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

DRAFT EIA REPORT

CHAPTER 14: CONCLUSIONS AND RECOMMENDATIONS

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CHAPTER 14: CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the key findings and recommendations from the EIA process based on the specialist studies, together with the EAP's reasoned opinion on the environmental suitability of the project and whether or not the project should receive environmental authorisation.

The conclusions on the most significant impacts identified, together with the management actions required to avoid or mitigate the negative impacts (or to enhance the positive benefits) are presented in the following sections. Other possible impacts arising from the proposed project, including waste, stormwater management and heritage that were identified during the Scoping Phase but that did not justify the need for a specialist study, have been addressed through suitable management measures also included in the Draft EMPr (Section B).

14.1 KEY FINDINGS ASSOCIATED WITH THE PROPOSED DESALINATION PLANT

For the potential significant impacts of this project, specialist studies were conducted and included in Chapters 6 to 12 of the EIA Report:

Specialist	Organisation	Specialist study	EIA Report
Dr Andrea Pulfrich	Pisces Environmental Services	Marine Ecology Assessment	Chapter 6
Dr Liz Day	The Freshwater Consulting Group	Freshwater Ecology Assessment	Chapter 7
Simon Bundy	Sustainable Project Developments cc	Terrestrial Ecology Assessment	Chapter 8
Dr Brett Williams	Safetech	Noise Impact Assessment	Chapter 9
Henry Holland	MapThis Trust	Visual Impact Assessment	Chapter 10
Duncan Kael	Acer Africa	Social Assessment	Chapter 11
Dr Hugo van Zyl	Independent Economic Researchers	Economic Assessment	Chapter 12
Len van Schalkwyk	eThembeni Cultural Heritage	Heritage Assessment	Chapter 13

14.1.1 Marine ecology

Based on the marine ecology specialist study, the marine environment will be impacted to some degree during both the construction and operational phases of the proposed SWRO Desalination Plant at Tongaat. The following main negative impacts during the construction phase have been identified:

- Disturbance and destruction of subtidal sandy biota during laying of the intake and discharge pipelines, excavation and rock blasting for riser pits.
- Effects of blasting on macrophytes, invertebrates and fish communities.
- Accidental spillage or leakage of fuel, chemicals, or lubricants that may cause water or sediment contamination and/or disturbance to beach and subtidal biota.
- Effects of blasting on marine communities, particularly turtles and marine mammals

The residual significance of these impacts (i.e. with the effective implementation of recommended management measures) is predicted to be **low** to **medium**.

During the operational phase, the main negative impacts are associated with the potential presence of antiscalants (non-toxic at the concentrations used but may bind nutrients and ions needed for plant growth) and heavy metals (originating from corrosion processes) in the brine discharged at sea as well as the permanent loss of habitat under submerged intake and discharge pipelines. The later impact, however, will be compensated by the fact that the submerged structures would offer a new settling substrate for hard bottom species and would therefore act as artificial reefs (**positive impact**). Recommended management actions will reduce the negative impacts of high and medium significance to **low** significance.

14.1.2 Freshwater ecology

This study identified one **fatal flaw** associated with the construction of the proposed powerline across the Mount Moreland wetland. The wetland supports three species of red data frogs, and is considered a (globally) Important Bird and Biodiversity Area, as a result of its use as a seasonal roost site by millions of Barn Swallows. The proposed powerline has therefor been re-routed to avoid the Lake Victoria wetland.

Although the report identified several minor and relatively easily mitigated impacts that could be associated with the proposed project, the following main negative impacts during the construction phase have been identified:

- Destruction of two large wetland areas at the proposed desalination plant site and impact on associated ecosystem services. Although these have been degraded to a highly significant degree, they remain both functional (in some respects) and rehabilitable. Despite the recommended off-site rehabilitation and ongoing management of a swathe of wetlands between the site and the coast, construction of the proposed plant would nevertheless result in a substantial net loss of wetlands (cumulative impact) which would be considered a medium to high significant (negative) impact.
- Short-term dewatering to at least 11m below sea level associated with the construction of the proposed sea water pump station, potentially altering downstream hydrology, drawing down the water table of adjacent wetlands and contributing sediments and other pollutants into downstream flows.

- Water quality pollution, sedimentation and the passage of aquatic alien vegetation into wetlands downstream of the site as a result of drainage / runoff from the site.
- Erosion of downstream wetlands draining onto the beach, and possible increased beach saturation levels.
- Possible disturbance to drainage lines as a result of plant clearing during the construction of the proposed powerline.
- Disturbance of channelled valley bottom wetlands and drainage lines (including Watercourse B1 and Drainage Line A2) associated with the construction of the potable water pipeline and powerline.
- Disturbance to the Mdloti Estuary and River as a result of alien clearing, with establishment of weedy alien vegetation expected in its place, and increased flooding/ erosion risks from felled material.
- Disturbance to the Mdloti Estuary, as a result of construction-associated pollution, during horizontal drilling of the pipeline

  Despite the importance of the Mdloti River and its estuary, the impacts to these systems that are likely to be associated with the proposed project in all of its phases are considered readily mitigatable, largely through implementation of standard best practice impact mitigation, avoidance and (in some cases) minor rehabilitation measures.

The residual significance of these impacts during the construction phase (i.e. with the effective implementation of recommended management measures) is predicted to be **low** to **medium**, with the exception of impacts associated with the destruction of wetlands at the proposed desalination plant which will remain of **medium** to **high** significance rating. For this reason, additional off-site offset measures are strongly recommended to address the identified cumulative impacts. Off-site offset mitigation would ideally include off-site rehabilitation of degraded wetlands to a condition of PES Category C or better. Inclusion of off-site mitigation measures as outlined above would reduce the significance of Cumulative Impacts substantially from High (negative) to **Medium** to **low**, with possibilities for positive impacts in the proposed rehabilitation of existing degraded valley bottom wetlands.

During the operational phase, the main negative impacts are associated with ongoing drainage / dewatering of wetlands into downstream areas as well as increased runoff of surface water from hardened surfaces, resulting in potential channelization as a result of increased velocities and possible further degrading of downstream wetlands and increased wettedness of the beach. The residual significance of impacts associate with the operation of the proposed development (i.e. with the effective implementation of recommended management measures) is predicted to be **low**.

14.1.3 Terrestrial ecology

The most sensitive ecological component identified in the study area relates to the beach – dune continuum, where vegetation diversity is the highest encountered within the development footprint and this eco system is most at risk of transformation. However, the seashore and dune form at Tongaat has been shown to be robust and able to rebound from significant erosion events on the coastline. Over 30 years, the dune form has shown little retreat and has shown improved stability. Such stability has been attributed to the recharge of freshwater from surface and groundwater reserves that lie inland of the dune. In this regard it is predicted that any alteration of the freshwater flow regime near the dune system, will destabilize the frontal dune.

The construction of the proposed tunnelling of the seawater intake and brine discharge pipelines under the frontal dune is not anticipated to significantly impact on the coastal environment. The most significant negative environmental impact relates to the alteration of surface and sub-surface hydrology due to the construction of the stormwater and drainage systems in and around the SWRO plant. This high significance impact is likely to affect the state of the frontal dune unless appropriately managed.

In addition, it is critical that surface and subsurface hydrological function be retained, at least in part, to ensure the delivery of freshwater to the frontal dune environment, situated immediately east of the proposed plant.

The terrestrial ecological assessment study showed that the construction of the proposed desalination plant is anticipated to have low or limited significance impacts on the mesic terrestrial environment. Disturbance of secondary forest habitat and associated potential alteration of slopes is expected with the establishment of the SWRO plant (to the south west of the proposed site) and with the establishment of the potable water pipeline to the north west of the SWRO plant.

During the operational phase, the main key impacts is associated with the presence of powerlines serving the facility as these would pose a potential hazard to, in particular, avian species in and around the uMdloti River valley. Habitat associated with bird corridors (valleys, wetlands and riverine environments) that are traversed by powerlines should have mitigation measures to reduce bird strikes and electrocution established on the conductors.

