

ENVIRONMENTAL IMPACT ASSESSMENT

Second Draft Environmental Impact Assessment Report for the
Proposed Construction, Operation and Decommissioning of a
Seawater Reverse Osmosis Plant and Associated
Infrastructure in Tongaat, Kwazulu-Natal

SECOND DRAFT EIA REPORT

CHAPTER 10: VISUAL IMPACTS

SUMMARY

This Visual Impact Specialist Study forms part of the Environmental Impact Assessment for the Tongaat site. The Scope of Work for this Visual Specialist Study, as provided by the CSIR is:

- Describe the affected environment and determine the status quo at each site.
- Indicate how a receptor or community will be affected.
- Map sensitive areas.
- Discuss gaps in baseline data.
- Assess potential impacts, including cumulative impacts and address public concerns.
- Propose and explain mitigation measures and summarise residual impacts after mitigation.

This report presents the visual specialist study prepared by Henry Holland as part of the Environmental Impact Assessment (EIA) for the Tongaat Sea Water Reverse Osmosis Plant proposed by Umgeni Water in the Desainagar area, KwaZulu-Natal.

The site proposed for the desalination plant is located in a landscape with a mixed rural, residential and beachfront character. The site itself is located on land cultivated for garden market crops. The M4, a major route along the north coast of the eThekweni Municipality, passes within 100 m east of the site, and the strip of land between the road and the beach contains a few buildings associated with beachfront holiday accommodation and resorts. La Mercy is a small residential area south of the proposed site and south of the Mdloti River is Umdloti, a major holiday and tourist destination. Several small residential and beachfront settlements are also located north of the site along the M4 such as Tongaat Beach and Genazzano. The King Shaka International Airport is within 5 km west of the site but is screened from the coast by

topography – high hills mostly covered in sugar cane fields. The landscape character of the proposed site and its immediate surroundings is highly sensitive to the changes that will be introduced by a desalination plant due to its size and industrial character.

Key issues and visual receptors

The following sensitive visual receptors are most likely to be highly affected by the proposed desalination project:

- Residents of Desainagar (residences immediately surrounding the site) are likely to be affected by most aspects associated with the desalination plant: construction of the plant and pump station, construction of marine and terrestrial pipelines, construction of a 132 kV power line and the operational desalination plant;
- Users of the beach at Desainagar and La Mercy will be highly exposed to construction activities associated with marine pipelines and structures (off-shore), construction activities associated with the desalination plant and pump station, as well as the operational desalination plant;
- Sea views from the Shaka Estate will be significantly altered by a desalination plant on the proposed site;
- Some residents of La Mercy may be affected by the proposed power line that will pass in close proximity to their homes;
- Residents and key viewpoints in Mount Moreland will potentially be affected by the power line and its construction; and
- Motorists using the M4 are likely to pass within 100 m of the desalination plant and they will be potentially be highly affected by most aspects of the project.

Impact assessment and mitigation

Using visual impact criteria such as visual exposure and visual intrusion, combined with a photographic survey and site visit, potential landscape and visual impacts were assessed:

The significance of the potential visual impact of construction activities associated with a desalination plant on sensitive visual receptors is High Negative before and after mitigation since mitigation measures are unlikely to lower the visual intrusion enough. Key mitigation measures include construction screens and erosion controls.

The significance of the potential visual impact of construction activities associated with terrestrial pipeline construction is Medium Negative before mitigation. The significance of impact for all routes after mitigation will be low negative. Mitigation measures are aimed at using existing vegetation and topography to screen construction activity from views from settlements east of the N2.

Impacts associated with the construction of the proposed overhead transmission line are anticipated to be of Medium significance for the first section (Section A) of the initial route (residents of La Mercy will be affected) and Low Negative significance for the Alternatives 1 and 2 routes before and after mitigation if mitigation is successful. Mitigation measures include best practice construction principles for transmission lines.

It is expected that visual impacts associated with the construction of the proposed Alternative 2 powerline route will be of slightly lower significance than Alternative 1 as it is closer to the N2 and will therefore be less visually intrusive. The proposed Alternative 2 route will also be further from highly sensitive receptors for a longer section of the route.

The significance of the potential visual impact of construction activities associated with marine pipelines at Desainagar is Medium

Negative before and after mitigation since sea views are likely to be affected by tunnelling activity beyond the surf-zone. The impact is temporary and will last for approximately 6 months.

The landscape impact of the operational desalination plant will have High Negative significance before mitigation since the landscape character has a high sensitivity to the development. Mitigation measures discussed for the visual impact of the desalination plant will lower the significance of the impact to Medium Negative since it is aimed at reducing the industrial aspect of the development.

The significance of the visual intrusion of a desalination plant on the views of sensitive visual receptors in the surrounding landscape is High Negative before mitigation and Medium Negative thereafter. It is high since there are many highly sensitive visual receptors in close proximity to the desalination site and the plant will cause considerable changes to their existing views. Mitigation measures aim to lower the significance of the impact by extensive use of vegetation and architectural design to break up straight lines of buildings and to reduce visibility of industrial structures.

The significance of the visual intrusion (before mitigation) of the proposed powerline from the desalination plant to the Mdloti Substation on the existing views of sensitive visual receptors in the region is High Negative for the first section (Section A) of the Initial powerline route (high visual intrusion on views of La Mercy residents) and Medium Negative for the Alternatives 1 and 2 powerline routes since the overall impact intensity is expected to be medium. Mitigation measures should lower the intensity of the impact and thereby lower the significance to Low to moderate Negative for Alternative 1 and Low for Alternative 2 powerline route.

The significance of the impact of night lighting of a desalination plant on the nightscape of the

surrounding region is Medium Negative before mitigation and Low Negative if successful. As mitigation a lighting plan must be prepared and submitted with the design plans of the plant and it should demonstrate that project lighting is sufficiently shielded to prevent light spill onto neighbouring properties and that glaring lights will not affect residents of the surrounding landscape.

The significance of the visual impact of decommissioning activities is very similar to those of construction activities and the same mitigation measures apply.

The significance of the cumulative impact on the landscape of the desalination plant and other future developments as planned in the Spatial Development Plan for the North Coastal Corridor (the area in which the desalination plant will be located) will be High Negative since the future landscape character will be low density residential and beachfront. Mitigation measures listed for the visual impact of the desalination plant will, if successfully implemented, lower the significance to Medium Negative.

The significance of the cumulative visual impact on sensitive visual receptors will also be High Negative because even though the sensitivity of visual receptors in the surrounding landscape will be lower than they are now (due to the urbanised views expected in the future and the change in sense of place for the area) sea views from Shaka Estate are still likely to be affected by the desalination plant. Mitigation measures listed for the visual impact should lower the intensity of the impact and the significance of the impact after mitigation is Medium Negative.

Overall, the significance of the visual impact of the desalination project will be high before mitigation. If the mitigation measures can be successfully implemented so that the desalination can at least fit partially into the landscape then the significance will be medium, with the exception of the potential visual impact of construction activities associated with a desalination plant (including the pump station) which will remain of high significance during the duration of the construction phase.



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CHAPTER 10: VISUAL IMPACT ASSESSMENT

This chapter presents the Visual Impact specialist study undertaken by Henry Holland of MapThis as part of the Environmental Impact Assessment for the proposed 150 Ml Seawater Reverse Osmosis Plant and associated infrastructure in Tongaat, KwaZulu Natal.

10.1 INTRODUCTION

10.1.1 SCOPE OF WORK AND TERMS OF REFERENCES

The overall scope and objectives of this Visual Impact Assessment are to:

- Determine the current conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
- Identify potential impacts that may occur during the construction, operational and decommissioning phases of development, as well as impacts associated with future environmental changes if the “no-go” option is implemented (both positive and negative);
- Assess the impacts, in terms of direct, indirect and cumulative impacts;
- Provide recommendations with regards to potential monitoring programmes;
- Determine mitigation and/or management measures which could be implemented to as far as possible reduce the effect of negative impacts and enhance the effect of positive impacts; and
- Incorporate and address all issues and concerns raised by I&APs and the public.

The terms of reference for the Visual Impact Assessment are as follows:

- Review detailed information relating to the project description and precisely define the environmental risks to the landscape and the risks to sensitive viewers, as well as the consequences thereto.
- Conduct a site visit and undertake a Photographic Survey of the surrounding region from which the landscape and visual baselines can be prepared.
- Compile a baseline description of the visual character/baseline and the landscape of the affected area.
- Undertake data preparation and the visibility analysis, which includes the calculation of viewsheds for various elements of the proposed development. Identify principal viewpoints and sensitive visual receptors.
- Identify and rate potential direct, indirect and cumulative impacts on the landscape and on sensitive viewers/receptors for the construction, operation and decommissioning phases of the proposed project. Study the cumulative impacts of the project by considering the impacts of existing industries within the area, together with the impact of the proposed project.
- Provide input to the Environmental Management Programme (EMPr), including mitigation and monitoring requirements to ensure that the visual impacts on the principal viewpoints and sensitive viewsheds are mitigated.

10.1.2 Study Approach

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).

A visibility analysis was conducted for the region surrounding the proposed development site and components of the development relevant to assessment of the potential visual impact (10 km radius) to identify key representative viewpoints and sensitive visual receptors. A site visit and photographic survey of this region followed (28 April 2015 and 14 July 2017) to establish a baseline for visual resources to compare the proposed developments against. Spatial development frameworks (SDF) and integrated development plans (IDP) for the relevant municipalities were studied to align the visual impact assessment with municipal objectives in terms of landscape and visual resources.

10.1.3 Information Sources

The Visual Impact Assessment is based on the following information:

- Documentation supplied by the Applicant and the CSIR.
- Digital contour lines from the eThekweni Municipal website:
http://www.durban.gov.za/Online_Tools/Pages/City-Maps.aspx
- Google Earth software and data.
- Eskom SPOT Building Count data set of (de la Rey 2008).
- Garmin map data (2013) for 'points of interest' layer.
- Spatial development framework (SDF) and Local Area Plan documents for KwaZulu Natal Province and eThekweni Municipality.

10.1.4 Assumptions and Limitations

10.1.4.1 Assumptions

Cumulative Impacts

It is assumed that the Northern Coastal Corridor between the Ohlanga and Tongati Rivers and centered around the M4, will be developed as mixed residential area as proposed in the Spatial Development Plan for northern part of the eThekweni Municipality (eThekweni Municipality 2014a).

10.1.4.2 Limitations

Potable Water Pipeline and Powerline alternative alignments

In August 2016, it was brought to the attention of the EAP that the initial potable water pipeline alignment was located in an area that is supposedly approved for the development of upmarket housing. This alignment was therefore not assessed further in this study. An alternative alignment (Potable water pipeline Alternative 1) was therefore identified and is assessed in this study. The only difference between the Initial alignment and the Alternative 1 alignment is the section of pipeline between the proposed desalination plant and La Mercy Reservoir.

The crossing of the Mount Moreland wetland by the proposed initial 132 kV transmission line (to La Mercy Major Substation) has been assessed by the aquatic ecology specialist study as an outright no-go proposition (Fatal flaw). In addition, the proposed alignment traverses the offset Conservation Area for the King Shaka Airport. This alignment was therefore not assessed further in this study. An alternative route (Alternative 2) that would avoid the important wetland areas as well as the KSIA biodiversity offset has been proposed to Mdloti Substation.

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.

Place names

Place names are taken from a number of different databases and it is likely that names do not always agree or correspond with names used locally, or that they refer to the wrong places. The text in the report will refer to places on the accompanying maps.

Viewshed calculations

Calculation of the viewsheds does not take into account the potential screening effect of vegetation and buildings. Vegetation surrounding residences and adjacent to roads in this region tends to be tropical or sub-tropical trees and dense bush which limits distant or open views from urban and residential areas. Holiday accommodation in the form of blocks of flats and hotels provide distant views but also block views for adjacent buildings. These aspects of viewsheds are not included in viewshed calculations but will be discussed when relevant.

Viewsheds are calculated using digital elevation model (DEM) which is derived from contour lines with a 2 m vertical distance between contours. The DEM has a pixel resolution of 10 m x 10 m and covers a 20 km x 20 km area. The study area for this assessment covers a region within 10 km of the proposed development (including pipeline routes).

10.2 PROJECT DESCRIPTION: VISUAL IMPACT

10.2.1 Construction/Decommissioning

All the components of the proposed desalination plant are likely to cause some visual impact during construction and decommissioning phases of the project, whereas components such as buried pipelines and submerged structures will cause minimal visual impact during the operational phase of the project. 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. Tunneling will only be visible at the launching pit located at the desalination plant and at the receiving pit which is off-shore. There will be little, if any, construction activity on the beach. A barge and support vessels will be visible beyond the surf zone at the receiving pit. Tunneling is expected to last for approximately 6 months.



Figure 10-1: A barge and support vessels similar to what will be used for tunnelling of the marine pipelines.

10.2.2 Operation

Elements of the project that will potentially cause significant visual impact during the operational phase include:

- In-take Pump Station – much of this structure will be buried, but some of it will potentially be visible;
- SWRO Desalination Plant – a number of structures will be higher than 10 m (e.g. pre-treatment plant, RO building). The lime silos will be up to 18 m high;
- Power supply infrastructure – 132 kV power lines (with pylons up to 28 m high) and a substation to convert power to 11 kV (approximately 15 m high).
- Discharge of brine can cause discolouration of water near the outlet and surrounding areas due to high content of ferric hydroxide (Voutchkov 2014).

Table 10-1: Heights in metres of structures relevant to the visual impact assessment.

Component	Height (m)
Construction Jetty	8
Construction Cranes	18
Intake Pump Station	10
Product Water Storage Tanks	12
Pre-filtration structures	8
RO Building	15
Filter Backwash Treatment Structures	8
Lime Silos	18
Post Treatment Structures	8
Overhead Transmission Lines	28
On-site Substation	15

10.3 DESCRIPTION OF THE AFFECTED ENVIRONMENT: VISUAL IMPACT

The proposed site for the desalination plant is located near Desainagar, west of the M4 (Figure 10-2).



Figure 10-2: Layout of the proposed desalination project (Alternative 2 Powerline and Alternative 1 Pipeline routes).

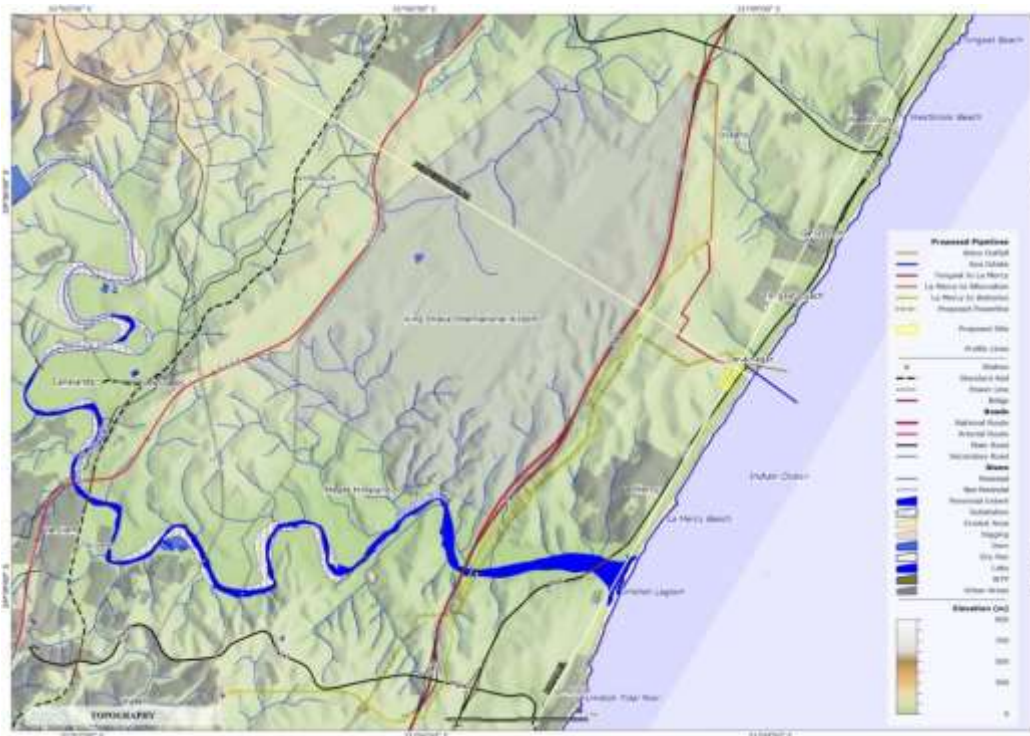


Figure 10-3: Topography of the region surrounding the Tongaat Desalination Plant project

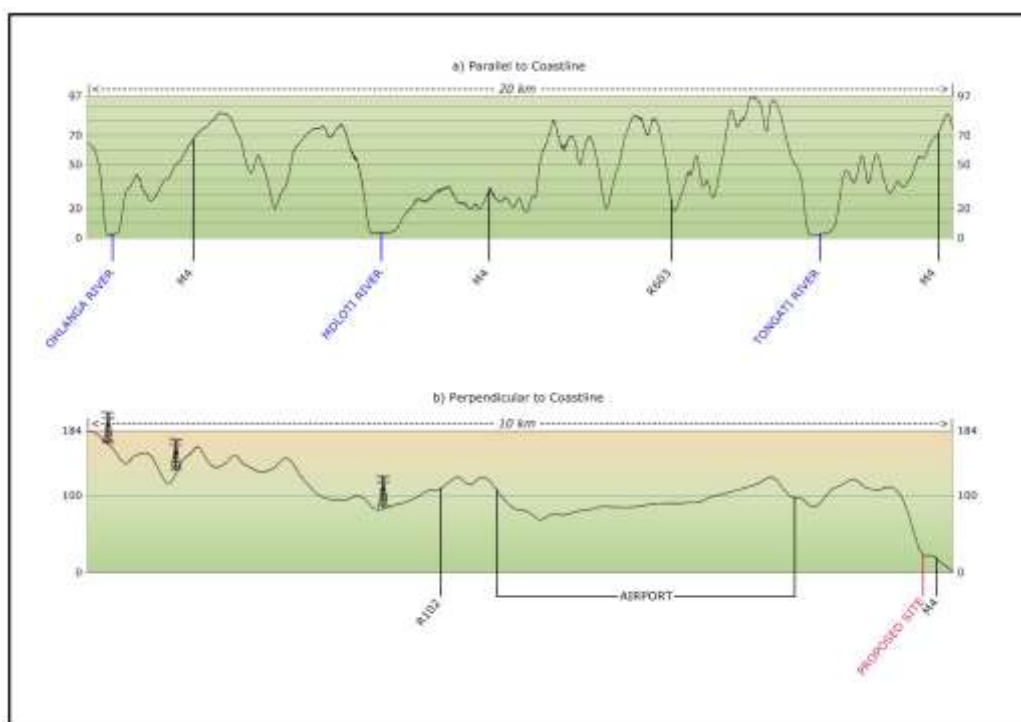


Figure 10-4: Topographic profiles parallel and perpendicular to the coastline as shown on the topographic map.

