

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 12: SOCIO-ECONOMIC IMPACT STUDY

ABBREVIATIONS, UNITS & GLOSSARY

BBBEE	Broad Based Black Economic Empowerment
BEE	Black Economic Empowerment
DEA&DP	Department of Environmental Affairs and Development Planning
DM	District Municipality
DR	District Road
EIA	Environmental Impact Assessment
EM	eThekweni Municipality
GDP	Gross Domestic Product
GRP	Gross Regional Product
GVA	Gross Value Added
HDSA	Historically Disadvantaged South African
IDP	Integrated Development Plan
KZN	Kwa-Zulu Natal
LED	Local Economic Development
LM	Local Municipality
MR	Main Road
NPV	Net Present Value
NSDI	Noise Sensitivity Depreciation Index
SANS	South African National Standard (for noise levels)
SDF	Spatial Development Framework
SWRO	Seawater reverse osmosis technology
UDM	Ugu District Municipality

EXECUTIVE SUMMARY

Umgeni Water is proposing to construct and operate a desalination plant at Lovu on the KwaZulu-Natal (KZN) South Coast which could produce 150 Ml/day of freshwater when at final capacity. This report presents the socio-economic specialist study to form part of the EIA for the plant and associated infrastructure.

A critical aspect of economic desirability is the **compatibility of the project with water supply planning** and wider **economic development planning** as reflected in **spatial development planning**. With regard to water supply planning documents, they contain clear justifications for moving to the detailed feasibility assessment and associated EIA phase for desalination. It has also been recognised in planning documents that desalination would entail relatively high costs as would some of the other water supply schemes being investigated. Given the limited alternatives, the avoidance of higher costs into the future is thus unlikely to be possible. In any event, water supply planning will remain a dynamic process in which additional information and data is periodically added to that which requires consideration in decision-making. The Department of Water and Sanitation and Umgeni Water will thus need to continue to carry out their mandates and consider the costs and other relevant aspects of the desalination project alongside other water supply options.

The proposed project would be **compatible with spatial planning documentation** for the area provided environmental impacts can be kept to an acceptable minimum. Note that the Alternative Site for the Plant would be located on land broadly earmarked for future residential development on the Illovo South Local Area Plan (LAP). This may make the alternative site relatively less compatible with future spatial planning when compared with the preferred site unless the future residential development in question can be moved.

With respect to **opportunity costs of land conversion**, the Applicant's Preferred Site would have significantly higher opportunity costs than the Alternative Site given higher sugar cane yields on the Preferred Site. The opportunity costs of the Preferred Site would increase if the Mother of Peace Children's Home sports fields have to be moved to make way for the plant. This would mean that an additional hectare of sugar cane land adjacent to Mother of Peace would have to be converted to sports fields – an outcome Illovo Sugar is like to strongly oppose given limited availability of cane lands for production. Mitigation in project planning includes the compensation of land owners for land losses or restrictions in the form of servitudes. All amounts in this regard should be fairly determined with the help of professional independent valuers.

The proposed project would entail significant financial costs to Umgeni Water in the order of R4.21 billion for construction and R400 million/year for operations at full capacity. These costs would be passed on to its customers in the form of water tariffs. The choice between alternative sites and pipeline routes should therefore **take any cost differences into account**. The key construction and establishment cost differences between the plant and pipeline alternatives which are essentially as follows:

- The Alternative Plant Site would be slightly further away from the sea and require an additional ~340m of pipelines. It should thus entail an additional cost of ~R23 million which is equivalent to 0.55% greater cost relative to the Applicant's Preferred Site bearing in mind that project planning and engineering processes have not focused on the production of accurate cost comparisons between the sites.
- For pipeline alternatives, at an estimated cost of R429 million, the Applicant's Preferred Alternative would be most preferable as it would be R196 million and R238 million less expensive when compared to Alternative 2 and Alternative 3 respectively. Lower costs would essentially be associated with the use of conventional pipe laying for the Applicant's Preferred Alternative as opposed to the selective use of more expensive tunnelling in the other Alternatives.

While most cost differences represent relatively small variations when compared to overall project costs, they are significant in absolute terms and should be borne in mind in decision-making.

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 all new water supply options generally being more expensive relative to existing schemes which were often constructed first precisely because of their lower cost.

At an overall level the Marine Specialist Study found that mitigation measures would reduce the negative impacts to a low significance level. This finding along with the relatively small potential sacrificial zone associated with the project and the findings of the Estuarine Ecological Impact Specialist Study indicates that **impacts on fishing** would be low during construction and operations with mitigation.

The plant site is not situated in a recognized tourist area. **Tourism risks** would thus be more prominent at the beach and estuary area given greater tourism use. The construction requirements for the project would be particularly intensive on the beach and in the dunes. Once the construction jetty is in place, it will not be possible to pass the area along the beach thereby restricting walks along the beach, etc. While the intensity of disturbance would be relatively high, it would be temporary lasting approximately 18 months and returning to normal thereafter. Tourism risks from visual impacts in the area associated with the construction jetty in particular and disturbance and destabilisation of the frontal dune system are also likely to be concentrated in the 18-month construction phase. During operations tourism risk should be low with mitigation.

Potential **impacts on the Mother of Peace Children's Home** would stem from the potential loss of sports field lands, visual and sense of place impacts and noise impacts. The Mother of Peace sports fields are best understood as a combination of a sports venue and a park in one as they provide the children with the only accessible green open space area for playing games, etc. They are thus critical to the overall functioning of the Home and need to be located adjacent to it for them to fulfil their role. If the plant was to be located on the Preferred Site, the sports fields would need to be re-established on roughly one hectare of alternative Illovo Sugar land adjacent to Mother of Peace. The

Alternative Site would hold the advantage of not affecting the sports field. It would also be associated with lower visual and noise impact given the ~200m buffer of sugar cane fields and the presence of the R197 between Mother of Peace and the Alternative Site. With the effective and particularly rigorous implementation of mitigation measures, impacts should be of a medium significance during the operational phase. For the Alternative Site impacts should be of a low negative significance during the operational phase with mitigation.

Community concerns are common regarding the **negative impacts associated with an influx of workers** particularly during the construction of large projects. These concerns include those associated with negative impacts on social structures and increased 'social ills' such as increased crime levels, increased alcohol and drug use, increased teenage and unwanted pregnancies, increased prostitution and increases in sexually transmitted diseases. With proper planning and mitigation, potential impacts of this nature can generally be managed thereby remaining at a low level of significance.

The project's impacts discussed above and in other specialist studies have the potential to be reflected in, or **impact on, property values**. These include visual, noise, water quality, ecological impacts and impacts associated with the presence of workers. Impacts on property values are thus a reflection of other impacts already assessed in this study along with impacts assessed in other studies forming part of the EIA. This needs to be taken into account in order to avoid the double counting of impacts. The focus of assessment was on risk factors for residential property values 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.

The construction phase would be associated with high intensity visual, noise and dust impacts along with disruptions. This would entail risks to the short-term saleability of surrounding property as would be the case with virtually all major construction projects. The property market is, however, likely to take its lead from permanent impacts and not temporary disturbances. Longer term impacts with mitigation during the operational phase were found to have a low significance noting that the achievement of low impacts during operation would require particularly stringent mitigation of visual and noise impacts.

The plant would have a positive impact on economic activity in the local area and region given the size of the **new spending injection** associated with it. It is expected that between 195 and 255 temporary jobs would be associated with the construction phase spread over roughly 30 months. Although operational expenditure would be significant, the plant would not be particularly labour intensive requiring approximately 30 people to operate it at full capacity. 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.

With respect to **alternatives**, the Alternative Site for the plant would hold clear advantages over the Preferred Site in terms of lower opportunity costs associated with land conversion and lower impacts on the Mother of Peace Children's Home. The Alternative Site should, however, entail ~R23 million

higher financial costs relative to the Preferred Site and would be arguably less compatible with spatial planning for the area as reflected in the Illovo South Local Area Plan. Both sites therefore have their socio-economic advantages and disadvantages which are conceptually difficult to reconcile particularly without further more detailed investigations and assessment. It is also worth noting that the ~R23 million 'savings' associated with the Preferred Site relative to the Alternative Site may present an opportunity to undertake particularly rigorous mitigation thereby resulting in more acceptable outcomes for the Mother of Peace Children's Home and Illovo Sugar. For the pipeline alternatives, the Applicant's Preferred Pipeline would be most favourable from a cost perspective. It would, however, require the applicant to engage further with the owners of the Winkelspruit Caravan Park site with a view to finding an agreement to avoid impacts. It would also entail significant risks to dune stability as assessed in the terrestrial ecology report which may outweigh cost advantages.

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12. SOCIO-ECONOMIC SPECIALIST STUDY

This chapter presents the economic specialist study prepared by Dr Hugo Van Zyl of Independent Economic Researchers as part of the Environmental Impact Assessment for the proposed 150 ML Seawater Reverse Osmosis Plant and associated infrastructure in Lovu, KwaZulu Natal

12.1 INTRODUCTION

Umgeni Water is proposing to construct and operate a desalination plant at Lovu on the KwaZulu-Natal (KZN) South Coast using seawater reverse osmosis technology (SWRO). The intake capacity of the plant will be approximately 333 ML/day, producing 150 ML/day of freshwater when at final capacity. The plant will have a lifespan of 20-25 years with the potential of a lifespan extension. This report presents the socio-economic specialist study prepared by Dr Hugo Van Zyl of Independent Economic Researchers as part of the EIA for a potential Umgeni Water desalination plant in the Lovu area, KwaZulu Natal Province.

12.1.1 Scope of work and terms of references

The overall objectives of the socio-economic specialist study was to:

- Determine the current socio-economic 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 socio-economic changes if the “no-go” option is implemented (both positive and negative).
- Assess the impacts, in terms of direct, indirect and cumulative impacts. This includes impacts of all proposed infrastructure on existing and proposed infrastructure and services in the area, e.g. roads, telecommunication, electricity.
- 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.
- Incorporate and address all issues and concerns raised during the Scoping phases of each EIA relevant to the specialist’s area of expertise

Prior to the completion of the scoping phase, the terms of reference for the study noted that while it is difficult to be sure of all relevant impacts before commencing with assessment, it is likely that the following impacts or key issues would need to be assessed using a cost-benefit analysis framework:

- Broad level review of the need and financial costs and risks associated with the project.
- Degree of fit with local, regional and national economic development visions and plans including water supply plans and spatial development frameworks.

- Opportunity costs and their distributional impacts associated with the use of the land making up the sites for development. These opportunity costs are expected to primarily be on the form of lost agricultural production given the nature of the site.
- Impacts on overall economic development potential in the area including impacts on commercial enterprises nearby the sites (incl. tourism, agriculture, fisheries and others).
- Impacts associated with environmental impacts that cannot be mitigated and have socio economic implications. This would focus on potential negative impacts on neighbouring land owners, communities and user groups (recreational users for example) should they be relevant.
- Impacts associated with project expenditure on direct and indirect employment and household incomes. These impacts should be investigated through an examination of how the project and the spending injection associated with it may impact on the local and regional economy.

12.1.2 Study Approach

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

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

Guidance on the approach was taken primarily from the Department of Environmental Affairs and Development Planning (Western Cape) guidelines on economic specialist input to EIA processes (van Zyl et al., 2005) augmented by the guidelines on social specialist input to EIA processes (Barbour, 2007). This included guidance on the appropriate level of detail required for the assessment in order that it be adequate for informing decision-making without going into superfluous detail (i.e. superfluous detail in this report as well as superfluous detail when the briefs of other specialist studies forming part of the EIA are taken into account).

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

12.1.3 Information Sources

Key information used in the assessment includes:

- Census data and other socio-economic baseline data.
- Policy document focused on water supply planning, economic development planning, spatial planning.
- Literature on the key impact categories assessed.
- Interviews with key stakeholders.

- I&AP comments and inputs into the EIA process.
- Inputs from the other specialists making contribution to the EIA.