All impacts can be mitigated through judicious design and planning, as well as management interventions during and post the construction and operational phases of the project. Following the effective implementation of the recommended key mitigation actions, all impacts on terrestrial ecology, associated with the proposed project are predicted to be of **low** significance. The redress of exotic invasion and general vegetative and ecological management interventions will be an important component of the post construction and operational management regime.

14.1.4 Noise Impacts

Results of the Noise impact study showed that, during the construction phase, there may be some short term increase in noise in the immediate areas surrounding the proposed desalination plant site and the pipeline and powerline routes as the ambient noise levels may be exceeded in some areas, in particular if construction activities are undertaken at night. It must be noted that noise associated with blasting and drilling during the construction phase will be difficult to mitigate.

Residents are not anticipated to be significantly impacted by noise generated at the desalination plant during the operational phase. Long term noise impact from the plant during the operation phase will be concentrated in the immediate area around the facility and is not anticipated to affect identified sensitive receptors.

Residual noise impacts associated with the proposed plant are predicted to be of **low** and **very low** significance during the construction and operational phases respectively, provided the recommendations for mitigating noise impacts are applied effectively. These include construction and operational management techniques to minimise impact as well as physical design considerations.

14.1.5 Visual Impacts

The site proposed for the desalination plant is located in a landscape with a mixed rural, residential and beachfront character. The desalination plant will introduce a more industrial development type into this landscape. A number of highly sensitive visual receptors have been identified in close proximity to the sites, including residents of Desainagar, Shaka Estate, La Mercy and motorists on the M4 adjacent to the plant site. Views with potential scenic or aesthetic qualities will therefore potentially be altered by the development.

The key issues identified in the visual impact assessment study (high significance without mitigation measures) relate to visual impacts associated with the construction of the proposed desalination plant, on sensitive visual receptors as well as impacts of the proposed plant on the landscape and visual intrusion of the latter and of the powerline on existing views of sensitive receptors, in particular King Shaka Estate and other nearby houses in Desainagar. The proposed power line route from the desalination plant to La Mercy Substation passes in close proximity to La Mercy and Mount Moreland. In both cases the visual intrusion is anticipated to be high. At La Mercy (and most of the coastal corridor) there are no high voltage power lines in views and these will be the first to be introduced into the landscape. At Mount Moreland there is at least one key viewpoint (used for bird watching) that will be highly intruded upon. In both cases, this visual intrusion was reduced by slightly altering the proposed powerline route.

Visual impacts associated with the construction of the proposed potable water pipeline, marine pipelines and powerline are predicted to be of medium significance prior to the implementation of mitigation measures.

During the operation, night lighting at the proposed desalination plant is also anticipated to impact on the nightscape of the surrounding region and is predicted to be of medium significance without mitigation actions.

With the implementation of recommended management actions, primarily aiming at reducing the industrial aspect of the development, the overall residual visual impact is predicted to be of a **low** to **medium** significance, with the exception of the short term visual impact associated with the construction of the desalination plant which remains of **high** significance.

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

14.1.6 Impacts on Heritage resources

The proposed Tongaat plant site is of low sensitivity from all aspects of archaeological heritage. The access servitudes for the intake/outlet pipelines under the coastal foreshore dunes and the immediate environs were “red-flagged” for the very probable presence of Iron Age shell middens, although site inspections revealed no immediate evidence of such middens.

The majority of the bulk water supply pipelines into the eThekweni water supply system are along existing servitudes with the exception of the proposed La Mercy-Waterloo Reservoir pipeline which is a "greenfield" alignment to its junction with the existing Waterloo-Mhlothi Reservoirs' servitude. The proposed 132kV powerline is aligned between La Mercy and Mt. Moreland. No heritage resources were observed within the proposed development areas.

The SAHRIS Palaeosensitivity Map indicates that the area has high sensitivity. However, the proposed intake/outlet pipelines are to be tunnelled 10–15m below sea-level from the desalination plant to beyond the surf zone in the ocean. For the rest of their length thereafter the pipelines will be aligned on the sea-bed. Consequently, impacts on the sensitive foreshore are minimised.

Should middens or subterranean archaeological material be exposed during these activities, a Phase Two assessment will have to determine their significance and appropriate mitigation. As per SAHRA request (Letter dated 8 December 2015), a desk-based maritime archaeological assessment of MUCH resources in the area is being undertaken and as agreed by SAHRA, the proposed magnetometer survey will take place post-consent, provided it is included as a condition of any approval granted for the proposed development.

14.1.7 Socio-Economic Impacts

The social and economic assessments found that the project would be associated with a number of **positive** socio-economic impacts. The proposed project should prove to be largely compatible with relevant water supply planning which contains clear justifications for moving to the detailed feasibility assessment and associated EIA phase for desalination whilst recognizing risks associated with high costs. Broad spatial planning guidance for the site also indicates that it has been earmarked for residential development in the future although it is currently used for agricultural purposes. This calls for clear justifications for proposals for the site that do not entail residential development. Arguably the supply of water for residential and other purposes would qualify as a reasonable justification in this regard and seems to reflect current thinking of the eThekwini Municipality's Framework Planning Branch in this regard.

The proposed desalination plant is also predicted to have a **positive** impact of **medium** significance on economic activity given the size of the new spending injections associated with it.

In order for the desalination plant to be constructed on the proposed site, privately owned land which is currently economically productive will be lost. The emotional and economic impact due to permanent loss of land and housing has been identified as a potentially significant impact. Although economic impacts associated with that loss can be mitigated to low significant impacts through appropriate compensation measures, the perceptual or emotional impact is difficult to quantify and mitigate against. Considering the sentimental value of the land identified during consultation with the land owners (i.e. this land is reported to have been in the Govender family for an extended period of time (in excess of 100 years)), the significance of such impact is considered **high**.

The loss of income for market garden employees is potentially a significant impact if suitable mitigation measures are not implemented. The social impact assessment study confirmed that the employees on the market gardens can be classified as 'vulnerable' and that a loss of income may have significant social implications. However, with suitable mitigation and management measures such as prioritising employment for garden employees at the plant or moving the

market gardens to alternative land, the significance of this impact is anticipated to be reduced to an acceptable level (**medium** significance). During the construction phase, impacts associated with the influx of workers are anticipated to be potentially significant. However, with the implementation of the recommended management actions, these residual impacts would be of **low** to **medium**.

A key concern identified during this process relates to how the sense of place of the area will be altered following the construction of the proposed desalination plant which would be associated with visual and noise impacts (refer to sections 14.1.4 and 14.1.5 above). The impact on sense of place is amplified by the strong connection many local residents report having with the area. However, it does need to be considered that the area which will be affected is relatively isolated in that the impacts on sense of place will be localised and not stretch along the coast line. This would also entail risks to the saleability of surrounding property as would be the case with virtually all major construction projects, leading to a residual impact (short term and long term) on property values of **medium** significance. Note that these impacts are not likely to be evenly spread and higher intensity impacts would be associated with the loss of views in particular. However, it needs to be borne in mind that the project would augment water supplies which are critical if property values are to be maintained. In this sense, the project or any other water supply project would provide important support for property values.

During the construction and operation phases, impacts on tourism and recreation are anticipated to be potentially significant when considering visual impacts along with relatively lower risks from noise and marine impacts. Although there would be some opportunity to mitigate visual impacts, the establishment of a plant of a nature and size proposed within the surrounding context would not be supportive of current tourism use or of the future development of tourism in the local area. However, with the effective implementation of the recommended management actions, these residual impacts would be of **medium** significance.

Impacts on fishing during construction and operation are likely to be of **low** significance with mitigation based on the findings of the marine specialist study.

