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 D

Visual

SPECIALIST DECLARATION

I, HENRY HOLLAND 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: _____

Professional Registration (Incl. number): _____

Date: 29 SEPTEMBER 2014

VISUAL IMPACT ASSESSMENT

SUMMARY

The proposed development will potentially affect a number of landscape character types in the region, of which the rural coastal recreational landscape of the Danger Bay/Jacobsbaai region is the only one that is moderately sensitive to the proposed development. The others have a low sensitivity to the SRMO project.

A pump station with associated structures, an 11 kV power line and a terrestrial as well as a marine outfall pipeline will be introduced into this landscape. The significance of the landscape impact is medium due to the long duration of the impact and its medium intensity. Mitigation measures such as using the screening potential of high dunes, and using paint colours for buildings and structures that will reduce contrast with their surroundings will lower the intensity of the impact resulting in low significance.

The following sensitive visual receptors will potentially be affected by the proposed SRMO development:

- Recreational users of beach and rocky shore near Danger Bay. These are receptors with a medium sensitivity to the development.
- Visitors to, and viewpoints in, SAS Saldanha Contractual Nature Reserve are highly sensitive visual receptors.
- Residents of, and visitors to, Jacobsbaai are highly sensitive visual receptors.
- Residents and viewpoints on farms along the pipeline corridor. These are classified as highly sensitive receptors.
- Visitors to Swartriet Private Nature Reserve are highly sensitive visual receptors.
- Residents of Vredenburg are low sensitivity visual receptors.
- Motorists using main roads in the region (R79, R559, R27 and R238). These are low sensitivity visual receptors.
- Workers and views in the industrial zone. Their sensitivity to the development is likely to be negligible due to the complexity of their existing views.

The significance of the visual intrusion of construction activities on the views of sensitive visual receptors at Danger Bay is medium before mitigation due to the local extent of the impact, its temporary nature and high intensity. Mitigation measures include locating laydown areas and stockyards in low visibility areas and limited night lighting.

The significance of visual intrusion of construction activities along power line and pipe line corridors on views of sensitive visual receptors is medium before mitigation due to the local extent, temporary nature and high intensity of the impact. Mitigation measures will not lower the significance of the impact.

The significance of the potential visual impact of a pump station and associated structures at Danger bay on sensitive visual receptors is medium before mitigation and low thereafter. Mitigation measures include locating structures such that they are screened by dunes, using non-reflective paints on structures to reduce contrast and using paint colours for structures and buildings so that they blend in with the natural background. Maintenance plans should include regular maintenance of exterior facades.

The significance of the potential visual impact of 11 kV overhead power lines from Pump Station E to Jacobsbaai on sensitive visual receptors is medium before mitigation due to the medium intensity, local extent and long term duration of the impact. Mitigation measures will not lower the significance unless the power lines are buried.

The significance of night lighting of Pump Station E at Danger Bay on the nightscape is low since the impact has a low intensity and local extent.

The Western Cape District Municipality has proposed to build a desalination plant in the Danger Bay area near the site for Pump Station E. If the plant is built at this site then the SRMO pipeline will connect directly with the disposal infrastructure of the desalination plant and a separate pump station with associated structures and power lines will not be necessary. The cumulative impact of the SRMO project will be low since the desalination plant will be the only development visible in the area.

In terms of visual impact the Jacobsbaai Western Corridor is the preferred corridor for the pipeline since it will follow the existing road and will not open up a new corridor in the landscape.

TABLE OF CONTENTS

INDEX OF TABLES

INDEX OF FIGURES

INDEX OF MAPS

LIST OF ABBREVIATIONS

AMSL	Above mean sea level
CPV	Concentrated photovoltaic
DEM	Digital Elevation Model
DTM	Digital Terrain Model
EIA	Environmental Impact Assessment
ENPAT	Environmental Potential Atlas
GIS	Geographic Information System
GLVIA	Guideline for Involving Visual and Aesthetic Specialists in EIA Processes
IDP	Integrated Development Plan
IUCN	International Union for Conservation of Nature
I&APs	Interested and Affected Parties
PV	Photovoltaic
SANBI	South African National Biodiversity Institute
STEP	Subtropical Thicket Ecosystem Project
ToR	Terms of Reference
VIA	Visual Impact Assessment
WPDA	World Database on Protected Areas
ZTV	Zone of Theoretical Visibility
ZVI	Zone of Visual Influence

GLOSSARY OF TERMS USED IN THE VISUAL ASSESSMENT

Cumulative viewshed	A viewshed which indicates in some way how much of a development is visible from a particular viewpoint. In a raster based cumulative viewshed each pixel value will indicate how many points within the development area are visible. A power line development could, for example, use pylons as points to generate a cumulative viewshed for the development. Each pixel value in the viewshed will be a count (accumulation) of the number of pylons that will potentially be visible from that pixel.
Digital Elevation Model (DEM)	A digital or computer representation of the topography of an area.
Landscape baseline	A description of the existing elements, features, characteristics, character, quality and extent of the landscape (GLVIA, 2002).
Landscape character	The distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement. It creates the particular sense of place of different areas of the landscape (GLVIA, 2002).

Landscape character sensitivity	This provides an indication of the ability of a landscape to absorb change from the proposed development without changing character. A pristine landscape prized for its natural beauty, or a landscape of high cultural value will have high sensitivity to changes brought about by new developments.
Landscape impacts	Change in the elements, characteristics, character and qualities of the landscape as the result of development (GLVIA, 2002). These effects can be positive or negative, and result from removal of existing landscape elements, addition of new elements, or the alteration of existing elements.
Memorability	The quality of being worth remembering; "continuous change results in lack of memorability"; "true memorability of phrase"
Nature-based tourism	Tourism that involves travelling to relatively undisturbed natural areas with the specific objective of studying, admiring and enjoying the scenery, fauna and flora, either directly or in conjunction with activities such as trekking, canoeing, mountain biking, hunting and fishing (Turpie *et al*. 2005)
Principal representative viewpoints	Principal representative viewpoints are identified during the visual baseline desk study and field survey. They should be representative of the visual amenity of the area and include walking public footpaths and visiting areas of open public access. A comprehensive photographic record of these points supports the visual impact assessment (GLVIA, 2002)
Receptor	An element or assemblage of elements that will be directly or indirectly affected by the proposed development.
Sense of place	That distinctive quality that makes a particular place memorable to the visitor, which can be interpreted in terms of the visual character of the landscape. The unique quality or character of a place, whether natural, rural or urban. Relates to uniqueness, distinctiveness or strong identity (Oberholzer 2005).
Sky glow	Brightening of the sky caused by outdoor lighting and atmospheric and celestial factors (McColgan 2007)
Viewer sensitivity	The assessment of the receptivity of viewer groups to the visible landscape elements and visual character and their perception of visual quality and value. The sensitivity of viewer groups depends on their activity and awareness within the affected landscape, their preferences, preconceptions and their opinions.
Viewshed	A viewshed is an area of land, water, and other environmental elements that is visible from a fixed vantage point. In digital imaging, a viewshed is a binary raster indicating the visibility of a viewpoint for an area of interest. A pixel with a value of unity indicates that the viewpoint is visible from that pixel, while a value of zero indicates that the viewpoint is not visible from the pixel.
Visibility of Project	The geographic area from which the project will be visible, or view catchment area. (The actual zone of visual influence of the project may be smaller because of screening by existing trees and buildings). This also relates to the number of receptors affected (Oberholzer 2005)

Visual absorption capacity (VAC)	Visual Absorption Capacity signifies the ability of the landscape to accept additional human intervention without serious loss of character and visual quality or value. VAC is founded on the characteristics of the physical environment such as vegetative screening, diversity of colours and patterns and topographic variability. It also relates to the type of project in terms of its vertical and horizontal scale, colours and patterns. A high VAC rating implies a high ability to absorb visual impacts while a low VAC implies a low ability to absorb or conceal visual impacts.
Visual amenity	The value of a particular area or view in terms of what is seen. (GLVIA, 2002)
Visual baseline	A description of the extent and nature of existing views of the site from representative viewpoints, and the nature and characteristics of the visual amenity of the potentially sensitive visual receptors (GLVIA, 2002)
Visual envelope	The approximate extent within which the development can be seen. The extent is often limited to a distance from the development within which views of the development are expected to be of concern.
Visual exposure	Visual exposure refers to the relative visibility of a project or feature in the landscape (Oberholzer, 2005). Exposure and visual impact tend to diminish exponentially with distance.
Visual impact	Changes to the visual character of available views resulting from the development that include: obstruction of existing views; removal of screening elements thereby exposing viewers to unsightly views; the introduction of new elements into the viewshed experienced by visual receptors and intrusion of foreign elements into the viewshed of landscape features thereby detracting from the visual amenity of the area.
Visual impact assessment	A specialist study to determine the visual effects of a proposed development on the surrounding environment. The primary goal of this specialist study is to identify potential risk sources resulting from the project that may impact on the visual environment of the study area, and to assess their significance. These impacts include landscape impacts and visual impacts.
Visual intrusion	Visual intrusion indicates the level of compatibility or congruence of the project with the particular qualities of the area – its 'sense of place'. This is related to the idea of context and maintaining the integrity of the landscape (Oberholzer 2005).
Visual quality	An assessment of the aesthetic excellence of the visual resources of an area. This should not be confused with the value of these resources where an area of low visual quality may still be accorded a high value. Typical indicators used to assess visual quality are vividness, intactness and unity. For more descriptive assessments of visual quality attributes such as variety, coherence, uniqueness, harmony, and pattern can be referred to.
Visual receptors	Visual receptors include viewer groups such as the local community, residents, workers, the broader public and visitors to the area, as well as public or community areas from which the development is visible.
Visual resource	Visual resource is an encompassing term relating to the visible landscape and its recognisable elements which, through their coexistence, result in a particular landscape and visual character

Zone of visual influence (ZVI)	The extent of the area from which the most elevated structures of the proposed development could be seen and may be considered to be of interest (see visual envelope or viewshed).
Zone of Theoretical Visibility (ZVT)	The area over which a development can theoretically be seen (also known as a Zone of Visual Influence, visual envelope, view catchment and viewshed). (horner + mclennan & Envision 2006)

1 INTRODUCTION

This chapter presents the findings of the visual specialist study undertaken by Henry Holland as part of the EIA being conducted by the CSIR for the proposed Saldanha Regional Marine Outfall (SRMO) development at Danger Bay, Western Cape.

1.1 GUIDING CONCEPTS FOR VISUAL ASSESSMENTS

This Visual Impact Assessment (VIA) is based on guidelines for visual assessment specialist studies as set out by South Africa's Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) (Oberholzer, 2005) as well as guidelines provided by the Landscape Institute of the UK (GLVIA, 2002). The DEA&DP guideline recommends that a visual impact assessment consider the following specific concepts (from Oberholzer 2005):

- An awareness that 'visual' implies the full range of visual, aesthetic, cultural and spiritual aspects of the environment that contribute to the area's sense of place.
- The considerations of both the natural and cultural landscape, and their interrelatedness.
- The identification of all scenic resources, protected areas and sites of special interest, together with their relative importance in the region.
- An understanding of the landscape processes, including geological, vegetation and settlement patterns, which give the landscape its particular character or scenic attributes.
- The need to include both quantitative criteria, such as 'visibility', and qualitative criteria, such as aesthetic value or sense of place.
- The need to include visual input as an integral part of the project planning and design process, so that the findings and recommended mitigation measures can inform the final design, and hopefully the quality of the project.
- The need to determine the value of visual/aesthetic resources through public involvement.

1.2 SCOPE OF STUDY

1.2.1 Visual Triggers

Oberholzer (2005) identifies visual triggers which are used to determine the approach and scope of an impact study. The following triggers, related to the receiving environment, are potentially applicable to this project:

- Areas with protection status, such as national parks or nature reserves;
- Areas with important vistas or scenic corridors;
- Areas of important tourism or recreational value.

Triggers related to the nature of the project:

- A change in land use from the prevailing use;
- A significant change to the fabric and character of the area;
- Possible visual intrusion in the landscape.

1.2.2 Information Base

The visual study is based on the following information:

- Documentation supplied by the client and the CSIR;
- Digital topocadastral data at 1:50 000 scale from the National Geo-spatial Information database (http://www.ngi.gov.za/);
- 1:250000 Geology map sheets covering the region;
- Google Earth software and data.
- South African digital land cover dataset of 2002 (Majeke *et al*. 2002);
- Eskom SPOT Building Count data set of (de la Rey 2008).
- Garmin map data (2011) for 'points of interest' layer.

1.3 ASSUMPTIONS AND LIMITATIONS

1.3.1 Spatial Data Accuracy

Spatial data used for visibility analysis originate from various sources and scales. Inaccuracy and errors are therefore inevitable. Where relevant these will be highlighted in the report. Every effort was made to minimize their effect.

1.3.2 Viewshed calculations

Calculation of the viewsheds does not take into account the potential screening effect of vegetation and buildings.

Viewsheds are calculated using digital elevation model (DEM) which is derived from 1:50000 scale contour lines with a 20 m vertical distance between contours. The DEM has a pixel resolution of 20 m x 20 m and covers a 70 km x 30 km area.

1.3.3 Study Area

A 10 km distance around proposed corridors and sites is used as the study area for the visual impact assessment of the structures proposed for the marine outfall development.

1.3.4 Mitigation Measures

Mitigation measures in this report will assume that construction activities are managed and performed in such a way as to minimise its impact on the receiving environment.

The following assumptions, in particular, apply since they are relevant to minimising visual impact during the construction phase:

- The contractor(s) will maintain good housekeeping on site to avoid litter and minimise waste;
- Project developers will demarcate construction boundaries and minimise areas of surface disturbance;
- Vegetation and ground disturbance will be minimised and take advantage of existing clearings;
- Construction of new roads will be minimised and existing roads will be used where possible;
- Topsoil from the site will be stripped, stockpiled, and stabilised before excavating earth for the construction of the facility;

- Vegetation matter from vegetation removal will be mulched and spread over fresh soil disturbances to aid in rehabilitation process;
- Plans will be in place to control and minimise erosion risks;
- Plans will be in place to minimise fire hazards and dust generation; and
- Plans will be in place to rehabilitate cleared areas as soon as possible.

It is also assumed that construction of overhead power lines will proceed according to specifications set out by Eskom (Eskom 2001) where applicable.

1.4 METHODOLOGY

The key steps followed in the visual study are presented below.

1.4.1 Site Visit and Photographic Survey

The field survey (conducted from 18 and 19 January 2012) provided an opportunity to:

- Determine the actual or practical extent of potential visibility of the proposed development, by assessing the screening effect of landscape features;
- Conduct a photographic survey of the landscape surrounding the development;
- Identify sensitive landscape and visual receptors.

Viewpoints were chosen using the following criteria:

- High visibility – sites from where most of the development will be visible.
- High visual exposure – sites at various distances from the proposed site.
- Sensitive areas and viewpoints such as nature reserves and game farms from which the development will potentially be seen.

Additionally, photo sites were chosen to aid in describing the landscape surrounding, and potentially affected by, the proposed development.

1.4.2 Landscape Description

A desktop study was conducted to establish and describe the landscape character of the receiving environment. A combination of data analysis using a Geographic Information System (GIS), literature review and photographic survey was used to identify land cover, landforms and land use in order to gain an understanding of the current landscape within which the development will take place (GLVIA, 2002). Landscape features of special interest were identified and mapped, as were landscape elements that may potentially be affected by the development.

1.4.3 Visual Impact Assessment

A GIS was used to calculate viewsheds for various components of the proposed development. The viewsheds and information gathered during the field survey were used to define criteria such as visibility, viewer sensitivity, visual exposure and visual intrusion for the proposed development. These criteria are, in turn, used to determine the intensity of potential visual impacts on sensitive viewers. All information and knowledge acquired as part of the assessment process were then used to determine the potential significance of the impacts according to the standardised rating methodology as described in the Terms of Reference document (and in section 5.2 of this document).

1.5 APPLICABLE POLICIES, LEGISLATION, STANDARDS AND GUIDELINES

The National Environmental Management Integrated Coastal Management Act (ICMA) (Act 29 of 2008) serves to define the coastal zone, coastal public property, coastal waters and coastal protection areas.

> *"…in order to promote the conservation of the coastal environment, and maintain the natural attributes of **coastal landscapes** and seascapes…"*

The National Heritage Resources Act (NHRA) (Act 15 of 1999) deals with cultural and heritage resources. There are various permitting provisions, as well as requirements relating to Heritage Impact Assessment (HIA).

> *"3. (1) For the purposes of this Act, those heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations must be considered part of the national estate and fall within the sphere of operations of heritage resources authorities.*
>
> *(2) Without limiting the generality of subsection (1), the national estate may include—*
>
> *(a) places, buildings, structures and equipment of cultural significance;*
>
> *(b) places to which oral traditions are attached or which are associated with living heritage;*
>
> *(c) historical settlements and townscapes;*
>
> *(d) **landscapes** and natural features of cultural significance;*
>
> *(e)…"*

The Saldanha Bay Spatial Development Framework (SDF) makes reference to the protection of scenic and cultural landscapes in several goals set out in the document (De Villiers Brownlie Associates & Urban Dynamics Western Cape 2011):

> "*To ensure that ongoing development pressure and its spatial implications are managed in a sustainable manner that protects the unique character of the existing **cultural landscape** and the place-specific character and form of the existing settlement pattern."*
>
> *"P71 Protect the **distinctive landscape** character of the municipal area from incentive development.*"

1.6 STATEMENT OF CONFIDENCE AND INDEPENDENCE

Henry Holland has been applying his Geographic Information Systems knowledge and experience to visual impact assessments since 1997, and has conducted a number of assessments for projects similar to the SRMOP, such as desalination plants and bulk water supply pipe lines. He has extensive practical knowledge in spatial analysis, landscape analysis and environmental modelling, and has been involved in many environmental management projects as GIS coordinator and analyst since 1992.

Henry has undertaken this work for the marine outfall development near Saldanha, proposed by Frontier Saldanha Utilities (Pty) Ltd, as an independent visual specialist, working in accordance with international and national guidelines for visual impact assessments. He has no vested interest in the proposed project.

2 PROJECT DESCRIPTION

2.1 OVERVIEW OF PROJECT

Frontier Saldanha Utilities (Pty) Ltd proposes to develop a marine outfall pipeline and associated infrastructure in Danger Bay near Saldanha, Western Cape. Background information on the proposed project is provided in the Scoping Report as well as introductory chapters of the EIA Report.

2.2 PROJECT COMPONENTS AND ACTIVITIES

2.2.1 Components and Design Layouts

The following components of the project are relevant to the visual impact assessment (Map 8-1):

Pump Stations

There are five pump stations with associated transfer tanks along the pipeline corridor (marked A to E on the map). These structures will not be taller than 5 m. Figure 2-1 and Figure 2-2 show examples of pump stations and associated transfer tanks.

Figure 2-1 An example of a pump station (Source: Huffcutt)

Figure 2-2 Transfer Tank of similar size to those proposed for the SRMO project. (Source: H2L group)

Linear Structures

The pipeline from the Saldanha Separation Plant (SSP) and Chlor-Alkali Production Facility (CAPF) to the marine outfall site is the main linear component of the project. There are two proposed corridors:

- Jacobsbaai Western Corridor; and
- Jacobsbaai Eastern Corridor.

If the proposed Waste Water Treatment Plant (WWTP) is built then a further pipeline corridor and pump station (E) will be included in the outfall pipeline route (WWTP Corridor on the map).

Each pump station will require a medium voltage overhead power line to connect with the Eskom grid. The 11 kV power line pylons will have a height of 12 m and will be wooden structures.

Map 8-1 provides a map of various proposed site alternatives and their associated linear structures and Table 2-1 provides a summary of the linear structures and their approximate lengths.

Table 2-1 Linear structures associated with each site.

Corridor	**Type**	**Length**
Jacobsdraai Western Corridor	Pipeline	23 km
Jacobsdraai Eastern Corridor	Pipeline	24 km
WWTP Corridor	Pipeline	25 km
Pump Station B OHL	Power Line	1200 m
Pump Station C OHL	Power Line	995 m
Pump Station D OHL	Power Line	60 m
Pump Station E OHL	Power Line	3450 m

2.2.2 Construction

2.2.2.1 General

The following main components related to construction activities will potentially cause visual impacts:

- Clearing of land for laydown areas and temporary access roads;
- Heavy construction equipment that may be used in site preparation would include bulldozers, graders, excavators, trucks and cranes;
- Increase in traffic on local roads, and in particular an increase in larger vehicles associated with large scale construction;
- Increase in human activity in areas that are currently quiet with low density population; and
- Increase in light pollution where construction occurs at night.

