval of the project.

5.5 Impacts on mariculture and fishing

The fishing and mariculture industries play a pivotal role in the economy of Saldanha Bay. Fishing is also a popular recreational activity in the area making it important to consider risks and impacts in this regard.

There are no mariculture operations in Danger Bay. Jacobsbaai Sea Products (JSP) is the only mariculture operation relatively nearby - approximately 6.5 km along the shoreline to the north of Danger Bay. JSP has registered as an I&AP for the EIA and has expressed concern regarding potential impacts on their operations. They operate a facility which was established in 1992 and represent an investment of between R25 million and R30 million in plant and equipment. Current annual production volumes are approximately 70 tonnes of abalone. This is practically all exported to the East. JSP has a staff complement of 52 people and its annual operational expenditure is between R12 million and R13 million. This includes direct salary payments as well as payments to suppliers and subcontractors such as those providing security, maintenance, transportation, feed suppliers (i.e. mostly seaweed) etc. Growth in the business has been relatively robust since inception. Increased demand along with the potential opportunity it would bring for expanding operations is being monitored by management (J. Venter, JSP, pers com).

Apart from mariculture operations in Jacobsbaai, the coastline and sea near the proposed marine outfall are used for fishing. Recreational and small-scale commercial line and rock-lobster fishing occurs in Danger Bay and on the rocky shoreline adjacent to the Bay (see the Marine Ecological Specialist study, Pisces, 2014 for more details; Appendix A in Volume II of this report).

Risks to mariculture and fishing would stem from impacts on the marine environment. These risks have been assessed in the marine ecology specialist study which focussed on the impacts associated with effluent disposal (Pisces, 2014). The summary figures contained in Appendix 3 of this study show the maximum extent of the brine and thermal plumes (exceeding water quality guidelines), and achievable dilutions <100-times of potential co-discharges, respectively, at the two alternative discharge sites under the 'worst-case-scenario' conditions. These are shown in relation to areas of potentially threatened or sensitive habitats (e.g. intertidal and subtidal reefs).

The figures indicate that regardless of the outfall location, the plume footprints will periodically overlap with recreational and commercial rock-lobster and line fisheries within Danger Bay to varying degrees. In the majority of cases the extent of the area of overlap would be relatively small at less than 0.35 km^2. In those cases where it would be larger, such as in the case of combined discharges from the SSP, CAPF, WWTW and the WCDM Desalination Plant, it is noted that a worst case scenario is being shown which will only occur for very short periods under very calm weather conditions (see further discussion in Pisces, 2014). This would also be the only case in which there is potential overlap of

plume footprints with a small section of subtidal reef within the bay. Under no scenarios are plumes predicted to extend beyond the entrance to Danger Bay which implies no risks to fishing outside the Bay or mariculture further up the coast in Jacobsbaai.

At an overall level the marine ecology specialist study found that all impacts could be mitigated relatively successfully. All potential impacts were rated as having a low significance level with mitigation (Pisces, 2014).

5.5.1 Overall impacts and impact significance

Based on the findings of the marine ecology specialist study, overall impacts on mariculture and fishing are expected to be **low with mitigation** for all outfall alternatives (see summary table of impacts in Section 5.8 for details).

The no-go alternative would result in zero risks to mariculture and fishing.

Mitigation:

Mitigation measures are detailed in the marine ecology specialist study (Pisces, 2014).

5.6 Impacts on tourism and recreation

As was outlined in the overall economic context section, tourism plays an important role in the economy of the wider Saldanha Bay area and has the potential to play an increasingly prominent role as a driver of economic development. It is thus important to consider the potential impacts of the proposed development on this sector.

In order to assess tourism impacts, information on current tourism and recreational use and potential future use focusing on the wider area surrounding the site was gathered. Pertinent information from other specialist studies was examined and an assessment of impacts made. Visual impact along with impacts on water quality and the marine environment would be the key drivers of tourism impacts. Although somewhat less important, given their location and extent, losses of conservation worth land are also relevant.

5.6.1 The tourism and recreation context

The SDF of the SBM provides extensive information regarding the nature and importance of tourism in the area (SBM, 2011). With regard to tourist attractions, it notes that these are all primarily orientated towards the environmental assets in the municipal area: seasonal wild flowers, the Berg River, sea, whales, mountains, protected fauna and flora species, proximity to the West Coast Nature Reserve, fossil sites, fossil museum etc. There are also a number of historical monuments and cultural features in the study area, which offer additional attractions. Appendix 4 contains a map of key tourist attractions mentioned in the SDF in the Saldanha and Jacobsbaai area.

On the whole the tourism offering and market for the areas within the municipality which are closest to the proposed project sites (i.e. Saldanha Bay town, Jacobsbaai and Danger Bay area) are fairly distinct. Saldanha Bay offers a variety of activities in a bustling working town with man-made and natural attractions that rely on leisure as well as a large portion of business tourism. Its attractions and character are summarised in the following extracts from the Saldanha Bay Tourism Organisation website:

> *"While Saldanha is a busy working town, holiday makers come to relax and unwind, enjoy fresh seafood at the various seafood restaurants at the water's edge, and to soak up the surrounding natural scenery...*
>
> *The town also hosts a naval training base and the South African Military Academy, while the popular SAS Saldanha Nature Reserve is a floral wonderland of spring flowers with a marine backdrop. Southern right whales also visit the safe waters near the nature reserve. Hoedjieskoppie Nature Reserve on a hill in the middle of town boasts beautiful views and traditional fishermen's cottages...*
>
> *Sailing, fishing, hiking and biking surrounded by spring daisies are all Saldanha specialties. So is relaxing or exploring the quaint town with views all the way to Cape Town. Bring along binoculars to scan the horizon and harbour down below..."*

Jacobsbaai is focused on peace and quiet in a relatively unspoilt and natural coastal setting as is summarised in the following extracts from the Saldanha Bay Tourism Organisation website:

> *"Locals call Jacobsbaai 'Namaqualand by the sea' for its spring wildflower tapestry that follows the coastline. Sun, sea, sand and stars are all plentiful in Jacobsbaai, which attracts those seeking solace, peace and calm. There's just one restaurant, one tiny café and the roads are still gravel in the hamlet... If it's peace, beauty and natural attractions you seek, that's what Jacobsbaai is built on."*

Danger Bay is used for recreational fishing as mentioned previously in addition to swimming, other water-based activities such as surfing and kajaking as well as walking. Roughly in the middle of the Bay there is a small resort with accommodation and a parking area at the end of Diaz Road from where there is easy access to the beach. This access is within easy walking distance of Diazville. To the south of this parking area lies the SAS Saldanha Nature Reserve which essentially takes up the southern half of Danger Bay.