The project would require relatively significant conversion of land to make way for the necessary infrastructure including the plant, pump station, pipelines and transmission lines. The **opportunity costs** with respect to current land use would therefore be relatively high in production terms given the high intensity production taking place. Land conversion would also have significant opportunity costs in terms of lost livelihood opportunities unless production can be established elsewhere.

In light of future planning guidance for the area it is also instructive to consider the opportunity costs associated with alternative potential future uses of the site. The site is generally well suited to future residential development given its position in an area earmarked for further growth, sea views on offer and easy access to the beach. Opportunity costs in this regard are thus likely to be high given the residential development that would have to be foregone.

Given the costs of the desalination plant it is likely that **water tariffs** in the area will have to continue increasing at rates above the base tariff and probably above the general rate of inflation. Bear in mind that any tariff increases related to desalination would take place within a context where it is likely that tariffs will need to increase regardless of which water supply option is implemented next. This is a common situation throughout the country and relates to new water supply options generally being more expensive relative to existing schemes which were often constructed first precisely because of their lower cost.

The proposed project does not present social nor economic related fatal flaws; however, there are social sensitivities which need to be addressed as the project progresses. These sensitivities need to be measured against the significant positive benefit that the proposed project would bring to alleviating serious water shortages in the study area and surrounding regions, and against the far more substantial negative social implications that will arise by not addressing water shortages.

14.1.8 Summary of the comparative assessment of the positive and negative implications of the proposed activity

Sections 14.1.1 to 14.1.7 provide a summary of the findings of the specialist studies (or inputs) that were sourced as part of this EIA process. Table 14.1 summarises the overall residual significance of these impacts following the implementation of the recommended mitigation and management measures. Section 14.2 presents the **key management actions** associated with identified significant impacts, i.e. impacts rating medium or higher prior to the implementation of the proposed mitigations.

From this table it can be seen that provided the stipulated management actions are implemented effectively, two (2) **negative** impacts of **high residual** significance are still predicted to occur as a result of this project, namely short term visual impacts associated with construction activities, and the emotional impact due to permanent loss of land and housing. The remaining impacts are all predicted to be of **very low** to **medium** significance rating providing that the recommended management actions are effectively implemented. It must be noted that the destruction of wetlands associated with construction activities has been assessed to be of **medium** to **high** significance after mitigation. In addition to the on-site rehabilitation of wetlands, as required to minimise direct impacts associated with loss of wetland ecosystem services on the site, it is strongly recommended to undertake off-site mitigation to attempt to offset the net loss of wetlands associated with the proposed desalination plant and to address Cumulative Impacts. This would include off-site rehabilitation, with possibilities for **positive** impacts in the proposed rehabilitation of existing degraded valley bottom wetlands to a condition of PES Category C or better.

The **positive** impacts generated by the project are associated with the economic benefits from employment opportunities, knowledge gained from conservation of potential fossil finds and the fact that the proposed facility is largely compatible with relevant water supply planning. Of **high** significance is the **positive** benefit that the proposed project would bring to alleviating serious water shortages in the study area and surrounding regions, in particular given increased variability in rainfall as a result of climate change.

Although decommissioning must be considered as a possibility, the probability of the plant being decommissioned is near zero. The intention would be to manage the plant indefinitely and to upgrade components of the plant as and when required. Once commissioned the plant would form an integral part of the supply system for the North Coast and as such will be needed for future supply to the area. Seawater desalination technologies will improve with time and it is possible that components of the scheme may be replaced (mostly internal process components) as these technologies improve. However, it is extremely unlikely that the plant will be decommissioned in totality.

Table 14.1: Comparative assessment of overall impacts following mitigation measures

	DESALINATION SITE	POTABLE WATER PIPELINE	POWERLINE
Construction Phase			
Marine Ecology Assessment	Low-Medium Negative	-	-
Freshwater Ecology Assessment	Low- Medium to High Negative	Low Negative	Low Negative
Terrestrial Ecology Assessment	Low Negative	Low Negative	Low Negative
Noise Impact Assessment	Very Low - Low Negative	Very Low - Low Negative	Very Low - Low Negative
Visual Impact Assessment	Medium-High Negative	Low Negative	Low Negative
Social Assessment	Medium-High Negative (Medium Positive)	Low-Medium Negative	Low-Medium Negative
Economic Assessment	Low-Medium Negative (Medium Positive)	-	-
Heritage Assessment	Low Negative	Low Negative	Low Negative
Operation Phase			
Marine Ecology Assessment	Very Low - Low Negative	-	-
Freshwater Ecology Assessment	Low-Medium Negative	Low Negative	-
Terrestrial Ecology Assessment	Low Negative	Low Negative	Low Negative
Noise Impact Assessment	Very Low Negative	-	-
Visual Impact Assessment	Medium Negative	Low Negative	Low Negative
Social Assessment	Low-Medium Negative (Medium – High Positive)	Low Negative	Low Negative
Economic Assessment	Low-Medium Negative (Medium Positive)	-	-
Heritage Assessment	-	-	-

14.2 RECOMMENDED KEY MANAGEMENT AND MONITORING REQUIREMENTS

Management actions proposed by the proponent	Key recommended management actions	Monitoring actions
MARINE ECOLOGY		
DESIGN PHASE • Install screens to prevent fish from entering the system while still allowing adequate water flow. CONSTRUCTION • Comply with Umgeni Water Construction Specification for Environmental Management	DESIGN PHASE • Design plant properly, e.g. by eliminating dead spots and threaded connections, to reduce corrosion to a minimum (corrosion resistance is considered good when the corrosion rate is <0.1 mm/a (UNEP 2008). • Align pipeline to minimise rock blasting. • Establish a rigorous Blasting Method Statement/Protocol in accordance with SANS standards, with adherence to all public safety requirements and which minimise the environmental effects of shock waves (e.g. no turtles, marine mammals or flocks of diving or swimming birds within a 2-km radius of the blasting point, smaller, quick succession blasts, one blast per day etc.) • Conduct an entrainment study. • Conduct a study on the chemical and physical properties of the raw water at the proposed intake site prior to the design and construction of the desalination plant. CONSTRUCTION • All construction activities in the coastal zone must be managed according to a strictly enforced Environmental Management Plan. • Compile and implement a Protocol for refuelling/servicing activities under normal and emergency situations • Compile and implement a Spill Contingency Plan or Response Method Statement • Good house-keeping must form an integral part of any construction activities. • Restrict disturbance of the sea bottom to the smallest area possible. • Restrict vibration-generating activities to the absolute minimum required. • All blasting activities should be conducted in accordance with the Blasting protocol/Method statement.	1. Establish a baseline of shallow subtidal invertebrate macrofaunal communities. Sample annually for a period of at least 4 years (including at least 2 years prior to construction). 2. Implement a monitoring program to study the effects of the discharged brine on the receiving water body, which is associated with the validation of the model results, and use the information to develop a contingency plan that examines the risk of contamination, and considers procedures that must be implemented to mitigate any unanticipated impacts. 3. Once in operation, conduct a monitoring program to ensure that the diffuser is performing to the expected specifications and that required dilution levels are achieved. 4. Confirm brine and thermal footprints by sampling with a conductivity-temperature-depth (CTD) probe to confirm the performance of the discharge system and the numerical model predictions. 5. Undertake WET testing of the discharged effluent for a full range of operational

Management actions proposed by the proponent	Key recommended management actions	Monitoring actions
	• Ensure that excavated sediments are only discharged down-current of the construction site. OPERATION • Keep intake velocities below ~0.15 m/s to ensure that fish and other organisms can escape the intake current. • If biocide dosing proves ineffective in controlling marine growth then undertake regular pigging of the intake pipelines. • Undertake intermittent chlorination of the intake water to prevent bacterial regrowth in the brine. • Ensure that residual chlorine is suitably neutralised with sodium bisulfite (SBS); residual chlorine in the brine discharge must be below No Observed Effect Concentration (NOEC) and/or the relevant water quality target values. • Avoid the use of nutrient-enriching antiscalants, and use antiscalants with low toxicity to aquatic invertebrate and fish species.	scenarios (i.e. shock dosing, etc.) to ensure complete confidence in the potential effects of co-discharged constituents and the antiscalant to be used. 6. Periodically assess bacterial regrowth. 7. Continuously monitor the effluent for heavy metals, residual chlorine and dissolved oxygen levels. If dissolved oxygen levels are too low (due to overdosing of sodium bisulfite), aerate if necessary. Residual chlorine in the brine discharge must be below 3 µg/ℓ. 8. Check corrosion levels of plant constituent parts and the physical integrity of the intake and outlet pipes and diffuser and replace or modify components if excessive corrosion is identified or specific maintenance is required.
AQUATIC AND ESTUARINE ECOLOGY		