2.2.2.2 Pipeline Construction

- Stockpiles of topsoil, soil and rock removed to make trench will be visible along the pipeline route;
- Exposed soil/rock along pipeline route where vegetation is cleared and trenching occurs;
- Potential erosion scarring of the landscape;
- Structures such as pipes and culverts will be visible where they are placed along the trench prior to installation; and
- Presence of construction workers along route.

Figure 2-3 and Figure 2-4 provide examples of pipeline construction sites.

Figure 2-3 Pipeline construction (Source: PVC Construction Inc.)

Figure 2-4 Water supply pipeline construction. (Source: Specifier)

2.2.2.3 Overhead Power Line Construction

- Construction activity, workers and equipment above the skyline (Figure 2-5);
- Stockpiles of topsoil, vegetation and material removed from the servitude;
- Structures such as cables and pylon components along power line route;
- Presence of construction workers along route.

Figure 2-5 Distribution power line construction and maintenance showing workers against the skyline. (Source: EC&M)

2.2.2.4 Pump Stations and Associated Structures

- Clearance of vegetation and levelling for temporary laydown areas;
- Clearance of vegetation and exposure of soil/rock for construction of pump station and transfer tank;
- Presence of construction workers on site;
- Presence of large construction equipment;
- Soil and material stockpiles;
- Construction vehicles on site and on local roads.

2.2.3 Operation and Maintenance

The pipeline will largely be hidden from views although the cleared servitude is likely to be visible for a long time. Rehabilitation of the servitude (or temporary parts of the servitude) will re-introduce some temporary activity along the corridor.

The 11 kV distribution overhead lines are a familiar element in most of the landscape. The pylons will be similar to existing pylons. Maintenance will occasionally introduce some visible activity along power line routes.

Pump stations and transfer tanks are of a similar size and form as farm buildings and structures in the region and will be dwarfed by large industrial developments in the industrial zone. Short access roads are also familiar features in the landscape (e.g. access roads to cellular phone towers).

2.2.4 Decommissioning Phase

The decommissioning phase will be similar to the construction phase but is likely to be of shorter duration. Rehabilitation of cleared areas will form part of this phase.

3 DESCRIPTION OF RECEIVING ENVIRONMENT

3.1 LANDSCAPE BASELINE

Landscape baseline	A description of the existing elements, features, characteristics, character, quality and extent of the landscape (GLVIA, 2002).

3.1.1 Topography (Map 8-2)

Much of the study area is flat coastal plain to open rolling hills, with occasional steep, round hills protruding from the plain. Topographic profiles in Map 8-3 show the subdued topography with occasional high, granite hills. The region between Diazville and Jacobsbaai also contains tall palaeo-dunes as well as existing dunes closer to the beach. These are mostly covered in shrubs and fynbos. The Bok River is a non-perennial stream that drains into Saldanha Bay.

3.1.2 Geology (Map 8-4)

Most of the study area is underlain by granite batholiths which are covered in more recent sedimentary rocks and sediments. Granite outcrops tend to form distinctive dome-like hills which are common in the western and northern parts of the study area. The sedimentary rocks and sediments form the more subdued topography of the coastal plain.

3.1.2.1 Bredasdorp Group [1]

This sequence represents coastal sediments deposited less than 1 million years ago during periods of sea-level fluctuation. It consists of consolidated and unconsolidated limestones and calcareous sandstones. Several palaeo-dune cordons are also found towards the top of the group, some of which are visible near the Danger Bay site (Transect A-A',**Error! Reference source not ound.**).

3.1.2.2 Cape Granite

Cape Granites were emplaced as large batholiths during tectonic events between 500 and 550 million years ago. Granite tends to be very resistant to erosion due to the high quartz content, and will form positive relief (often round, dome-like hills such as at Vredenburg) and rocky coastlines.

3.1.3 Land Cover (Map 8-5)

Agricultural land covers a large part of the study area, most of which is medium potential agricultural land of the Sandveld 'saaigebied'. The agricultural land north of Vredenburg has higher potential and is known as Koppiesveld. Some shrubland remains, although much of it is degraded. A number of mines or quarries are scattered through the area, mainly extracting limestone from the Bredasdorp Group rocks. The Fossil Park at Langebaan Weg was originally a phosphate mine, but it is now more renowned for its fossil discoveries. Industrial and urban centres are also present and will be discussed in the next section on settlement patterns.

The study area contains several private and provincial nature reserves, as well as national parks and marine reserves.

Private Nature Reserves

- Swartriet PNR
- Elandsfontein PNR

[1] Classified in *Geology of South Africa* (Johnson *et al*. 2006) the Sandveld Group (a correlate of the Bredasdorp Group).

Provincial Nature Reserves

- SAS Saldanha Contractual Nature Reserve
- Jacob's Rock Island Reserve

National Parks and Marine Reserves

- West Coast National Park
- West Coast National Park Marine Reserve
- Jutten Island Marine Protected Area
- Malgas Island Marine Protected Area
- Marcus Island Marine Protected Area.

3.1.4 Built Environment (Map 8-6)

The built environment is a mixture of heavy industry, rural towns and coastal resort towns and villages. The Port of Saldanha has created important opportunities for large scale industrial development of the area and it is likely that an industrial development zone (IDZ) will be established in the area. The following towns or settlements are part of this study:

Saldanha and Diazville

Saldanha initially developed as a fishing village but once the deep water port was established a number of large scale industrial developments changed the character of the town and it became the service centre for the port and its industrial concerns. The last fifteen years has seen a rapid increase in population for the town, and it is likely that an IDZ in the region will create even more opportunities for expansion.

Vredenburg

Vredenburg developed as a service centre for the surrounding farming community, but has seen rapid expansion in the last fifteen years and is now a commercial and business centre for coastal resorts along the West Coast.

Langebaan

Langebaan is a large coastal resort town along the Langebaan lagoon which developed in parallel with Saldanha. It was a whaling station until the 1960s. There are no industrial developments in the town and Club Mykonos Resort is an important holiday/tourist destination.

Jacobsbaai

The village of Jacobsbaai is a small coastal resort town which developed from a farm which dates back to early white settlers.

Industrial Developments

The major industrial developments in the area are the Namakwa Sands Smelter, the Arcelormittal Saldanha Steel Works and the deep water Port of Saldanha which services among other things large oil rigs and oil tankers. There are further plans for large scale industrial developments as well as expansion of existing developments, although currently many industrial properties are not occupied.

Railways

Iron ore is brought to the Port and smelters from the mines in Northern Cape via rail and a large marshalling yard next to the Namakwa Sands smelter services the ore carrying trains at several trains a day. Container trains can comprise 50 or more wagons.

Roads

There are several major roads connecting the various settlements and industrial developments:

- R27 – West Coast Road between Milnerton and Velddrif.
- R45 – trunk road between Hopefield and Vredenburg.
- R399 – main road between Vredenburg and Velddrif.
- R79 – north of Arcelormittal Steel Works, connecting R27 from Cape Town with Saldanha Bay.

Most of these roads provide access to popular tourist destinations such as Langebaan, Paternoster and St Helena Bay, as well as various nature reserves and parks in the region.

Power Lines

High voltage transmission lines are necessary to power the iron smelters as well as the burgeoning towns of Saldanha and Vredenburg and these are clearly visible in the landscape, particularly east of the Steel Works.

3.2 LANDSCAPE CHARACTER

Landscape character	The distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement. It creates the particular sense of place of different areas of the landscape (GLVIA, 2002).
Landscape character sensitivity	This provides an indication of the ability of a landscape to absorb change from the proposed development without changing character. A pristine landscape prized for its natural beauty, or a landscape of high cultural value will have high sensitivity to changes brought about by new developments.

Considering the landscape elements discussed in section 3.1 above it is possible to identify a number of major landscape character types that may potentially be affected by the SRMO project.

3.2.1 West Coast Rural-Resort

The Danger Bay site is located in this landscape. The region is separated from the industrial and urban landscape of Saldanha Bay by a ridge of hills formed by sand and limestones (palaeo-dunes) of the Bredasdorp Group. Jacobsbaai is a small holiday village which the Saldanha Bay SDF aims to keep at close to its current size. Danger Bay is bound by high, vegetated dunes, but its sense of remoteness is marred by sand mining activity in the dunes, vehicle tracks along the rocky coastline in the west and a few buildings and ruins. However, there are no industrial type developments in the landscape. This landscape character type therefore has a **moderate** sensitivity to the pump station and associated structures proposed for this area (Pump Station E) since elements that are only partially congruent with the landscape character type will be introduced.

3.2.2 Northern Granite Hills Urban

Vredenburg is a rapidly expanding settlement which is partially located on a high granite dome. It doesn't contain heavy industry, but is a commercial centre for the surrounding farming community and coastal holiday towns. The landscape already contains transmission lines and structures similar to that of the SRMO project. The landscape character type has a **low** sensitivity to the proposed development.

3.2.3 Coastal Plain Agricultural

This landscape character type covers the region between Vredenburg and the western coastline. Large farm buildings and farmsteads are common, as are distribution power lines, and although no industrial type developments are present, these do become visible closer to Vredenburg. A **low** sensitivity to the proposed development for this area is expected since small transfer tanks, distribution power lines and buildings are common to this landscape.

3.2.4 Coastal Plain Industrial

Large industrial developments are present in this landscape character type and large industrial type buildings are common features. Railways, roads and high voltage distribution power lines criss-cross the landscape. Large oil tanker ships and off-shore oil drilling platforms are often visible at the port. A **low** sensitivity to the structures proposed for this area is expected.

3.2.5 Langebaan Lagoon Urban

Holiday and resort settlements along the lagoon. There are no big industrial developments in this landscape, but due to the relatively flat topography views of the Port and large industrial developments beyond are common. A **low** sensitivity to the proposed development is expected since the proposed development is unlikely to affect this landscape.

4 IDENTIFICATION OF ISSUES AND IMPACTS

No issues related to visual impact were raised by I&APs during the Scoping Phase of the EIA.

5 PERMIT REQUIREMENTS

There are no permit requirements specific to visual or landscape conservation.

5.1 ASSESSMENT AND MITIGATION OF IMPACTS

The assessment and mitigation of impacts is conducted in the following steps:

- Identification of visual impact criteria (key theoretical concepts).
- Conducting a visibility analysis.
- Assessment of impacts of the project on the landscape and on receptors (viewers) taking into consideration factors such as sensitive viewers and viewpoints, visual exposure and visual intrusion.

5.2 VISUAL IMPACT CONCEPTS AND ASSESSMENT CRITERIA

5.2.1 Visual assessment criteria used in assessing magnitude and significance

The potential visual impact of the proposed development is assessed using a number of criteria which provide the means to measure the magnitude and determine the significance of the potential impact (Oberholzer, 2005). The **visibility** (Section 5.2.2) of the project is an indication of where in the region the development will potentially be visible from. The rating is based on viewshed size only and is an indication of how much of a region will potentially be affected visually by the development. A high visibility rating does not necessarily signify a high visual impact, although it can if the region is densely populated with sensitive visual receptors. **Viewer (or visual receptor) sensitivity** (Section 5.2.3) is a measure of how sensitive potential viewers of the development are to changes in their views. Visual receptors are identified by looking at the development viewshed, and include scenic viewpoints, residents, motorists and recreational users of facilities within the viewshed. Their distance from the development (measured as **visual exposure** – Section 5.2.4) and the current composition of their views (measured as **visual intrusion** – Section 5.2.5) will determine impact intensity. The results of the analysis is summarised in Table 5-3 on page 29.

The rating methodology for the impact assessment is provided in the Scoping Report of the EIA.

5.2.2 Visibility

Visibility of Project	The geographic area from which the project will be visible, or view catchment area. (The actual zone of visual influence of the project may be smaller because of screening by existing trees and buildings). This also relates to the number of receptors affected (Oberholzer, 2005). • *High visibility* - visible from a large area (e.g. several square kilometres). • *Moderate visibility* – visible from an intermediate area (e.g. several hectares). • *Low visibility* – visible from a small area around the project site.

In this report there is also another sense in which 'visibility' is used. Cumulative viewsheds indicate not only where a feature is visible from (the meaning of visibility as used in the definition above), but also how much of the feature will be visible from that point or area. On the viewshed maps 'high visibility' indicates areas from where most of the development is visible, and 'low visibility' indicates areas from where only a few elements of the development is visible.

Table 5-1 shows viewshed catchment areas for various components of the development.

Table 5-1 View catchment areas for components of the development for areas within 10 km of each component.

Site	Structure	Viewshed Area (km^2)
Jacobsbaai Western Corridor	Pipeline	469
Jacobsbaai Eastern Corridor	Pipeline	473
WWTP Corridor	Pipeline	480
Pump Station A	Pump Station	112
Pump Station B	Pump Station	120
Pump Station C	Pump Station	74
Pump Station D	Pump Station	147
Pump Station E	Pump Station	198
OHL B	Overhead Power Line	121
OHL C	Overhead Power Line	113
OHL D	Overhead Power Line	113
OHL E	Overhead Power Line	220
SRMOP Jacobsbaai Western Corridor	All Structures	507
SRMOP Jacobsbaai Eastern Corridor	All Structures	496
SRMOP WWTP Corridor	All Structures	507

Viewsheds for pipelines are mostly applicable to the construction phase since they will be buried and only the servitude and access points will potentially be visible during the operational phase. Map 8-7 is a map of the cumulative viewshed calculated for all relevant components of the SRMO project if the Jacobsbaai Western Corridor is used for the pipeline. Map 8-8 shows the cumulative

viewshed if the Jacobsbaai Eastern Corridor is used for the pipeline, and Map 8-9 shows the cumulative viewshed if the WWTP Corridor is included. Visibility for all three options is high due to the size of the project (the length of the corridors as well as the height of some of the components). There are many visual receptors in the region that will potentially be affected.

Map 8-10 shows the cumulative viewsheds of all pump stations with the Pump Station B at the future regional WWTP and Map 8-11 without Pump Station B.

The cumulative viewshed for the power line route from Pump Station E to the Jacobsbaai Feeder station is shown on Map 8-12.

5.2.3 Sensitive Viewers and Viewpoints

Viewer sensitivity	The assessment of the receptivity of viewer groups to the visible landscape elements and visual character and their perception of visual quality and value. The sensitivity of viewer groups depends on their activity and awareness within the affected landscape, their preferences, preconceptions and their opinions.

A rating system provided by the Landscape Institute of the United Kingdom was used to determine viewer sensitivity:

	Definition (GLVIA, 2002)
Exceptional	Views from major tourist or recreational attractions or viewpoints promoted for or related to appreciation of the landscape, or from important landscape features.
High	Users of all outdoor recreational facilities including public and local roads or tourist routes whose attention may be focussed on the landscape; Communities where the development results in changes in the landscape setting or valued views enjoyed by the community; Residents with views affected by the development.
Moderate	People engaged in outdoor sport or recreation (other than appreciation of the landscape).
Low	People at their place of work or focussed on other work or activity; Views from urbanised areas, commercial buildings or industrial zones; People travelling through or passing the affected landscape on transport routes
Negligible (uncommon)	Views from heavily industrialised or blighted areas.

The following sensitive visual receptors will potentially be affected by the development:

- Recreational users of beach and rocky shore near Danger Bay. These receptors will potentially have pump station E and its transfer tank, and power lines and pylons in their views. Construction of the pipeline will also be visible from some areas along the shore. These receptors will have a **medium** sensitivity to the development.
- Visitors to, and viewpoints in, SAS Saldanha Contractual Nature Reserve. These receptors will potentially have views of the pump station and power line, as well as the pipeline during construction. They are rated as **highly** sensitive to the development since they are likely to have their attention focussed on the landscape.

- Residents of, and visitors to, Jacobsbaai will potentially have their existing views intruded on by the proposed power line from pump station E, as well as construction activity during installation of the pipeline (regardless of which corridor is used). Residents are **highly** sensitive to changes in their views.
- Residents and viewpoints on farms along the pipeline corridor will potentially have views of pump stations and power lines. They will also potentially be affected during the construction phase of the pipeline. Residents are **highly** sensitive to changes in their existing views.
- Visitors to Swartriet Private Nature Reserve will potentially have the proposed power line from pump station E in views. Pump station D will also potentially affect some of their views. These visual receptors are **highly** sensitive since they have an active interest in the surrounding landscape.
- Some areas in Vredenburg are located within viewsheds of some components of the proposed development. Visual receptors in Vredenburg are likely to have very complex views with highly contrasting elements and they are therefore classified as having **low** sensitivity to the proposed development.
- Motorists on a number of roads surrounding the site (R79, R559, R27, Jacobsbaai Road and the R238). Motorists are seen as **low** sensitivity visual receptors since their attention is focussed on the road.
- Workers and views in industrial area. Their sensitivity to the development is likely to be **negligible** due to the complexity of their existing views.

5.2.4 Visual Exposure

Visual exposure	Visual exposure refers to the relative visibility of a project or feature in the landscape (Oberholzer, 2005). Exposure and visual impact tend to diminish exponentially with distance. The exposure is classified as follows: • *High exposure* – dominant or clearly noticeable; • *Moderate exposure* – recognisable to the viewer; • *Low exposure* – not particularly noticeable to the viewer

The number of visual receptors (buildings) potentially affected by components of the proposed development are summarised in Table 5-2 although it must be kept in mind that the screening effect of vegetation and buildings were not modelled and that the numbers are likely to be much lower in reality. The numbers should only be used as a relative measure to compare the potential visual impact of various corridors and should not be interpreted outside of the context of this report. There is a high number of buildings in the viewsheds because of a number of urban and industrial areas that fall within them, but it does not mean that all of those visual receptors will be affected (due to screening from adjacent buildings and/or vegetation) and it also does not make any comment on the existing quality of their views. It is clear from the table that the difference between the two Jacobsbaai Corridors is minimal in terms of the number of visual receptors affected.

Table 5-2 Number of visual receptors (buildings) potentially affected by components of the development.

Site	High Visual Exposure	Medium Visual Exposure	Low Visual Exposure	Total
Jacobsbaai Western Corridor	510	197	4315	5022
Jacobsbaai Eastern Corridor	508	188	4436	5132
WWTP Corridor	501	259	4372	5132
OHL E	275	1	66	342
Pump Stations (WWTP included)	71	314	3190	3575
Pump Stations (WWTP excluded)	68	293	3089	3540

Map 8-13 to Map 8-24 show visual exposure ratings for visual receptors to various components and corridors of the proposed development.

5.2.4.1 Recreational users of beach and rocky shore near Danger Bay

Recreational users of the beach along Danger Bay will be **highly** exposed to the pump station, transfer tank and power line at site E because they will have good views of the site and will be in close proximity. They will also be highly exposed to construction activity during installation of pipelines (onshore and marine outfall pipelines).

5.2.4.2 Viewers and viewpoints in the SAS Saldanha Contractual NR

These visual receptors will experience **low** exposure to the development after construction due to their distance from the site pump station E and the power line (more than 2.5 km). During construction of the pipeline some visual receptors may experience **medium** visual exposure to construction activities if the Jacobsbaai Eastern Corridor is used.

5.2.4.3 Residents of, and visitors to, Jacobsbaai

There are residents in Jacobsbaai who will be **highly** exposed to the power line along this route since it passes near residential areas (Map 8-18 and Map 8-24). Residents of Jacobsbaai will also be highly exposed to construction activities when the pipeline is installed, regardless of the corridor chosen.

5.2.4.4 Residents and viewpoints on farms along the pipeline corridor

There are some farm residences in close proximity to components of the proposed development and these visual receptors will be **highly** exposed to the development both during construction and during operation (pump stations and power lines).

5.2.4.5 Visitors to Swartriet Private Nature Reserve

Some views from the nature reserve will be **highly** exposed to a couple of structures associated with the proposed development. These include the power line from pump station E to Jacobsbaai, the power line, pump station and transfer tank at site D, as well as construction activities during the installation of the pipeline.

5.2.4.6 Residents of Vredenburg

Visual exposure to the development will be **low** for views from Vredenburg since the town is more than 5 km from any components of the development.

5.2.4.7 Motorists

Motorists using the R79 (Jacobsbaai Road) will be **highly** exposed to construction activity for almost the whole length of the road since the pipeline will be installed alongside this road. However construction does not occur along the whole length of the pipeline at once so this high exposure will have a very short duration. High visual exposure to pump stations and associate structures will occur for relatively short sections of this road (Map 8-22 and Map 8-23). High exposure to pump station D for 1.7 km, to pump station C for 2.4 km, and to pump station B for 3 km.

The R238 will have a section (3 km) where motorists will be **highly** exposed to construction activity, but visual exposure will **low** for the proposed development (pump stations, transfer tank and power lines) during the operational phase (Map 8-22 and Map 8-23).

Motorists using the R27 will be **highly** exposed to the development for a 6 km section if pump station B is built, and for 3 km if not.