5.6.2 Visual impacts

The visual specialist study recognises that the landscape into which the pump stations and pipelines near Jacobsbaai and Danger Bay will be introduced is separated from the industrial and urban landscape of Saldanha Bay by a ridge of hills. Very few industrial elements are visible in this landscape. Sand mining close to the proposed outfall site has affected the landscape by clearing an area of vegetation and dunes (about 9 ha), but other than this and a small shed there are few other man-made structures. The landscape character type is seen as highly sensitive to development (Holland, 2014).

With regard to mitigation factors, the visual specialist study points out that the dunes are quite high near the Danger Bay outfall site implying that careful placing of structures, as well as appropriate colour schemes, can lower visibility (Holland, 2014). The topography would largely shield the views of motorists including tourists driving on the road between Jacobsbaai and Diazville.

With regard to power lines at a height of 12 m, the visual specialist study finds generally high impacts for all Corridor Options on receptors in the area that are sensitive to industrial installations. Those with particular relevance to tourism include Jacobsbaai residents, users of Swartriet Nature Reserve, users of SAS Saldanha Contractual Nature Reserve and surroundings. Overall the visual specialist slightly favours the use of the Jacobsbaai Western Corridor over the Jacobsbaai Eastern Corridor. The main reason for favouring the

Jacobsbaai Western Corridor is that it would run along an existing road and power line servitude in Jacobsbaai (Holland, 2014). However, if the power lines can be buried (which is noted as a possibility in the project description particularly depending on the width of the pipeline servitude), impacts would fall away.

5.6.3 Water quality impacts

The impacts of changes in marine water quality on fishing including recreational fishing have been assessed in Section 5.5. Impacts could, however, also have implications for other marine tourist and recreation activities such as swimming. Based on the findings of the marine ecology specialist study, however, risk in this regard are considered low. The overall impact on the marine environment has been given a **low impact significance** rating with mitigation as discussed in Section 5.5. In addition, the worst case scenario predicted for brine and thermal plumes by the marine ecology specialist study (shown in Appendix 3) would not reach the beach and near shore areas which are the focus of marine recreational use.

5.6.4 Loss of conservation worthy land

Any significant loss of conservation worthy land has potential implications for tourism. This is because conservation worthy lands and their associated sense of place often appeal to tourists and are becoming increasingly scarce. The key findings of the botanical specialist study (Helme, 2014) with relevance in this regard were that:

- Pump Stations A, B, C and D (and their proposed access roads) have negligible botanical impact and require no specific mitigation.
- Pump Station E is likely to have a Medium negative botanical impact, before and after mitigation.
- Both proposed pipeline routes would have some negative botanical impacts which cannot be avoided or mitigated. Without mitigation the blue route (i.e. Jacobsbaai Western Corridor; see Figures 1 and 3)) would have a High negative botanical impact, which could be reduced to Medium negative with mitigation. The required mitigation includes rerouting a portion of the route (from pump station C to D).
- The purple route (i.e. Jacobsbaai Eastern Corridor, see Figures 1 and 3) would have a Medium negative botanical impact, both before and after mitigation.
- Thus if rerouting of a portion of the blue route is undertaken, and all mitigation is put in place then there is no strongly preferred routing alternative from a botanical perspective.

Some losses of conservation worthy land would thus be unavoidable. This impact would, however, be reduced through the sharing of servitude areas earmarked for the proposed desalination plant and by rehabilitation of lands once pipelines are laid. Note also that the footprint of the pump stations would not be extensive.

5.6.5 Overall impacts and impact significance

Based on a consideration of the factors discussed above, impacts on tourism should be **low to medium with mitigation** for all pipeline and outfall alternatives (see summary table of impacts in Section 5.8 for details). Note however that for the pipeline alternatives, the Jacobsbaai Western Corridor along the existing road is slightly preferred given its lower visual impacts associated with its positioning along an existing road and power line servitude in Jacobsbaai.

The no-go alternative would have no impact relative to the status quo with regard to tourism.

If handled with care, decommissioning would essentially result in the removal of project infrastructure which would reverse any risks to tourism.

Some disturbance and nuisance would be experienced during construction. This would include the potential for increased dust, noise and ecological impacts. Impacts should, however, be temporary and acceptable provided the construction phase is well managed and the mitigation measures suggested by the other specialist studies forming part of the EIA are implemented with a particular focus on minimising footprints and rehabilitation.

Mitigation:

Impacts on tourism are primarily dependent on how the project is designed, constructed and operated to minimise negative biophysical impacts and enhance positive ones. The measures recommended in other specialist studies to minimise negative impacts (primarily visual, marine ecology and botanical) and enhance positive impacts would thus also reduce impacts on tourism and should be implemented. These measures are not repeated here. Note that the burying of power cables would reduce visual impacts significantly and should be implemented unless there are justifiable constraints in this regard.

5.7 Impacts linked to construction and operational expenditure

The construction and operational phase of the project would both result in spending injections that would lead to increased economic activity best measured in terms of impacts on employment and associated incomes focusing on the local area and region.

All expenditures will be linked to direct, indirect and induced impacts on employment and incomes. Taking employment as an example, impacts would be direct where people are employed directly on the project in question (e.g. jobs such as construction workers), indirect - where the direct expenditure associated with a project leads to jobs and incomes in other sectors (e.g. purchasing building materials maintains jobs in that sector) and induced where jobs are created due to the expenditure of employees and other consumers that gained from the project. Direct impacts are the most important of these three categories as they are the largest and more likely to be felt in the local area. Their estimation also involves the lowest level of uncertainty. The quantification of indirect and induced impacts is a far less certain exercise due to uncertainty surrounding accurate multipliers particularly at a local and regional level. This uncertainty makes it inadvisable to quantify indirect employment unless an in-depth analysis of this aspect is absolutely essential to decision making. Potential direct employment and income impacts are consequently quantified here and likely indirect impacts are borne in mind qualitatively when providing overall impact ratings.

5.7.1 Construction phase impacts

5.7.1.1 Project construction expenditure/investment

Construction expenditure would constitute a positive injection of new investment. Preliminary estimates indicate that a total of approximately R113 million would be spent on all aspects of construction over 12 to 18 months (see Table 6 below).

Table 6: Construction phase expenditure

Construction component	Total cost of construction in 2014 Rands
Pipelines and pump stations	R 61,500,250
Marine pipeline & outfall	R 32,000,000
Mechanical equipment	R 14,880,417
Electrical connections	R 4,736,837
Total	**R 113,117,504**

Given its size and the expenditure associated with it, the project has the potential to have a significant positive impact on commercial activity in the local area during construction. It is likely that between R60 million and R80 million would accrue to contractors within the Saldanha Bay municipal area with the remainder going to other Western Cape contractors.

