

Environmental Impact Assessment (EIA) for the
Proposed Construction, Operation and
Decommissioning of a Sea Water Reverse Osmosis
Plant and Associated Infrastructure Proposed at
Lovu on the KwaZulu-Natal South Coast

FINAL EIA REPORT

CHAPTER 10: VISUAL IMPACTS

EXECUTIVE SUMMARY

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

The landscape proposed for the desalination plant sites is predominantly rural-agricultural but it is in close proximity, and surrounded by, an urban landscape with a mixture of landscape character types. West of sites are rural, informal settlements spread out over the rugged terrain of Vulamehlo Municipality, while to the immediate north is the Illovo Village with low- and medium income residential areas as well as a light industrial zone. Further north are residential areas of Kingsburgh and Lovu North. Beyond the N2 in the east are coastal resort towns such as Winklespruit and Illovo Beach. All these landscape types are to some extent visible from the proposed sites. The desalination plant will however introduce a more industrial development type into a landscape that is mostly agricultural in character. A moderate sensitivity to the proposed development is expected for the surrounding landscape character.

Key issues and visual receptors

The following highly sensitive visual receptors will potentially be affected by the proposed desalination project:

- Residents of Mother of Peace Illovo orphanage will potentially be affected by the desalination plant at either site, any of the pipeline routes during construction (particularly the southern route that passes by their property), the pipe bridge and the power line from the desalination plant to the Kingsburgh Major Substation;
- Residents and viewpoints on farms in the surrounding landscape may be affected by the desalination plant at either site, any of the pipeline routes during construction, the pipe bridge and the power line from the desalination plant to the Kingsburgh Major Substation;
- Residents of Illovo Village will potentially be affected by the desalination plant at either site, any of the pipeline routes during construction, the pipe bridge and the power line from the desalination plant to the Kingsburgh Major Substation;
- Residents of Winklespruit will potentially be affected by the desalination plant at either site, any of the pipeline routes during construction, the power line from the desalination plant to Kingsburgh Major Substation, in-take pump station, construction jetty and marine pipeline construction and the power line from the pump station to Winklespruit Major Substation;
- Residents of the Boardwalk residential complex will potentially be affected by the in-take pump station, construction activities and jetty on the beach and the power line from the pump station to Winklespruit Major Substation; and
- Residents of Illovo Beach will potentially be affected by the desalination plant at either site, any of the pipeline routes during construction, power line from the desalination plant to the Kingsburgh Major Substation and construction activities and jetty on the beach at Winklespruit.

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 mitigation for the Preferred Site since visual intrusion on the views of residents of the Mother of Peace Illovo orphanage adjacent to the site will be high. It is High Negative for the Alternative Site. Key mitigation measures for the Preferred Site include establishing construction screens on the orphanage boundary and a vegetation buffer between the orphanage and construction site. Mitigation measures for the Alternative Site specifies erosion controls and slope stabilisation. After mitigation the significance of the impact will be High Negative for either site.

The significance of the potential visual impact of construction activities associated with pipeline construction is medium negative before mitigation for the two routes options north of the Lovu River since visual intrusion will potentially be high for some residents of Illovo Beach for the section of pipeline east of the N2. The significance of the impact for the southern route option with tunnel is low negative. The significance of impact for all routes after mitigation will be low negative. Mitigation measures are aimed at using the existing vegetation east of the N2 as screening for construction activity.

The significance of the potential visual impact of construction activities associated with an overhead transmission line from the desalination plant to Kingsburgh Major Substation is Medium Negative before and after mitigation since the intensity of the impact will be medium but its spatial extent regional. Mitigation measures applicable to construction activities are listed in the report.

The significance of the potential visual impact of construction activities associated with the in-take pump station in Winklespruit is Medium Negative before mitigation since highly sensitive visual receptors in Winklespruit may be affected. Key mitigation measures include using existing vegetation as screening opportunities against views from the public. The significance of this impact after mitigation is Low Negative.

The potential visual impact of construction activities associated with marine pipelines and the construction jetty at the Winklespruit beach is highly significant since visual intrusion on sea views from the Boardwalk residential complex will be high. Tunnelling would potentially lower visual intrusion since construction activities will occur off-shore (although still in view), but at much higher cost.

The significance of the visual impact of construction activities associated with a power line from the pump station to the desalination plant is low negative since visual intrusion is low for all sensitive receptors.

The landscape impact of the operational desalination plant will have Medium Negative significance before mitigation since the landscape character has a medium sensitivity to the development. Mitigation measures discussed for the visual impact of the desalination plant will lower the significance of the impact to Low 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 for both proposed sites before mitigation and Medium Negative thereafter. It is high since there are many highly sensitive visual receptors in close proximity to the desalination sites 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 of a power line from the desalination plant to the Kingsburgh Major Substation on the existing views of sensitive visual receptors in the region is Medium Negative since residents of eastern Illovo Village will be in close proximity to the line and it will potentially intrude on existing views. Mitigation measures should lower the intensity of the impact and thereby lowering the significance to Low Negative.

The significance of the visual intrusion of a pump station in Winklespruit on the existing views of sensitive visual receptors is Low Negative before and after mitigation. Mitigation measures aim to lower the visibility of industrial aspects of the pump house using vegetation and architectural design.

The significance of the visual intrusion of a power line from the pump station to the desalination plant on existing views of sensitive visual receptors is Low Negative before and after mitigation. Mitigation measures are similar to those listed for the proposed transmission line.

The significance of the impact of night lighting of a desalination plant on the nightscape of the surrounding region is Medium Negative before mitigation for both sites since new lights will be introduced into a dark area of the Lovu River floodplain. 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 the orphanage property and that glaring lights will not affect residents of the surrounding farms, Illovo Village or Winklespruit.

The significance of the impact of night lighting of a pump station on the nightscape of the surrounding region is Low Negative since the nightscape is well lit already. Mitigation measures will ensure that light spill onto adjacent properties and glare are minimized which will limit the extent of the impact to site specific.

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

The cumulative impact on the landscape of the desalination plant and other future developments as suggested in the Local Area Plan for Illovo South (the area in which the desalination plant will be located) will be medium before mitigation and low thereafter since the future landscape character will be mixed urban with residential, industrial and commercial elements and mitigation measures listed are aimed at reducing the industrial aspects of the development..

The cumulative visual impact on sensitive visual receptors will also be medium since, if the LAP is developed as outlined, then industrial structures and developments will be familiar elements of views and the visual intrusion will be medium. The mitigation measures discussed for the potential visual impact of the desalination plant are likely to make the desalination plant fit at least partially into the mixed residential district proposed for the sites in the LAP.

The significance of the visual impact of the desalination project overall will be high before mitigation and medium thereafter. If mitigation measures for construction activities at the desalination plant can be successfully implemented then the visual impact should not prevent the project from being developed.

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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 Lovu, KwaZulu Natal.

10.1 INTRODUCTION

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

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 (27 April 2015) 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) documents for KwaZulu Natal Province, and eThekweni and Ugu Municipalities.

10.1.4 Assumptions and Limitations

10.1.4.1 Assumptions

Cumulative Impacts

The Illovo South Local Area Plan (eThekweni Municipality 2014a) has been accepted by the Executive Committee of the municipality. The plan provides for development districts within the region proposed for the desalination plant. An Automotive Supplier Park (ASP) is planned for the region south-east of the proposed desalination plant sites. The proposed desalination plant sites are located in an area designated for the future as mixed residential.

10.1.4.2 Limitations

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.

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 x10 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.

Changes in Pipeline Routes

Alternative 3 of the pipeline routes was introduced later in the EIA process and as such were not specifically assessed in this report. However, the pipeline for this alternative follows the Preferred Pipeline Route from the desalination plant to the N2 and then uses tunnelling underneath the N2 to the in-take pump station. The viewshed for this route will be smaller than that of the Preferred Route and fewer sensitive visual receptors will be affected. However, the potential visual impact for the pipelines is temporary and the difference in impact between the Preferred Route and Alternative 3 is unlikely to be significant.

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 the construction and decommissioning phases of the project, whereas components such as buried pipelines (preferred and alternative routes) and submerged structures will cause minimal visual impact during the operational phase of the project. The construction method used for burying the pipelines will influence the severity of the visual impact. Conventional burying of the pipeline will affect visual receptors along the whole length of the route (temporary jetty, exposed/blasted rock, cranes), while tunnelling will only be visible at key points along the pipeline (launching pit, receiving pits and offshore barge).

The construction jetty used to build the marine intake and outflow structures will be a highly visible component of the development. It will have a maximum height of 8 m above sea level while the cranes on the jetty can reach heights of 18 m when in the full vertical position. Users of the beach and sensitive visual receptors with views on the beach are likely to be affected by the jetty and pipeline

construction activity during the construction phase. The jetty will be removed after construction of the pipelines.



Figure 10-1 Example of a construction jetty for marine intake and outfall pipelines.

10.2.2 Operation

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

- Pump Station – much of this structure will be buried, but some of it will potentially be visible;
- Pipe bridge – the preferred pipeline route has to cross the Lovu River and one option is for a pipe bridge to be constructed near the desalination plant site. The proposed alternative route south of the river which includes tunnelling from the in-take pump station to the south bank will avoid a pipe bridge.
- 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 preferred and alternative sites proposed for the desalination plant in the Lovu River floodplain is shown in Figure 10-2. Proposed pipeline routes to and from the pump station at Illovo Beach are shown as well as overhead power line routes.

A dense network of rivers has created a rugged terrain and a fragmented hinterland with deeply incised valleys and steep hills (Figure 10.3, Figure 10.4). The coastal plain is narrow and the land rises quickly into steep rolling hills away from the coastline. In contrast the Lovu River floodplain is broad and flat roughly from the proposed desalination plant sites to the river mouth at Illovo Beach. The preferred desalination plant is located in the floodplain while the alternative site is on the floodplain boundary. Other major rivers are the Mgababa, Msimbazi, Little Manzimtoti and Manzimtoti Rivers. These all flow from west to east into the Indian Ocean.

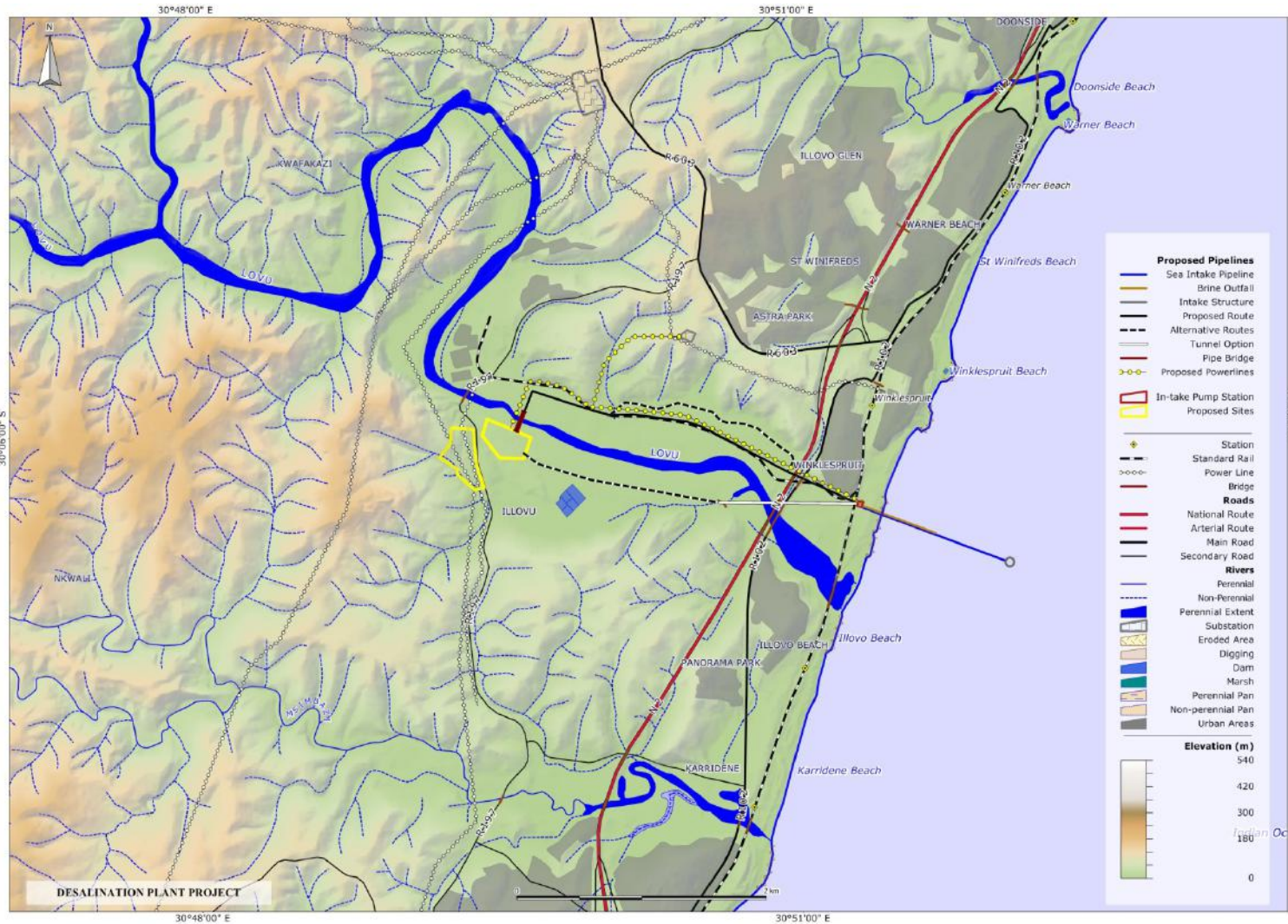


Figure 10-2 Lovu Desalination Plant and ancillary structures. The preferred and alternative sites are shown in yellow.

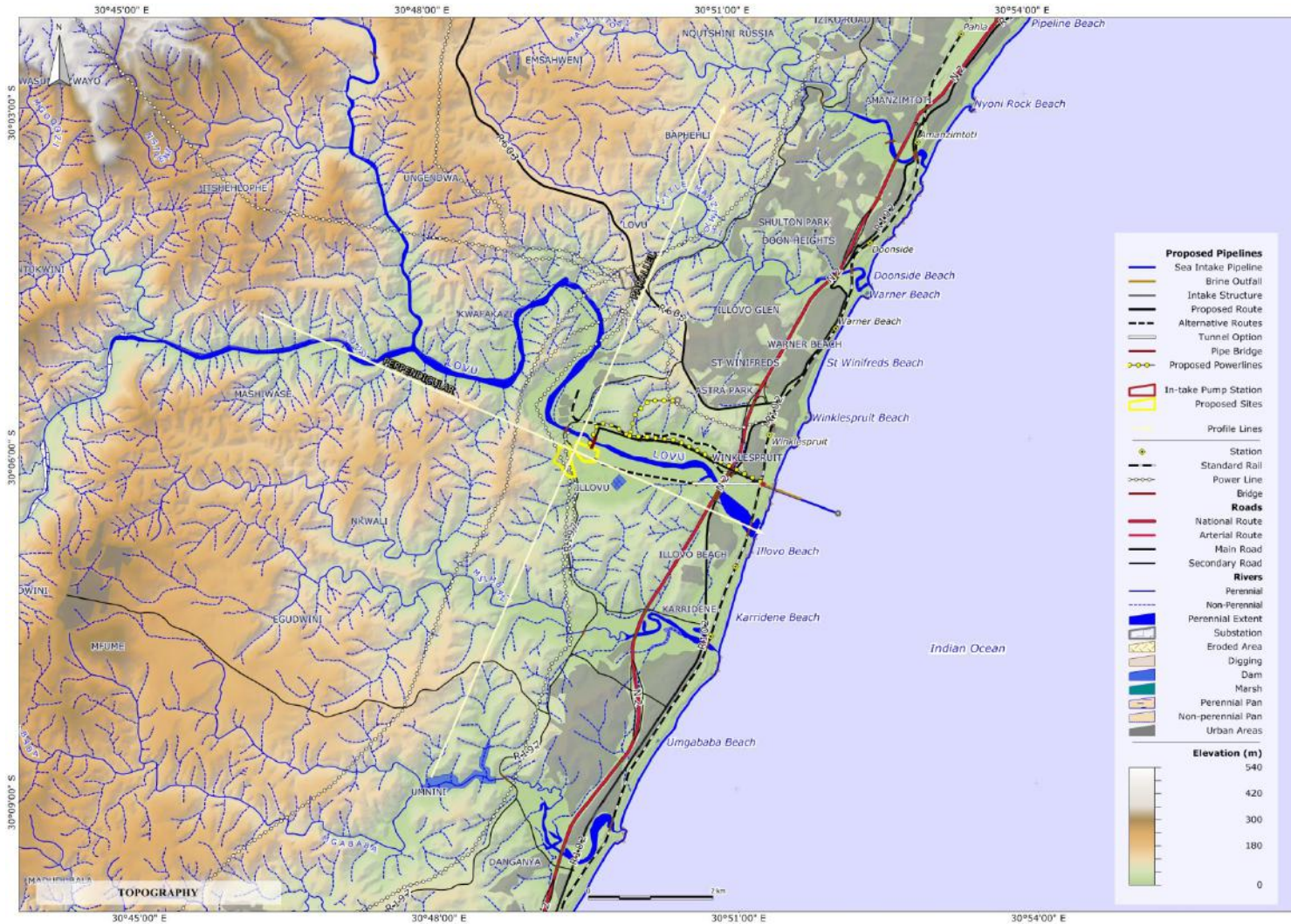


Figure 10-3 Topography of the region surrounding the Lovu Desalination Plant sites.

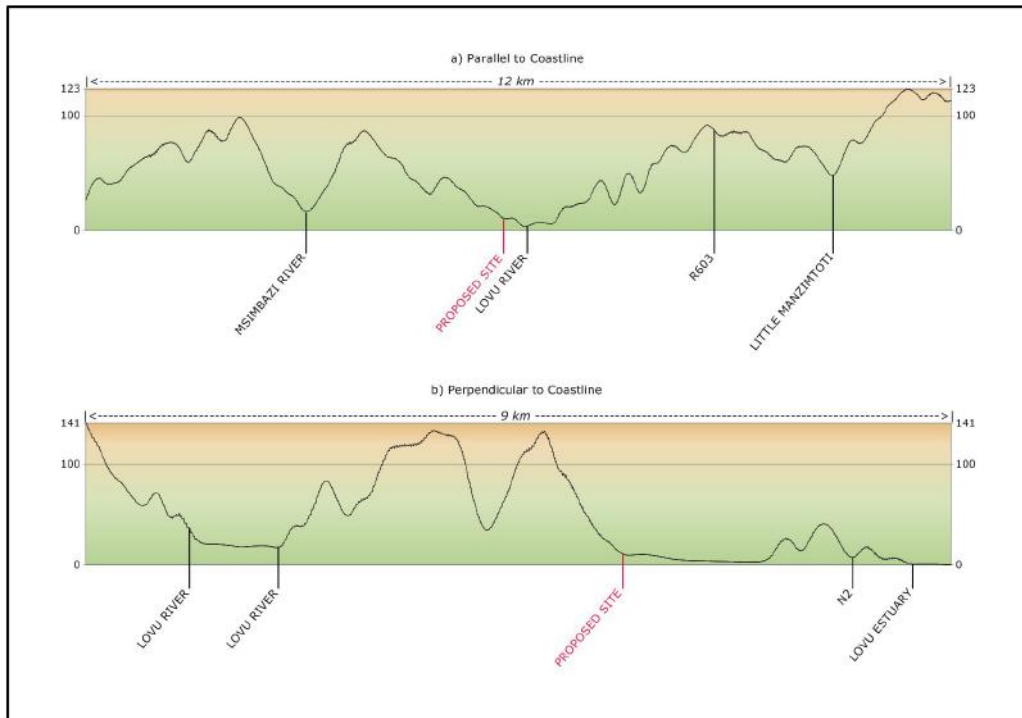


Figure 10-4 Topographic profiles parallel and perpendicular to the coastline as shown on the topographic map.

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 region around the proposed site.

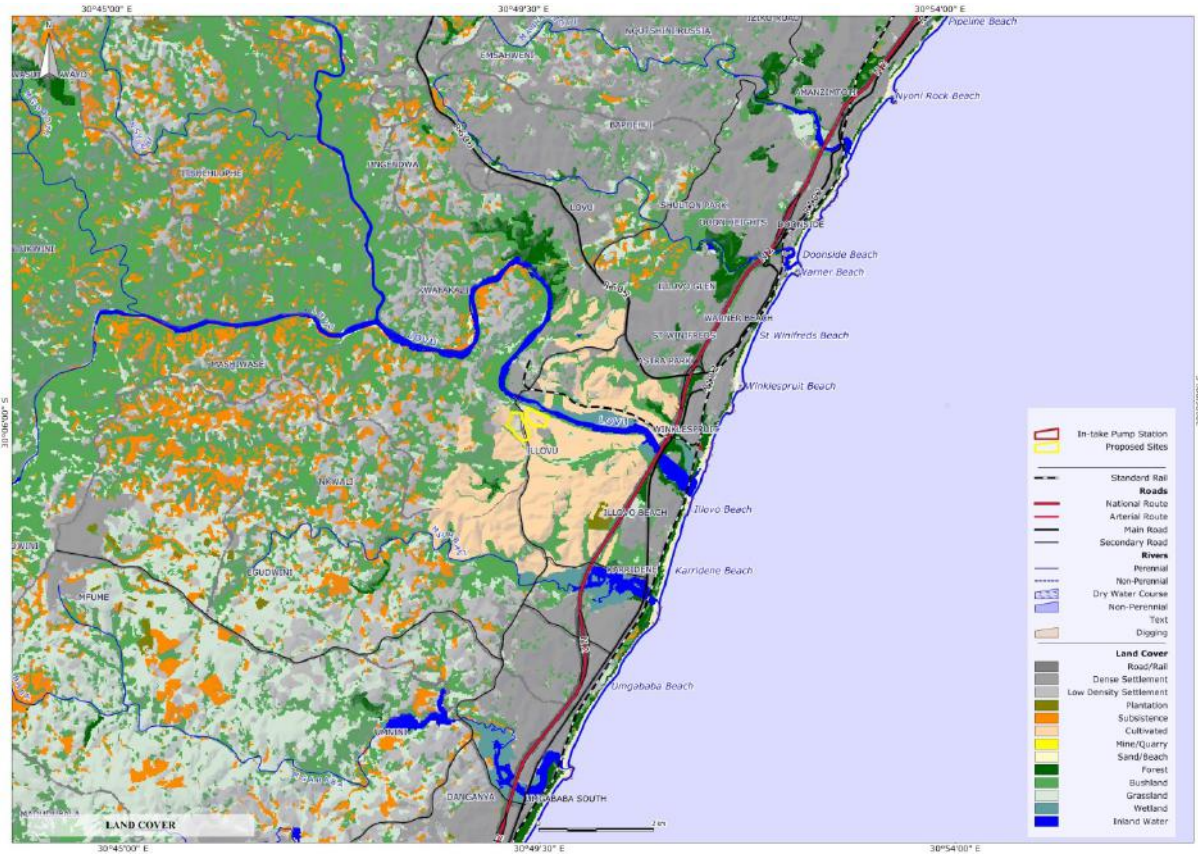


Figure 10-6 Land cover for the region surrounding the proposed desalination plant sites.

The proposed desalination plant sites are located in land currently used for commercial cultivation of sugar cane. The sugar cane fields extend eastwards to the N2 and southwards to the Msimbazi River as well as some north of the Lovu River to the R603. The steep hills and deep valleys of the Vulamehlo Municipality west of the sugar cane fields are covered in scattered rural settlements and subsistence farms. The coastal strip east of the N2 is Illovo Beach. Coastal resorts and residential areas extend north and south of Illovo Beach. Illovo Village is a small residential area just north of the proposed sites on the northern bank of the Lovu River.

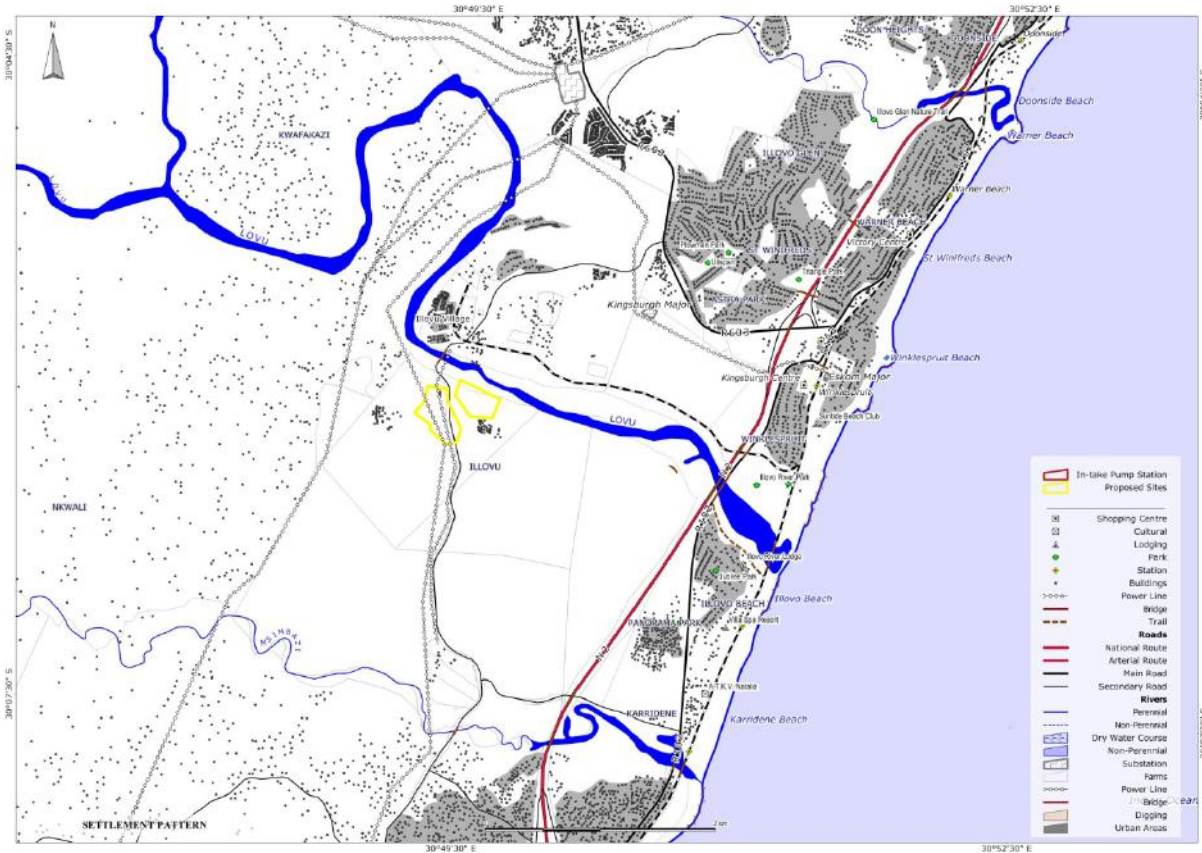


Figure 10-7 Settlement patterns and man-made structures in the region surrounding the proposed desalination plant.

The area immediately surrounding the proposed sites is sparsely populated since it falls within an agricultural area (Figure 9-7). The orphanage (demarcated as an institutional structure in the Illovo South LAP) is adjacent to the preferred site and there are a number of buildings west of the alternative site but the rest of the area is almost free of buildings since it is used for sugar cane crops. Rural settlements of the Vulamehlo Municipality west of the sites are evenly distributed throughout the landscape. Formal urban residential areas of coastal resort towns straddle the N2 east of the proposed sites. The in-take pump station and marine pipelines are located in Winklespruit, part of the settlement of Kingsburgh north of the Lovu River. Illovo Beach is south of the Lovu River and Umgababa is further south beyond the Mzimbazi River. Illovo Village is a small town just north of the Lovu River which developed as a service centre (Sugar Mill village) for the surrounding sugar cane farms.

The N2 freeway is a major route in the KwaZulu-Natal Province which provides a freight link between coastal economic nodes and Durban. It also provides access to coastal resorts all along the coast and is a major tourist route in the province. The R102 is an alternative route to the N2. These routes pass east of the proposed sites. Access to the N2 and R102 is provided by the R197 which passes in between the two proposed sites. This road crosses the Lovu River via an old, one-lane bridge and connects with the R603 north-east of Illovo Village. Southwards it passes through Illovo South and connects to the N2 and R102 via the P491 near Karradene. The R603 north of Illovo Village is a major route providing access to large economic nodes to the west via the N3.