12.1.4 Assumptions and Limitations

The following assumptions and limitations apply to this study:

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

12.2 PROJECT DESCRIPTION

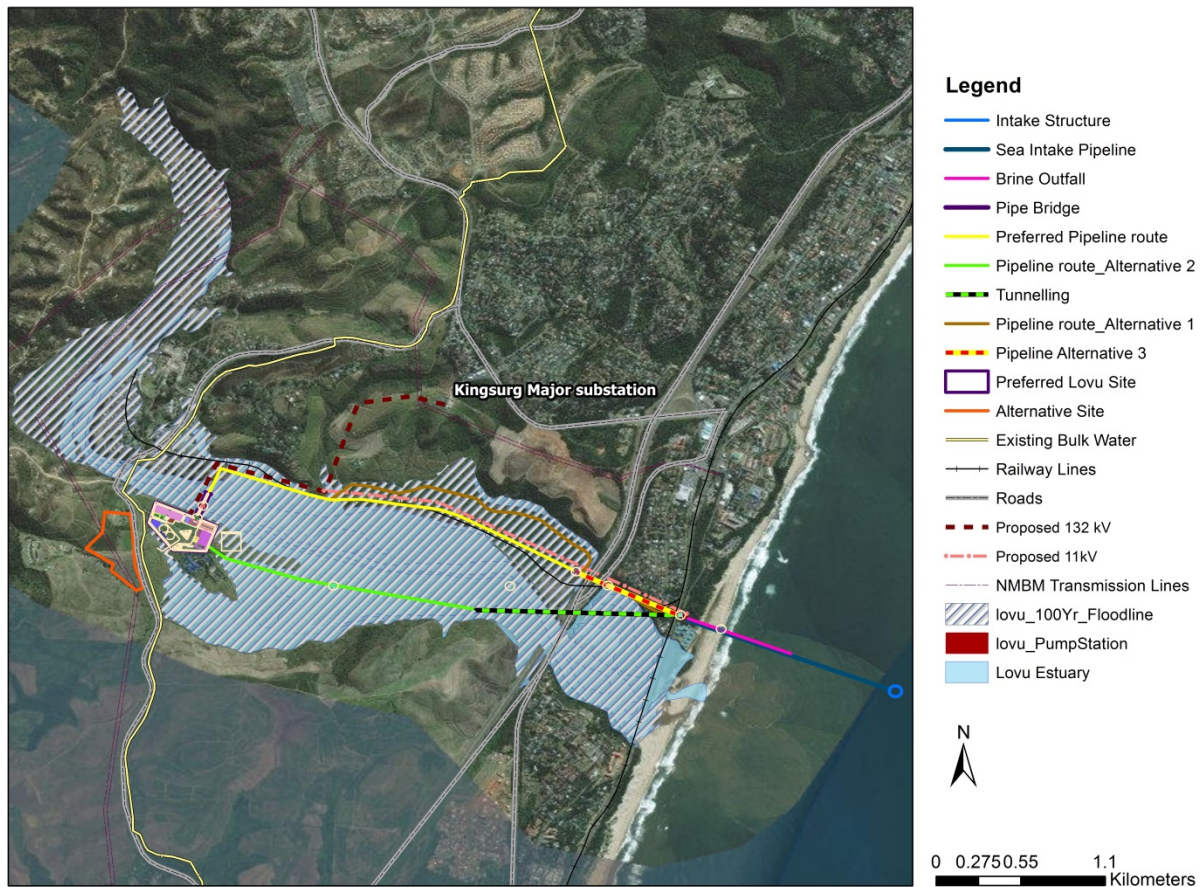
The Final Scoping Study and Environmental Impact Report provide detailed descriptions of the project. These are not repeated here. A brief overview of project elements and locations are, however, provided.

The intake capacity of the desalination plant would be approximately 333 Ml/day, producing 150 Ml/day of freshwater when at final capacity. The plant would have a lifespan of 20-25 years with the potential for extension and may be constructed in two phases over a period of five years. It would be relatively large industrial plant occupying an area of approximately 70 000 m² (excluding servitudes for pipelines) and an additional 1 ha for the intake pump station. The project would require approximately 32 MW (i.e. approximately 4.5 kWh/m³ of potable water produced), including the power required to pump water to the plant from the sea and to deliver potable water to the bulk supply infrastructure. It would consist of on-site elements as well as the following linear infrastructure elements:

- Seawater (source water) intake with screens, sea-bed pipeline buried under the coast to the seawater pump station located a short distance inland;
- Brine outfall constructed from the seawater pump station under the coast to a sea-bed pipeline and diffuser;
- Terrestrial pipelines comprising a seawater pipeline between the seawater pump station and the desalination plant, a brine pipeline from the plant back to the seawater pump station and a short treated water pipeline to the existing South Coast System pipeline; and
- Electrical power line and transformer yard infrastructure.

With respect to alternatives, two plant site alternatives are being considered (Applicant's Preferred site and Alternative site). In addition, four pipeline route alternatives are being considered as follows (see map in figure below):

1. Applicant's Preferred route. It would comprise two parallel 1800 mm HDPE pipelines laid in the Northern floodplain of the Lovu River Estuary by conventional pipe trenching. Where the pipelines cross the railway, R102 and N2 roads, they would pass through separately jacked concrete sleeve pipes. The pipes would cross the Lovu River Estuary by means of a specially constructed pipe bridge to the desalination plant on the Southern bank.
2. Alternative 1. This alternative is largely the same as the applicant's preferred alternative but with a deviation as indicated on the map.
3. Alternative 2. This alternative would comprise two 2000 mm diameter parallel 1100 m long micro tunnels that would extend from the pump station, under the railway, the Lovu River Estuary, the R102 and the N2 to the Southern bank of the Lovu River. From there, two 1800 mm diameter HDPE pipelines would be laid by conventional pipe trenching to the desalination plant.
4. Alternative 3. It would comprise two 2000 mm diameter parallel 650 m long micro tunnels would extend along the Northern Bank of the Lovu River Estuary under the railway, the R102 and the N2. From there two parallel 1800 mm HDPE pipelines would be laid on the Northern bank of the Lovu River Estuary by conventional pipe trenching, and would cross the Estuary by means of a specially constructed pipe bridge to the desalination plant on the Southern bank.



Source: CSIR (2015)

Figure 12-1: Locality Map of plant and associated infrastructure

12.3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

The significance of impacts is often highly dependent on the economic environment or context within which they occur. For example, job creation or loss in a small local community with a stagnating economy and high unemployment will be far more significant than it would be in a larger community with a healthy economy. In order to offer such baseline information to the impact assessment this section describes the socio-economic environment.

Given the location and nature of the project, the economic context includes information primarily on eThekweni and Kingsburgh (which includes the smaller Illovo Beach and Winkelspruit areas along the coast) along with the Ugu District and the Vulamehlo Local Municipality which includes the more rural area located adjacent and to the east of the proposed plant sites. Note that eThekweni the Ugu District would benefit from the additional water made available by the project.

The main information sources used were Census 2011 data, Community Survey 2007 data, Integrated Development Plans, Spatial Development Frameworks and Demarcation Board data.

12.3.1 Demographics

The 2011 Census estimated the population of eThekweni to be approximately 3.44 million up from 3.09 million in 2001 and implying an annual growth rate of 1.13% (StatsSA, 2012). With respect to future population growth projection, the eThekweni Municipality expect growth to remain relatively robust with the total population reaching 3.77 million by 2020 (EM, 2013).

Table 12-1 shows the 2011 population estimates for the local areas near the proposed project site. Kingsburgh had a population of approximately 16,400 whilst the coastal areas near the proposed project site had smaller populations with 1,688 people living in Winkelspruit and 1,103 in Illovo Beach. The wider Vulamehlo Local Municipality had a population of approximately 77,400 people whilst Ugu District has a population of 722,450.

Table 12-1: Population by area and population group (2011)

	KwaZulu-Natal	eThekweni	Kingsburgh	Winkelspruit	Illovo Beach	Ugu District	Vulamehlo Local Municipality
Black African	8,912,479	2,540,360	3721	355	126	654747	76546
Coloured	141,373	85,906	316	50	13	6123	150
Indian or Asian	756,984	573,327	752	53	45	24711	382
White	428,797	228,402	11515	1,228	911	35716	254
Other	27,169	14,271	64	2	8	1154	61
Total	10,266,802	3,442,266	16,368	1,688	1,103	722,451	77,393

Source: StatsSA, 2012

12.3.2 Employment

As with the rest of the country, unemployment is a major challenge in the wider area. This situation continues to be exacerbated by the current difficult economic climate characterised by relatively low levels of economic growth. Based on the 2011 Census figures in Table 12-2 below, the eThekweni Municipality had an unemployment rate of approximately 30% slightly better than the KZN provincial average of 33%. In the local areas along the coast, unemployment was generally substantially lower ranging between 8% and 12% for Kingsburgh, Winkelspruit and Illovo Beach. In the more rural inland areas near the plant site unemployment was, however, substantially higher with the wider Vulamehlo Local Municipality experiencing 53% unemployment which exceeds the provincial average by a significant margin. Unemployment in the Ugu District was similar to that of the province at 35%.

Table 12-2: Unemployment by area (2011)

	KwaZulu-Natal	eThekweni	Kingsburgh	Winkelspruit	Illovo Beach	Ugu District	Vulamehlo Local Municipality
Employed	2,041,394	992,518	6,508	511	380	116,405	5,886
Unemployed	1,006,383	430,313	600	70	35	63,168	6,551
% unemployed	33%	30%	8%	12%	8%	35%	53%

Source: StatsSA, 2012

Formal employment comprised 76% of total 2011 employment in eThekweni, whilst informal employment made up the remaining 24%. The informal sector employed 262,758 people in 2011, up from 233,104 people in 2006 (EM, 2013).

With regard to the sectoral division of employment opportunities, the tertiary sector accounted for 73% of employment in eThekweni in 2012, while the secondary sector accounted for 26% and the primary sector made up 1%. With respect to the broad economic sectors in eThekweni, trade accounted for 23.5% of total employment, while manufacturing accounted for 18.6% and community services for 20.7% in 2012. The community services sector percentage contribution increased in the past five years, while the trade and manufacturing sectors decreased in their percentage contribution over the same time period (EM, 2013).

Unfortunately it is not possible to get an accurate estimate of current jobs in the tourism sector on the basis of Census statistics as they do not have a separate category for tourism. Tourism is, however, recognised as a key sector in eThekweni and in the local areas near the proposed sites making a highly significant contribution to employment creation.

12.3.3 Household incomes

Table 12-3 reports on the percentage of households per household income level in the study area for 2011. Approximately 27% of households in eThekweni had incomes below R9,600 per year which is close to the KZN provincial average of 29% and the Ugu District average of 28%. Real disposable income in eThekweni grew by an average of 3.6% per annum from 2006 to 2011, despite dipping to a negative growth rate of 0.9% in 2009. From 2006 to 2011, the percentage of lower income households decreased by 18.6%, the middle income group increased by 7.3% and the affluent category increased by 9.3% (EM, 2013).

Kingsburgh along the coast had more favourable household income levels compared to the eThekweni average with only 14% of households having annual incomes below R9,600. In contrast to this, 30% of households in the inland rural areas of Vulamehlo Local Municipality had incomes below R9,600.

Table 12-3: Household incomes by area (2012)

Annual income	KwaZulu-Natal	eThekwini	Kingsburgh	Winklespruit	Illovo Beach	Ugu District	Vulamehlo Local Municipality
No income	15%	17%	11%	12%	10%	14%	14%
R 1 - R 4800	5%	4%	1%	2%	1%	5%	6%
R 4801 - R 9600	9%	6%	1%	2%	2%	9%	10%
R 9601 - R 19 600	19%	14%	5%	3%	6%	24%	30%
R 19 601 - R 38 200	20%	17%	7%	6%	7%	22%	25%
R 38 201 - R 76 400	12%	13%	10%	12%	11%	11%	9%
R 76 401 - R 153 800	8%	11%	17%	19%	22%	7%	3%
R 153 801 - R 307 600	6%	9%	23%	22%	22%	5%	2%
R 307 601 - R 614 400	4%	6%	17%	15%	14%	3%	1%
R 614 001 - R 1 228 800	1%	2%	5%	4%	4%	1%	0%
R 1 228 801 - R 2 457 600	0%	1%	1%	1%	0%	0%	0%
R 2 457 601 or more	0%	0%	1%	1%	1%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%

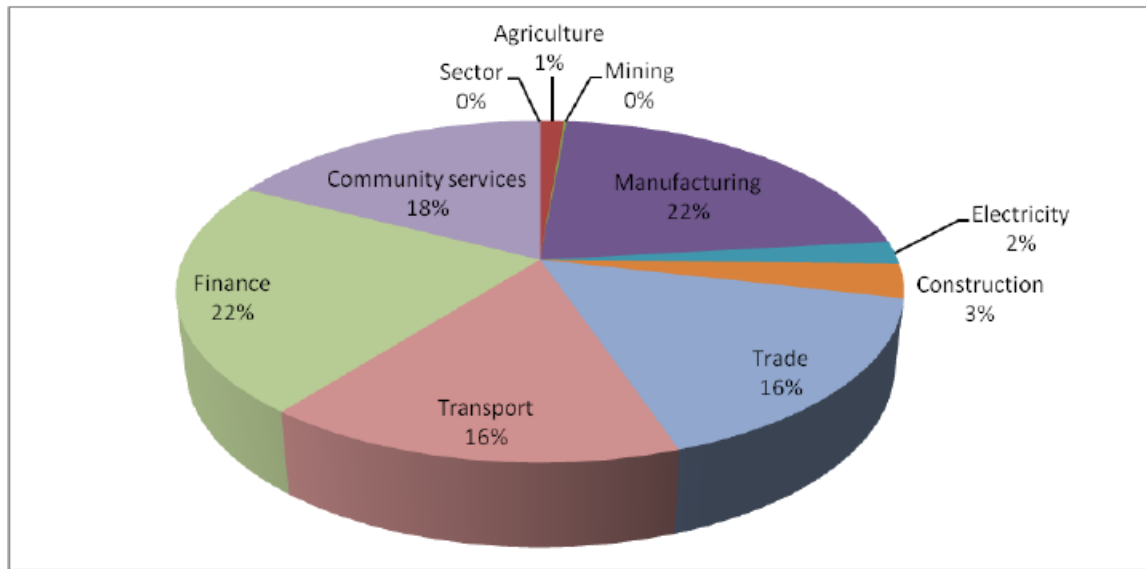
Source: StatsSA, 2012

eThekwini Municipality also reported that the percentage of people living in poverty within their area has reduced from 34% in 2006 to 31% in 2011 (EM, 2013).