DESIGN PHASE
 	
• The powerline support towers would not be located within drainage lines/wetlands, and would be spaced so as to allow the lines to span across low points (spanning distances from 300 – 400 m, but up to 600m if necessary).
	DESIGN PHASE
	
	• Incorporate measures that allow collection of groundwater flows upstream of the built structures of the desalination plant, and their diversion and subsequent infiltration across the full width of the existing two wetland basins downstream of the built structures.
	• Powerline:
	  ○ Re-align the proposed transmission line route to avoid the important Lake Victoria wetlands
	  ○ Finalise alignment to avoid as far as possible areas where lines cannot overpass riparian zones and areas of indigenous vegetation within 30m of a watercourse
		1. Visually inspect water passing into channels for signs of turbidity – upstream and downstream assessment sites should be used.
		2. Monitor flow / water level at culverts on South Dune Road.
		3. Annual assessments of wetland areas adjacent to the site to identify areas of erosion or sources of possible salt water

Management actions proposed by the proponent	Key recommended management actions	Monitoring actions
• Crossings of drainage lines with pipelines will be routed where feasible along high-lying areas. CONSTRUCTION • Comply with Umgeni Water Construction Specification for Environmental Management. • General construction impact control measures to be included for watercourses (i.e. Drainage Lines A1, A2 and Watercourse B1)	○ No transmission line support towers should be located below the 8m contour and the 12 m contour of the estuary and river respectively or within the 1:50 year floodline, whichever is the greater distance from the channel • Potable water pipeline: ○ Shift the pipeline to the east to avoid the mapped drainage line between the desalination plant and La Mercy pump station. ○ Where possible, shifting the pipeline alignment so as to by-pass hillslope seep wetlands. ○ Where the channelled valley bottom wetland (specifically Watercourse B1) is considered significantly incised as a result of head cut erosion, include of a low gabion weir structure across the channel at the point of crossing, to flatten an artificially steepened channel gradient. ○ Ground-truth the final proposed alignment of the Mdloti river crossing with an aquatic ecologist • Design and implement a stormwater management plan to control the velocity, quantity and quality of runoff from the site (particular attention should be given to limit the amount of hardened surfaces, measures to include SUD principles) • Offsite wetland rehabilitation based on extent of wetland to be lost on site ○ Rehabilitate a swathe of wetlands between the site and the coast and manage them as near-natural wetland systems (as opposed to agricultural lands). ○ Dissipate subsurface and surface drainage from the north eastern portion of the desalination plant site into these wetlands, via a series of specifically designed dissipation trenches. ○ Replace existing cultivated crops with locally indigenous wetland vegetation. ○ Maintain a level of ecological connectivity between the lower wetland areas and the upland portions of the catchment by establishing an ecological corridor, vegetated with locally indigenous vegetation, along the north eastern boundary of the site (minimum 20m width), extending to the undeveloped land on the upslope side of the property. • Additional offsite wetland rehabilitation ○ Additional offsite wetland rehabilitation should ideally actively improve the condition of similar or more threatened wetland habitat, to a condition that is better than Category D	contamination. 4. Monitor rehabilitated wetlands and ensure it has been rehabilitated to the agreed category. 5. Assess on-site and downstream wetland condition and extent via aerial photography, to identify whether hydrological management is meeting mitigation objectives (two-yearly for first 4 years after development).

Management actions proposed by the proponent	Key recommended management actions	Monitoring actions
	– that is, Category C or better. ○ Possible targets for offset mitigation <u>could</u> include the existing agricultural wetlands downstream of the southern portion of the proposed desalination plant site (between South Dune Road And South Beach Road and South Beach Road and the beach); or the (degraded) FEPA valley bottom wetlands located along the pipeline section from the proposed plant to La Mercy Reservoir, which might be rehabilitated as far as their beach outlets or similar alternative wetlands that will meet offset requirements. <u>CONSTRUCTION</u> • Demarcation of wetland areas/floodplain, Mdloti estuary channel and 12 m contour below the Mdloti river as no go areas and controls over construction camps etc. • Limit construction footprint and undertake awareness training for all staff (flora and fauna). • No stockpiles and construction material within 50m of the Mdloti river or any watercourse, or such that they will contaminate such areas through uncontrolled runoff or wind erosion. • Implement an Alien vegetation management programme. • Restrict construction activities in and around wetlands to the dry season (winter) when the water table is low. • Manage dewatering activities to protect more natural wetlands from sediment laden runoff. • Backfill pipeline to preconstruction levels. • Rehabilitation of disturbed areas to pre-impact condition, re-vegetate with appropriate indigenous species. Ensure that no-go areas are also rehabilitated, if and where required. • Implement measures to minimize the passage of sediments from the disturbed site into downstream areas, including sandtraps and geotextile blankets, sediment stilling ponds or similar. • Deep excavations need to incorporate cut-off sleeves or other devices that separate upland groundwater inflows from the excavated area, and allow for their passage and subsequent infiltration / diffusion downstream of the site, without resulting in erosion of downstream wetlands. • Collection of groundwater flows upstream of the built structures of the desalination plant, and their diversion and subsequent infiltration across the full width of the existing two	

Management actions proposed by the proponent	Key recommended management actions	Monitoring actions
	wetland basins. • The profile at the crossing point of wetlands should be as it was prior to construction; Topsoil to be replaced after construction; on steep slopes, disturbed area to be replanted to effect stability; disturbance zone to be minimised – no greater than 15m. • For tunnelling options at the Mdloti estuary, no disposal of excavated material, slurry wastewater within the floodplain of the estuary or the waterbody. All wastes should be appropriately disposed of (at registered landfill site or recycled if appropriate). • Avoid the passage of any construction waste into the estuary or its riparian margins. OPERATION • Equip the pump station with telemetry to provide early warning of drop in pressure or other signs of pipe leakage or rupture. • Repair of leaks to take place with immediate effect and appropriate disposal of leaked saltwater so that it will not affect freshwater ecosystems or other areas sensitive to salinity. • Attend erosion of drainage lines events, where necessary.	
TERRESTRIAL ECOLOGY		
CONSTRUCTION • Comply with Umgeni Water Construction Specification for Environmental Management.	DESIGN PHASE • Incorporate a retaining system into the design to maintain present grades encountered around the secondary forested areas. • Compile an Alien Invasive Vegetation Management Plan for implementation during all phases of the proposed project. • Prudent alignment of all pipelines to ensure the avoidance of potential faunal refugia, including steeper slopes and thickets of vegetation. • Install bird flight diverters where powerlines traverse valleys or extensive open fields, are proximal to open water or wetland environments and lie adjacent to scarps. • Incorporate consideration of subsurface flow rates and the position of the freshwater lens at points close to the dune into final design to maintain the recharge of the frontal dune cordon.	1. Monitor behavioural changes and avian mortalities along powerlines