A major metro railway line runs parallel to the coast east of the N2 and R102 (often on the seaward side of coastal settlements). A railway line connecting Illovo Village with the main line at Winklespruit runs along the northern bank of the Lovu River. The metro line is a significant structure in the coastal resort landscape.

There are a number of substations in the region. The main substation is north of Illovo Village next to the R603, and the other large substation is the Kingsburgh Major substation near Astra Park. A network of high voltage transmission lines visible throughout the landscape connect to these substations. The power line route proposed for the desalination plant will connect to the Eskom grid at the Kingsburgh Major substation. A power line from a smaller substation in Winklespruit will provide power to the pump station. High voltage transmission lines from this substation currently pass through the Winklespruit village, connecting with the Kingsburgh Major Substation further west.

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 (pump station, seawater intake and brine discharge pipelines) on existing sea views of residents living in southern Winklespruit and The Boardwalk estate.
- Potential visual impact of construction activities of beach users in the vicinity (up to 5 km away depending on the topography of the beach in this area) of seawater intake and brine discharge pipelines and structures (e.g. Illovo Beach);
- Potential visual intrusion of construction activities on views of residents living just north of the Lovu River, and rural residents east of the desalination plant sites;
- Potential visual intrusion of construction activities on views of residents living near the Lovu River where the pipe bridge may be built;
- Potential visual intrusion of a pump station on the existing sea views of residents living in close proximity to the proposed sites (Winklespruit and The Boardwalk);
- Potential visual intrusion of a desalination plant on views of residents in the surrounding area;
- 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;
- Potential visual intrusion on existing views of residents near the proposed pipe bridge across the Lovu River.

The Issues and Responses Trail, Chapter 5 of the Final Scoping Report included the following visual aesthetic concern from Carolyn Schwegman (Coastwatch):

- Impacts to the D'MOSS area/s need to be looked at from the perspective of the attributes of D'MOSS in addition to visual aesthetics ("While the proposed desalination facility is not a 'visually obtrusive' development, it will be located in an area designated as D'MOSS, and may have an effect on the visual aesthetics of the area.")

The Mother of Peace orphanage is concerned about the following potential visual and landscape issues of the development (interview with the head of the orphanage during visit to the site):

- The change in sense of place of the surrounding area. The rural sense of place plays an important part of the rehabilitation process for the orphanage and they are concerned that the changes to the landscape and their proximity to the proposed desalination plant will compromise the process;
- The football field is a crucial recreational component of the orphanage and its removal will severely impact on the rehabilitation process.

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 sites is a mixture of landscape character types. The sites are located in an agricultural landscape where sugar cane is cultivated commercially, a common landscape type in the province. The site is adjacent to the Lovu River/Estuary, although the natural vegetation has been severely altered by sugar cane farming. North of the river is Illovo Village which is a mixture of low income housing in the west, to middle and high income housing to the east, overlooking the river floodplain. Rural, informal settlements cover the hills and rugged terrain west of the sugar cane fields. Further east are the urban landscapes of coastal resorts and commercial centres. There are light industrial developments in Illovo Village, visible from the proposed sites and transmission lines and pylons throughout the regional landscape. All these landscape types are to some extent visible from the proposed sites. The desalination plant will however introduce a more industrial development type into a landscape that is mostly agricultural in character. A **moderate** sensitivity to the proposed development is expected for the surrounding landscape character.

10.4.2.2 Sensitive Visual Receptors

Desalination Plant

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

- Residents of the Mother of Peace Illovo orphanage are highly sensitive visual receptors since the surrounding rural landscape is an important aspect of their rehabilitation and recovery¹;
- Residents and viewpoints on surrounding sugar cane farms are highly sensitive visual receptors since they have an active interest in the surrounding landscape;
- Residents of Illovo Village are highly sensitive visual receptors since there are residences with views overlooking the Lovu River floodplain;
- Residents of rural settlements west of the proposed sites are low sensitivity visual receptors since their existing views are complex with highly contrasting elements;
- Residents of the western edge of Winklespruit (higher income residential area) are highly sensitive visual receptors since some of them have existing views of the Lovu River floodplain;
- Motorists using the N2 are low sensitivity visual receptors since they are driving through a highly urbanised region and their existing views are complex;
- Motorists using the R102 are low sensitivity visual receptors since they are driving through a highly urbanised region and their existing views are complex (views from this road is also very limited due to high and dense vegetation next to the road in most areas); and
- Motorists on rural roads Ungendwa/Kwfakazi are low sensitivity visual receptors since their views are complex with highly contrasting elements.

In-take Pump Station

The following sensitive visual receptors were identified from the In-take Pump Station viewshed:

- Residents of the Boardwalk residential complex adjacent to the site are highly sensitive visual receptors since they have an active interest in their surrounding landscape;
- Residents of the southern parts of Winklespruit are high sensitivity visual receptors since they may have scenic views of the sea that may be affected;
- Users of the beach at Winklespruit near the proposed site.

The calculated viewshed for the pump station is more extensive than its actual viewshed is likely to be since high and dense vegetation will prevent many views. If the dense vegetation that surrounds the current site is minimally disturbed by construction then it is likely that the only sensitive visual receptors will be users of the beach at Winklespruit and possibly a few residents on the hill above the railway line.

Construction Jetty

Visual receptors that may be affected during construction of the in-take and outfall marine pipelines include:

- Residents of the Boardwalk residential complex adjacent to the proposed site are highly sensitive, particularly since their existing sea views will be affected;
- Residents of northern Illovo Beach (suburb) are highly sensitive since they are likely to have existing views valued for their scenic qualities that may be affected;

¹ <http://www.motherofpeace.org.za/mission.html>

- Users of the beaches near the Jetty site are highly sensitive visual receptors since their views of the sea will be affected;
- Residents of the southern parts of Winklespruit are highly sensitive visual receptors since some have sea views that may be affected;
- Residents of Warner Beach suburb are medium to high sensitivity visual receptors since they live in urbanized surroundings but can include tourists and holiday accommodation with ocean views;
- Residents of tall, multi-storey buildings in the Doonside suburb are highly sensitive visual receptors since these are holiday accommodation and scenic views of the ocean may be affected;

The screening effect of vegetation and adjacent buildings will result in a much smaller actual viewshed for the Jetty. The viewshed was calculated for the cranes that will be used on the jetty and these are not necessarily as visible as the viewshed suggests.

Pipeline Routes

Visual receptors that may be affected by construction activities along pipeline routes include:

- Residents of the Mother of Peace Illovo orphanage are highly sensitive visual receptors since the surrounding rural landscape is an important aspect of their rehabilitation and recovery;
- Residents and viewpoints on farms along the routes;
- Residents of rural settlements west of the desalination plant sites are low sensitivity visual receptors since their existing views are complex with highly contrasting elements;
- Residents of the western and southern edge of Winklespruit (higher income residential area) are highly sensitive visual receptors since some of them have existing views of the Lovu River floodplain that may be affected;
- Residents of northern Illovo Beach (suburb) are highly sensitive since they are likely to have existing views over the Lovu River floodplain, valued for their scenic qualities, that may be affected;
- Residents of the Boardwalk residential complex adjacent to the proposed site are highly sensitive visual receptors with an active interest in their surrounding landscape;
- Residents of Panorama Park suburb are highly sensitive visual receptors since existing views of the Lovu River floodplain may be affected;
- Residents of the southern edge of Astra Park suburb are highly sensitive visual receptors since scenic views of the Lovu River floodplain may be affected;
- Residents of eastern Illovo Village are highly sensitive visual receptors since scenic views of the Lovu River floodplain may be affected;
- Motorists using the N2 are low sensitivity visual receptors since they are driving through a highly urbanised region and their existing views are complex;

Pipe Bridge

Visual receptors that will potentially be affected by the pipe bridge include:

- Residents of the Mother of Peace Illovo orphanage are highly sensitive visual receptors since the surrounding rural landscape is an important aspect of their rehabilitation and recovery;
- Residents and viewpoints of surrounding farms are highly sensitive visual receptors since they have an active interest in the surrounding landscape;
- Residents of Illovo Village are highly sensitive visual receptors since there are residences with views overlooking the Lovu River floodplain;
- Residents of rural settlements west of the proposed sites are low sensitivity visual receptors since their existing views are complex with highly contrasting elements;

Transmission Line from Desalination Plant to Kingsburgh Major SS

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

- Residents of the Mother of Peace Illovo orphanage are highly sensitive visual receptors since the surrounding rural landscape is an important aspect of their rehabilitation and recovery;
- Residents and viewpoints on farms along the route;
- Residents of Illovo Village are highly sensitive visual receptors since scenic views of the Lovu River floodplain may be affected;
- Residents of the western edge of Winklespruit (higher income residential area) are highly sensitive visual receptors since some of them have existing views of the Lovu River floodplain that may be affected;
- Residents of rural settlements west of the proposed sites are low sensitivity visual receptors since their existing views are complex with highly contrasting elements;
- Residents of St Winifreds and Illovo Glen suburbs are moderately sensitive visual receptors within urbanized surroundings that may have views of the Lovu River floodplain;
- Residents of Astra Park suburb are moderately sensitive visual receptors within urbanized surroundings that may have views of the Lovu River floodplain;
- Motorists on the N2 and R102 are low sensitivity visual receptors since they are driving through a highly urbanised region and their existing views are complex;

Transmission line from Pump Station to Desalination Plant

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

- Residents of Winklespruit are highly sensitive visual receptors since they have an active interest in the surrounding landscape and some sea views may be affected;
- Users of Winklespruit beaches are moderate- to highly sensitive visual receptors since even though they are recreational users of the beach they may include local and international tourists;
- Residents of the Boardwalk residential complex are highly sensitive visual receptors since they have an active interest in their surrounding landscape.

- Residents of eastern Illovo Village are highly sensitive visual receptors since scenic views of the Lovu River floodplain may be affected;
- Residents and viewpoints on farms along the routes;
- Residents of northern Illovo Beach (suburb) are highly sensitive since they are likely to have existing views over the Lovu River floodplain, valued for their scenic qualities, that may be affected;
- Motorists on the N2 and R102 are low sensitivity visual receptors since they are driving through a highly urbanised region and their existing views are complex.

The potential impacts identified during the EIA assessment are:

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 an overhead transmission line from the desalination plant to Kingsburgh Major Substation
- Potential impact 4: Visual impact of construction activities associated with the in-take pump station in Winklespruit
- Potential impact 5: Visual impact of construction activities associated with marine pipelines and the construction jetty at the Winklespruit beach
- Potential impact 6: Visual impact of construction activities associated with a power line from the pump station to the desalination plant.

10.4.2.4 Operational Phase

- Potential impact 7: Landscape impact of a desalination plant on an agricultural landscape that is surrounded by mixed residential and coastal resorts
- Potential impact 8: Visual intrusion of a desalination plant on existing views of sensitive visual receptors in the region
- Potential impact 9: Visual intrusion of a power line from the desalination plant to the Kingsburgh Major Substation on the existing views of sensitive visual receptors in the region
- Potential impact 10: Visual intrusion of a pump station in Winklespruit on the existing views of sensitive visual receptors
- Potential impact 11: Visual intrusion of a power line from the pump station to the desalination plant on existing views of sensitive visual receptors
- Potential impact 12: Impact of night lighting of a desalination plant on the nightscape of the surrounding region
- Potential impact 13: Impact of night lighting of a pump station on the nightscape of the surrounding region

10.4.2.5 Decommissioning Phase

- Potential impact 14: Potential visual impact of decommissioning activities associated with a desalination plant on sensitive visual receptors
- Potential impact 15: Visual impact of decommissioning activities associated with an overhead transmission line from the desalination plant to Kingsburgh Major Substation
- Potential impact 16: Visual impact of decommissioning activities associated with the intake pump station in Winklespruit
- Potential impact 17: Visual impact of decommissioning activities associated with a power line from the pump station to the desalination plant.

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.”

The Illovo Local Area Plan of 2010 (eThekweni Municipality 2010), under Goal 4 – Imageability, discusses the aesthetics of future development in the region (Illovo Village and areas north of the Lovu River):

“Intervention within the Illovo LAP area should seek to enhance the overall character and identity of the study area (and its component areas), celebrate spatial connections with the past, and establish a logic to the spatial configuration and functioning of the existing and future settlement structure.”

This Local Area Plan is incorporated into the Illovo South Local Area Plan of 2014 (eThekweni Municipality 2014a) which was accepted by the eThekweni Executive Committee. The 2014 LAP overlaps with that of the 2010 study but extends further south to the Msimbazi River and provides for future development in the area. Specifically, an industrial district south of the proposed desalination plant sites will incorporate an Automotive Supplier Park (ASP) while the desalination plant areas are designated for mixed residential developments. The proposed desalination plant is mentioned in the LAP and its location indicated as north and adjacent of the orphanage. However, there is no discussion on its potential impact on the LAP for the area. It is also not incorporated into the plans.

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 10-2 Viewshed sizes and number of buildings in viewsheds per component for a 10 km distance and excluding offshore viewshed

Component	Viewshed Size (km ²)	Number of Buildings in Viewshed
Preferred Site	8	1087
Alternative Site	10	1570
In-take Pump Station	6	400
Jetty	7	827
Preferred Pipeline route	9	772
Alternative 1 Pipeline route	10	755
Alternative 2 Pipeline with tunnel	7	687
Pipe Bridge	5	547
OHL Desalination Plant to Kingsburgh Major SS	29	6421
OHL Pump Station to Desalination Plant	11	933

10.6.1.1 Preferred Desalination Plant Site

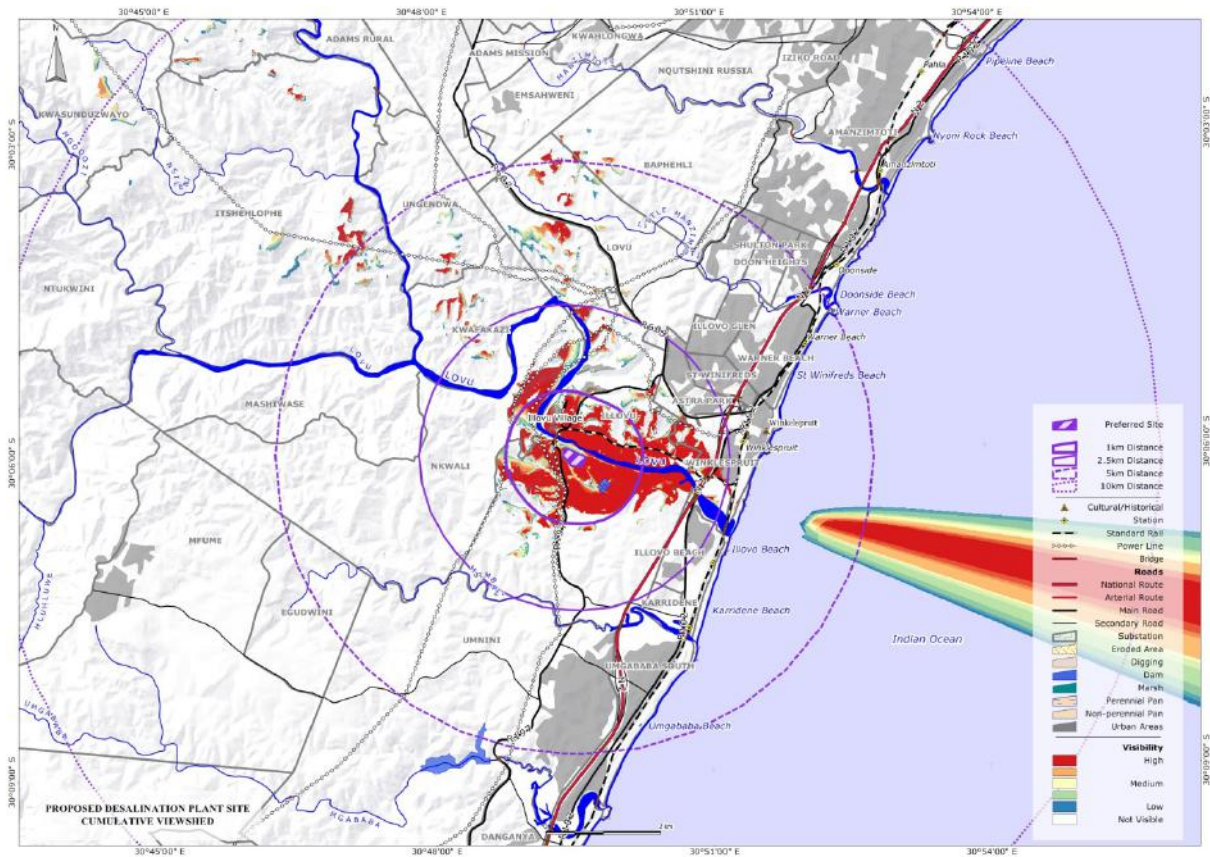


Figure 10-8 Cumulative viewshed for a desalination plant at the preferred site.

The viewshed of a desalination plant at the Preferred Site is mostly limited to an area within 2.5 km of the site. High lying areas further away to the north and north-west may also be affected. The viewshed within 10 km of the site is 8 km² and there are approximately 1087 buildings in the envelope. Visibility for a desalination plant at the Preferred Site is **high**.

10.6.1.2 Alternative Site

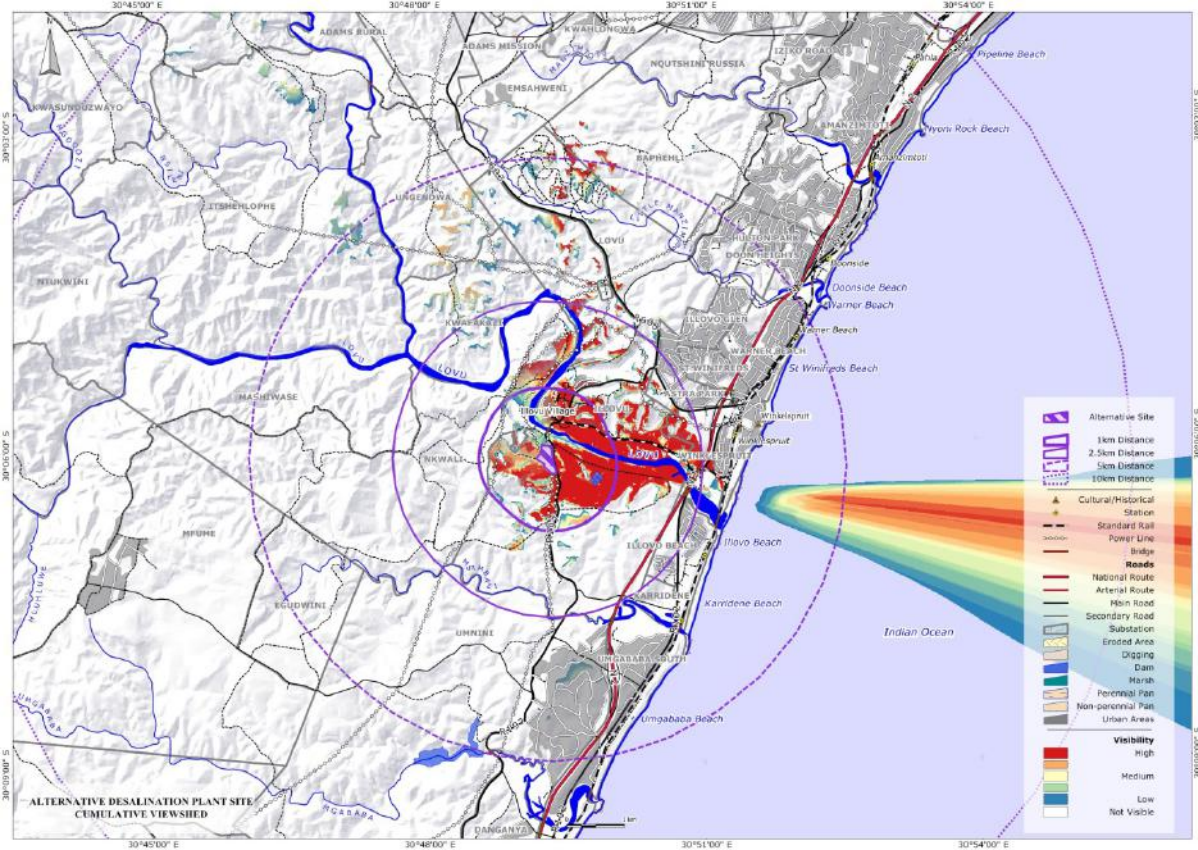


Figure 10-9 Cumulative viewshed of a desalination plant at the Alternative Site.

The viewshed for the Alternative Site is very similar to that of the Preferred Site except that it is slightly bigger at 10 km² with more buildings in the envelope (1570). The visibility is **higher** because the Alternative Site is at a higher elevation than the Preferred Site.

10.6.1.3 In-take Pump Station

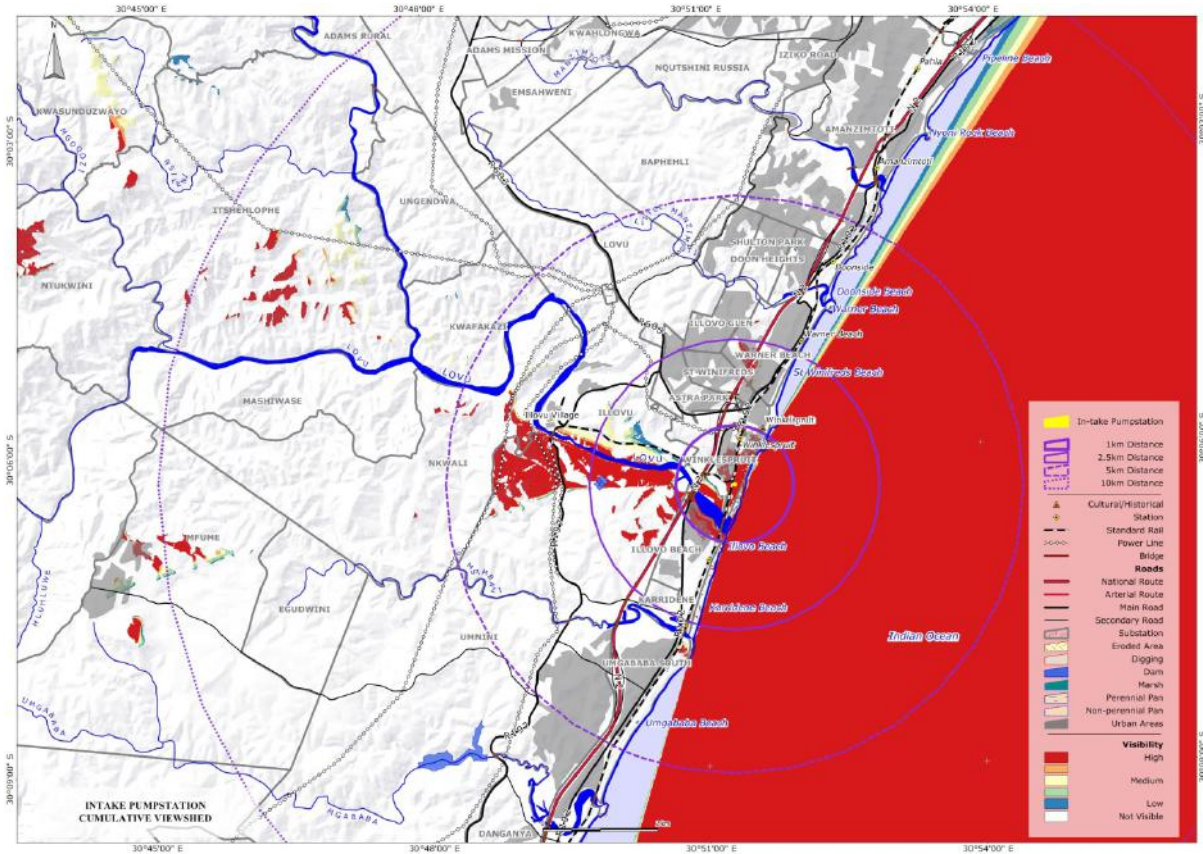


Figure 10-10 Cumulative viewshed for a pump station at the In-take Pump Station site.

The In-take Pump Station viewshed is 6 km² and contains 400 buildings. It therefore has a high visibility. The viewshed indicates that the pump station will be seen from areas in the Lovu River floodplain and from rural settlements in Nkwali and Mfume but it is highly unlikely that the actual viewshed will be this extensive since there is dense and high vegetation at the proposed site as well as in the landscape surrounding the site. The actual viewshed is more likely to be contained within 1 km of the site and actual visibility is likely to be at most medium.

10.6.1.4 Construction Jetty

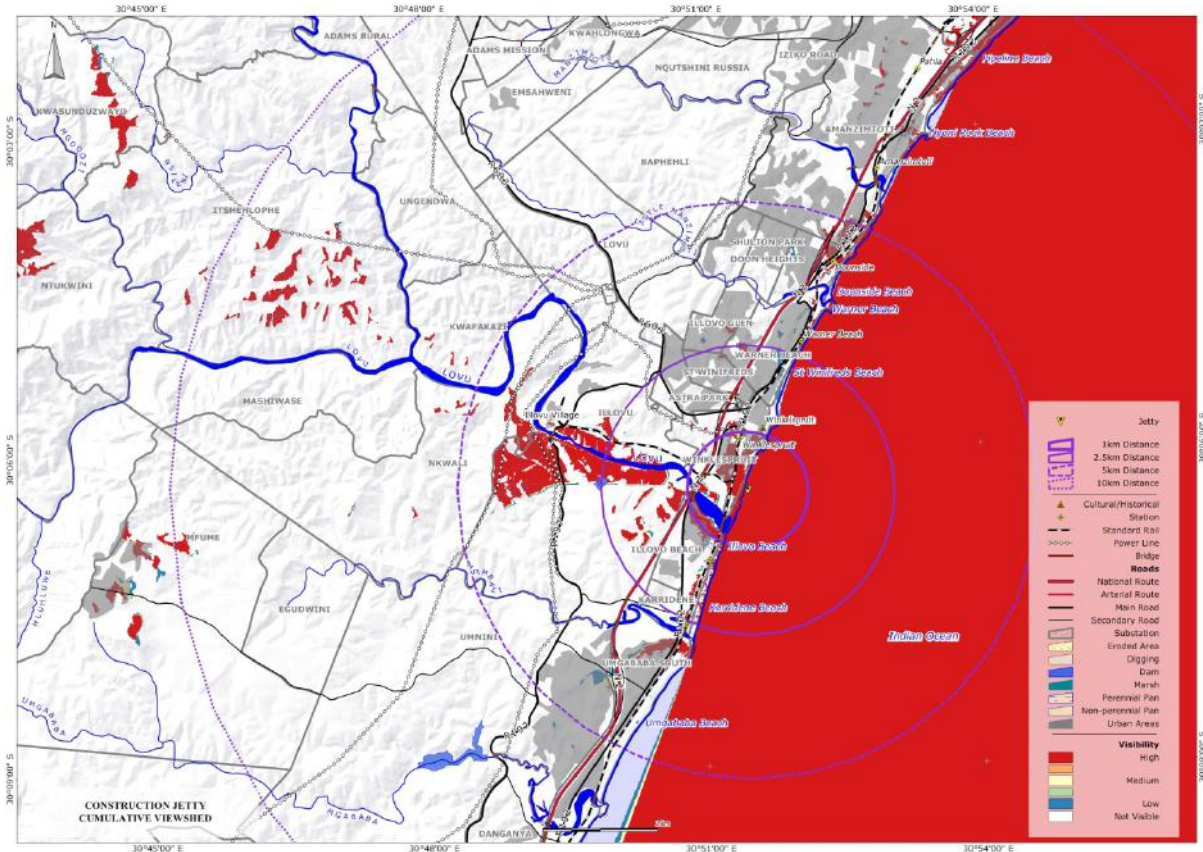


Figure 10-11 Cumulative viewshed of the proposed construction jetty at Winklespruit Beach.