5.2.4.8 Workers and views in industrial area

Many of the industrial developments in the region will be **highly** exposed to some aspect of the proposed SRMO project during the construction phase, for example the Arcelor-Mittal smelter, Namakwa Sands smelter and Transnet Salcor Yard, due to their proximity to the pipeline corridors. Visual exposure during the operational phase of the project will be medium to high for the Namakwa Sands smelter and Transnet Salcor Yard. The Arcelor Mittal smelter lies almost completely outside the viewsheds for pump stations.

5.2.5 Visual Intrusion

Visual intrusion	Visual intrusion indicates the level of compatibility or congruence of the project with the particular qualities of the area – its *sense of place*. This is related to the idea of context and maintaining the integrity of the landscape (Oberholzer, 2005). It can be ranked as follows: *High* – results in a noticeable change or is discordant with the surroundings; *Moderate* – partially fits into the surroundings, but is clearly noticeable; *Low* – minimal change or blends in well with the surroundings.

Sense of place is defined by (Oberholzer, 2005) as: '*The unique quality or character of a place...[It] relates to uniqueness, distinctiveness or strong identity.*' It describes the distinct quality of an area that makes it memorable to the observer.

5.2.5.1 Recreational users of beach and rocky shore near Danger Bay

A 9 ha area of dunes have been cleared of vegetation and mined (essentially flattened) just south-east of Pump Station E, but the only building is a shed not far from the site (Figure 5-1). There are a couple of ruins visible in the area. The sense of place for this site is one of a beach and rocky coast disturbed by (unregulated) recreational activity (Figure 5-2). The pump station and associated structures are not dissimilar to the shed, and the power lines are not high-voltage transmission lines. The structures associated with the development will therefore be clearly noticeable but will partially fit into the surroundings. Visual intrusion for visual receptors in this area will therefore be **moderate**.

Figure 5-2 Panoramic view of Danger Bay and the rocky cape west of the proposed site.

5.2.5.2 Viewers and viewpoints in the SAS Saldanha Contractual NR

Viewpoints from the nature reserve are more than 2.5 km from Pump Station E and the power lines and these structures will make up a small part of the view. Other buildings and ruins will also be in view, and it is likely that activity at the sand mine will also be visible from the reserve. Visual intrusion is likely to be **low** for views from the reserve.

5.2.5.3 Residents of, and visitors to, Jacobsbaai

The power line from pump station E will be the structure that is most likely to affect sensitive visual receptors in Jacobsbaai. Views of similar distribution overhead lines are common from viewpoints in Jacobsbaai and a **low** visual intrusion is expected for residents (Figure 5-3, Figure 5-4).

Figure 5-3 View of road Danger Bay passing through Jacobsbaai.

Figure 5-4 View north-east from Jacobsbaai. A number of power lines cross the landscape.

5.2.5.4 Residents and viewpoints on farms along the pipeline corridor

The structures associated with the proposed SRMO development are similar to existing structures in the surrounding landscape (Figure 5-5). The pump stations and transfer tanks are similar in size and form to farmsteads and structures associated with farms (Figure 5-6). Distribution and transmission power lines are common in the landscape and the new overhead lines proposed for this project are relatively short and similar to existing lines in the same viewsheds. Minimal change is therefore expected in the landscape and the proposed structures are likely to fit into their surroundings. **Low** visual intrusion is therefore expected for these sensitive visual receptors.

Figure 5-5 View west along R79. The building on the right is adjacent to the Pump Station D site.(Source: Google Streetview)

Figure 5-6 Farmstead and associated buildings viewed from R79.

Figure 5-7 View of surrounding landscape from R79.

5.2.5.5 Visitors to Swartriet Private Nature Reserve

Views from Swartriet Private NR will potentially be affected by power lines since high visual exposure is predicted for visual receptors in the reserve. There are existing power lines in the landscape visible from the reserve such as the distribution lines feeding Jacobsbaai, and views

from in the reserve will include buildings and structures of coastal towns. The structures proposed for the SRMO project are similar in size and form to existing structures in views from the reserve. A **low** visual intrusion is therefore expected for the development.

Figure 5-8 Residential buildings and structures in view from Swartriet PNR.

Figure 5-9 View of buildings and structures from Swartriet PNR. Structures proposed for the SRMO project will be congruent with some views from the reserve.

5.2.5.6 Residents of Vredenburg

Vredenburg is more than 5 km from the proposed development. Views from Vredenburg include many industrial developments and structures larger and more prominent than the structures

proposed for the SRMO project (Figure 5-10, Figure 5-11). Visual intrusion on views from Vredenburg are expected to be **low**.

Figure 5-10 Saldanha Bay industrial area from Vredenburg.

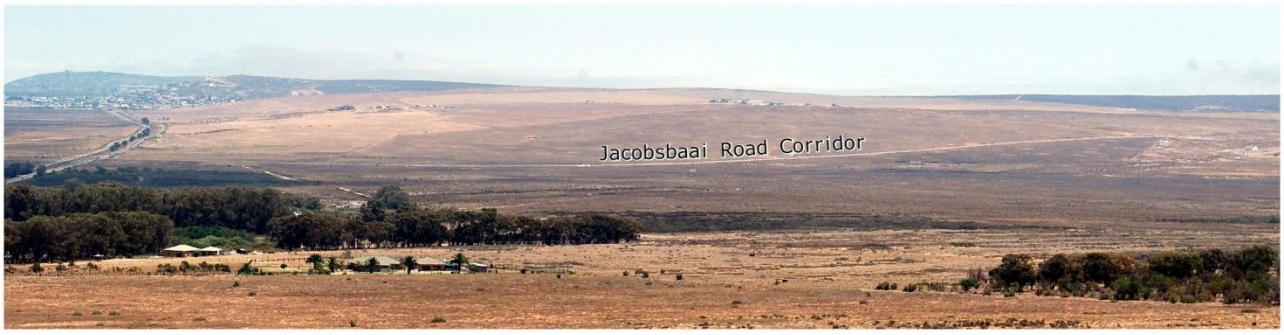

Figure 5-11 View on Jacobsdraai Road corridor from Vredenburg.

5.2.5.7 Workers and views in industrial area

Visual receptors in the industrial area will experience **low** intrusion on their views since their existing views are complex and contain large industrial developments (Figure 5-12; Figure 5-13; Figure 5-14).

Figure 5-12 Arcelormittal Steel Works as seen from the R79.

Figure 5-13 Namakwa Sands smelter.

Figure 5-14 High voltage power lines are common features of the industrial landscape.

5.2.5.8 Roads

Visual intrusion for motorists using the main roads in the region is likely to be **low** for the proposed development since the structures are the same or very similar in size and form to structures in the existing landscape. Many structures in views of motorists will be much more prominent than those of the SRMO project (Figure 5-15 to Figure 5-17 as well as other photos in previous sections).

Figure 5-15 Industrial structures visible from R79.

Figure 5-16 View south from R79 towards SSP site and proposed Pump Station A and B. (Source: Google Streetview)

Figure 5-17 View north towards SSP site from R27. (Source: Google Streetview)

Table 5-3 Visual impact criteria and impact intensity for the proposed development

Sensitive Viewer	Criteria	Rating	Reasoning
Recreational users of beach and rocky shore of Danger Bay.	Visual Sensitivity	**Medium**	Fishermen and recreational users of the beach are likely to be more focussed on their activity than the landscape
	Visual Exposure	**High**	Recreational users of the beach will be in close proximity to Pump Station E (200 m) while fishing spots are between 600 m and 1 km from the pump station.
	Visual Intrusion	**Moderate**	The proposed pump station and transfer tank are similar to existing structures in the area and the power line is medium voltage. These structures will be noticeable but will partially fit into the surroundings.
	Impact Intensity	**Medium**	Moderately sensitive visual receptors will be highly exposed to a development that partially fits into the surroundings. There are very few sensitive visual receptors in the area.
Visitors to, and viewpoints in, SAS Saldanha Contractual Nature Reserve	Visual Sensitivity	**High**	Hikers visiting the reserve are classified as highly sensitive since they have an active interest in the surrounding landscape.
	Visual Exposure	**Low**	The reserve is more than 2.5 km from development structures and these will not be particularly noticeable to observers.
	Visual Intrusion	**Low**	Viewpoints in the reserve are more than 2.5 km from proposed structures. There are similar buildings and ruins in the same views and it is likely that the pump station and its associated structures will not be noticeable from the reserve.
	Impact Intensity	**Low**	The reserve is quite far from the site and the pump station is unlikely to be a prominent feature from the distance.
Residents of, and visitors to, Jacobsbaai	Visual Sensitivity	**High**	Residents have an active interest in the surrounding landscape.
	Visual Exposure	**High**	The power line from Pump Station E will pass in close proximity to residences in Jacobsbaai.
	Visual Intrusion	**Low**	The existing distribution power lines are common features of existing views in town and the proposed overhead lines will follow the same route.

Sensitive Viewer	Criteria	Rating	Reasoning
	Impact Intensity	**Medium**	Highly sensitive visual receptors will be highly exposed to proposed structures even though the structures will be congruent with the existing landscape.
Residents and viewpoints on farms along the pipeline corridor	Visual Sensitivity	**High**	Residents have an active interest in the surrounding landscape.
	Visual Exposure	**High**	There are viewpoints and farmsteads in close proximity to some components of the development (pump stations, power lines and transfer tanks).
	Visual Intrusion	**Low**	Proposed structures are very similar in size and form to structures in the current landscape.
	Impact Intensity	**Medium**	Highly sensitive visual receptors will potentially be highly exposed to elements of the project but proposed structures are congruent with the current landscape.
Visitors to Swartriet Private Nature Reserve	Visual Sensitivity	**High**	Visitors to the nature reserve are likely to value the surrounding landscape.
	Visual Exposure	**High**	There are a number of structures of the proposed development that will be in close proximity to the reserve. These include the power line from Pump Station E, and Pump Station D and its power line and transfer tank.
	Visual Intrusion	**Low**	Proposed structures are very similar in size and form to structures in current views.
	Impact Intensity	**Medium**	Highly sensitive visual receptors will potentially be highly exposed to elements of the project but proposed structures are congruent with the current landscape.
Residents of Vredenburg	Visual Sensitivity	**Low**	The existing views of these residents already contain a number of industrial structures much larger than the proposed development.
	Visual Exposure	**Low**	The town is further than 5 km from any of the proposed development structures.
	Visual Intrusion	**Low**	Views from Vredenburg towards the proposed development will include much larger and more prominent industrial structures such as Port structures, Arcelormittal Steel Works and Namakwa Sands smelter.
	Impact Intensity	**Low**	Residents are living too far from the proposed development to be affected.

Sensitive Viewer	Criteria	Rating	Reasoning
Motorists on roads surrounding the site (R27, R79 and R238).	Visual Sensitivity	**Low**	The roads are most often used by motorists in transit to work or home and there attention will not be on the landscape.
	Visual Exposure	**High**	High for motorists on R79 for sections in close proximity to pump stations. High for a 6 km section of R27 where it passes Pump Stations A and B. Low for R238 after construction of the pipeline.
	Visual Intrusion	**Low**	Proposed structures are very similar in size and form to structures in current views in areas outside the industrial area.
	Impact Intensity	**Low**	Low sensitivity visual receptors are highly exposed to proposed elements of the development but will experience low visual intrusion on their views.
Workers and views in industrial area.	Visual Sensitivity	**Negligible**	The landscape is made up of industrial structures and activity and workers are not focussed on the landscape.
	Visual Exposure	**High**	There will be workers at Transnet Salcor Yard and Namakwa Sands smelter (and other industrial developments along the R79) that will be in close proximity to some of the proposed structures.
	Visual Intrusion	**Low**	Low since their existing views contain large industrial developments.
	Impact Intensity	**Low**	The quality of views of workers will not be altered by the proposed development.

5.3 SIGNIFICANCE OF VISUAL IMPACT ON THE LANDSCAPE

Landscape impacts	Change in the elements, characteristics, character and qualities of the landscape as the result of development (GLVIA, 2002). These effects can be positive or negative, and result from removal of existing landscape elements, addition of new elements, or the alteration of existing elements.

5.3.1 Impact of introducing marine outfall structures into a coastal recreational landscape

Cause and Comment

The landscape into which Pump Station E, its storage tank and the 11 kV power line at the Danger Bay site 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. The area is mainly used by recreational fishermen. Sand mining close to the proposed site has affected the landscape by clearing an area of vegetation and dunes (about 9 ha), but other than this, a small shed and a few ruins, there are few other man-made structures. The landscape character type is seen as moderately sensitive to structures proposed for this area. The main issue is that much of the landscape around Saldanha Bay is already affected by the industrial developments and few areas remain unaffected. The landscape west of the ridge of hills is currently free of industrial elements and care should be taken to preserve the landscape character type.

Mitigation Measures

The dunes are quite high in this area and careful placing of structures and buildings, as well as appropriate colour schemes for buildings can lower their visibility. Wooden power line pylons will maintain a rural feel to the landscape

Table 5-4 Significance of landscape 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**
Operational Phase											
Change in landscape character due to introduction of proposed structures to a coastal recreational landscape.	**Negative**	**Local** – the effect of the impact will be limited to Danger Bay.	**Long term** – 20 to 25 years.	**Medium** – elements incongruent with the existing landscape type are introduced.	**Probable** – there are no industrial elements in the current landscape, but those to be introduced are small in scale.	**High** – Removal of the structures and buildings will remove the industrial elements from the landscape.	**Medium** – there are similar landscapes with a better chance of preservation further north along the coast.	**Medium** – due to the long duration of the impact.	Utilising high dunes to screen the plant as much as possible. Using paint colours on buildings and structures which will reduce contrast with surroundings.	**Low** – lowering the visibility will reduce the intensity of the impact.	**High** – based on site visit and available information.

5.4 SIGNIFICANCE OF VISUAL IMPACT ON VIEWERS

Visual impacts	Changes to the visual character of available views resulting from the development that include: obstruction of existing views; removal of screening elements thereby exposing viewers to unsightly views; the introduction of new elements into the viewshed experienced by visual receptors and intrusion of foreign elements into the viewshed of landscape features thereby detracting from the visual amenity of the area

5.4.1 Intrusion of construction activity on views of sensitive visual receptors at Danger Bay Site

Cause and Comment

Potential visual impacts caused by construction activities will include the visual changes brought about by clearance of vegetation and removal of dunes for buildings and laydown areas; visual disturbance caused by construction of buildings and structures, increased traffic (and number of large vehicles), worker presence and activity, and dust emissions. Other visual disturbances may include sand and soil stockpiles (from excavation for building foundations and other structures), contrasting colours of excavated sand and soil with surface sand.

Mitigation Measures

In addition to assumed best environmental practices as set out in section 1.3.4 on page 2 of this report, the following mitigation measures will lower the impact intensity:

- Laydown areas and stockyards should be located in low visibility areas (e.g. between high dunes) and existing vegetation should be used to screen them from views where possible.
- Night lighting of the construction sites should be minimised within requirements of safety and efficiency.

5.4.2 Intrusion of construction activity along power line and pipeline corridors on views of sensitive visual receptors

Cause and Comment

Power lines and pipelines are linear developments and the point of construction moves along the corridor affecting sensitive viewers for a relatively short time only (even if construction of the whole structure can take a long time). It is likely that only one construction camp for the pipeline is required since the pipeline will not be longer than about 25 km. Construction activities for pipelines will include clearing of a servitude (approximately 10 to 15 m wide within which all construction will occur), grading which entails levelling, cutting and filling (topsoil is removed and stockpiled on the servitude), trench digging which involves trench digging equipment and vehicles, delivering of pipe sections to the servitude where they are distributed end-to-end, connecting pipe sections into one continuous pipe between crossings (river, road or rail), lowering of the pipe and backfilling the ditch. Restoration involves compacting of trench backfill material, restoring original ground contours, respreading stockpiled topsoil and reseeding where appropriate or possible.

Power line construction activities include land clearing of a servitude along the route, access road construction or upgrade, equipment assembly areas, site preparation and installation of components such as pylons and substations.

Pump station and transfer tank construction will involve similar activities and equipment than for pipelines, but will be localised at each site.

Mitigation Measures

In addition to the best construction practises mentioned in section 1.3.4 on page 2 the following mitigation measures will lower the intensity of the impact:

- Construction duration should be kept as short as is practical in order to reduce the visual impact of the construction phase on visual receptors.
- Temporary laydown areas should be located in low visibility areas and existing vegetation should be used to screen these where possible.

5.4.3 Visual intrusion of a pump station and associated structures at Danger Bay on the views of sensitive visual receptors

Cause and Comment

Danger Bay area is currently used by recreational fisherman who mainly fish off the rocks to the west of the proposed site. A sand mining operation has cleared an area of vegetation and removed dunes east of the proposed site, but the operation is small scale and there are very few buildings or man-made structures in existing views. The pump station at site E will introduce a number of elements into this landscape which will potentially alter the sense of place of the area. Recreational users of an area are seen as moderately sensitive to changes in the surrounding landscape, but they will be highly exposed to the pump station and its structures (inlet/outlet pipelines on the beach, power lines and transfer tank).

The marine outfall pipeline will not be visible after construction and the effluent streams will be colourless and will not cause discolouration of the sea water at the outlet points.

Mitigation Measures

- Use existing dunes to conceal as much development as possible.
- Keep building and structure heights as low as possible in order to reduce structure visibility.
- Use non-reflective paint for buildings and structures in a colour that blends in as well as possible with the background (e.g. RAL-9010, RAL-9016, RAL-9003 or RAL-9001).
- The maintenance plan should include regular maintenance of exterior facades since the pump station and associated structures are likely to be highly exposed to the elements.

5.4.4 Visual intrusion of 11 kV overhead power lines from Pump Station E to Jacobsbaai on views of sensitive visual receptors

Cause and Comment

There are a number of highly sensitive visual receptors along this corridor that will potentially be affected by power lines along this corridor. They include residents of Jacobsbaai, residents and viewpoints of farms along the path of the corridor, and visual receptors in Swartriet Private Nature Reserve.

Mitigation Measures

There is not much that can be done to mitigate the impact since the visibility of the power lines and pylons cannot be reduced (unless the lines are buried, particularly for the section through/past Jacobsbaai). It would make sense to use a pylon design similar to the existing power line pylons, particularly for the section through Jacobsbaai, although the added pylons and lines will increase the clutter of power lines already visible in the town.

5.4.5 Visual impact of night lighting of Pump Station E at Danger Bay

Cause and Comment

The nightscape of Danger Bay is fairly dark as there are no lights in the vicinity of the proposed site, but the proximity of settlements such as Jacobsbaai, Middelpos and Diazville, as well as contribution from the industrial area and port to the east, means that there is considerable sky glow (Figure 5-18). Lights from Jacobsbaai are also directly visible from the dunes in places. The pump station will introduce lights to an area which is currently free from lights, which will affect existing views of Danger Bay at night. The impact is not expected to be high since most existing night views of Danger Bay will also include other areas with light, and will already be affected by sky glow. Lighting of the pump station will be similar to, or less than, that of a farmstead.

Mitigation Measures

The mitigation measures below target lighting features that will contribute to light pollution and attempt to reduce light trespass, glare and sky glow (see Lighting Research Center website for more information on light pollution).

- Lighting of the facility should not exceed, in number of lights and brightness, the minimum required for safety and security.
- Uplighting and glare (bright light) should be minimised using appropriate light screening features on all external lights.
- Low-pressure sodium light sources should be used to reduce light pollution.
- Light fixtures should not spill light beyond the project boundary (light trespass).
- Lights should be switched off when not in use whenever it is in line with safety and security.

Figure 5-18 Night glow from the industrial zone near Saldanha.

Table 5-5 Significance of potential visual impact on sensitive viewers

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											
Intrusion of construction activity on views of sensitive visual receptors at Danger Bay Site	**Negative**	**Local** – the viewshed for this development is small.	**Temporary** – less than a year.	**High** – medium sensitivity visual receptors, high visual exposure and high visual intrusion.	**Probable** – construction activities are common in the Saldanha industrial area.			**Medium** – local extent and temporary nature of impact, but high intensity.	Laydown areas and stockyards should be located in low visibility areas (e.g. between high dunes) and existing vegetation should be used to screen them from views where possible. Night lighting of the construction sites should be minimised within requirements of safety and efficiency.	**Low** – lowering the visibility will reduce the intensity of the impact.	**High** – based on site visit and available information.
Intrusion of construction activity along power line and pipeline corridors on views of sensitive visual receptors	**Negative**	**Local –** the effect of the impact will be limited immediate surroundings of construction site. The point of construction moves along corridor and does not include the whole corridor	**Temporary** – less than a year.	**High –** There are highly sensitive visual receptors that will be highly exposed to construction activity. Visual intrusion will be high.	**Probable** – construction activities are common in the Saldanha industrial area.			**Medium** – local extent and temporary nature of impact, but high intensity.	Construction duration should be kept as short as is practical in order to reduce the visual impact of the construction phase on visual receptors. Temporary laydown areas should be located in low visibility areas and existing vegetation should be used to screen these where possible.	**Medium** – lowering the visibility will reduce the intensity of the impact somewhat, but construction of the pipeline and power line in Jacobsbaai will still be highly intrusive on existing views.	**High** – based on site visit and available information.