12.3.4 Economic growth and key sectors

Gross Domestic Product (GDP) provides a broad indicator of economic output and general economic growth. GDP within eThekwini Municipality was estimated at R206.9 billion in 2012 (in constant 2005 prices) and comprises 65.5% of KwaZulu-Natal's GDP and 10.7% of the national GDP (EM, 2013).

Figure 12-2 shows the percentage contribution to eThekwini GDP per sectors for 2012. On the whole, the economy is dominated by finance (22% of GDP), manufacturing (22% of GDP), community services (18% of GDP), trade (16% of GDP), transport (16% of GDP) and construction (3% of GDP). Within manufacturing, food and beverages, as well as fuel, petroleum, chemical and rubber products were prominent contributors.



Source: EM (2013).

Figure 12-2: Percentage contribution to GDP per sector (2012)

12.3.5 Infrastructure delivery

Infrastructure delivery is a key element of economic development which the eThekweni Municipality continues to address (EM, 2013). Table 12-4 below shows recent estimates of backlogs of different services to houses/dwellings in the municipality together with anticipated delivery rates and the related timeframes for backlog eradication. Water services delivery, for example, has a backlog of approximately 73,500 houses which should be possible to deal with in 29-37 years assuming current funding levels remain relatively constant.

Table 12-4: eThekweni infrastructure backlogs and targets (2012)

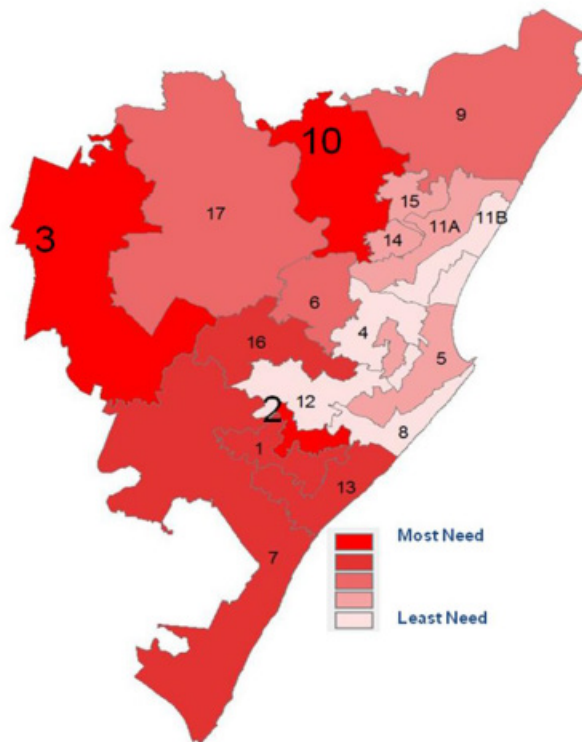
Basic Service	Existing Backlog (consumer units) as at 30 June 2012	Delivery ranges per annum	Timeframe to address based on current funding levels *
Water	73460	2000-2500	29-37 years
Sanitation	226557	8000-10000	23-28 years
Electricity	301448	8000-13000	23-37 years
Refuse removal	0	1500-2000	0 years ²
Roads	1 456kms	10-15kms	97-145 years

* - The timeframes indicated depend on the rollout of funding / subsidies.

- Linked to the housing delivery programme.

Source: EM (2013).

The map in Figure 12-3 below taken from the municipally IDP gives an indication of the areas of greatest need with respect to infrastructure provision within the eThekweni municipal area. The area around the proposed project site, for example, has a medium to high level of need relative to other areas in the municipality.



Source: EM (2013).

Figure 12-3: Level of infrastructure provision need within eThekweni (2012)

With respect Ugu District, the IDP identifies aged water and sanitation infrastructure as a key challenge. Levels of access and backlogs per local municipality in the District are shown in the table below. For 2011 the major backlogs identified were in Umzumbe and Vulamehlo Municipalities with backlogs of 46% and 34% respectively whilst the rest of the municipalities had backlogs of less than 20%.

Local Municipality	Total Households (HH)	Total Households Served	HHs below minimum standards	% Backlog		
				2011	2001	1996
Vulamehlo	16135	10617	5518	34	68	89
Umdoni	22869	22389	480	2	15	32
Umzumbe	35171	19050	16121	46	77	90
Hibiscus Coast	72175	69452	2723	4	32	33
Ezinqoleni	11472	9809	1663	14	58	84
Umuziwabantu	21619	18296	3323	15	53	84
Ugu District	179441	149613	29828	17	49	67

Table 12-5: Water services access and backlog within Ugu District

Source: UDM (2014)

12.3.6 Economic development goals

The eThekweni Integrated Development Plan (IDP) is the key planning document that aims to address of the socio-economic challenges faced by the wider Metro area. The 2013/2014 review of the IDP outlines the following development challenges as key (EM, 2013):

- “High rates of unemployment and low economic growth
- High levels of poverty
- Low levels of skills development and literacy
- Limited access to basic household and community services
- Increased incidents of HIV/AIDS and communicable diseases
- Loss of Natural Capital
- Unsustainable developmental practises
- High levels of crime and risk
- Ensuring adequate energy and water supply
- Ensuring food security
- Infrastructure degradation
- Climate change
- Ensuring financial sustainability
- Ineffectiveness and inefficiency of inward-looking local government still prevalent in the Municipality.”

In order to address these development challenges and achieve the vision of the municipality, the IDP identifies six strategic priority areas which need to be addressed. Each of these priority areas is associated with an overall goal and a list of strategic Development Principles as follows (EM, 2013):

Strategic priority one: Creating Sustainable Livelihoods

Goal: All citizens in a prosperous eThekweni earn a decent living and support a sustainable lifestyle.

Strategic Development Principles:

- Create infrastructure for economic development;
- Improve and support new livelihood choices;
- Develop skills for the future economic sectors;
- Promote small and medium enterprise;
- Secure resources for future industrial development e.g. land;
- Retain businesses and promote expansion;
- Develop key economic sectors;
- Develop priority nodes and corridors.

Strategic priority two: Socially Cohesive City

Goal: eThekweni has well rounded and caring citizens who act to support the common well being of eThekweni and embrace mutual respect, tolerance and compassion for those in need.

Strategic Development Principles:

- Ensure a more responsive local government;
- Engender mutual respect and ubuntu;
- Empower and develop skills of the citizens;
- Promote sustainable development of vulnerable groups;
- Develop a culture of helping citizens in the Municipality that are in need;
- Enhance municipal learning knowledge management;
- Create a transparent and accountable local government environment.
- Sustainable Human Settlements

Strategic priority three: A Financially Sustainable City

Goal: To maximise the Municipality's financial resources to ensure long-term financial viability and sustainability, thus improving service delivery.

Strategic Development principles:

- Grow and diversify our revenue base;
- Ensure sustainable budgeting;
- Enhance sound financial management and reporting;
- Focus on value for money expenditure.
- Co-ordinate, synergize and maximize public sector funding

Strategic priority four: Creating a Safer City

Goal: All those who live, work, play and invest in eThekweni feel and are safe in private and public spaces.

Strategic Development Principles:

- Promote development of community structures/forums;
- Minimise risk to the Municipality and citizens;

- Create a healthier city;
- Mitigate against disasters;
- Alignment with National and Provincial Health and Safety Programs;
- Promote the security of citizens;
- Promote the safety of citizens.

Strategic priority five: Promoting an Accessible City

Goal: All citizens of eThekweni can easily and affordably access the facilities and service that they require for a sustainable lifestyle.

Strategic Development Principles:

- Promote use of public transport;
- Promote access to basic services;
- Increase density along nodes and corridors;
- Provide equitable access to social facilities;
- Align with strategic spatial plan for the city;
- Enhance communication networks;
- Increase economic and sustainable job opportunities.
- Sustainable Human settlements

Strategic priority six: Environmentally Sustainable City

Goal: The environment of eThekweni protects and promotes the health of its citizens and its biodiversity.

Strategic Development Principles:

- Sustain our ecosystems and natural resources;
- Understand the municipality's natural thresholds and develop within these boundaries.
- Develop integrated and collaborative partnerships to ensure innovative responses to environmental challenges
- Build a green economy and create green jobs;
- Create sustainable human settlement built form;
- Respond appropriately to climate change;
- Ensure alignment of the Municipality's strategic direction with environmental planning and sustainability principles.

Ugu District has developed a Growth and Development Strategy guided by their vision that: "By 2030, the Ugu District will be a leading tourism destination and manufacturing and agricultural hub where jobs are created and everyone benefits equally from socio-economic opportunities and services". The six strategic drivers that have been identified are:

1. Sectoral Development and Support
2. Education and Skills development
3. Safety and Empowerment of Communities

4. Strategic Infrastructure Investment
5. Institutional development
6. Environmental Sustainability

These, in turn, respond to the following identified development challenges and priority areas:

- Infrastructure Investment.
- Economic and Sectoral Development.
- Financial Viability.
- Education and skills development.
- Institutional Integration and Coordination.
- Centralised planning.
- Reduce HIV & Aids.
- Clean Environment.
- Peace and Stability.

12.4 IDENTIFICATION OF KEY ISSUES AND POTENTIAL IMPACTS

12.4.1 Key Issues Identified During the Scoping Phase

The following socio-economic issues were identified as potentially relevant for assessment during the scoping phase:

1. Compatibility with planning for water supply, socio-economic development and associated spatial development
2. Cost of the project, differences between alternatives and implications for water tariffs
3. Opportunity costs associated with land use conversions
4. Impacts on fishing
5. Impacts on tourism and recreation
6. Impacts on the Mother of Peace Children's Home
7. Impacts associated with the presence of workers
8. Impacts on property values
9. Impacts associated with expenditure linked to the construction and operation of the development.

12.4.2 Identification of Potential Impacts

The following impacts were identified as relevant for assessment based on inputs during scoping, the nature of the project and receiving environment, information from I&APs inputs and consultations and guidance documentation for socio-economic specialist inputs to EIA:

1. Compatibility with planning for water supply, socio-economic development and associated spatial development
2. Cost differences between alternatives and potential implications for water tariffs

3. Opportunity costs associated with land use conversions
4. Impacts on commercial and recreational fishing
5. Impacts on tourism and recreation
6. Impacts on the Mother of Peace Children's Home
7. Impacts associated with the presence of workers
8. Impacts on property values
9. Impacts associated with expenditure linked to the construction and operation of the development.

These impacts were assessed and assigned significance ratings where applicable using accepted EIA conventions (refer to Chapter 4). Note that significance ratings were not deemed instructive or appropriate in dealing with issues of planning fit, cost differences and implications for water tariffs and opportunity cost.

The potential impacts identified during the EIA assessment per project phase are therefore:

12.4.2.1 Construction Phase

- Compatibility with planning for water supply, socio-economic development and associated spatial development
- Cost differences between alternatives and implications for water tariffs
- Opportunity costs associated with land use conversions
- Impacts on commercial and recreational fishing
- Impacts on tourism and recreation
- Impacts on the Mother of Peace Children's Home
- Impacts associated with the presence of workers
- Impacts on property values
- Impacts associated with expenditure linked to the construction and operation of the development.