The viewshed of the construction Jetty is approximately 7 km² and contains 827 buildings. According to the calculated viewshed the visibility of the Jetty will be high. However, existing vegetation screening will result in a smaller actual viewshed, particularly to the west of the site. The cranes used on the jetty taper to the top and are not always fully extended which will also result in a smaller actual viewshed and the actual visibility is likely to be medium

10.6.1.5 Proposed Pipeline Route (Preferred route)

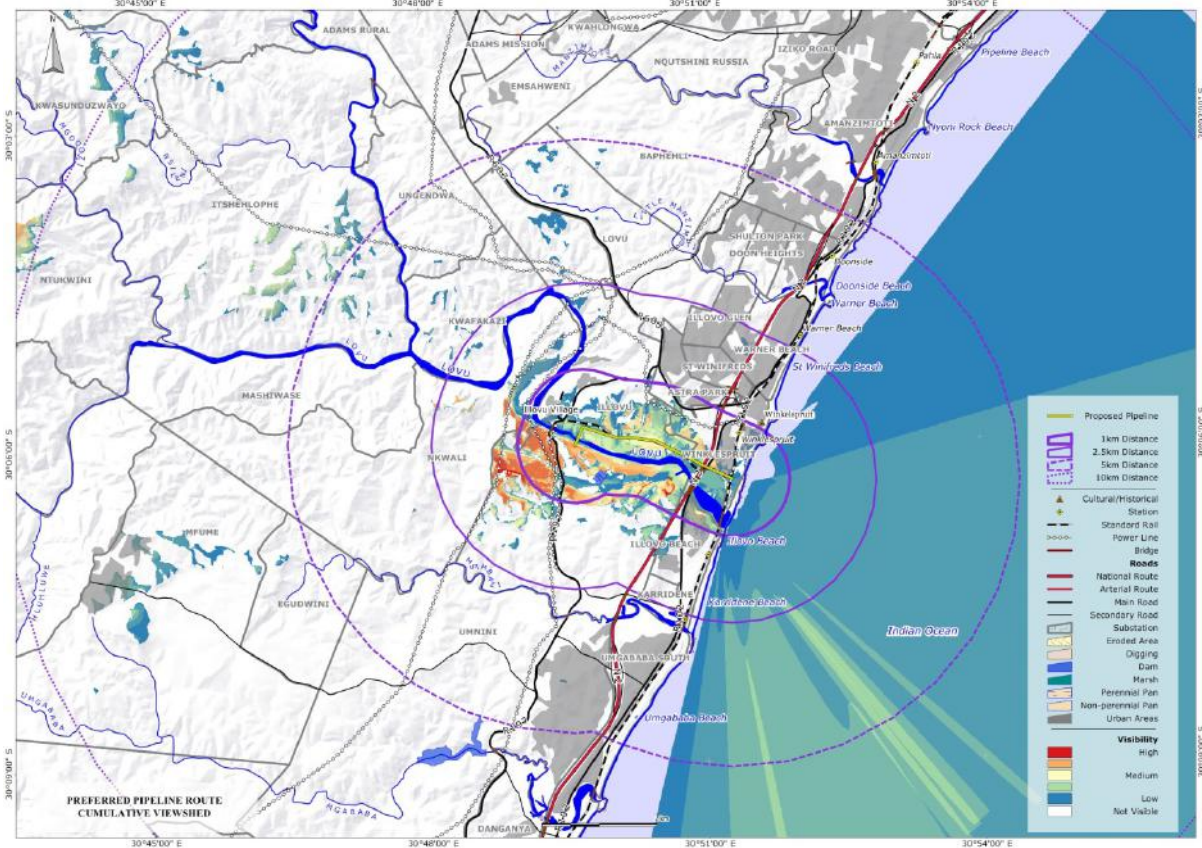


Figure 10-12 Cumulative viewshed of a pipeline along the preferred route during construction.

The length of the proposed structure (3 km) results in high visibility during construction. The viewshed is 9 km² and contains 772 buildings. The actual visibility will be lower since construction does not occur along the whole length of the pipeline simultaneously but moves along the route. The screening effect of vegetation and buildings will result in a smaller actual viewshed but visibility will still be high in terms of the criteria above.

10.6.1.6 Alternative Pipeline Route (Alternative 1)

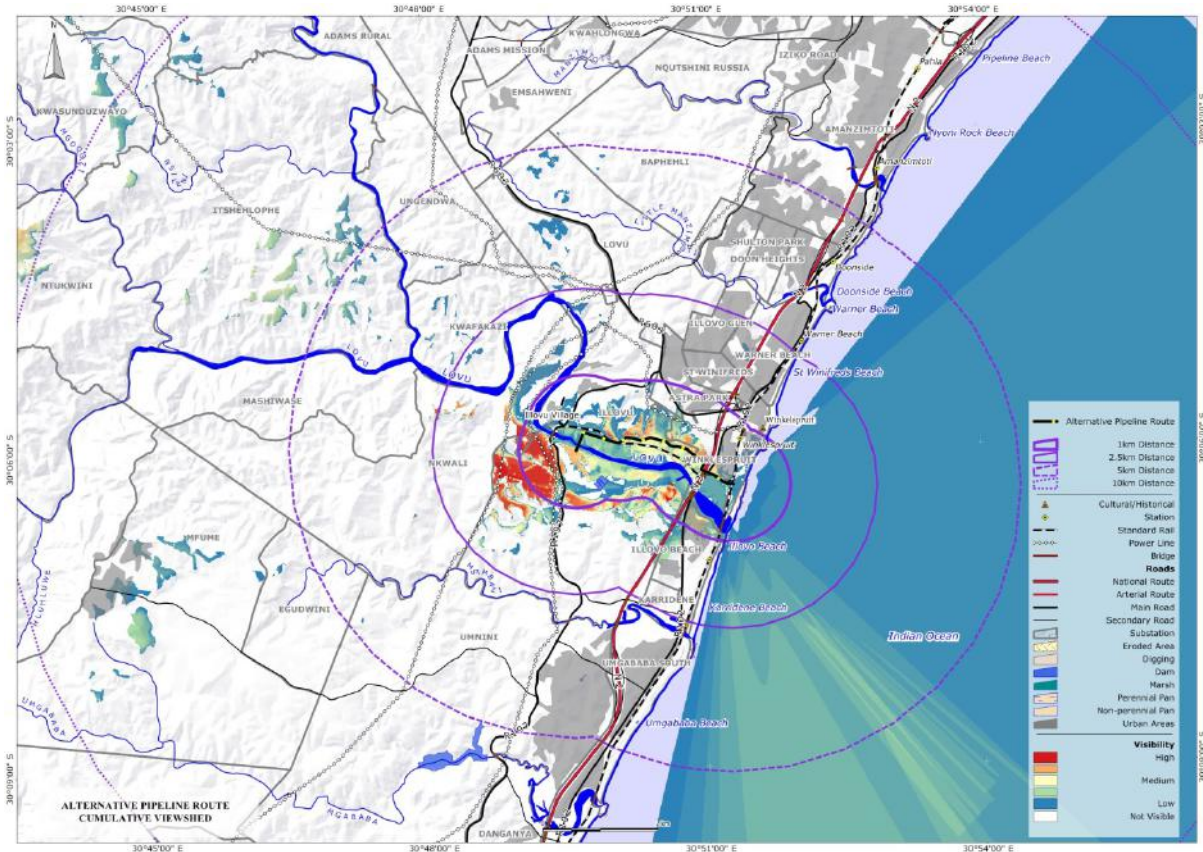


Figure 10-13 Cumulative viewshed of a pipeline along the Alternative Route during construction.

The Alternative Route (3.4 km long) has a slightly bigger viewshed during construction than the Preferred Route. The viewshed is 10 km² and contains 755 buildings. Construction along the Alternative Route therefore has a high visibility, but similarly to the Preferred Route its actual viewshed will be much smaller (although visibility is still likely to be high due to the length of the route).

10.6.1.7 Alternative Route with Tunnel (Alternative 2)

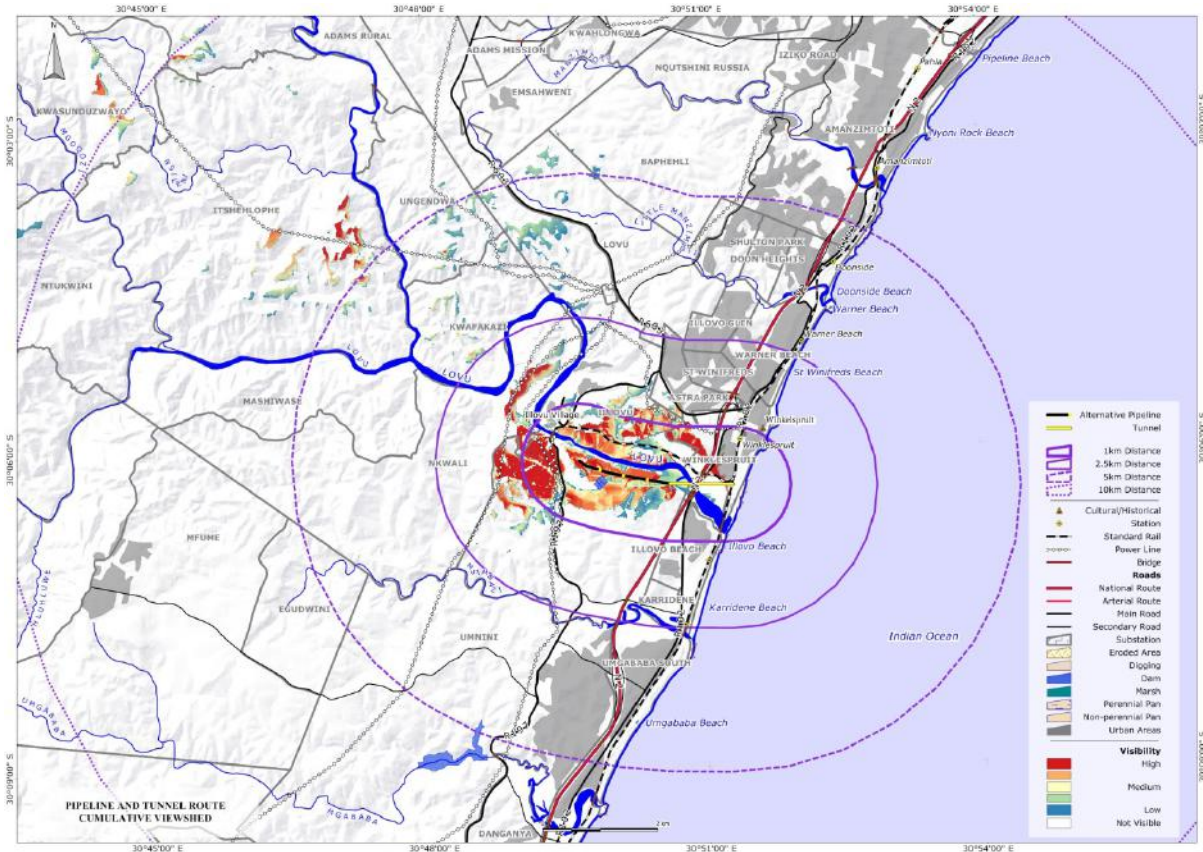


Figure 10-14 Cumulative viewshed of construction of a pipeline along the southern alternative route which includes a tunnel.

The viewshed of pipeline construction along the southern alternative route is smaller than for the other two proposed routes since the tunnel section is not visible except for entry points. The pipeline will be approximately 1.6 km long and the tunnel section about 1.1 km. The viewshed is 7km² and there are 687 buildings in the visibility envelope.

10.6.1.8 Alternative Route with Tunnel (Alternative 3)

This pipeline alternative follows the Preferred Pipeline Route from the desalination plant to the N2 and then uses tunnelling underneath the N2 to the in-take pump station. The viewshed for this route will be smaller than that of the Preferred Route and fewer sensitive visual receptors will be affected. In addition, the potential visual impact for the pipelines is temporary and the difference in impact between the Preferred Route and Alternative 3 is unlikely to be significant

10.6.1.9 Pipe Bridge

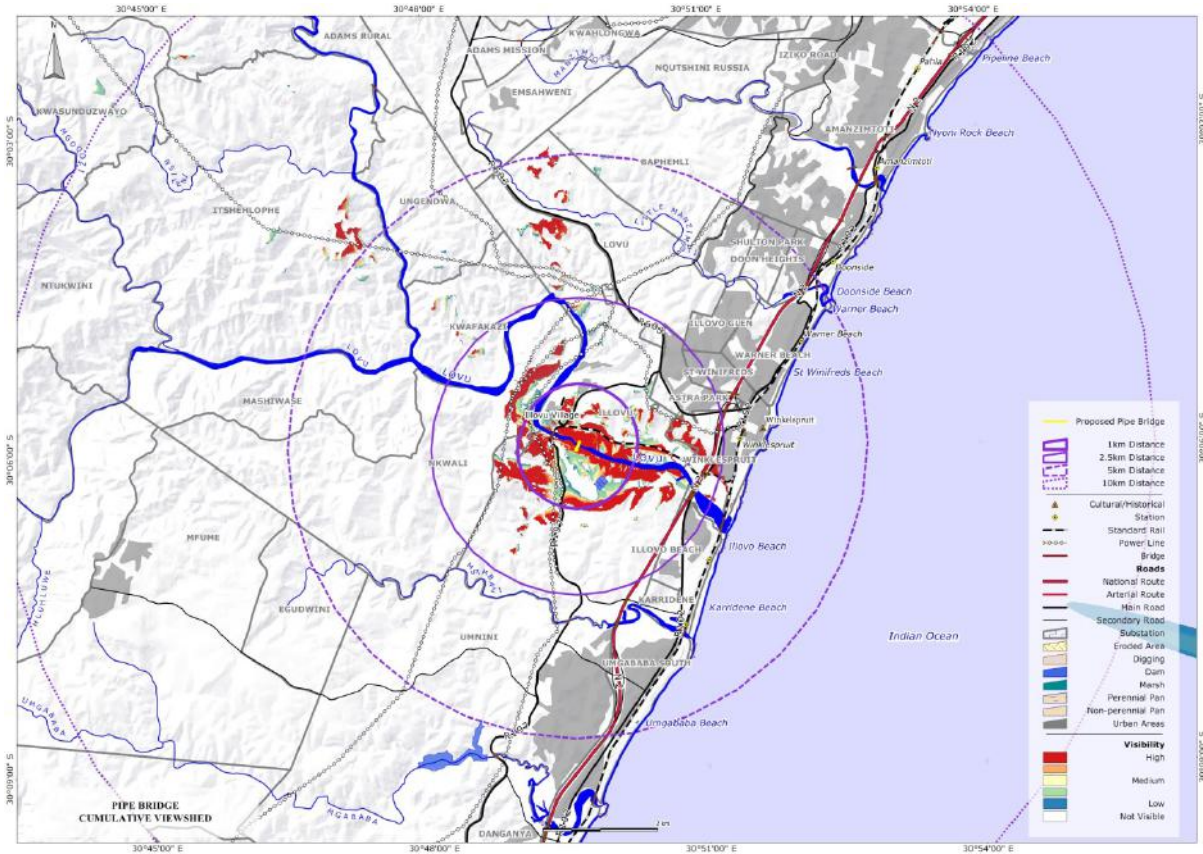


Figure 10-15 Cumulative viewshed of the pipe bridge across the Lovu River.

The viewshed for the pipe bridge is 5 km² and contains 547 buildings. Most of it is contained in the Lovu River floodplain and the actual viewshed is likely to be smaller. The bridge will be screened to the south by the desalination plant and vegetation surrounding visual receptors will limit views as well. Visibility based on the calculated viewshed for the pipe bridge is high, but is likely to be low when taking vegetation and building screening into account.

10.6.1.10 Overhead Transmission Line from Desalination Plant to Kingsburgh Major SS

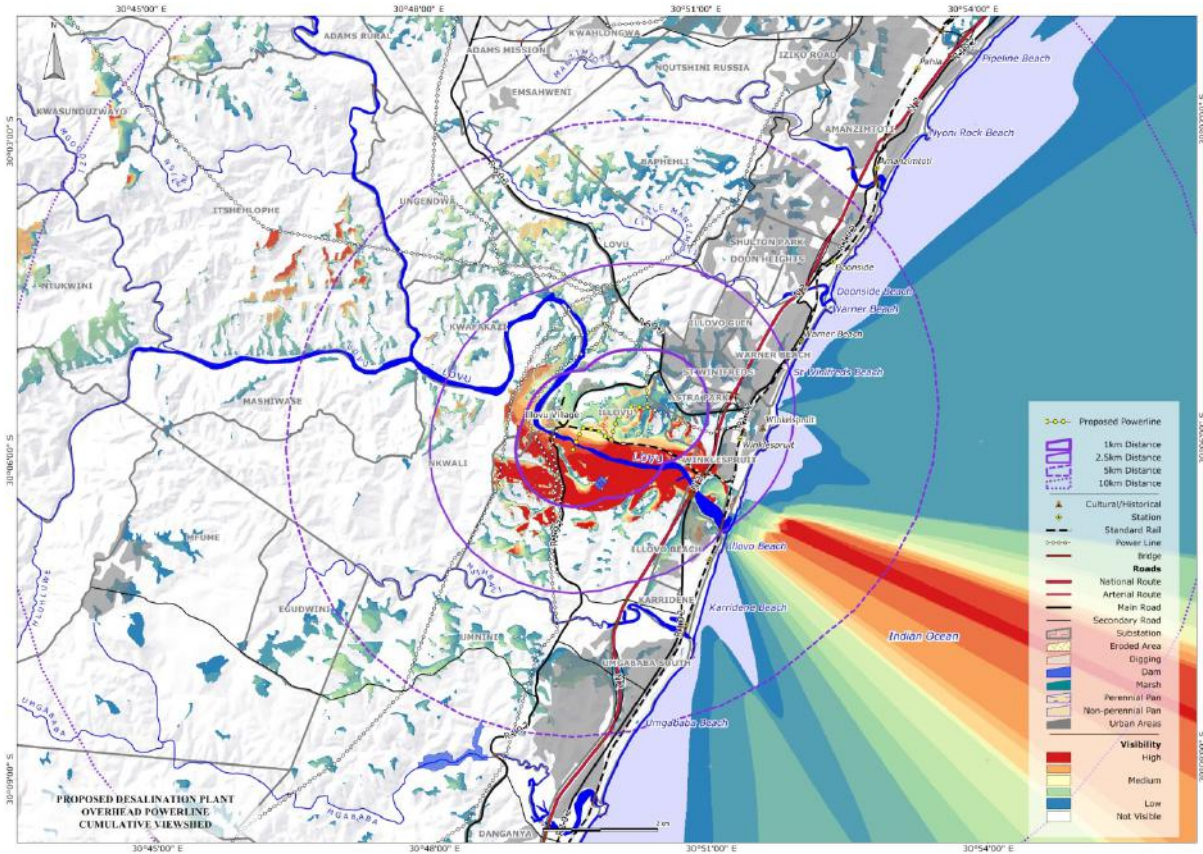


Figure 10-16 Cumulative viewshed of the proposed overhead transmission line from the Desalination Plant to Kingsburgh SS.

The power line will be approximately 2 km long and its viewshed is 29 km². The viewshed contains 6421 buildings. The viewshed is clearly more extensive than the other viewsheds discussed so far and this is due to the length of the line and the height of its components. Actual visibility will be lower but it will still be high as can be seen from the existing transmission lines in the landscape.

10.6.1.11 Overhead Transmission Line from Pump Station to Desalination Plant

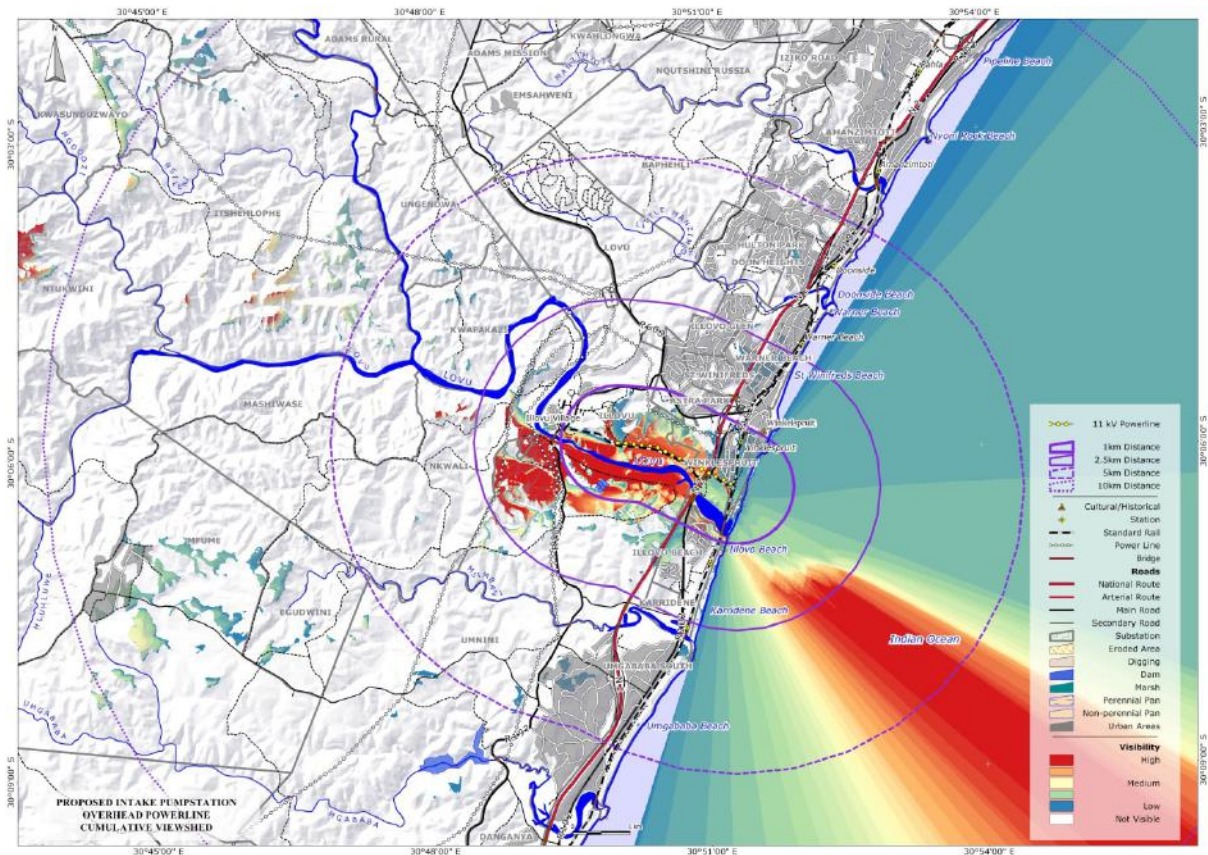


Figure 10-17 Cumulative viewshed for an 11 kV overhead power line from the pump station site to the desalination plant.

The proposed 11 kV distribution line from the in-take pump station to the desalination plant is approximately 2.2 km long. Its viewshed is 11 km² and there are 933 buildings in the viewshed. Most of the buildings are in Winklespruit, Illovo Beach, Warner Beach and Illovo Village. High vegetation and buildings are likely to screen power line from most of these buildings and the actual viewshed will be much smaller. The theoretical visibility is high but the actual visibility is likely to be medium to low.

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 10-3 Visual exposure ratings and number of buildings

Component	Low	Medium	High
Preferred Desalination Plant Site	541	153	393
Alternative Desalination Plant Site	844	296	430
In-take Pump Station	234	99	162
Construction Jetty	563	224	165
Preferred Pipeline Route	532	99	145
Alternative Pipeline Route	497	86	176
Alternative Pipeline and Tunnel Route	462	78	160
OHL Desalination Plant to Kingsburgh Major SS	5740	383	366
OHL Pump Station to Desalination Plant	584	138	211

10.6.2.1 Preferred Site

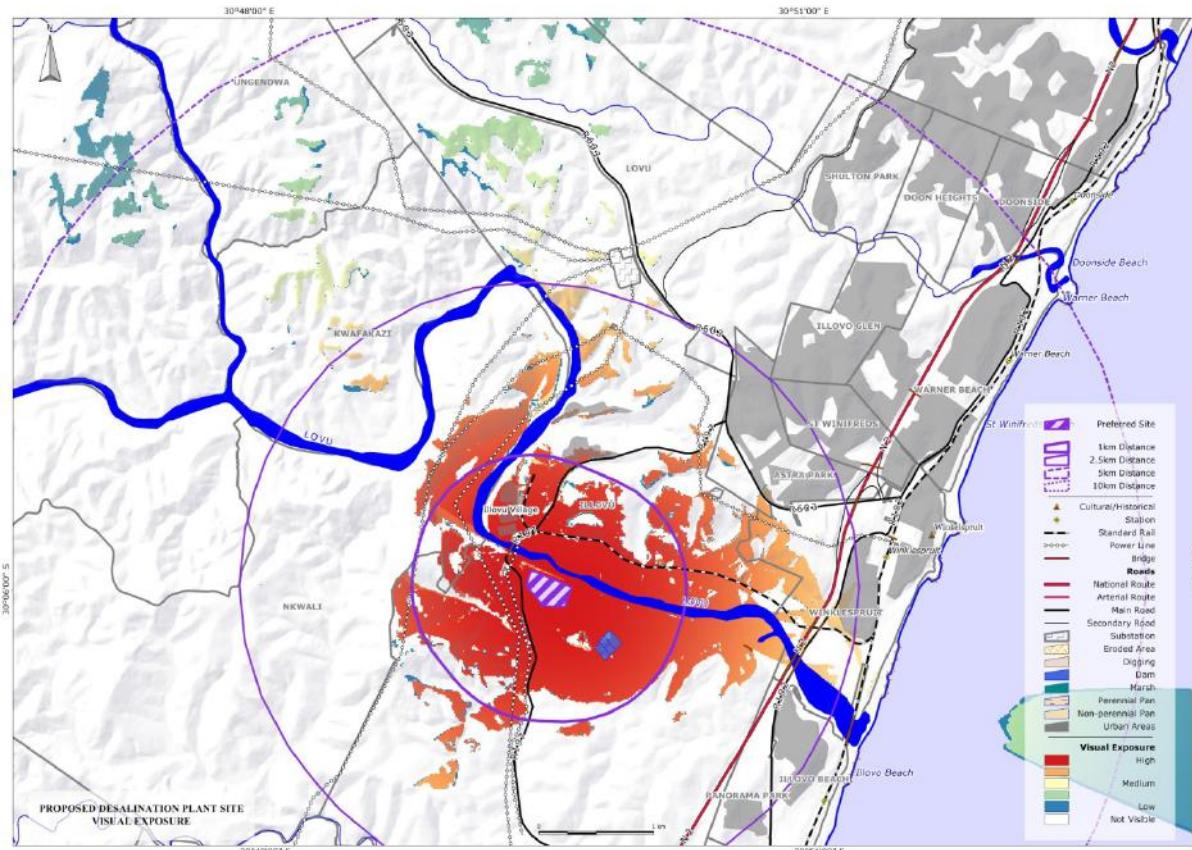


Figure 10-18 Visual exposure to a desalination plant at the Preferred site.

Visual exposure of sensitive visual receptors for the desalination plant at the Preferred site is as follows (Figure 10-18, Figure 10-19):

- Residents of the Mother of Peace Illovo Orphanage will experience high visual exposure since they live within 100 m of the site.
- Residents and viewpoints on farms surrounding the site will experience high visual exposure due to their proximity to the site.
- Residents of Illovo Village will potentially experience high visual exposure to a desalination plant on the preferred site.
- Some residents in the rural settlements west of Illovo Village in the horseshoe bend of the Lovu River may experience high visual exposure to the plant at the preferred site, particularly those living on the hills.
- Residents on living on the western edge of Winklespruit will potentially experience moderate visual exposure to the development on the preferred site.
- Motorists driving along the N2 will potentially be highly exposed to a desalination plant on the preferred site for about 12 s (400 m at 120 km/h).

- Motorists using the R102 will potentially be moderately exposed for about 13 s (300 m at 80 km/h) although vegetation adjacent to the road will limit views.
- Motorists driving on rural roads in Ungendwa/Kwfakazi will experience low to medium visual exposure when they can see the development.