Management actions proposed by the proponent	Key recommended management actions	Monitoring actions
	CONSTRUCTION Coastal environment • Where applicable, maintain and enhance vegetation in affected areas through both cordoning and planting of the area in order to prevent undue destabilisation of the dune frontage. • Ensure that within the beach and supratidal beach environment, pipelines are laid at a depth greater than 5m below mean sea level. • Manage pedestrian traffic through the dune environment for all activities (i.e. cordoning off the area). Other mesic environment • Stabilise the affected land in the secondary forest habitat and maintain a "forest form" in keeping with the present seral processes. • Identify soil horizons (O, A and B) and stockpile according to prevailing horizons during excavation and backfilling. • Where required, re-vegetate open and bare areas using a rapid germination species such as a mix of graminoids (*Digitaria spp; Eragrostis spp*) or active vegetation with appropriate herb and woody species. • Where possible, use of geofabric stabilising materials or re-vegetation of embankments to address erosion. • Where extensive cut and fill operations are required (i.e. slopes >18˚), appropriate engineering interventions should be considered to address potential erosion risks. • Possible infilling or rectification of extensive depressions or variations in topography to be addressed. • Preliminary review of sites prior to construction to identify fauna that may be traversing or be present within particular areas. OPERATION • Generalised land management regimen, including exotic weed control, habitat and	

Management actions proposed by the proponent	Key recommended management actions	Monitoring actions
	vegetation management regimen. • Monitoring and management of pipeline and powerline servitudes for secondary seral growth to facilitate management and maintenance operations, while also allowing for the preservation and enhancement of natural seral processes. • Implement vegetation management regime with exotic weed control measures.	
VISUAL IMPACTS		
CONSTRUCTION • Comply with Umgeni Water Construction Specification for Environmental Management.	DESIGN PHASE • Powerline: o If possible, the final route for the power line should avoid crossing over hills near La Mercy and should use topography to screen the power line from residents of La Mercy where possible – refer to proposed Alternative 1 powerline route; • Compile a rehabilitation and erosion control plan. • Design the desalination plant (with emphasis on reducing its discordance with the surrounding landscape) in such a way that the industrial aspects are effectively minimized through architecture (e.g. appropriate colour, design etc.), landscaping (e.g. grading, naturally occurring vegetation, etc.) and vegetation (e.g. maintain existing vegetation, vegetation buffer, etc.). • Prepare a lighting plan for the proposed desalination plant to ensure that project lighting is effectively shielded from surrounding and adjacent properties. • Careful location of towers, use wooden towers is possible, minim use of strain towers. CONSTRUCTION • Construction site screens and vegetation buffers. Where possible, use existing dense and high vegetation as a screen to views of the construction phase. • Attempt grading/slopes to recreate or follow the natural terrain by avoiding straight lines and large flat surfaces. • Whenever practical, use naturally occurring vegetation (native species) for slope stabilization.	1. Monitor building, façade and garden maintenance. 2. Monitor effectiveness of the rehabilitation plan for temporarily cleared areas and erosion scarring. 3. Monitor, via site visits, the effectiveness of architectural design of the desalination plant and vegetation to • screen the public from industrial aspects • fit in as the landscape changes from rural to mixed urban-industrial • reduce visual intrusion on visual receptors that are changing in sensitivity over time. 4. Monitor the effectiveness of the lighting plan to minimize light spill and glare.

Management actions proposed by the proponent	Key recommended management actions	Monitoring actions
	• Avoid extensive retaining walls of materials that contrast visually with the landscape. • Implement lighting plan (e.g. light fixtures that shield the light and focus illumination on the ground; minimum lamp wattage within safety/security requirements; no elevated lights within safety/security requirements; where possible, use timer switches or motion detectors etc.). OPERATION • Implement a lighting plan and a building and structure maintenance plan. • Maintain a good housekeeping. • Maintain building, façade and gardens/vegetation buffer areas and timeously attend erosion scarring and landslides.	
NOISE IMPACTS		
DESIGN PHASE • Building walls will be at least 200mm thick with an Rw55-60. • Acoustic attenuation devices will be installed on all ventilation outlets. • No noisy plant and equipment will be contained in buildings that have been cladded in thin sheeting (such as corrugated metal or cement fibre sheets). CONSTRUCTION • Comply with Umgeni Water Construction Specification for Environmental Management.	DESIGN PHASE • Select equipment with lower sound power levels. • Install silencers on fans; suitable mufflers on exhausts and compressor components; acoustic enclosures for equipment to stop noise at source and vibration isolation products for mechanical equipment. • Improve the acoustic performance of buildings by applying sound insulation where possible. • Do not ventilate high pressure gas or liquid directly to the atmosphere, but through an attenuation chamber or device. • Keep the pump station equipment below ground level and fit the ventilation exit points with sound attenuation devices. • Install all high pressure pumps in dedicated enclosed buildings where sound attenuation properties have been considered for the walls, roofs and access doors. CONSTRUCTION • All construction operations should only occur during daylight hours if possible; • Blasting should only occur if there are no signs of birds feeding in the immediate vicinity (e.g.	1. During the commissioning phase an environmental noise survey is conducted to determine if the noise emissions on the site boundary are within the noise rating limits and to identify potential further mitigation measures, if required. 2. Conduct an environmental noise monitoring survey to assess impacts and recommend further actions if required, and to ensure that the day time noise does not exceed 45dB (A) and the night time noise does not exceed 35 dB(A) at the site boundary for rural districts and 50 dB(A) during the day and 40 dB(A) during the night for suburban districts with little road traffic (monitor noise as per SANS 10103:2008) • Quarterly during the construction phase • Every 2 years during operation

Management actions proposed by the proponent	Key recommended management actions	Monitoring actions
	flocks of gulls out to the sea) or marine mammals present if blasting is conducted at sea. • All blasting and piling driving, if required, should only occur during the day. Blasting should only occur during the hottest part of the day to take advantage of unstable atmospheric conditions. • Training of staff on use of construction equipment and on presence of fauna OPERATION • Limit vehicle speeds (especially for supply and waste removal vehicles) in and around the plant.	
HERITAGE IMPACTS		
CONSTRUCTION • Comply with Umgeni Water Construction Specification for Environmental Management.	DESIGN PHASE • Undertake a Marine archaeology impact assessment for the marine sections of the proposed project (magnetometer survey). CONSTRUCTION • Powerline between La Mercy and Mt Moreland and potable water pipeline between La Mercy and Waterloo reservoirs - general monitoring of excavations for potential fossil heritage, artefacts and material of heritage importance. OPERATION • Should middens, or subterranean archaeological material be exposed during construction activities (i.e. entry and exit pit), a Phase Two assessment will have to determine their significance and appropriate mitigation.	
SOCIAL AND ECONOMIC IMPACTS		
CONSTRUCTION • Comply with Umgeni Water Construction Specification for	DESIGN PHASE • Provide compensation for permanent loss of land and housing associated with the construction of the desalination plant.	

Management actions proposed by the proponent	Key recommended management actions	Monitoring actions
Environmental Management.	• Compensate affected land owners for any temporary loss of agricultural land associated with the construction of the potable water pipeline and powerline. • Develop a Code of Conduct for the project. • Make use of alternative energy as far as possible (solar power for lighting, etc.) • Engagement with all of the estate agencies operational in Desainagar, La Mercy and Tongaat Beach (e.g. 3-D model of the plant). CONSTRUCTION • Maximise positive impacts through tendering, procurement and employment policies. • Develop and implement a traffic management plan • Awareness programme for all construction workers at the outset of the construction phase. • Establish a Monitoring Forum for the project (key stakeholders, including representatives from the local community, local councillors and the contractor) • In order to limit impacts on local residents along with tourism and recreational stakeholders, the applicant should (a) Inform main commercial and recreational fishing associations (e.g. ski boat clubs) operating in the area and local residents and bodies representing tourism and recreation well in advance of any access restrictions and exclusion zones and (b) Provide information to local media (newspapers and radio stations) informing the public of access restrictions and exclusion zones. • A number of measures are also outlined in the report in order to limit negative social impacts that can be associated with the presence of workers particularly during construction. • Clear the servitude, and place the potable water pipeline following the harvesting of sugarcane on the affected land so as to reduce losses OPERATION • Maximise positive impacts through tendering, procurement and employment policies, with priority being given to people currently making use of the land. • Enhance local community benefits with a focus on broad-based BEE.	