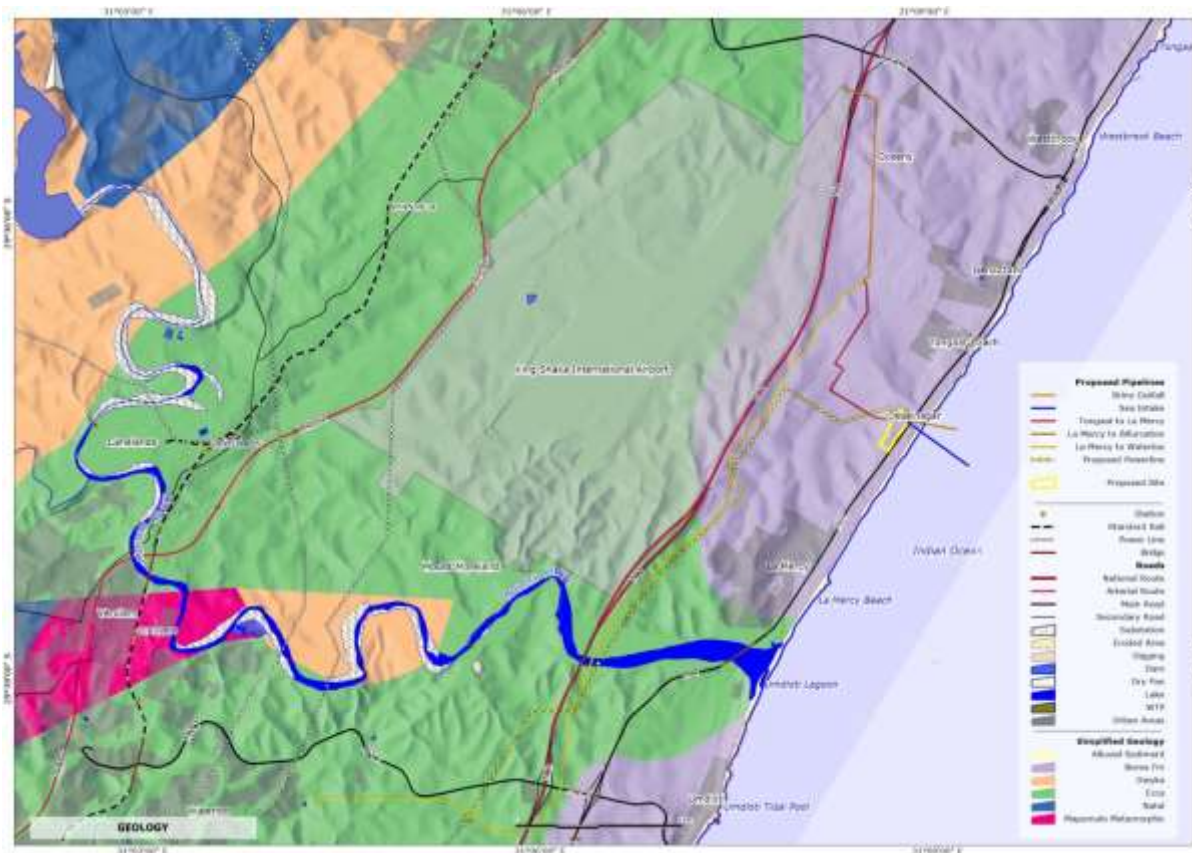


Figure 10-5: Simplified geology and stratigraphy of the region surrounding the proposed desalination plant sites.

Beaches are relatively narrow and the land rises quickly, forming prominent bluffs in places (Figure 10-4, Figure 10-3). Beyond the bluffs are steep, rolling hills carved in by the three major river networks in the region. The Ohlanga, Mdloti and Tongati River networks produced a rugged terrain with steep narrow valleys and high hills. The rivers have relatively wide, flat floodplains and broad estuaries. The proposed site for the desalination plant is located just beyond the bluff in a relatively flat area between the beach and the hills.

The geology of the region is complex and includes fairly recent red palaeo-dune sands of the Berea Formation which extends all along the Natal coastline, Ecca shales and Dwyka tillites of the Karoo Supergroup, quartzitic sandstone of the Natal Group which correlates with the Table Mountain Group in the Western Cape, and metamorphic rocks of the Mapumulo Metamorphic Suite (Figure 10.5). The last 20 million years saw two major periods of continental uplift in Southern Africa with the eastern portion rising more than the rest (approximately a 900 m rise during the second period 5 million years ago). These rapid uplift events caused the rivers along the east coast to incise deeply into the landscape creating the fragmented topography evident in the hinterland beyond the proposed site.



Figure 10-6: Land cover for the region surrounding the proposed desalination plant sites.

The proposed site for the desalination plant is located on land currently under cultivation for market gardening crops (e.g. vegetables). West of the site are some patches of natural vegetation and beyond that the hills are covered in sugar cane plantations up to the N2. Urban residential areas are located all along the coast and the M4, with the area surrounding the proposed site (Desainagar) the least developed. The land beyond the N2 is now dedicated to the King Shaka Airport and associated industries (Dube Tradeport), although most hills are still covered by sugar cane fields. Large urban areas such as at Verulam and Tongaat cover the rest of the landscape.

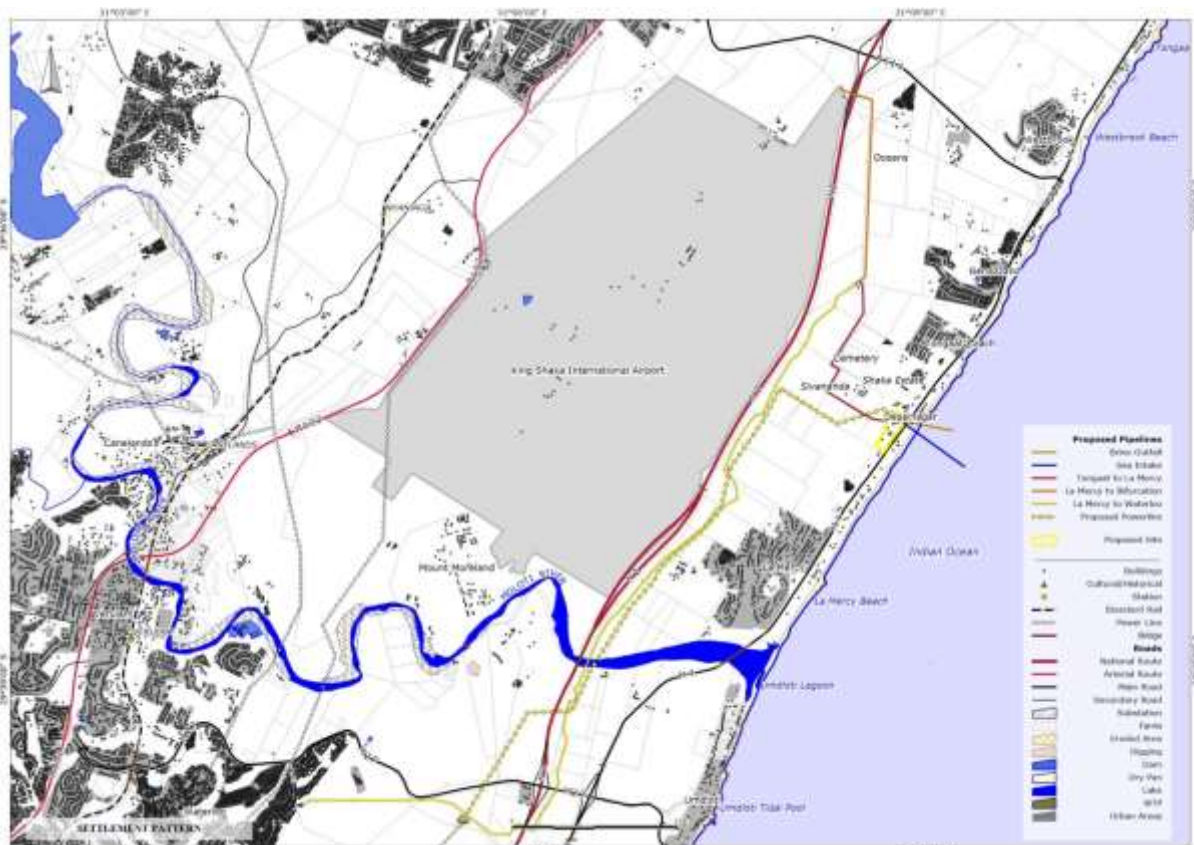


Figure 10-7: Settlement patterns and man-made structures in the region surrounding the proposed desalination plant.

The site is located at Desainagar between coastal resort settlements of La Mercy and Tongaat Beach. The Ohlanga-Tongati Coastal Corridor (between the beach and the N2) is relatively undeveloped compared to south of the Ohlanga River and Desainagar is still mostly undeveloped. The settlements in the corridor tend to have a pattern of urban beachfront with hotels and holiday apartment blocks between the beach and the M4 and more permanent residential areas on the hills inland from the road. Umdloti, south of the Mdloti River Estuary, is a major coastal resort with prominent holiday apartment blocks, hotels and recreation facilities. La Mercy and Tongaat Beach are quieter residential towns with more permanent residential areas. The proposed site is located on properties similar to smallholdings with market gardening crops, and the beachfront contains only a few holiday apartment blocks and a small commercial property. The Shaka Estate is an upmarket residential complex lining the hill north of the site and the large Sivananda International Cultural Centre is located just west of the site.

Inland from the N2 is the International Airport and Dube Trade Hub with various large development projects in process. North of the Airport are the townships of Inyanga and Tongaat, while south of the Mdloti River are major residential and industrial areas of Verulam and Phoenix.

The major roads in the study area are the M4, the N2 and the Watson Highway (R613 or M43). The M4 is an alternative to the N2 tollroad, but also provides access to the resorts along the north coast. The Watson Highway provides access to the N2 from the M4 as well as to the International Airport and urban areas west of the N2. The N2 is a national route connecting Durban with tourist destinations north of the city and is also heavily used by freight transport between Durban and other major industrial and commercial centres in the northern part of the province as well as beyond (e.g. as an alternative route to Gauteng).

There are normally a large number of ships visible near the coast because of the proximity of the Durban Harbour. Most of these are large freight/cargo ships and are elements associated with a large city landscape character.

10.4 IDENTIFICATION OF KEY ISSUES AND POTENTIAL IMPACTS

10.4.1 Key Issues Identified During the Scoping Phase

The potential visual issues identified during the scoping phase of this EIA process include:

- Potential impact of construction activities on existing sea views of residents living in the region surrounding the desalination plant, pump station and intake pipelines.
- Potential visual impact of construction activities on residents living on farms traversed by potable water pipelines.
- Potential visual intrusion of a pump station on the existing views of residents living in close proximity to the proposed sites.
- Potential visual intrusion of a desalination plant on sea views of residents in the surrounding area (e.g. residents of King Shaka Estate)
- Potential landscape impact of introducing an industrial development into a predominantly agricultural and residential area
- Potential impact of night lighting of the desalination plant on the nightscape of the area and on existing views of sensitive visual receptors

The Issues and Responses Trail, Chapter 5 of the Final Scoping Report included the following visual aesthetic concerns from Interested and Affected Parties (I&APs):

Table 10-2: Issues raised by I&APs during the Scoping Phase of the EIA

NO	ISSUES RAISED	DATE	COMMENTATOR
3.1	We note that the proposed pipeline route traverses mainly Tongaat Hulett Landholdings and, whilst we support the initiative in principle, there are a number of issues that will require clarity and confirmation, namely inter alia, aesthetics of the proposed plant (visual impact).	25/03/2014	Tina Hattingh (Tongaath Hulett Properties) Email and Letter
3.2	Grounds for objection to proposed desalination plant at King Shaka estate: Damage to the Aesthetic natural beauty of the coastline bordering the M4, a road used by thousands daily.	09/08/2014	Betty Rawheath (La Mercy Residents Action Group) Email and letter
3.3	I must state now that at the consultation Umgeni Water stated that it would consider developing the site underground and create a park over it so that children can play. With all due respect to Umgeni Water, this is a load of crock. We rather you not touch our landscape and leave our children to play on the land as it currently exists. It is ludicrous for Umgeni water to even consider such a proposal given that it would double or triple the costs of the proposed plant.	20/10/2014	Tashya Giyapersad (Resident) Email and Letter
3.4	An 8000 m2 desalination plant would have a negative visual impact.	09/03/2015	Roy Rawheath (La Mercy Resident Action Group) Public Meeting

10.4.2 Identification of Potential Impacts

Features at risk of impact in a visual impact assessment are the landscape and sensitive visual receptors in the landscape.

10.4.2.1 Landscape

A landscape impact occurs when a development alters the existing landscape character. If the landscape character is highly sensitive to the development type then the intensity of the impact will be high. A high intensity landscape impact will be highly significant if the landscape character type is scarce as well as highly valued by the community (local, regional, national and international). The landscape impact does not depend only on the existing sensitive visual receptors since it can also affect future visual receptors and communities beyond the local or regional context.

The landscape surrounding the proposed desalination plant site is a mixture of urban, rural and coastal resort landscapes. The site itself is in a landscape with characteristics of small holdings near a larger settlement. The land is used for garden market crops and much of it is surrounded by natural vegetation. It is overlooked by an upmarket residential complex which is located on the hills to the north and the town of Tongaat Beach is north of the site (although screened by topography and vegetation from the site). The M4, a major route along the coastal corridor, passes within 100 m of the site and a small number of buildings associated with a coastal resort can be found along the beach east of the M4. La Mercy is a small coastal resort town south of Desainagar with a considerable permanent resident population while Umdloti, south of the Mloti River, is a major holiday and tourist destination. Northwards from the site are more low-key resort and residential areas. The King Shaka International Airport to the east does not impact on the local landscape and is screened by the topography.

Apart from the large ships often visible near the coast there are no other structures similar in type or scale in the landscape to the proposed desalination plant. The landscape character is seen as highly sensitive to the proposed development.

10.4.2.2 Sensitive Visual Receptors

Desalination Plant with Pump Station

The following sensitive visual receptors were identified from viewsheds of the desalination plant and field work:

- Visual receptors on the beach at Desainagar¹ are recreational users and are moderately sensitive to the surrounding landscape since they are primarily focused on their activities and the sea;
- Visual receptors on the beach at La Mercy are recreational users and are moderately sensitive to the surrounding landscape since they are primarily focused on their activities and the sea;
- Visual receptors in Desainagar with sea views are highly sensitive visual receptors since they value those views for the scenic qualities, while those without sea views are moderately sensitive since the landscape is transformed and variable due to agricultural practices;
- Residents of Shaka Estate are highly sensitive visual receptor since these properties are marketed for their sea views;

¹ Desainagar is the settlement immediately adjacent to the proposed desalination plant site and includes residences east of the M4 along the beachfront.

- Residents of La Mercy are moderately sensitive visual receptors since the residential areas are urbanised and their views include many buildings and structures associated with urban landscapes;
- Residents of Tongaat Beach are moderately sensitive visual receptors since the residential areas are urbanised and their views include many buildings and structures associated with urban landscapes;
- Residents of the northern section of Umdloti are highly sensitive visual receptors since they have views of scenic quality that may be affected by the development and residents will include tourists and international tourists;
- Users of the beach at Umdloti are moderately sensitive visual receptors since their attention will be on their activities and on the sea;
- Motorists using the M4 have a moderate visual sensitivity since they may include tourists and international tourists who have an active interest in the surrounding landscape, but they pass through highly urbanised landscapes and will tend to be more focused on the sea views.

Terrestrial Pipelines

Visual receptors that will potentially be affected by construction activities along the proposed terrestrial pipeline routes:

- Visual receptors in Desainagar with sea views are highly sensitive visual receptors since they value those views for the scenic qualities, while those without sea views are moderately sensitive since the landscape is transformed and variable due to agricultural practices;
- Residents of Shaka Estate are highly sensitive visual receptors since these properties are marketed for their sea views;
- Residents and visitors of Sivananda Cultural Centre are moderately sensitive visual receptors since their attention is focused on their activities rather than the surrounding landscape;
- Residents of La Mercy are moderately sensitive visual receptors since the residential areas are urbanised and their views include many buildings and structures associated with urban landscapes;
- Residents of Tongaat Beach and Genazzano are moderately sensitive visual receptors since the residential areas are urbanised and their views include many buildings and structures associated with urban landscapes;
- Residents, visitors and viewpoints of Mount Moreland are highly sensitive visual receptors since they have an active interest in the surrounding landscape and have viewpoints that are tourist attractions (the views are not exceptionally sensitive since they are primarily for birdwatching and include many urban structures);
- Residents of Waterloo have a low visual sensitivity since they live in highly urbanised surroundings and their views are complex in pattern, colours and contrast;
- Residents and viewpoints within 1 km of a pipeline route are moderately sensitive visual receptors since although they have an active interest in the surrounding landscape they are also within 1 km of the N2 and will have many urban structures also in views;
- Motorists on the N2 are low sensitivity visual receptors since their views are mostly filled with large structures and urban elements;
- Motorists on the R614/M43 (Watson Highway from the M4 to Tongaat) are low sensitivity visual receptors since the sections that are within the viewsheds are also within viewsheds of highly urbanised landscapes which include many transmission lines, large roads, toll plaza's and cityscapes;
- Motorists on the M27 (Umdloti to Waterloo) are low sensitivity visual receptors since they pass through highly urbanised landscapes and their views are filled with complex patterns, colours and contrasts.

Overhead Transmission Line

The following sensitive visual receptors were identified from the transmission line viewshed and fieldwork:

- Residents of La Mercy are moderately sensitive visual receptors since the residential areas are urbanised and their views include many buildings and structures associated with urban landscapes;
- Residents of Shaka Estate are highly sensitive visual receptor since these properties are marketed for their sea views;
- Residents and visitors of Sivananda Cultural Centre are moderately sensitive visual receptors since their attention is focused on their activities rather than the surrounding landscape;
- Residents, visitors and viewpoints of Mount Moreland are highly sensitive visual receptors since they have an active interest in the surrounding landscape and have viewpoints that are tourist attractions (the views are not exceptionally sensitive since they are primarily for birdwatching and include many urban structures);
- Residents of Tongaat Beach and Genazzano are moderately sensitive visual receptors since the residential areas are urbanised and their views include many buildings and structures associated with urban landscapes;
- Residents and viewpoints within 1 km of the power line route are moderately sensitive visual receptors since although they have an active interest in the surrounding landscape they are also within 1 km of the N2 and are likely to have many large structures also in views;
- Motorists on the N2 are low sensitivity visual receptors since their views are mostly filled with large structures and urban elements;
- Motorists using the M4 have a moderate visual sensitivity since they may include tourists and international tourists who have an active interest in the surrounding landscape, but they pass through highly urbanised landscapes.