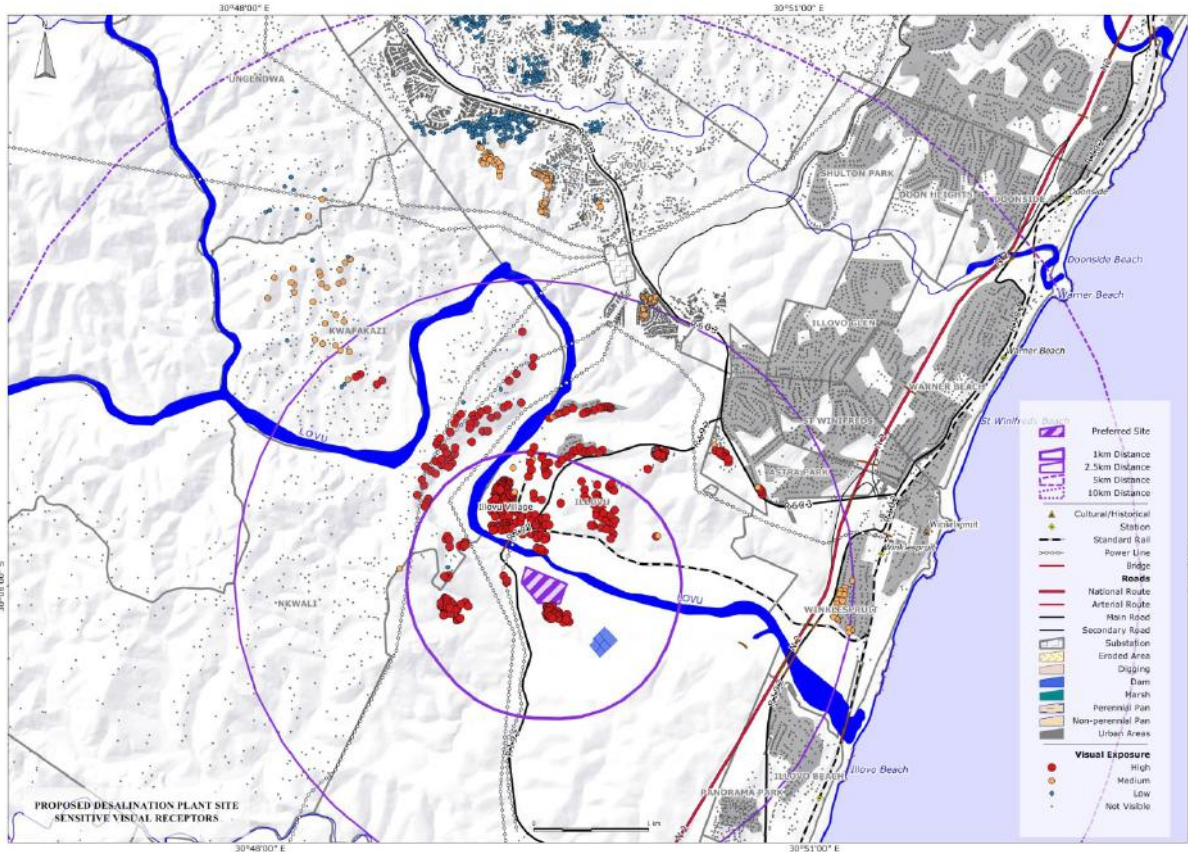


Figure 10-19 Visual exposure of sensitive visual receptors to a desalination plant on the preferred site.

10.6.2.2 Alternative Site

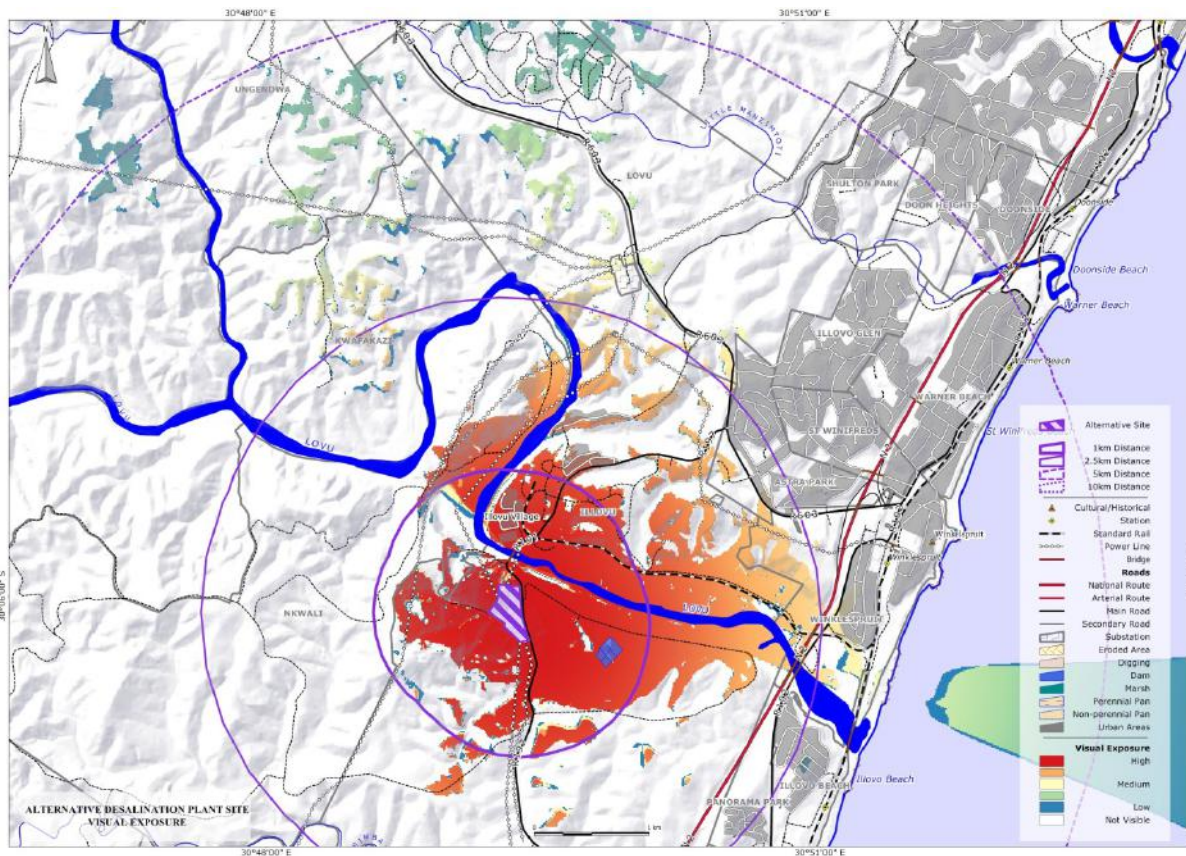


Figure 10-20 Visual exposure to a desalination plant on the Alternative Site.

The maps in Figure 10-20 and Figure 10-21 show the expected visual exposure of the region to a desalination plant on the Alternative Site. Sensitive visual receptors will experience the following visual exposure:

- Residents of the Mother of Peace Illovo orphanage will be highly exposed since they live within 500 m of the Alternative site.
- Residents and viewpoints on farms surrounding the site will experience high visual exposure due to their proximity to the site.
- Residents of Illovo Village live within 2.5 km of the site and if they have views of the site they will be highly exposed to the development.
- Residents of the rural settlements west of the site and Illovo Village will potentially be highly exposed to a desalination plant on the Alternative site since some of them are closer than 2 km from the site.
- Residents who have existing views of the site from the western edge of Winklespruit will potentially be moderately exposed.
- Motorists driving along the N2 will potentially be highly exposed for approximately 18 s (600 m at 120 km/h).

- Motorists using the R102 will experience moderate visual exposure for approximately 13 s (300 m at 80 km/h).
- Motorists driving on rural roads in Ungendwa/Kwafakazi will potentially experience low to moderate visual exposure when they can see the development.

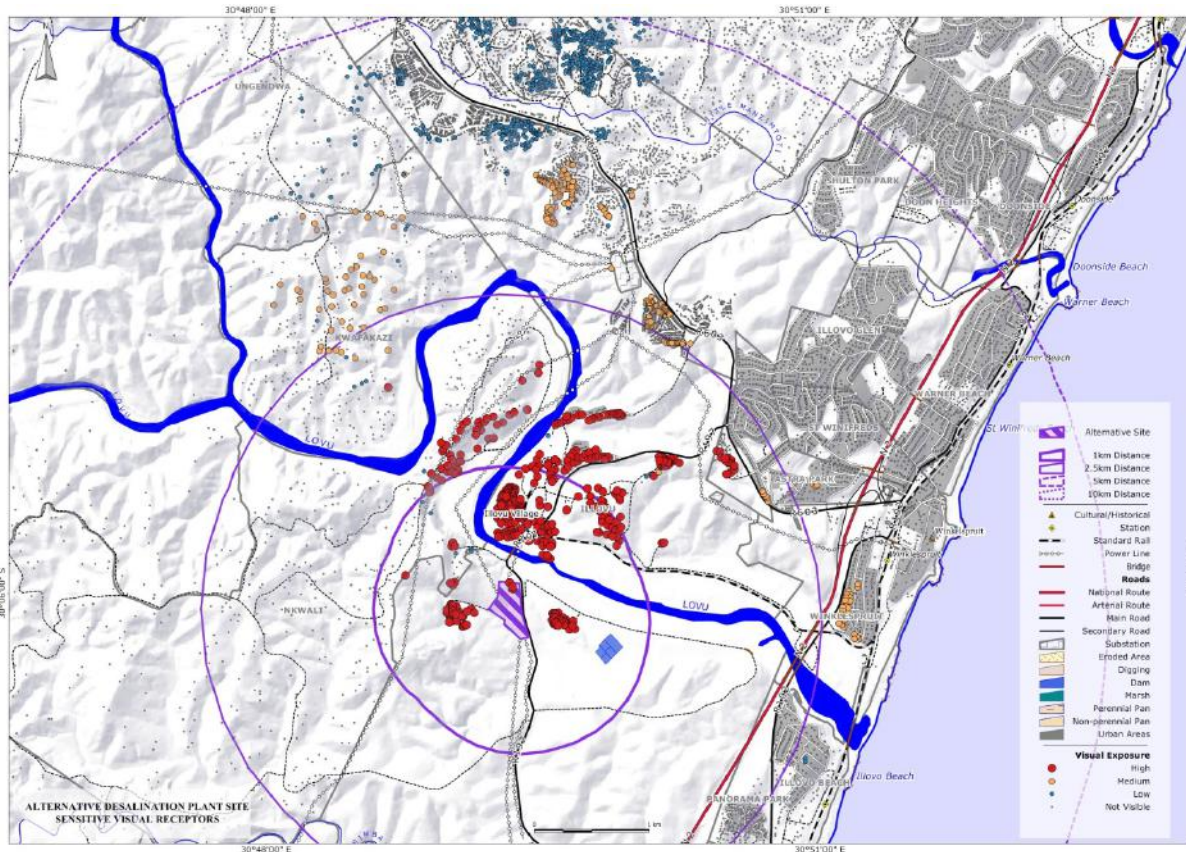


Figure 10-21 Visual exposure of sensitive visual receptors to a desalination plant at the Alternative Site.

10.6.2.3 In-take Substation

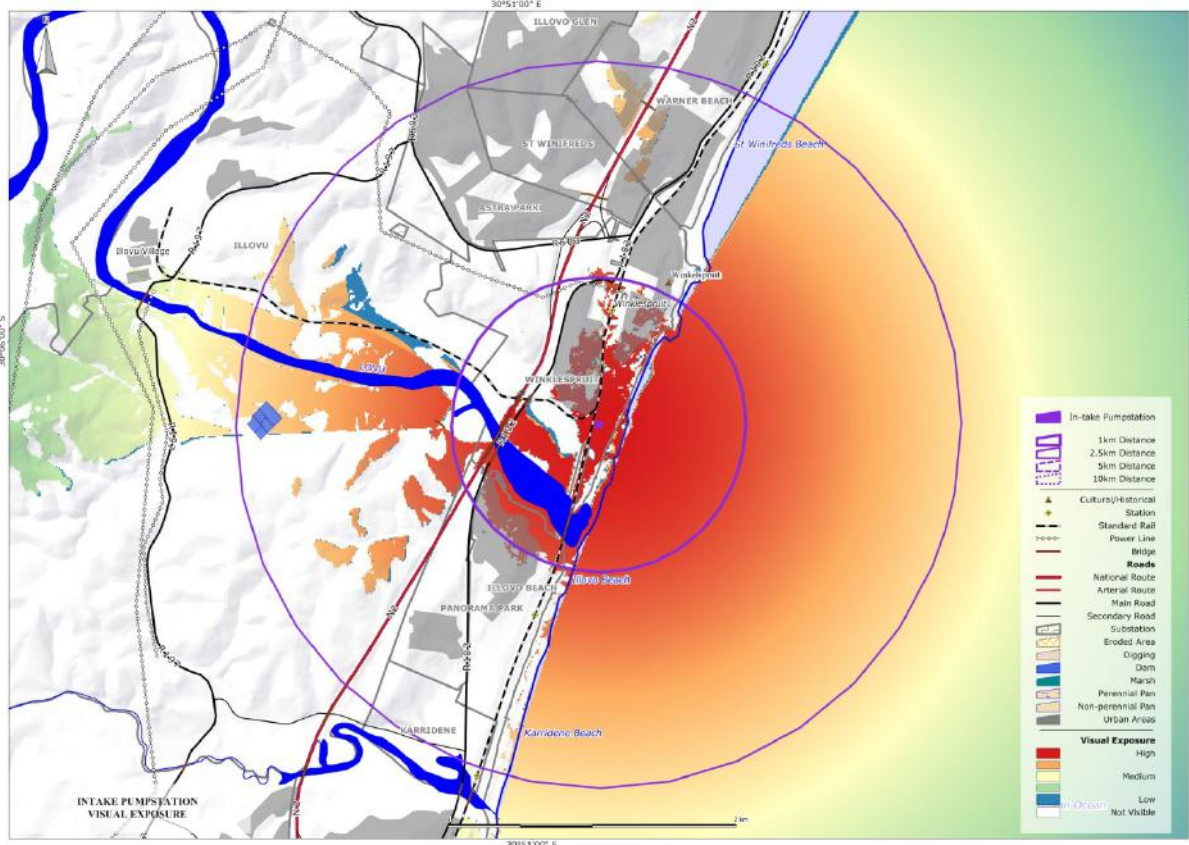


Figure 10-22 Visual exposure to the proposed In-take Pump Station in Winklespruit.

Sensitive visual receptors will be exposed to the proposed pump station in Winklespruit as follows (Figure 10-22, Figure 10-23):

- Residents of the Boardwalk residential complex next to the pump station site will be highly exposed since they live within 200 m of the site – if it is visible to them.
- Residents of the southern edge of Winklespruit (across the railway) will experience high visual exposure if the site is in existing views.
- Users of the beach near the proposed site will experience high visual exposure due to the proximity of the beach.

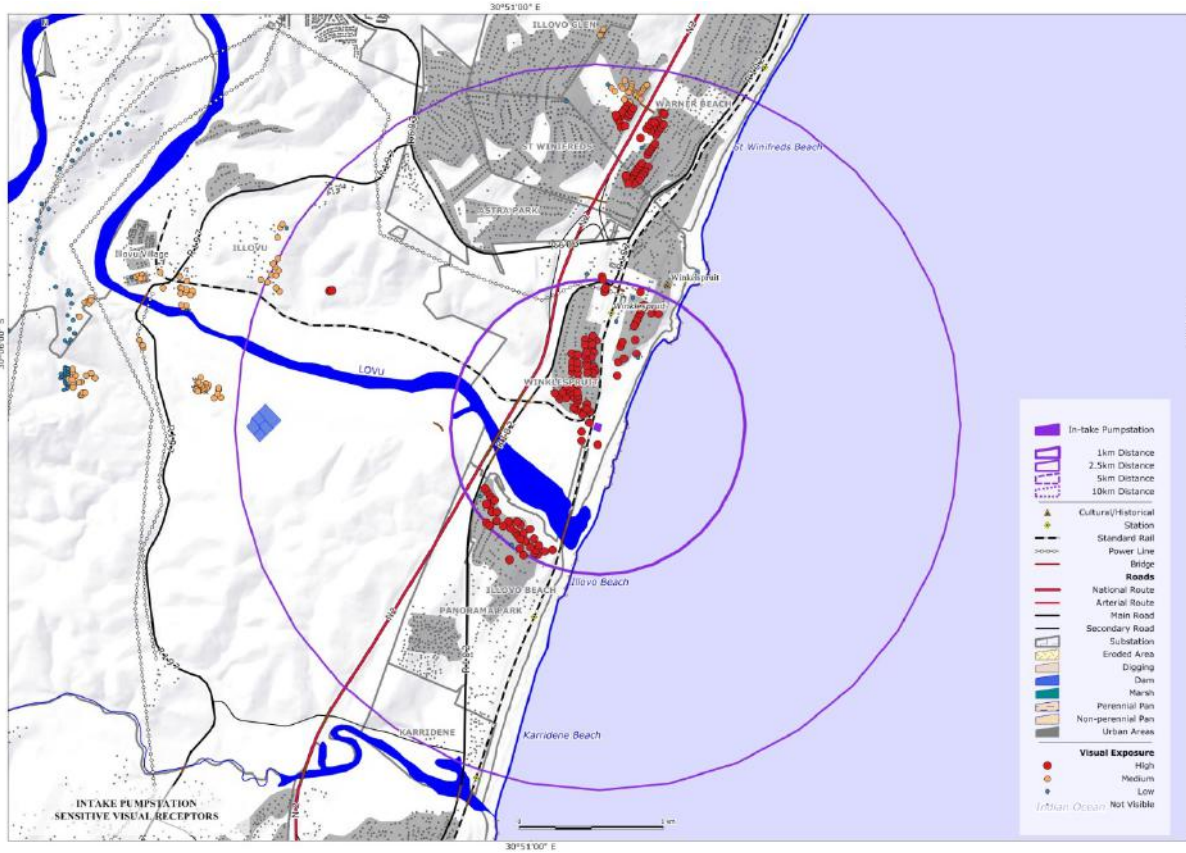


Figure 10-23 Visual exposure of sensitive visual receptors to an in-take pump station in Winklespruit.

10.6.2.4 Construction Jetty

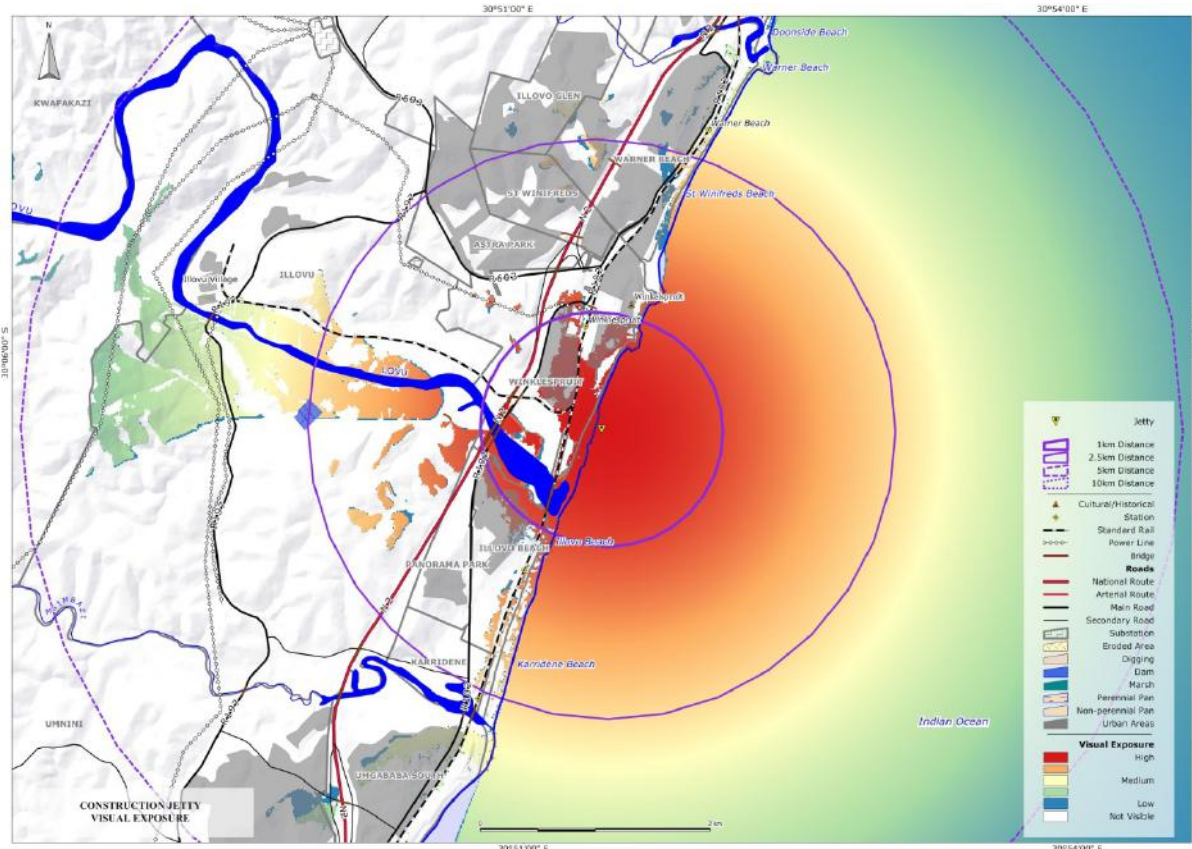


Figure 10-24 Potential visual exposure for the construction jetty at Winklespruit beach.

Sensitive visual receptors will potentially be exposed as follows:

- Residents of the Boardwalk residential complex will be highly exposed to the construction jetty and construction activities on the beach since some of them have views directly on the beach where these will occur and are within 100 m of the site.
- Residents of northern Illovo Beach will experience high visual exposure to the jetty since some of them have sea views in this direction and they are within 1 km of the site.
- Users of the beach within 2.5 km of the jetty site and within the viewshed will be highly exposed to it and construction activity at the site.
- Residents of the southern parts of Winklespruit with existing views of the site will be highly exposed to the jetty and construction activity at the site.
- Residents of tall buildings in Doonside and northern Winklespruit with existing views of the site will have a low visual exposure to the jetty since they are more than 2.5 km from the site.

10.6.2.5 Preferred Pipeline Route

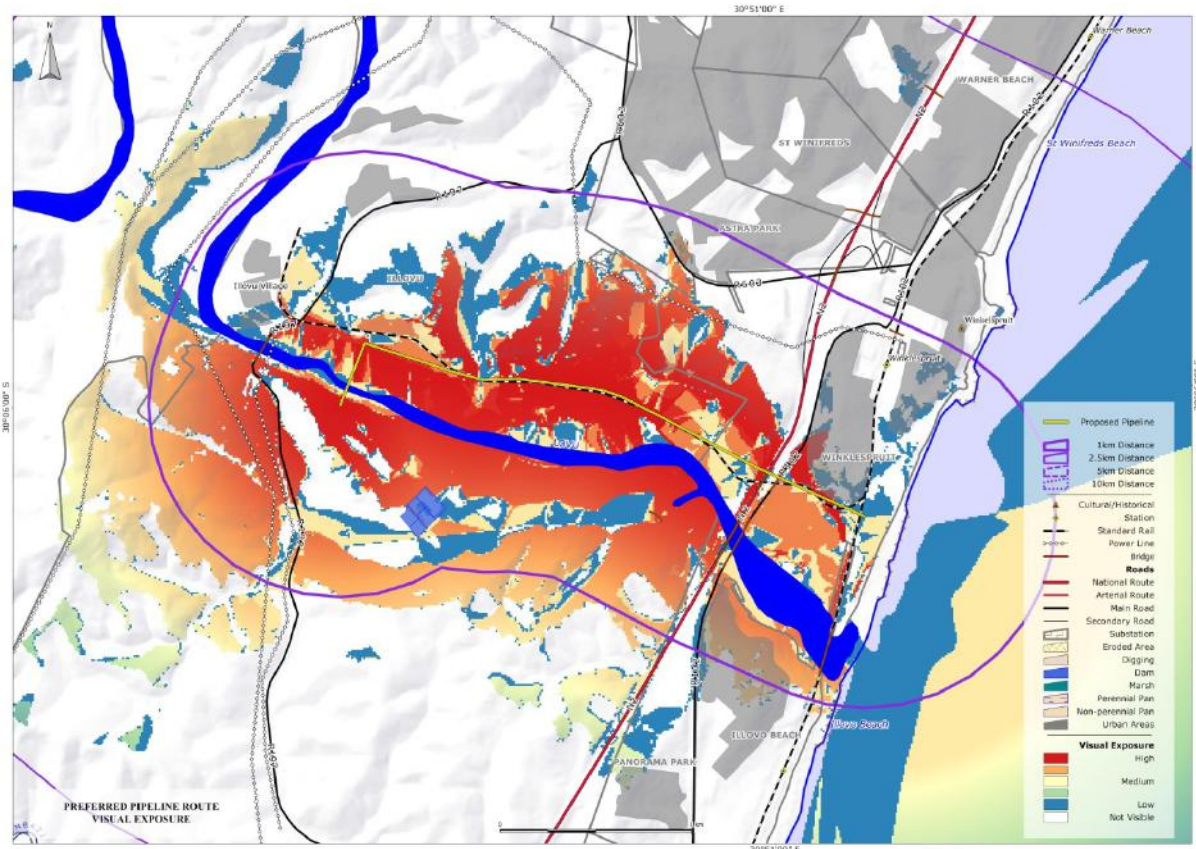


Figure 10-26 Visual exposure to construction activity along the Preferred Pipeline Route.

Sensitive visual receptors will potentially be affected by construction activities along the Preferred Pipeline Route:

- Residents of the Mother of Peace Illovo orphanage will potentially be highly exposed to construction activities along the pipeline route.
- Residents and viewpoints on farms within 1 km of the Preferred Pipeline Route will be highly exposed to construction activities.
- Some residents of rural settlements west of the desalination plant with existing views of the Preferred Route will be moderate- to highly exposed to construction activities if they are within 2.5 km of the route.
- Residents of the western and southern edge of Winklespruit with existing views on the Preferred Route will be highly exposed to construction activity since they are within 1 km of the route.
- Residents of northern Illovo Beach with existing views of the Preferred Route will be highly exposed to construction activities since they are within 1 km of the route.
- Residents of Panorama Park with existing views of the Preferred Route will potentially be moderately exposed to construction activity since they are more than 1 km from the route.
- Residents of eastern Illovo Village with existing views on the Preferred Route will potentially be highly exposed since they are within 1 km of the route.

- Motorists using the N2 will potentially be highly exposed to construction activity along the Preferred Route for approximately 20 s (600 m at 120 km/h).

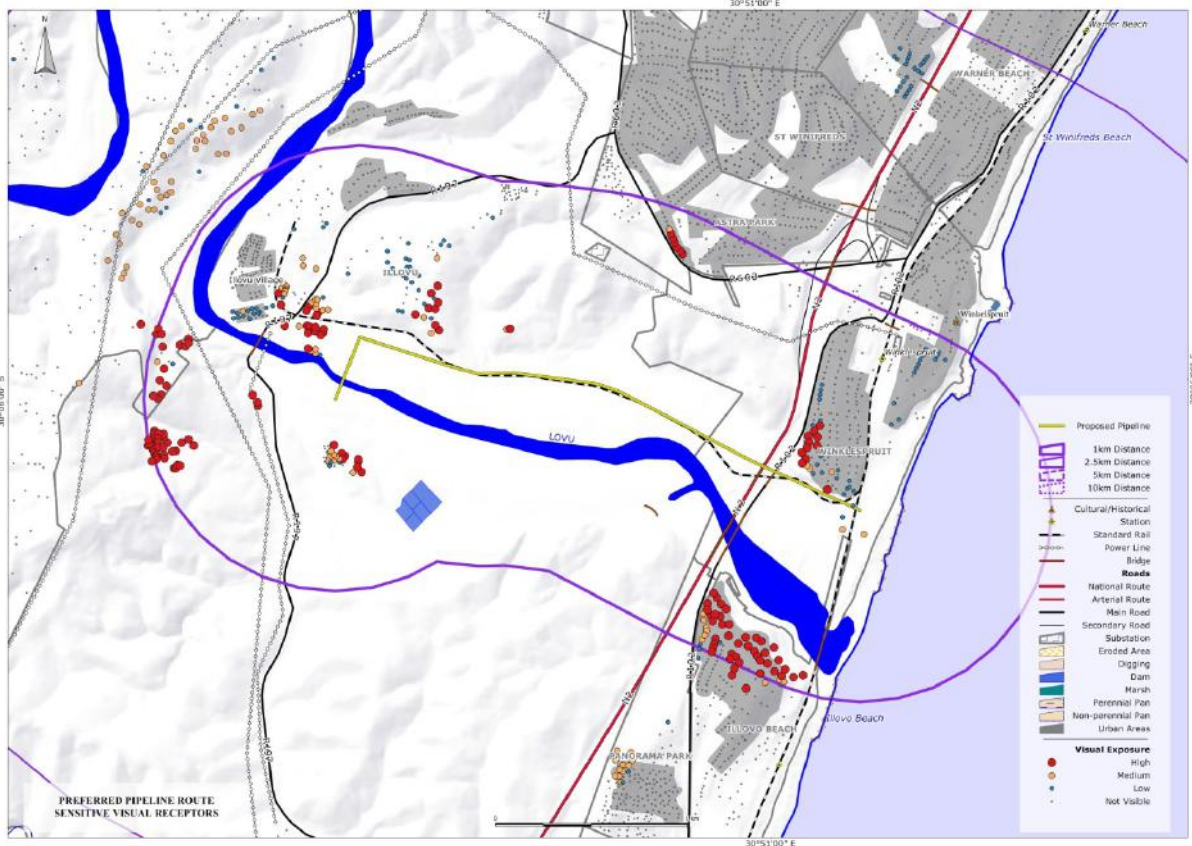


Figure 10-27 Potential visual exposure of sensitive visual receptors to construction activity along the Preferred Pipeline Route.