14.3 CUMULATIVE EFFECTS

Cumulative effects can also be defined as the total impact that a series of developments, either present, past or future, will have on the environment within a specific region over a particular period of time (DEAT IEM Guideline 7, Cumulative effects assessment, 2004).

It is expected that the project would facilitate further development in the wider area through the potential to influence investors (including locals) due to the availability of water supply which is a pre-requisite for such development. This would result in cumulative **positive** impacts of **medium** to **high** significance on overall investment levels. In a sense the project has the potential to lead to the 'crowding in' of further investment.

Concerns have however been raised that the proposed development would open the way for more industrial development in the immediate vicinity of the site. It is not possible to predict outcomes in this regard as future land use will depend on developer interest and what the Municipality approves. Residential development is, however, currently indicated in municipal planning for the area surrounding the site. Its suitability for industrial development beyond a desalination plant is thus not clear at this stage along with the potential for the development of an industrial node. However, while it is likely that the sense of place of the area will be affected, it is not believed that the establishment of the desalination plant will lead to the growth of other industry in the area or that the area will become similar to the Durban South Basin. This is based on the understanding that the Durban South Basin has developed largely around the presence of petrochemical industries and the Durban Port.

From a coastal and marine environmental perspective, the proposed intake/discharge sites cannot be considered particularly "pristine". The coastline is relatively uniform over the 1-1.5 km stretch under consideration at each location, has undergone substantial developments over the past decades and is already impacted by seasonally high visitor numbers who utilize the area primarily for coastal recreation, rock- and surf-angling and kite-surfing. Water and sediment quality have no doubt already been compromised by the various marine outfalls along the coast. Likewise, the river water shows measurable anthropogenic contamination due to discharges from wastewater treatment plants within the river's catchment areas. Therefore, given the current past and future proposed development along the coastline of the project area, cumulative impacts as well as further disturbances to marine or coastal systems or features can be expected. The magnitude and significance of these to the nearshore benthic ecosystem and potential cascade effects on higher order consumers are, however, difficult to predict and impossible to quantify. Of importance is the recognition that cumulative effects may occur and this should be kept in mind during any monitoring studies undertaken as part of this (or other similar) project.

In terms of aquatic ecology, construction of the proposed desalination plant would result in the loss of wetlands, extending across a large area of the site, and without mitigation, is moreover likely to result in further degradation of downstream wetlands, as a result of changes in runoff patterns and intensities. While it is acknowledged that the wetlands in question have been highly and permanently degraded by past activities, if this argument is applied to development along the Durban coastline as a whole, where few if any unimpacted examples of such wetlands are likely to occur, then the cumulative loss of wetlands of this type will be highly significant. For this reason, additional off-site offset measures are strongly recommended to address the identified cumulative impacts. Off-site offset mitigation would ideally include off-site rehabilitation of degraded wetlands to a condition of PES Category C or better. Inclusion of off-site mitigation measures as outlined above would reduce the significance of Cumulative Impacts substantially from High (negative) to **Medium** to **low**, with

possibilities for positive impacts in the proposed rehabilitation of existing degraded valley bottom wetlands.

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

Aside from issues discussed above, cumulative impacts on tourism and property values are expected to be driven primarily by cumulative visual, noise and ecological impacts.

The combined effects of the above findings indicate **low** to **medium risks** of cumulative impacts and cumulative **positive** impacts of **medium** to **high** significance on overall investment levels.

14.4 CONSIDERATION OF ALTERNATIVES

14.4.1 NO GO alternative

The no-go alternative assumes that the project as proposed does not go ahead. This alternative provides the baseline against which other alternatives are compared and will be considered throughout the report. The implications of the "no project" alternative are that:

- The land-use remains as Agriculture;
- There is no development the proposed location;
- There is no change in the landscape;
- Alternative and possibly more expensive water supply schemes will be developed;
- Water will become more expensive and possibly more scarce in the region and water reduction strategies will have to be enforced e.g. the watering of gardens will be prohibited;
- Industrial development in the region will be stunted under the growing concern for water; and
- Private and public sector industries will implement their own smaller-scale desalination facilities, leading to many RO plants with multiple intake and outfall (brine discharge) infrastructure components in the region.

The main implication of the no go alternative is the lack of adequate water supply to the region. Umgeni Water has a mandate to provide adequate safe potable water and not implementing this project could impact on that duty. Further, as conventional water resources near their full potential, the region will face serious challenges in terms of sustaining the economic growth envisaged for the region.

In order to assess the "No-Go" alternative it must be assumed that the projected inadequate assurance of water supply that informed the project planning will persist and water supplies would remain under increasing pressure in terms of ensuring potable water to residents and sustaining economic growth in the region.

The no-go would have no impact in the locality relative to these benefits as there would be no expenditure injection. Water supply needs would still, however, need to be met even if the project does not go ahead. To a degree, expenditure that would have flowed from the project would

therefore essentially be 'replaced' by expenditure on other water supply projects that will have to go ahead in order to supply water to the wider area. For this reason, impacts associated with expenditure should not be treated as a key decision factor.

Apart from the no-go alternative, other types of alternatives were considered in the pre-feasibility planning for this project and as part of this EIA process. The analysis of the various alternatives is presented in Chapters 2 of this EIA Report, with a summary provided below:

14.4.2 Location alternatives

As highlighted in Chapter 2, an Environmental Screening Study (Aurecon, 2012) was used to assess 5 potential site locations between Durban and Ballito (north of Durban) in terms of ecological and social sensitivity to the receiving marine and terrestrial environments, as well as project technical requirements. These included a site near Virginia Airport; Tongati; Umhlanga by Sibaya Casino, Mdloti and Tongaat near Desainagar. Based on the findings of the multi-criteria analysis, the site at Tongaat was selected. This proposed site is addressed in this EIA.

14.4.3 Layout Alternatives

14.4.3.1 Pump station

Four potential sites for the sea water pump station were considered during the feasibility study (Aurecon, 2015). Of the four potential sites, the option assessed as part of this EIA is the only one which falls within the overall footprint impact area of the desalination, and it coincides with the launch pit for the tunnels to sea and it is also located on already disturbed land (where scale agriculture takes place). Consequently its impact in terms of overall impacted area would be the least, whilst also being located at a relatively low elevation, and without direct impact on existing structures. The other options have been discarded based on technical/engineering and environmental criteria.

14.4.3.2 Potable Water Pipeline

The route for the treated water pipeline from the desalination plant to the existing La Mercy reservoir passes through a young forest containing many exotic trees (secondary forest) and the final route will be selected to minimise the impact on any important indigenous trees.

The route of the pipeline from the La Mercy reservoir site to the pipeline bifurcation in the north will follow the existing pipeline servitude.

A number of alternative pipeline routes from the La Mercy reservoir to Waterloo Reservoir were considered and the route selected close to the N2 and along existing roads was considered to have the lowest impact and is the route that has been assessed in this EIA.

14.4.3.3 Powerline route

eThekwini indicated that they are currently planning several new substations in the northern side of eThekwini Municipality due to rapid growth in that area. This implementation may delay providing a supply point at Tongaat. If an application is made prior to eThekwini future networks being build, the developer (i.e. Umgeni) will have to construct the 132kV transmission line in accordance with eThekwini standard and pegged by an eThekwini approved surveyor as it would have to form part of their future network and be constructed in a servitude secured and registered by them.

If however, the supply to the proposed desalination plant is coincided with eThekwini's future development, then a 132kV supply point would be available within approximately 1km from the proposed desalination plant site. The transmission line route proposed by Umgeni complies with eThekwini future network planning. However, following findings from the visual and the aquatic ecology specialist studies, two alternatives for the powerline route have also been assessed as part of this EIA. Alternative 1 minimizes visual impacts on La Mercy residents and Alternative 2 avoids Lake Victoria wetland habitat and its high sensitive fauna.