During the construction phase the building construction, civil and other construction and specialist industrial machinery sectors would benefit substantially. The structural metal products, wholesale and retail trade and construction materials sectors would also stand to gain due to indirect linkages. The project would provide a major injection for contractors and workers in the area that would in all likelihood purchase goods and services in the Saldanha Bay and wider West Coast region leading to positive indirect impacts.

5.7.1.2 Employment during construction

In order to estimate direct temporary employment during construction, standard construction industry estimates for labour required per spend were used. Bear in mind that the estimates are not to be regarded as highly accurate and are meant to give an indication of potential employment impacts.

Table 7 outlines the total number of employment opportunities associated with the construction phase of the project. Approximately 164 temporary construction jobs with a duration of 12 to 18 months are expected. The majority of these would be medium and low skilled positions in keeping with the nature of the construction required.

Table 7: Estimated direct temporary employment during construction in person years

Construction component	Number of workers				Duration of employment for construction components
	Low skill	Medium skill	High skill	Total	
Pipelines and pump stations	45	15	1	61	12 - 18 months
Marine pipeline & outfall	44	18	1	63	12 - 18 months
Mechanical equipment	18	8	1	27	12 - 18 months
Electrical connections	10	2	1	13	12 - 18 months
Total	**117**	**43**	**4**	**164**	

Based on the likely availability of labour, training possibilities and experiences in the area, approximately 108 construction jobs should be allocated to residents of Saldanha Bay with the bulk of the remainder going to Western Cape residents (see Table 8 below). Note that these estimates are based largely on a fairly broad assessment of the availability of labour in these areas and it is the applicant's intention to use a greater proportion of labour from Saldanha Bay where possible.

Table 8: Likely spread of construction jobs per area

	Low skill	Medium skill	High skill	Total
Anticipated % of workers from the Saldanha Bay Municipality area	60%	80%	95%	
Corresponding number of workers	70	34	4	**108**
Anticipated % of workers from the rest of the Western Cape	30%	15%	5%	
Corresponding number of workers	35	6	0	**42**
Anticipated % of workers from the rest of South Africa	10%	5%	0%	
Corresponding number of workers	12	2	-	**14**
Total	**117**	**43**	**4**	**164**

5.7.1.3 Incomes from wages during construction

Direct household income impacts would flow from all wages paid during construction. These were estimated by multiplying the projected number of direct jobs associated with the project above by assumed average monthly salaries for each skill category. Again, these estimates are to be treated as indicative. The results of this exercise are shown in Table 9 below. It shows that total incomes of R20 million would be associated with the construction phase.

Table 9: Direct household income impacts during construction

Construciton component	Labour Cost Per Category			
	Low skill	Medium skill	High skill	Total
Pipelines and pump stations	R 3,780,000	R 3,300,000	R 360,000	R 7,440,000
Marine pipeline & outfall	R 3,696,000	R 3,960,000	R 360,000	R 8,016,000
Mechanical equipment	R 1,512,000	R 1,760,000	R 360,000	R 3,632,000
Electrical connections	R 840,000	R 440,000	R 360,000	R 1,640,000
Total	**R 9,828,000**	**R 9,460,000**	**R 1,440,000**	**R 20,728,000**

5.7.1.4 Indirect opportunities during construction

In addition to the above direct employment and associated income opportunities, a significant number of temporary indirect opportunities would be associated with the project. These would stem primarily from expenditure by Frontier Utilities in the local area and region as well as expenditure by workers hired for the construction phase.

5.7.2 Operational phase impacts excluding displacement

5.7.2.1 Project expenditure/investment during operations

The key operational phase impacts associated with the project would flow from expenditure on operations at the plant. Operational costs were estimated at approximately R2.6 million per year - the majority of which would be spent in the Saldanha Bay area (Table 10).

Table 10: Estimated operational expenditure

Operational cost categories	Annual costs once plant is fully operational in 2014 Rands	Likely % of expenditure that would go to suppliers within the Saldanha Bay Municipality	Likely expenditure that would go to suppliers within the Saldanha Bay Municipality
Operations Labour	R 750,000	85%	R 637,500
Maintenance Labour	R 300,000	95%	R 285,000
Energy / Electrical	R 756,397	80%	R 605,117
Maintenance Material	R 557,702	80%	R 446,162
Transport	R 250,000	100%	R 250,000
Total costs once fully operational	**R 2,614,099**		**R 2,223,779**

5.7.2.2 Employment during operations

Table 11 outlines the employment opportunities during the operational phase that would be associated with the project. Approximately eight jobs would be created resulting in a total local operational labour salary bill of approximately R1.2 million per year.

Table 11: Operational employment

Job category	Anticipated number of employees	Annual estimated salary in 2014 terms
Operations manager	1	R 170,000
Operators	5	R 145,000
Maintenance workers	2	R 150,000
Total	**8**	

5.7.2.3 Indirect opportunities during operations

In addition to the above direct employment and associated income opportunities, indirect opportunities would be associated with the operational phase of the project. These would stem primarily from increased expenditure by Frontier Utilities and its employees in the local area and region.

5.7.3 Overall impacts and impact significance

Impacts with mitigation would be of a medium magnitude during construction at a regional level given the size of the expenditure injection and the number of potential employment and income generation opportunities involved (see summary table of impacts in Section 5.8 for details). New positive impacts during operations would be less significant given relatively limited employment opportunities and have been given a low significance rating with mitigation for all pipeline and outfall alternatives.

Decommissioning would essentially result in no more operational expenditure or jobs associated with the project which would result in negative impacts of a low significance as the project is withdrawn from the economy.

The no-go alternative would result in no construction and operational phase impacts as outlined above.

Mitigation:

Mitigation in the form of benefit enhancement should focus on three areas:

1. *Targets should preferably be set for how much local labour should be used based on the needs of the applicant and the availability of existing skills and people that are willing to undergo training. Opportunities for the training of unskilled and skilled workers from local communities should be maximized.*
2. *Local sub-contractors should be used where possible and contractors from outside the local area that tender for work should also be required to meet targets for how many locals are given employment.*
3. *The applicant should explore ways to enhance local community benefits with a focus on mechanisms such as community projects.*

5.8 Summary of impacts

The table below provides a summary of all impacts for the project.