10.6.2.6 Alternative Pipeline Route

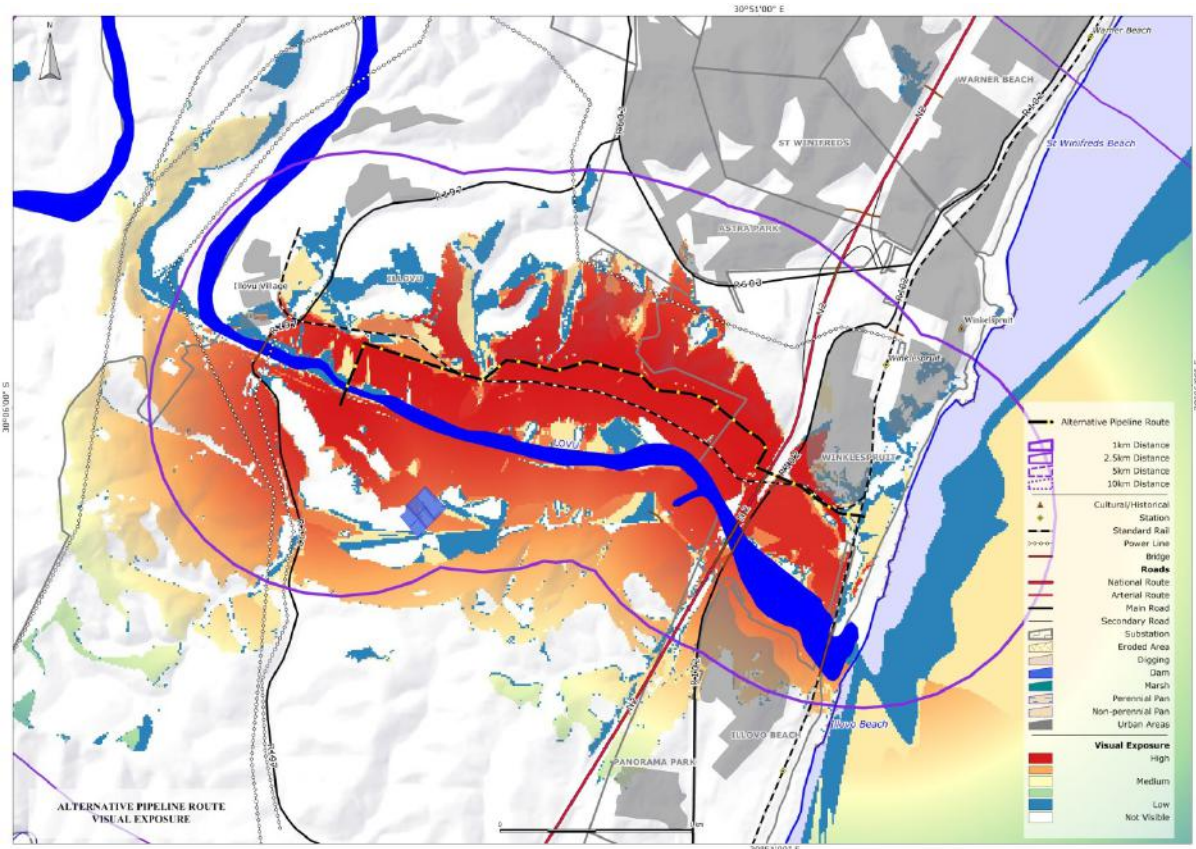


Figure 10-28 Visual exposure to construction activity along the Alternative Pipeline Route.

Sensitive visual receptors will potentially be affected by construction activities along the Alternative Pipeline Route:

- Residents of the Mother of Peace Illovo orphanage will potentially be highly exposed to construction activities along the pipeline route.
- Residents and viewpoints on farms within 1 km of the Alternative Pipeline Route will be highly exposed to construction activities.
- Some residents of rural settlements west of the desalination plant with existing views of the Alternative Route will be moderate to highly exposed to construction activities if they are within 2.5 km of the route.
- Residents of the western and southern edge of Winklespruit with existing views on the Alternative Route will be highly exposed to construction activity since they are within 1 km of the route.
- Residents of northern Illovo Beach with existing views of the Alternative Route will be highly exposed to construction activities since they are within 1 km of the route.
- Residents of Panorama Park with existing views of the Alternative Route will potentially be moderately exposed to construction activity since they are more than 1 km from the route.

- Residents of eastern Illovu Village with existing views on the Alternative Route will potentially be highly exposed since they are within 1 km of the route.
- Motorists using the N2 will potentially be highly exposed to construction activity along the Alternative Route for approximately 20 s (700 m at 120 km/h).

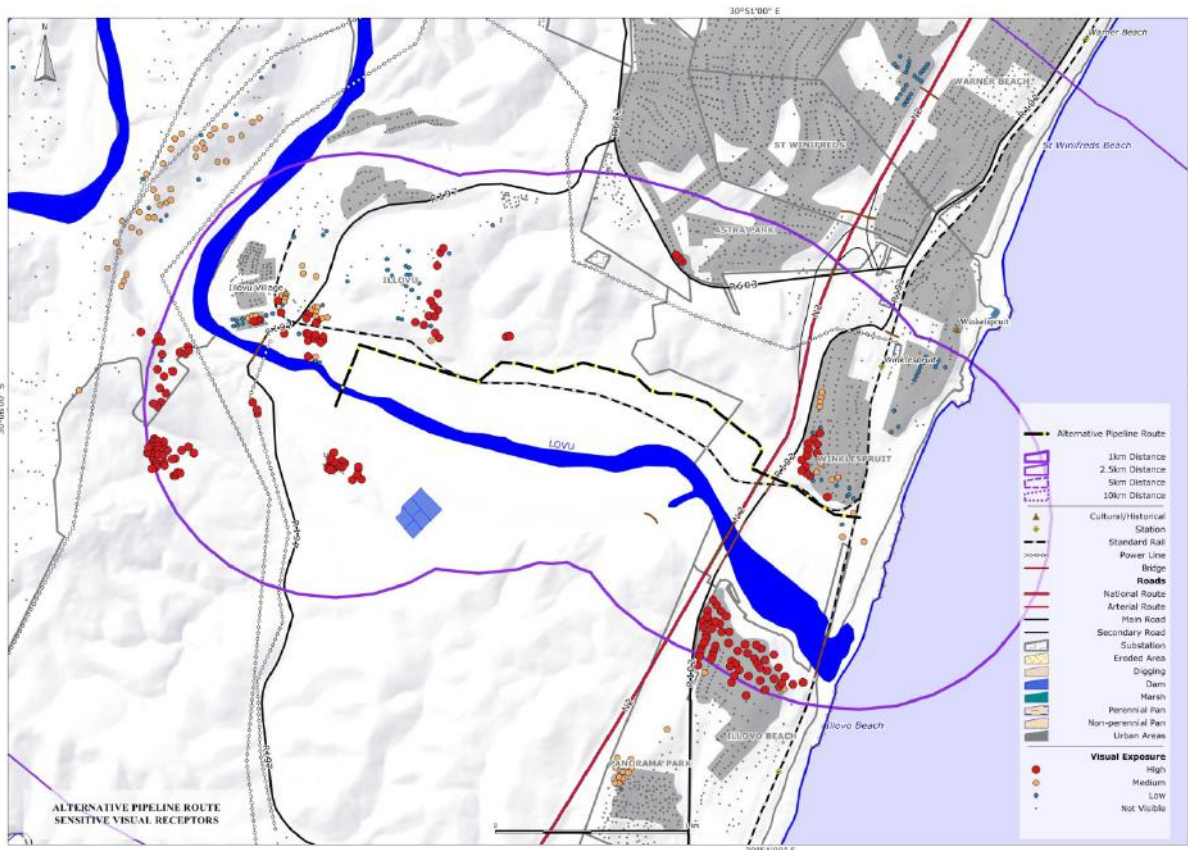


Figure 10-29 Potential visual exposure of sensitive visual receptors to construction activity along the Alternative Pipeline Route.

10.6.2.7 Alternative Pipeline Route with Tunnel

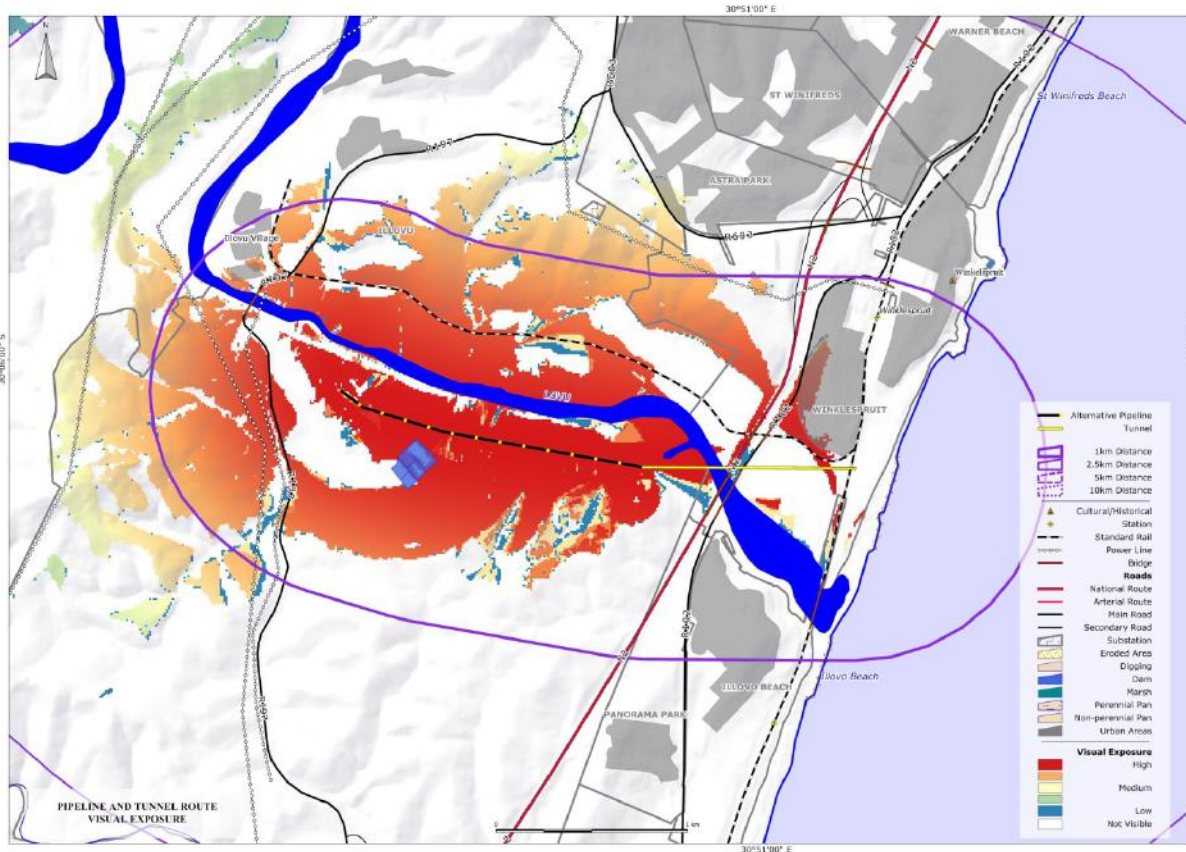


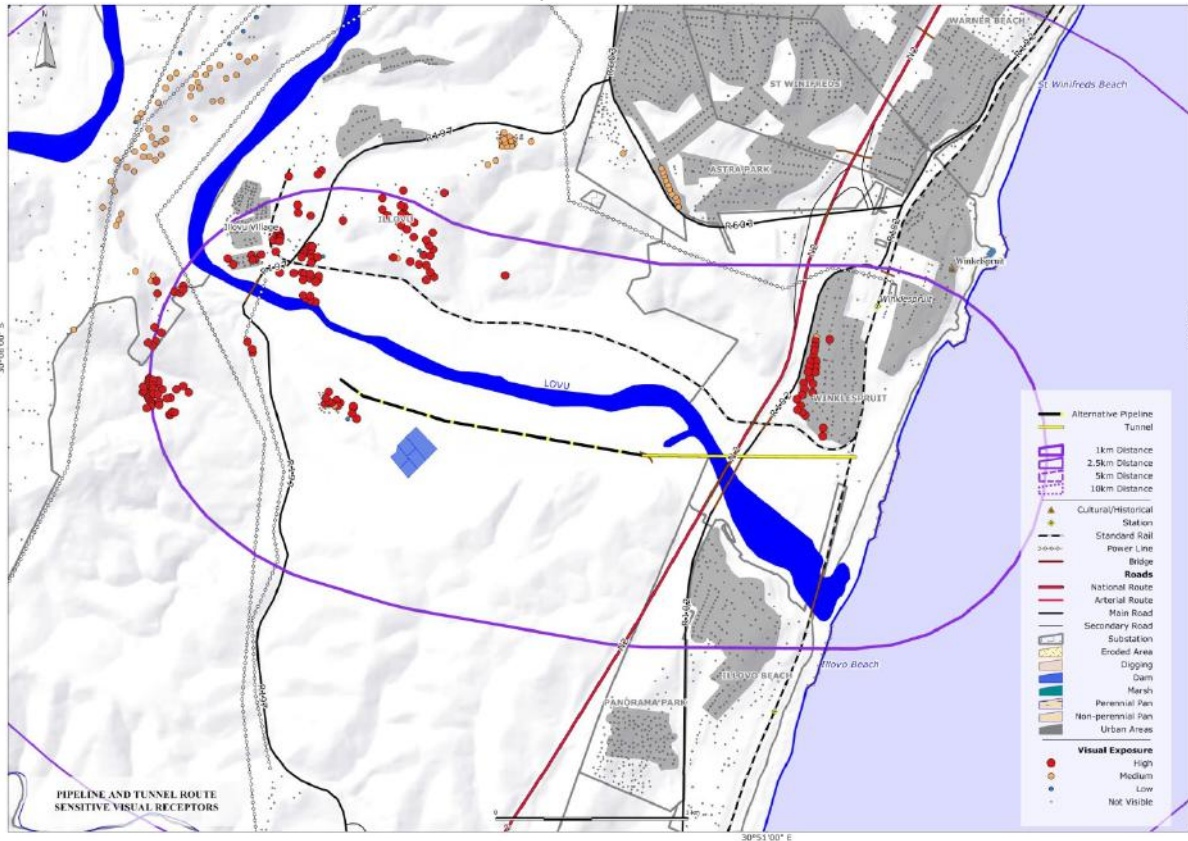
Figure 10-30 Visual exposure to construction activity along the southern Alternative Pipeline with Tunnel Route.

Sensitive visual receptors will potentially be affected by construction activities along the southern Alternative Pipeline with Tunnel Route:

- Residents of the Mother of Peace Illovo orphanage will potentially be highly exposed to construction activities along the pipeline route since it passes adjacent to the orphanage and will not be screened by the desalination plant.
- Residents and viewpoints on farms within 1 km of the route will be highly exposed to construction activities.
- Some residents of rural settlements west of the desalination plant with existing views of the route will be moderate- to highly exposed to construction activities if they are within 2.5 km of the route.
- Residents of the western and southern edge of Winklespruit with existing views on the route will be highly exposed to construction activity since they are within 1 km of the route.
- Residents of northern Illovo Beach with existing views of the route will be highly exposed to construction activities since they are within 1 km of the route.
- Residents of Panorama Park are unlikely to have views of the route.
- Residents of eastern Illovo Village with existing views on the route will potentially be highly exposed since they are within 1 km of the route.

- Motorists using the N2 will potentially be highly exposed to construction activity along the route for approximately 10 s (300 m at 120 km/h).

Figure 10-31 Potential visual exposure of sensitive visual receptors to construction activity along the southern Alternative Pipeline and Tunnel Route.



10.6.2.8 Pipe Bridge

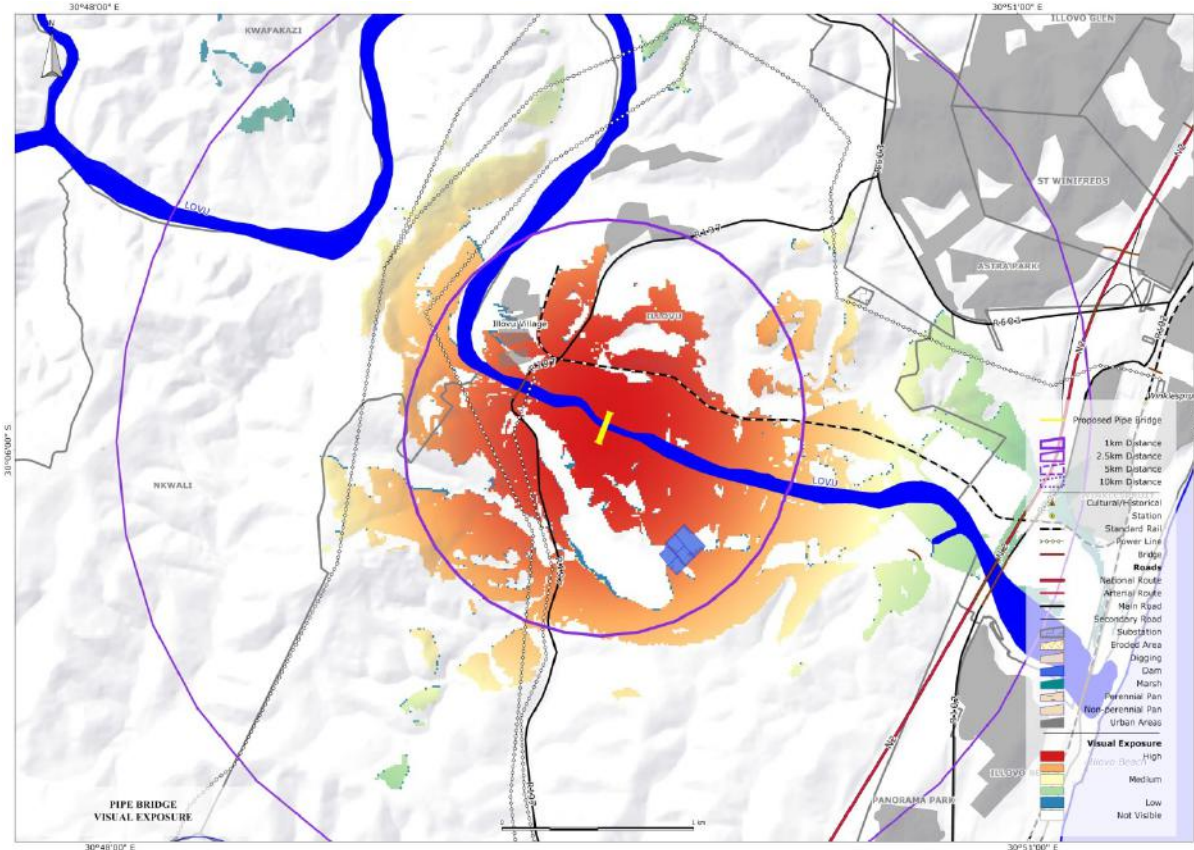


Figure 10-32 Potential visual exposure to a pipe bridge across the Lovu River.

Visual exposure to the proposed Pipe Bridge across the Lovu River will be as follows:

- Residents of the Mother of Peace Illovo orphanage will potentially be highly exposed to the Pipe Bridge. However, if the desalination plant is built at the Preferred Site then it is likely that the plant will be in the way and residents will not see it from the orphanage.
- Residents and viewpoints on surrounding farms will potentially be highly exposed to the Pipe Bridge if they are within 1 km of the site.
- There are residents in Illovo Village who will be highly exposed to the Pipe Bridge if they have the site in existing views, particularly in eastern Illovo Village where there are potential views over the Lovu River.
- Residents of rural settlements west of Illovo Village will be moderately exposed to the Pipe Bridge if they have the site in existing views since they are more than 1 km from the site.

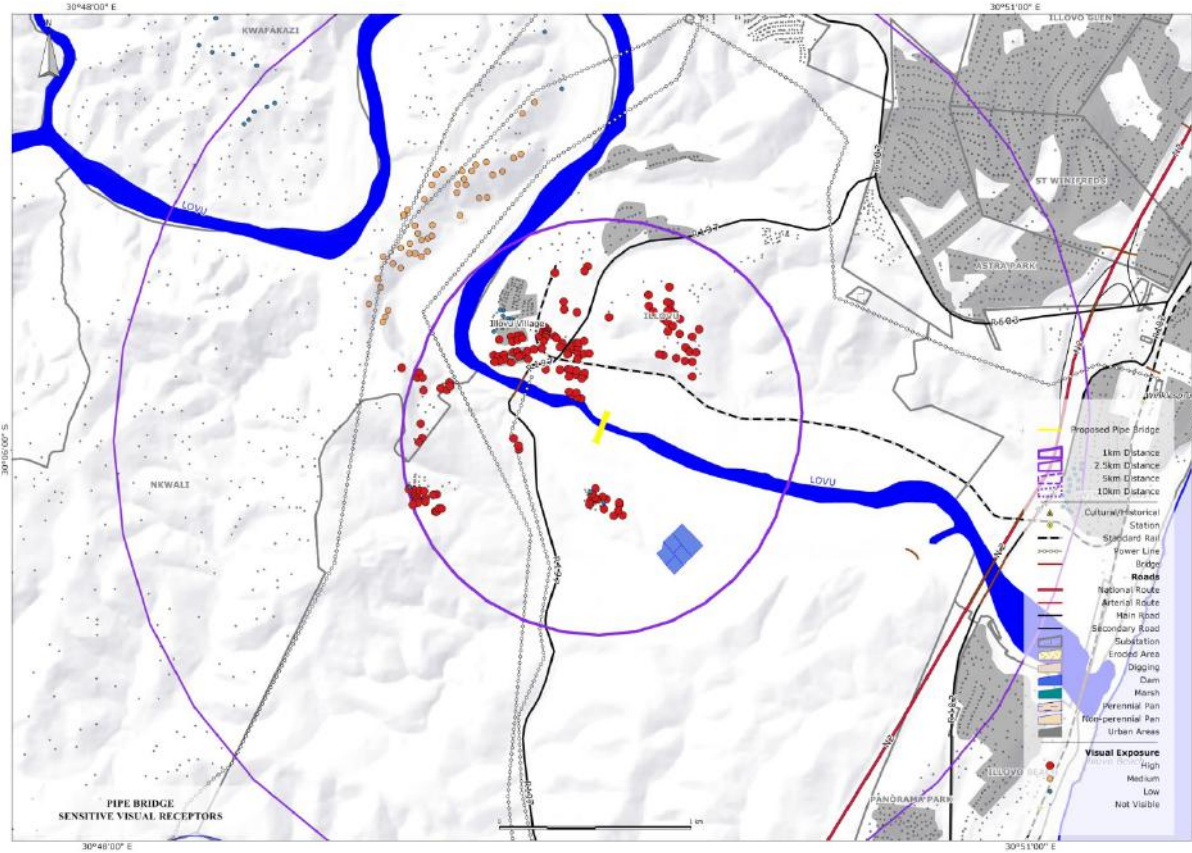


Figure 10-33 Potential visual exposure of sensitive visual receptors to a pipe bridge across the Lovu River.

10.6.2.9 Transmission Line from Desalination Plant to Kingsburgh Major SS

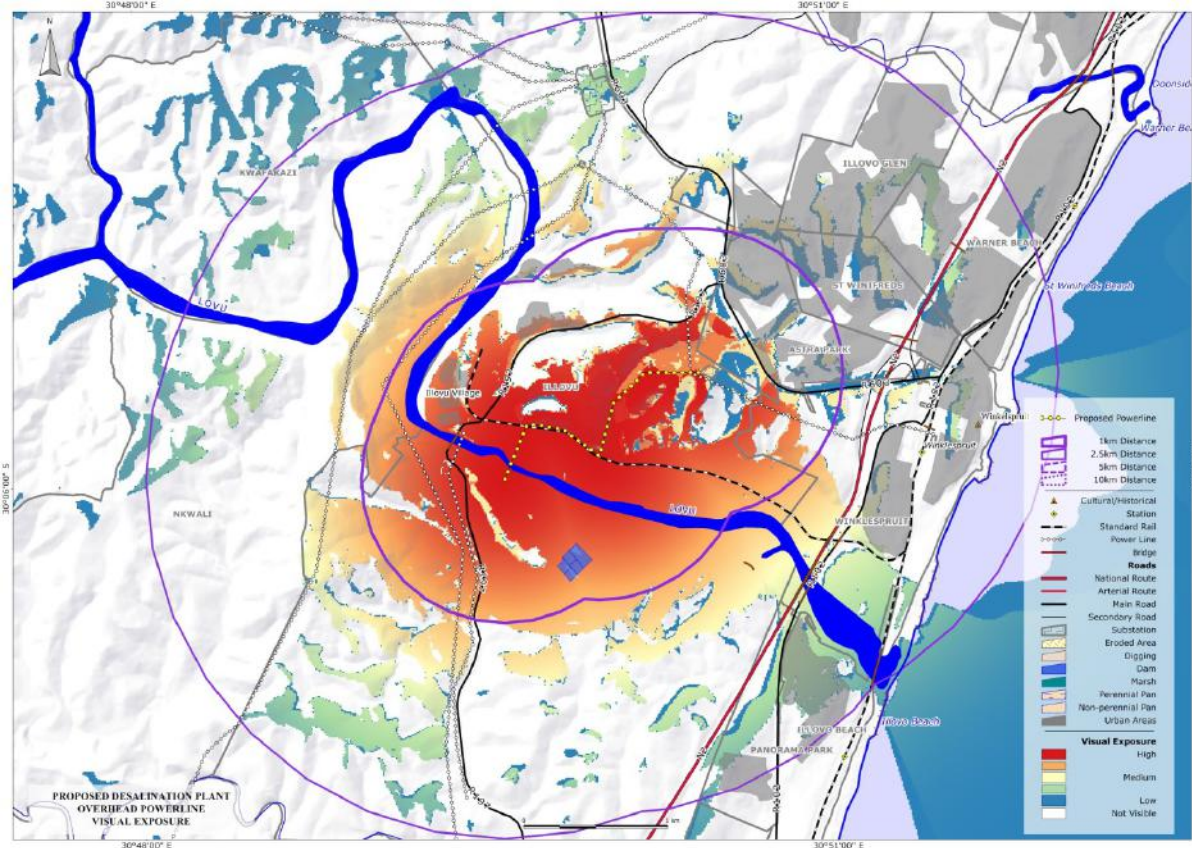


Figure 10-34 Potential visual exposure to a power line from the desalination plant to Kingsburgh Major SS.

The proposed overhead power line from the desalination plant to Kingsburgh Major SS will pass in close proximity to Illovo Village and the Substation is close to the southern suburbs of Kingsburgh. Potential visual exposure for sensitive visual receptors will be as follows:

- Residents of Mother of Peace Illovo orphanage will be highly exposed to the power line since they are within 250 m of the route. The desalination plant, if it is built at the Preferred Site, will screen some of the power line route but not all.
- Residents and viewpoints on farms along the route will be highly exposed to the power line if they are within 1 km of the line.
- Residents of Illovo Village, and particularly the eastern residential area, will be highly exposed to the power line since they live within a few hundred meters of the route.
- Residents of rural settlements west of Illovo Village will be highly exposed if they are within 1 km of the route and within the viewshed.
- Some residents of the southern suburbs of Kingsburgh (Astra Park, St Winifreds) will be highly exposed to the power line since they are within 1 km of the route.