10.4.2.3 Construction Phase

- Potential impact 1: Potential visual impact of construction activities associated with a desalination plant on sensitive visual receptors
- Potential impact 2: Visual impact of construction activities associated with a buried pipeline on sensitive visual receptors
- Potential impact 3: Visual impact of construction activities associated with the alternative overhead transmission line from the desalination plant to Mdloti Substation
- Potential impact 4: Visual impact of construction activities associated with marine pipelines Desainagar beach

10.4.2.4 Operational Phase

- Potential impact 5: Landscape impact of a desalination plant on a landscape with mixed rural, residential and beach front character
- Potential impact 6: Visual intrusion of a desalination plant on existing views of sensitive visual receptors in the region
- Potential impact 7: Visual intrusion of the alternative power line from the desalination plant to the Mdloti Substation on the existing views of sensitive visual receptors in the region
- Potential impact 8: Impact of night lighting of a desalination plant on the nightscape of the surrounding region

10.4.2.5 Decommissioning Phase

- Potential impact 9: Potential visual impact of decommissioning activities associated with a desalination plant on sensitive visual receptors
- Potential impact 10: Visual impact of decommissioning activities associated with the alternative overhead transmission line from the desalination plant to Mdloti Substation

10.4.2.6 Cumulative impacts

- Cumulative impact 1: Cumulative impact on the landscape
- Cumulative impact 2: Cumulative visual impact

10.5 PERMIT REQUIREMENTS

There are no permit requirements for wind energy facilities in terms of visual or landscape impacts.

The following legislation is applicable to the proposed project in terms of visual and landscape impacts:

- The National Environmental Management Act (NEMA) and the Regulations in terms of Chapter 5 of NEMA. (Act No.107 of 1998);
- The Protected Areas Act (PAA) (Act 57 of 2003, Section 17) which refers to the conservation and protection of natural landscapes;

The Department of Water and Sanitation (DWS) (formerly Department of Water Affairs and Forestry) published guidelines for evaluating environmental impacts of desalination plant developments (DWAF 2007). Under visual impacts they suggest:

“Since most seawater desalination will be positioned close to - or within - coastal zones, it is important to minimise the negative visual impact that such infrastructures might have. These impacts can mostly be addressed by appropriate architectural design of the required infrastructure.”

One of the key spatial proposals of the eThekweni Municipal Spatial Development Framework (SDF) (eThekweni Municipality 2014b) is to conserve visual features of the landscape under Sustaining our Natural and Built Environment:

“The visual amenity and character of the municipality closely associated with highly visible natural features. These should be conserved for residents and tourists and include components such as:

*Cliffs and escarpments,
Hilltops and ridgelines,
Large water bodies,
Rivers and waterfalls,
Marine (beaches and rocky shores) and estuarine environments, and
Coastal dune forests and mangroves.”*

A Local Area Plan (LAP) and Coastal Management Plan was conducted between 2007 and 2010 for the area east of the N2 and between the Ohlanga and Tongati Rivers (eThekweni Municipality 2007; eThekweni Municipality 2008; eThekweni Municipality 2010). The LAP suggested that the area proposed for the desalination plant be developed as low density residential land, and that the M4 be declared a

scenic route with the goal of providing “aesthetic visual experiences for travellers of the City's road network.”

More recently the Spatial Development Plan for northern eThekweni Municipality incorporated the LAP (eThekweni Municipality 2014a) and proposed the following for the Northern Coastal Corridor:

It will be consolidated as a mixed use and mixed density residential, recreation, entertainment and tourist oriented corridor. The highly fragile, but relatively intact, coastal assets of this corridor should be vigorously protected and appropriately developed to provide a residential/recreation/ tourism corridor that provides a high quality natural coastal experience which complements the hard working urban beachfront of the central metropolitan area.

There is no provision made in the plan of declaring the M4 a scenic route.

10.6 VISUAL IMPACT CONCEPTS AND ASSESSMENT CRITERIA

The assessment of potential impacts for the desalination plant is conducted in the following steps:

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

Potential visual impacts are assessed using a number of criteria which provide the means to measure the intensity of the impacts. The intensity and other criteria such as spatial extent and duration of the impact are then used to determine its potential significance (Oberholzer, 2005). The visibility of the project is an indication of where in the region the development will potentially be visible from. The rating is based on viewshed area size and is an indication of how much of a region will potentially be visually affected 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 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 viewshed of the proposed development, and include scenic viewpoints, residents, motorists and recreational users of facilities within the viewshed. Their distance from the development (visual exposure) and the composition of their existing views (visual intrusion) will determine impact intensity.

10.6.1 Visibility Ratings

Visibility is the geographic area from which the project will be visible, or view catchment area. The actual zone of visual influence of the project is likely to be smaller because of screening by existing trees and buildings. The number of visual receptors in the viewshed has an influence on the visibility rating (Oberholzer, 2005).

- *High* - visible from a large area (e.g. several square kilometres).
- *Moderate* – visible from an intermediate area (e.g. several hectares).
- *Low* – visible from a small area around the project site.

Table 10-3: Viewshed sizes and number of buildings in viewsheds per component and excluding offshore viewshed²

Component	Viewshed Size (km ²)	Number of Buildings in Viewshed
Desalination Plant, including the pump station	2	215
Proposed Terrestrial Pipelines (Alternative 1)	57	6600
Proposed Transmission Line (Alternative 2)	65	2800

10.6.1.1 Desalination Plant with Pump Station

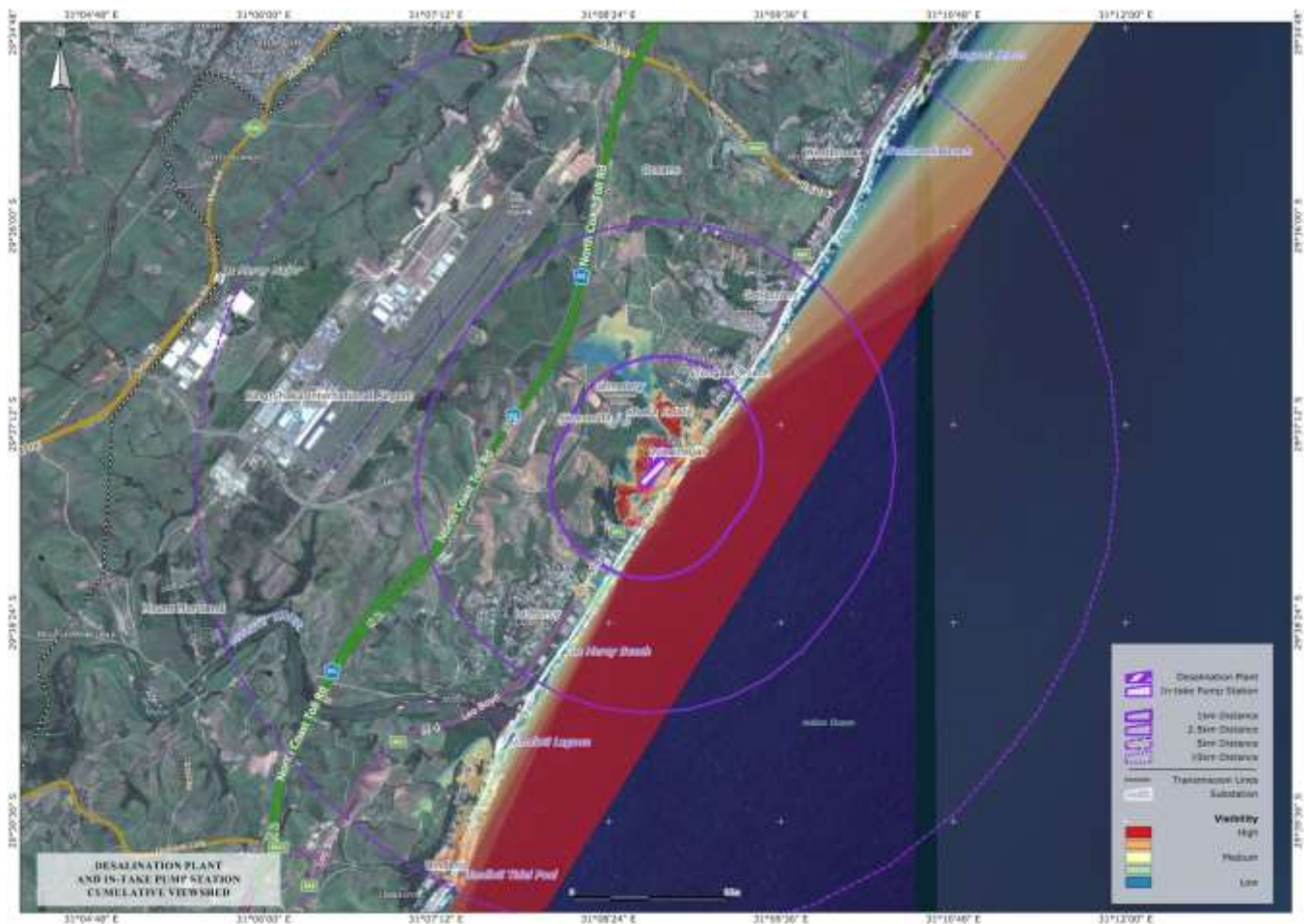


Figure 10-8: Cumulative viewshed for the proposed desalination plant near Desainagar with a pump station

The visibility of the desalination plant with in-take pump station inside the perimeter of the plant is high since the viewshed area is approximately 2 km² and there are 215 buildings in the viewshed. The Shaka Estate is within the viewshed and it is possible that residents in Umdloti will be able to see the development. Most of the viewshed is over the ocean and on land the viewshed is mostly limited to the

² Viewshed areas and number of buildings are calculated for an area within 10 km of the proposed desalination plant and within 5 km of proposed pipelines and transmission lines.

immediately surrounding area. The screening effect of vegetation and buildings is not taken into account in the theoretical viewshed and it is likely that the actual viewshed will be smaller.

10.6.1.2 Proposed Pipeline Route

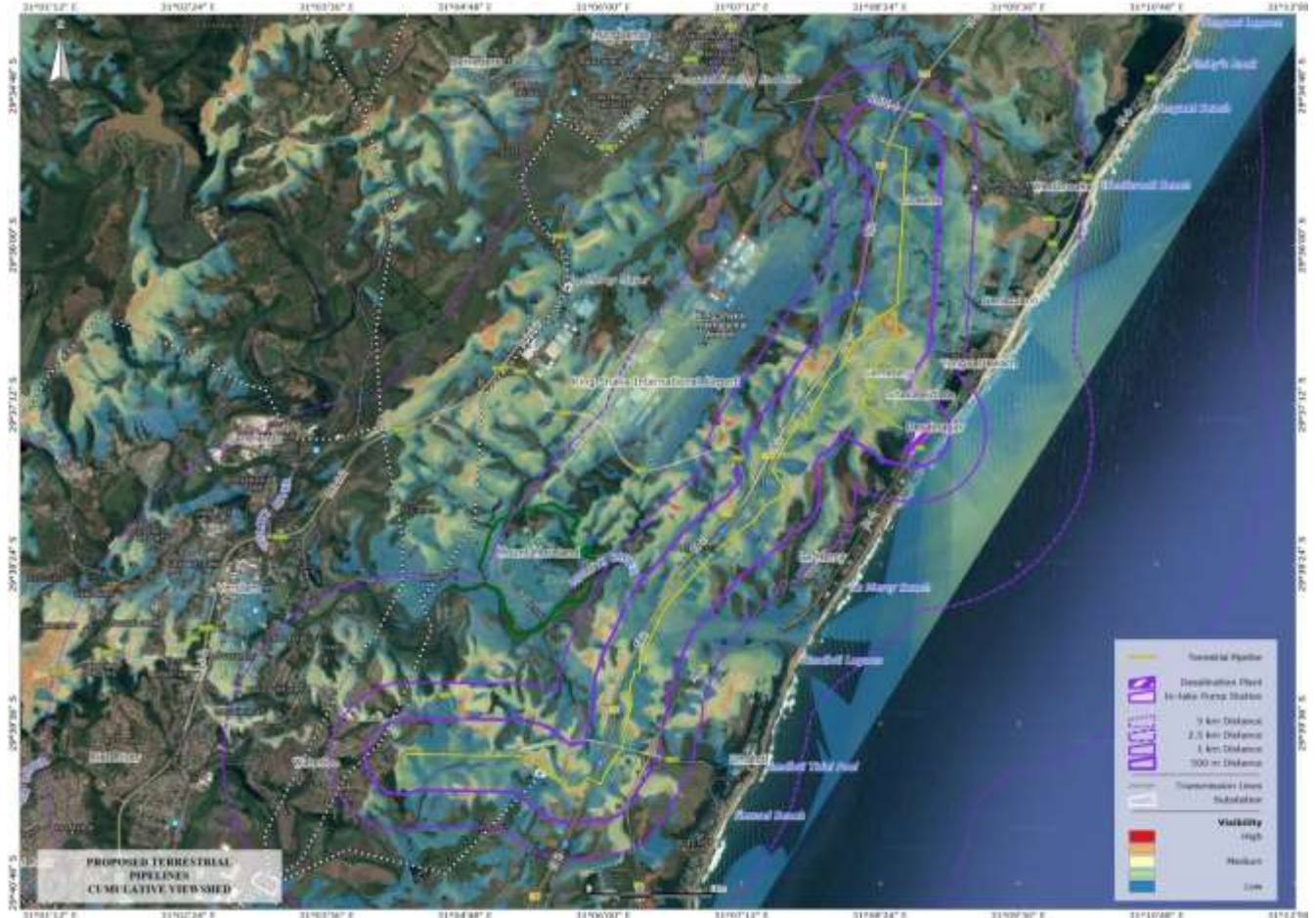


Figure 10-9: Cumulative viewshed of a pipeline along the Alternative 1 pipeline route during construction

The total length of the pipelines is approximately 16 km and the viewshed for construction activities along the lines is therefore large (57 km²) and its visibility high. Over 6000 buildings are in the view envelope although vegetation and buildings will reduce the actual viewshed size and number of buildings potentially affected.

10.6.1.3 Proposed Overhead Power lines

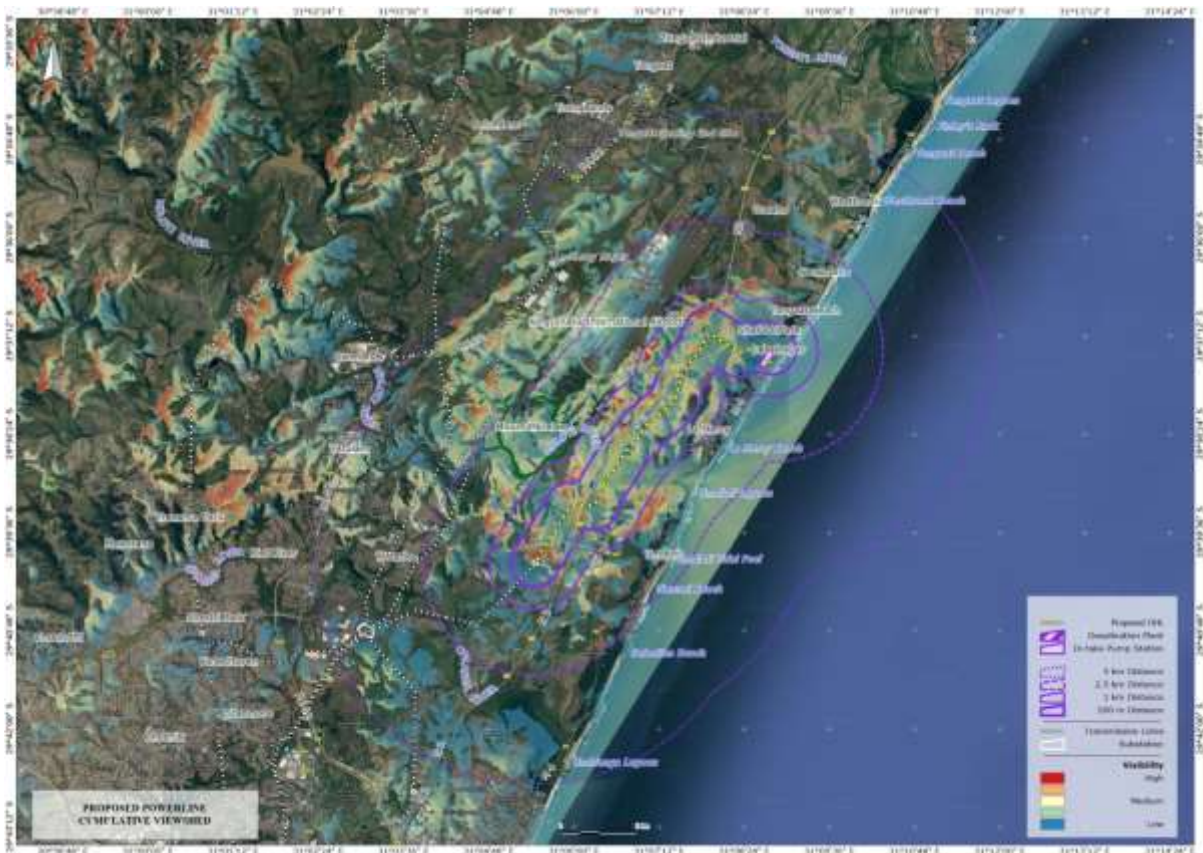


Figure 10-10: Cumulative viewshed of the Alternative 2 overhead powerline along the proposed route.

The transmission line (Alternative 2) is approximately 6.5 km long and will potentially affect a large area. The viewshed is 65 km² and contains approximately 2800 buildings. Visibility of the power line is therefore high.

10.6.2 Visual Exposure

Visual exposure refers to the relative visibility of a project or feature in the landscape and is related to the distance between the observer and the project (Oberholzer 2005). Exposure and visual impact tend to diminish exponentially with distance since the observed element comprises a smaller part of the view. Visual exposure is classified as follows:

- *High* – dominant or clearly noticeable;
- *Moderate* – recognisable to the viewer; and
- *Low* – not particularly noticeable to the viewer

Table 10-4: Visual exposure ratings and number of buildings

Component	Low	Medium	High
Desalination Plant, including pump station	128	11	66
Terrestrial Pipelines (Alternative 1 route)	5184	464	963
Overhead Transmission Lines (Alternative 2 route)	2080	238	507

10.6.2.1 Desalination Plant with Pump Station

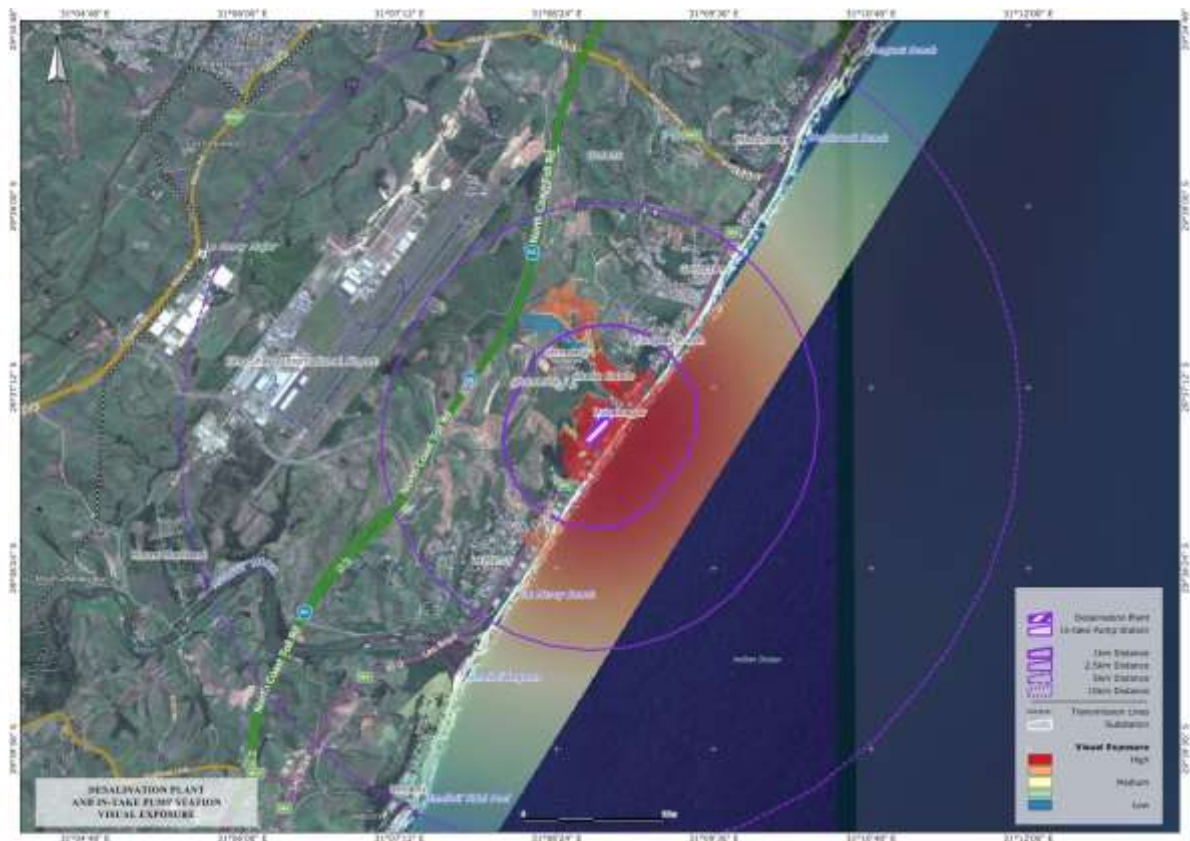


Figure 10-11: Visual exposure to a desalination plant with in-take pump station.