Table 12: Summary table of impacts

Nature of impact	Status (Negative or Positive)	Extent	Duration	Intensity	Probability	Reversibility	Irreplaceability	Significance (no mitigation)	Mitigation / Management Actions	Significance (with mitigation)	Confidence level
Construction Phase											
Impacts on mariculture and fishing	**Negative**	**Local**	**Short term**, i.e. 2 years	**Low**, since construction activity would be relatively localised	**Highly probable**, since construction will entail significant activity on site	**High,** mariculture and fishing would return to normal if construction stopped	**Medium,** given importance and value of mariculture and fishing near the site to the local economy	**Medium**, given potential risks without mitigation	The measures recommended in the marine ecology specialist study would minimise impacts.	**Low,** considering potential for mitigation	**Medium**
Impacts on tourism and recreation	**Negative**	**Local**	**Short term**, i.e. 2 years	**Low to medium**, since construction activity would be disruptive but relatively localised	**Highly probable**, since construction will entail significant activity on site	**High,** tourism potential would return to normal if construction stopped provided the site is adequately rehabilitated	**Medium,** given future potential and value of tourism and recreational assets around the site	**Low to medium**, since recreational and tourist activities may be disrupted and negative visual impacts would be introduced	The measures recommended in the visual, botanical and marine specialist studies would minimise impacts.	**Low,** considering potential for mitigation	**Medium to high**
Impacts associated with project investment / expenditure	**Positive**	**Local and regional**	**Short term**, i.e. 2 years	**Medium,** since construction expenditure would be a significant injection	**Highly probable**, since construction will entail significant activity on site and investment	**Moderate**, even if expenditure flows fall away, income can be invested and converted to other forms of capital to provide ongoing benefits	**Low,** as project expenditure can be replaced by expenditure on other projects	**Low to Medium,** given significance of injection relative to economy	Set targets for use of local labour and maximise opportunities for the training of unskilled and skilled workers. Use local sub-contractors where possible	**Medium,** given potential for mitigation to enhance benefits	**High**

Nature of impact	Status (Negative or positive)	Extent	Duration	Intensity	Probability	Reversibility	Irreplaceability	Significance (no mitigation)	Mitigation / Management Actions	Significance (with mitigation)	Confidence level
Operational Phase											
Impacts on industrial development opportunities	**Positive**	**Local and regional**	**Long term**	**High,** given magnitude of opportunities	**Highly probable**, since operations would continue for at least 25 years	**High** as gains would be reversed if the facility is closed	**High**, given limited availability of other opportunities	**High,** given economic significance of opportunities	No mitigation possible beyond approval of the project	**High,** given economic significance of opportunities	**High**
Impacts on municipal services provision	**Positive**	**Local**	**Long term**	**Medium,** given magnitude of opportunities	**Highly probable**, since operations would continue for at least 25 years	**High** as gains would be reversed if the facility is closed	**Medium,** , given limited availability of other wastewater disposal options	**Medium,** given potential to facilitate lower cost services provision	No mitigation possible beyond approval of the project	**Medium,** given potential to facilitate lower cost services provision	**High**
Impacts on mariculture and fishing	**Negative**	**Local**	**Long term**	**Medium to high,** given sensitivity of marine environment	**Highly probable**, since operations would continue for at least 25 years	**High,** mariculture and fishing would return to normal if operations stopped	**Medium,** given importance and value of mariculture and fishing near the site to the local economy	**Medium to high,** considering risk levels	The measures recommended in the marine ecology specialist study would minimise impacts.	**Low,** considering potential for mitigation and residual risk	**Medium**
Impacts on tourism and recreation	**Negative**	**Local**	**Long term**	**Medium,** given sensitivity and tourism and recreational use	**Highly probable**, since operations would continue for at least 25 years	**High,** tourism potential would return to normal if operations stopped provided the site is adequately rehabilitated	**Medium to high,** given future potential and value of tourism assets around the site	**Medium,** considering risk levels	The measures recommended in the visual, botanical and marine ecology specialist studies would minimise impacts.	**Low to Medium,** considering potential for mitigation	**Medium to high**
Impacts associated with project investment / expenditure	**Positive**	**Local**	**Long term**	**Low,** in keeping with modest operational expenditure levels and employment	**Highly probable**, since expenditure on operations would continue for at least 25 years	**Moderate**, even if expenditure flows fall away, income can be invested and converted to other forms of capital to provide ongoing benefits	**Low,** as project expenditure can be replaced by expenditure on other projects	**Low,** given significance of injection relative to economy	Set targets for use of local labour and maximise opportunities for the training of unskilled and skilled workers. Use local sub-contractors where possible.	**Low,** given potential for mitigation to enhance benefits	**High**

6 CUMULATIVE IMPACTS

Cumulative impacts are defined as the impact on the environment, which result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (CEQ, 1997).

Impact assessment including significance ratings in previous sections has encompassed all impacts including those of a cumulative nature providing comment specifically on their cumulative nature where relevant. This section provides further consolidated discussion of these impacts in order to provide greater clarity. Bear in mind also that the distinction between cumulative and other impacts is often difficult to make. The assessment of cumulative impacts is also generally more difficult primarily as they often require more onerous assumptions regarding the likely actions of others.

The key sources of potential negative cumulative impacts identified in this assessment are those associated with impacts on mariculture and fishing along with those on tourism and recreation. Risks to mariculture and fishing would flow from cumulative impacts on the marine environment which are assessed in the marine ecology specialist study (Pisces, 2014). This study notes a high level of uncertainty associated with predicting cumulative impacts without knowledge of proposed future developments in the immediate vicinity of Danger Bay. It concludes that, “If the various effluent streams contributing to the outfall are regularly checked and stringently controlled to ensure compliance with water quality guidelines, and the state of the receiving environment is monitored, potential cumulative impacts should be avoidable. If any additional effluents from future developments are proposed for the outfall, this should be thoroughly investigated to ensure that the quality of the water and sediments within the bay remain within acceptable limits” (Pisces, 2014). Cumulative risks to mariculture and fishing should therefore remain **low with mitigation**. Cumulative risks to tourism and recreation are equally difficult to predict, but should remain at a **low to medium level of significance.**

Positive cumulative impacts are also likely as the project should set a positive precedent for further investment in the wider area. The project would represent a commitment to investment in infrastructure and service development that facilitates the development of other industries and creates a partnership with the local municipality. It would thus be a strong ‘vote of confidence’ in the local economy. This has the potential to influence other investors to also act with similar confidence thereby resulting in cumulative impacts on overall investment levels and the ‘crowding in’ of further investment. Its positive cumulative impacts in this regard have therefore been given a **high significance rating**.