12.4.2.2 Operational Phase

- Compatibility with planning for water supply, socio-economic development and associated spatial development
- Cost differences between alternatives and implications for water tariffs
- Impacts on commercial and recreational fishing
- Impacts on tourism and recreation
- Impacts on the Mother of Peace Children's Home
- Impacts on property values
- Impacts associated with expenditure linked to the construction and operation of the development

12.4.2.3 Decommissioning Phase

As per the Social Specialist Study for the proposed desalination plant at Tongaat (Keal, 2015), it needs to be understood that the socio-economic environment surrounding the site is likely to change substantially over 20-25 years' time which is when decommission may be considered. This makes it impossible to give anything more than highly speculative consideration to the impacts of decommissioning at this stage. It also implies that an assessment of socio-economic impacts at the time of decommissioning would be needed.

Conceptually, decommissioning and rehabilitation of the site would essentially withdraw risks to fishing, tourism and recreation and to adjacent land users/owners and their properties although much will depend on what happens to the plant site (e.g. residential development, a recreational area, etc.). It would result in no more operational expenditure or jobs associated with the project as the project is withdrawn from the economy although the decommission process would provide a limited short term boost to decommissioning contractors.

12.4.2.4 Cumulative impacts

- Facilitation of further development
- Impacts on fishing and water-based recreation
- Impacts on tourism and property values

12.5 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

12.5.1 Compatibility with planning for water supply, socio-economic development and associated spatial development

The proposed project's key strategic objectives is to provide much needed additional water supply capacity. It is thus part of wider planning processes focused on water supply planning and socio-economic development and associated spatial planning. With this in mind, this section broadly reviews the project's compatibility or fit with planning objectives and guidance.

12.5.1.1 Water supply planning imperatives

In recognition of the high levels of growth and increasing supply constraints, the then Department of Water Affairs and Forestry (DWAF) completed the Water Reconciliation Strategy Study for the KwaZulu Natal Coastal Metropolitan Areas in 2009. The objectives of the Strategy were to identify, evaluate and prioritise the interventions that should be implemented to meet future water requirements. The Strategy is used as a decision support framework for making informed decisions on interventions and projects. Subsequent to the Strategy, an update or review document was commissioned by the Department of Water and Sanitation (DWS) entitled "Support on the Continuation of the Reconciliation Strategy of the KwaZulu-Natal Coast Metropolitan Area: Phase 2 2015 recon update" (see AECOM, 2015). The purpose of this document was to report on the current status of the 2009 Strategy as discussed and agreed upon at the 7th meeting of the Strategy Steering Committee

(SSC) held in February 2015. As such it addresses water supply challenges, water requirement projections, water balances and progress on key short, medium, and long-term projects required for the implementation of the Strategy. Internal planning

The 2009 Strategy concluded that over the medium and long term further interventions are required to provide additional water after the implementation of the Spring Grove Dam and its transfer infrastructure (Mooi-Mgeni Transfer Scheme). Both of these scheme are now completed. It recommended that key options which include desalination be considered further and that feasibility studies be conducted on them (DWAF, 2009). Specifically with regard to desalination it states that (DWAF, 2009):

“A study to investigate the feasibility of desalination of sea water as an option to provide additional domestic water is being undertaken by Umgeni Water. Initial results suggest that desalination of sea water is becoming economically competitive and should be investigated further. The initial results from the Umgeni Water desalination feasibility study, which became available subsequent to the publication of these results, indicated that a large desalination project becomes economically competitive when compared to conventional development options such as the Smithfield Dam option. This finding indicated that there is not a clear economic differentiation and therefore further higher level investigations are required for desalination options.”

The 2015 Strategy Review provides an update on water supply options being considered. With respect to desalination it notes the following (AECOM, 2015):

“Umgeni Water is investigating the option of desalinating seawater as an alternative water supply source. A feasibility study is currently being finalised to investigate two 150 Mℓ/d plants, located at Lovu on the South Coast and Tongaat on the North Coast, respectively. The size of these plants is based on the capacity of existing and proposed bulk water supply infrastructure in these areas, which can be utilised to convey the potable water from the plants to the various distribution points. Current estimates show that the total cost of the infrastructure will be approximately R3 400 million, bringing the cost of water to between R10/kℓ and R15/kℓ. The EIA is underway and the feasibility study will be completed in the near future. Implementation can potentially be achieved by 2019. However, it is noted that initial result indicates the Tongaat plant on the North Coast may not be required as the Lower Thukela Bulk Water Supply Scheme (BWSS) and raising of Hazelmere Dam will address the short-term needs, while the medium- to long-term needs will be from the uMkhomazi Water Project Phase 1 (Smithfield Dam). The feasibility of the Lovu plant depends on an economic comparison with the other proposed scheme for the South Coast, namely the Lower uMkhomazi BWSS.”

Having reviewed the above water supply planning documents, it can be concluded that they contain clear justifications for moving to the detailed feasibility assessment and associated EIA phase for desalination. It has been recognised that desalination would entail relatively high costs. However, given the limited alternatives, the avoidance of higher costs into the future is unlikely to be possible regardless of water supply option(s) chosen. In any event, water supply planning will remain a dynamic process in which additional information and data is periodically added to that which requires consideration in decision-making. The DWS and Umgeni Water will thus need to continue to carry out their mandates and consider the costs and other relevant aspects of the desalination project alongside other water supply options within the Reconciliation Strategy process.

12.5.1.2 Compatibility with socio-economic development and spatial planning

Socio-economic development imperatives inform spatial planning imperatives. A critical aspect of socio-economic desirability is thus whether the proposed development complements planning as reflected in spatial development planning. Integrated Development Plans (IDPs) and their accompanying Spatial Development Frameworks (SDFs) are particularly important in this regard. SDFs in particular are central to economic development planning and are drawn up in order to guide overall development in a direction that local and provincial authorities see as desirable. Indeed, the basic purpose of an SDF is to specify the spatial implications of IDPs designed to optimise economic opportunities.

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

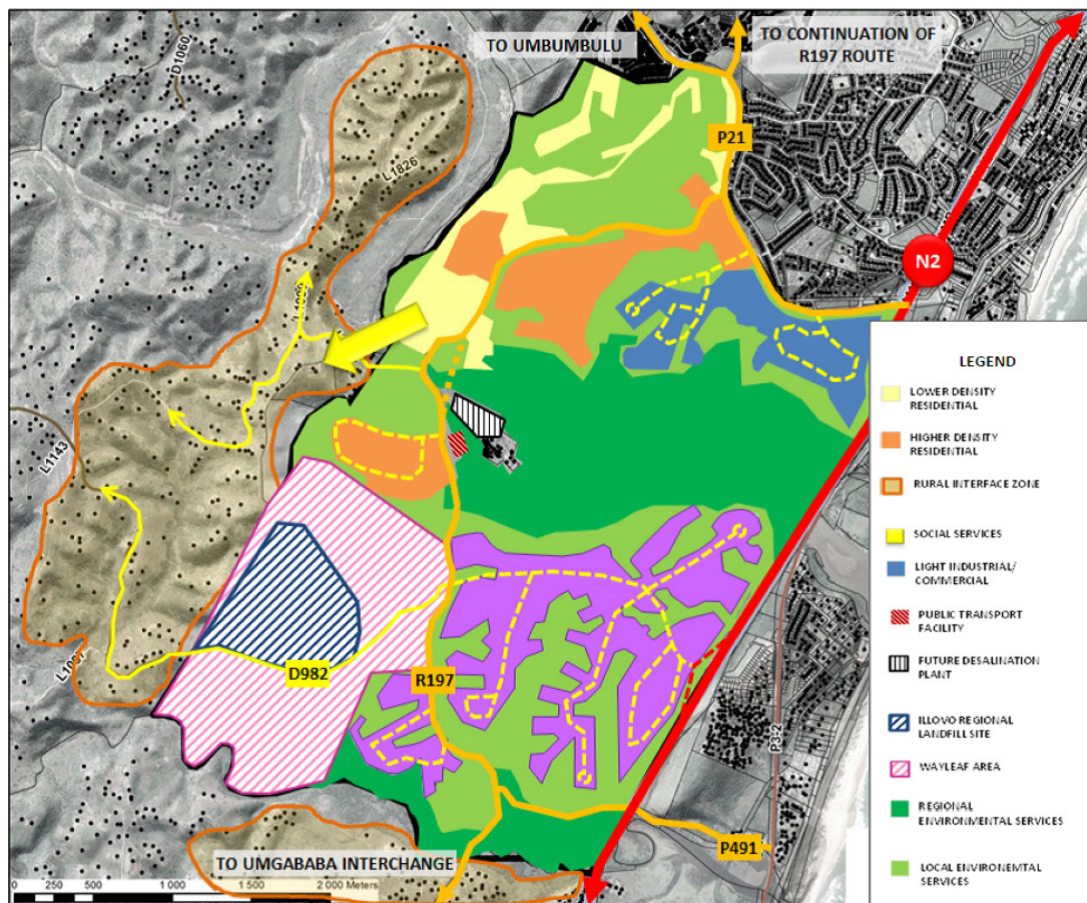
The following planning documents were found to be of particular relevance and were reviewed:

- eThekweni Municipality IDP and SDF.
- eThekweni Municipality South Spatial Development Plan (SDP)
- eThekweni Municipality Illovo South Local Area Plan (LAP).

Considered as a whole these documents recognise the critical importance of the availability of reliable water resources in order to facilitate socio-economic development. They also recognise the importance of striving for compatibility between land uses and environmental protection that allows for the continued delivery of valuable ecosystem services.

With regard to specific spatial imperatives affecting the site, the South Spatial Development Plan (SDP) was drawn up in 2012 and was informed by the overall eThekweni SDF. The SDP was, in turn, used as a departure point for the Illovo South Local Area Plan (LAP) completed in 2014. This plan considers the Illovo South area in detail. It specifically recognises the desalination plant site on its main composite maps (see Figure 12.4) whilst also showing where urban expansion is likely to occur near the site.¹

¹ Note that the Framework Planning Branch of the eThekweni Municipality make reference to this plan when commenting that they have no major concerns regarding the proposed site as part of the EIA process.



Source: EM (2014)

Figure 12-4: Illovo South Spatial Development Plan Map

Based on the findings above, it can be concluded that the proposed project is compatible with relevant socio-economic development and associated spatial planning for the area provided environmental impacts can be kept to an acceptable minimum. Note that the alternative plant site would be partially located on land earmarked for future residential development on the Illovo South Local Area Plan (LAP). This may make the Alternative Site relatively less compatible with future spatial planning when compared with the Preferred Site unless the future residential development in question can be moved.

12.5.2 Opportunity costs associated with the use of land

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 loss of this land would entail an opportunity cost in terms of uses foregone. Note that

12.5.2.1 Desalination plant site

The 7 ha plant site would entail the highest opportunity costs by a significant margin when compared to the other project components. For the applicant's preferred site, it would require the conversion of

roughly 6 ha of sugarcane belonging to Illovo Sugar with the sports field of the Mother of Peace Children's Home making up the remaining 1 ha. For the Alternative Site, essentially all of the site would be made up of sugarcane with the exception of the houses on an erf of about 4,000 m² used by Illovo Sugar to provide accommodation to farm managers.

Information supplied by Illovo Sugar revealed that an average hectare of sugarcane in the wider area yields 35 tons at a value of R490/ton. This would be the kind of yield associated with the alternative plant site given its average growing conditions. However, the preferred site generally provides substantially better yields at up to twice the average for the area due to agronomic conditions (primarily, the preferred site has better soils and moisture content as it is closer to the river). The annual gross value of production losses from the site would thus be in the order of R205,800 while that of the alternative site would be approximately R118,300. From a cane production perspective, the alternative site would thus have significantly lower opportunity costs. For this reason it would be preferred by Illovo Sugar even if it would require the finding of alternative accommodation for farm managers. The opportunity costs of the preferred site would increase further in a scenario in which the Mother of Peace sports fields would have to be moved to make way for the plant. This would mean that an additional hectare of higher yielding sugarcane adjacent to Mother of Peace would have to be converted to sports fields. Illovo would be strongly opposed to such an outcome or any other in which anything more than the absolute minimum of land has to be sacrificed particularly if it is high yielding (C. Woollaston, Illovo Sugar, pers com). Their position reflects the challenging commercial conditions faced by the industry in particular with regard to the availability of cane. In essence, the total hectares of cane currently cultivated in KZN (~10,000 ha) is already not able to produce enough cane for the sugar mills to operate optimally (and therefore competitively). This results in a high level of risk for the entire industry and not just for cane farming. It is part of a trend and relates to factors such as increased urbanisation and failure of land reform to result in stable or increased production. For example, the farm on which the site would be located has lost land to the municipal landfill and indications are that further urban developments are likely in the future as per spatial planning for the area.