Operational Phase											
Visual intrusion of a pump station and associated structures at Danger Bay on the views of sensitive visual receptors	**Negative**	**Local** – visual exposure will be low beyond 2 km..	**Long Term** – lifetime of the project.	**Medium** - Moderately sensitive visual receptors will be highly exposed to a development that partially fits into the surroundings. There are very few sensitive visual receptors in the area	**Probable** – the pump station and associated structures fit in partially with the landscape.	**High** – visible structures can be completely removed from the landscape/views.	**Medium** – there are other sites similar to that of Danger Bay further north along the coast, but these are much further away from towns like Diazville This means that for some recreational fishermen important visual resources are altered.	**Medium** – due to medium intensity, local extent and long term of the impact.	Use existing dunes to conceal as much development as possible. Keep building and structure heights as low as possible in order to reduce structure visibility. Use non-reflective paint for buildings and structures in a colour that blends in as well as possible with the background (e.g. RAL-9010, RAL-9016, RAL-9003 or RAL-9001). The maintenance plan should include regular maintenance of exterior facades since the pump station and associated structures are likely to be highly exposed to the elements.	**Low** – lowering the visibility will reduce the intensity of the impact and will lower the effect on visual resources.	**High** – based on site visit and available information.
Visual intrusion of 11 kV overhead power lines from Pump Station E to Jacobsbaai on views of sensitive visual receptors	**Negative**	**Local** – even though the power line is 4 km long it is only the section within Jacobsbaai that will potentially affect residents.	**Long term** – lifetime of project	**Medium** – Highly sensitive visual receptors will be in close proximity to the power line.	**Highly Probable** – Residents of Jacobsbaai will be affected by another power line through town.	**High** – visible structures can be completely removed from views.	**Low** – there is an existing power line along the route and views along the road are complex and to an extent, cluttered.	**Medium** – medium intensity impact of local extent and long term duration.	Pylons should be similar to existing pylons.	**Medium** – mitigation measures are unlikely to reduce the significance of the impact unless the power lines can be buried.	**High** – based on site visit and available information.

Impact of night lighting of Pump Station E at Danger Bay on the nightscape.	**Negative**	**Local** – considering the existing light pollution in the region night lighting at Danger Bay is expected to affect only a few visual receptors.	**Long term** – lifetime of the project (20 to 25 years)	**Low** – lighting is unlikely to be more intense than that of a farmstead..	**Probable** – since it is unclear whether there are visual receptors with night views on Danger Bay that will be impacted.	**High** – removal of lights from site will restore the original nightscape state.	**Low** – it is unlikely that views of Danger Bay are without lights and nightglow.	**Low** – low intensity impact with a local extent.	Lighting of the facility should not exceed, in number of lights and brightness, the minimum required for safety and security. Uplighting and glare (bright light) should be minimised using appropriate light screening features on all external lights. Low-pressure sodium light sources should be used to reduce light pollution. Light fixtures should not spill light beyond the project boundary (light trespass). Lights should be switched off when not in use whenever it is in line with safety and security.	**Low**	**High** – based on site visit and available information.

5.5 CUMULATIVE IMPACT

The Western Cape District Municipality (WCDM) has proposed a desalination plant for the Danger Bay area in close proximity to Pump Station E of the SRMO project. The desalination plant development has received environmental authorisation from the Department of Environmental Affairs. If the desalination plant is built in the Danger Bay area as proposed then the landscape there will be altered considerably. A large industrial element will be introduced to the region and its rural nature is unlikely to remain.

High voltage (66 kV) power lines will be installed along the same route as that proposed for the SRMO project, from the desalination plant (or Pump Station E) to Jacobsbaai along the gravel road. If the desalination plant is built then the SRMO pipeline will connect directly to the disposal infrastructure of the desalination plant and a separate pump station will not be necessary.

The cumulative visual impact will be **low** since the desalination plant will predominate views in the area, and since Pump Station E will not be necessary the 11 kV power line to Jacobsbaai will also not be required.

6 CONCLUSIONS AND RECOMMENDATIONS

The SRMO pipelines will be buried and will therefore only have a visual impact on sensitive visual receptors during the construction phase. The servitude for the pipeline for the most part will be adjacent to the road, except if the Jacobsbaai Eastern Corridor is used.

The overhead power lines are medium voltage distribution lines (11 kV) which are familiar features of the existing landscape and for Pump Stations A to D are unlikely to cause visual intrusion on existing views. However the power line from Pump Station E to Jacobsbaai will be a new element in the Danger Bay landscape. It will also increase the visual clutter in Jacobsbaai caused by existing power lines.

The only pump station that will potentially cause significant visual intrusion is Pump Station E in Danger Bay but careful siting among the dunes can reduce the impact since the structures are no larger than existing buildings in the area. The other proposed pump stations are located in areas where they will not seem out of place in the landscape since they are similar in size and form to farm buildings and structures.

In terms of visual impact the Jacobsbaai Western Corridor is the preferred corridor for the pipeline since it will follow the existing road and will not open up a new corridor in the landscape.

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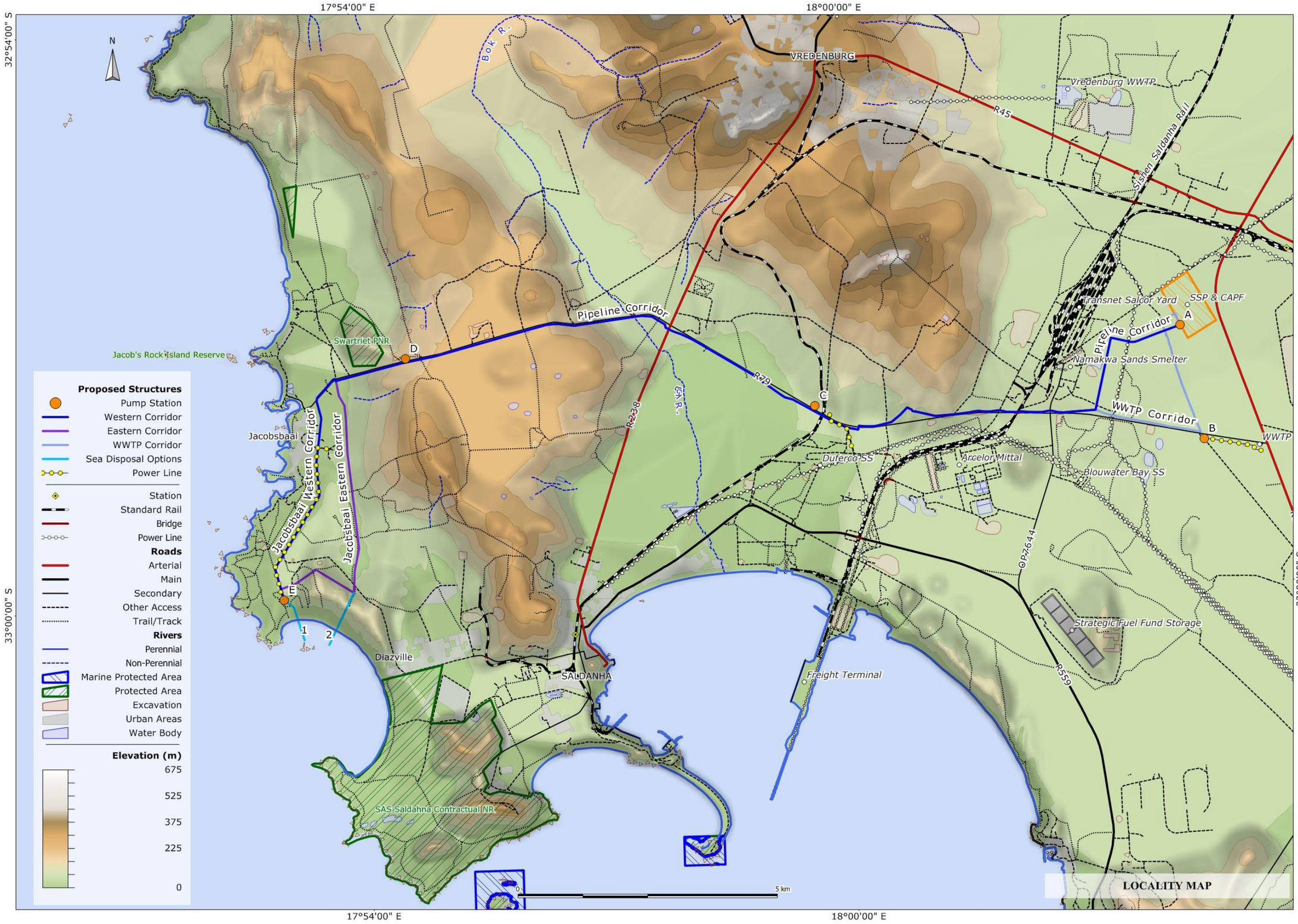
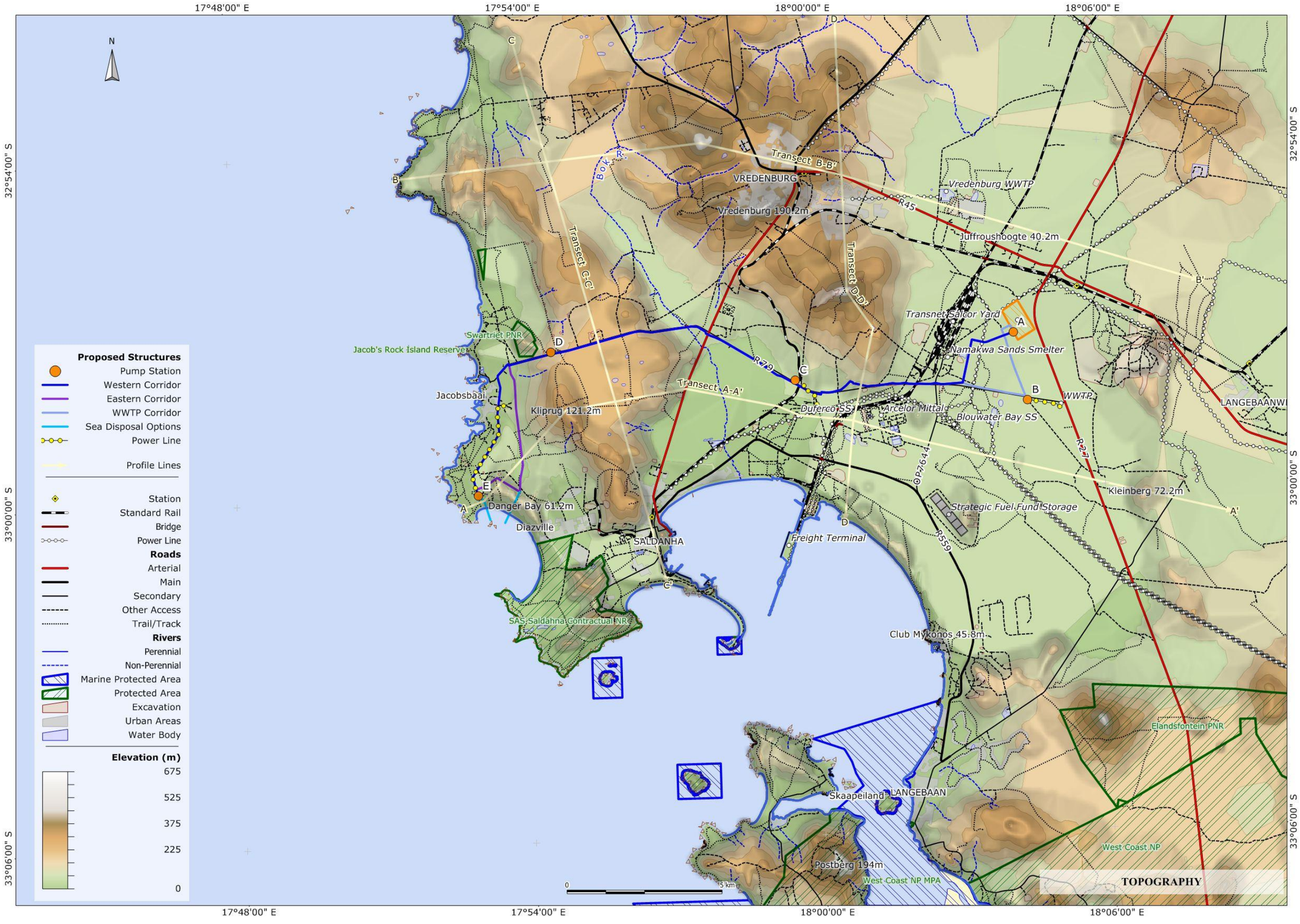
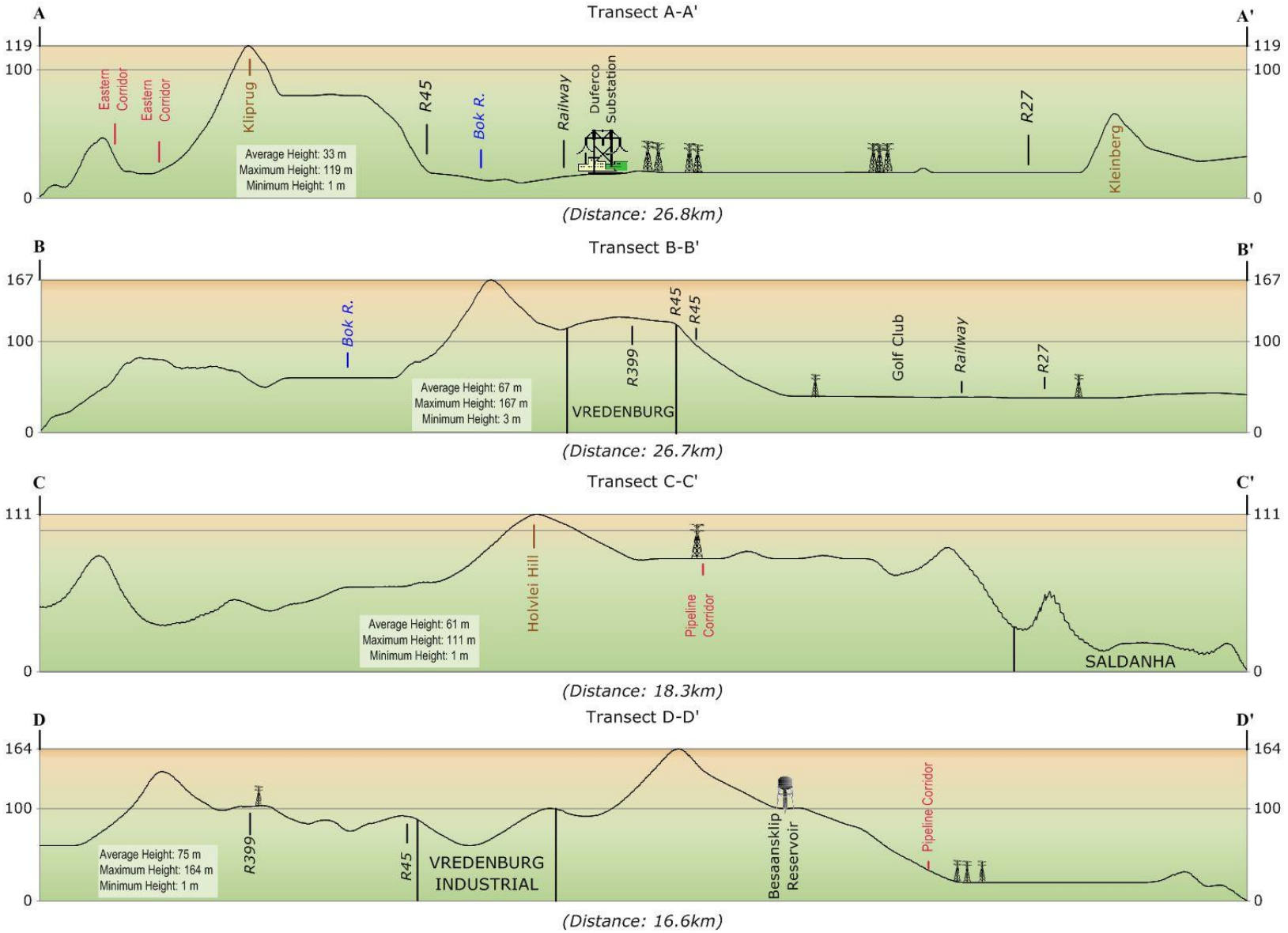
8 MAPS



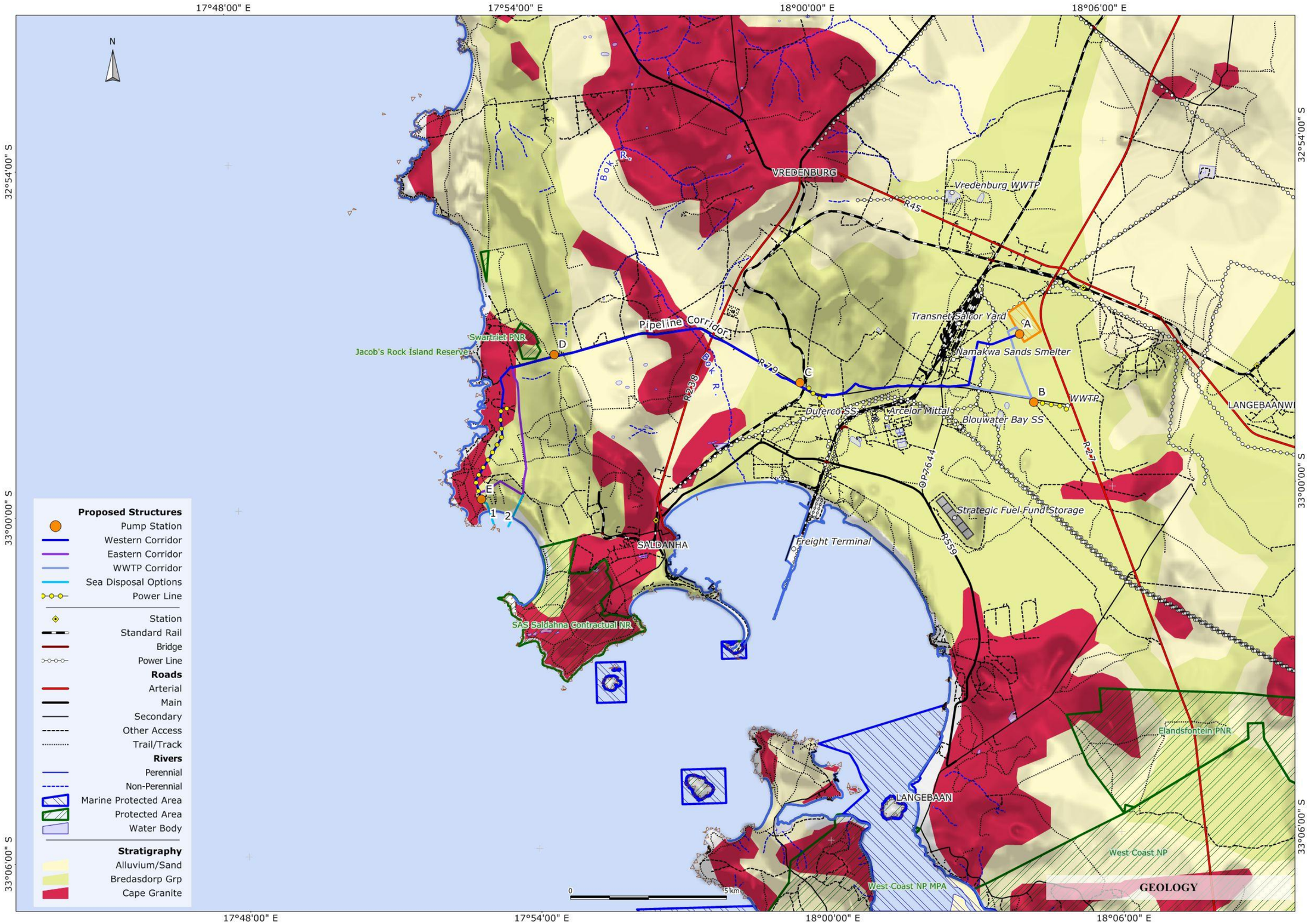
Map 8-1 Proposed layout for the SRMO project components and alternatives.