Potential visual exposure of sensitive visual receptors for the desalination plant with an in-take pump station is as follows (Figure 10-11, Figure 10-12):

- Users of the beach at Desainagar will be highly exposed to the desalination plant since the beach is within 200 m of the proposed site;
- Users of the beach at La Mercy will be highly exposed to the desalination plant since the beach within the viewshed is less than 2 km from the proposed site;
- Residents living in Desainagar will be highly exposed to the desalination plant since they are in very close proximity to the proposed site (less than 100 m in some cases);
- Residents of Shaka Estate will be highly exposed to the desalination plant – the estate is less than 500 m from the proposed site;
- Residents of La Mercy are between 1 and 2 km from the proposed site and will be highly exposed to the desalination plant;

- A few residents in Tongaat Beach will potentially be highly exposed to the desalination plant since they are in the viewshed and are 1.4 km from the proposed site;
- The northern edge of Umdloti is approximately 4 km from the proposed site and some of its residents will be moderately exposed to the desalination plant;
- Users of the beach at Umdloti will have low to moderate visual exposure to the desalination plant;
- Motorists driving on the M4 will potentially be highly exposed to the desalination plant for a total 2.5 minutes (3.3 km at 80 km/h).

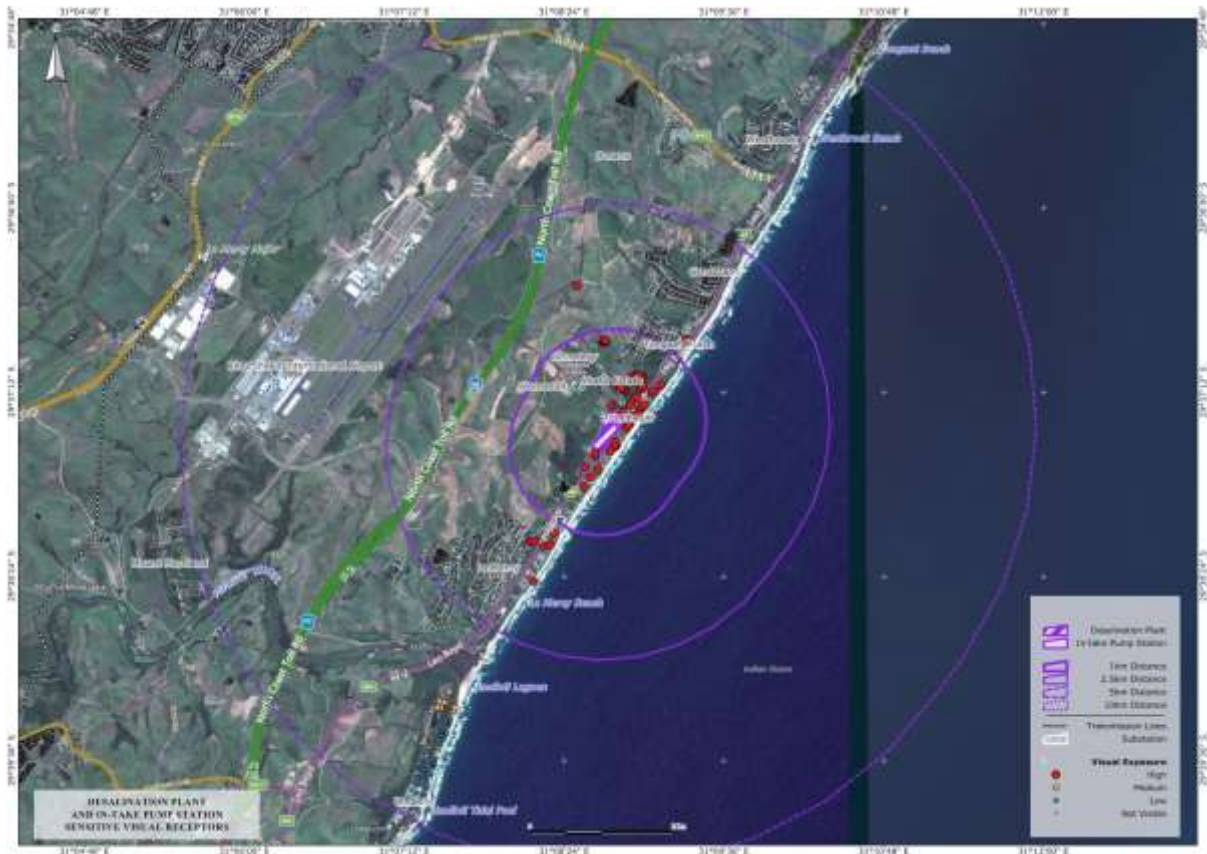


Figure 10-12: Visual exposure of sensitive visual receptors to desalination plant with in-take pump station1.

10.6.2.2 Terrestrial Pipelines

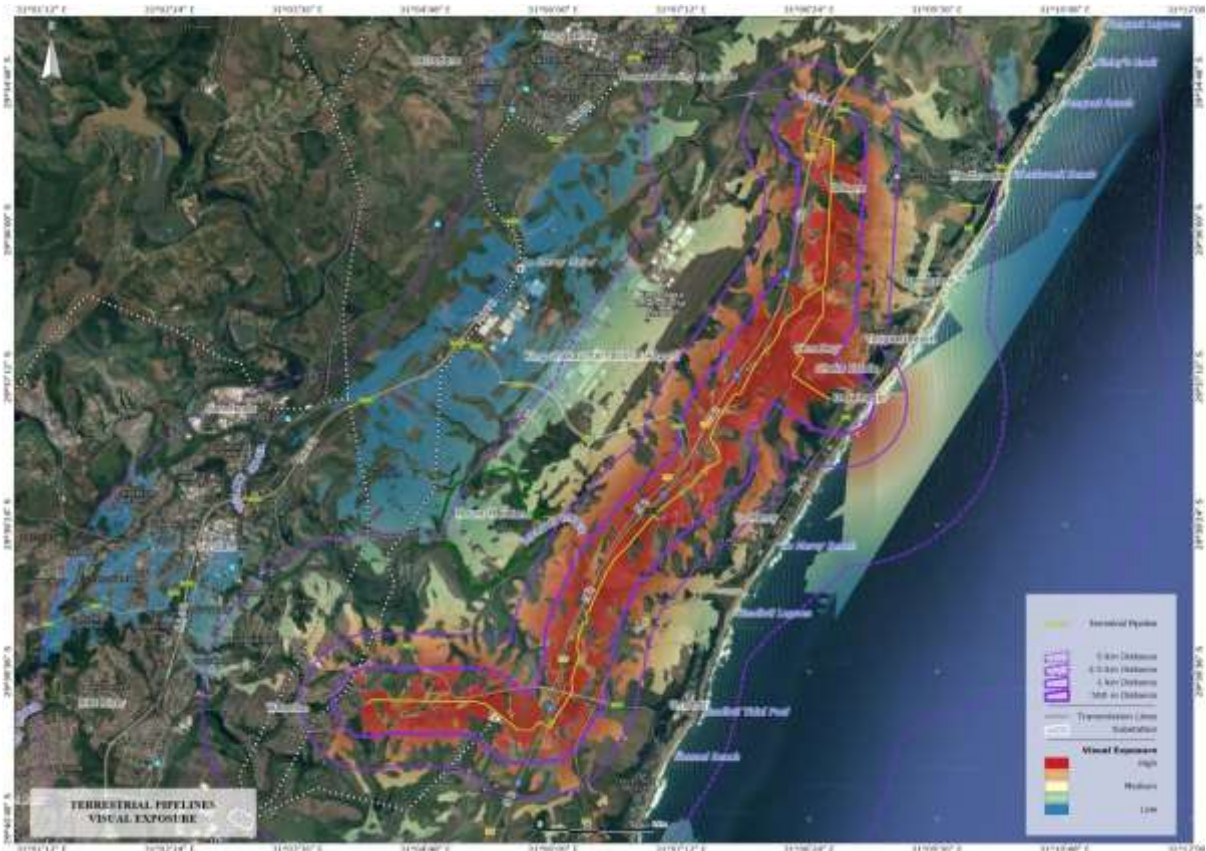


Figure 10-13: Visual exposure to construction activity along the terrestrial pipeline routes.

The maps in Figure 10-13 and Figure 10-14 show the potential visual exposure of the region to construction activities along the proposed terrestrial pipeline routes. Sensitive visual receptors will experience the following visual exposure:

- Residents living in Desainagar will be highly exposed to construction activities along the pipeline route from the desalination plant to La Mercy Reservoir since there are some who live within 100 m of the route;
- The proposed pipeline (Alternative 1) will pass approximately 500 m from the Shaka Estate and residents will potentially be highly exposed to construction activities along the initial section from the desalination plant to the La Mercy Reservoir;
- Visitors and residents of the Sivananda Cultural Centre will be highly exposed to construction activities along a section of the route from the desalination plant to the La Mercy Reservoir since the route passes approximately 100 m from the Centre, although existing vegetation between the route and the Centre will screen construction activities from most views;
- Residents of La Mercy living west of the M4 are within 1 km of the pipeline route from La Mercy Reservoir to Waterloo Reservoir and those with views on the route will be highly exposed to construction activities;
- Residents of the western parts of Tongaat Beach and Genazzano are within 1 km of the pipeline route from the desalination plant to La Mercy Reservoir and where the route is visible they will be highly exposed to construction activities;

- Mount Moreland is more than 1 km from the pipeline route between La Mercy and Waterloo Reservoirs and residents will be moderately exposed to construction activities where the route is in view;
- Residents of the eastern part of Waterloo township live within 1 km of the pipeline route between La Mercy and Waterloo Reservoirs and will be highly exposed to construction activities along the route;
- There are several small settlements and clusters of buildings within 1 km of the pipeline routes and residents will be highly exposed to construction activities along the routes if they are within the actual viewshed;
- Motorists driving on the N2 will potentially be highly exposed to construction activities along the pipeline routes for approximately 5 minutes (10 km at 120 km/h);
- Motorists driving on the R614/M43 will potentially be highly exposed to construction activities along the pipeline routes for approximately 1 minute (1 km at 80 km/h);
- Motorists driving on the M27 will potentially be highly exposed to construction activities along the pipeline routes for approximately 2.5 minutes (3 km at 80 km/h)



Figure 10-14: Potential visual exposure of sensitive visual receptors to construction activity along the terrestrial pipeline routes.

10.6.2.3 Overhead Transmission Line

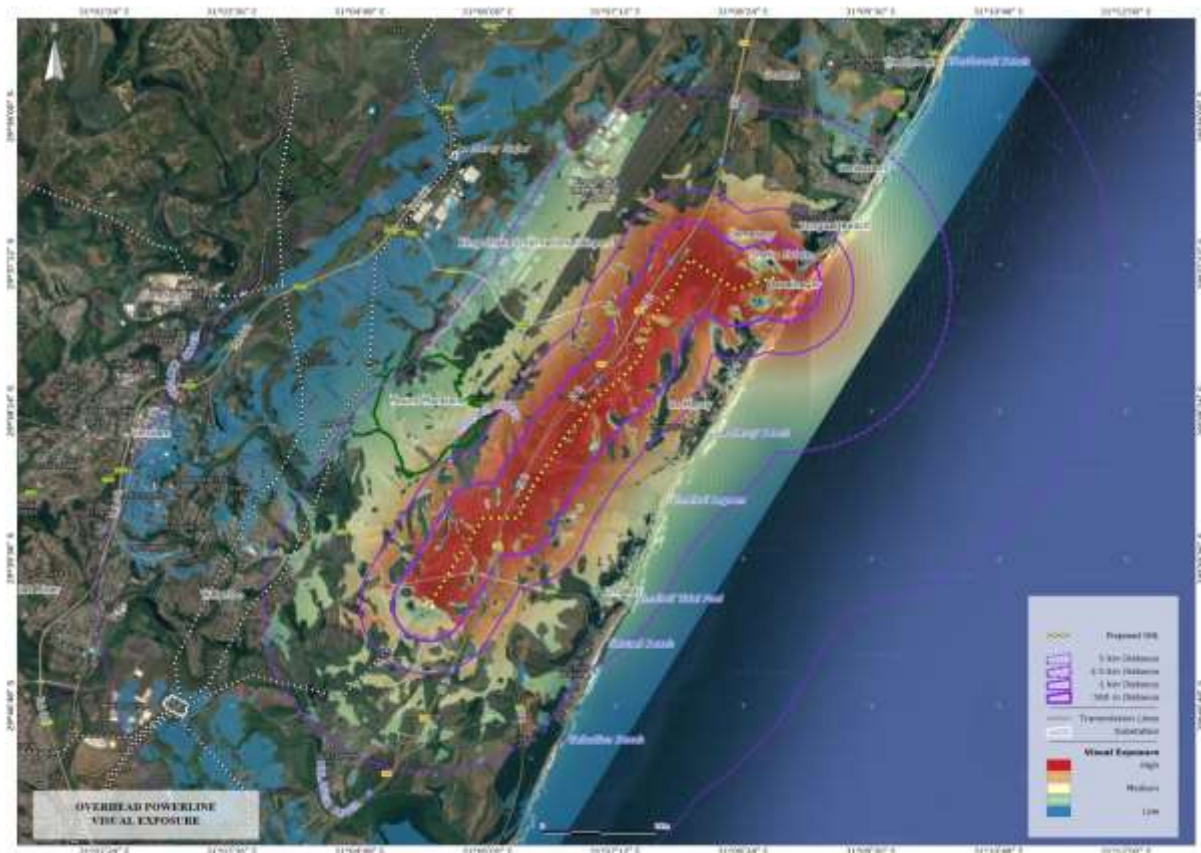


Figure 10-15: Visual exposure to proposed overhead transmission line.

The maps in Figure 10-15 and Figure 10-16 show the potential visual exposure of the region to construction activities along the proposed overhead transmission line route as well as to the operational power lines. Sensitive visual receptors will experience the following visual exposure:

- Residents of La Mercy living west of the M4 are within 1 km of the power line route and will be highly exposed to the power line;
- The Shaka Estate is within 500 m of a section of the proposed overhead line route and residents will potentially be highly exposed to the power lines, although the lines are unlikely to project into seaviews;
- Residents and visitors of the Sivananda Cultural Centre will potentially be highly exposed to the proposed overhead line since they will be within 500 m of the line, although views will be limited by vegetation between the power lines and the Centre;
- The power line will be more than 1 km from residences and viewpoints in Mount Moreland. Viewers will experience moderate to low visual exposure to the power line where they have views of the route;
- There are a number of building/residence clusters along the power line route where visual receptors will be highly exposed to the power line (some of the buildings are within 50 m of the route);
- Motorists driving on the N2 will potentially be highly exposed to the power line for approximately 5 minutes (9 km at 120 km/h);

- Motorists driving on the M4 will potentially be highly exposed to the power line for approximately 4 minutes (5.5 km at 80 km/h);



Figure 10-16: Potential visual exposure of sensitive visual receptors to the proposed overhead transmission line.

10.6.3 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; and
Low – minimal change or blends in well with the surroundings.





Figure 10-18: Sea view from residence in Shaka Estate (TVP002). Small plots of market gardening crops in various states of cultivation dominates the on-shore landscape. A few residences are scattered through the area with coastal resort type developments occurring along the narrow strip of land between the M4 and the beach.



Figure 10-19: View south from site along the M4. Apartment blocks and other holiday accommodation are visible in places but much of the coastal strip is undeveloped (Photo site TVP012).

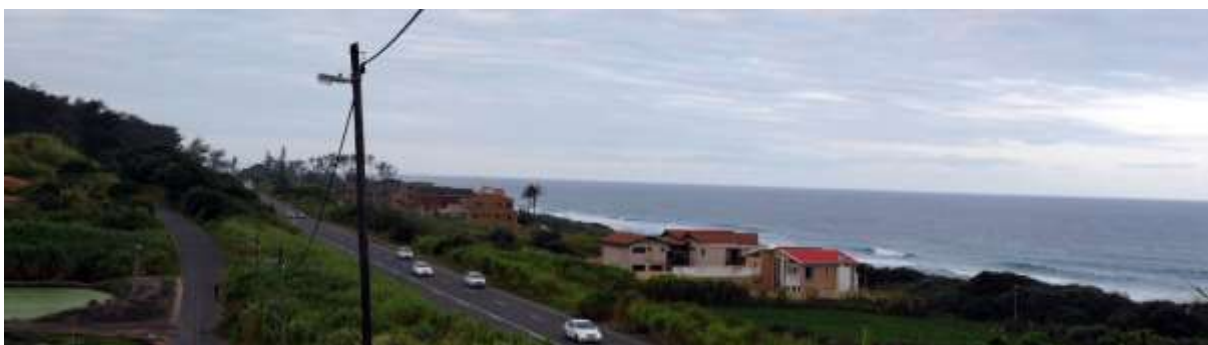


Figure 10-20: View north along the M4 from the proposed site (Photo site TVP012).



Figure 10-21: Shaka Estate along the northern hills overlooking the proposed site (TVP012).

10.6.3.2 Residents of Desainagar

Residents living in the area immediately surrounding the desalination plant will be highly exposed to the development and its associated structures. The following aspects of the development will potentially affect these visual receptors:

- Construction activities associated with terrestrial pipelines;
- Construction activities associated with marine pipelines (tunnels) and structures;
- Construction and decommissioning activities associated with the desalination plant and pump station;
- Construction and decommissioning activities associated with a 132 kV power line;
- Desalination plant and pump station at any of the proposed sites during the operational phase; and
- Overhead transmission line from the desalination plant to the Mdloti Substation.