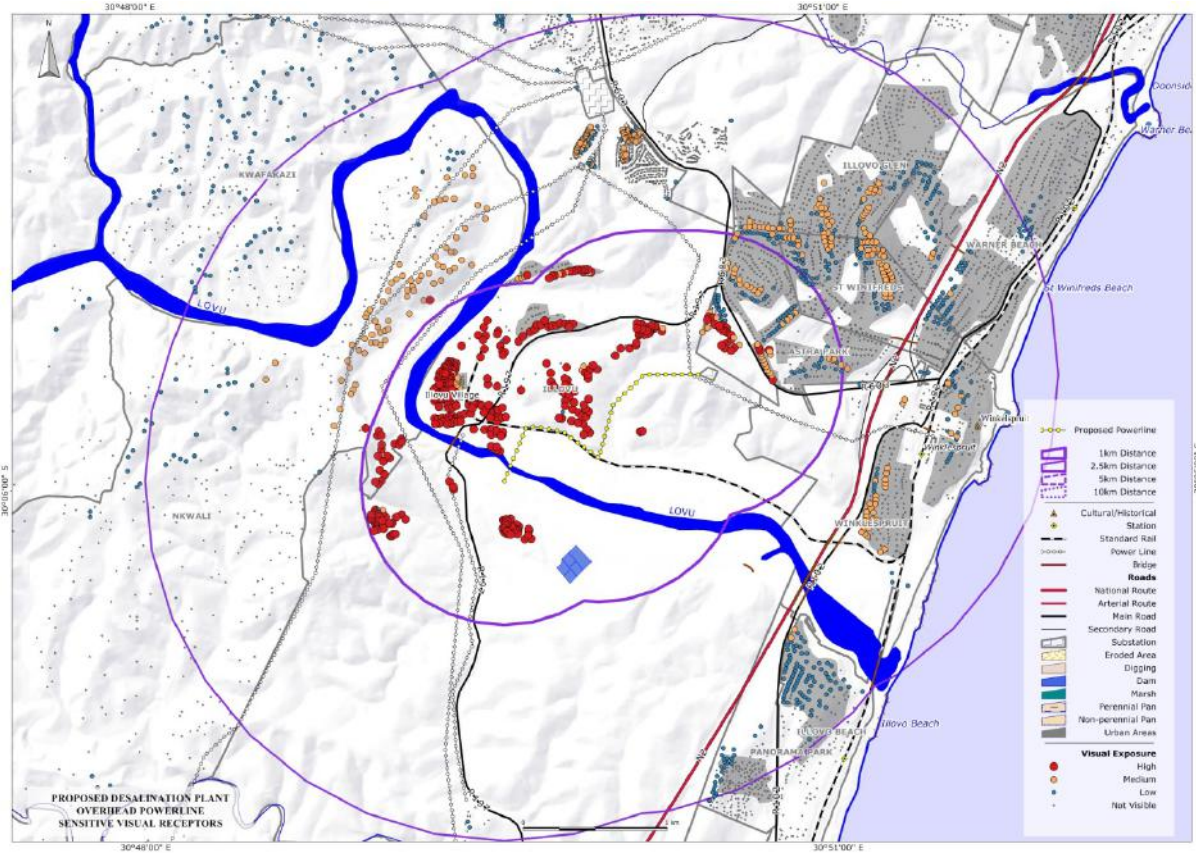


Figure 10-35 Potential visual exposure of sensitive visual receptors to a transmission line from the desalination plant to Kingsburgh Major SS.

10.6.2.10 Transmission line from Pump Station to the Desalination Plant

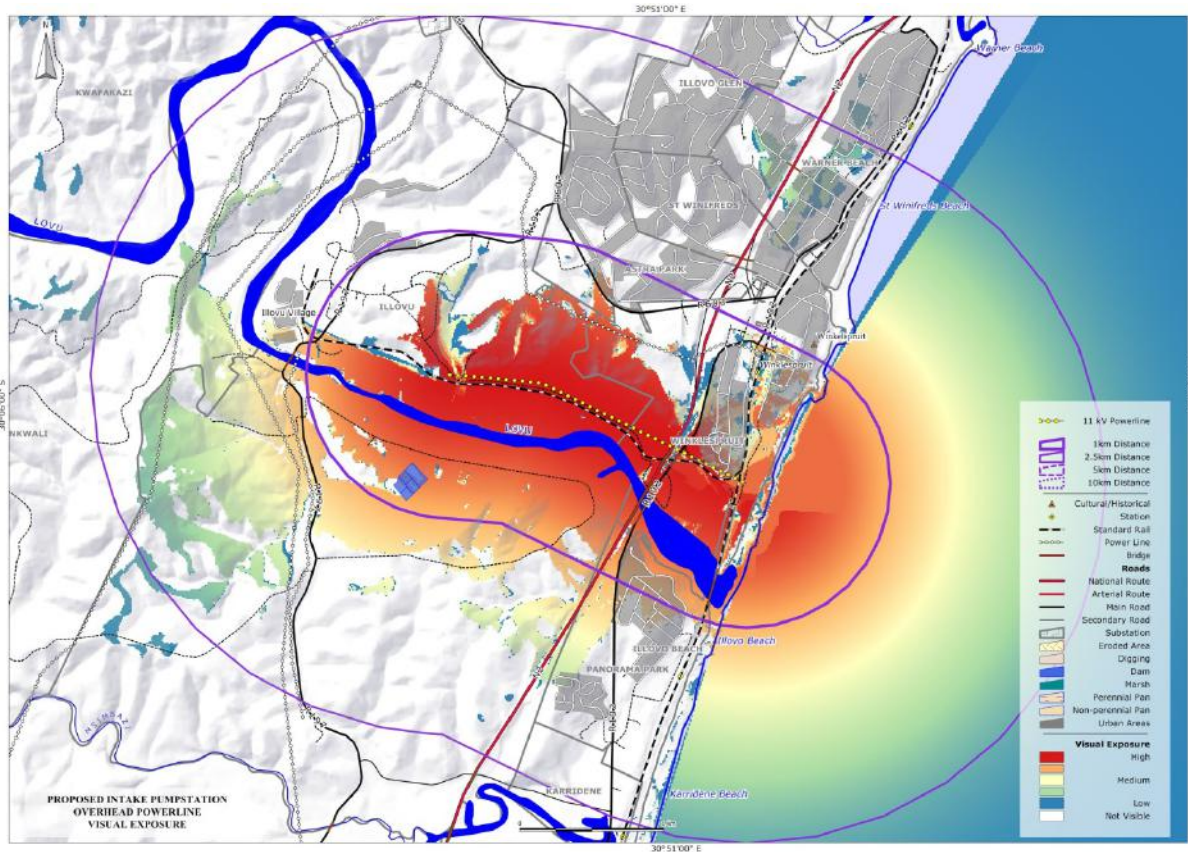


Figure 10-36 Potential visual exposure to the proposed 11 kV power line from the in-take pump station to the desalination plant.

The proposed power line will pass south of Winklespruit village along Ocean View Road to the N2, and from there through sugar cane fields to connect with the 132 kV line from the desalination plant. Potential visual exposure of sensitive visual receptors will be as follows:

- Residents of Winklespruit within 1 km of the route will potentially be highly exposed to the power line if their existing views include the route.
- Users of the Winklespruit beaches will potentially be highly exposed to the power line since they will be within a few hundred meters of the route.
- Residents of the Boardwalk residential complex are within 150 m of the route and if their existing views include the power line route then they will potentially be highly exposed to the power line.
- Residents of northern parts of Illovo Beach are within 1 km of the route and will potentially be highly exposed to the power line;
- Residents of eastern Illovo Village are within 500 m of the route and will potentially be highly exposed to the power line;
- Residents and viewpoints within 1 km of the route will potentially be highly exposed to the power line;

- Motorists using the N2 will potentially be highly exposed to the power line for 45 s (1.5 km at 120 km/h).
- Motorists using the R102 will potentially be highly exposed to the power line for approximately 1 minute and 10 s (1.6 km at 80 km/h).

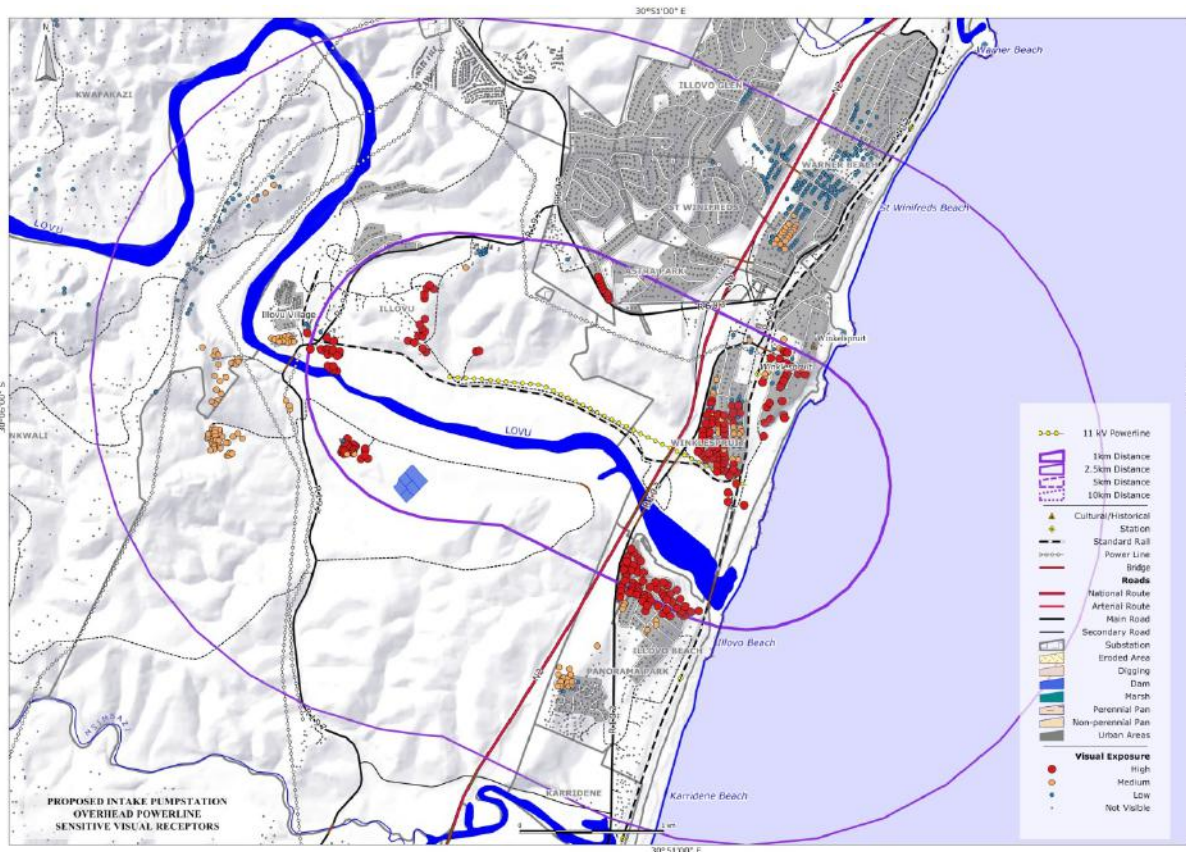


Figure 10-37 Potential visual exposure of sensitive visual receptors to the proposed 11 kV power line from the in-take pump station to the desalination plant.

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.

10.6.3.1 Photographic Survey

Site from which landscape photographs were taken are shown in Figure 10-39. The discussion below refers to photo sites on the map.

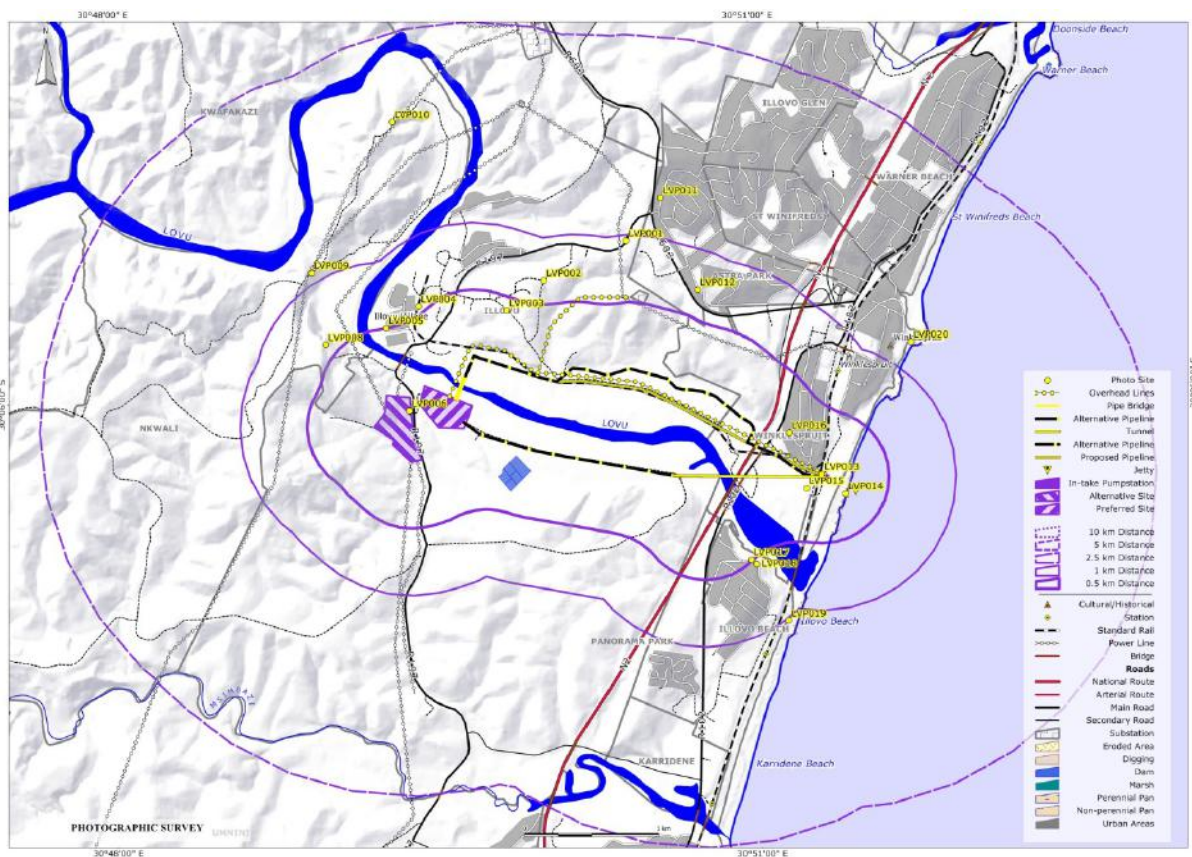


Figure 10-38 Sites visited during the fieldwork and photographic survey.

The two sites proposed for the desalination plant are in a relatively small pocket of agricultural land surrounded by formal and informal settlements. They are located in the floodplain of the Lovu River and views onto the sites are relatively free of man-made structures when compared to views away from the sites. As such these views are potentially valued by sensitive visual receptors in the surrounding landscape. The landscape is not pristine in the sense that most of it is disturbed and transformed by agricultural practices and most views contain elements of high contrast, but as an

agricultural landscape typical of the region it remains intact. It should also be kept in mind that the landscape changes with the harvesting cycle of the sugar cane. During harvesting the fields are set alight and once harvesting has occurred large patches of exposed soil will be common features of the landscape. The photographic survey was conducted before harvesting traditionally occurs. There are light industrial developments in southern Illovu Village with big, brightly coloured buildings in the light industrial area and most views will include high voltage power lines and pylons. The N2 is another large structure in the surrounding landscape. Views from Winklespruit up the Lovu River floodplain tend toward the scenic even if the landscape is transformed and not in a pristine condition.



Figure 10-39 View south-west from LVP003 in Illovu Village towards the two proposed sites for the desalination plant.



Figure 10-40 View east from LVP008 across the Lovu River floodplain. The Preferred desalination plant site is between the river and the orphanage on the right (blue roofed buildings in the floodplain).



Figure 10-41 View south from LVP010 towards the Lovu River floodplain with the orphanage buildings and trees to the right. Illovu Village is in the foreground.



Figure 10-42 View west from LVP016 in Winklespruit up the Lovu River. The proposed Alternative Site for the desalination plant is to the left of the gravel road up the hill on the opposite side of the floodplain. The Preferred Site is below that on the floodplain.



Figure 10-43 View west from LVP016 in Winklespruit towards the proposed sites for the desalination plant.



Figure 10-44 Kingsburgh Major Substation as seen from LVP012 in Astra Park.

The proposed Pump Station site is near the beach in Winklespruit, adjacent to the Boardwalk residential complex which is an upmarket development on the beach with views of the sea. The site is currently in dense bush with high trees. The beach does not appear to be a swimming beach but is used for recreational fishing. The construction Jetty will also be visible from places on the beach at Illovo Beach.



Figure 10-45 View from the beach at LVP014 near the proposed Jetty site. The Boardwalk residential complex is to the left and the proposed Pumpstation site to the right behind the dune.



Figure 10-46 View from the beach at the Jetty site (LVP014) towards the north. Various residential complexes and holiday flats will have a view of the construction Jetty and pipeline construction along the beach. Tall apartment buildings in northern Winklespruit and Doonside are also visible.



Figure 10-47 View from the beach at Illovo Beach towards the construction Jetty site. The Pump Station site is located behind the Boardwalk complex (turquoise roofs).

Views from the northern part of Illovo Beach (settlement) may include the desalination plant since there are high apartment buildings in this area, but they are likely to be affected by pipeline and power line construction.



Figure 10-48 View north-west from LVP017, northern Illovo Beach, across the Lovu River floodplain. The Kingsburgh Major Substation is visible on the hills in the middle, as are the N2 and R102 bridges across the river.



Figure 10-49 View from northern Illovo Beach (LVP017) towards Winklespruit. The Boardwalk residential complex with turquoise roofs can be seen on the right. It is possible that the proposed pumpstation will be visible from here. Dense vegetation will likely conceal pipeline construction activities on this side of the N2.

10.6.3.2 Residents of Mother of Peace Illovo Orphanage

The residents of the orphanage live in close proximity to both sites proposed for the desalination plants. A desalination plant is a large industrial development and will be the dominant aspect of the project in terms of visual intrusion on their views. The following aspects of the development will potentially affect these visual receptors:

- Desalination plant at either of the proposed sites;
- Power line from the desalination plant to Kingsburgh Major Substation;
- Construction of terrestrial pipeline; and
- Pipe bridge across the Lovu River.

Desalination Plant

Visual intrusion will be high for a desalination plant at the Preferred site since their existing views are predominantly rural-agricultural in nature. The immediate surroundings include sugar cane fields, hills with dense vegetation interspersed with houses of the rural settlements. Across the river to the north are buildings associated with Illovo Village which includes larger buildings of light industry as well as middle to higher income houses to the north-east. Residents are used to a rural sense of place and a large industrial development where their sports field used to be is likely to seem incongruent with their existing views. Visual intrusion will be high for a desalination plant at the Alternative Site as well since an industrial development in such proximity will still be incongruent with elements in their existing views. However, it will be lower than for the Preferred site since there is a buffer of sugar cane fields between them and the site.

Power line from Desalination Plant to Kingsburgh Major SS

Visual intrusion will be low for the proposed power lines since these are common elements in their existing views.

Terrestrial Pipelines

Construction activities associated with the terrestrial pipeline from the pump station to the desalination plant will be overshadowed by construction of the desalination plant itself except for a pipeline along the southern Alternative Route with Tunnel which will be highly intrusive due to the proximity in which construction will occur for the initial part of the route.

Pipe Bridge

The pipe bridge will intrude on their views if the desalination plant is built on the Alternative site. In that case visual intrusion will be moderate due to the proximity of the structure and the fact that it partially fits into the agricultural landscape. It is also likely that the pipe bridge will not be visible for most of the year when the sugar cane fields are likely to screen the structure.

10.6.3.3 Residents and viewpoints on farms surrounding the proposed desalination plant sites

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

- Desalination plant at either of the sites;
- Power line from the desalination plant to the Kingsburgh Major Substation;
- Construction of the terrestrial pipeline;
- Power line from the pump station to the desalination plant; and
- Pipe bridge across the Lovu River.

Desalination Plant

There are potential viewpoints on surrounding hills that will experience high visual intrusion on their existing views of both sites proposed for the desalination plant since an industrial development will result in noticeable change in these views. The desalination plant will seem discordant with the surroundings since there is nothing of a similar size or type in existing views.

Power Lines

The power lines will not seem out of place in this landscape since electrical infrastructure already forms a highly visible part of views of the surrounding land. The power line from the pump station is a distribution line and there are many of these in existing views. Visual intrusion is expected to be low for these visual receptors.

Terrestrial Pipeline

Construction activities along these routes are likely to be moderately intrusive on views since even though there are similarities with agricultural activities, and the quality of views vary throughout the year the influx of workers, large pipe burying equipment and vehicles are likely to be noticed. A moderate visual intrusion is expected.

Pipe Bridge

A pipe bridge across the Lovu River, although not an aesthetically pleasing structure, is a feature that a viewer may expect in an agricultural landscape. As such the visual intrusion will be moderate since although it will be clearly noticeable it will not stand out as discordant with its surroundings.

10.6.3.4 Residents of Illovu Village

The Illovu Village is adjacent to the two proposed sites for the desalination plant and visual receptors in the village will potentially be affected by the following aspects of the development:

- Desalination plants at either of the two sites;
- Power line from Kingsburgh Major Substation;
- 11 kV Power line from the pump station to the desalination plant; and
- Pipe bridge across the Lovu River.

Desalination Plant

Residences of eastern Illovu Village are located against hillslopes and some overlook the Lovu River floodplain. Some will have existing views of the proposed sites for the desalination plant. These views are likely to also include larger buildings and warehouses of the light industrial area of Illovu Village, as well as numerous transmission lines and pylons. Visual intrusion is therefore likely to be moderate to high for these visual receptors depending on whether the warehouses are in their existing views or not. The size of the desalination plant is such that it will be clearly noticeable, but it may fit in partially with the surroundings.

Power Lines

Visual intrusion will be low for the proposed power line from the desalination plant to the Kingsburgh Major Substation since transmission lines are already common elements of views. This is also the case for the power line from the substation since it is a much smaller line and is likely to fit into the surrounding landscape.

Pipe Bridge

A pipe bridge across the Lovu River, although not an aesthetically pleasing structure, is a feature that a viewer may expect in an agricultural landscape. As such the visual intrusion will be moderate since although it will be clearly noticeable it will not stand out as discordant with its surroundings.

10.6.3.5 Residents of rural settlements west of Illovu Village

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

- Desalination plant at either of the two sites;
- Power line from desalination plant to Kingsburgh Major Substation;
- Terrestrial pipeline construction and burying;
- Power line from pump station to desalination plant; and
- Pipe bridge across the Lovu River.

Desalination Plant

These visual receptors will experience moderate visual intrusion on their existing views if they are highly exposed to the desalination plant (either site). Their current views are complex and are likely to

include the Illovu Village in the foreground with many structures of the residential areas as well as the larger buildings of the light industrial area, as well as settlements and suburbs further east. The desalination plant will be clearly noticeable but will partially fit into the surroundings since it will appear as an extension of Illovu Village.

Power Lines

There are many power lines (high voltage transmission lines as well as distribution lines) in views from the rural settlements. Visual intrusion will be low for the power line from the desalination plant to Kingsburgh Major Substation since electrical infrastructure in the form of transmission lines and substations are common features of the landscape and are in most views of the surrounding landscape. The proposed 11 kV power line is unlikely to make a noticeable change to these views. A low visual intrusion is expected for these visual receptors.

Terrestrial Pipelines

Existing views from the rural settlements include other structures and activities associated with urban and agricultural landscapes (including power lines, N2 bridge and road, and activities associated with sugar cane farming). Construction activities along any of the pipeline routes will be moderately intrusive on their views since it will be clearly noticeable.

Pipe Bridge

The pipe bridge will moderately intrusive on views of sensitive visual receptors that are highly exposed to it since although it will be easily recognizable the bridge will not be unfamiliar in the landscape and is likely to be associated with the desalination plant as well as the village (and therefore will not be discordant with the landscape).

10.6.3.6 Residents of Winklespruit

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

- Desalination plant at the preferred or alternative site;
- Pipeline construction along the preferred, alternative and southern alternative route with tunnel;
- Pipe bridge across the Lovu River;
- Power lines from the desalination plant to the Kingsburgh Major Substation;
- Pump Station at the southern Winklespruit beach;
- 11 kV power line from the pump station to desalination plant;
- Construction Jetty near the pump station; and
- Power line from the pump station to the Winklespruit Major Substation.

Desalination Plant

Some residents on the eastern edge of Winklespruit have views of the Lovu River floodplain and could potentially have views of the desalination plant on either proposed site. Existing views may include sections of the N2 but are unlikely to include the R102 since high trees and dense vegetation adjacent to the road provide screening. Views are mainly of an agricultural landscape along the Lovu River. Riparian vegetation should remain green throughout the year while sugar cane crops will vary (in colour as well as exposed soil areas). The introduction of a large industrial development in the

floodplain will intrude highly on some of these views since there are no other structures of a similar size or type in existing views.

Terrestrial Pipeline

Pipeline construction will occur just south of Winklespruit and residents along the southern edge of town will potentially have views of the route. However, tall trees and dense vegetation in this area are likely to limit views considerably. Visual intrusion, where it is visible to residents, is likely to be high since large vehicles and construction equipment, an increase in activities in a relatively quiet area and large structures are likely to change existing views and seem discordant with the surroundings.

Pipe Bridge

The pipe bridge will be a small feature of the landscape from this distance and is unlikely to be noticed as separate from the desalination plant. It will therefore have a low visual intrusion on existing views.

Pump Station

Residents living in southern Winklespruit west of the railway are unlikely to see the pump station since high and dense vegetation between them and the site is likely to limit views considerably. Visual intrusion on their existing views is likely to be low if they can see the site since there are other large buildings in close proximity to the pump station site. The pump station will not obstruct any sea views. Views from other areas in Winklespruit will experience low visual intrusion since the pump station will be much smaller than buildings of the Broadwalk complex which will dominate views.

Power Lines

There are a number of transmission lines in existing views from Winklespruit and some may include the Kingsburgh Major Substation as well. The proposed power line from the desalination plant to this substation is likely to fit into the landscape and visual intrusion is expected to be low. The 11 kV power line from the substation will follow the Ocean View Road towards the R102 and N2. This road is lined on both sides with tall trees and dense vegetation which will limit views from Winklespruit. Power lines of this type are a common sight in the landscape and it will fit in with the surrounding landscape. A low visual intrusion is expected on existing views.

Jetty and Construction Activities on the Beach

The construction jetty is likely to intrude highly on views of all sensitive visual receptors in Winklespruit (Figure 10-52). It will result in a noticeable change in existing views and will be discordant with the surroundings.



Figure 10-50 Power lines along railway line in Winklespruit (LVP013).



Figure 10-51 Example of a construction jetty at the desalination plant at Wlotzkasbaken, Namibia.

10.6.3.7 Residents of Boardwalk residential complex

Visual receptors of the complex will potentially be affected by the following aspects of the proposed development:

- Construction jetty; and
- Power line from the pump station to the desalination plant.

Jetty and Construction Activities on the Beach

The construction jetty will be highly intrusive on views from the Boardwalk complex since it will obstruct some sea views and will be very discordant with elements in existing views.

11 kV Power Line

Vegetation adjacent to the Boardwalk complex is highly likely to prevent views of the power line. If the power line is visible it will have low intrusion on views since there are many similar structures in their views (e.g. railway line and associated electrical structures).

10.6.3.8 Residents of Illovo Beach

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

- Desalination plant at either of the two sites;
- Power line from the desalination plant to Kingsburgh Major Substation;
- Construction jetty at Winklespruit beach; and
- Power line from the pump station to desalination plant.

Desalination Plant

Only a few visual receptors living in tall holiday apartments in the coastal town are likely to be able to see the desalination plant. If their existing views include either of the two sites then they are also likely to see many other buildings and structures (e.g. N2, R102 and both road bridges). The Lovu River floodplain is relatively free of structures from the N2 bridge to the Illovo Village and only agricultural elements associated with sugar cane crops will affect their existing views. The desalination plant will be moderately intrusive on these views since it is a large structure and is likely to be noticed.

Power Lines

The power line from the desalination plant is unlikely to be noticed from this distance since there are already a number of transmission lines visible in the same views and the hills surrounding the desalination plant sites are covered in electrical infrastructure. The 11 kV power line from the pump station to the desalination plant will not appear out of place since distribution lines are a common feature of urban landscapes and the proposed line will not interfere with any sea views. Visual intrusion will be low for residents of Illovo Beach.