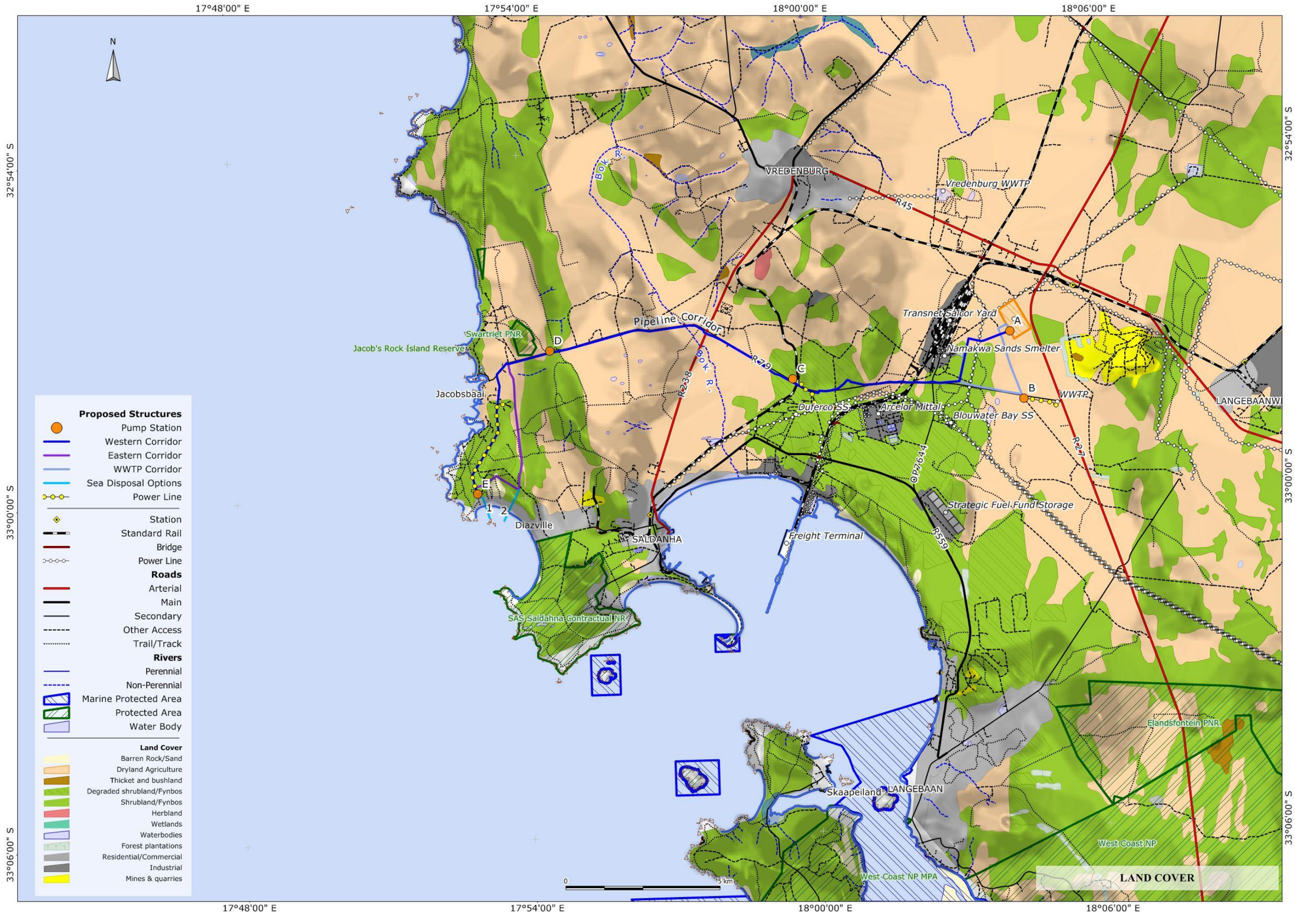
Map 8-2 Topography of the region surrounding the proposed development.



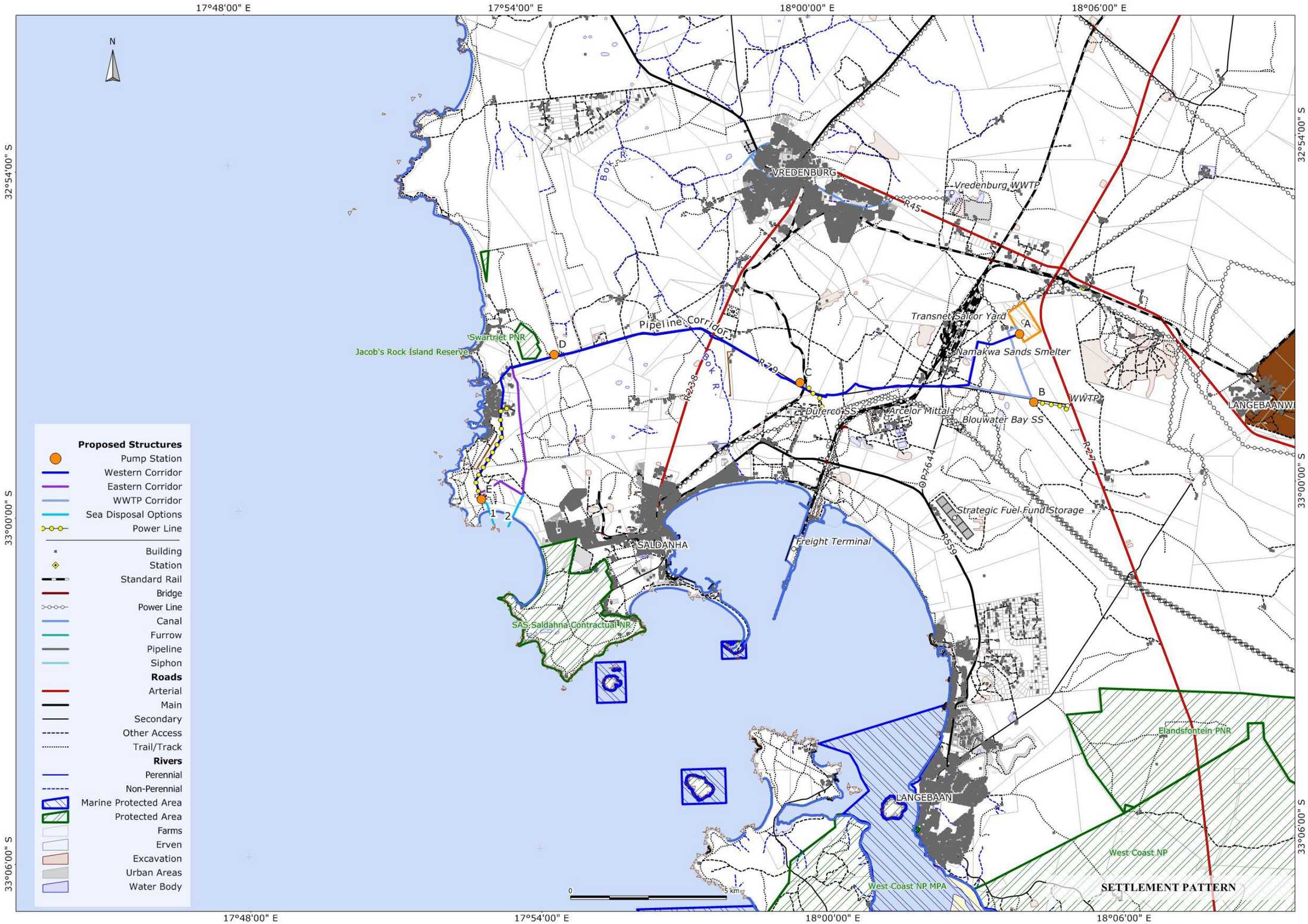
Map 8-3 Topographic profiles for the region. Vertical scale is exaggerated and different for each profile. Red text indicates proposed structure and corridor positions in the landscape where they occur along the transects.



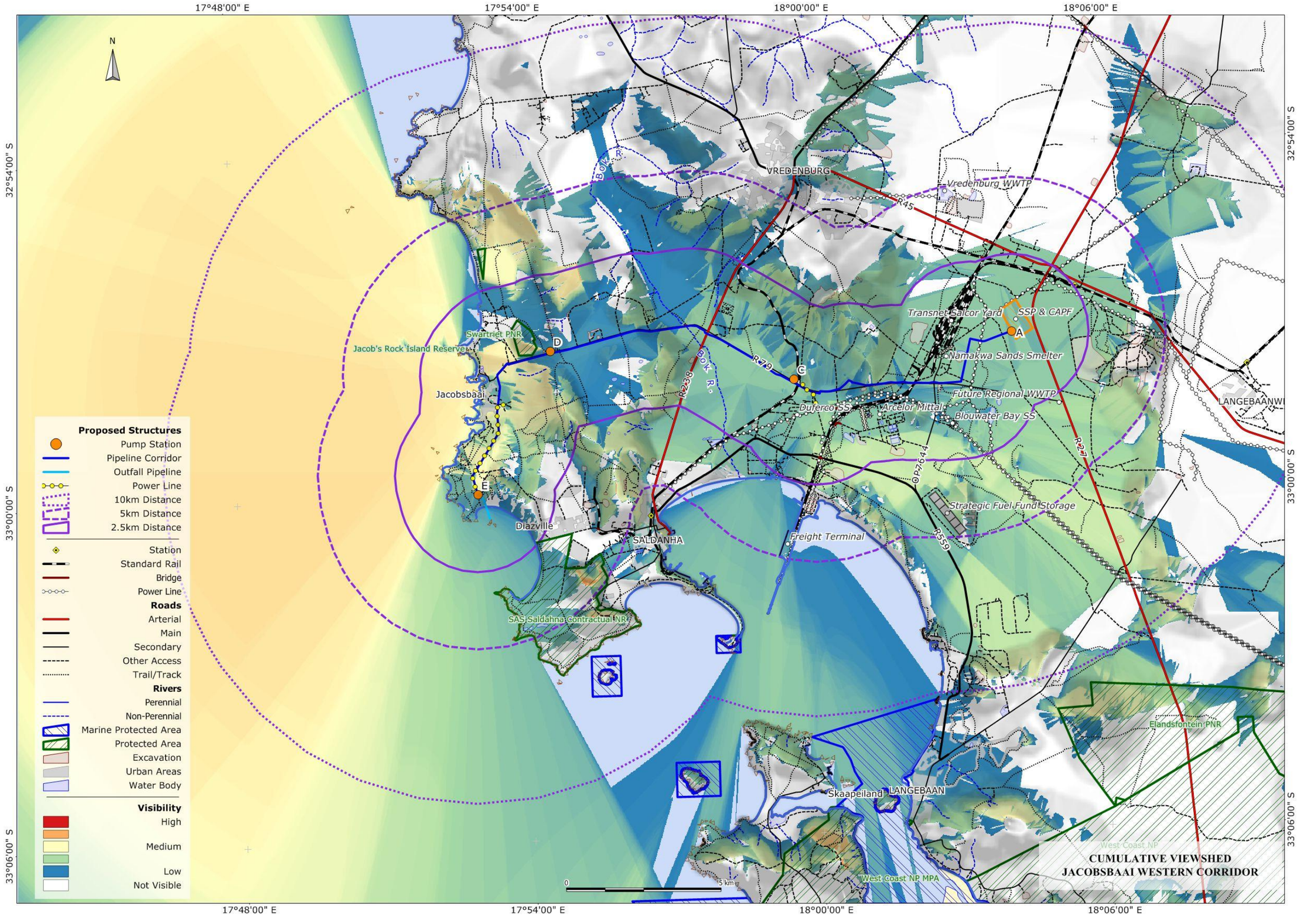
Map 8-4 Geology of the region. (Grp - group)



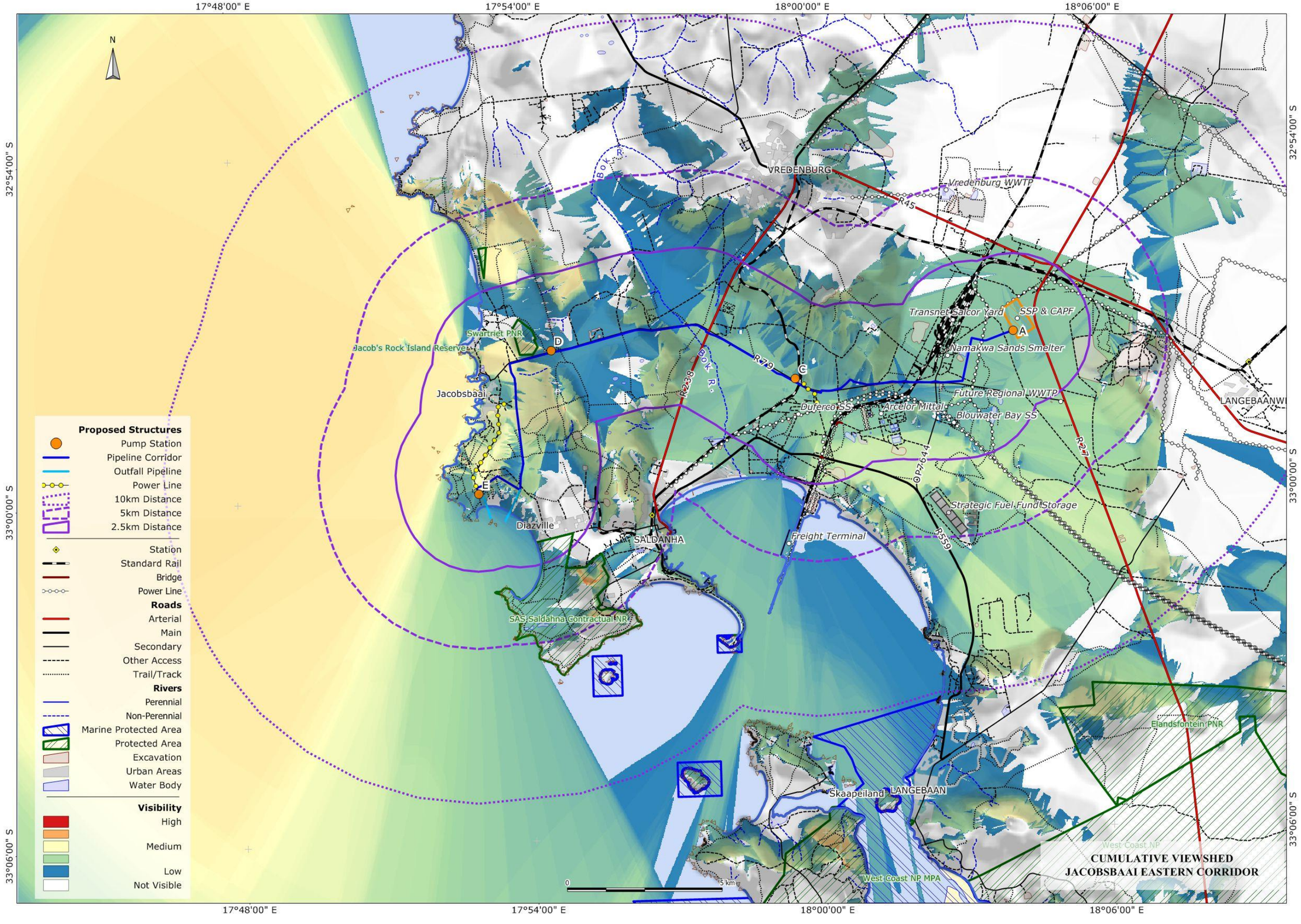
Map 8-5 Map of land cover for the region.



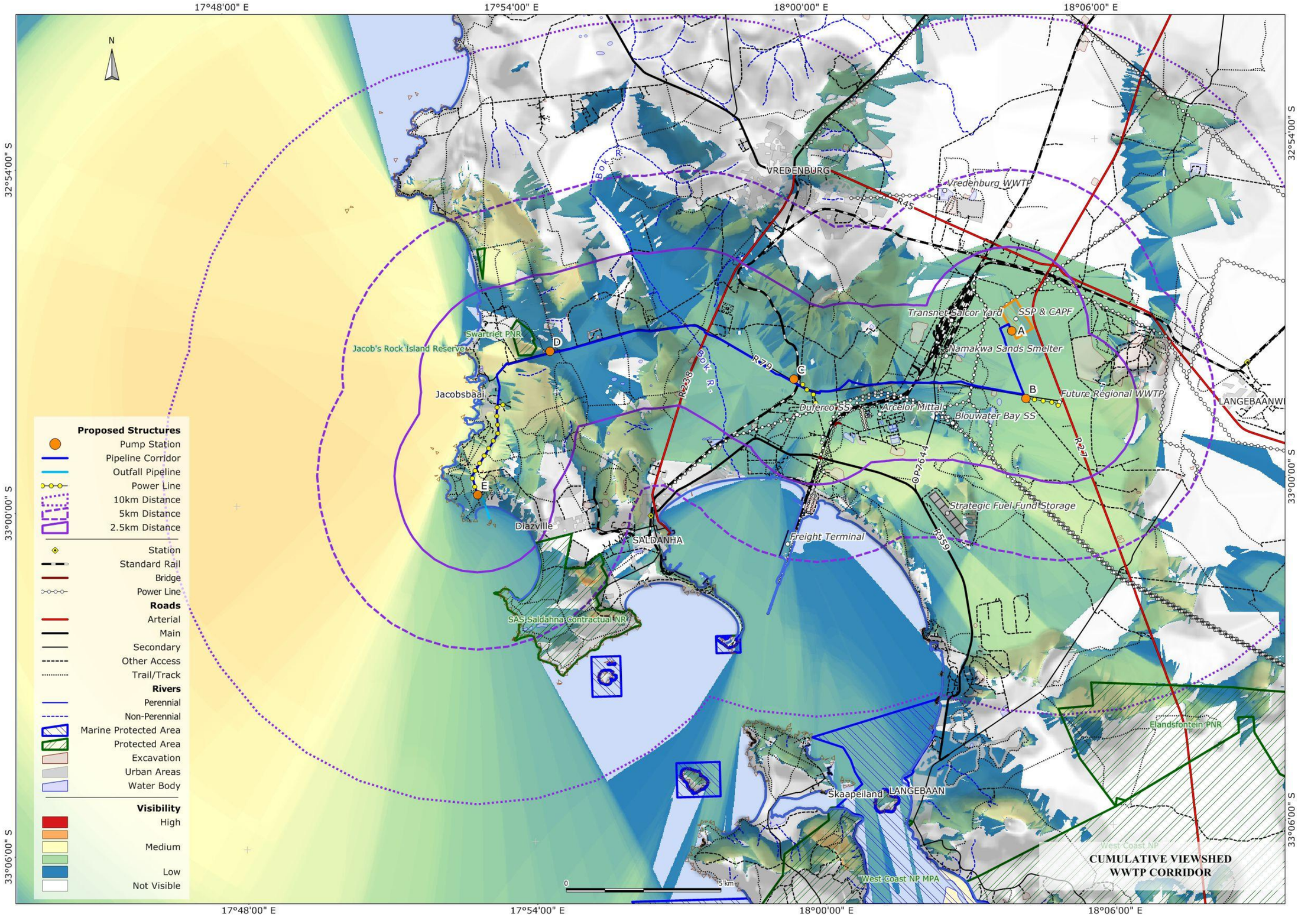
Map 8-6 Settlement pattern and large man-made structures in the regional landscape.