12.5.2.2 Pump station site

The pump station would require a relatively small piece of land (less than 1 000 m²) behind the primary dune which is covered in natural vegetation and has no current productive use implying low opportunity costs for this site.

12.5.2.3 Pipelines and transmission lines

The pipelines and transmission lines would primarily be routed along existing roads and servitudes which should limit additional land needs particularly from productive lands. Where this is not possible, production would be disrupted while underground pipes are laid. It would, however, be able to continue with cultivation after this has been done and land has been rehabilitated.

Note that pipeline servitudes would potentially be needed over the Winkelspruit Caravan Park site for the Preferred Alternative and Alternative 1 which follows the same route in this section (Alternative 2 and Alternative 3 would involve tunnelling underneath the site with no servitude requirements). The site land has been acquired by Alley Roads Development who intend establishing a residential complex on it (Mr I. Pretorius, Alley Roads, pers com). Based on the current preliminary pipeline route

alignment provided by Aurecon, the Preferred Alternative pipeline should traverse a portion of the north eastern part of the site. Based on current information there is therefore likely to be a trade-off between the Preferred Alternative and the development of the site without mitigation. A potential engineering solution is, however, available in the form of an extension of the jacking of the pipeline to include the Caravan Park site (i.e. after jacking the pipeline under the railway line, jacking would need to continue for 30 to 40 meters under the north eastern corner of the site). Alternatively, compensation could be offered to the owner of the site. Consequently, if the project goes ahead using the Preferred Alternative for pipeline routing, Umgeni would need to engage further with the owners of the site and either (a) apply jacking to avoid that part of the site or (b) adequately compensate the owners based on an independent valuation. If agreement still cannot be reached, which seems unlikely, then it is recommended that a full independent comparison of costs and benefits of each option be commissioned by the authorities to inform decision-making.

12.5.2.4 Mitigation

As alluded to above, mitigation included in project planning includes the compensation of land owners for land losses or restrictions in the form of servitudes. All amounts in this regard should be fairly determined with the help of professional independent valuers.

12.5.3 Overall costs and comparison between alternatives

The proposed project would entail significant financial costs to Umgeni Water that would be passed on to its customers in the form of water tariffs. The choice between alternative sites and pipeline routes should therefore take any cost differences into account in order to minimise costs where possible. This section starts by presenting an assessment of overall costs and differences between site and pipeline alternatives followed by a consideration of impact on water tariffs.

The project engineers (Aurecon) have generated estimates of the financial costs associated with the proposed plant and associated infrastructure as part of their feasibility study (Aurecon, 2015). Capital costs have been estimated at R3.785 billion (including 20% for Preliminary and General Items, 25% for contingencies and excluding VAT). It is also anticipated that an additional R425 million would be required for engineering fees, environmental and social costs, land acquisition, further geotechnical and survey requirements, project management and administration. Operation and maintenance costs have been estimated at R400 million/yr and these include annual operation and infrastructure maintenance, staff costs, chemical costs, membrane replacement costs and power supply.²

With respect to the cost of alternatives, the pipeline alternatives would have a more substantial influence on cost differences than the plant site alternatives.

Alternative plant sites

The alternative plant site would be slightly further away from the sea and require an additional ~340m of pipelines. It should thus entail an additional cost of ~R23 million relative to the applicant's preferred site bearing in mind that project planning and engineering processes have not focused on the production of accurate cost comparisons between the sites.

² Note that given their importance to overall costs, power supply costs have been based on price increases that are 37% above the normal inflation rate up to 2027 (Aurecon, 2015).

Pipeline alternatives

For pipeline alternatives, the Aurecon feasibility study discarded Alternative 1 due to high costs. The costs associated with the other alternatives were as follows (Aurecon, 2015):

- Applicant's Preferred Alternative - R429 million.
- Alternative 2 - R667 million.
- Alternative 3 - R625 million.

The Applicant's Preferred Alternative would thus be most preferable from a cost perspective as it would be R196 million and R238 million less expensive when compared to Alternative 2 and Alternative 3 respectively. Lower costs would essentially be associated with the use of conventional pipe laying for the Applicant's Preferred Alternative as opposed to the selective use of more expensive tunnelling in the other Alternatives.

The operational costs for the alternatives have been assumed to be roughly equivalent at this stage of planning and have consequently been excluded from quantified comparison estimates. It should, however, be noted that increased pipeline distances have the potential to result in increased operational costs.

Summary of the cost of alternatives

The table below provides a summary of the construction and establishment cost differences between the alternatives discussed above. While most cost differences represent relatively small variations when compared to overall project costs, they are significant in absolute terms and should be borne in mind in decision-making.

Table 12-6: Construction and establishment cost comparison summary

	Pipeline route alternative		
	Applicant's Preferred	Alternative 2	Alternative 3
Design, establishment and capital costs			
Applicant's Preferred plant site	R 4,210,700,000	R 4,448,700,000	R 4,406,700,000
Alternative plant site	R 4,234,820,000	R 4,472,820,000	R 4,430,820,000
Costs relative to the preferred site and pipeline alternative			
Applicant's Preferred plant site	0.00%	5.65%	4.65%
Alternative plant site	0.57%	6.23%	5.23%

Source: Aurecon (2015)

12.5.3.1 Implications for water tariffs

Umgeni Water has six municipal customers, namely eThekweni Metropolitan Municipality, Ilembe District Municipality, Harry Gwala District Municipality, Umgungundlovu District Municipality, Ugu District Municipality and Msunduzi Local Municipality. It currently supplies 426 million m³ of potable water to these customers at an average tariff of R4.97/kl for 2014. It is difficult to make accurate predictions regarding the desalination plant's impacts on increased water tariffs. Nevertheless, the following factors are relevant in this regard and are discussed below:

- The unit cost of desalination relative to other supply options.
- The volume of water to be supplied by the desalination plant relative to overall water supply levels from all the other supply options used by Umgeni Water (i.e. other dams etc.).

As part of the project feasibility study, Aurecon has estimated that an indicative water tariff of R13.78/m³ would be required to cover the capital and operational cost of the project (Aurecon, 2015). This estimate is based solely on the sale of water from the desalination plant without mixing in of water from other sources with different costs. It is also worth bearing in mind that it is relatively approximate and highly dependent on the volumes of water which are sold against which to recover the capital costs of the desalination plant.

In order to better understand the implications of the plant for water tariffs, it needs to be viewed within the wider context of all water supplied by Umgeni Water. Desalination may be one of the higher cost options on its own. However, the plant would produce 150 Ml/day (or 54.7 million m³ per annum) which would be roughly 13% of Umgeni Water's current total supply. This low to moderate percentage would allow Umgeni to better absorb the relatively higher cost of the desalination plant into its overall water supply cost structures.

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 at rates above the base tariff and probably above the general rate of inflation 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.

12.5.4 Impacts on fishing

Commercial and recreational fishing are important socio-economic activities along the majority of the KZN coastline. It is thus important to consider the potential impacts of the proposed project on these activities. The Marine Biology Specialist Study has taken the lead in this regard along with the Estuarine Ecological Impact Specialist Study. The Marine Study outlines the nature of the marine environment and fishing activity in the wider area and assesses impacts on the marine environment and associated risks to fishing. This section briefly reviews the findings of the relevant specialist studies and interprets them from a socio-economic perspective.

The Marine Specialist Study points out that key impacts are related to the construction of the intake and outfall structures along with the operational phase intake of feed water from the ocean and consequent discharge of a high-salinity brine back into it. It found that construction activities would severely impact the intertidal and nearshore habitats and their associated communities, but the impacts would be highly localised and confined to the immediate construction area (Pulfrich, 2015). It was also considered likely that, with adequate mitigation, the marine communities in the localized construction areas would recover in the short to medium term after construction. For the operational phase, the hydrodynamic modelling carried out for the Marine Specialist Study indicates that the project would be associated with a sacrificial zone footprint in the order of 40 m wide by about 80 m long (the length of the 60 m-long diffuser, plus 20 m buffer beyond the last port). The zone may

extend to up to 50 m from the discharge point under minimum discharge conditions. This would, however, be temporary occurring only 1% of the time. Note also that the modelled salinity levels beyond the sacrificial zone did not reach 1 psu above ambient levels at any time and scientific studies have shown that effects on marine biota are primarily observed for increases of 4 psu and above. These potential concentrations beyond the sacrificial zone were consequently not predicted to have significant negative impact on marine communities (Pulfrich, 2015).

At an overall level the Marine Specialist Study found that, with few exceptions, mitigation measures would reduce the negative impacts to a low significance level. This finding along with the relatively small potential sacrificial zone associated with the project indicates that impacts on fishing would be low during construction and operations with mitigation.

The Estuarine Ecological Impact Specialist Study identified the possible entrainment of brine into the surf zone as a risk noting that estuarine environments are important nursery areas for several fishes and crustaceans. Increased salinity due to brine discharge thus has the potential to negatively impact on fish recruitment (Pillay and Weerts, 2015). The significance of these potential impacts were, however, given a low significance rating with and without mitigation in the Estuarine Study based on the low frequency and intensity of predicted salinity increases.

12.5.4.1 Mitigation and impact significance

The Marine and Estuarine Specialist Studies outline the key measures required to mitigate impacts on fishing which are not repeated here.

In addition to these measures, the applicant should undertake to inform the main commercial and recreational fishing associations (e.g. ski boat clubs) operating in the area about the nature and timing of construction and operational activities should the project proceed. This should ensure that the fishing sector remains informed limiting unnecessary confusion about the project.

Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), the impacts are predicted to be of a medium negative significance for all alternatives during the construction phase and a medium negative significance for all alternatives during the operational phase.

With the effective implementation of the above key mitigation measures, impacts should reduce to a low negative significance for all alternatives during the construction and operational phase.

The no-go would maintain the status quo and would have no impact.

Further details on impact ratings can be found in the impact assessment tables in Section 12.6 which include ratings for the significance of impacts along with factors informing significance such as impact spatial extent, duration, intensity and probability.

12.5.5 Impacts on tourism and recreation

Tourism plays an important role in the economy of the local area and wider region. It is thus important to consider the potential impacts of the proposed project on this sector alongside impacts on recreation. In order to assess impacts, information on current tourism and recreational use and potential future use focusing on the wider area surrounding the site was gathered. Discussions were

also held with tourism stakeholders in order to get their views. These discussions confirmed that visual, air quality, noise, marine and ecological impacts were the key concerns for tourism. Pertinent information from other specialist studies was examined, discussions were held with the specialists where necessary and an assessment of impacts was made.

12.5.5.1 The tourism and recreation context

The plant site is not situated in a recognized tourist area. Tourism risks would thus be more prominent at the beach and estuary area given tourism use. The site lies within the so-called Sapphire Coast area of the eThekweni Municipality which stretches from Amanzimtoti to Umkomaas. Sapphire Coast Tourism which is based in Amanzimtoti summarises the attractions and activities of the area as follows:

“The Sapphire Coast is renowned for its wealth of ocean activities, whether you are looking for adventure or a purely relaxing family holiday. This stretch of coast has some of the most idyllic beaches in the country, with excellent swimming conditions and a high safety standard. Amanzimtoti Main Beach, Warner Beach, Winkelspruit, Karridene and Umgababa are protected by shark nets and watched over by professional lifeguards. For the adventurous at heart, there are epic surfing spots at Amanzimtoti Main Beach, Clansthal, Widenham and Warner Beach. This stretch of coast is famed for its quality right hand point-breaks and beach breaks, which work particularly well in the winter months when big swells come marching up the coast from the ‘Cape of Storms’. The Sapphire Coast has excellent fishing conditions, particularly between May and November, with shad, salmon, barracuda and snoek among the catches. Amanzimtoti is the venue for the ‘Summer Showdown’, which is the biggest shore angling competition in KwaZulu-Natal.”