Pipeline construction will introduce more activity into the Desainagar area, including workers, equipment, vehicles and structures. Construction activities at this scale are however similar to agricultural activities in many ways and will not appear incongruent with the landscape (especially considering that large residential complexes are being constructed in the surrounding landscape). Visual intrusion on views of residents of Desainagar will be moderate – construction activities associated with burying of the pipeline will be clearly noticeable but will fit in partially with the surroundings.

Construction activities associated with marine pipelines will be moderately intrusive on existing views of sensitive visual receptors since it involves tunneling and will occur beyond the surf zone.

The desalination plant is a large development with potentially tall structures and its construction phase will introduce considerable changes in existing views. The construction activities will not be unlike that seen during the construction of a large holiday resort complex such as can be seen in views towards La Mercy and Umdloti but over a larger area. Visual intrusion of construction activities on existing views will be high due to the size of the development – it will result in a noticeable change in views.

Construction activities associated with the power line will often occur against the skyline for sensitive visual receptors in close proximity to the route. If the construction activities occur in sea views then the visual intrusion will be high (e.g. if the route follows the M4 or Dune Road), otherwise it will be moderate.

The residences in close proximity to the desalination plant (Desainagar on the maps) were built with views of the sea in mind (i.e. large east facing windows and decks) and the desalination plant is unlikely to intrude on these views since there are no houses west of the desalination plant. One house just north

of Valley Road does face the desalination plant site and if residents have sea views from here then the desalination plant will most likely cut these off completely. Very few, if any, views valued for their scenic qualities will be intruded on by the desalination plant. The desalination plant will however be discordant with other existing views due to the size and industrial nature of the development.

132 kV overhead power lines will be highly intrusive where they appear in existing sea views, which will potentially occur to a few residents if the route is along the M4 or Dune Road.

10.6.3.3 Visual receptors on the beach at Desainagar

The proximity of these visual receptors to the proposed development means that a number of aspects of the project will potentially affect their views:

- Construction phase of the desalination plant;
- Construction phase of pump station;
- Construction of marine pipelines (tunnels) and off-shore structures; and
- Desalination plant and pump station.

The beach is narrow with high, steep, vegetated dunes on the landward side and very few views of a pump station on either of the lower two sites will be available from it (Figure 10-22, Figure 10-23). The desalination plant is a much larger and taller development on a higher elevation, and it is likely to be visible from more places on the beach. From the beach partial views of the pump station will be very similar to those of other large buildings in existing views.

Construction activities at the desalination plant site will be highly intrusive on views from the beach due to the size of the development and its elevated position. It will be discordant with elements in existing views.

The desalination plant will be highly intrusive on views from the beach within the actual viewshed. Existing vegetation on high dunes provide some screening but there are places from where the desalination plant will be visible. Due to the size of the plant and the industrial type structures it will seem discordant with its surroundings. The pump station will most likely be seen as part of the desalination plant from the beach.



Figure 10-22: View north from photo site TVP005 on the beach.



Figure 10-23: View south from photo site TVP005 on the beach.

10.6.3.4 Visual receptors on the beach at La Mercy

Views of the desalination plant from the La Mercy beach will mostly be screened by a multi-storey residential complex. At some places along the beach users will potentially be affected by the following aspects of the development:

- Construction activities associated with the desalination plant;
- Construction activities associated with marine pipelines (tunnels) and off-shore structures; and
- Desalination plant with pump station.

Visual intrusion will be high for construction activities associated with the desalination plant due to the size of the development. It will seem incongruent with elements in existing views.

Visual intrusion of the desalination plant on views of users of the La Mercy beach will be high since the development is much larger than existing developments such as holiday apartments and residential complexes and it has industrial type structures which is discordant with the surroundings.

10.6.3.5 Residents of Shaka Estate

These visual receptors will potentially be affected by the following aspects of the development:

- Construction activities associated with the desalination plant and pump station;
- Construction activities associated with terrestrial pipelines from the desalination plant to La Mercy Reservoir;
- Construction activities associated with transmission lines from the desalination plant to Mdloti Substation;
- Desalination plant with a pump station; and
- Transmission lines from the desalination plant to Mdloti Substation.

The site proposed for the desalination plant occupies a large part of views from the Shaka Estate. Their current views of the on-shore landscape are dominated by agricultural land and natural vegetation, and buildings are sparse with cultivated plots and vegetation between them (Figures 10.18 and 10.21). The plots are generally in different states of cultivation, from plots of exposed soil to green crops with all shades in between. Workers are active among the crops most of the day and most work are done manually so that vehicles or larger agricultural equipment are mostly absent from these views. The views are therefore rural in nature. Construction activities on the scale necessary to build a desalination plant will increase worker numbers, introduce large vehicles and equipment, and will project at least to some extent into views of the sea. The rural nature of the views will be completely altered and visual intrusion is expected to be high for construction activities associated with the desalination plant.

The desalination plant itself will dominate views from the Shaka Estate since most of the land now under cultivation will be replaced by buildings, structures and paved areas. The buildings associated with the desalination plant are large and many of the structures are industrial in nature. Many of the structures are tall and are likely to project into the sea views and detract from the quality of existing views. The rural aspect of these sea views will also be completely altered. A high visual intrusion on sea views from the Shaka Estate is therefore expected if a desalination plant is built here.

Construction activities associated with the pipeline are likely to intrude moderately on views from Shaka Estate since it will occur in close proximity to residents but will not project into sea views.

The proposed power line and activities associated with its construction are also likely to intrude moderately on views from Shaka Estate since they will be easily recognized but will not be incongruent with existing views (and they are unlikely to project into views of the sea).

10.6.3.6 Residents of La Mercy

Residents of La Mercy will potentially have views on the following aspects of the proposed desalination plant development:

- Construction activities associated with the desalination plant;
- Construction activities associated with proposed pipeline from La Mercy Reservoir to Waterloo Reservoir;
- Construction activities associated with proposed overhead transmission lines from the desalination plant to Mdloti Substation;
- Desalination plant with pump station; and
- Overhead power lines from the desalination plant to Mdloti Substation.

Visual intrusion will be high for construction activities associated with the desalination plant due to the size of the development which will seem incongruent elements in existing views. There are however very few residents who will be affected.

Visual intrusion of the desalination plant on views of a few La Mercy residents will be high since the development is much larger than existing developments such as holiday apartments and residential complexes and it has industrial type structures which is discordant with the surroundings. It is likely to affect very few La Mercy residents due to the screening effect of garden and natural vegetation as well as neighbouring buildings.

Construction of the pipeline will occur against the backdrop of the N2 where major road works have been taking place for a long time. The increase in activity will be noticed but it will not seem discordant with the surroundings. A moderate visual intrusion is expected.

The transmission line and construction activities are likely to be associated with other activities and structures related to the N2. Views from La Mercy are downhill and the power line is unlikely to be exposed against the sky. Visual intrusion is expected to be low for residents of La Mercy.

10.6.3.7 Residents of Tongaat Beach and Genazzano

Residents of Tongaat Beach and Genazzano are unlikely to see much of the desalination plant and pump station due to high trees and dense bush as well as neighbouring buildings. Residents of the western edges of the settlements will potentially be affected by the construction activities related to the terrestrial pipelines from the desalination plant to La Mercy Reservoir and those from the Reservoir to the Bifurcation point. Existing views include clumps of natural vegetation among sugar cane fields. An increase of activities and the introduction of large construction vehicles and equipment, as well as large pipes and soil heaps are likely to be noticed but vegetation screening will mean that only partial views of construction activities will occur. A moderate visual intrusion on existing views is expected for these sensitive visual receptors.

10.6.3.8 Residents of Umdloti and users of the Umdloti beach

Residents of the northern parts of the coastal resort (Figure 10.24) will potentially be affected by the following aspects of the proposed development:

- Construction activities associated at the desalination plant site or any of the pump station sites;
- Desalination plant with a pump station at any of the proposed sites.



Figure 10-24: View from the northern edge of Umdloti (photo site TVPo11) towards La Mercy and Desainagar.

There are a number of residences and upmarket holiday accommodation developments in the northern parts of Umdloti where sensitive visual receptors may be able to see the desalination plant at Desainagar. Their existing views in this direction contain several large residential complexes and holiday

apartment buildings stretching along the beachfront to the north. The proposed development is large with tall structures and it is close enough to sensitive visual receptors to be noticed. A moderate visual intrusion is expected during construction, operation and decommissioning of the desalination plant for a few northern views from Umdloti, including from the beach at the Mdloti River mouth.

10.6.3.9 Motorists on the M4

Motorists driving on the M4 will potentially be affected by the following aspects of the proposed development:

- Construction activities at the desalination plant site (including the pump station);
- Construction activities associated with an overhead transmission line from the desalination plant to the Mdloti Substation;
- A desalination plant at the site near Desainagar with a pump station; and
- An overhead transmission line from the desalination plant to the Mdloti Substation.

Construction activities at the desalination plant will occur in close proximity to motorists driving along the M4 and where motorists are in sections of high visual exposure they will experience high visual intrusion since the development will take up a large part of views. Construction vehicles, equipment and workers will make for complex patterns and textures in views and due to the size of the development will seem discordant with the surroundings.

Motorists driving along the M4 are likely to experience low visual intrusion due to construction activities related to the proposed powerline since, where they are visible, the activities will be indistinguishable from those associated with the desalination plant. Construction of the desalination plant will overshadow any activities associated with the power line in that area. Vegetation adjacent to the M4 will screen many views particularly where the road approaches the power line route. At this point the N2 will also be visible.

The desalination plant will be highly intrusive on views of motorists since it is a very large structure compared to its surroundings. It replaces land under cultivation and existing views are often of green vegetation and rural in nature. The industrial structures and size of structures will seem discordant with its surroundings.

Views of the power line from the M4 will be very limited due to topography, vegetation and buildings. The proposed route is adjacent to the N2 and the power line will likely fit in with other structures along the road for motorists driving along the M4. Visual intrusion of a power line along this route is therefore expected to be low for motorists using the M4.

10.6.3.10 Residents and visitors of Sivananda Cultural Centre

These visual receptors will potentially be affected by:

- Construction of the pipeline along the route from the desalination plant to the La Mercy Reservoir;
- Construction of the transmission line from the desalination plant to the Mdloti Substation; and
- The proposed transmission line from the desalination plant to the Mdloti Substation.

The pipeline route (Alternative 1) passes behind the Sivananda Centre (i.e. views from the Centre are primarily directed north down the hill towards the Sivananda Cemetery) and existing vegetation and topography makes it unlikely that viewers will notice construction activity along this section of the route (Figure 10.25). The La Mercy Reservoir is on a hill above the Sivananda Cemetery approximately 1.5 km

from the Centre. The Reservoir is surrounded by sugar cane fields and the pipeline will pass through these fields. Existing views from the Centre is rural in its sense of place but also variable in quality due to the agricultural practices related to sugar cane and garden market crops. Construction activities will be clearly noticeable but will not be discordant with existing views. A moderate visual intrusion on views from the Sivananda Cultural Centre is expected.

Construction activities along the proposed power line route are unlikely to be noticed by viewers at the Centre since the route is away from/behind the direction of views and existing vegetation and topography is likely to screen viewers from the power line. The route is more than 300 m from the Centre. If there are views of construction activities along the route it is likely that they will be recognized but not incongruent with other elements also in view. A moderate visual intrusion is therefore expected for viewers at the Centre, both for construction activities as well as for the operational power line.



Figure 10-25: View of the Sivananda Cultural Centre from Shaka Estate (photo site TVP001). The power line and pipe line routes both pass behind the Centre and views from the Centre are unlikely to include either structure.

10.6.3.11 Residents, visitors and viewpoints of Mount Moreland

Sensitive visual receptors in this area will potentially be affected by:

- Construction of the terrestrial pipeline from La Mercy Reservoir to Waterloo Reservoir;
- Construction of transmission lines from the desalination plant to the Mdloti Substation; and
- Overhead transmission lines from the desalination plant to the Mdloti Substation.

There are few places in Mount Moreland from where the N2 is visible due to topographic and vegetation screening. The proposed pipeline (Alternative 1) and transmission line (Alternative 2) routes are on the other side of the N2 from Mount Moreland and it is therefore likely that views of construction activities will also be very limited. In terms of visual intrusion it is unlikely that construction activities will be specifically noticed beyond the N2 which is a large structure with high traffic volume. Visual intrusion is therefore expected to be low for views of construction activities and overhead lines from Mount Moreland.

10.6.3.12 Residents of Waterloo

Some residents of Waterloo township will potentially be affected by construction activities associated with building the pipeline from La Mercy Reservoir to Waterloo Reservoir. Their existing views are of sugar cane fields with roads (e.g. N2) and transmission lines in the distance. Construction activities will be noticed but it will partially fit into the surroundings. A moderate visual intrusion is expected on views from Waterloo.



Figure 10-26: View of Waterloo Reservoir from Mdloti Substation (Photo site TVP014). An unrelated pipeline is currently being laid to the Reservoir.

10.6.3.13 Residents and viewpoints within 1 km of the pipeline route (Alternative 1)

There are various buildings clustered along the pipeline routes and within 1 km of a route. These include farmsteads, farm worker houses and informal settlements. They are most often surrounded by high and dense vegetation, particularly towards the N2 (and therefore the pipeline route), and it is likely that few residents will have views of the route from their homes. Where views of the route exist they will often include large structures such as the N2, structures associated with the airport, and high voltage transmission lines. A low to moderate visual intrusion is expected for these sensitive visual receptors during construction of the proposed pipelines.

10.6.3.14 Residents and viewpoints within 1 km of the power line route (Alternative 2)

There are a few clumps of buildings (farmsteads and farm worker houses) within 1 km of the power line route. Most views of the power line will also include the N2 and structures associated with it and the power line is unlikely to be noticed in this environment. Low visual intrusion is therefore expected for the proposed power line for these visual receptors.

10.6.3.15 Motorists on the N2

The pipeline routes from La Mercy Reservoir to the Bifurcation point and from La Mercy Reservoir to Waterloo Reservoir follow the N2 for much of the way and also pass underneath the road eventually. The proposed power line route also follows the N2 for most of its length before crossing the road. Motorists will therefore potentially be affected by construction activities along the pipeline and power line routes, and will also have the operational power line in views once it is constructed.

Motorists travelling on the N2 are likely to recognize the construction activity since construction along this part of the N2 has been intensive in the last couple of years due to the new international airport. Maintenance and construction is a familiar aspect of the N2. Construction activity is therefore clearly noticeable but is not discordant with the surroundings of these visual receptors. A moderate visual intrusion is expected during construction of the pipeline as well as the transmission line.

There are no existing transmission lines on the eastern side of the N2 in the high exposure sections of the road, but several are visible on the western side for at least some sections. They are part of the highly urbanised landscape to the west. The transmission line in such close proximity to the N2 on the eastern side of the road will affect existing views of rolling hills covered in sugar cane fields. The variable nature, in terms of texture and colour, of the sugar cane landscape, and the structures associated with a highway (lamp posts, toll gates and the road itself) means that even though the transmission line detracts from views, the existing views are not necessarily of high quality. There are very few opportunities along the N2 for views of the pipeline or power line. A low visual intrusion is expected for visual receptors on the N2.



Figure 10-27: Familiar structures in views of motorists using the N2 near the proposed development



Figure 10-28: View south from N2 showing sugar cane fields as well as structures associated with the N2



Figure 10-29: Agricultural activities associated with sugar cane farming as seen from the N2



Figure 10-30: 8View across the Mdloti River from the N2 where the pipeline and power line routes cross the river

10.6.3.16 Motorists using the M43 (Watson Highway)

These visual receptors will potentially be affected by construction of the pipeline from the La Mercy Reservoir to the Bifurcation point just west of the N2. Most of the road east of the N2 is lined with tall vegetation and it is likely that motorists will only notice pipeline construction once they are close to the N2. Due to the topography motorists will seldom be in the viewshed on the highway west of the N2. Construction activity along the pipeline route is unlikely to be noticed by motorists on the M43 and a low visual intrusion is expected for these visual receptors.

10.6.3.17 Motorist using the M27

These motorists will potentially be affected by construction activity associated with the proposed pipeline from La Mercy Reservoir to Waterloo Reservoir. Most views from the road are of hills covered in sugar cane fields. Some views will include substations, roads, transmission lines and residential areas as well. A moderate visual intrusion is expected since the increase in activity with large construction vehicles, equipment and structures is likely to be noticed. The power line is likely to fit in with other structures and elements of views from the road and low visual intrusion is expected for motorists using this road.

Table 10-5: Summary of visual impact criteria for key components and visual receptors

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
Construction of Terrestrial Pipelines	Residents of Desainagar	Visual Sensitivity	Moderate to High	Sea views are highly sensitive while other views are moderately sensitive due to the variable nature of their views.
		Visual Exposure	High	The pipeline will pass within 100 m of some residents.
		Visual Intrusion	Moderate	Construction activities associated with burying of the pipeline will be clearly noticeable but will fit in partially with the surroundings.
		Impact Intensity	Medium	Moderate intrusion on moderately sensitive visual receptors
	Residents of Shaka Estate	Visual Sensitivity	High	Units are marketed for their sea views.
		Visual Exposure	High	The pipeline route passes in close proximity to the complex.
		Visual Intrusion	Moderate	Construction activities will be noticed but will not affect sea views.
		Impact Intensity	Medium	Moderate intrusion on highly sensitive visual receptors
	Sivananda Cultural Centre	Visual Sensitivity	Moderate	Their attention is focused on their activities rather than the surrounding landscape.
		Visual Exposure	High	The route passes within 100 m of the Centre, but it is likely that existing vegetation will screen most views from the Centre.
		Visual Intrusion	Moderate	Construction activities will be noticed but views are highly variable.
		Impact Intensity	Medium	Moderately sensitive visual receptors will be highly exposed to construction activities along the route.
	Residents of La Mercy	Visual Sensitivity	Moderate	The residential areas are urbanised and their views include many buildings and structures associated with urban landscapes
		Visual Exposure	High	Residents of La Mercy living west of the M4 are within 1 km of the pipeline route.

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Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
		Visual Intrusion	Moderate	Views of construction activity are likely to contain the N2 and its associated activity and structures.
		Impact Intensity	Medium	High exposure to moderately intrusive activities.
	Residents of Tongaat Beach and Genazzano	Visual Sensitivity	Moderate	The residential areas are urbanised and their views include many buildings and structures associated with urban landscapes
		Visual Exposure	High	Some residents are within 1 km of the pipeline route from the desalination plant to La Mercy Reservoir.
		Visual Intrusion	Moderate	Partial views of pipeline construction through sugar cane fields.
		Impact Intensity	Medium	High exposure to moderately intrusive activities.
	Residents, visitors and viewpoints of Mount Moreland	Visual Sensitivity	High	They have an active interest in the surrounding landscape and have viewpoints that are tourist attractions (the views are not exceptionally sensitive since they are primarily for birdwatching and include urban structures)
		Visual Exposure	Moderate	Residents are more than 1 km from the route.
		Visual Intrusion	Low	The pipeline route is beyond the N2 and M27. Pipeline construction activities are unlikely to be noticed from Mount Moreland.
		Impact Intensity	Medium-Low	Moderate visual exposure to low visual intrusion activities.
	Residents of Waterloo	Visual Sensitivity	Low	They live in highly urbanised surroundings and their views are complex in pattern, colours and contrast.
		Visual Exposure	High	The Waterloo Reservoir is on the southern edge of the township and there are residences that overlook the valley through which the pipeline route passes.
		Visual Intrusion	Moderate	Their existing views are of sugar cane fields with roads (e.g. N2) and transmission lines in the distance. Construction activities will be noticed but it will partially fit into the surroundings.