7 MITIGATION MONITORING PROGRAMME

Table 13 outlines how the mitigation measures outlined in the report can be monitored in order to maximise the achievement of mitigation objectives. On the whole negative economic impacts would stem from biophysical impacts assessed in other specialist studies which also deal with their mitigation. The application of economic benefit enhancement measures would be the responsibility of the applicant.

Table 13: Summary of monitoring for mitigation measures

Impact	Mitigation objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
Impacts on mariculture and fishing	Minimise potential risks to water quality and therefore mariculture and fishing	Implement recommendations of the marine ecology specialist study (Pisces 2014)	Refer to marine specialist study	Refer to marine specialist study	Refer to marine specialist study
Impacts on tourism and recreation	Minimise potential risks to tourism and recreation	The measures recommended in other specialist reports for this study to minimise biophysical impacts (primarily the minimisation of visual, water quality and botanical impacts) would also minimise impacts on tourism and recreation	Refer to other specialist studies	Refer to other specialist studies	Refer to other specialist studies
Impacts associated with project investment / expenditure	Maximise positive impacts through tendering, procurement and employment policies	Set targets for use of local labour and maximise opportunities for the training of unskilled and skilled workers. Use local sub-contractors where possible Explore ways to enhance local community benefits with a focus on broad-based BEE.	Applicant to draw up plans in keeping with their policies	Annual auditing of achievement of socio-economic benefit goals with corrective actions if needed	Applicant

8 CONCLUSIONS

The findings of the assessment indicate that with regard to positive findings and impacts:

- There are more factors that support the financial viability of the project than there are indications that the project would not be viable.
- The SRMO Project should prove largely compatible with relevant industrial policy, infrastructure development, economic development and associated spatial planning for the area provided environmental impacts can be kept to an acceptable minimum.
- The project would play a critical role in facilitating industrial development in Saldanha Bay with highly significant benefits.
- The project would present the opportunity to facilitate municipal service provision by the SBM at a cost saving relative to the SBM constructing their own wastewater outfall facility. Overall, the project represents an opportunity to achieve the co-ordinated provision of infrastructure and services within in a public-private partnership framework that allows for risk and costs sharing.
- The project would have a positive impact on economic activity in the local area and region given the size of the new spending injections associated with it. Positive impacts in this regard during the construction phase have been given a medium significance rating with mitigation whilst those during operations have been given a low rating given jobs and income effects.

Key findings with regard to risk and negative impacts are as follow:

- The marine ecology specialist study found that all impacts could be mitigated relatively successfully. No impacts where found to exceed a low significance level with mitigation. Consequently, overall impacts on mariculture and fishing are expected to be low with mitigation for all outfall alternatives.
- Drawing on the findings of the visual, marine ecology and botanical specialists, impacts on tourism should be of a low to medium significance with mitigation for all pipeline and outfall alternatives.

At an overall level, the low to moderate magnitude of risks should be exceeded by the highly significant magnitude of potential benefits from the project with adequate mitigation for all pipeline alternatives. Nevertheless, with regard to pipeline routing alternatives near Jacobsbaai, the Jacobsbaai Western Corridor would be slightly preferable to the Jacobsbaai Eastern Corridor as it would ensure that additional pipeline infrastructure would be confined to the areas near existing infrastructure (primarily the Main Road and electrical transmission lines). This would make more sense from an infrastructure planning perspective and would reduce visual impacts with links to tourism impacts.

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10 APPENDICES

Appendix 1: Impact rating methodology supplied by the CSIR

The following methodology is to be applied in the specialist studies:

The assessment of impact significance should be based on the following convention:

- ✓ Impacts should be assessed for the **preferred layout and an alternative layout.**
- ✓ All impacts should be evaluated for **both the construction and operation phases** of the project, where relevant.
- ✓ Impacts should be described **both before and after the proposed mitigation and management measures have been implemented**.
- ✓ The impact evaluation should take into consideration the **cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region**.
- ✓ The specialist studies must attempt to **quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used**. Where appropriate, national and/or international standards are to be used as a measure of the level of impact.

For each potential impact the following criteria must be identified and indicated:

- ✓ **Nature of impact** - this reviews the type of effect that a proposed activity will have on the environment and should include "what will be affected and how?".
- ✓ **Spatial Extent** - this should indicate whether the impact will be:
    - Site specific
    - Local (<2 km from site)
    - Regional (within 30 km of site)
    - National.
- ✓ **Duration** - The timeframe during which (lifetime of) the impact will be experienced:
    - Temporary (less than 1 year)
    - Short term (1 to 6 years)
    - Medium term (6 to 15 years)
    - Long term (the impact will cease after the operational life of the activity)
    - Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient).
- ✓ **Intensity** - here it should be established whether the impact is destructive or innocuous and should be described as either:
    - High (severe alteration of natural systems, patterns or processes such that they temporarily or permanently cease)
    - Medium (notable alteration of natural systems, patterns or processes; where the environment continues to function but in a modified manner)
    - Low (negligible or no alteration of natural systems, patterns or processes).
- ✓ **Probability** - this considers the likelihood of the impact occurring and should be described as:
    - Improbable (little or no chance of occurring)
    - Probable (<50% chance of occurring)
    - Highly probable (50 – 90% chance of occurring)
    - Definite (>90% chance of occurring).

The status of the impacts and degree of confidence with respect to the assessment of the significance must be stated as follows:

- ✓ **Status of the impact**: A description as to whether the impact will be positive (environment overall benefits from impact), negative (environment overall adversely affected), or neutral (environment overall not affected).
- ✓ **Degree of confidence in predictions**: The degree of confidence in the predictions, based on the availability of information and specialist knowledge. This should be assessed as high, medium or low.