The proposed site is situated roughly half way between Winkelspruit Main Beach and Illovo Beach at a distance of roughly 1.2 km from either of these beaches. They are the main swimming beaches in the local area and have the facilities to accommodate high volumes of visitors (i.e. lifeguards, ablutions and adequate parking facilities). The beach area at the site is also used for swimming and sun bathing but substantially less intensively when compared to these beaches. It is somewhat more remote and offers limited parking at the end of Eastern Glen Road (~20 bays), no public ablution facilities and no lifeguards. Other beach activities such as fishing and walking are relatively common along this stretch of beach. The estuary is also used primarily for fishing and kayaking.

Tourist accommodation facilities tend to be more concentrated in the part of Winkelspruit nearer the Main Beach although there are guest houses relatively nearby the site. The Boardwalk cluster of townhouses is also situated adjacent to the beach and parking lot. Some of the units in this development are holiday units while others are permanently occupied. Note that the Winkelspruit Caravan Park is also near the site but has fallen into disrepair and was recently sold to a private developer who intends establishing a townhouse development on the site.

12.5.5.2 Disruption and restricted access during construction

The construction requirements for the project would be particularly intensive on the beach and in the dunes adjacent to the Boardwalk where the pump station would be located. Significant excavation would be required on the beach so that pipelines can be laid and access to the beach would be restricted. Once the construction jetty is in place, it will not be possible to pass the area along the

beach thereby restricting walks along the beach, etc. While the intensity of disturbance would be relatively high, it would be temporary lasting approximately 18 months. Thereafter, use of the beach area would be able to return to normal.

12.5.5.3 Visual impacts

With respect to project components in the Winkelspruit area, the VIA notes that 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. 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” (Holland, 2015). The power line between the plant and the Kingsburgh Major Sub-station will “not seem out of place in this landscape since electrical infrastructure already forms a highly visible part of views of the surrounding land. Visual intrusion is expected to be low for these visual receptors” (Holland, 2015). As noted in the VIA, the pipelines would be not be visible limiting their impacts to the construction period associated with them. Tourism risks from visual impacts in the area are therefore likely to be concentrated in the 18-month construction phase and be associated with the construction jetty in particular.

12.5.5.4 Noise impact

Noise impacts have the potential to impact on tourism and recreation if they are significant and impact negatively on tourism and recreation receptors and their experiences. The findings of the noise specialist study indicate that concerns in this regard would primarily be related to construction noise in the beach and dune area where tourism and recreational use is most significant (i.e. associated mostly with the construction of the pump station and marine pipeline components). The closest receptors to the pump station would include the nearby dunes, Boardwalk Complex and nearby beach area where disturbing noise level increases are likely during construction (Williams, 2014). In combination with general disruptions and restricted access discussed above, these impacts are likely to severely curtail recreation and tourism uses in the immediate area where construction would take place. This would result in existing users having to temporarily find substitute areas nearby of a similar nature during construction. Thereafter, use of the area would be able to return to normal with no noise impacts with tourism and recreation implications.

12.5.5.5 Marine and estuarine impacts

Risks to the marine and estuarine environment have the potential to result in risks to tourism given the popularity of activities such swimming, surfing and kayaking.³ The findings of the Marine and Estuarine Specialist Studies in this regard are dealt with in Section 12.5.4. Overall risks during operations were found to be low with mitigation implying that risks to tourism and recreation would also be low with mitigation.

³ Note that risks to recreational fishing are assessed in Section 12.5.4.

12.5.5.1 Dune stability risks

Tourism and recreational use nearby the pump station site depend partially on continued dune stability. The terrestrial ecological assessment found that highly significant risks would be associated with the disturbance and destabilisation of the frontal dune system due to excavations for the pump station and marine pipelines. As a consequence, it recommends tunnelling for the seaward sections of the proposed seawater intake and brine discharge pipelines. This would reduce impacts to a low level of significance (Bundy, 2015) and should thereby limit risks to tourism. Without tunnelling, the significance of impacts would remain at a medium level of significance with mitigation (Bundy, 2015) and would entail greater tourism and recreation risks.

12.5.5.2 Mitigation and impact significance

Impacts on tourism are primarily dependent on how project operations are designed, constructed and executed to minimise negative biophysical and social impacts and enhance positive ones. The measures recommended in other specialist studies to minimise negative impacts (primarily visual, marine and estuarine, noise and ecological measures) and enhance positive impacts would thus also reduce impacts on tourism and should be implemented. These measures are not repeated here.

In addition to these mitigation measures, the applicant should:

- Inform local residents and bodies representing tourism and recreation well in advance of any access restrictions and exclusion zones.
- Provide information to local media (newspapers and radio stations) informing the public of access restrictions and exclusion zones.

In order to estimate the significance of impacts, the combined effects of the risks described in the preceding section were considered relative to the tourism and recreation context.

Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), the impacts are predicted to be of a medium negative significance for all alternatives during the construction phase and a medium negative significance for all alternatives during the operational phase.

With the effective implementation of the above key mitigation measures, impacts should reduce to a low to medium negative significance for all alternatives during the construction phase and a low significance during the operational phase.

The no-go would maintain the status quo and would have no impact.

Further details on impact ratings can be found in the impact assessment tables in Section 12.6 which include ratings for the significance of impacts along with factors informing significance such as impact spatial extent, duration, intensity and probability.

12.5.6 Impacts on the Mother of Peace Children's Home

The Mother of Peace Children's Home is situated adjacent to the preferred desalination plant site and roughly 230m to the east of the alternative plant site. The premises used to belong to Illovo Sugar who used it as a cane cutters' hostel. It was then offered to Operation Jumpstart who are a non-profit organization (NPOs) essentially focusing on the provision of premises for other NPOs and charities. They converted the hostels into a children's home in 2003 with a view to fulfilling a request from Mother of Peace who now rent the premises for a nominal fee. Initially Mother of Peace was opened based on the needs of children affected by the HIV/AIDS crisis in KZN. These needs are still a focus along with those of other vulnerable children such as those that have been abandoned or suffered sexual abuse. The children are provided with all their daily material and developmental needs including health care and on-site schooling. This is all done in the tranquil environment among the cane fields which offers therapeutic benefits to the children most of whom have suffered significant emotional trauma. Approximately 95 children are in the care of Mother of Peace with the majority of them living on the Illovo site. The ratio between staff and children is high with a total of 46 staff members from the local community including 20 care givers that live on-site with the children.⁴

Potential impacts on Mother of Peace are assessed separately focusing on the loss of sports field lands, visual and sense of place impacts and noise impacts below before making an assessment of overall impacts. Note that impacts associated with presence of construction workers are assessed in the next section.

12.5.6.1 Loss of sports field land

The Mother of Peace sports fields are best understood as combination of a sports venue and a park area in one as they provide the children with the only accessible green open space area for playing games, etc. They are thus critical to the overall functioning of the Home and need to be located adjacent to it for them to fulfil their role.

If the plant was to be located on the preferred site, the sports fields would need to be re-established on roughly one hectare of alternative Illovo Sugar land adjacent to Mother of Peace. Illovo Sugar would, however, be strongly opposed to this as discussed in Section 12.5.2.1. The alternative site would hold the significant advantage of not affecting the sports field and therefore not requiring any relocation and associated negotiations.

12.5.6.2 Visual and sense of place impacts

The VIA notes that the "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" (Holland, 2015). It finds that visual exposure and intrusion levels would be very high for Mother of Peace as the Preferred Site would be directly adjacent to it. Note that visual intrusion would be high for Alternative Site as well but noticeably lower than for the Preferred Site given the ~200m buffer of sugar cane fields and the presence of the R197 between Mother of Peace and the Alternative Site. The Alternative Site thus has the inherent benefit of a buffer area between the plant and Mother of Peace that is more than six times wider than for the preferred site with mitigation.

⁴ Contextual information provided by Mr B. Khumalo of Operation Jumpstart and Mrs I. Canham of Mother of Peace Children's Home.

Given the very close proximity of the Preferred Site to Mother of Peace, the visual specialist recommends a minimum 30m buffer zone between Mother of Peace and the site to be planted with fast growing indigenous bush and trees.

12.5.6.3 Noise impacts

The findings of the noise specialist study indicate that for the Applicant's Preferred Site, noise level increases would exceed 7 dB(A) and therefore be classified as disturbing for the majority of the construction phase with the exception of the time when construction activities would be furthest from Mother of Peace. Construction noise impacts on Mother of Peace have therefore been given a high intensity rating by the noise specialist albeit noting their local and temporary nature. They are also noted as having a high intensity for the Alternative Site although noise levels increases at Mother of Peace would, for example, be substantially lower during the day for the Alternative site (59 dB(A) versus 68 dB(A)). For both site alternatives, overall construction noise impacts were predicted to be of low to medium significance before mitigation during the day and a medium significance at night (Williams, 2015).

During operations the main findings of the noise specialist focusing on the plant were as follows (Williams, 2015):

- “Preferred Site – The noise emissions from the main plant (36.5 dB(A)) will exceed the rural night limit of 35 dB(A) at the northern most portion of the school. The northern portion of the school property may be affected at night if occupied at night in this area. It is however difficult to quantify the exact impact due to the shielding effect the current buildings have on the noise emissions. It is however not anticipated that the noise impact will exceed the limits indoors. The daytime noise rating limit is not exceeded.
- Alternative Site – The noise emissions from the main plant will not exceed the rural night limit of 35 dB(A) at any of the NSA's providing that NSA 10 (i.e. Illovo Sugar managers housing) is removed. The daytime noise rating limit is not exceeded for any receptor.”

Overall noise impacts during operations for both site alternatives were rated as having a low significance with mitigation by the noise specialist (Williams, 2015). Predicted noise levels at Mother of Peace receptors would be in the order of 2 to 3 dB(A) higher for the Preferred Site implying that the Alternative Site would be preferable when compared to the Preferred Site but not by a particularly significant margin.

12.5.6.4 Mitigation and impact significance

Impacts on Mother of Peace are primarily dependent on how project operations are designed, constructed and executed to minimise negative biophysical and social impacts and enhance positive ones. The measures recommended in other specialist studies to minimise negative impacts (primarily visual and noise measures) and enhance positive impacts would thus also reduce impacts on Mother of Peace and should be implemented. These measures are not repeated here.

In addition to these mitigation measures, if the Preferred Site is to be used, an amicable solution will need to be found to the provision of replacement sports fields for Mother of Peace. These fields would need to be of a similar size and quality containing the same facilities (e.g. a small pavilion as is currently in place) as at present and should be established before the existing sports fields are built

on. They will need to also be adjacent to the existing Mother of Peace buildings which implies that land would be needed from Illovo Sugar as the owners of such land.

In order to estimate the significance of impacts, the combined effects of the risks described in the preceding section were considered relative to the operations of Mother of Peace.

Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), impacts are predicted to be of a medium to high negative significance for the Preferred Site during the construction phase and a high significance for the operational phase. For the Alternative Site impacts should be of a medium negative significance during the construction and operational phase.

With the effective implementation of the above key mitigation measures, impacts should reduce to a medium negative significance for the Preferred Site during the construction phase and a medium significance during the operational phase. Note that this medium impact during operations would require particular rigorous mitigation of noise and visual impacts. For the Alternative Site impacts should reduce to a low negative significance during the construction and operational phases.

The no-go would maintain the status quo and would have no impact.

Further details on impact ratings can be found in the impact assessment tables in Section 12.6 which include ratings for the significance of impacts along with factors informing significance such as impact spatial extent, duration, intensity and probability.

12.5.7 Impacts associated with the presence of construction workers

Community concerns are common regarding the negative impacts associated with an influx of outside workers particularly during the construction of large projects. These concerns include those associated with negative impacts on social structures and increased 'social ills' such as increased crime levels, increased alcohol and drug use, increased teenage and unwanted pregnancies, increased prostitution and increases in sexually transmitted diseases (STDs). Given their high levels of vulnerability and isolated location adjacent to the plant site, these risk would be particularly prominent for the children and staff at the Mother of Peace Children's Home. Note that these types of impacts are more commonly associated with the influx of people looking for work without success, but can also be associated with workers that do find work.

Potential impacts of this nature have been assessed in detail as part of the social specialist studies for construction projects the finding of which are drawn on here (see Barbour and van der Merwe, 2012 and van Zyl and Barbour, 2014 in particular). Barbour and van der Merwe note that while the presence of construction and other workers does not in itself constitute an impact, the manner in which workers conduct themselves can affect the local community and lead to increased social ills. They also make the observation that likely impacts are related to the number of employment opportunities that would go to non-locals and how the recruitment process is managed.

12.5.7.1 Mitigation and impact significance

Mitigation measures inherent to the project design include:

- A 'locals first' policy with regard to labour needs.