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Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
	Residents and viewpoints within 1 km of a pipeline route	Impact Intensity	Medium-Low	Moderate intrusion on low sensitivity visual receptors.
		Visual Sensitivity	Moderate	Although they have an active interest in the surrounding landscape they are also within 1 km of the N2 and will have many urban structures also in views.
		Visual Exposure	High	Sensitive visual receptors within 1 km of the route.
		Visual Intrusion	Low to Moderate	Where views of the route exist they will often include large structures such as the N2, structures associated with the airport, and high voltage transmission lines.
		Impact Intensity	Medium	Moderately sensitive visual receptors are highly exposed to construction activities.
	Motorists on the N2	Visual Sensitivity	Low	Their views are mostly filled with large structures and urban elements.
		Visual Exposure	High	For approximately 5 minutes (10 km at 120 km/h)
		Visual Intrusion	Moderate	Construction activity is clearly noticeable but is not discordant with the surroundings of these visual receptors.
		Impact Intensity	Medium-Low	Low sensitivity visual receptors are highly exposed to construction activities.
	Motorists on the R614/M43 (Watson Highway from the M4 to Tongaat)	Visual Sensitivity	Low	The sections that are within the viewsheds are also within viewsheds of highly urbanised landscapes which include many transmission lines, large roads, toll plaza's and city scapes
		Visual Exposure	High	For approximately 1 minute (1 km at 80 km/h).
		Visual Intrusion	Low	Construction activity along the pipeline route is unlikely to be noticed by motorists on the M43.
		Impact Intensity	Low	Low visual intrusion on low sensitivity visual receptors.

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Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
	Motorists on the M27 (Umdloti to Waterloo)	Visual Sensitivity	Low	They pass through highly urbanised landscapes and their views are filled with complex patterns, colours and contrasts.
		Visual Exposure	High	For approximately 2.5 minutes (3 km at 80 km/h).
		Visual Intrusion	Moderate	The increase in activity with large construction vehicles, equipment and structures is likely to be noticed.
		Impact Intensity	Medium-Low	High exposure to moderately intrusive construction activities.
Construction of Power Line	Residents of Desainagar	Visual Sensitivity	Moderate to High	Sea views are highly sensitive while other views are moderately sensitive due to the variable nature of their views.
		Visual Exposure	High	The power line will be within 200 m of a few residences.
		Visual Intrusion	High	Visual intrusion will be high since the route passes in close proximity to a small number of residences adjacent to the proposed desalination plant site.
		Impact Intensity	High	High exposure to highly intrusive construction activities.
	Residents of La Mercy	Visual Sensitivity	Moderate	The residential areas are urbanised and their views include many buildings and structures associated with urban landscapes
		Visual Exposure	High	Residents of La Mercy living west of the M4 are within 1 km of the power line route.
		Visual Intrusion	Low	The route is along the N2 and in close proximity to the road and construction activity along the route will be associated with the N2 and other construction activities related to the road.
		Impact Intensity	Low	Low visual intrusion on existing views of moderately sensitive visual receptors.
	Residents of Shaka Estate	Visual Sensitivity	High	Units are marketed for their sea views.
		Visual Exposure	High	A section of the proposed line is within 500 m of the Estate.

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Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
		Visual Intrusion	Moderate	Construction activities will be easily recognised from the Estate but will not be incongruent with existing views.
		Impact Intensity	Medium	Moderate visual intrusion on highly sensitive visual receptors.
	Sivananda Cultural Centre	Visual Sensitivity	Moderate	Their attention is focused on their activities rather than the surrounding landscape.
		Visual Exposure	High	The Centre is within 500 m of the proposed route, although vegetation surrounding the Centre will likely screen viewers from the power line.
		Visual Intrusion	Moderate	In the unlikely case that viewers at the Centre can see construction activities along the power line they will experience moderate visual intrusion on their existing views due to other elements that will also be in those views (buildings, N2 and structures associated with an urban landscape).
		Impact Intensity	Medium	Moderate visual intrusion on moderately sensitive visual receptors.
	Residents, visitors and viewpoints of Mount Moreland	Visual Sensitivity	High	They have an active interest in the surrounding landscape and have viewpoints that are tourist attractions (the views are not exceptionally sensitive since they are primarily for birdwatching and include many urban structures).
		Visual Exposure	Moderate to Low	The proposed power line route is more than 1 km from residences and viewpoints in Mount Moreland.
		Visual Intrusion	Low	The power line route is beyond the N2 and construction activities along it will be associated with the N2 – it is unlikely they will be noticed from Mount Moreland.
		Impact Intensity	Low	Low visual intrusion and moderate to low exposure.
	Residents and viewpoints within 1 km of the power line route	Visual Sensitivity	Moderate	There are a few visual receptors with views that consist mostly of an agricultural landscape containing fields of sugar cane and structures normally associated with agricultural activities. The

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Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
				variable nature of the sugar cane landscape means that the views are not necessarily of high quality (scenic).
		Visual Exposure	High	Some of the buildings are within 50 m of the route.
		Visual Intrusion	Low	Views of the transmission line are likely to also include N2 and other large structures associated with the road.
		Impact Intensity	Low	Low visual intrusion on existing views of moderately sensitive visual receptors/
	Motorists on the N2	Visual Sensitivity	Low	Their views are mostly filled with large structures and urban elements
		Visual Exposure	High	For approximately 5 minutes (9 km at 120 km/h).
		Visual Intrusion	Moderate	Construction activity is therefore clearly noticeable but is not discordant with the surroundings of these visual receptors.
		Impact Intensity	Medium-Low	Moderate intrusion on low sensitivity visual receptors.
	Motorists using the M4	Visual Sensitivity	Moderate	They may include tourists and international tourists who have an active interest in the surrounding landscape, but they pass through highly urbanised landscapes.
		Visual Exposure	High	For approximately 4 minutes (5.5 km at 80 km/h).
		Visual Intrusion	Low	Views from the M4 of construction activities will be very limited due to topography, vegetation and buildings and where motorists are in the viewshed they are likely to associate these activities with other activities related to construction of the desalination plant, or related to the N2.
		Impact Intensity	Low	Low visual intrusion on moderately sensitive visual receptors.
Construction of Desalination Plant (with Pump Station)	Visual receptors on the beach at Desainagar	Visual Sensitivity	Moderate	Recreational users of the beach who are primarily focused on their activities and the sea

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Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
		Visual Exposure	High	The beach is within 200 m of the proposed site.
		Visual Intrusion	High	Construction activities at the scale of the desalination plant will result in a noticeable change in existing views from the beach
		Impact Intensity	High	High exposure to a highly intrusive development.
	Visual receptors on the beach at La Mercy	Visual Sensitivity	Moderate	Recreational users of the beach who are primarily focused on their activities and the sea
		Visual Exposure	High	The beach within the viewshed is less than 2 km from the proposed site
		Visual Intrusion	High	Construction activities at the scale of the desalination plant will result in a noticeable change in existing views from the beach
		Impact Intensity	High	High exposure to a highly intrusive development.
	Visual receptors in Desainagar	Visual Sensitivity	Moderate to high	Residents with sea views are highly sensitive while others are moderately sensitive since the quality of view is variable due to agricultural practices and season.
		Visual Exposure	High	They are in very close proximity to the proposed site (less than 100 m in some cases)
		Visual Intrusion	High	Due to the size of the development the construction activities will result in a noticeable change in the rural sense of place.
		Impact Intensity	High	High exposure to a highly intrusive development.
	Residents of Shaka Estate	Visual Sensitivity	High	Units in the estate are marketed for their scenic views.
		Visual Exposure	High	The estate is less than 500 m from the proposed site
		Visual Intrusion	High	Sea views will be considerably altered and the existing rural sense of these views will be highly altered. Some of the structures will

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Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
				potentially project into the sea views with construction activities occurring against the sea and sky.
		Impact Intensity	High	Views valued for their scenic qualities will be significantly altered.
	Residents of La Mercy	Visual Sensitivity	Moderate	The residential areas are urbanised and their views include many buildings and structures associated with urban landscapes
		Visual Exposure	High	Residents of La Mercy are between 1 and 2 km from the proposed site.
		Visual Intrusion	High	Construction of such a large development will be discordant with other elements in existing views. However, there are very few residents in La Mercy who will have a view of the desalination plant site.
		Impact Intensity	High	High exposure to a highly intrusive development.
	Residents of Tongaat Beach	Visual Sensitivity	Moderate	The residential areas are urbanised and their views include many buildings and structures associated with urban landscapes
		Visual Exposure	High	Those in the theoretical viewshed are 1.4 km from the proposed site.
		Visual Intrusion	High	Residents are unlikely to see the desalination plant due to high trees and dense vegetation between Tongaat Beach and the proposed site. If they do see it the construction activities will seem incongruent with the other elements in their views due to the size of the development.
		Impact Intensity	High	High exposure to a highly intrusive development.
	Residents of the northern section of Umdloti	Visual Sensitivity	High	They have views of scenic quality that may be affected by the development and residents will include tourists and international tourists
		Visual Exposure	Moderate	The northern edge of Umdloti is approximately 4 km from the proposed site

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Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
		Visual Intrusion	Moderate	Their existing views in this direction contain several large residential complexes and holiday apartment buildings stretching along the beachfront to the north. The proposed development is large with tall structures and it is close enough for sensitive visual receptors to notice.
		Impact Intensity	Medium	Moderate intrusion on highly sensitive visual receptors.
	Motorists using the M4	Visual Sensitivity	Moderate	They may include tourists and international tourists who have an active interest in the surrounding landscape, but they pass through highly urbanised landscapes.
		Visual Exposure	High	High visual exposure for about 2.5 minutes (3.3 km at 80 km/h)
		Visual Intrusion	High	Construction vehicles, equipment and workers will make for complex patterns and textures in views and due to the size of the development will seem discordant with the surroundings.
		Impact Intensity	High	High exposure to a highly intrusive development.
Desalination Plant (with Pump Station)	Visual receptors on the beach at Desainagar	Visual Sensitivity	Moderate	Recreational users of the beach who are primarily focused on their activities and the sea
		Visual Exposure	High	The beach is within 200 m of the proposed site.
		Visual Intrusion	High	Due to the size of the plant and the industrial type structures it will seem discordant with its surroundings. The pump station will most likely be seen as part of the desalination plant from the beach.
		Impact Intensity	High	High visual exposure to a highly intrusive development.
	Visual receptors on the beach at La Mercy	Visual Sensitivity	Moderate	Recreational users of the beach who are primarily focused on their activities and the sea
		Visual Exposure	High	The beach within the viewshed is less than 2 km from the proposed site

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Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
		Visual Intrusion	High	The development is much larger than existing developments such as holiday apartments and residential complexes and it has industrial type structures which is discordant with the surroundings.
		Impact Intensity	High	High visual exposure to a highly intrusive development.
	Visual receptors in Desainagar	Visual Sensitivity	Moderate to high	Residents with sea views are highly sensitive while others are moderately sensitive since the quality of view is variable due to agricultural practices and season.
		Visual Exposure	High	They are in very close proximity to the proposed site (less than 100 m in some cases)
		Visual Intrusion	High	The size of the development and the industrial nature of some of its components will be discordant with existing views. Very few, if any, sea views will be affected.
		Impact Intensity	High	High visual exposure to a highly intrusive development.
	Residents of Shaka Estate	Visual Sensitivity	High	Units in the estate are marketed for their scenic views.
		Visual Exposure	High	The estate is less than 500 m from the proposed site
		Visual Intrusion	High	Existing sea views will be highly altered by the large proposed development. The rural sense of these views will be lost. Industrial type structures will detract from the quality of views and may potentially project against the sea and sky.
		Impact Intensity	High	High visual exposure to a highly intrusive development.
	Residents of La Mercy	Visual Sensitivity	Moderate	The residential areas are urbanised and their views include many buildings and structures associated with urban landscapes
		Visual Exposure	High	Residents of La Mercy are between 1 and 2 km from the proposed site.

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Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
		Visual Intrusion	High	The development is much larger than existing developments such as holiday apartments and residential complexes and it has industrial type structures which is discordant with the surroundings. There are very few residences in the actual viewshed of the desalination plant due to the screening effect of vegetation and neighbouring buildings.
		Impact Intensity	High	High visual exposure to a highly intrusive development.
	Residents of Tongaat Beach	Visual Sensitivity	Moderate	The residential areas are urbanised and their views include many buildings and structures associated with urban landscapes
		Visual Exposure	High	Those in the theoretical viewshed are 1.4 km from the proposed site.
		Visual Intrusion	High	Residents are unlikely to see the desalination plant due to high trees and dense vegetation between Tongaat Beach and the proposed site. If they do see it the plant will seem incongruent with the other elements in their views due to its size and industrial type structures.
		Impact Intensity	High	High visual exposure to a highly intrusive development.
	Residents of the northern section of Umdloti	Visual Sensitivity	High	They have views of scenic quality that may be affected by the development and residents will include tourists and international tourists
		Visual Exposure	Moderate	The northern edge of Umdloti is approximately 4 km from the proposed site
		Visual Intrusion	Moderate	Their existing views in this direction contain several large residential complexes and holiday apartment buildings stretching along the beachfront to the north. The proposed development is large with tall structures and it is close enough to sensitive visual receptors to be noticed.
		Impact Intensity	Medium	Moderate intrusion on highly sensitive visual receptors.

SECOND DRAFT EIA REPORT

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
	Motorists using the M4	Visual Sensitivity	Moderate	They may include tourists and international tourists who have an active interest in the surrounding landscape, but they pass through highly urbanised landscapes.
		Visual Exposure	High	High visual exposure for about 2.5 minutes (3.3 km at 80 km/h)
		Visual Intrusion	High	It is a very large structure compared to its surroundings. It replaces land under cultivation and existing views are often of green vegetation and rural in nature. The industrial structures and size of structures will seem discordant with its surroundings.
		Impact Intensity	High	High visual exposure to a highly intrusive development.
Overhead Power Line	Residents of Desainagar	Visual Sensitivity	Moderate to High	Sea views are highly sensitive while other views are moderately sensitive due to the variable nature of their views.
		Visual Exposure	High	The power line will be within 200 m of a few residences.
		Visual Intrusion	High	Visual intrusion will be high since the route passes in close proximity to a small number of residences adjacent to the proposed desalination plant site.
		Impact Intensity	High	High visual intrusion on the views of a few receptors living in close proximity to the route.
	Residents of La Mercy	Visual Sensitivity	Moderate	The residential areas are urbanised and their views include many buildings and structures associated with urban landscapes
		Visual Exposure	High	Residents of La Mercy living west of the M4 are within 1 km of the power line route.
		Visual Intrusion	Low	The power lines will most likely be associated with the N2 and other structures along the N2.
		Impact Intensity	Low	Low visual intrusion on views of moderately sensitive visual receptors.

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Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
	Residents of Shaka Estate	Visual Sensitivity	High	Units are marketed for their sea views.
		Visual Exposure	High	A section of the proposed line is within 500 m of the Estate.
		Visual Intrusion	Moderate	The proposed power lines will not be incongruent with elements in existing views although they will be easily recognised.
		Impact Intensity	Medium	Moderate visual intrusion on existing views of highly sensitive visual receptors.
	Sivananda Cultural Centre	Visual Sensitivity	Moderate	Their attention is focused on their activities rather than the surrounding landscape.
		Visual Exposure	High	The Centre is within 500 m of the proposed route, although vegetation surrounding the Centre will likely screen viewers from the power line.
		Visual Intrusion	Moderate	In the unlikely case that viewers at the Centre can see the power line they will experience moderate visual intrusion on their existing views due to other elements that will also be in those views (buildings, N2 and structures associated with an urban landscape).
		Impact Intensity	Medium	Moderate visual intrusion on moderately sensitive visual receptors.
	Residents, visitors and viewpoints of Mount Moreland	Visual Sensitivity	High	They have an active interest in the surrounding landscape and have viewpoints that are tourist attractions (the views are not exceptionally sensitive since they are primarily for birdwatching and include many urban structures).
		Visual Exposure	Moderate to Low	The proposed power line route is more than 1 km from residences and viewpoints in Mount Moreland.
		Visual Intrusion	Low	The proposed route is beyond the N2 from Mount Moreland and the power line will fit in with other structures of the N2.
		Impact Intensity	Low	Low visual intrusion and moderate to low exposure.

SECOND DRAFT EIA REPORT

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
	Residents and viewpoints within 1 km of the power line route	Visual Sensitivity	Moderate	There are a few visual receptors with views that consist mostly of an agricultural landscape containing fields of sugar cane and structures normally associated with agricultural activities. The variable nature of the sugar cane landscape means that the views are not necessarily of high quality (scenic).
		Visual Exposure	High	Some of the buildings are within 50 m of the route.
		Visual Intrusion	Low	Views of the transmission line are likely to also include N2 and other large structures associated with the road.
		Impact Intensity	Low	Low visual intrusion on existing views of moderately sensitive visual receptors/
	Motorists on the N2	Visual Sensitivity	Low	Their views are mostly filled with large structures and urban elements
		Visual Exposure	High	For approximately 5 minutes (9 km at 120 km/h).
		Visual Intrusion	Moderate	The variable nature, in terms of texture and colour, of the sugar cane landscape, and the structures associated with a highway (lamp posts, toll gates and the road itself) means that even though the transmission line detracts from views, the existing views are not necessarily of high quality.
		Impact Intensity	Medium-Low	Moderate intrusion on low sensitivity visual receptors.
	Motorists using the M4	Visual Sensitivity	Moderate	They may include tourists and international tourists who have an active interest in the surrounding landscape, but they pass through highly urbanised landscapes.
		Visual Exposure	High	For approximately 4 minutes (5.5 km at 80 km/h).
		Visual Intrusion	Low	The power lines are likely to be obscured or overshadowed by the desalination plant, or will be associated with the N2 and its structures (and will therefore fit in with other elements in view).
		Impact Intensity	Low	Low visual intrusion on moderately sensitive visual receptors.

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
All	Mixed urban, rural and coastal resort landscape	Sensitivity	High	Sensitivity to the proposed development, a large industrial type development, is high. There are no other similar structures, in type and size, in the landscape. It will potentially alter the landscape character.
		Impact Intensity	High	A large industrial development introduced to a landscape that has a character that is highly sensitive to such a development.

The visual resources that will potentially be affected in this case are the landscape character (sense of place) and scenic views of the ocean:

- The landscape character is a mixture of rural agriculture, and mixed residential and coastal resort developments. The rural agricultural character is unlikely to remain in future regardless of whether the desalination plant is built or not (as indicated by municipal plans for the area as well as trends for similar landscapes in the region).
- The potential for scenic views of the ocean are limited and are being reduced steadily as coastal lands are being developed. In this case the desalination plant will have an effect on a small number of existing scenic views as well as on the potential for future scenic views (particularly the hills west and north of the site).