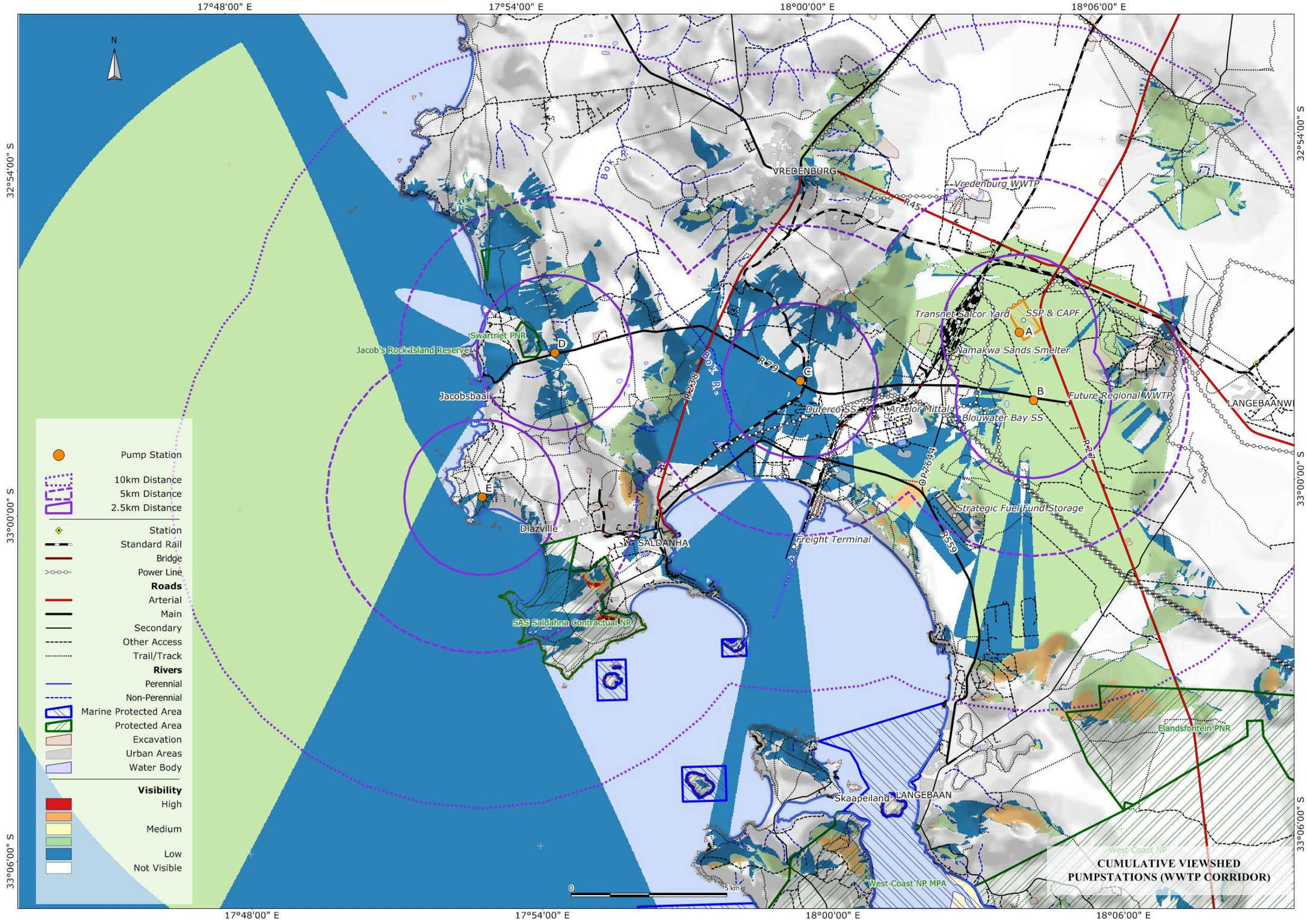
Map 8-7 Cumulative viewshed of the SRMO project using the Jacobsbaai Western Corridor.



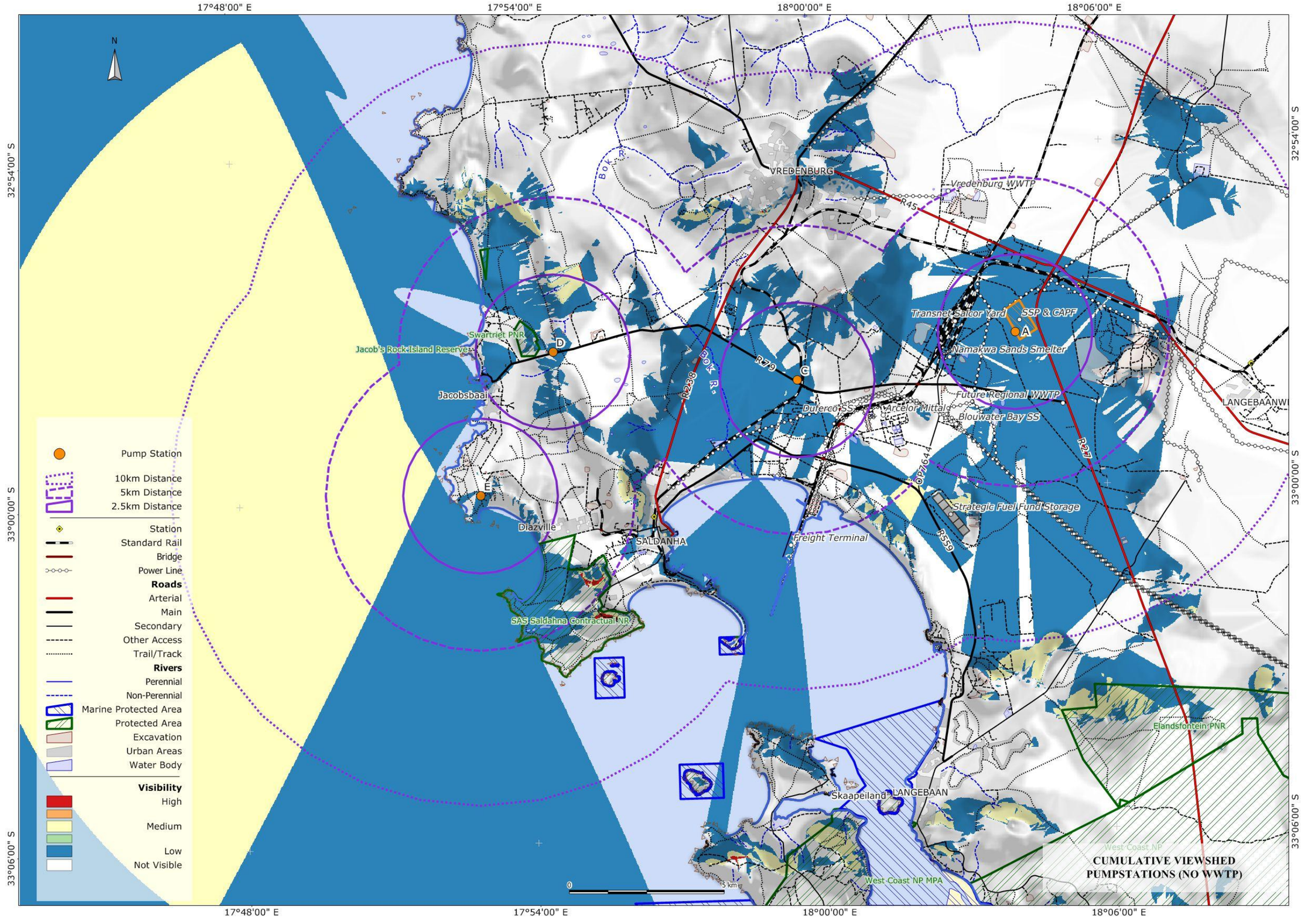
Map 8-8 Cumulative viewshed of the SRMO project using the Jacobsbaai Eastern Corridor.



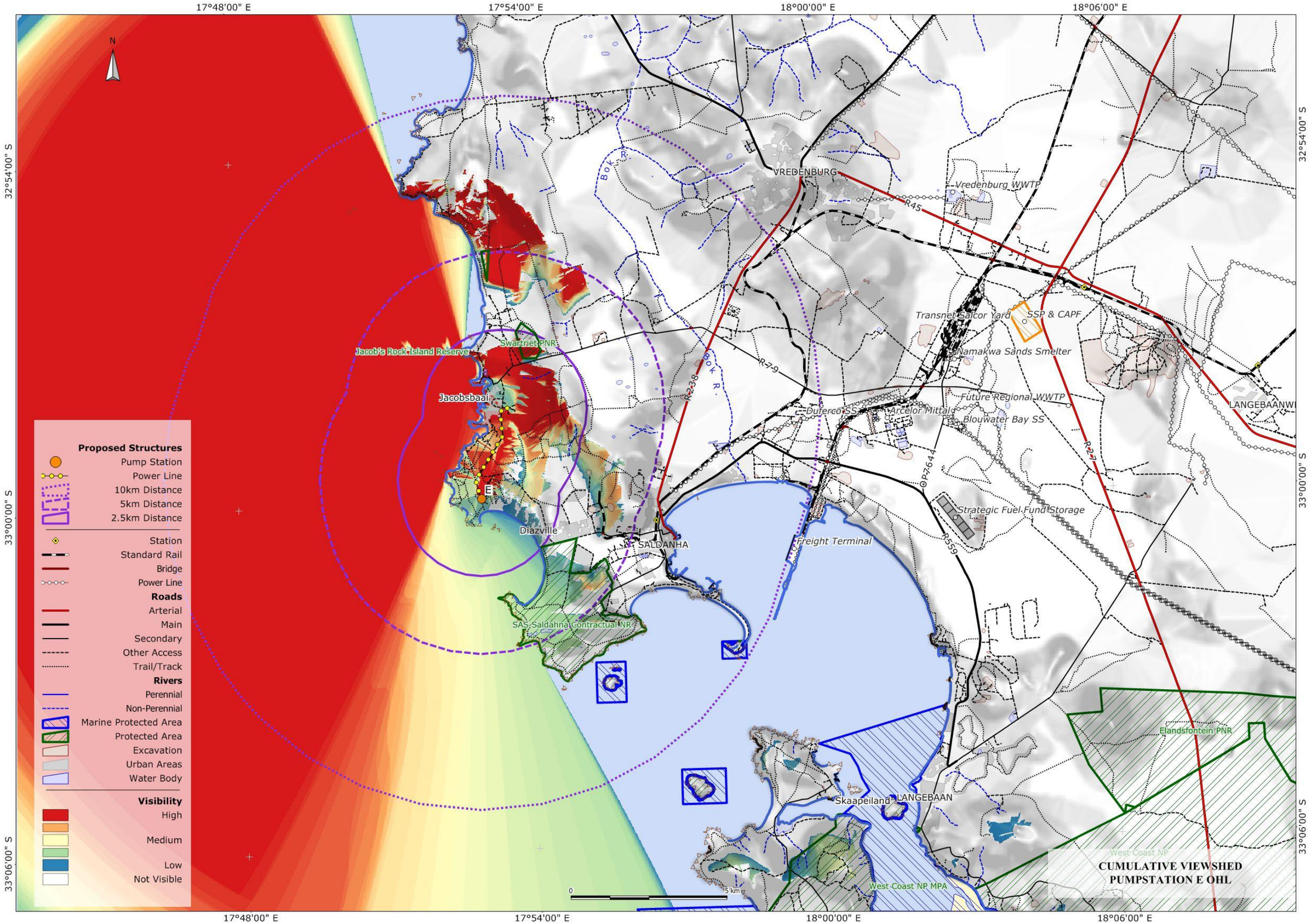
Map 8-9 Cumulative viewshed of the SRMO project using the WWTP corridor.



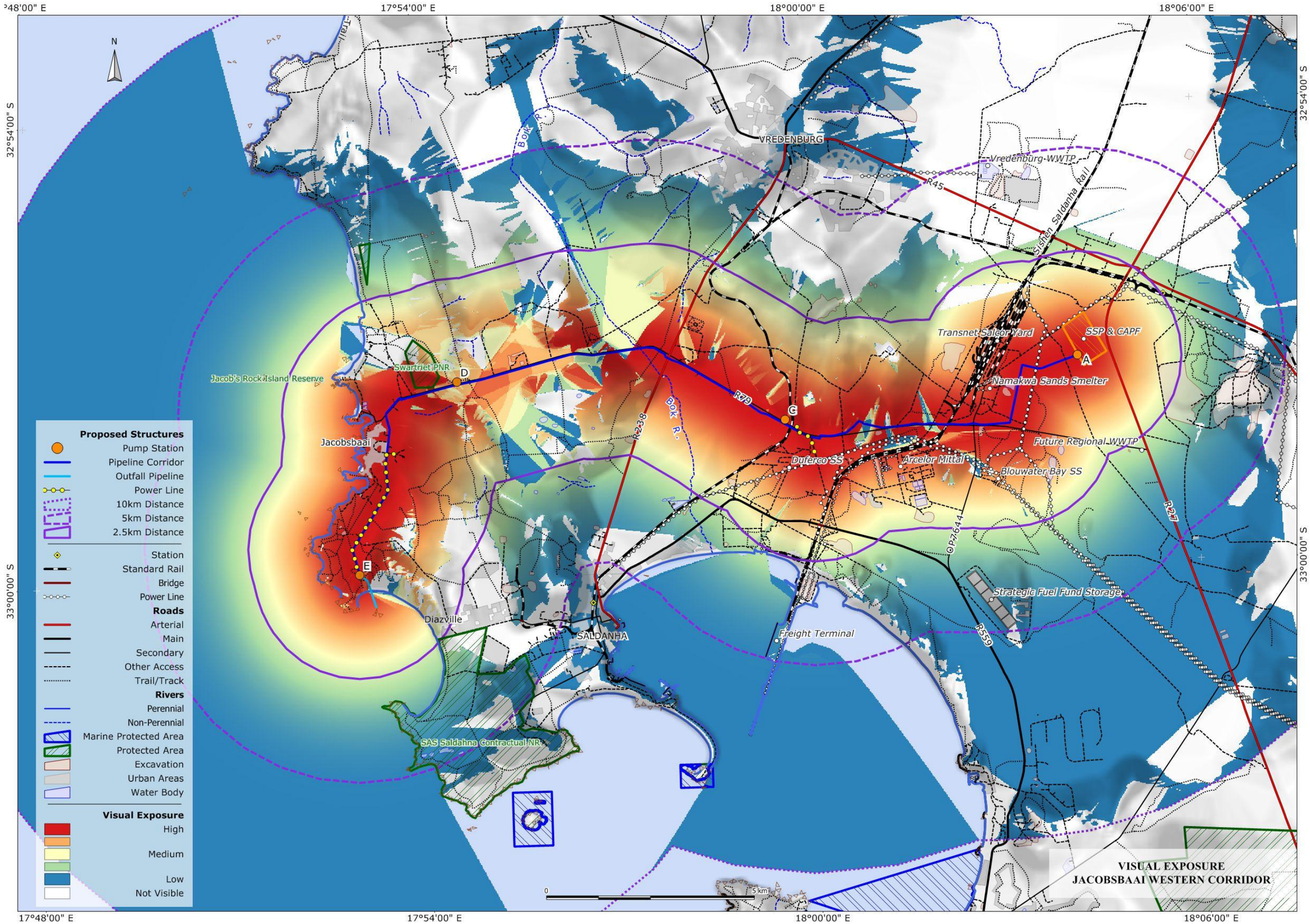
Map 8-10 Cumulative viewshed of all five proposed pump stations.



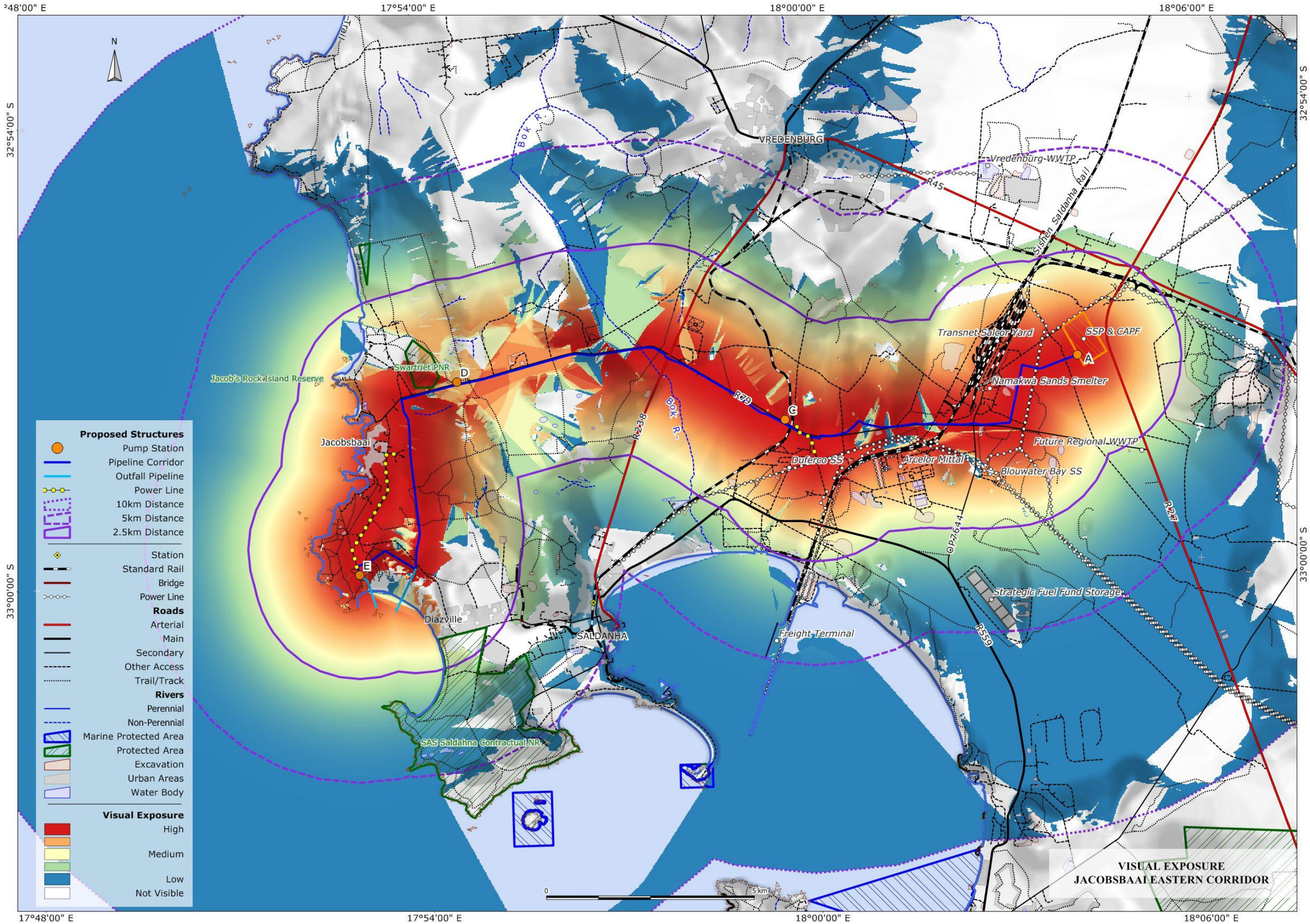
Map 8-11 Cumulative viewshed of four pump stations.



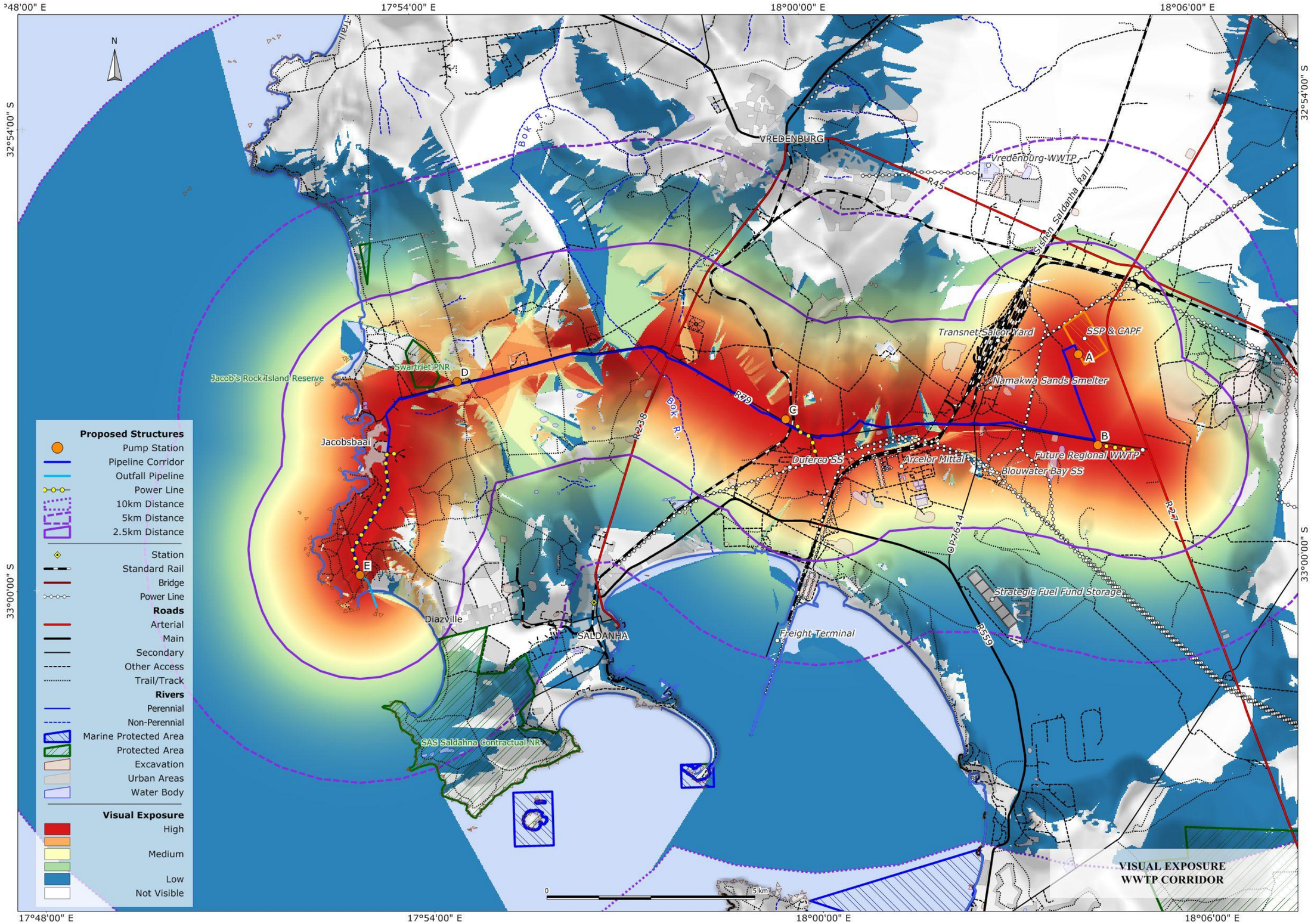
Map 8-12 Cumulative viewshed for a power line from pump station E to the 11 kV Jacobs Bay Feeder.