14.4.4 Technology alternatives as part of the development

The technology proposed for the construction and operation of the desalination plant will be guided by industry standards and global best practice. The applicable technology alternatives for this project relate to the infrastructure being installed and constructed. As noted above, a detailed feasibility study was undertaken by the applicant. The study assessed the various technology and design options for the proposed project and recommended (technically, economically and environmentally) feasible options to be considered during the detailed design phase. The following technical and design alternatives have been presented in this study based on the detailed feasibility study (Aurecon, 2015):

- Sea abstraction (surface intake) versus beach well abstraction (subsurface intake);
- Surface intake screen types;
- A variation of pipeline technologies (trenched, versus tunnelling, including mirco tunnelling);
- A number or alternatives are possible for the best concentrate management e.g. the combination of waste streams;
- Rosette or pipeline diffuser alternatives; and
- Operational sludge strategy, e.g. co-discharge with return brine or disposal at landfill.

14.5 PERMITS AND LICENCES

14.5.1 Environmental Authorisation

Before clearing of the proposed site is initiated, the appropriate environmental authorisation must be obtained in terms of the National Environmental Management Act (NEMA) and associated EIA Regulations, 2010.

14.5.2 Terrestrial Ecology

14.5.2.1 Removal of protected species

In terms of the National Forests Act, 1998 (Act No 84 of 1998) and Government Notice 1339 of 6 August 1976 (promulgated under the Forest Act, 1984 (Act No 122 of 1984) for protected tree species), the removal, relocation or pruning of any protected plants will require a license from the Department of Agriculture, Forestry and Fisheries (DAFF).

- **Protected Trees**. Protected trees, (in particular *Mimusops caffra* and *Sideroxylon inerme*), which are listed in terms of the Act, require permit applications if they are to be removed. Such specimens are to be identified in respect of the final layout of the desalination plant and pipeline/powerline routes, to identify whether there is a need to apply for such permit.

- **Clearance of Natural Forest**. Where "three or more indigenous trees form a contiguous canopy" the legal definition of "forest" applies. If "forest" is to be disturbed then a permit is required prior to such disturbance. In this regard, a permit is likely to be required for construction within/in the vicinity of the desalination plant site and along the proposed pipeline routes. Upon final survey and confirmation of the line, consideration is given to the presence of forest as per the NFA, and a suitable permit application made.

Protected indigenous plants in general are controlled under the relevant provincial Ordinances or Acts dealing with nature conservation. Threatened or Protected Species (T.o.P.S) in terms of the National Environmental Management: Biodiversity Act (No. 10 of 2004), the KZN Provincial Nature Conservation Ordinance (1974) and the KZN Provincial Conservation Act (Act 29 of 1992) identify a number of threatened or protected species that require consideration and permitting, before their removal or destruction. Such permit requirements will apply, in particular, to species within the wetland environments. If a permit is required from the Provincial conservation body, *Ezemvelo* KZN Wildlife should be contacted.

14.5.2.2 The Integrated Coastal Management Act (Act 24 of 2008 & Act 36 of 2014) (ICMA)

In terms of Section 69 of the ICMA, discharge of materials into the sea from a terrestrial source requires a discharge permit. The nature of the discharge and other requirements must be considered by the Directorate: Coastal Pollution Management, Department of Environmental Affairs (Branch: Oceans & Coasts) prior to the issuing of a permit.

14.5.2.3 The Conservation of Agricultural Resources Act (43 of 1983)

The control of agricultural land and its transformation to other land uses fall under the jurisdiction of this Act. An application for the release of agricultural land, particularly in respect of the establishment of the SWRO plant, will require the authorization of the Minister. An application should be sent to the Department of Agriculture Forestry and Fisheries.

14.5.2.4 Off Road Vehicles Regulations of 1998 (GN 1379)

The control of vehicles within the coastal zone is governed by the ORV regulations of NEMA, published in 2001 GN 1379 December 2004. These regulations serve to govern the operation of vehicles on the beach and dune forms of the coast. A permit will be required in order to place a vehicle on the beach.

14.5.3 Water Use

A Water Use License will be required in terms of Section 21 of the Water Act (Act 36 of 1998) as a result of the proximity to or the crossing of watercourses in the area. The WULA application will be submitted to the Department of Water Affairs after submission of the draft EIA report to account for feedback from DWA.

Activities that would definitely trigger either GA registration or WULA requirements would include:

- Construction of the proposed desalination plant in a wetland;
- Excavation of pipelines through or within 500m of a wetland;
- Construction of transmission lines across wetlands or rivers;
- Passage of pipelines across wetlands or rivers.

14.5.4 Heritage

In terms of Sections 35(4) of the National Heritage Resources Act 25 of 1999, should any archaeological or palaeontological materials/sites be found during construction of the proposed facility, a permit must be obtained from the South African Heritage Resources Agency (SAHRA) to remove such remains. Such removal should be undertaken by a professional archaeologist/palaeontologist.

In terms of Sections 36(3) (a) of the National Heritage Resources Act 25 of 1999, a permit will be required for the relocation of graves, if any are identified during construction activities.

14.6 OVERALL EVALUATION OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

Population projections in South Africa estimate that the population will grow to 53 million by 2025 and with it water demand will rise. Rapid rates of urbanisation will place stress on existing water infrastructure. South Africa is generally a water scarce country. Large dams are required to store water for cities, especially during droughts. Much of the easily available water resources are now almost totally developed – the Mgeni Catchment in KZN is a typical example of this and now has four large dams.

According to the South African National Water Resource Strategy (DWA, 2013), South Africa faces serious water challenges in the near future if the economic growth envisaged for the country is to be sustained. As conventional water resources near their full yield potential and with climate change likely to increase the risks associated with water supply (such as increased variability in rainfall and associated water supply), the attention is focusing on sea water desalination as one of the solutions to the looming water crisis in many South African coastal towns and cities. It should be noted that the strategic planning aspects of water supply are not appropriately dealt within an EIA and form part of planning studies by national and provincial planning departments.

According to Umgeni Water (2015), parts of the Umgeni Water operational area are currently in a state of drought. The affected areas are the north of the eThekwini Municipality, parts of the iLembe District and the Middle South Coast. The Department of Water and Sanitation's Reconciliation Strategy Study for the Kwazulu-Natal Metropolitan Coastal Areas (2015-Ongoing) indicates that even with further augmentation of the Mgeni System (including the implementation of Spring Grove Dam and the planned Mooi-Mgeni Transfer Scheme Phase 2) by an additional 137 Ml/day (50 million m^3/a), the supply of water in future will still not exceed the required 99% assurance of supply. This study therefore identified a number of water resource augmentation options, and alternative schemes such as the proposed Mvoti Dam and uMkhomazi Water Project are also being considered. Phase 1 of the proposed uMkhomazi Water Project is planned to secure an additional 600 Ml/d (220 million m^3/a). This involves the potential development of Smithfield Dam located along the central reaches of the uMkhomazi River, with a storage capacity of 250 million m^3 (250 000 Ml). The capital cost for the proposed Smithfield Dam and associated infrastructure would however be about R17 billion and the scheme would take many years to construct. Umgeni Water has therefore identified a 150 Ml/day sea water desalination plant in the Tongaat area using RO technology as a possible short-medium term alternative that could be implemented more rapidly to meet the growing water demand and ensure the sustainable economic development of the region. This project would supply water to Umgeni Water's North Coast Supply System and to some of the areas supplied by eThekwini's Northern Aqueduct by reversing the flow from Waterloo Reservoir. As part of understanding the need for the proposed desalination plant, Umgeni commissioned a Phase 1 (screening study) and a Phase 2 (detailed study and preliminary design) feasibility study (Aurecon, 2012 & 2015). The uMkhomazi Water Project remains the favoured medium to long term augmentation option, however, if this project

cannot be implemented in the tight time frame identified (by 2023) or if there is a fatal flaw on the project, then the desalination alternative would have to be the selected option.