The irreplaceability of the visual resources for this region is therefore seen as moderate since the landscape character is changing but scenic views of the ocean (a limited visual resource) will be altered.

10.7 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

10.7.1 Construction Phase

10.7.1.1 *Mitigation measures common to construction activities*

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 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;
- Develop local plant sources and nurseries for vegetative erosion control materials. Use local native species whenever possible. Select species appropriate for the use, the site, and the bioregion;
- 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.

10.7.1.2 *Potential impact 1: Potential visual impact of construction activities associated with a desalination plant (including pump station) on sensitive visual receptors*

Large areas will be temporarily cleared of vegetation for construction camps and laydown areas as well as permanently for components of the desalination plant. However, this will be familiar to visual receptors since current agricultural activities also leave patches of exposed soil throughout the area. Large construction vehicles and equipment will be introduced into the area and a considerable increase in workers will also be visible. Construction on large buildings and structures will be unfamiliar in the setting particularly since some of them have an industrial feel to them. The activities (moving vehicles and workers in the field of view) associated with construction will attract attention to these structures.

Residents in close proximity to the site (including views from Shaka Estate) will be most affected by these activities and the changes to their existing views. Visual intrusion of construction activity at the proposed site is likely to have a high intensity for these residents. The impact will be local since visual exposure will be low beyond 2 km. Construction is unlikely to last longer than 2 years for the desalination plant – a temporary impact. Reversibility of the impact is high since the highly visible aspects of construction can be removed. The probability of the impact is definite since there are highly sensitive visual receptors in close proximity to the site.

Aside from mitigation measures listed in section 10.7.1.1 above the following key mitigation measures are necessary to lower the visual intrusion of construction activities specifically for the preferred site:

- Construction site screens should be put up in such a way as to ensure that these are adequate to screen construction activities from sensitive visual receptors living adjacent to the site.
- A landscape architect should be consulted to ensure the best screening results.
- An erosion control plan should be in place before construction starts;
- Grading should attempt to recreate or follow the natural terrain by avoiding straight lines and large flat surfaces (Figure 10-31);
- Naturally occurring vegetation should be the preferred choice for slope stabilization whenever practical. Choose vegetation that is adapted to the site, has strong roots, and provides good ground cover. Ideally, use native species;
- Fills should be constructed whenever practical with slopes such that vegetation can be grown on it;
- Avoid extensive retaining walls of materials that contrast visually with the landscape;

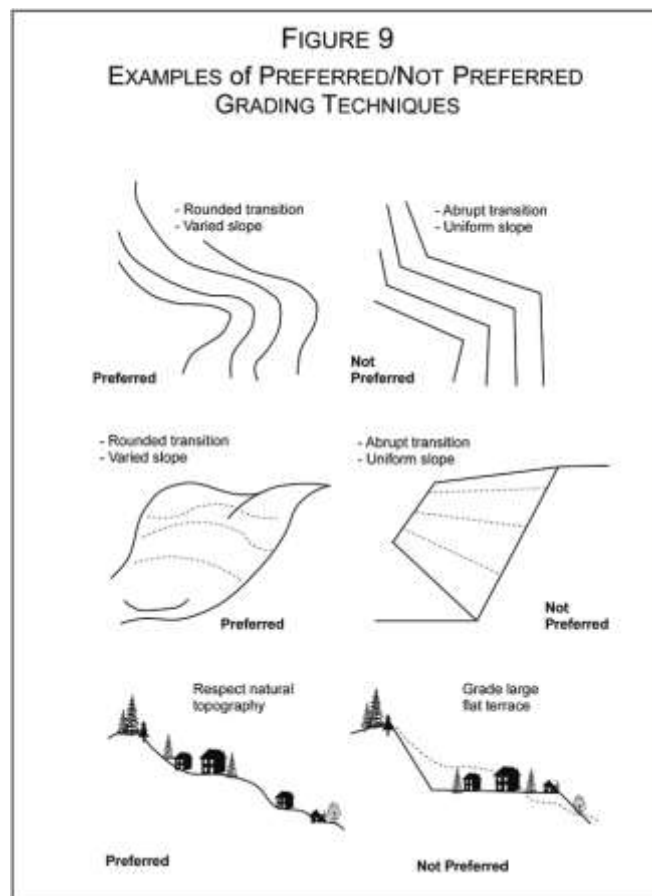


Figure 10-31: Preferred grading techniques (<http://www.lvpc.org/pdf/SteepSlopes.pdf>)

Lighting of the construction site should minimize light pollution such as glare and light spill. The following measures must be applied:

- Light fixtures that shield the light and focus illumination on the ground (or only where light is required) should be used to ensure that light spill does not occur onto the orphanage property;
- Using minimum lamp wattage within safety/security requirements;
- Avoid elevated lights within safety/security requirements;
- Where possible, use timer switches or motion detectors to control lighting in areas that are not occupied continuously (if permissible and in line with minimum security requirements); and
- Switch off lights when not in use in line with safety and security.

Key mitigation measures will lower the intensity of the impact but it will remain high since some views are from an elevated position in the landscape and screening will not be effective for those views. The significance of this impact will therefore be **High Negative** before and after mitigation.

10.7.1.3 Potential impact 2: Visual impact of construction activities associated with buried pipelines on sensitive visual receptors

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 takes longer). 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.

The pipelines will mostly pass through sugar cane and cultivated fields but construction activity will in places be visible from residential areas and farmsteads where the intensity of the impact will be medium. Mitigation measures listed in section 10.7.1.1 will keep visual intrusion to a minimum.

The duration of the impact is temporary

and it is highly reversible. Its extent is regional due to the length of the pipeline which means that many receptors will potentially be affected. The impact probability is highly probable since there are highly sensitive visual receptors with views on the route and they are likely to notice the construction activity.

Additional mitigation measures:

- The pipeline route from La Mercy Reservoir to Waterloo Reservoir along the N2 should use the topography of the land as much as possible to screen construction from residential areas to the east (La Mercy), unless an existing servitude is used (the eThekweni Municipal database does not indicate a servitude along this route);
- The route should use existing natural vegetation to screen construction activities from residential areas east of the N2 where it is practical to do so.

The significance of the impact is **Medium Negative** before mitigation and **Low Negative** after mitigation. Mitigation measures will, if successful, reduce the number of highly sensitive visual receptors that will be affected.

The aquatic ecology specialist study has recommended some re-alignments of the potable water pipeline to avoid drainage lines and wetlands. This re-alignment will not change the significance of the impact of construction activities on sensitive visual receptors, particularly if re-alignment means that the route will be closer to the N2. This will provide more opportunities for construction work to be screened from residences in the villages east of the route, and construction will be associated with the N2 where construction activities in the form of road maintenance are common elements of the landscape.

In addition, adjustments of the pipeline route within a 50 m corridor are unlikely to alter the significance of the visual impact of construction activities on sensitive visual receptors along the route as assessed in this study.

10.7.1.1 Potential impact 3: Visual impact of construction activities associated with an overhead transmission line from the desalination plant to Mdloti Substation

There are highly sensitive visual receptors that will be affected by construction activities along section A of the proposed powerline route (Figure 10.32 – Yellow route) (i.e. from the desalination plant to a point (Point A) in the vicinity of the proposed eThekweni 132 kV point of supply as per future plan and then following the route proposed by eThekweni as part of their electrical infrastructure expansion). Visual receptors along the northern and north-western edge of La Mercy will experience the construction activities as highly intrusive on their existing views since it is likely to occur against the skyline and in views that do not contain large structures similar to the proposed power lines. The spatial extent of the impact is regional due to the linear extent of the line. Duration of impact is temporary since it will take less than a year to build the powerline. It is highly probable that the impact will occur since visual receptors in La Mercy will be in close proximity to the construction activity. The significance of this impact is anticipated to be **Medium Negative** before mitigation.

An alternative route (Alternative 1) was therefore proposed to minimise impacts on La Mercy residents (Figure 10.32 below). This route extends directly to the N2 from the desalination plant site and then follows the N2 to south of La Mercy.



Figure 10-32: Powerline route Alternatives to minimise impacts on La Mercy residents

The impacts on sensitive visual receptors associated with the construction of this alternative powerline route (Alternative 1) are anticipated to be of **Low Negative** significance.

The intensity of the impact associated with the construction of the Alternative 2 powerline route (Figure 10.32) will be high for only a few current residents of Desainagar and it is likely that construction of the desalination plant will overshadow all other activities in the area. Overall it is expected that this potential impact will have at most a medium intensity. The spatial extent of the impact is regional due to the linear extent of the line. Duration of impact is temporary since it will take less than a year to build the power line. Likelihood of the impact occurring is probable since some construction activities will potentially occur against the sky for residents in close proximity to the route (e.g. on surrounding properties in Desainagar). The significance of this impact is expected to be **Low Negative** before mitigation.

Mitigation measures for construction activities are listed in section 10.7.1.1.

Impacts associated with the construction of the proposed powerline route are anticipated to be of **Medium** significance for the initial route (Yellow route) and **Low Negative** significance for the Alternatives 1 and 2 route after mitigation. It is expected that visual impacts associated with the construction of the proposed Alternative 2 powerline route will be of slightly lower significance than Alternative 1 as it is closer to the N2 and will therefore be less visually intrusive. The proposed Alternative 2 route will also be further from highly sensitive receptors for a longer section of the route.

A 100 m corridor (50 m on either side of the proposed powerline route) will not alter the significance of the visual impact of the powerline. If the route has to be adjusted within the 100 m corridor then the preference from a visual point of view would be to move it closer to the N2 (where relevant) and further away from residential areas such as La Mercy.

10.7.1.2 Potential impact 4: Visual impact of construction activities associated with marine pipelines at the Desainagar beach

Construction of the marine intake pipelines will require tunneling from the pump station at the desalination plant to beyond the surf zone. Construction activities will therefore occur beyond the surf zone and will be visible in the form of a barge, support vessels and equipment related to tunneling of pipelines. These will be in views for approximately 6 months. There will be no construction activities on the beach.

The intrusion of construction activities on existing views of the sea will cause a medium-low to medium intensity impact for some residents of Desainagar, La Mercy and Tongaat Beach as well as for users of the beaches since although construction vessels will be distinguishable from fishing vessels the beach will remain clear. The duration of the impact is temporary (approximately 6 months) and spatial extent local. The impact is reversible but has a probability of definitely occurring since sea views of sensitive visual receptors will be affected.

Aside from the mitigation measures listed in section 10.7.1.1 there are no mitigation measures that will lower the intensity of the impact. The duration of this impact should be kept to an absolute minimum. The significance of this impact is **Medium Negative** before and after mitigation.

10.7.2 Operational Phase

10.7.2.1 *Potential impact 5: Landscape impact of a desalination plant on a landscape with mixed rural, residential and beach front character*

As discussed in section 10.4.2.1 the landscape, the landscape is a mixture of rural agriculture, mixed residential and beachfront resorts. The landscape is relatively quiet and sparsely populated compared to further north and south along the coast. It is separated from highly urbanised and industrial landscapes to the west by hills and sugar cane plantations. The landscape character is highly sensitive to an industrial development on the scale of the proposed desalination plant. The intensity of the landscape impact is high since the landscape character will be altered – a rural sense of place will be changed to an industrial sense of place to a considerable extent due to the size of the development. The duration is long term and reversibility of the impact is high since the removal of industrial structures will return the landscape character to rural. The impact is highly probable before mitigation and probable thereafter since mitigation measures attempt to reduce the industrial aspect of the development.

Mitigation measures are discussed in the following section (10.7.2.2) to reduce the significance of the visual intrusion of the development on sensitive visual receptors. It is not

The impact significance is **High Negative** before mitigation and **Medium Negative** thereafter. It is negative because there is a loss of its existing sense of place – rural to industrial.

10.7.2.2 *Potential impact 6: Visual intrusion of a desalination plant on existing views of sensitive visual receptors in the region*

The desalination plant is a large industrial development covering a 7 ha area, currently used predominantly for garden market crop farming, with large buildings and industrial type structures. The surrounding area is sparsely populated with only a few large houses adjacent to the site, but the upmarket residential complex of Shaka Estate is located above the site. Units on the Estate are designed for sea views towards the south east and the proposed desalination plant will be an intrusive development in these views due to its size and the height of some of its structures. There are other highly sensitive visual receptors in the surrounding landscape that will be impacted but residents of the Shaka Estate will be directly affected since their sea views will be significantly altered. The impact intensity is potentially high for a number of receptors (Shaka Estate, residents of Desainagar and La Mercy, motorists on the M4 as well as users of the beaches of Desainagar and La Mercy). The extent of the impact is local since it is unlikely to be noticed beyond 2 km. The impact duration is long term and reversibility is high since most structures which cause high visual intrusion (large buildings, tall industrial structures and power lines) can be removed completely. The impact will definitely occur since it is a large development with highly sensitive visual receptors living in close proximity to the sites.

In order to reduce the significance of the impact it is necessary to lower the impact intensity since the other factors (duration, spatial extent, etc.) are more difficult or impossible to change. The impact intensity is mainly influenced by the visual intrusion rating which is high for several highly sensitive visual receptor groups in the immediately surrounding landscape. This means that for sensitive visual receptors their existing views will change significantly – that the development is discordant with other elements of their views. It is a large development with several buildings and structures, many of them industrial in nature. In order to lower visual intrusion to moderate it is necessary for the development to at least fit in partially with its surroundings even if it is still clearly noticeable. The surroundings (other

elements in views towards the proposed sites) are plots of market gardening cultivation, upmarket residential estates, mixed residential areas and beach front resort developments.

The SDF for the Northern Coastal Corridor provides for this area to become *‘a residential/recreation/ tourism corridor that provides a high quality natural coastal experience which complements the hard working urban beachfront of the central metropolitan area.’* It would therefore be useful for the desalination plant to at least fit in partially with the future landscape. Using vegetation and landscaping such as can be seen in Figure 10-30 and Figure 10-31 will break up the straight lines of large buildings. Separating buildings with vegetation between them will also reduce the industrial feel of large, monolithic style buildings. Industrial structures should be screened from public views and tall structures should be placed such that they do not project into sea views from Shaka Estate. A buffer of vegetation should also be installed between the M4 and the desalination plant. The following mitigation measures to reduce the visual intrusion of the desalination plant should be implemented:

- A landscape architect should be consulted to aid with the desalination plant design with emphasis on reducing its discordance with the surrounding landscape;
- The exterior design of the desalination plant should include screening of industrial features/structures such as chemical storage tanks and service facilities, as well as the substation from public views (Figure 10-31);
- A buffer of indigenous vegetation around the outside of the plant which should include high trees (preferably a variety of tree types and heights);
- Existing vegetation native to the area should be maintained and incorporated into the Desalination Plant design where possible;
- The design plan for the desalination plant should include vegetation (including trees) in between buildings and structures where possible;
- Tall structures and buildings should be located in such a way as to avoid projecting into views of the sea from Shaka Estate³;
- Security fencing should be placed between the plant and the buffer of vegetation (rather than around the outside of the buffer area);
- Signage should be minimized and in keeping with the surroundings;
- A consistent and appropriate colour and architectural scheme should be used for buildings;
- Non-reflective paint should be used for metal surfaces;
- Rehabilitation of temporary, cleared construction areas such as laydown areas should commence as soon as possible after they are not required anymore;
- A building and structure maintenance plan should be in place for upkeep of building facades and structures;
- The maintenance plan should include retaining walls and structures used in high sloping terrain in order to prevent erosion scarring and landslides.

³ In other words the buildings and structures should not project above the beach in views from Shaka Estate



Figure 10-33: Example of use of vegetation as visual buffering
(<http://www.luminova.net/projects/desalination-plant-concept-victoria>)



Figure 10-34: Another example of using a buffer of vegetation around a desalination plant. Most industrial type structures are screened from public views and a consistent and appropriate colour and architectural scheme is used for buildings.

The significance of impact is **High Negative** before mitigation and **Medium Negative** thereafter if the mitigation measures can be successfully implemented. The size of the area available for mitigation is limited (i.e. space between buildings is likely to be very limited so that a vegetated separation between buildings will be difficult to accomplish effectively).

10.7.2.3 Potential impact 7: Visual intrusion of a powerline from the desalination plant to the Mdloti Substation on the existing views of sensitive visual receptors in the region

Section A of the proposed initial powerline route (Figure 10.32 - Yellow route) passes in close proximity to La Mercy residential areas. Currently there are no transmission lines or large substations in the coastal corridor between Ohlanga and Tongati Rivers. Transmission lines will affect many views along the route and is likely to affect future potential for scenic views of the sea in the coastal corridor. The impact intensity is high for a number of visual receptors, particularly for some residents of La Mercy and the probability of the impact occurring is highly probable since there are highly sensitive visual receptors that will be affected. The impact will last for the lifetime of the project and its duration is therefore long term. Reversibility is high since removal of the powerlines will remove the impact completely. The extent of the impact is regional due to the length of the development. The significance of this impact is anticipated to be **High Negative** before mitigation.

The Alternative 1 and Alternative 2 powerline routes avoid crossing over hills near La Mercy and use topography to screen the powerline from residents of La Mercy where possible. The impact intensity is high for only a few visual receptors in Desainagar living on properties adjacent to the desalination plant site, but low to medium for all other visual receptors along the route. The probability of the impact occurring is probable since, although there are a few receptors that live in close proximity to the proposed route it is likely that the power line will be overshadowed by the desalination plant in that specific area. The visual intrusion of the proposed powerline alternatives will decrease as these routes are likely to be associated with other structures of the N2 and are also unlikely to be exposed above the skyline for these viewers. The significance of the visual intrusion associated with the Alternative 1 and Alternative 2 powerline routes is **Medium Negative** before mitigation.

Key mitigation measures include:

- Minimal clearing of vegetation for servitudes;
- Rehabilitate temporary areas cleared during construction;
- Locate towers in such a way as to maximize the screening effect of existing topography and avoid where possible locations where towers will be exposed above the skyline (e.g. avoid hill or ridge tops);
- Use wooden towers if possible since these have a more rural feel to them than lattice towers;
- Minimise the use of strain towers (used where the power line changes direction of more than 3°) since these towers are larger and more visually intrusive than normal towers; and
- Leave the project area in a condition that protects soil and surface materials, both on and off site, against erosion and instability.

Mitigation measures should lower the intensity of the impact to medium-low which will lower the significance of the impact to **Low to Medium** for the Alternative 1 route and **Low** for the Alternative 2 route, while the significance of the visual intrusion associated with Section A of the initial route will remain of **high**.

10.7.2.4 Potential impact 8: Impact of night lighting of a desalination plant on the nightscape of the surrounding region

The nightscape of the region is well lit. Night glow from Durban is very dominant to the south and the coastal resorts along the beach emit considerable light. The area proposed for the desalination plant is relatively dark compared with the surrounding landscape, but security lights from the houses on and near the site contribute to a nightscape that does not get very dark (Figure 10.35). It should be noted

that the Shaka Estate also contributes substantially to light pollution in the form of glare and light spill (Figure 10.36).