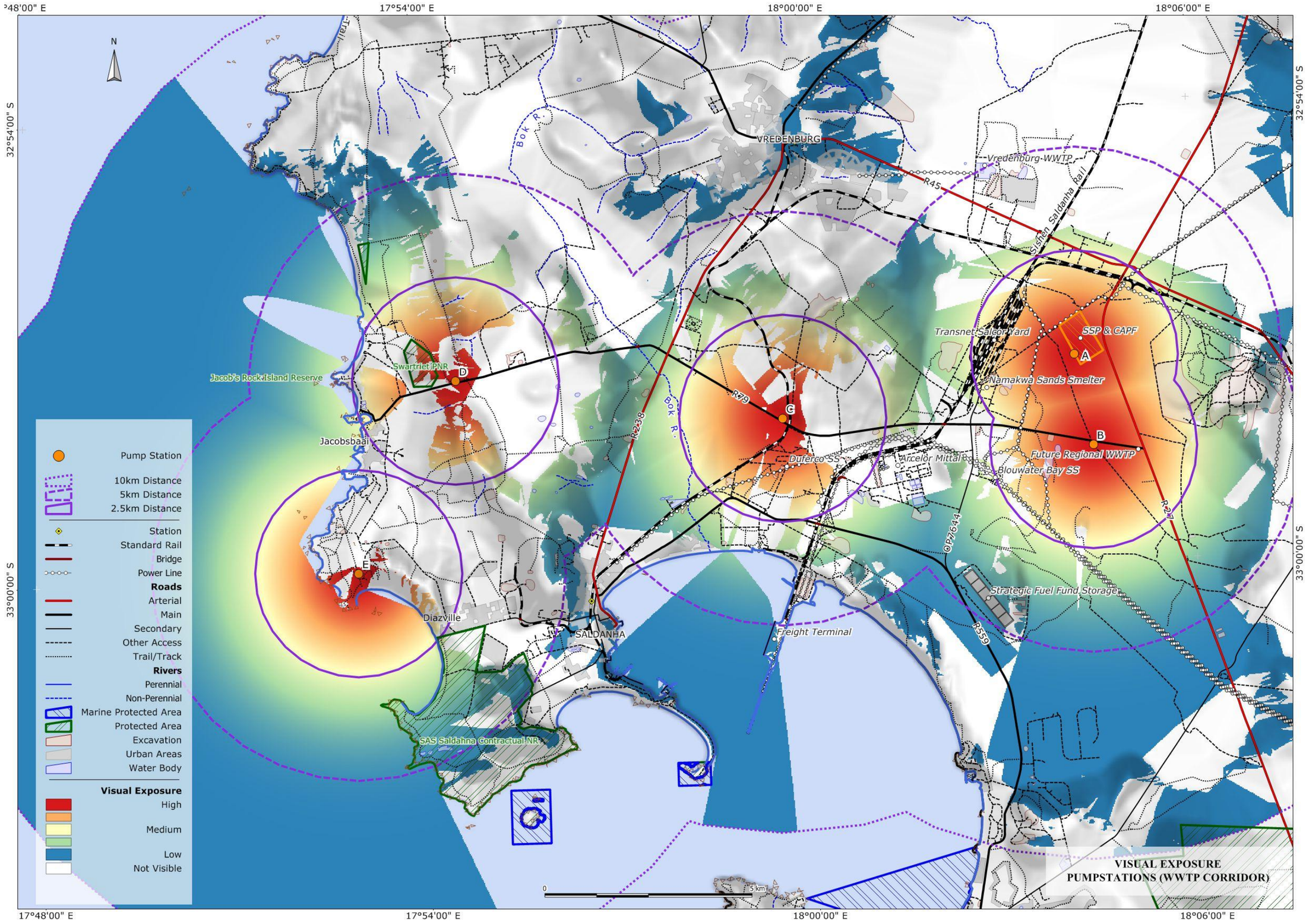
Map 8-13 Visual exposure map for the SRMO project using the Jacobsbaai Western Corridor.



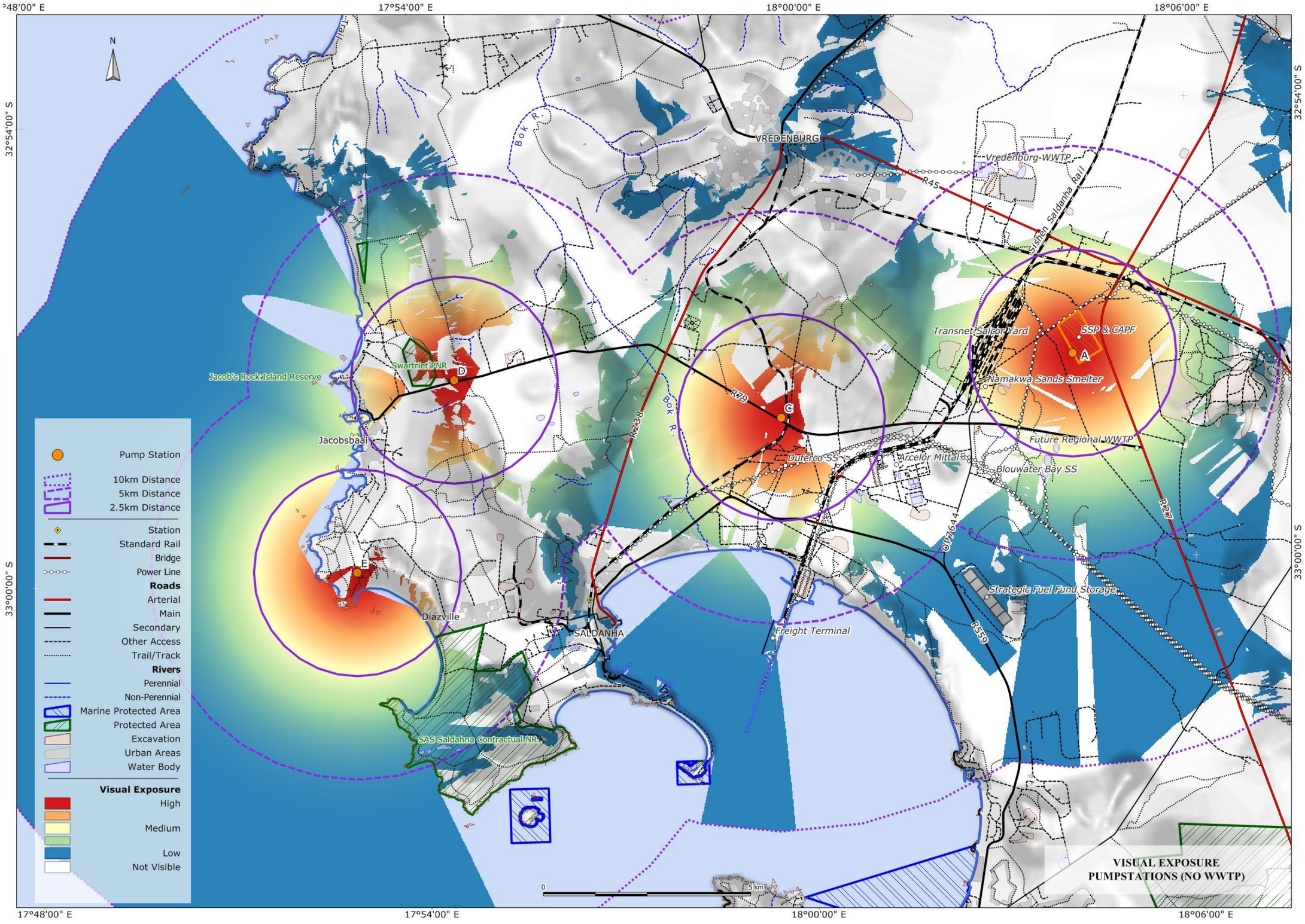
Map 8-14 Visual exposure map for the SRMO project using the Jacobsbaai Eastern Corridor for the pipeline.



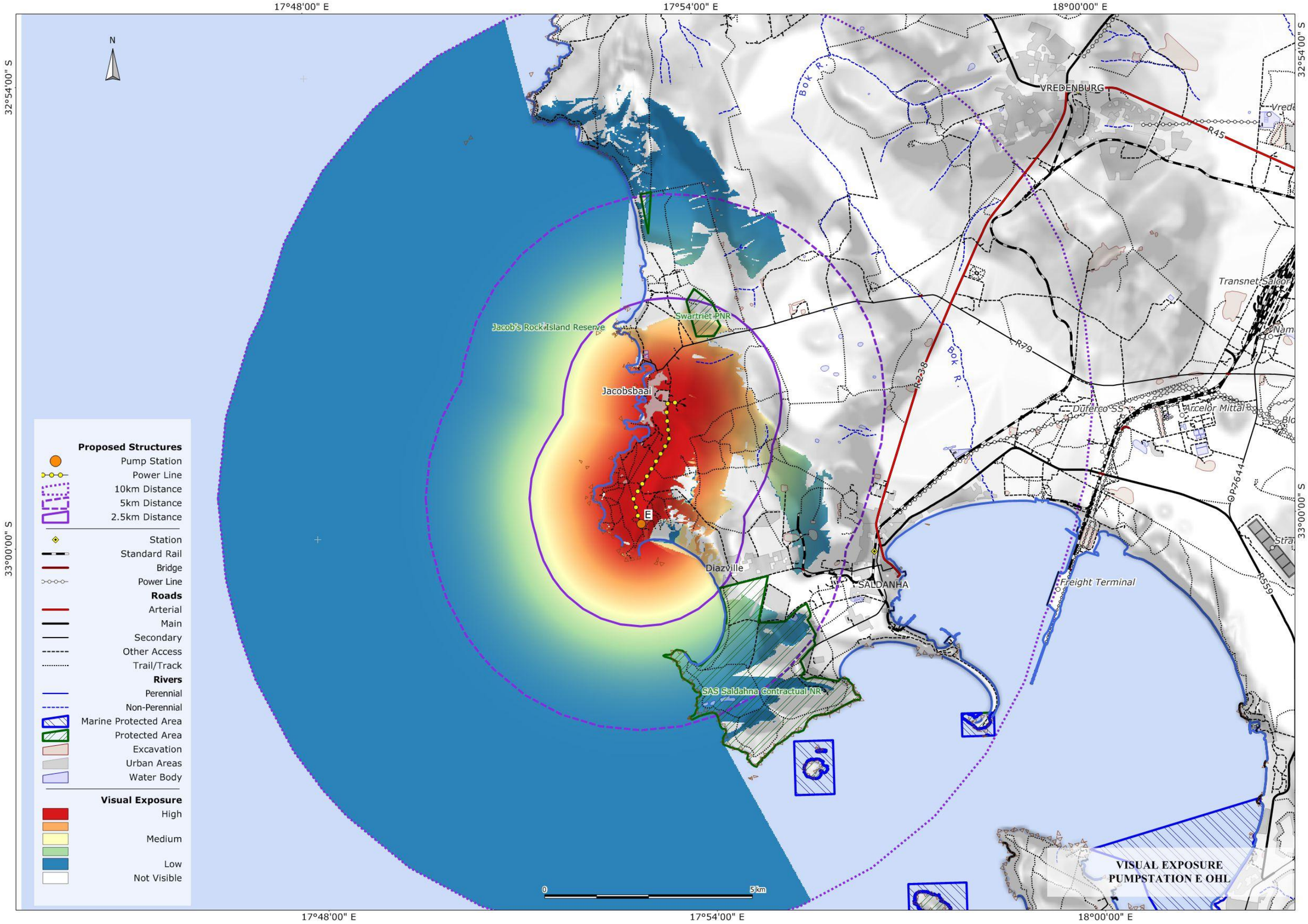
Map 8-15 Visual exposure map for the SRMO project using the WTTP Corridor for the pipeline.



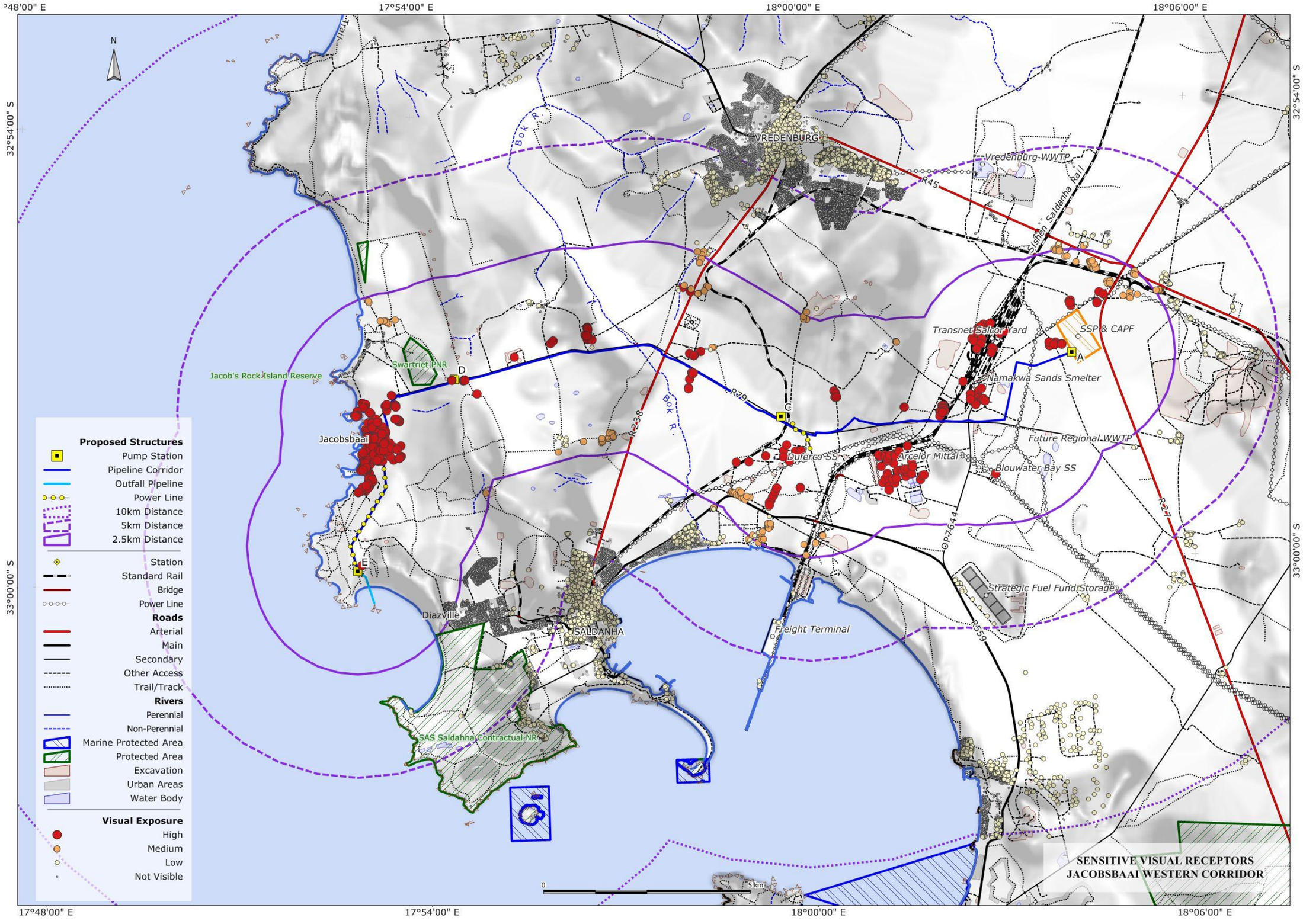
Map 8-16 Visual exposure map for five proposed pump stations.



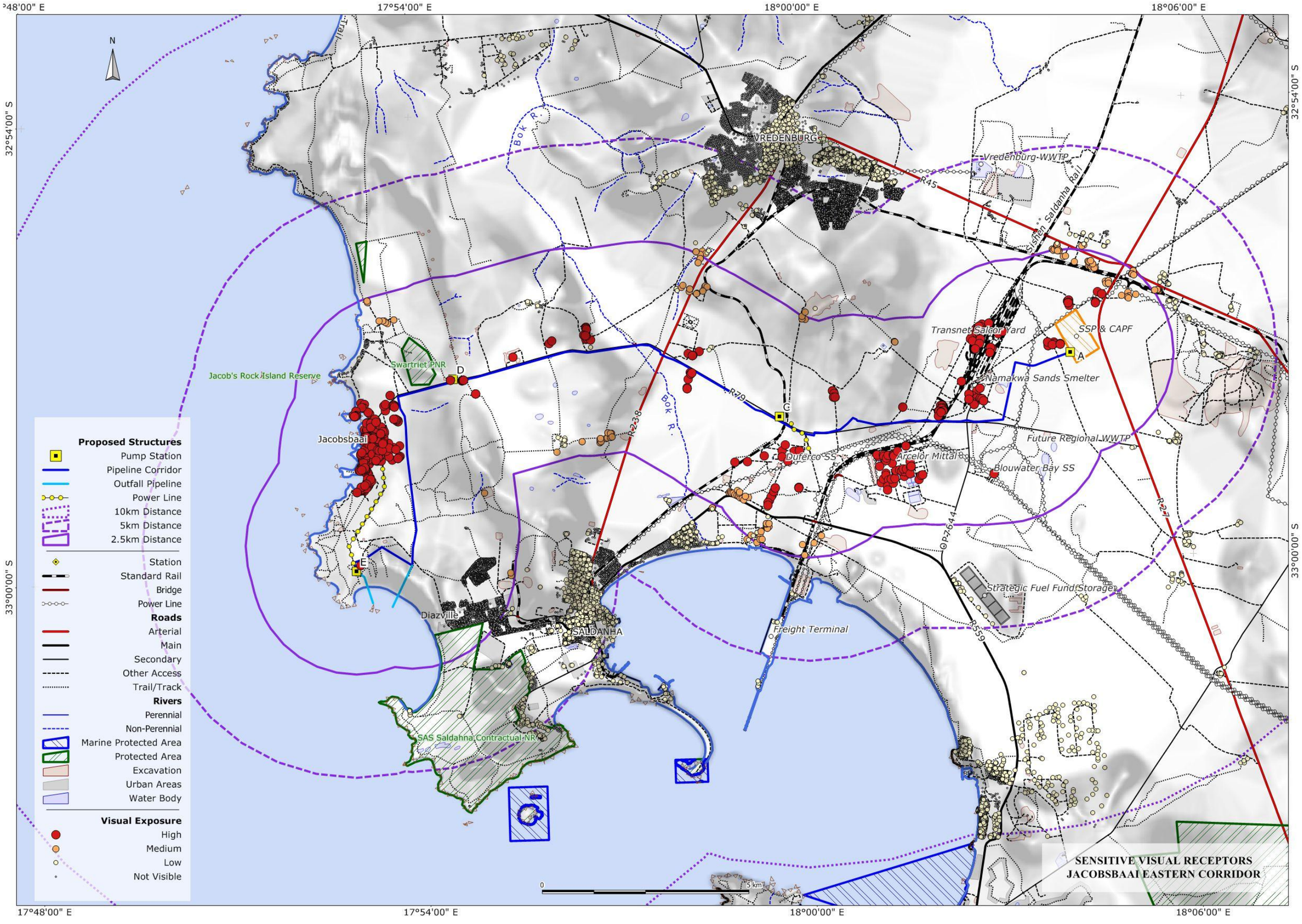
Map 8-17 Visual exposure map of four proposed pump stations.