In accordance with the Guideline on Need and Desirability published in the Government Gazette of 20 October 2014 (GN No 38108), this EIA considered the nature, scale and location of the development as well as the wise use of land (i.e. is this the right time and place for the development of this proposed project).

Section 24 of the Constitutional Act states that "everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that –

i) Prevents pollution and ecological degradation;
ii) Promotes conservation; and
iii) Secures ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

This EIA was undertaken to ensure that these principles are met through the inclusion of appropriate management and mitigation measures and monitoring requirements. Such measures have been identified to promote conservation by avoiding the sensitive environmental features present on site and through appropriate monitoring and management plans to, inter alia, monitor the impacts on marine ecology associated with the discharge of brine and protection of freshwater features present within this area (refer to the draft EMPr).

The EIA has investigated and assessed the significance of the predicted positive and negative impacts associated with the proposed Desalination Facility. Through this EIA process, clear recommendations have been provided to ensure that this project succeeds in meeting the environmental management objectives of protecting the ecologically sensitive areas and supporting sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development (refer to Sections 14.1.1 and 14.1.7). Provided that the recommended management actions are implemented effectively, no **residual negative impacts** have been identified within the ambient of this EIA that, in the opinion of the Environmental Assessment Practitioner, should be considered "fatal flaws" from an environmental perspective, and thereby necessitate substantial re-design or termination of the project.

Based on the need for the desalination facility and associated benefits (positive impacts) and the residual impacts identified and assessed by specialists during the EIA process (including inputs from the local community), it is the reasoned opinion of the EAP that the proposed 150 Ml/day SWRO facility would contribute to sustainable water supply in a responsible manner. It is therefore the recommendation of the EAP that this application should be **granted Environmental Authorisation** from the Department of Environmental Affairs on the condition that key management and monitoring actions are implemented in order to mitigate the main potential negative impacts of the project (refer to Figure 14-1 for the final proposed layout). These management actions include the recommendation for off-site offset rehabilitation of degraded wetlands to a condition of PES Category C or better, to address cumulative impacts associated with the destruction of wetlands. Provisional identification of a degraded wetland systems was undertaken as a possible option for further consideration.

Note that if the power supply to the proposed development is coincided with eThekwini's future development plan in the area, then a 132kV point of supply would be available within 1km from the proposed Tongaat site (Figure 14.1 - Point A). In this case, Umgeni would construct a transmission line from the latter point of supply to the proposed desalination plant. In the event, however, that supply

to the proposed desalination plant precedes eThekwini electrical infrastructure expansion, Umgeni would construct a single-circuit 132 kV transmission line from the nearest 132 kV point of supply (i.e. which is the supply from the La Mercy Major Substation located approximately 5 km from the proposed site, on the western side of King Shaka international airport) to the proposed desalination plant site. Where possible, Umgeni intends to follow the route proposed by eThekwini as part of their electrical infrastructure expansion, however, an Alternative route (Alternative 1 – Figure 14.1) has also been proposed to mitigate visual intrusion on La Mercy residents. Both options are considered environmentally acceptable, i.e. the Proposed powerline route (orange route – eThekwini future plans) and an Alternative 1 route (green) (Figure 14.1) and are recommended for Environmental Authorisation. This will enable eThekwini to evaluate environmental as well as engineering and planning factors in determining whether they retain their current route plan, noting that visual intrusion of the proposed eThekwini powerline route (orange route) on La Mercy residents will remain high.

In order to ensure the effective implementation of the mitigation and management actions, a framework **Environmental Management Plan (EMP)** has been prepared for the construction and operation of the proposed project (Part B of the EIA Report). It is proposed that the draft EMPr be finalised, following input and comments from various stakeholders and authorities, and be implemented during all phases of this project.

All the required permits, licenses (including a CWDP and WULA) and authorisations (including an EA) must be obtained prior to the construction of this facility (as discussed in Section 14.5). It should also be noted that the proposed plant location will need to be re-zoned from agriculture to industrial before development of the scheme can proceed.

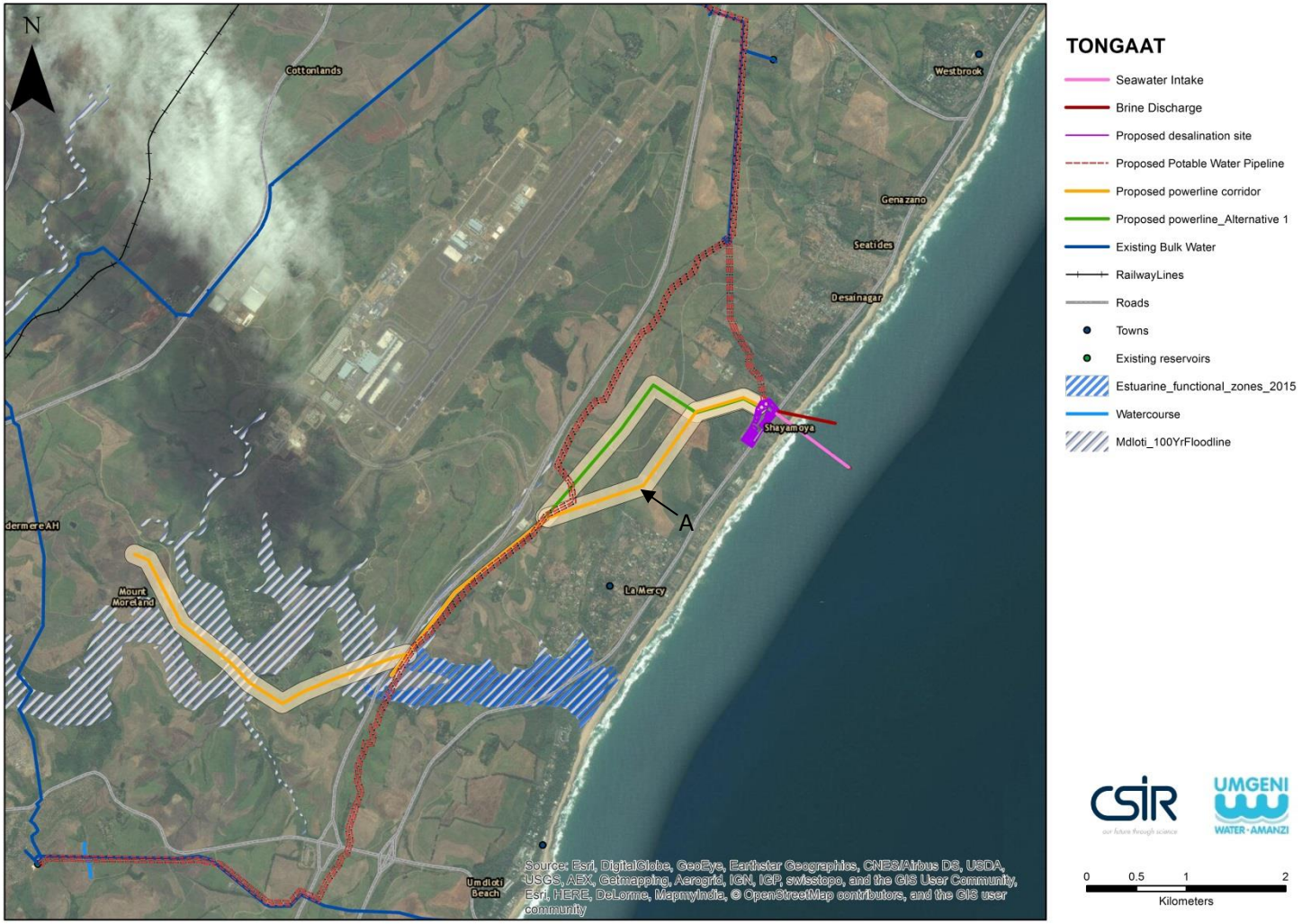

Figure 14-1: Final layout for the proposed desalination plant and associated infrastructures