- The community will be able to contact the site manager to report any issues which they may have. The site manager will be stationed within the area and will therefore be available on hand to deal with and address any concerns which may be raised.
- A complaints register will be available on site to any individual who may have a particular complaint.

Key mitigation measures proposed by the specialist include:⁵

- The applicant should establish a Monitoring Forum for the project. The Forum should be established before the construction phase commences and should include key stakeholders, including representatives from the local community, local councillors and the contractor. The role of the Forum would be to monitor the project and the implementation of the recommended mitigation measures.
- The applicant and the contractors should, in consultation with representatives from the Monitoring Forum, develop a Code of Conduct for the project. The Code should identify what types of behaviour and activities by workers are not permitted in agreement with surrounding land owners and residents. For example, access on land that is not part of the development will not be allowed (no short cuts by workers going from home to site over land that is not part of the project).
- The applicant and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase.
- The contractor should make necessary arrangements to enable workers from outside the area to return home over weekends and or on a regular basis during the construction phase. This would reduce the risk posed by non-local construction workers to local family structures and social networks.

With regard to impacts, and in keeping with the findings of Barbour and van der Merwe (2012), it is anticipated that with mitigation the threat posed to the community by influx would be manageable. This comes with the caveat that the impact on individuals affected community members has the potential to be high (for example, for an individual being affected by crime).

Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), the impacts are predicted to be of a medium negative significance for all alternatives during the construction phase.

With the effective implementation of the above key mitigation measures, impacts should reduce to a low negative significance for all alternatives during the construction phases.

The no-go would maintain the status quo and would have no impact.

Further details on impact ratings can be found in the impact assessment tables in Section 12.6 which include ratings for the significance of impacts along with factors informing significance such as impact spatial extent, duration, intensity and probability.

⁵ Partially drawing on Barbour and van der Merwe (2012) and van Zyl and Barbour (2014).

12.5.8 Impacts on property values

Economic theory assumes that property values capture not only the physical characteristics and productive potential of properties, but also the environmental and social characteristics of their surroundings. The project's impacts discussed in preceding sections and in other specialist studies thus also have the potential to be reflected in, or impact on property values. These include visual, noise, water quality, ecological impacts and impacts associated with the presence of workers. These impacts are briefly revisited here to inform assessment. They are not dealt with extensively as most of these impacts have been discussed in previous sections of this report and in other specialist studies. Impacts on property values are thus a reflection of other impacts already assessed in this study along with impacts assessed in other studies forming part of the EIA.

The focus here is on risk factors for property values with a focus on residential properties. 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. It is likely that the impacts of not having adequate water supply (whether from this or other alternative sources) would be more detrimental to property values in the wider area when compared to localized risks to property values brought about by the plant.

From a property values perspective, construction phase impacts are substantially less important when compared to lasting impacts during the operational phase. Disturbances would be experienced during construction which may entail risks to the short-term saleability of surrounding property as would be the case with virtually all major construction projects. The property market is, however, likely to take its lead from permanent impacts and not temporary disturbances.

12.5.8.1 Visual impacts

With respect to project components, the desalination plant would be the key risk factor for property values given its substantial size and nature. The power lines would also be a risk factor from a visual perspective albeit a lesser one. As noted in the VIA, views of the power line between the pump station and Winkelspruit sub-station “will also include electrical structures of the railway line as well as trains moving past regularly. Visual intrusion is therefore expected to be low”. In addition, the VIA notes that the power line between the plant and the Kingsburgh Major Sub-station will “not seem out of place in this landscape since electrical infrastructure already forms a highly visible part of views of the surrounding land. Visual intrusion is expected to be low for these visual receptors” (Holland, 2015).

The implications of other project components with limited risks to property values should be as follows:

- The pipelines would be not be visible limiting their impacts to the construction period associated with them (see comment above).
- As noted in the VIA, 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. 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” (Holland, 2015).

- As noted in the VIA, the “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” (Holland, 2015).

In addition to those above, the VIA provides a number of findings that were used to assist in the assessment of impacts on property values. These are not all repeated here. The following observations are, however, provided for particular areas where visual intrusion would be high or medium drawing on the VIA:

The area surrounding 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 including the Illovo Village residential area and a light industrial area near the Lovu River. The VIA concludes that the surrounding landscape character would have a moderate sensitivity to the proposed project. The closest residential property area in Illovo Village starts about 500m to the north-east of the plant site on the northern side of the Lovu River. This area is elevated above the site and some of the properties facing south have views over the site and the Lovu River floodplain such as those in Draeger Crescent. The VIA notes that views from these properties are likely to include larger buildings in the light industrial area of Illovo 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.

Residents of the western and southern edge of Winkelspruit have views of the Lovu River floodplain and could potentially have views of the desalination plant alternatives. The VIA predicts that the introduction of the plant 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. This would introduce some level of risk to property values. However, the houses in this area are a minimum of ~2.2km from the plant site. Views would thus be relatively distant within the context of the wider area resulting in lower risks.

Residents of Winkelspruit near the pump station and marine pipelines site include those in the Boardwalk complex which is situated in close proximity to the pump station site (~30m from the nearest units in the complex) and has its entrance off Eastern Glen Road. The nearest other houses in Winkelspruit have their entrances off Ocean View Road. The nearest houses are ~100m from the pump station site with Eastern Glen Road and the railway line between the site and the houses. As noted above, with adequate screening, the pump station and associated powerlines are not likely to introduce visual risks. The construction jetty would have a significant temporary visual impact during the construction phase particular for residents of the Boardwalk but not thereafter. Assuming conventional trenching is used for the laying of pipelines, the houses along the edge of Winkelspruit on Ocean View Road would be significantly impacted on during construction but not thereafter.

12.5.8.2 Noise impacts

As outlined in previous sections, noise impacts during construction would be highly significant for a number of receptors. They would, however, only affect the property market temporarily. Noise

impacts during operations are a more important consideration and have been assessed to have a low level of significance for both plant site alternatives and for the pump station (Williams, 2015). Risks to property values from noise are thus considered low.

12.5.8.3 Dune stability risks

Property values nearby the pump station site depend on continued dune stability. The terrestrial ecological assessment found that highly significant risks would be associated with the disturbance and destabilisation of the frontal dune system due to excavations for the pump station and marine pipelines. As a consequence, it recommends tunnelling for the seaward sections of the proposed seawater intake and brine discharge pipelines. This would reduce impacts to a low level of significance (Bundy, 2015) and should thereby limit risks to property values. Without tunnelling, the significance of impacts would remain at a medium level of significance with mitigation (Bundy, 2015).

The terrestrial ecological study also found that breaching of the Lovu River Mouth is likely to be required during construction and that this could entail risks for coastal properties to the south of the site (i.e. the Boardwalk Complex). Any such breach would have to be very carefully managed if risk to these properties are to remain acceptable.

12.5.8.4 Mitigation and impact significance

Impacts on property values are primarily dependent on how project operations are designed, constructed and executed to minimise negative biophysical and social impacts and enhance positive ones. The measures recommended in other specialist studies to minimise negative impacts (primarily visual, noise and ecological measures) and enhance positive impacts would thus also reduce impacts on tourism and should be implemented. These measures are not repeated here.

In order to estimate the significance of impacts, the combined effects of the risks described in the preceding section were considered relative to the property context.

Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), the impacts are predicted to be of a medium negative significance for all alternatives during the construction phase given its high intensity but temporary nature and a medium negative significance for all alternatives during the operational phase.

With the effective implementation of the above key mitigation measures, impacts should reduce to a low negative significance for all alternatives during the construction phase and a low significance during the operational phase. Note that the achievement of low impacts during operations would require particularly stringent mitigation of visual and noise impacts.

Whilst the overall significance rating of their impacts would be the same, the impacts of the Alternative Site for the plant may be very slightly higher than for the Preferred Site given its slightly higher visual impacts. The pipeline alternatives that involve the greatest amount of tunnelling would also be preferred from a risk minimization point of view. This would make Alternative 2 and Alternative 3 slightly preferable along with the recommendation in the terrestrial ecological assessment regarding additional tunnelling.

The no-go would maintain the status quo and would have no impact.

Further details on impact ratings can be found in the impact assessment tables in Section 12.6 which include ratings for the significance of impacts along with factors informing significance such as impact spatial extent, duration, intensity and probability.

12.5.9 Impacts associated with expenditure on the construction and operation of the project

The construction and operational phases of the project would both result in positive spending injections into the area the benefits of which are best measured in terms of impacts on employment and associated incomes. Bear in mind that at this stage of project planning estimates of expenditure and employee needs are generally tentative and not detailed resulting in a broad level of assessment.

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

12.5.9.1 Construction phase impacts

Preliminary estimates indicate that a total of approximately R4.2 billion would be spent on the entire construction phase over approximately 30 months including infrastructure and building construction as well as specialised machinery installation. Bear in mind that these estimates are subject to revision and only meant to give an approximate indication of potential expenditure.

The table below outlines the applicant's upper and lower employment expectations for job creation during the construction period. It is expected that between 195 and 255 temporary jobs would be associated with the construction phase spread over roughly 30 months.

Table 12-7: Estimated direct temporary employment during construction

Skill level	Anticipated number of employees		
Unskilled and semi-skilled	150	-	200
Skilled	45	-	55
Total	195	-	255

In addition to the above direct employment and associated income opportunities, a significant number of temporary indirect opportunities would be associated with the project. These would stem

primarily from expenditure by the applicant in the local area and region as well as expenditure by workers hired for the construction phase.

12.5.9.2 Operational phase impacts

Once established, the operation of the facility would result in direct and indirect economic opportunities. These would stem from expenditure on operations including expenditure on employees that would not otherwise have occurred particularly in the local area. It is anticipated by the applicant that operational and maintenance expenditure would rise to roughly R213 million per year escalating gradually in line with inflation. As with construction, a portion of operational needs would initially necessitate imports given limited local availability particularly of technical components and services.

Although operational expenditure would be significant, the plant would not be labour intensive. The table below outlines the operational phase employment opportunities that that would be associated with the project. Approximately 30 people would be required to operate the plant at capacity. Total salaries paid to employees would be in the order of R9.2 million per year.

Table 12-8: Employment associated with operations

Job category	Anticipated number of employees	Annual estimated salary	Total salary costs per category
Plant Manager	1	R 650,482	R 650,482
Senior Operator/Shift Manager	4	R 367,905	R 1,471,620
Operator	8	R 271,742	R 2,173,936
Instrumentation/Lab Technicians	4	R 367,905	R 1,471,620
Electrical Technician	3	R 376,905	R 1,130,715
Mechanical Technician	4	R 307,270	R 1,229,080
Laborers	5	R 152,349	R 761,745
Admin Assistant	1	R 271,742	R 271,742
Total	30		R 9,160,940

Aside from these direct employment opportunities, the operational expenditure on the project (detailed above) and the spending of those employed directly would result in positive indirect impacts on the local and regional economy. Essentially those that secure jobs on the project would spend some portion of their increased income on local goods and services generally purchased by households. This would benefit those businesses where the money is spent.

12.5.9.3 Mitigation and impact significance

Umgeni Water's policies with regard to tendering, procurement and employment should act as a departure point when considering benefit enhancement measures. In keeping with the national government guidance on which they are based, these policies should ensure that local benefit maximisation and equity goals are met.

Targets should preferably be set (in tender documents) for how much local labour should be used based on the needs of the project and the availability of existing skills and people that are willing to undergo training. Opportunities for the training of unskilled and skilled workers from local communities during construction and operation should be maximized. Local sub-contractors should

be used where possible and contractors from outside the local area that tender for work should also be required to meet targets for how many locals are given employment.

Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), the impacts are predicted to be of a medium positive significance for all alternatives during the construction phase and a medium positive significance for all alternatives during the operational phase.

With the effective implementation of the above key mitigation measures, benefits would be enhanced somewhat. The overall significance ratings of impacts should, however, remain the same.

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.

Further details on impact ratings can be found in the impact assessment tables in Section 12.6 which include ratings for the significance of impacts along with factors informing significance such as impact spatial extent, duration, intensity and probability.

12.5.10 Cumulative Impacts

Cumulative impact are defined as the impact on the environment, which results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (CEQ, 1997). Bear in mind also that the distinction between cumulative and other impacts is often difficult to make. The assessment of cumulative impacts is also generally more difficult primarily as they often require more onerous assumptions regarding the likely actions of others.