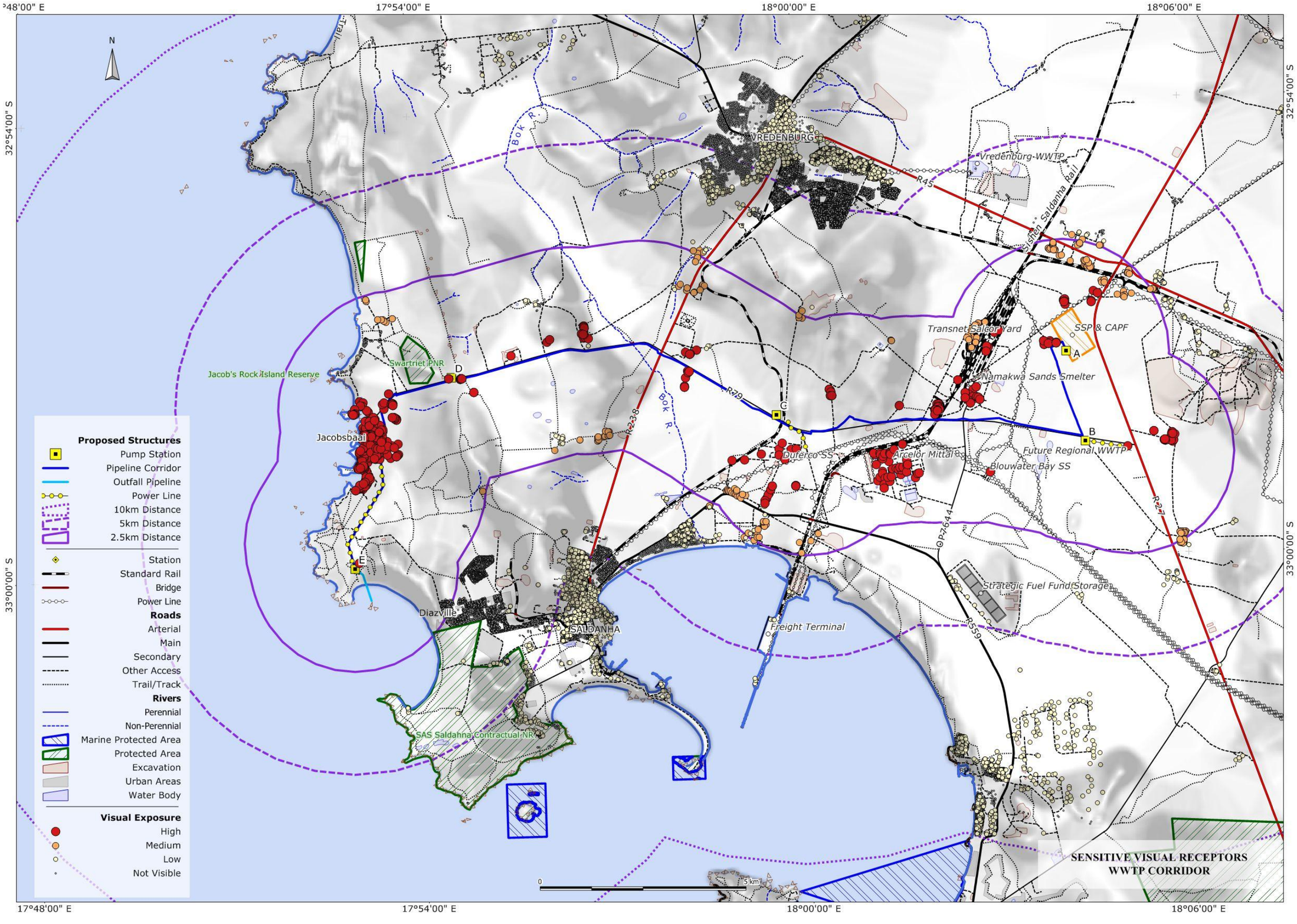
Map 8-18 Visual exposure map for a power line from pump station E to the 11 kV Jacobsbaai Feeder.



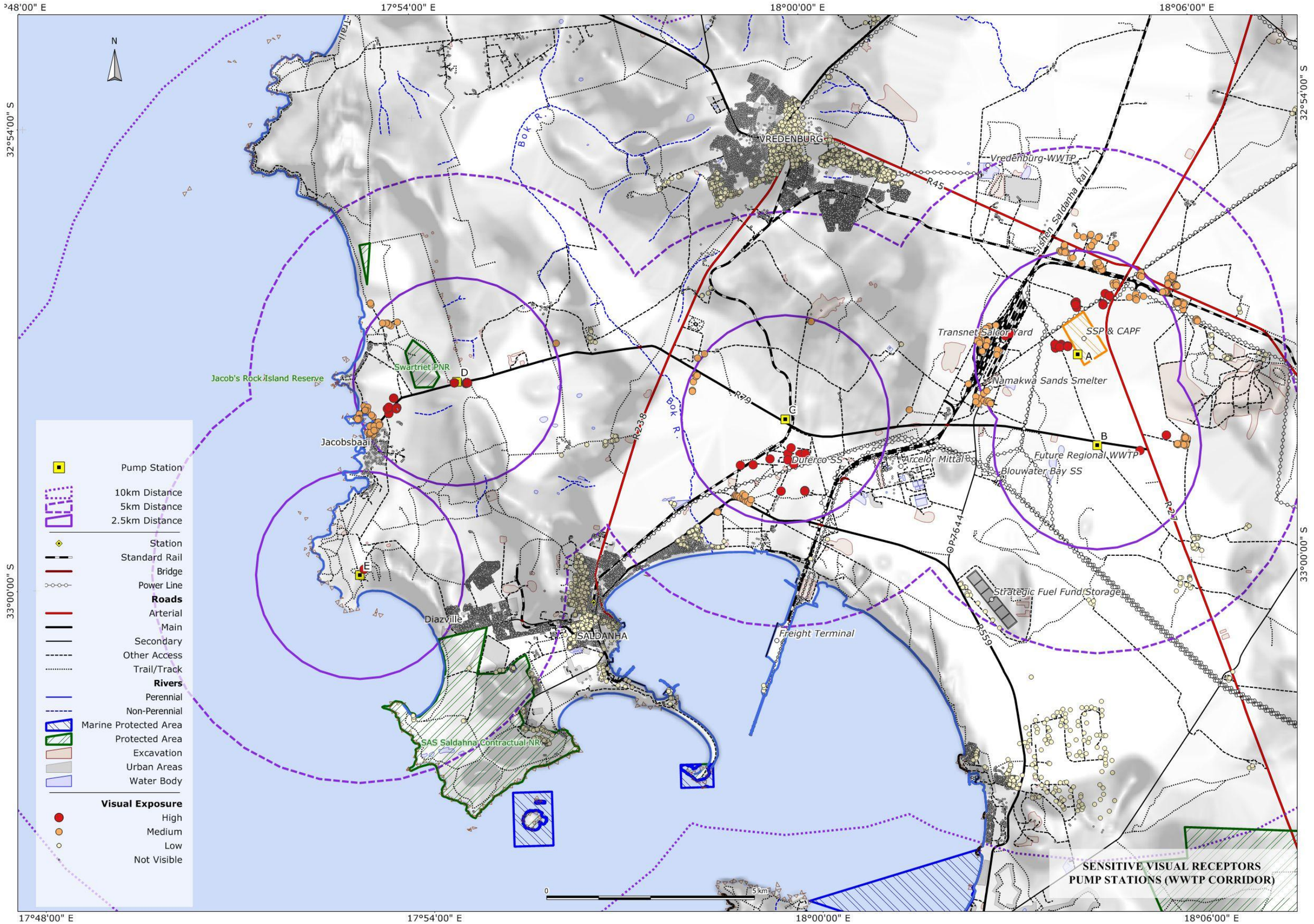
Map 8-19 Visual exposure to sensitive visual receptors of the SRMO project using the Jacobsbaai Western Corridor.



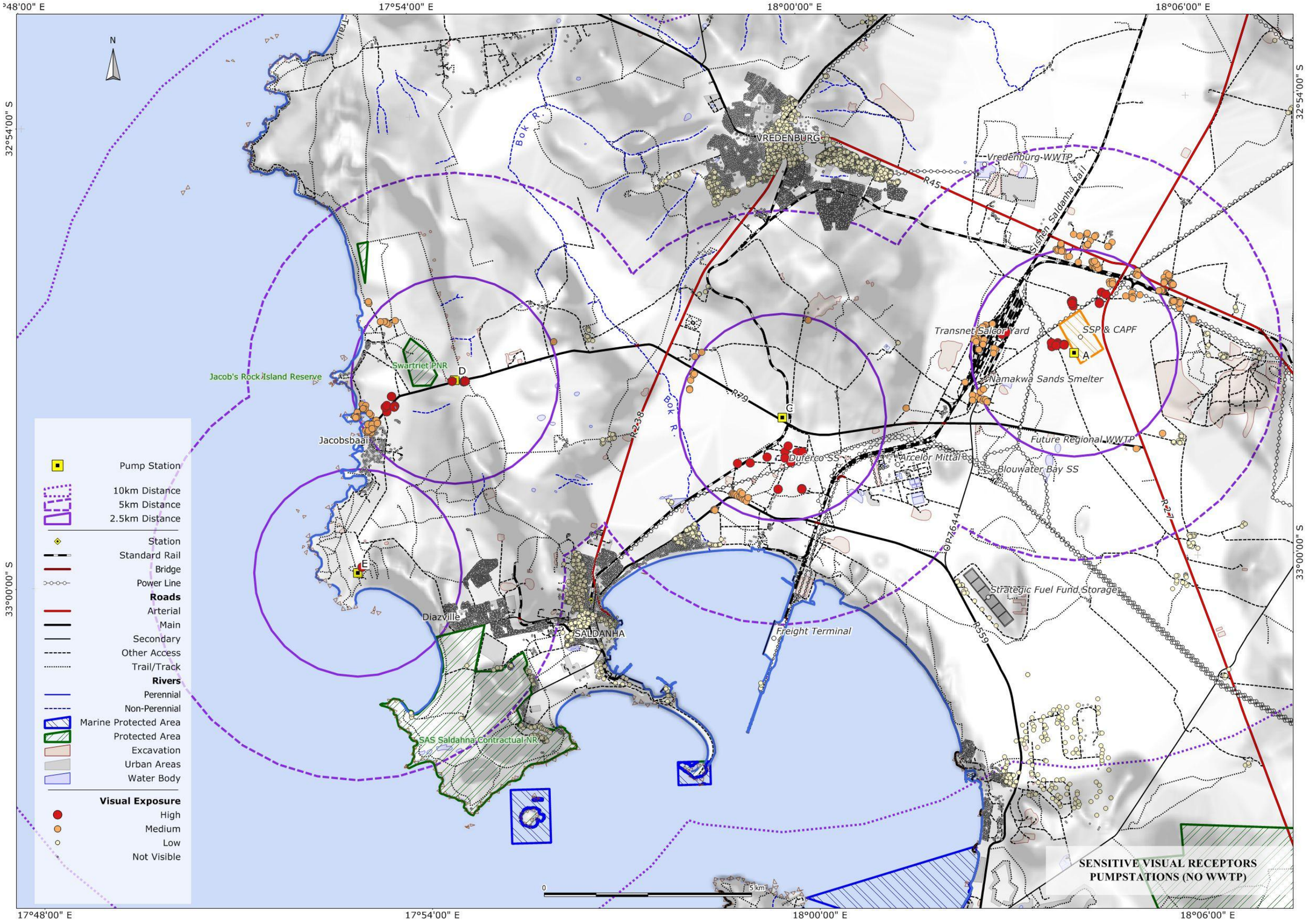
Map 8-20 Visual exposure to sensitive visual receptors of the SRMO project using the Jacobsbaai Eastern Corridor.



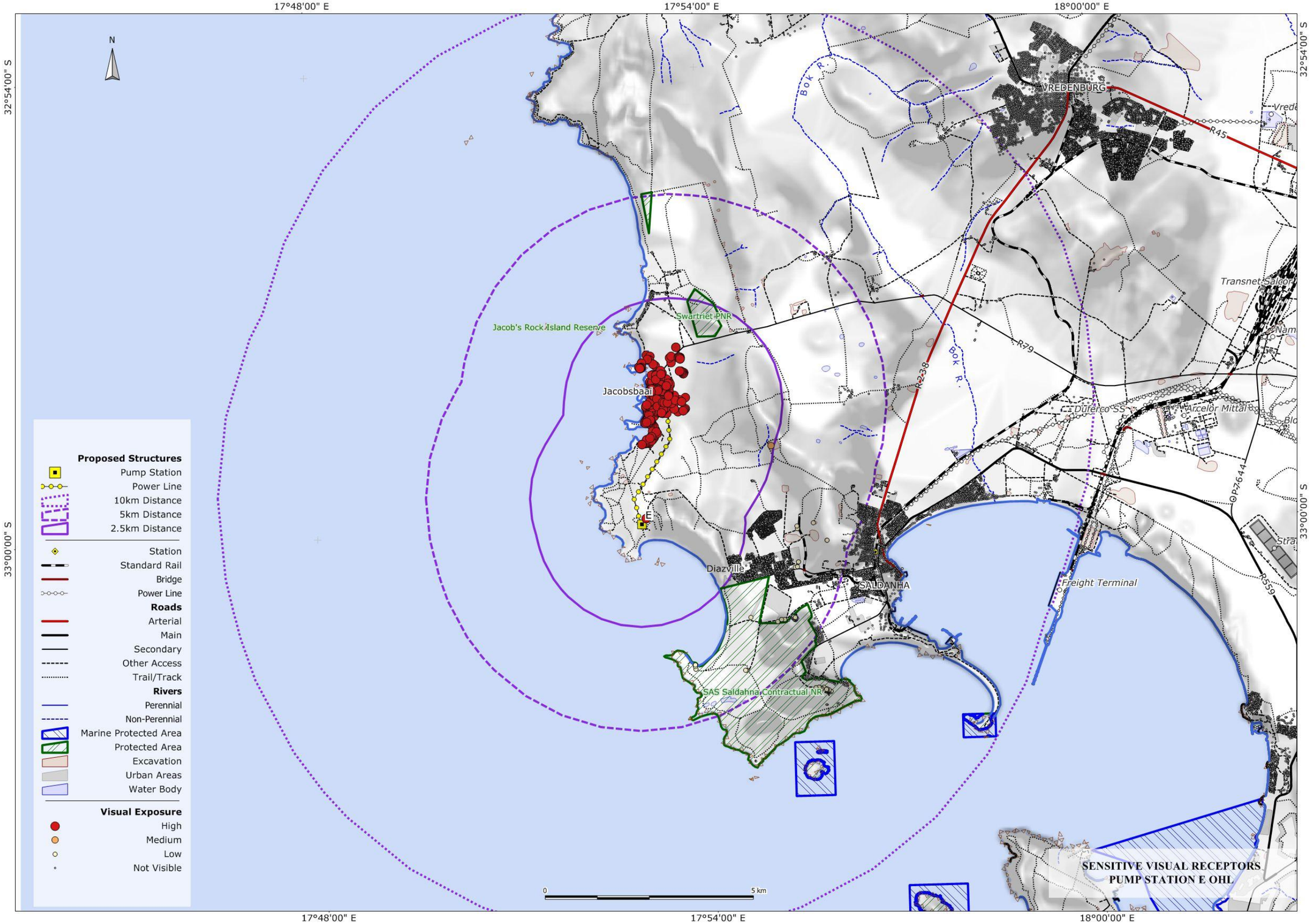
Map 8-21 Visual exposure to sensitive visual receptors of the SRMO project using the WWTP Corridor.



Map 8-22 Visual exposure of sensitive visual receptors to five proposed pump stations.



Map 8-23 Visual exposure of sensitive visual receptors to four proposed pump stations.



Map 8-24 Visual exposure to sensitive visual receptors of power line from pump station E to the 11 kV Jacobsbaai Feeder.

ABBREVIATED CURRICULUM VITAE – HENRY HOLLAND

Name of organisation:	Mapthis Trust
Profession:	GIS Consultant
Position in Firm:	Owner
Date of Birth:	26 December 1968
Years with Firm:	6

BIOGRAPHICAL SKETCH

Henry has been doing GIS related work since 1992 when he started his M.Sc. in Geology. Since finishing his Masters he worked in Angola establishing a GIS department for a diamond exploration company, after which he worked on a freelance basis for eight years doing GIS related work and computer programming. In 2005 he established the Mapthis Trust which provides geospatial services for a range of environmental and geological companies and projects. Henry has been involved in Visual Impact Assessments (VIAs) since 1997.

TERTIARY EDUCATION

1996	M. Sc. Geology/GIS	Rhodes University
1986	B.Sc. Hons	UOFS

KEY EXPERIENCE

The table below presents an abridged list of Henry's project experience relevant to this proposal:

Completion Date	Project description	Role	Client
2014	Dealesville Solar Plants VIA, Freestate Province	Author	CSIR
2014	Mulilo Solar Plants VIA, Northern Cape	Author	CSIR
2014	Umgeni Water SWRO Plant VIA, KwaZulu Natal	Author	CSIR
2013	Ishwati Emoyeni Wind Energy Facility VIA, Western Cape	Author	CSIR
2013	Venter Fert Composting and Fertiliser Plant	Author	Public Process Consultants
2013	Kipeto Power Line, Kenya	Author	Kipeto Energy Ltd.
2012	Ngqura Manganese Export Facility VIA, Coega, Eastern Cape	Author	CSIR
2012	Toliara Sands Mining Project VIA,	Author	CES

Completion Date	Project description	Role	Client
	Toliara, Madagascar		
2012	Mkuze Biofuel Power Plant VIA, Mkuze, KwaZulu-Natal	Author	CSIR
2012	Vleesbaai WEF VIA, Western Cape	Author	CSIR
2012	Saldanha Desalination Plant VIA, Saldanha Bay, Western Cape	Author	CSIR
2012	Mossel Bay WEF, Western Cape	Author	CES
2012	Keimoes Solar Energy Facility, NC	Author	CSIR
2012	Douglas Solar Energy Facility, NC	Author	CSIR
2012	Richards Bay WEF VIA, KZN	Author	CES
2012	Hluhluwe WEF VIA, KZN	Author	CES
2012	Plan8 Grahamstown Wind Farm VIA, Eastern Cape	Author	CES
2012	Kipeto Wind Farm VIA, Kenya	Author	Galetech Energy Developments Ltd.
2011	Coega IDZ Zone 12 Wind Farm	Author	CSIR
2011	Haverfontein Wind Farm, Mpumalanga	Author	CES
2011	Middleton Wind Farm, Cookhouse	Author	CES
2011	Broadlands PV Plant, Humansdorp	Author	CSIR
2011	Ubuntu Wind Farm, Jeffrey's Bay	Author	CSIR
2011	Lushington Park Wind Farm, East London	Author	CES
2011	Chaba Wind Farm, Komga	Author	CES
2010	Thomas River Wind Farm and PV Park VIA, Stutterheim	Author	CES
2010	Eskom Power Line VIA, Kouga	Author	CES
2010	Laguna Bay Resort VIA	Author	CES
2010	Kouga Wind Farm VIA	Author	Arcus GIBB
2010	Electrawinds Coega Wind Farm VIA	Author	CSIR
2010	Innowind Coega Wind Farm VIA	Author	CES
2010	Jeffrey's Bay Wind Farm VIA, Jeffrey's Bay	Author	CSIR
2010	Cookhouse Wind Farm VIA, Cookhouse	Author	CES
2009	Waainek Wind Farm VIA, Grahamstown	Author	CES
2009	Coega Wind Turbine BA (Visual Input)	Author	CSIR
2009	Sierra Leone Ethanol Plant VIA	Author	CSIR
2009	NamWater Desalination Plant VIA, Swakopmund, Namibia	Author	CSIR
2009	Nooitgedagt/Coega Water Supply VIA, Motherwell	Author	SRK
2009	CDM Brewery VIA, Nampula, Mozambique	Author	CES

Completion Date	Project description	Role	Client
2009	TankaTara Preliminary Visibility Analysis, Addo	Author	CES
2008	Kouga Wind Energy Project VIA, Jeffreys Bay	Author	CSIR
2008	Aston Bay VIA	Author	CES
2008	NPA Boundary Wall VIA, Port Elizabeth	Author	CSIR
2008	Elitheni Coal Mining VIA, Indwe	Author	Savannah Environmental (PTY) Ltd.
2008	Coegakamma Chicken Broiler Housing VIA	Author	Public Process Consultants
2008	Amanzi Country Lifestyle Estate VIA, Uitenhage	Author	Public Process Consultants
2008	Coegakammaskloof Chicken Broiler Housing VIA	Author	Public Process Consultants
2008	Ngqura Manganese Terminal Pre-Feasibility VIA	Specialist Input	CSIR
2007	Visual Impact Assessment for Stuytlerville Bulk Water Supply, Baviaanskloof	Author	Anton Bok and Associates
2007	Elitheni Coal Mining Scoping VIA	Author	Savannah Environmental (PTY) Ltd.
2007	Kouga Wind Farm and Pump Station VIA	Author	CSIR
2007	Boschfontein Chicken Broiler Housing VIA	Author	Public Process Consultants
2006	Telkom Tower Replacement, Elarduspark, VIA	Author	Naledzi Environmental Consultants CC

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe my qualifications, my experience, and me, and that I am available to work on this project.

Date: 13/04/15

[Signature of staff member and authorized representative of the firm] Day/Month/Year

Full name of staff member: Henry Holland