Pump Station

The pump station in Winklespruit, if at all visible to residents of Illovo Beach, will be one building among many larger and more dominating buildings and structures. The pump station will cause low visual intrusion on existing views of these visual receptors.

Jetty and Construction Activities on the Beach

Views of the beach at Winklespruit will include large buildings of the Boardwalk complex as well as the railway line and railway bridge across the river. However, the jetty will not fit into these existing views since it contrasts highly with the white beach. It is a relatively large structure and the cranes and construction activities associated with it will cause a considerable change in existing views from here. A high visual intrusion is expected since off shore construction activity and vessels will also be visible.

10.6.3.9 Residents of Kingsburgh suburbs

Residents of the western suburbs of Kingsburgh will potentially be affected by the following aspects of the proposed development:

- A desalination plant at the Alternative Site; and
- Power line from the desalination plant to the Kingsburgh Major Substation.

Desalination Plant

Existing views towards the Alternative Site for the desalination plant will include the Kingsburgh Substation and other large electrical infrastructure. It will also include many buildings of Illovo Village and rural settlements across the floodplain. Visual intrusion on these views is likely to be low to moderate if the desalination plant is visible. High vegetation adjacent to residences and between viewers and the proposed site is likely to limit views considerably.

Power Line

The power line from the desalination plant will end at the substation which is adjacent to the suburb. The power line will fit in with the other elements in view where it is visible and low intrusion on existing views is expected.

Table 10-4 Summary of visual impact criteria for key components and visual receptors

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
Construction of terrestrial pipelines	Residents of Mother of Peace Orphanage	Visual Sensitivity	High	Residents have an active interest in the surrounding landscape and are sensitive to changes brought about by developments. In this case the rural landscape is also part of the rehabilitation process.
		Visual Exposure	High	They live within 1 km of all proposed routes and the Alternative Pipeline with Tunnel route will pass within metres of the property.
		Visual Intrusion	Low to High	Low for the two routes north of the river but high for the initial section of the southern alternative route.
		Impact Intensity	High	High visual intrusion on highly sensitive visual receptors for the southern alternative route but medium-low for the two northern routes.
	Residents and viewpoints on surrounding farms	Visual Sensitivity	High	Residents have an active interest in their surrounding landscape.
		Visual Exposure	High	Close proximity to all route alternatives (within 1 km).
		Visual Intrusion	Moderate	Construction activity will fit in partially with activities in the landscape but will be clearly noticeable.
		Impact Intensity	Medium	Moderately intrusive construction activities.
	Residents of Illovu Village	Visual Sensitivity	High	Some residences have views overlooking the Lovu River floodplain.
		Visual Exposure	High	Residents are within 1 km of all routes.
		Visual Intrusion	Moderate	Existing views from the town include other structures and activities associated with urban and agricultural landscapes (including power lines, N2 bridge and activities associated with

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
				sugar cane farming).
		Impact Intensity	Medium	Moderately intrusive construction activities.
	Residents of rural settlements	Visual Sensitivity	Low	Views are complex with many contrasting elements and patterns.
		Visual Exposure	High	Some residents will be within 1 km of the power line.
		Visual Intrusion	Low	There are many power lines in existing views and the proposed 11 kV line will fit into the landscape.
		Impact Intensity	Low	Low visual intrusion on low sensitivity visual receptors.
	Residents of Winklespruit	Visual Sensitivity	High	Potential scenic views of the Lovu River Estuary.
		Visual Exposure	High	Residents live within 1 km of the two routes north of the Lovu River (Preferred and Alternative Routes).
		Visual Intrusion	High	Visual intrusion, where it is visible to residents, is likely to be high since large vehicles and construction equipment, an increase in activities in a relatively quiet area and large structures are likely to change existing views and seem discordant with the surroundings.
		Impact Intensity	High	Highly intrusive construction activities potentially in views of highly sensitive receptors.
	Residents of Illovo Beach	Visual Sensitivity	High	Residents have an interest in their surrounding landscape and will be highly sensitive to changes brought about by new developments.
		Visual Exposure	High	Northern edge of the town is within 1 km of the route..
		Visual Intrusion	Moderate	Some of these receptors will have a view of most of the pipeline routes and their views will be affected for most of the duration of pipeline

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning	
				construction.	
		Impact Intensity	Medium	Moderate visual intrusion on highly sensitive visual receptors.	
	Residents of the Boardwalk residential complex	Visual Sensitivity	High	Residents have an interest in their surrounding landscape and will be highly sensitive to changes brought about by new developments.	
		Visual Exposure	High	The complex is within a few hundred metres of the terrestrial pipeline routes.	
		Visual Intrusion	Moderate	Views towards the terrestrial pipeline routes also include the railway line and its structures as well as urban structures of the residential areas on the other side of the railway line. Construction activities along the pipeline route in this area will be clearly noticeable.	
		Impact Intensity	Medium	Moderate visual intrusion on highly sensitive visual receptors.	
	Motorists	Visual Sensitivity	Low	The N2 and R102 pass through highly urbanised landscapes.	
		Visual Exposure	High	The Preferred and Alternative routes north of the Lovu River will pass underneath the two roads.	
		Visual Intrusion	Moderate	There are many structures and activities in existing views of motorists in this section of the road. Construction activities will be clearly noticeable but will fit in partially with the surroundings.	
		Impact Intensity	Medium-Low	High visual exposure to moderately intrusive construction activities.	
	Desalination plant at Preferred Site	Residents of Mother of Peace Illovo Orphanage	Visual Sensitivity	High	Residents have an active interest in the surrounding landscape and are sensitive to changes brought about by developments. In this

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
				case the rural landscape is also part of the rehabilitation process.
		Visual Exposure	High	They live in close proximity to the site.
		Visual Intrusion	High	Existing views are rural-agricultural.
		Impact Intensity	High	They will be highly exposed to a large industrial type development.
	Residents and viewpoints on surrounding farms	Visual Sensitivity	High	Residents have an active interest in their surrounding landscape.
		Visual Exposure	High	Close proximity to the site (within 1 km).
		Visual Intrusion	High	An industrial type development will seem discordant in the landscape in such close proximity.
		Impact Intensity	High	Highly intrusive development in views of highly sensitive visual receptors.
	Residents of Illovu Village	Visual Sensitivity	High	Some residences have views overlooking the Lovu River floodplain.
		Visual Exposure	High	Some residences are within 1 km of the site.
		Visual Intrusion	High	Some residents will experience high visual intrusion since they have existing views of the Lovu River floodplain which an industrial type development will change significantly.
		Impact Intensity	High	Highly intrusive development in views of highly sensitive visual receptors.
	Residents of rural settlements	Visual Sensitivity	Low	Views are complex with many contrasting elements and patterns.
		Visual Exposure	High	Some residences are within 1 km of the site.
		Visual Intrusion	Moderate	Their views include most of Illovu Village including large buildings of light industrial area near river.
		Impact Intensity	Medium-Low	Some visual receptors are highly exposed to a moderately intrusive development.

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
	Residents of Winklespruit	Visual Sensitivity	High	Potential scenic views of the Lovu River floodplain.
		Visual Exposure	Moderate	More than 2 km from the site.
		Visual Intrusion	High	Some residents have views of the Lovu River floodplain towards the proposed sites. They will have no other structures of a similar size or type in existing views.
		Impact Intensity	High	High visual intrusion on views of highly sensitive visual receptors.
	Residents of Illovo Beach	Visual Sensitivity	High	Residents have an interest in their surrounding landscape and will be highly sensitive to changes brought about by new developments.
		Visual Exposure	Low	Residences are more than 2 km from either site.
		Visual Intrusion	Moderate	Even though the proposed development is relatively big it will comprise only a small part of views from here.
		Impact Intensity	Medium	Moderate intrusion on highly sensitive visual receptors.
	Motorists	Visual Sensitivity	Low	The N2 and R102 pass through highly urbanised landscapes.
		Visual Exposure	High	N2 approximately 12 s and R102 approximately 13 s if at all due to adjacent vegetation.
		Visual Intrusion	High	Existing views from the N2 are of an agricultural landscape and a large industrial development will seem incongruent (although other examples exist in the broader regional landscape e.g. sugar refineries).
		Impact Intensity	Medium	High visual intrusion and close proximity to the development.
Desalination plant at	Residents of Mother of	Visual Sensitivity	High	Residents have an active interest in the

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
Alternative Site	Peace Illovo Orphanage			surrounding landscape and are sensitive to changes brought about by developments. In this case the rural landscape is also part of the rehabilitation process.
		Visual Exposure	High	Within 500 m of the site.
		Visual Intrusion	High	Sense of place is rural-agricultural and a large industrial type development in such close proximity will be a significant change to existing views.
		Impact Intensity	High	They will be highly exposed to a large industrial type development.
	Residents and viewpoints on surrounding farms	Visual Sensitivity	High	Residents have an active interest in the surrounding landscape and are sensitive to changes brought about by developments.
		Visual Exposure	High	For those within 1 km of the site.
		Visual Intrusion	High	An industrial type development will seem discordant in the landscape in such close proximity.
		Impact Intensity	High	Highly intrusive development in views of highly sensitive visual receptors.
	Residents of Illovo Village	Visual Sensitivity	High	Some residences have views overlooking the Lovu River floodplain.
		Visual Exposure	High	For those within 1 km of the site (in the viewshed).
		Visual Intrusion	High	Some residents will experience high visual intrusion since they have existing views of the Lovu River floodplain which an industrial type development will change significantly.
		Impact Intensity	High	Highly intrusive development in views of highly sensitive visual receptors.

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
	Residents of rural settlements	Visual Sensitivity	Low	Views are complex with many contrasting elements and patterns.
		Visual Exposure	High	Some houses are within 1 km of the site.
		Visual Intrusion	Moderate	Their views include most of Illovu Village including large buildings of light industrial area near river.
		Impact Intensity	Medium-Low	Some visual receptors are highly exposed a moderately intrusive development.
	Residents of Illovo Beach	Visual Sensitivity	High	Residents have an interest in their surrounding landscape and will be highly sensitive to changes brought about by new developments.
		Visual Exposure	Low	Residences are more than 2 km from either site.
		Visual Intrusion	Moderate	Even though the proposed development is relatively big it will comprise only a small part of views from here.
		Impact Intensity	Medium	Moderate intrusion on highly sensitive visual receptors.
	Residents of Winklespruit	Visual Sensitivity	High	Potential scenic views of the Lovu River floodplain.
		Visual Exposure	Moderate	More than 2,5 km from the site.
		Visual Intrusion	High	Some residents have views of the Lovu River floodplain towards the proposed sites. They will have no other structures of a similar size or type in existing views.
		Impact Intensity	High	High visual intrusion on views of highly sensitive visual receptors.
Motorists	Visual Sensitivity	Low	The N2 and R102 pass through highly urbanised landscapes.	
	Visual Exposure	High	Approximately 18 s on the N2 and 13 s on the R102 (probably less due to adjacent vegetation).	
	Visual Intrusion	High	Existing views from the N2 are of an agricultural	

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
				landscape and a large industrial development will seem incongruent (although other examples exist in the broader regional landscape e.g. sugar refineries).
		Impact Intensity	Medium	High visual intrusion and close proximity to the development.
In-take Pump Station	Residents of the Boardwalk residential complex	Visual Sensitivity	High	Residents have an interest in their surrounding landscape and will be highly sensitive to changes brought about by new developments.
		Visual Exposure	High	The complex is within 200 m of the site.
		Visual Intrusion	Low	It is highly unlikely that residents will have a view of the pump station. If, in future, the vegetation is removed and they do see it then it is still likely to fit in with the surroundings since it looks similar to a residence.
		Impact Intensity	Medium-Low	Low visual intrusion.
	Residents of Winklespruit	Visual Sensitivity	High	Residents have an active interest in the surrounding landscape and are sensitive to changes brought about by developments. In this case the rural landscape is also part of the rehabilitation process. Sea views may be affected.
		Visual Exposure	High	Some houses are within 1 km of the site.
		Visual Intrusion	Low	If the proposed site is in existing views then it is likely that there are other larger buildings also in those views. The pump station will fit into the landscape since it resembles a large house.
		Impact Intensity	Medium-Low	Potentially low intrusive for a few highly sensitive visual receptors.
	Users of the beach at Winklespruit	Visual Sensitivity	Moderate	Recreational users with a focus on their activity and/or on the sea.

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
		Visual Exposure	High	The beach is within 200 m of the site.
		Visual Intrusion	Low	There are other structures in views from the beach such as the railway bridge and large residential complexes and since it resembles a large house it will fit in with the surroundings. It is possible that dense vegetation between the beach and the pump station will screen the development.
		Impact Intensity	Low	Low visual intrusion.
Construction Jetty	Residents of the Boardwalk residential complex	Visual Sensitivity	High	Residents have an interest in their surrounding landscape and will be highly sensitive to changes brought about by new developments.
		Visual Exposure	High	The complex is within 200 m from the site.
		Visual Intrusion	High	The jetty will make a significant change to existing views of the beach and sea.
		Impact Intensity	High	Highly intrusive structure in sea views.
	Residents of Illovo Beach settlement	Visual Sensitivity	High	Residents have an interest in their surrounding landscape and will be highly sensitive to changes brought about by new developments.
		Visual Exposure	High	Northern edge of the town is within 1 km of the site.
		Visual Intrusion	High	If the jetty is in views from here then the intrusion will be high since it will highly noticeable against the beach background.
		Impact Intensity	High	Highly intrusive structure.
	Users of beach near the jetty site	Visual Sensitivity	Moderate	Recreational users with a focus on their activity and/or on the sea.
		Visual Exposure	High	Close proximity to the site.
		Visual Intrusion	High	The construction jetty is not an aesthetically pleasing structure and will be a very prominent

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
				feature on the beach. It does not fit in with the landscape and will result in a significant change to existing views. Since it will cross the beach it is almost impossible for these viewers to avoid it.
		Impact Intensity	High	High visual intrusion on moderately sensitive viewers.
	Residents of Winklespruit	Visual Sensitivity	High	Residents have an interest in their surrounding landscape and will be highly sensitive to changes brought about by new developments.
		Visual Exposure	High	Within 1 km of the site.
		Visual Intrusion	High	The jetty will make a significant change to many existing views of the beach and sea.
		Impact Intensity	High	Highly intrusive structures.
	Residents of Warner Beach	Visual Sensitivity	High	Residents have an interest in their surrounding landscape and will be highly sensitive to changes brought about by new developments.
		Visual Exposure	Low	Residents are more than 2.5 km from the site
		Visual Intrusion	Low	It will make up a small part of their views from here and is unlikely to be noticed among the other structures in views from here.
		Impact Intensity	Medium-Low	Low visual intrusion on views.
Power line from Desalination Plant to Kingsburgh Major Substation	Residents of Mother of Peace Illovo Orphanage	Visual Sensitivity	High	Residents have an active interest in the surrounding landscape and are sensitive to changes brought about by developments. In this case the rural landscape is also part of the rehabilitation process.
		Visual Exposure	High	They are within 250 m of the route.
		Visual Intrusion	Low	Power lines and electrical infrastructure are common elements of existing views.
		Impact Intensity	Medium-Low	Low visual intrusion on views.

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
	Residents and viewpoints on farms along the route	Visual Sensitivity	High	Residents have an active interest in the surrounding landscape and are sensitive to changes brought about by developments.
		Visual Exposure	High	For those within 1 km of the route.
		Visual Intrusion	Low	Electrical infrastructure is a common element in existing views.
		Impact Intensity	Medium-Low	Low visual intrusion.
	Residents of Illovu Village	Visual Sensitivity	High	Residents have an active interest in the surrounding landscape and are sensitive to changes brought about by developments.
		Visual Exposure	High	The route passes within a few hundred metres of residences in eastern Illovu Village.
		Visual Intrusion	Low	Electrical infrastructure is a common element in existing views.
		Impact Intensity	Medium-Low	Low visual intrusion.
	Residents of Winklespruit	Visual Sensitivity	High	Residents have an active interest in the surrounding landscape and are sensitive to changes brought about by developments.
		Visual Exposure	Moderate	They are more than 1 km from the route.
		Visual Intrusion	Low	Transmission lines, pylons and substations are common elements of existing views in this direction.
		Impact Intensity	Medium-Low	Low visual intrusion.
	Residents of rural settlements	Visual Sensitivity	Low	Views are complex with many contrasting elements and patterns.
		Visual Exposure	High	For those within 1 km of the route.
		Visual Intrusion	Low	Electrical infrastructure is a common element in existing views.
		Impact Intensity	Low	Low visual intrusion on views of visual receptors with a low sensitivity to power lines in their views.

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
	Residents of Kingsburgh residential areas	Visual Sensitivity	Moderate	Urbanised views that contain many contrasting elements.
		Visual Exposure	High	Some residents of Astra Park and St Winifreds are within 1 km of the route.
		Visual Intrusion	Low	Existing views of the power line route includes the Kingsburgh substation as well as a number of high voltage transmission lines.
		Impact Intensity	Medium-Low	Low visual intrusion.
	Motorists using N2 and R102	Visual Sensitivity	Low	The N2 and R102 pass through highly urbanised landscapes.
		Visual Exposure	Low	The two roads are more than 1 km from the route.
		Visual Intrusion	Low	Electrical infrastructure is a common element of the surrounding landscape.
Impact Intensity	Low	All criteria are low.		
Power line from Pump Station to Desalination Plant	Residents of Boardwalk Complex	Visual Sensitivity	High	Residents have an interest in their surrounding landscape and will be highly sensitive to changes brought about by new developments.
		Visual Exposure	High	They are within a few hundred metres of the route.
		Visual Intrusion	Low	If the power line is visible from the complex it will be visible against an urban background and in landscape which contains many similar structures..
		Impact Intensity	Medium-Low	Low visual intrusion.
	Residents of Winklespruit	Visual Sensitivity	High	Residents have an active interest in the surrounding landscape and are sensitive to changes brought about by developments.
		Visual Exposure	High	For those within 1 km of the route.
		Visual Intrusion	Low	Other similar structures in existing views.
		Impact Intensity	Medium-Low	Low visual intrusion.

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
	Users of the beach at Winklespruit	Visual Sensitivity	Moderate	Recreational users with a focus on their activity and/or on the sea.
		Visual Exposure	High	For those within 1 km of the route.
		Visual Intrusion	Low	If the power line is visible from the beach (and is not screened by existing vegetation) then the visual intrusion will be low since the power lines of the railway line behind the route will also be visible.
		Impact Intensity	Low	Low visual intrusion on views of moderately sensitive viewers.
	Residents and viewpoints on farms along the route	Visual Sensitivity	High	Residents have an active interest in the surrounding landscape and are sensitive to changes brought about by developments.
		Visual Exposure	High	For those within 1 km of the route.
		Visual Intrusion	Low	Electrical infrastructure is a common element in existing views.
		Impact Intensity	Medium-Low	Low visual intrusion.
	Residents of Illovu Village	Visual Sensitivity	High	Residents have an active interest in the surrounding landscape and are sensitive to changes brought about by developments.
		Visual Exposure	High	The route passes within a few hundred metres of residences in eastern Illovu Village.
		Visual Intrusion	Low	Electrical infrastructure is a common element in existing views.
		Impact Intensity	Medium-Low	Low visual intrusion.
	Residents of rural settlements	Visual Sensitivity	Low	Views are complex with many contrasting elements and patterns.
		Visual Exposure	High	For those within 1 km of the route.
		Visual Intrusion	Low	Electrical infrastructure is a common element in existing views.

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
	Residents of Illovo Beach settlement	Impact Intensity	Low	Low visual intrusion.
		Visual Sensitivity	High	Residents have an interest in their surrounding landscape and will be highly sensitive to changes brought about by new developments.
		Visual Exposure	High	Northern edge of the town is within 1 km of the route.
		Visual Intrusion	Low	Distribution lines are a common feature of urban landscapes and the proposed line will not interfere with any sea views.
		Impact Intensity	Medium-Low	Low visual intrusion.
	Motorists on the N2 and R102	Visual Sensitivity	Low	The N2 and R102 pass through highly urbanised landscapes.
		Visual Exposure	High	45 s on the N2 and 70 s on the R102 (assuming no vegetation screening)
		Visual Intrusion	Low	There are many power lines and several substations in views from the two roads.
		Impact Intensity	Low	Low visual intrusion on low sensitivity visual receptors.
	All	Mixed rural, agricultural, urban landscape	Sensitivity	Moderate
Impact Intensity			Medium	The landscape character has moderate sensitivity to the development type.

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 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 harvesting of the sugar cane also exposes soil over large areas. Large construction vehicles and equipment will be introduced into the area and an increase in workers will also be visible. To some extent this will also be familiar to visual receptors in the region since it also occurs during harvesting of the sugar cane. In this case the changes will likely be more intensive. Construction on large buildings and structures will be less familiar particularly since the structures are not so familiar and some of them have an industrial feel to them. The activity associated with construction will attract attention to these structures.

The high slopes of the Alternative Site will require more landscaping than at the Preferred Site which could result in erosion scarring, landslides and large areas where the soil is exposed. These conditions

impact on visual receptors since they create areas of high contrast with surrounding vegetation and should be avoided through construction practices that minimize slope destabilization.

Residents of the orphanage 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. It will be lower for construction at the alternative site since there is some buffer between the viewers and the site. 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 for both sites since there are highly sensitive visual receptors in close proximity to both sites.

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 on the orphanage boundary with the desalination plant site. Ensure that these are adequate to screen construction activities from sensitive visual receptors living adjacent to the boundary.
- At onset of construction a buffer zone of 20 to 30 m should be in place between the orphanage and the construction site. Fast growing vegetation (bush and tall trees) native to the region (particularly the natural vegetation of the floodplain if that is appropriate) should be planted in this buffer zone in such a way as to minimize visibility of the desalination plant once the construction site screen is removed. A landscape architect should be consulted to ensure the best screening results.

Key mitigation measures for the Alternative Site:

- 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 10-53);
- 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;

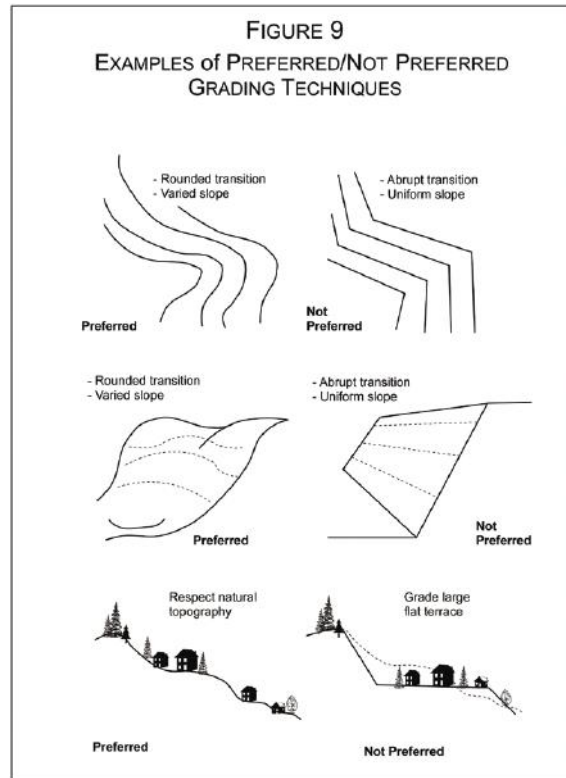


Figure 10-52 Preferred grading techniques
(<http://www.lvpc.org/pdf/SteepSlopes.pdf>)

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.

Additional mitigation measures include:

- The orphanage will lose its sports field if the desalination plant is built on the preferred site. It may draw attention away from the desalination plant if the sports field is moved to the opposite (south-eastern) side of the orphanage.

Without key mitigation measures the significance of this impact is **High Negative** for a desalination plant at the preferred site and **High Negative** for the alternative site. Key mitigation measures will lower the intensity of the impact for residents of the orphanage but the significance of the impact will

remain **High Negative** for the preferred site. The significance rating of this impact associated with the alternative site also remains **high negative** after mitigation. In both cases the intensity of the impact is lowered, particularly for those receptors immediately adjacent to the sites. However, the intensity remains high since construction cannot be screened for all highly sensitive visual receptors in the surrounding landscape.

10.7.1.3 Potential impact 2: Visual impact of construction activities associated with a buried pipeline 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 can take a long time). 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, re-spreading stockpiled topsoil and reseeding where appropriate or possible. Tunnelling will only be visible at key points along the pipeline such as the launching pit, intervention pits and receiving pits. The pipeline will be about 3 km long for the preferred and alternative routes, and 1 km for the route south of the river which includes a tunnel section.

The pipeline routes pass through sugar cane fields (generally following existing tracks in the fields) from the desalination plant sites to the N2. In this section the visual intrusion on views will be low to moderate since it will be similar to existing agricultural activities. Mitigation measures listed in section 10.7.1.1 will keep visual intrusion to a minimum.

Beyond the N2 visual intrusion is likely to be higher for pipeline routes (the tunnel will not cause visual intrusion along this section) since they are along the edge of a residential area. However, dense vegetation cover in this section should limit views considerably (Figure 10-48, Figure 10-55). Overall an impact intensity of medium is expected since viewers in Illovo Beach will potentially experience medium visual intrusion - some of them will have a view of most of the pipeline routes and their views will be affected for most of the duration of pipeline construction.



Figure 10-53 Dense and tall vegetation on either side of the road (towards R102) will limit views of pipeline construction along this section of the route (Google Earth).

The duration of the impact is short term and highly reversible. Its extent is regional due to the length of the pipeline and the fact that some viewers may have views on most of the route. The impact probability is highly probable since there are sensitive visual receptors with views on the route and they are likely to notice the construction activity.

The significance of the impact is **Medium Negative** for the preferred route and alternative route (Alternative 1) north of the Lovu River before mitigation and **Low Negative** after mitigation. The significance of the impact is **Low Negative** for the southern route with the tunnel (Alternative 2) since visual intrusion for viewers from Winklespruit and Illovo Beach will be low.

Mitigation measures listed in section 10.7.1.1 are particularly important for the sections east of the N2. The dense vegetation along the routes in this area should be used for maximum screening of construction activities, particularly for viewers from the south (Illovo Beach). Maintain vegetative cover on both sides of the route.

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

There are highly sensitive visual receptors that will be affected by construction activities along the power line route. However, power line construction is a familiar element in these landscapes and visual intrusion is likely to be low. The impact intensity will be medium, duration short term and spatial extent will be regional. The significance of impact will be **Medium Negative** before and after mitigation. Visual intrusion is already low for this impact and mitigation measures will not change that.

Mitigation measures for construction activities are listed in section 10.7.1.1.

10.7.1.5 Potential impact 4: Visual impact of construction activities associated with the in-take pump station in Winklespruit

Construction of the in-take pump station is unlikely to be any more visually intrusive than construction of a residential complex like the adjacent Boardwalk complex. The activities associated with its

construction are likely to be familiar to most sensitive visual receptors. There are a few highly sensitive visual receptors that will be affected by construction activity in this area and the intensity of the impact will be medium. Impact duration is temporary and the impact is highly reversible. Spatial extent is local. The probability of the impact occurring is highly probable since there it is a residential area and highly sensitive visual receptors are likely to be affected.

Mitigation, other than that listed for construction activities in section 10.7.1.1, is mainly an attempt to limit the number of affected sensitive visual receptors. If it is possible to use the existing vegetation, which is dense and high, as a screen to views of the construction phase then this should be incorporated into the design layout for the pump station site. Visual receptors that need to be taken into consideration are residents living west of the railway line who may have views down onto the site, residents of the Boardwalk complex and users of the beach. Ideally the road access (and presumably the terrestrial pipeline to the desalination plant) should be the only section of vegetation cleared on the road side. Vegetation on either side of the pump station should also be kept to ensure that residents of the Boardwalk complex do not have the site in their views. Vegetation screening should be between the road and security fencing.

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

- 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 adjacent 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 this impact is **medium** negative before mitigation and **low** negative thereafter, if mitigation is successful.

10.7.1.6 Potential impact 5: Visual impact of construction activities associated with marine pipelines and the construction jetty at the Winklespruit beach

This impact is likely to be most controversial since high visual intrusion will occur on a number of highly sensitive visual receptors. These include residents of the Boardwalk complex, residents of Winklespruit (west of the railway line as well as residents of large residential complexes just north of the site), and residents of Illovo Beach. Recreational users of the beach will also be highly affected. The impact intensity will be high for residents of the Boardwalk residential complex, residents of Winklespruit and Illovo Beach with sea views in this direction, its duration temporary (up to 18 months) and spatial extent local. The impact is reversible but has a probability of definitely occurring.