Based on the above considerations, the specialist must provide an overall evaluation of the significance of the potential impact, which should be described as follows:

LOW TO VERY LOW	THE IMPACT MAY RESULT IN MINOR ALTERATIONS OF THE ENVIRONMENT AND CAN BE EASILY AVOIDED BY IMPLEMENTING APPROPRIATE MITIGATION MEASURES, AND WILL NOT HAVE AN INFLUENCE ON DECISION-MAKING
MEDIUM	THE IMPACT WILL RESULT IN MODERATE ALTERATION OF THE ENVIRONMENT AND CAN BE REDUCED OR AVOIDED BY IMPLEMENTING THE APPROPRIATE MITIGATION MEASURES, AND WILL ONLY HAVE AN INFLUENCE ON THE DECISION-MAKING IF NOT MITIGATED
HIGH	THE IMPACTS WILL RESULT IN MAJOR ALTERATION TO THE ENVIRONMENT EVEN WITH THE IMPLEMENTATION ON THE APPROPRIATE MITIGATION MEASURES AND WILL HAVE AN INFLUENCE ON DECISION-MAKING

Appendix 2: Disclaimer

The primary role of this study is to inform the decision-making processes being undertaken by the relevant environmental authorities with regards to the proposed project. Due care and diligence has been applied in the production of the study. However, ultimate responsibility for approving, denying or requiring changes to the proposed project application rests with the relevant environmental authorities (and other government bodies where relevant) who also bear responsibility for interrogating and determining how assessment information from this economic specialist study along with other information is to be used to reach their decisions. Independent Economic Researcher and Dr Hugo van Zyl can therefore not be held responsibility or liable for any consequences of the decisions made by the relevant environmental authorities with regard to the proposed project. This includes any financial, reputational or other consequences that such decisions may have for the applicant, the Environmental Assessment Practitioner responsible for conducting the Environmental Impact Assessment process or for the environmental authorities themselves.

Appendix 3: Visual summary of the results from the hydrodynamic modelling for salinity, temperature and 100-fold dilution from the marine ecology specialist study

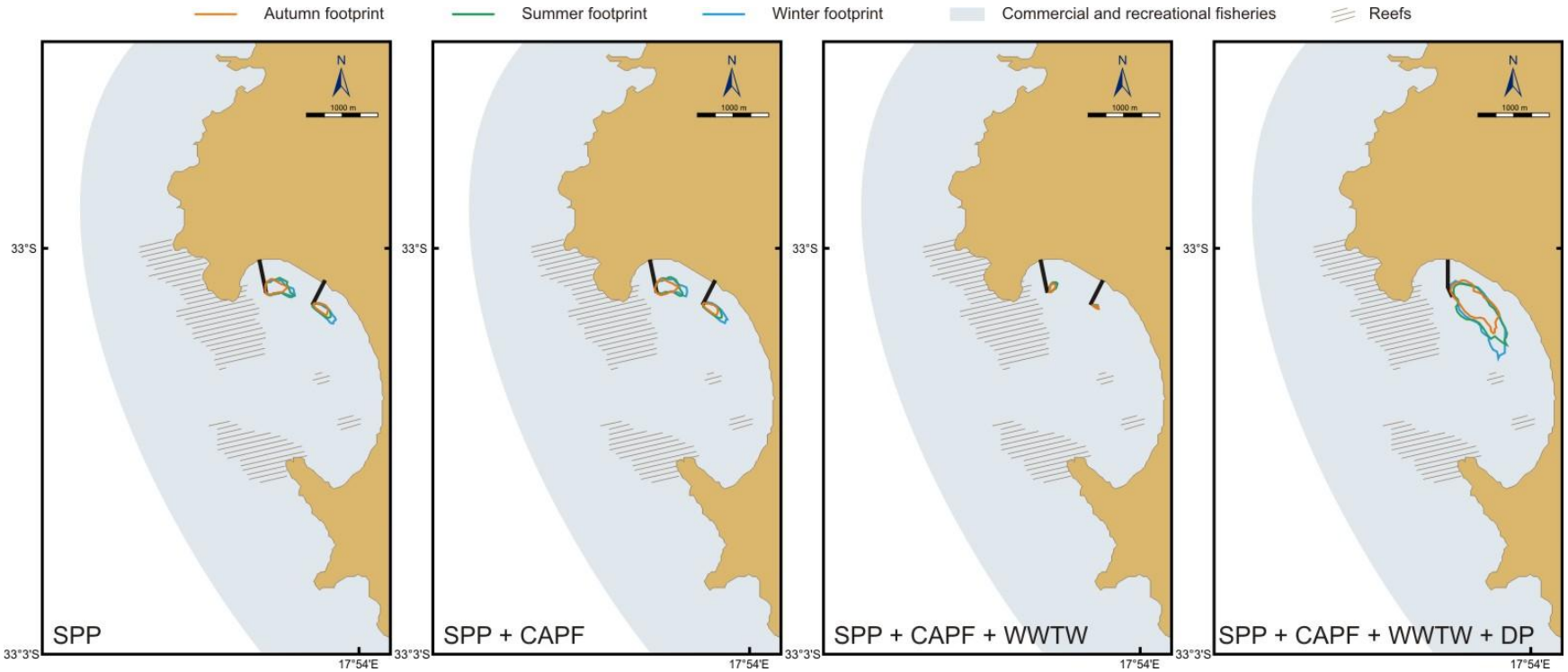


Figure 18: 99% non-exceedance contours of the maximum salinity footprint (exceeds water quality guideline of ΔS 1 psu for no more than 6 hours per month) for the four effluent combinations considered. For SSP, SSP+CAPF and SSP+CAPF+WWTW the footprints for both discharge option 1 and 2 are shown; for effluent combination SSP+CAPF+WWTW+DP discharge option 4 is shown.