12.5.10.1 Facilitation of further development

The project would facilitate further development in the wider area through the provision of water supply which is a pre-requisite for such development. Positive impacts in this regard are expected to be of a **medium** to **high** significance. It has the potential to influence investors (including locals) to act with greater confidence with regard to water resources being available thereby resulting in cumulative impacts on overall investment levels. In a sense the project has the potential to lead to the ‘crowding in’ of further investment. Note that this is not a differentiating factor with regard to project alternatives – i.e. all alternatives considered would result in a similar cumulative impacts in this regard. Note also that in the medium to longer term this is likely to include more development in the general vicinity of the Mother of Peace Children’s Home as per the Illovo South Local Area Plan (LAP).

Concerns have been raised that the development of an essentially industrial facility in the area would open the way for more industrial development in the immediate vicinity of the site. In other words, an industrial node of sorts could form around 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 in keeping with its position and key advantages for residential development. 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.

12.5.10.2 Impacts on fishing and water based recreation

Negative cumulative impacts on fishing and water based recreation are a possibility particularly when combined with other current and potential future threats to water quality. In this regard the Marine Specialist Study points out the (Pulfrich, 2015):

“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 any other similar) project.”

Further assessment of the socio-economic impacts of these potential cumulative effects is not possible in light of these findings regarding uncertainties. The Estuarine Ecological Impact Specialist Study did not envisage any cumulative impacts from the project (Pillay and Weerts, 2015). That latter finding thus informs the tentative assessment of low impact significance with mitigation emphasizing low levels of confidence in assessment.

12.5.10.3 Impacts on tourism and property values

Aside from water quality consideration discussed above, cumulative impacts on tourism and property values should be driven primarily by cumulative visual, noise and ecological impacts.

For visual impacts, the visual specialist found that, “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 low since the future landscape character will be mixed urban with residential, industrial and commercial elements” (Holland, 2015). It also noted that cumulative visual impacts on sensitive visual receptors would be low given future plans for the area.

The noise specialist found no cumulative impacts would be associated with the project (Williams, 2015).

The terrestrial ecological assessment found that the Lovu River mouth and the immediate dune and beach environment to the north of the mouth have been subject to significant transformation. With this mind, and considering the dynamic and unpredictable nature of impacts, the assessment found the cumulative impact associated with the disturbance and variation of the dune and mouth

environment would have a low negative significance without and with mitigation measures (Bundy, 2015)

The combined effects of the above findings indicate low risks of cumulative impacts on tourism and property values.

12.5.11 Decommissioning Phase Impacts

As per the Social Specialist Study for the proposed desalination plant at Tongaat (Keal, 2015), it needs to be understood that the socio-economic environment surrounding the site is likely to change substantially over 20-25 years' time which is when decommission may be considered. This makes it impossible to give anything more than highly speculative consideration to the impacts of decommissioning at this stage. It also implies that an assessment of socio-economic impacts at the time of decommissioning would be needed.

Conceptually, decommissioning and rehabilitation of the site would essentially withdraw risks to fishing, tourism and recreation and to adjacent land users/owners and their properties although much will depend on what happens to the plant site (e.g. residential development, a recreational area, etc.). It would result in no more operational expenditure or jobs associated with the project as the project is withdrawn from the economy although the decommission process would provide a limited short term boost to decommissioning contractors.

12.6 IMPACT ASSESSMENT SUMMARY

The tables below provide a summary of the impacts and recommended mitigation measures discussed in the preceding sections.

Table 12-9: Impact assessment summary table for the Construction Phase

Construction Phase										
Impact Description	Status	Spatial Extent	Duration	Reversibility	Potential Intensity	Probability	Significance (Without Mitigation)	Key Management actions (i.e. actions that are <u>not</u> negotiable and <u>have</u> to be implemented to ensure that the significance of the associated impact is acceptable)	Significance (With Mitigation)	Confidence
Impacts on commercial and recreational fishing (direct and indirect)	Negative	Local (2)	Temporary (1)	High	High (8)	Probable (0.5)	Medium (5.5)	<ul style="list-style-type: none"> The measures recommended in the marine and estuarine specialist studies would minimise impacts. In addition to these measures, the applicant should undertake to inform the main commercial and recreational fishing associations (e.g. ski boat clubs) operating in the area about the nature and timing of construction and operational activities. 	Low (3)	Medium
Impacts on tourism and recreation (direct and indirect)	Negative	Local (2)	Temporary (1)	Moderate	High (8)	Probable (0.5)	Medium (5.5)	<p>The measures recommended in the visual, noise, marine and ecological specialist studies would minimise impacts.</p> <p>The applicant should also:</p> <ul style="list-style-type: none"> Inform local residents and bodies representing tourism and recreation well in advance of any access restrictions and exclusion zones. Provide information to local media (newspapers and radio stations) informing the public of access restrictions and exclusion zones. Ensure that any pipelines across the Winkelspruit Caravan Park site are not in conflict with current planning for the park 	Low to medium (4)	Medium
Impacts on the Mother of Peace Children's Home for the Applicant's Preferred plant site	Negative	Local (2)	Temporary (1)	High	High (8)	Highly probable (0.75)	Medium to high (8.25)	<ul style="list-style-type: none"> The measures recommended in the visual and noise specialist studies would minimise impacts. An amicable solution will need to be found to the provision of replacement sports fields 	Medium (5)	Medium

(direct and indirect)								for Mother of Peace. These fields would need to be of a similar size and quality containing the same facilities as at present and should be established before the existing sports fields are built on. They will need to also be adjacent to the existing Mother of Peace buildings which implies that land would be needed from Illovo Sugar as the owners of such land.		
Impacts on the Mother of Peace Children's Home for the Alternative plant site (direct and indirect)	Negative	Local (2)	Temporary (1)	High	Medium (4)	Highly probable (0.75)	Medium (5.25)	<ul style="list-style-type: none"> The measures recommended in the visual and noise specialist studies would minimise impacts. 	Low (4)	Medium
Impacts associated with the presence of construction workers (direct and indirect)	Negative	Local (2)	Temporary (1)	High	Medium (4)	Highly probable (0.75)	Medium (5.25)	<ul style="list-style-type: none"> The applicant should establish a Monitoring Forum for the project. The Forum should be established before the construction phase commences and should include key stakeholders, including representatives from the local community, local councillors and the contractor. The role of the Forum would be to monitor the project and the implementation of the recommended mitigation measures. The applicant and the contractors should, in consultation with representatives from the Monitoring Forum, develop a Code of Conduct for the project. The Code should identify what types of behaviour and activities by workers are not permitted in agreement with surrounding land owners and residents. For example, access on land that is not part of the development will not be allowed (no short cuts by workers going from home to site over land that is not part of the project). The applicant and the contractor should implement an HIV/AIDS awareness programme for all construction workers at 	Low (3)	High

								the outset of the construction phase. •The contractor should make necessary arrangements to enable workers from outside the area to return home over weekends and or on a regular basis during the construction phase. This would reduce the risk posed by non-local construction workers to local family structures and social networks.		
Impacts on property values (direct and indirect)	Negative	Local (2)	Temporary (1)	Moderate	Medium (4)	Highly probable (0.75)	Medium (5.25)	•The measures recommended in the visual, noise and ecological specialist studies would minimise impacts.	Low (3)	Medium
Impacts associated with expenditure on the project (direct and indirect)	Positive	Regional (3)	Temporary (1)	Moderate	Medium (4)	Definite (1)	Medium (8)	•Use local workers and sub-contractors where possible. •Maximise opportunities for training.	Medium (8)	High

Table 12-10: Impact assessment summary table for the Operational Phase

Operational Phase										
Impact Description	Status	Spatial Extent	Duration	Reversibility	Potential Intensity	Probability	Significance (Without Mitigation)	Key Management actions (i.e. actions that are <u>not</u> negotiable and <u>have to be</u> implemented to ensure that the significance of the associated impact is acceptable)	Significance (With Mitigation)	Confidence
Impacts on commercial and recreational fishing (direct and indirect)	Negative	Local (2)	Long term (4)	High	Medium (4)	Probable (0.5)	Medium (5)	<ul style="list-style-type: none"> The measures recommended in the marine and estuarine specialist studies would minimise impacts. 	Low (3)	Medium
Impacts on tourism and recreation (direct and indirect)	Negative	Local (2)	Long term (4)	Moderate	Medium (4)	Probable (0.5)	Medium (5)	<ul style="list-style-type: none"> The measures recommended in the visual, noise, marine and ecological specialist studies would minimise impacts. 	Low (3)	Medium
Impacts on the Mother of Peace Children's Home for the Applicant's Preferred plant site (direct and indirect)	Negative	Local (2)	Long term (4)	High	High (8)	Highly probable (0.75)	High (10.5)	<ul style="list-style-type: none"> The measures recommended in the visual and noise specialist studies would minimise impacts. 	Medium (8)	Medium
Impacts on the Mother of Peace Children's Home for the Alternative plant site (direct and indirect)	Negative	Local (2)	Long term (4)	High	Medium (4)	Highly probable (0.75)	Medium (7.5)	<ul style="list-style-type: none"> The measures recommended in the visual and noise specialist studies would minimise impacts. 	Low (4)	Medium
Impacts on property values (direct and indirect)	Negative	Local (2)	Long term (4)	Moderate	Medium (4)	Highly probable (0.75)	Medium (7.5)	<ul style="list-style-type: none"> The measures recommended in the visual, noise and ecological specialist studies would minimise impacts. 	Low (4)	Medium

Impacts associated with expenditure on the project (direct and indirect)	Positive	Regional (3)	Long term (4)	Moderate	Low (2)	Definite (1)	Medium (7)	<ul style="list-style-type: none"> • Use local workers and sub-contractors where possible. • Maximise opportunities for training. 	Medium (8)	High
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Table 12-11: Impact assessment summary table for Cumulative Impacts

Cumulative Impacts										
Impact Description	Status	Spatial Extent	Duration	Reversibility	Potential Intensity	Probability	Significance (Without Mitigation)	Key Management actions (i.e. actions that are <u>not</u> negotiable and <u>have to be</u> implemented to ensure that the significance of the associated impact is acceptable)	Significance (With Mitigation)	Confidence
Facilitation of further development in the area due to the availability of water	Positive	Local (2)	Long term (4)	High	Medium to high (6)	Definite (1)	Medium to high (12)	<ul style="list-style-type: none"> None recommended 	Medium to high (12)	Medium to high
Impacts on fishing and water-based recreation	Negative	Local (2)	Long term (4)	High	Medium (4)	Probable (0.5)	Low to medium (5)	<ul style="list-style-type: none"> The measures recommended in the marine and estuarine specialist studies would minimise impacts. 	Low (3)	Low
Impacts on tourism and property values	Negative	Local (2)	Long term (4)	High	Medium (4)	Probable (0.5)	Low to medium (5)	<ul style="list-style-type: none"> The measures recommended in the visual, noise and ecological specialist studies would minimise impacts. 	Low (3)	Low to medium

12.7 CONCLUSIONS AND RECOMMENDATIONS

The assessment found that the project would be associated with the following positive socio-economic impacts:

- It should prove 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.
- It should also prove largely compatible with relevant economic development and associated spatial planning for the area provided environmental impacts can be kept to an acceptable minimum.
- The project would have a positive impact on economic activity given the size of the new spending injections associated with it.

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

- Impacts on fishing are likely to be low with mitigation based on the findings of the marine and estuarine specialist studies.
- The construction phase would be associated with high intensity impacts and disruptions along with risks associated with the presence of workers. These impacts would, however, be temporary in nature and possible to mitigate.
- Longer term impacts on tourism and recreation along with risks to property values were found to be low with mitigation given primarily visual, noise and ecological impacts.
- Impacts on the Mother of Peace Children's Home are likely to be of a medium to high significance during the operational phase for the Applicant's Preferred Site. This may reduce to a medium impact during operations if mitigation measures are particularly successful. For the Alternative Site impacts should be of a low to medium negative significance during operations.

The mitigation measures contained in other specialist studies would also limit socio-economic risks. In addition, the following key mitigation measures are recommended:

- If the Preferred Site is chosen an amicable solution will need to be found to the provision of replacement sports fields for the Mother of Peace Children's Home. These fields would need to be of a similar size and quality containing the same facilities as at present and should be established before the existing sports fields are built on. They will need to also be adjacent to the existing Mother of Peace buildings, which implies that land would be needed from Illovo Sugar.
- In order to limit impacts on local residents along with tourism and recreational stakeholders, the applicant should (a) Inform 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.

- Ensure that any pipelines across the Winkelspruit Caravan Park site are not in conflict with current planning for the park.

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