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 at an absolute minimum.

The significance of this impact is **High Negative** before and after mitigation.

10.7.1.7 Potential impact 6: Visual impact of construction activities associated with a power line from the pump station to the desalination plant

The construction activities associated with an 11 kV power line is a relatively common occurrence in an urban environment and visual intrusion will be low. The intensity of the impact will be medium at most. The duration of the impact is temporary (and will be much shorter since construction activities move along the route). Reversibility of the impact is high. The impact extent is local since it is a short line. The probability of it occurring is probable since there are a few visual receptors that have views on sections of the route.

Mitigation measures listed in section 10.7.1.1 will lower the intensity of the impact and reduce the number of visual receptors.

The significance of the impact is **Low Negative** before and after mitigation.

10.7.2 Operational Phase

10.7.2.1 Potential impact 7: Landscape impact of a desalination plant on an agricultural landscape that is surrounded by mixed residential and coastal resorts

As discussed in section 10.4.2.1 the landscape, although mostly agricultural in character also contains various other landscape types including rural settlements, formal settlements and coastal resorts. It has a moderate sensitivity to the proposed development which means the intensity of the landscape impact is medium. The impact is restricted to the Lovu River floodplain since this is a pocket of remaining sugar cane farmland and so the extent of the impact is local. The duration is long term and reversibility of the impact is high since the removal of industrial structures will return the landscape character to agricultural. The impact is highly probable before mitigation and probable thereafter since mitigation measures attempt to reduce the industrial aspect of the development.

The impact significance is **Medium Negative** before mitigation and **Low Negative** thereafter. It is negative because the landscape character is not complete and becomes mixed industrial/agricultural.

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.

10.7.2.2 Potential impact 8: Visual intrusion of a desalination plant on existing views of sensitive visual receptors in the region

There are a number of sensitive visual receptors in the surrounding landscape that will experience high visual intrusion on their existing views if a desalination plant is built on either of the two proposed sites. The Mother of Peace Illovo orphanage is located immediately adjacent to the Preferred Site and only a few hundred meters from the Alternative Site, and other highly sensitive visual receptors live not much further from these sites. The impact intensity is therefore high for a number of receptors. The extent of the impact can be taken as local since high visual exposure does not extend beyond 2 km. The impact duration is long term and reversibility is since most structures which cause high visual intrusion (large buildings, tall industrial structures, 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.

The significance of impact is **High Negative** before mitigation for both proposed sites and **Medium Negative** thereafter. The Preferred Site has more potential to mitigate while the Alternative Site has

more risks due to the need to develop on relatively steep slopes. However, successful mitigation will reduce the intensity of the impact for both 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, for both sites, is high. 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 predominantly sugar cane fields, residences (e.g. buildings of the orphanage) surrounded by trees and bush, as well as riparian vegetation associated with the Lovu River.

As a key mitigation measure to reduce the significance of the impact it will be necessary to use vegetation to screen some of the development and break up straight lines of large buildings (see Figure 10-56 and Figure 10-57 for example):

- 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 10-57);
- A buffer of indigenous vegetation around the outside of the plant which should include high trees (preferably a variety of tree types and heights) as well as riparian vegetation which is natural to the Lovu River floodplain;
- The elevated location and high slopes of the Alternative Site is more challenging but the vegetation buffer zone should extend at least along the eastern boundary of the site in order to reduce visual intrusion for visual receptors in Illovo Village, Winklespruit and Illovo Beach;
- Existing vegetation native to the area (such as some pockets on the Alternative Site) 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;
- 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; and
- Non-reflective paint should be used for metal surfaces;
- Muted, non-reflective colours should be used for the pipe bridge;
- 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, including the pipe bridge;
- The maintenance plan should include retaining walls and structures used in high sloping terrain of the Alternative Site in order to prevent erosion scarring and landslides.



Figure 10-54 Example of use of vegetation as visual buffering
(<http://www.luminova.net/projects/desalination-plant-concept-victoria>)



Figure 10-55 Another example of using a buffer of vegetation around a
desalination plant. All industrial type structures are screened from public views.

10.7.2.3 Potential impact 9: Visual intrusion of a power line from the desalination plant to the Kingsburgh Major Substation on the existing views of sensitive visual receptors in the region

Transmission lines are familiar features in the landscape and most hills or ridges are lined with them. There are also several large substations in the region, some of which are visible from the desalination plant sites. The route proposed for the power line from the desalination plant will cross the river near the pipe bridge (if that is built) and will follow the railway for a short distance and then up the hill next to the eastern part of Illovu Village. There are therefore several highly sensitive visual receptors that will potentially be affected but the visual intrusion on their views will be low. The impact intensity is medium for some visual receptors and the extent of the impact is local. The impact will last for the

lifetime of the project and its duration is therefore long term. Reversibility is high since removal of the power lines will remove the impact completely. The probability of the impact occurring is probable since there are only distribution lines currently in the floodplain but there are many crisscrossing the terrain.

Given the above, the significance of the impact is **Medium** Negative before mitigation.

Key mitigation measures include:

- Minimal clearing of vegetation for servitude;
- 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 against 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 potential intensity of the impact to medium-low which will lower the significance of the impact to **Low** Negative.

10.7.2.4 Potential impact 10: Visual intrusion of a pump station in Winklespruit on the existing views of sensitive visual receptors

The pump station is unlikely to cause a significant visual impact once it is built since it resembles a large house and will be located in what is currently dense, high vegetation. If the construction phase does not remove too much surrounding vegetation then very few visual receptors will be aware of the building. Those visual receptors that are affected will experience low visual intrusion since there are other much larger buildings in the surrounding landscape and even though the pump station is not a residential building it is not unlike a small residential substation. The intensity of the impact will be low. Its duration will be long term and spatial extent local. The probability of the impact occurring is low since the visual intrusion is low and only a few visual receptors are likely to be affected.

The significance of the impact is **Low** Negative before and after mitigation. It is negative because some aspects of the pump station are industrial in nature and even though these are minor highly sensitive visual receptors are likely to view them as negative. Mitigation measures will keep the visual intrusion low and ensure as few visual receptors as possible are affected.

Key mitigation measures:

- A maintenance plan for the building façade, roof, signage and fence should be in place;
- Rehabilitation of temporary cleared areas not required for the operational phase should be started as soon after construction as possible;
- Rehabilitation of cleared areas should use vegetation native to the area;

- In designing the pump station building keep in mind that visual intrusion should be kept to a minimum and as such that it should resemble a residence as much as possible – keep industrial aspects of the pump station hidden as much as possible;
- Use existing vegetation and rehabilitated vegetation as screening opportunities;
- If possible locate the pump station slightly away from the road so that vegetation can be used to screen it from views from the road;
- Signage should be kept as discrete as safety and security allows;
- Muted colours should be used for the building façade and dark green for the roof.

10.7.2.5 Potential impact 11: Visual intrusion of a power line from the pump station to the desalination plant on existing views of sensitive visual receptors

An 11 kV power line is unlikely to be noticed by visual receptors since they are common features of urban and agricultural landscapes. The line will cross the railway line adjacent to the proposed pump station site and then mostly follow the road to the R102 and N2. This road is lined on both sides with trees and dense vegetation. If the vegetation next to the road can be maintained then it is likely that residents of Winklespruit will not see the line. West of the N2 the line will follow existing tracks/roads in the sugar cane fields until it connects to the 132 kV line from the desalination plant. Visual intrusion on the views of sensitive visual receptors along the route is expected to be low. The intensity of the visual impact is likely to be at most medium-low. The duration of the impact is long term and spatial extent local. The probability of it occurring is probable since there are highly sensitive visual receptors with views on the route. The significance of this impact before and after mitigation is **Low Negative**.

Mitigation measures inherent to the project include:

- Minimal clearing of vegetation for servitude;
- Maintain where possible vegetation on both sides of the line;
- Rehabilitate temporary areas cleared during construction;
- Use towers similar in type to those of other distribution lines in the study area; and
- Leave the project area in a condition that protects soil and surface materials, both on and off site, against erosion and instability.

10.7.2.6 Potential impact 12: Impact of night lighting of a desalination plant on the nightscape of the surrounding region

The bowl of the Lovu River floodplain which is currently covered in sugar cane fields is dark with very few lights. The hills to the north and east are well lit and the sky glow of Amanzimtoti and Durban to the north is considerable. The substations north of the floodplain are sources of considerable light pollution in the area. Residences and street lights of Illovo Village are also a source of light in the surrounding landscape. The Mother of Peace Illovo orphanage is recognizable by a couple of security- or streetlights surrounded by darkness. The lights of a desalination plant in the Preferred Site will extend these lights towards the river and will reduce the dark nightscape of the floodplain. The effect will be smaller if the plant is built on the Alternative Site since there are already lights on this site and more against upper slopes of the eastern hill. However, the intensity of this impact will be medium since only a few visual receptors are likely to notice the change. The duration of the impact is long term (lifetime of the project) and the extent site specific since the only visual receptors that are likely to be affected are those in the adjacent orphanage. The impact is highly reversible – once the

lights are removed there will be no impact. It is highly probable that residents of the orphanage will be affected since they will be living in close proximity to the plant.

The significance of the impact is **Medium Negative** before mitigation for both sites (although the probability of the impact occurring for the Alternative Site will be probable) and **Low Negative** after mitigation.

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 orphanage, 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 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.

10.7.2.7 Potential impact 13: Impact of night lighting of a pump station on the nightscape of the surrounding region

The night lighting of the pump station is unlikely to contribute much to the nightscape of Winklespruit or its surroundings since the nightscape is that of an urban residential area. The intensity of the impact is low, its duration long term and reversibility high. The impact will be local and its probability of occurring will be probable since there are visual receptors with existing views in this direction.

The significance of this impact is **Low Negative** before and after mitigation. Mitigation measures will ensure that light spill onto adjacent properties and glare are minimized which will limit the extent of the impact to site specific.

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

- A lighting plan for the proposed pump station that demonstrate that project lighting is shielded from surrounding areas, particularly the Boardwalk complex south of the site and Winklespruit residences west of the railway line, 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 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.

10.7.3 Decommissioning Phase

10.7.3.1 *Potential impact 14: Potential visual impact of decommissioning activities associated with a desalination plant on sensitive visual receptors*

Assuming that the mitigation measures for Potential Impact 8 in section 9.7.2.2 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. Intensity will be medium if they were successfully implemented and high if not since it will affect residents of the adjacent orphanage. 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 on the orphanage boundary with 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 take advantage 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** if mitigation measures implemented for the construction phase was not successful and a vegetation buffer between the orphanage and the desalination plant was not established. It will be **Medium Negative** if they were implemented and successful.

10.7.3.2 *Potential impact 15: Visual impact of decommissioning activities associated with an overhead transmission line from the desalination plant to Kingsburgh Major Substation*

The visual intrusion of these activities will be similar to that of construction although perhaps lower since not as much equipment will be required. The impact intensity will be medium since the activity will be noticed by residents of Illovu Village where the power line passes in close proximity to residences. The impact will be regional in extent and its duration temporary. The probability of it occurring is highly probable since some of the activities will occur against the skyline for some viewers and is likely to attract some attention.

The significance of the impact is **Medium Negative** before mitigation and thereafter.

10.7.3.3 Potential impact 16: Visual impact of decommissioning activities associated with the in-take pump station in Winklespruit

Vegetation screening implemented during the construction phase will ensure low visual intrusion on views and will limit the impact to the immediate surroundings (site specific spatial extent). Decommissioning activities are similar to those of construction but the duration of the impact is shorter than for construction. If the vegetation screening is successful then the probability of the impact occurring is probable.

The significance of the impact is **Low Negative** before and after mitigation.

Mitigation measures are similar to those of the construction phase:

- 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 take advantage 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.

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

- 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 adjacent 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.

10.7.3.4 Potential impact 17: Visual impact of decommissioning activities associated with a power line from the pump station to the desalination plant

Decommissioning activities will be very similar to those during construction of the power line, except that decommissioning will require less time and equipment. The impact intensity will be medium since there are residents with potential views on the line. The impact will probably occur since activities against the sky are will attract attention. The impact duration is temporary and its spatial extent local.

The significance of the impact is **Low Negative** before and after mitigation.

10.7.4 Cumulative Impacts

10.7.4.1 Cumulative impact 1: Cumulative impact on the landscape

The Local Area Plan for the area in which the proposed desalination plant will be located was accepted by the eThekweni Municipality. An Automotive Suppliers Park is a large development proposed for the eThekweni Municipality and the LAP for Illovo South was prepared in large part to investigate the region as a potential site for the Park. It is not clear how far the ASP is from development but by accepting the LAP one can assume that eThekweni Municipality has chosen Illovo South as the area to host the Park.

The Automotive Suppliers Park will be an industrial area on the hills south-east of the sites proposed for the desalination plant. Other changes proposed by the LAP include mixed residential areas, light industrial areas as well as a landfill site to the south-west (Figure 10-59). The rural-agricultural sense of place is the current landscape resource and developing the region as suggested by the LAP will reduce that resource. Each development will reduce the rural-agricultural sense of place and increase the urban (as a catch-all for the various districts in the LAP) sense of place. The end result of the LAP is that the landscape character will be mixed urban. The Lovu River floodplain will be a green, open area within the urban setting. Even though the proposed desalination plant will be located in a mixed residential district it will not alter the mixed urban landscape character much if the final architectural and landscape architectural design layout of the plant take this into consideration.

The intensity of the cumulative impact will be medium since it is large industrial development in a mixed residential landscape. The impact will be local, long term and highly probable. The desalination plant can be removed and residences built in its place and the reversibility of the impact is therefore high.

The significance of the cumulative landscape impact is **medium** negative. Mitigation measures specific to the potential visual impact of the desalination plant discussed in section 10.7.2.2 will reduce the intensity of the cumulative impact as well if they can be successfully implemented. After mitigation the significance will be **low** negative.

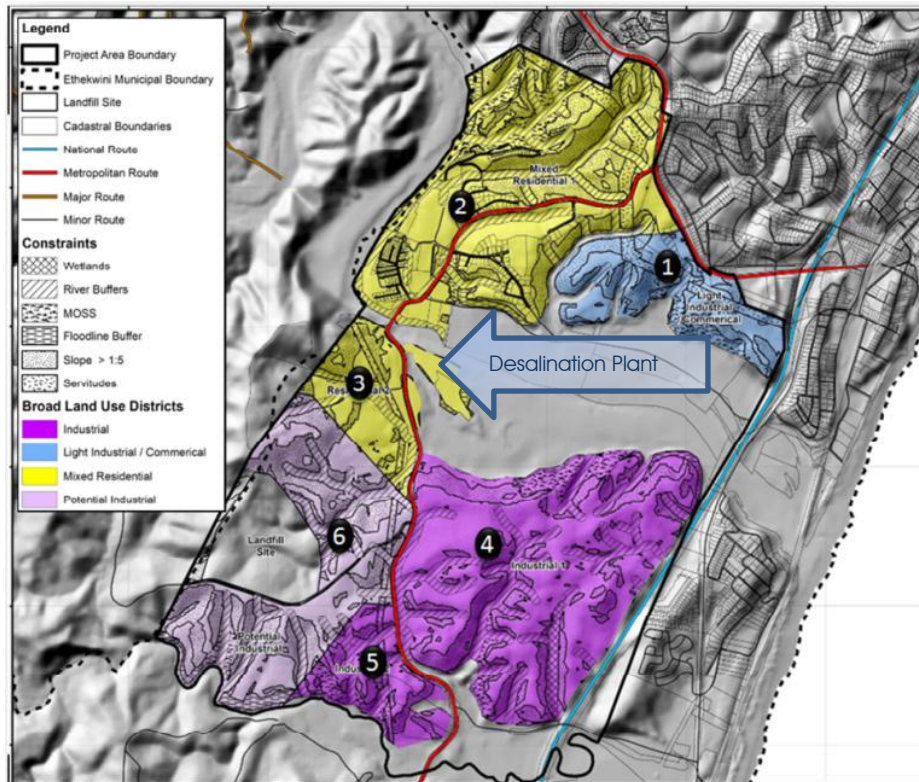


Figure 10-56 Local Area Plan for Illovo South with Preferred Desalination Plant Site indicated (Source: Black Balance Projects)

10.7.4.2 Cumulative impact 2: Cumulative visual impact

The visual resource in this case is the potential for views valued by sensitive visual receptors for their scenic or aesthetic qualities. Residents and viewpoints on surrounding farms, residents of Illovo Village, Winklespruit and Illovo Beach may have views of the Lovu River floodplain that they value for its scenic qualities. Developments in the floodplain will change (and potentially reduce) the quality of those views. If the Local Area Plan for Illovo South is developed then the contents of existing views of the floodplain will change considerably. Sugar cane fields will give way to urban developments of various types and less open space will be evident in views. The river floodplain itself will remain the same (and ideally will be improved) but the surrounding land will be urbanised. The desalination plant will form a small part of the eventual change in views. Large industrial structures will become more familiar elements in views and the cumulative effect of this will be that the visual intrusion of a desalination plant will be lower than what it would be for current views. The intensity of the cumulative impact on sensitive visual receptors is medium. The impact is long term in duration, local in spatial extent (since it is an urban landscape with large buildings common in views) and highly probable (residents in close proximity to the desalination plant). Reversibility is high since the desalination plant structures can be replaced by residential buildings.

Mitigation measures discussed in section 10.7.2.2 will also help lower the intensity of the cumulative impact if the architectural design of the desalination plant is planned with the future residential landscape in mind. The significance of the impact before mitigation is **medium** negative and low **negative** thereafter.

10.8 IMPACT ASSESSMENT SUMMARY

The assessment of impacts and recommendation of mitigation measures as discussed above are collated in Table 10-5 to Table 10-7 below.

Table 10-5 Impact assessment summary table for the Construction Phase

Construction Phase										
Impact Description ²	Status	Spatial Extent	Duration	Reversibility	Potential Intensity	Probability	Significance (Without Mitigation)	Key Management actions (i.e. actions that are not negotiable and have to be implemented to ensure that the significance of the associated impact is acceptable)	Significance (With Mitigation)	Confidence
Potential visual impact of construction activities associated with a desalination plant at the Preferred Site (Direct)	Negative	Local	Temporary	High	High	Definite	High	<ul style="list-style-type: none"> Construction site screens at orphanage north-eastern boundary. Buffer zone of 30 m between orphanage and construction site – to be planted with fast growing indigenous bush and tall trees (consult landscape architect to ensure best screening results). 	High	High
Potential visual impact of construction activities associated with a desalination plant at the Alternative Site (Direct)	Negative	Local	Temporary	High	High	Definite	High	<ul style="list-style-type: none"> 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

² Please specify in this column whether the impact is direct or indirect.

Potential visual impact of construction activities associated with a buried pipeline on sensitive visual receptors (Direct)	Negative	Regional	Temporary	High	Medium	Highly probable	Medium	<ul style="list-style-type: none"> The dense vegetation along the routes east of the N2 should be used for maximum screening of construction activities, particularly for viewers from the south (Illovo Beach). Maintain vegetative cover on both sides of the route. 	Low	High
Visual impact of construction activities associated with an overhead transmission line from the desalination plant to Kingsburgh Major Substation (Direct)	Negative	Regional	Temporary	High	Medium	Highly Probable	Medium	<ul style="list-style-type: none"> Mitigation measures common to all construction activities are listed in the report. 	Medium	High
Visual impact of construction activities associated with the in-take pumpstation in Winklespruit (Direct)	Negative	Local	Temporary	High	Medium	Highly Probable	Medium	<ul style="list-style-type: none"> If it is possible to use the existing vegetation, which is dense and high, as a screen to views of the construction phase then this should be incorporated into the design layout for the pump station site. Visual receptors that need to be taken into consideration are residents living west of the railway line who may have views down onto the site, residents of the Boardwalk complex and users of the beach. 	Low	High
Visual impact of construction activities associated with marine pipelines and the construction jetty at the Winklespruit beach (Direct)	Negative	Local	Temporary	High	High	Definite	High		High	Medium
Visual impact of construction activities associated with a power line from the pumpstation to the desalination plant (Direct)	Negative	Local	Temporary	High	Medium	High	Medium	<ul style="list-style-type: none"> Mitigation measures common to all construction activities are listed in the report. 	Low	High

Table 10-6 Impact assessment summary table for the Operational Phase

Operational Phase

Impact Description ³	Status	Spatial Extent	Duration	Reversibility	Potential Intensity	Probability	Significance (Without Mitigation)	Key Management actions (i.e. actions that are <u>not negotiable</u> and <u>have to be implemented</u> to ensure that the significance of the associated impact is acceptable)	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	Medium	Highly Probable	Medium	(see mitigation measures for visual intrusion of a desalination plant below)	Low	High
Visual intrusion of a desalination plant on existing views of sensitive visual receptors in the region for both proposed sites	Negative	Local	Long Term	High	High	Definite	High	<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) as well as riparian vegetation which is natural to the Lovu River floodplain; • The elevated location and high slopes of the Alternative Site is more challenging but the vegetation buffer zone should extend at least along the eastern boundary of the site in order to reduce visual intrusion for visual receptors in Illovu Village, Winklespruit and Illovo Beach; • Existing vegetation native to the area (such as some pockets on the Alternative Site) should be maintained and incorporated into the 	Medium	High

³ Please specify in this column whether the impact is direct or indirect.

								<ul style="list-style-type: none"> Desalination Plant design where possible; The design plan for the desalination plant should include vegetation (including trees) in between buildings and structures where possible; 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; and Non-reflective paint should be used for metal surfaces; Muted, non-reflective colours should be used for the pipe bridge; 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, including the pipe bridge; The maintenance plan should include retaining walls and structures used in high sloping terrain of the Alternative Site in order to prevent erosion scarring and landslides. 		
Visual intrusion of a power line from the desalination plant to the Kingsburgh Major Substation on the existing views of sensitive visual receptors in the region	Negative	Local	Long Term	High	Medium	Probable	Medium	<ul style="list-style-type: none"> Minimal clearing of vegetation for servitude; 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 against 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 	Low	High

								<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 pumpstation in Winklespruit on the existing views of sensitive visual receptors	Negative	Local	Long Term	High	Low	Low Probability	Low	<ul style="list-style-type: none"> • A maintenance plan for the building façade, roof, signage and fence should be in place; • Rehabilitation of temporary cleared areas not required for the operational phase should be started as soon after construction as possible; • Rehabilitation of cleared areas should use vegetation native to the area; • In designing the pump station building keep in mind that visual intrusion should be kept to a minimum and as such that it should resemble a residence as much as possible – keep industrial aspects of the pump station hidden as much as possible; • Use existing vegetation and rehabilitated vegetation as screening opportunities; • If possible locate the pump station slightly away from the road so that vegetation can be used to screen it from views from the road; • Signage should be kept as discrete as safety and security allows; • Muted colours should be used for the building façade and dark green for the roof. • 	Low	High
Visual intrusion of a power line from the pumpstation to the desalination plant on existing views of sensitive visual receptors	Negative	Local	Long Term	High	Medium-Low	Probable	Low	<ul style="list-style-type: none"> • Minimal clearing of vegetation for servitude; • Rehabilitate temporary areas cleared during construction; • Use towers similar in design to other distribution line towers in the landscape; • Leave the project area in a condition that protects soil and surface materials, both on and off site, against erosion and instability. • 	Low	High
Impact of night lighting of a desalination plant on the nightscape of the surrounding region	Negative	Site Specific	Long Term	High	Medium	Highly Probable	Medium	<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 orphanage, 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 	Low	High

								<p>is required) should be used to ensure that light spill does not occur onto the orphanage property;</p> <ul style="list-style-type: none"> • 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. • 		
Impact of night lighting of a pumpstation on the nightscape of the surrounding region	Negative	Local	Long Term	High	Low	Probable	Low	<ul style="list-style-type: none"> • A lighting plan for the proposed pump station that demonstrate that project lighting is shielded from surrounding areas, particularly the Boardwalk complex south of the site and Winklespruit residences west of the railway line, 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 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. • 	Low	High

Table 10-7 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 (i.e. actions that are not negotiable and have to be implemented to ensure that the significance of the associated impact is acceptable)	Significance (With Mitigation)	Confidence
Potential visual impact of decommissioning activities associated with a desalination plant at either site on sensitive visual receptors	Negative	Local	Temporary	High	High	Definite	High	<ul style="list-style-type: none"> Construction site screens should be put up on the orphanage boundary with 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 take advantage of existing clearings; Plans will be in place to 	Medium	High

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

								control and minimise erosion risks; <ul style="list-style-type: none"> 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. 		
Visual impact of decommissioning activities associated with an overhead transmission line from the desalination plant to Kingsburgh Major Substation	Negative	Regional	Temporary	High	Medium	Highly Probable	Medium		Medium	High
Visual impact of decommissioning activities associated with the in-take pump station in Winklespruit	Negative	Site Specific	Temporary	High	Medium-Low	Probable	Low	<ul style="list-style-type: none"> 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 take advantage 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. 	Low	High

Visual impact of decommissioning activities associated with a power line from the pumpstation to the desalination plant	Negative	Local	Temporary	High	Medium	Probable	Low		Low	High

Table 10-8 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 of a desalination plant on a mixed residential landscape as proposed by the LAP for the area.	Mitigation measures listed for the visual impact of the desalination plant.	Negative	Local	Long Term	High	Medium	Highly Probable	Medium	Low	
Cumulative Impact 2										
Cumulative visual impact of a desalination plant on the views of sensitive visual receptors if the area is developed as planned in the LAP.	Mitigation measures listed for the visual impact of the desalination plant.	Negative	Local	Long Term	High	Medium	Highly Probable	Medium	Low	

10.9 CONCLUSION AND RECOMMENDATION

A desalination plant is a large development with many components that are normally associated with industrial landscapes. The two sites proposed for the Lovu River area are in a predominantly agricultural landscape which is surrounded by mixed residential, rural informal and coastal resort areas. There are highly sensitive visual receptors in close proximity to the sites and views with potential scenic or aesthetic qualities may be altered by the development. Highly sensitive visual receptors include residents of the Mother of Peace Illovo orphanage adjacent to the Preferred Site, residents of Illovo Village, residents of Winklespruit and residents of Illovo Beach.

Construction activities on the Preferred Site will occur within 100 m of the Mother of Peace Illovo orphanage and the visual intrusion on the views of residents will be high and the intensity of the impact on them will be high. Mitigation measures will lower the intensity of the impact if successfully implemented. Mitigation measures include placing construction screening along the orphanage northern boundary and creating a vegetation buffer between the orphanage and the construction site/desalination plant. The vegetation buffer is also part of the mitigation for the visual impact caused by the desalination plant on sensitive visual receptors in the surrounding landscape. Construction activities at the Alternative Site will be less intrusive on views due to its distance from highly sensitive visual receptors (although it will still be high and the intensity of the impact at this site will also be high).

Construction activities and the construction jetty on the Winklespruit beach will intrude **highly** on sea views from the Boardwalk residential complex adjacent to the site. There are no cosmetic mitigation measures that will lower this impact. If tunnelling is used to install the marine pipelines the jetty will be avoided but offshore activity and vessels will be increased. It should be kept in mind that the visual impact caused by the jetty is temporary and will be completely removed after construction of the marine structures.

A desalination plant at any of the two sites 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. The Preferred Site has more potential for mitigation while the Alternative Site has more risks in terms of visual impact due to the need to develop on relatively steep slopes.

Mitigation involves a vegetation buffer around the plant (as well as between buildings) with high trees endemic to the region. A landscape architect need 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, particularly from residents of the orphanage next door, residents of Illovo Village, residents and viewpoints on surrounding farms, residents of Illovo Beach and Winklespruit. Successful mitigation will reduce the significance of the impact to **medium** negative.

The cumulative impact of the desalination plant on the future landscape as planned for in the LAP for Illovo South will be high negative before mitigation and medium negative if mitigation is successful. The cumulative visual impact on sensitive visual receptors, assuming the area to be developed as planned for in the LAP, will be medium negative before mitigation and **low** if mitigation measures are successfully implemented. Mitigation measures listed for the visual impact of the desalination plant apply for cumulative impacts.

In terms of visual impacts the Preferred Site for the desalination plant should be developed if the visual impacts can be mitigated for. The pipeline routes are similar in terms of visual impact but the southern route with tunnel is preferred since it will intrude less on views from Illovo Beach.

The significance of the visual impact of the desalination project overall will be high before mitigation and medium thereafter. If mitigation measures for construction activities at the desalination plant can be successfully implemented then the visual impact should not prevent the project from being developed.

10.10 REFERENCES

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