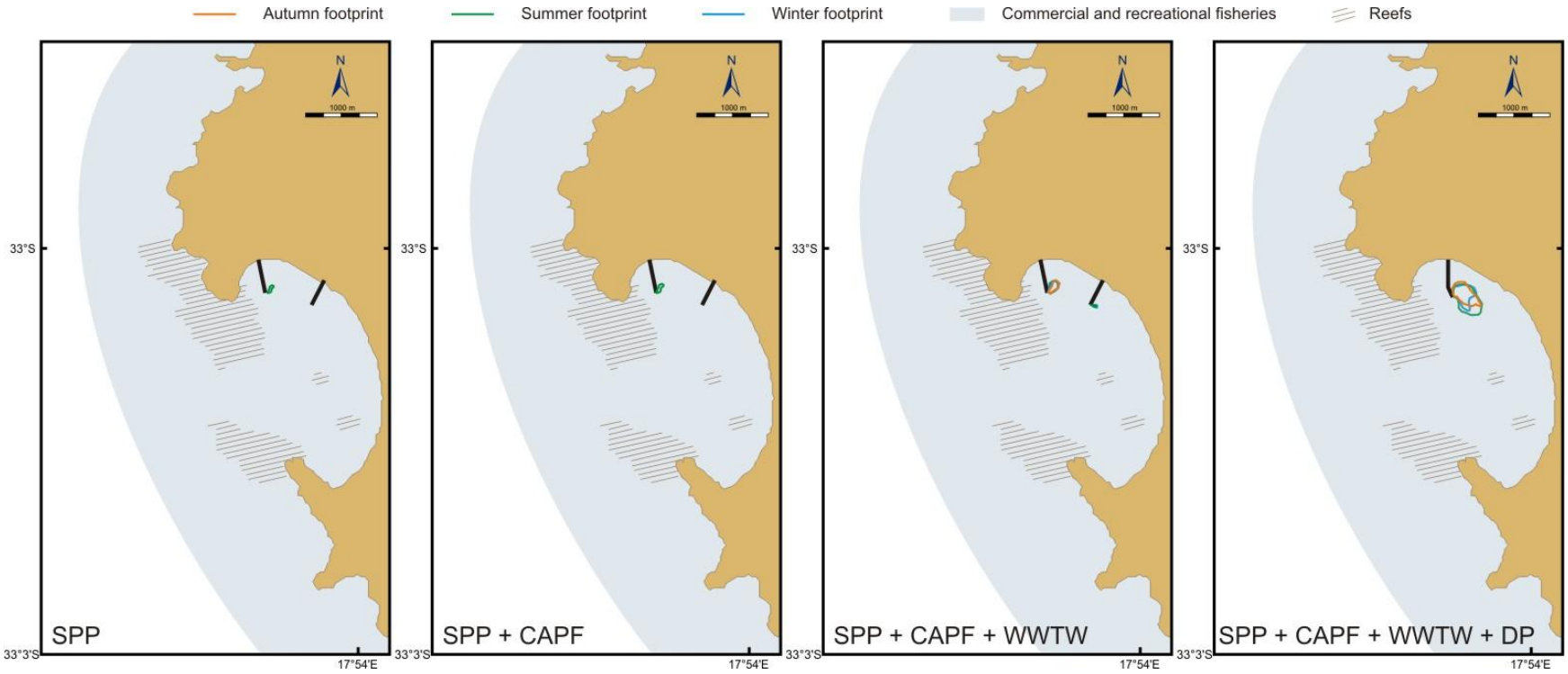


Figure 19: 99% non-exceedance contours of the maximum temperature change footprint (exceeds water quality guideline of ΔT 1°C for no more than 6 hours per month) for the four effluent combinations considered. For SSP, SSP+CAPF and SSP+CAPF+WWTW the footprints for both discharge option 1 and 2 are shown; for effluent combination SSP+CAPF+WWTW+DP discharge option 4 is shown.

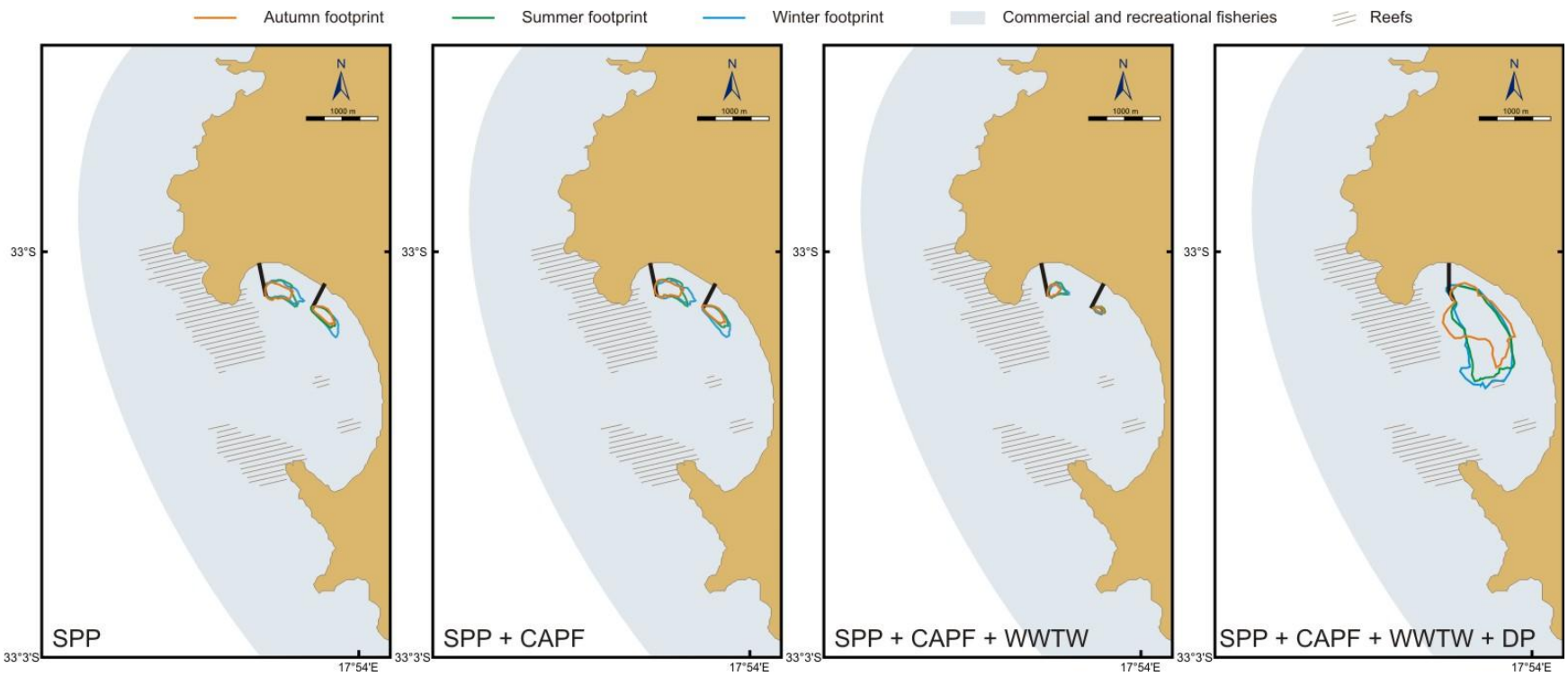
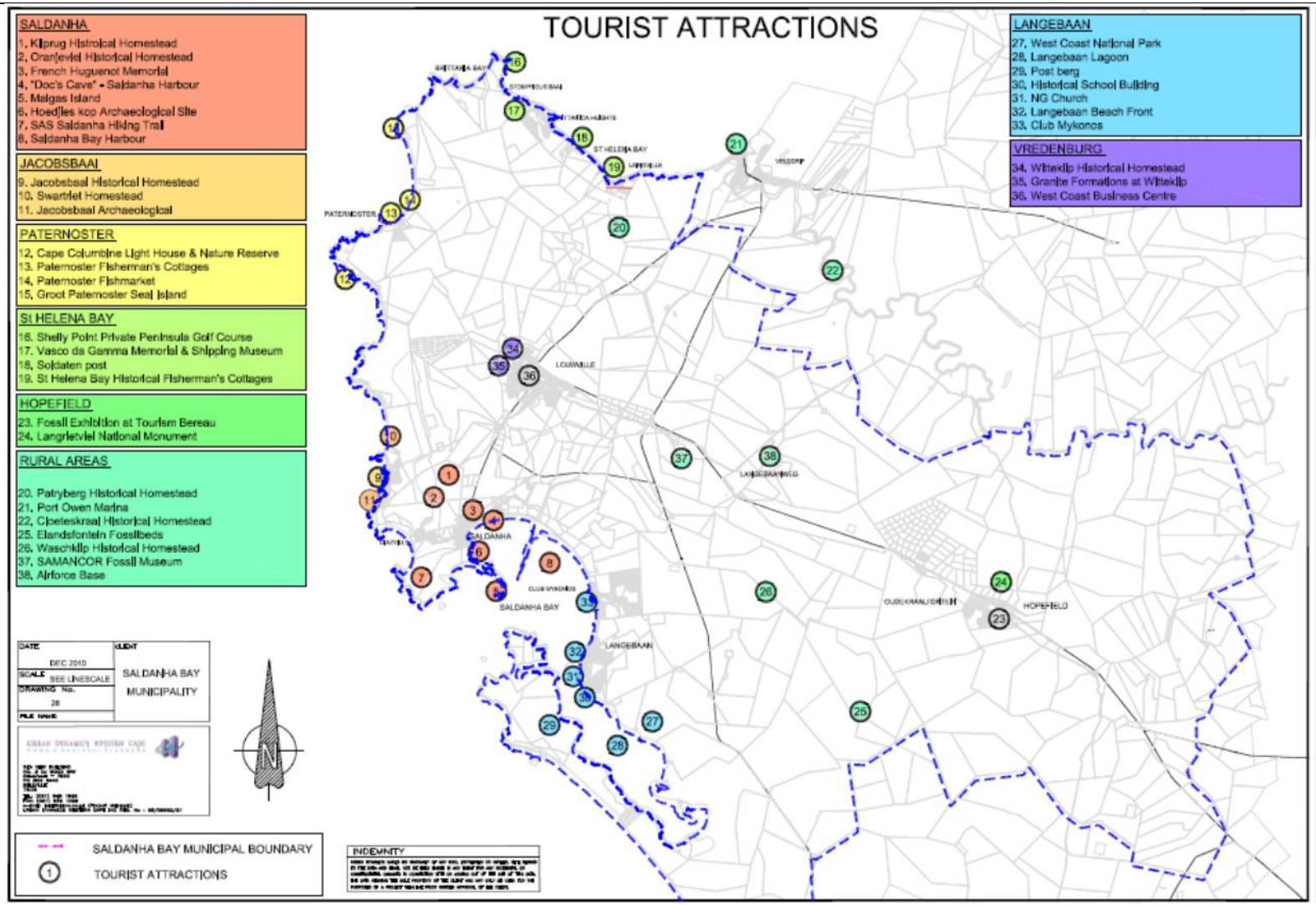