The intensity of the impact is medium-low since the surrounding landscape is already well lit with many sources of bright lights and considerable night glow in the south. The spatial extent of the impact is site specific since only the immediately neighbouring receptors (including Shaka Estate) are likely to be affected. Duration of the impact is long term (project lifetime), reversibility is high since removal of the lights will remove the impact, and probability of it occurring is highly probable since the development is likely to introduce many more lights to the region.



Figure 10-35: Night view from Shaka Estate. The house on the right is on the proposed desalination plant site. The big building in the centre is the hotel and lights in the distance are ships.



Figure 10-36: View from the proposed desalination plant site towards the Shaka Estate.

Key mitigation measures to minimize light pollution such as glare and light spill (light trespass):

- A lighting plan for the proposed desalination plant that demonstrate that project lighting is shielded from surrounding areas, particularly the adjacent houses, must be prepared with the design plans of the plant;
- Light fixtures that shield the light and focus illumination on the ground (or only where light is required) should be used to ensure that light spill does not occur onto neighbouring properties;
- Using minimum lamp wattage within safety/security requirements;
- Avoid elevated lights within safety/security requirements;

- Where possible, use timer switches or motion detectors to control lighting in areas that are not occupied continuously (if permissible and in line with minimum security requirements); and
- Switch off lights when not in use in line with safety and security.

The significance of the impact is **Medium Negative** before mitigation and **Low Negative** after mitigation. Mitigation measures attempt to reduce light spilling onto neighbouring properties, limit glaring lights which affect neighbouring receptors and reduce the contribution of the project to light pollution in general.

10.7.3 Decommissioning Phase

10.7.3.1 *Potential impact 9: Potential visual impact of decommissioning activities associated with a desalination plant on sensitive visual receptors*

Assuming that the mitigation measures for Potential Impact 7 in section 10.7.2.2 were implemented and successful then the intensity of the decommissioning phase activities will be lower than for construction since vegetation planted during the construction phase will provide screening and limit views. The intensity of the impact will be high before and after mitigation due to the size of the development and the fact that highly sensitive visual receptors will be affected. The duration of the impact will be shorter than for construction and local in spatial extent. The impact will definitely occur since highly sensitive visual receptors are in close proximity to the activities.

Mitigation measures similar to that for construction apply. Specifically:

- Construction site screens should be put up around the desalination plant site. Ensure that these are adequate to screen construction activities from sensitive visual receptors living adjacent to the boundary.
- The contractor will maintain good housekeeping on site to avoid litter and minimise waste;
- Project developers will demarcate decommissioning boundaries and minimise areas of surface disturbance;
- Vegetation and ground disturbance will be minimised and advantage taken of existing clearings;
- 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 using local plant sources and nurseries.

The significance of this impact will be **High Negative** before and **Medium Negative** after mitigation. Mitigation measures will lower the probability (to highly probable) of the impact occurring by reducing the number of highly sensitive visual receptors that will potentially be affected.

10.7.3.2 *Potential impact 10: Visual impact of decommissioning activities associated with an overhead transmission line from the desalination plant to Mdloti Substation*

Assuming that the proposed route remains the same then the visual impact of decommissioning activities will be much the same as for construction activities (significance of Low Negative before and after mitigation) since the same equipment and vehicles will be required. The same visual receptors are likely to be affected.

10.7.4 Cumulative Impacts

10.7.4.1 Cumulative impact 1: Cumulative impact on the landscape

The Spatial Development Frameworks and Spatial Development Plans for the Northern Coastal Corridor (Ohlanga to Tongati River) for the last few years have provided for most of the agricultural land to become residential areas (earmarked as ‘Future Residential Areas’) (Figure 10.37):

“It will be consolidated as a mixed use and mixed density residential, recreation, entertainment and tourist oriented corridor.” - Northern SDP Report 2013-2014 (eThekweni Municipality 2014a)

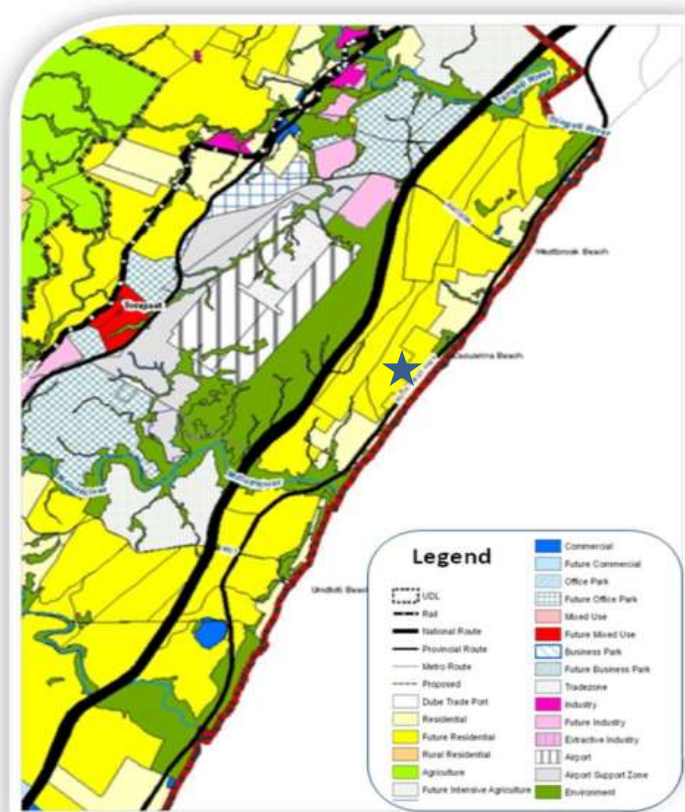


Figure 10-37: Spatial Development Plan (2013/2014) for Northern Coastal Corridor. Star marks the approximate location of the proposed desalination plant.

The plan is for low density housing (10 units/ha). In order to assess the cumulative impact of the proposed project, and assuming that the SDP is followed, it is necessary to determine the change in landscape character if the character is that of a middle- to up-market residential area adjacent to beach front resorts. An industrial development of this scale will change the landscape character considerably since low density residential areas are highly sensitive to changes brought on by introducing an industrial development. The intensity of the cumulative landscape impact will therefore be high.

Mitigation measures listed in section 10.7.2.2 for visual intrusion are likely to also reduce the intensity of the cumulative impact if successfully implemented. Using vegetation, landscaping and architectural design to reduce the industrial feel of the plant will reduce the incongruence of the desalination plant in a residential landscape. It is likely, though, that the intensity will still be high.

The significance of the cumulative impact is **High Negative** before and **Medium Negative** after implementation of mitigation measures depending on their effectiveness in reducing the industrial nature of a desalination plant.

10.7.4.2 Cumulative impact 2: Cumulative visual impact

As discussed in the previous section the future plans for the area proposed for the desalination plant involve middle- to up-market, low density residential areas adjacent to tourism oriented beach front accommodation and recreation. If the area is developed according to the SDP for the Northern Coastal Corridor then the rural sense of place of the area will be altered or lost. Residents of Desainagar will be moderately sensitive visual receptors since their views will be urbanised with complex patterns and colours. It is also highly likely that existing sea views from Desainagar will not all be available if the area is developed as a residential area. Views from Shaka Estate will also be more complex – the quality of the sea views are likely to be lower due to the complex patterns and colours that will be introduced with an increase in residences. However, it is unlikely that sea views will be blocked by new buildings due to the elevated position of the Shaka Estate in the landscape - low density residential areas means that buildings of more than 2 storeys are unlikely to be allowed. Residents of Shaka Estate will therefore remain highly sensitive visual receptors.

The cumulative impact of the desalination plant will have a high intensity since sea views of residents of the Shaka Estate are likely to be affected regardless of the planned changes for the area. The industrial nature of the development will be highly intrusive on views from surrounding residential areas. The significance of the cumulative visual impact is **High Negative** (the desalination plant is incongruent with future plans for the area) before mitigation and **Medium Negative** if the measures can be successfully implemented. Mitigation measures, as discussed in section 10.7.2.2, will lower the intensity of the impact to medium.

10.8 IMPACT ASSESSMENT SUMMARY

The assessment of impacts and recommendation of mitigation measures as discussed above are collated in Table 10-6 to Table 10-8 below.

Table 10-6: Impact assessment summary table for the Construction Phase

Construction Phase										
Impact Description	Status	Spatial Extent	Duration	Reversibility	Potential Intensity	Probability	Significance (Without Mitigation)	Key Management actions	Significance (With Mitigation)	Confidence
Potential visual impact of construction activities associated with a desalination plant (including the pump station) (Direct)	Negative	Local	Temporary	High	High	Definite	High (11)	<ul style="list-style-type: none"> Construction site screens. Consult landscape architect to ensure best screening results. An erosion control plan should be in place before construction starts; Grading should attempt to recreate or follow the natural terrain by avoiding straight lines and large flat surfaces; Naturally occurring vegetation should be the preferred choice for slope stabilization whenever practical. Choose vegetation that is adapted to the site, has strong roots, and provides good ground cover. Ideally, use native species; Fills should be constructed whenever practical with slopes such that vegetation can be grown on it; Avoid extensive retaining walls of materials that contrast visually with the landscape; 	High	High
Potential visual impact of construction activities associated with a buried pipeline on sensitive visual receptors (Direct) – Alternative 1	Negative	Regional	Temporary	High	Medium	Highly probable	Medium (9)	<ul style="list-style-type: none"> The pipeline route from La Mercy Reservoir to Waterloo Reservoir along the N2 should use the topography of the land as much as possible to screen construction from residential areas to the east (La Mercy), unless an existing servitude is used (the eThekweni Municipal database does not indicate a servitude along this route); The route should use existing natural vegetation to screen construction activities 	Low	High

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								from residential areas east of the N2 where it is practical to do so.		
Visual impact of construction activities associated with an overhead transmission line from the desalination plant to Mdloti Substation (Direct) – Section A of the initial powerline route	Negative	Regional	Temporary	High	High	Highly Probable	Medium (9)	<ul style="list-style-type: none"> The final route for the powerline should avoid crossing over hills near La Mercy and should use topography to screen the power line from residents of La Mercy where possible (refer to Alternative 1 route – Figure 10.32) 	Low	High
Visual impact of construction activities associated with an overhead transmission line from the desalination plant to Mdloti Substation (Direct) – Alternatives 1 and 2 routes	Negative	Regional	Temporary	High	Medium	Probable	Low (3.5)	<ul style="list-style-type: none"> 	Low	High
Visual impact of construction activities associated with marine pipelines at Desainagar beach (Direct)	Negative	Local	Temporary	High	Medium-Low to Medium	Definite	Medium (7)	<ul style="list-style-type: none"> Mitigation measures common to construction activities are listed in the report. 	Medium	Medium

Table 10-7: Impact assessment summary table for the Operational Phase

Operational Phase										
Impact Description	Status	Spatial Extent	Duration	Reversibility	Potential Intensity	Probability	Significance (Without Mitigation)	Key Management actions	Significance (With Mitigation)	Confidence
Landscape impact of a desalination plant on an agricultural landscape that is surrounded by mixed residential and coastal resorts	Negative	Local	Long Term	High	High	Highly Probable	High (10.5)	(see mitigation measures for visual intrusion of a desalination plant below)	Medium	High
Visual intrusion of a desalination plant on existing views of sensitive visual receptors in the region	Negative	Local	Long Term	High	High	Definite	High (14)	<ul style="list-style-type: none"> A landscape architect should be consulted to aid with the desalination plant design with emphasis on reducing its discordance with the surrounding landscape; The exterior design of the desalination plant should include screening of industrial features/structures such as chemical storage tanks and service facilities, as well as the substation from public views; A buffer of indigenous vegetation around the outside of the plant which should include high trees (preferably a variety of tree types and heights); Existing vegetation native to the area should be maintained and incorporated into the Desalination Plant design where possible; The design plan for the desalination plant should include vegetation (including trees) in between buildings and structures where possible; 	Medium	High

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								<ul style="list-style-type: none"> • Tall structures and buildings should be located in such a way as to avoid projecting into views of the sea from Shaka Estate; • Security fencing should be placed between the plant and the buffer of vegetation (rather than around the outside of the buffer area); • Signage should be minimized and in keeping with the surroundings; • A consistent and appropriate colour and architectural scheme should be used for buildings; • Non-reflective paint should be used for metal surfaces; • Rehabilitation of temporary, cleared construction areas such as laydown areas should commence as soon as possible after they are not required anymore; • A building and structure maintenance plan should be in place for upkeep of building facades and structures; • The maintenance plan should include retaining walls and structures used in high sloping terrain in order to prevent erosion scarring and landslides. 		
Visual intrusion of a power line from the desalination plant to the Mdloti Substation on the existing views of sensitive visual receptors in the region – Section A of the initial powerline route	Negative	Regional	Long Term	High	High	Highly Probable	High (11.25)	<ul style="list-style-type: none"> • The final route for the powerline should avoid crossing over hills near La Mercy and should use topography to screen the power line from residents of La Mercy where possible (refer to Alternative 1 route – Figure 10.32) • Rehabilitate temporary areas cleared during construction; • Locate towers in such a way as to maximize the screening effect of existing topography and avoid where possible locations where towers will be exposed above the skyline (e.g. avoid hill or ridge tops); • Use wooden towers if possible since these have a more rural feel to them than lattice towers; • Minimise the use of strain towers (used where the power line changes direction of more than 3°) since these towers are larger and more visually intrusive than normal towers; and 	Medium	High

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								<ul style="list-style-type: none"> • Leave the project area in a condition that protects soil and surface materials, both on and off site, against erosion and instability. 		
Visual intrusion of a power line from the desalination plant to the Mdloti Substation on the existing views of sensitive visual receptors in the region – Alternative 1 and 2 routes	Negative	Regional	Long Term	High	Medium	Probable	Medium (5.5)	<ul style="list-style-type: none"> • Minimal clearing of vegetation for servitudes; • Rehabilitate temporary areas cleared during construction; • Locate towers in such a way as to maximize the screening effect of existing topography and avoid where possible locations where towers will be exposed above the skyline (e.g. avoid hill or ridge tops); • Use wooden towers if possible since these have a more rural feel to them than lattice towers; • Minimise the use of strain towers (used where the power line changes direction of more than 3°) since these towers are larger and more visually intrusive than normal towers; and • Leave the project area in a condition that protects soil and surface materials, both on and off site, against erosion and instability. 	<p>Low (Alternative 2)</p> <p>Low to Moderate (Alternative 1)</p>	High
Impact of night lighting of a desalination plant on the nightscape of the surrounding region	Negative	Site Specific	Long Term	High	Medium-Low	Highly Probable	Medium (5.25)	<ul style="list-style-type: none"> • A lighting plan for the proposed desalination plant that demonstrate that project lighting is shielded from surrounding areas, particularly the adjacent houses, must be prepared with the design plans of the plant; • Light fixtures that shield the light and focus illumination on the ground (or only where light is required) should be used to ensure that light spill does not occur onto neighbouring properties; • Using minimum lamp wattage within safety/security requirements; • Avoid elevated lights within safety/security requirements; • Where possible, use timer switches or motion detectors to control lighting in areas that are not occupied continuously (if permissible and in line with minimum security requirements); and • Switch off lights when not in use in line with safety and security. 	Low	High

Table 10-8: Impact assessment summary table for the Decommissioning Phase

Decommissioning Phase										
Impact Description ⁴	Status	Spatial Extent	Duration	Reversibility	Potential Intensity	Probability	Significance (Without Mitigation)	Key Management actions	Significance (With Mitigation)	Confidence
Visual impact of decommissioning activities associated with a desalination plant on sensitive visual receptors	Negative	Local	Temporary	High	High	Definite	High (11)	<ul style="list-style-type: none"> Construction site screens should be put up around the desalination plant site. Ensure that these are adequate to screen construction activities from sensitive visual receptors living adjacent to the boundary. The contractor will maintain good housekeeping on site to avoid litter and minimise waste; Project developers will demarcate decommissioning boundaries and minimise areas of surface disturbance; Vegetation and ground disturbance will be minimised and advantage taken of existing clearings; 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 using local plant sources and nurseries. 	Medium	High
Visual impact of decommissioning activities associated with an overhead transmission line from the desalination plant to Mdloti Substation – All Alternatives	Negative	Regional	Temporary	High	Medium-Low	Probable	Low (3)	<ul style="list-style-type: none"> Mitigation measures as listed for construction activities in the report apply. 	Low	High

⁴ Please specify in this column whether the impact is direct or indirect.

Table 10-9: Impact assessment summary table for the Cumulative Impacts

Cumulative Impacts										
Impact Description	Management actions	Status	Spatial Extent	Duration	Reversibility	Potential Intensity	Probability	Significance & Status		Confidence
								Without Mitigation	With Mitigation	
Cumulative Impact 1										
Cumulative impact on the landscape	See mitigation measures for the visual impact of the desalination plant on sensitive visual receptors	Negative	Local	Long Term	High	High	Highly Probable	High (10.5)	Medium	Medium
Cumulative Impact 2										
Cumulative visual impact	See mitigation measures for the visual impact of the desalination plant on sensitive visual receptors	Negative	Local	Long Term	High	High	Highly Probable	High (10.5)	Medium	Medium

10.9 CONCLUSION AND RECOMMENDATION

A desalination plant is a large development with many components that are normally associated with industrial landscapes. The site is located in a residential area with a rural sense of place. There are highly sensitive visual receptors in close proximity to the sites and views with potential scenic or aesthetic qualities will potentially be altered by the development. Highly sensitive visual receptors include residents of Desainagar, Shaka Estate, La Mercy and motorists on the M4 adjacent to the plant site.

A desalination plant at the proposed site will potentially cause a highly significant negative impact on sensitive visual receptors in the surrounding landscape. Visual intrusion and visual exposure is high for a number of them, particularly for sea views from Shaka Estate.

It will be difficult to mitigate for the visual and landscape impact on immediately surrounding receptors since the development is large and highly intrusive. The rural sense of place is likely to be lost. Mitigation will involve an architectural design of the plant that maximizes spaces between buildings and which screens public views from industrial components. A landscape architect needs to be consulted about the best way to screen the desalination plant from public views. The design of the plant should incorporate screening of industrial type structures from public views and avoid tall structures from obstructing and intruding into views of the sea from Shaka Estate. Successful mitigation will reduce the significance of the impact to **medium** negative.

From a visual perspective, the proposed Alternative 2 powerline route will be preferred as it will be less visually intrusive.

Plans for the future of this region, Northern Coastal Corridor, indicate that most of it will be used for residential areas. Sugar cane farms will become residential areas and Desainagar will become a middle-to up-market residential area. The desalination plant will therefore potentially have a high cumulative impact on the area since it is a large industrial development which will be surrounded by low density residential areas. Mitigation measures discussed for the visual impact above will also apply for the cumulative visual and landscape impacts. If successful the measures will reduce the significance of both cumulative landscape and visual impacts to **medium** negative.

Overall, the residual significance of the visual impact of the desalination project is anticipated to be **low** to **medium** with the efficient implementation of the recommended management actions, with the exception of the potential visual impact of construction activities associated with a desalination plant (including the pump station) which will remain of **high** significance during the construction phase.

10.10 REFERENCES

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