Figure 20: 1% non-exceedance contours of <100-fold dilution footprint for the four effluent combinations considered. For SSP, SSP+CAPF and SSP+CAPF+WWTW the footprints for both discharge option 1 and 2 are shown; for effluent combination SSP+CAPF+WWTW+DP discharge option 4 is shown.

Appendix 4: Saldanha Bay key tourist attractions (SBM, 2011)



ABBREVIATED CURRICULUM VITAE - DR. HUGO VAN ZYL

Key qualifications:

The report was compiled by Dr. Hugo van Zyl. Dr. van Zyl holds a PhD in economics from the University of Cape Town and has sixteen years experience focusing on the analysis of projects and policies with significant environmental and development implications. He has been involved in over 60 economic appraisals of infrastructure projects, industrial developments, mixed use developments, mining, energy projects, conservation projects and eco-tourism initiatives throughout southern Africa. The majority of these appraisals have involved the use of economic impact assessment tools and cost-benefit analysis in order to inform decision-making. He has lead, participated in and co-ordinated research in environmental resource economics (incl. environmental valuation, payments for ecosystem services, policy reform), socio-economic impact assessment, strategic assessment and protected area business planning. From a policy perspective he has provided economic inputs and guidance to national water tariff, air pollution, biodiversity conservation, biofuels, mine closure funding and climate change policy.

Selected relevant experience:

Economic specialist inputs into Environmental Impact Assessments (EIAs):

- ***Major infrastructure -*** *15 projects* including:
  Desalination plant for West Coast District Municipality, Western Cape (2012); Green Point World Cup Stadium, Cape Town (2008); Petroline petrol pipeline between Maputo and Gauteng (2008); Muldersvlei water treatment plant and reservoir near Klapmuts, Western Cape (2007); Iron ore terminal expansion at Saldanha port, Western Cape (2000); Wastewater treatment plan for East London, Eastern Cape (1996);
- ***Industrial developments and mining,*** *11 projects* including:
  AfriSam limestone mine at Saldanha Bay, Western Cape (2012); Vedanta zinc mine near Aggeneys, Northern Cape (2013); Expansion of the PPC cement plant at Riebeek West, Western Cape (2009); Burnstone gold mine expansion (2009)
- ***Mixed-use and residential developments -*** *14 projects including:*
  Barinor and Richmond park developments in greater Cape Town (2011); De Plaat residential estate near Velddrif, Western Cape (2009); Langezandt leisure development in Struisbaai, Western Cape (2011); Garden Route Dam mixed use development in George, Western Cape (2008);
- ***Renewable energy -*** *8 projects including:*
  Wind – SWE near Vleesbaai, Western Cape (2013); SAGIT Energy Ventures near Bot River and Wolesley, Western Cape (2012). Windcurrent near Jeffrey's Bay, Eastern Cape (2011); InnoWind near Mossel Bay, Western Cape (2011); Solar - Mainstream near Douglas and Keimoes, Northern Cape (2012); Thupela Energy near Vaalwater, Limpopo (2011).
- ***Roads -*** *9 projects* including:
  Musina Ring Road, Limpopo (2011); Bloubos local road in Somerset West, Western Cape (2010); N1/N9 intersection upgrade at Colesberg, Free State (2009);

Guideline document formulation and similar projects:

- Second author of TEEB (The Economics of Ecosystems and Biodiversity) guideline manual on conducting TEEB Country Studies focus on the value of ecosystem services. (2013)
- Part of study team that formulated guidelines for the Western Cape Provincial Government on the use of biodiversity offsets. (2007)
- Lead author of the Western Cape Provincial Government guidelines on economic specialist inputs into Environmental Impact Assessments. (2005)