

SLR Environmental Consulting (Namibia)  
in association with Aurecon Namibia

**SOCIO-ECONOMIC BASELINE AND ASSESSMENT STUDY**  
**as input to the**  
**ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT PLAN**  
**FOR RÖSSING URANIUM'S PROPOSED DESALINATION PLANT NEAR**  
**SWAKOPMUND**

**Final Report**

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## List of Acronyms

CBS	Central Bureau of Statistics
CNNC	China National Nuclear Corporation
DWA	Department of Water Affairs
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
LHU	Langer Heinrich Uranium
MAWF	Ministry of Agriculture Water and Forestry
MET	Ministry of Environment and Tourism
Mlb	Million pounds
Mm <sup>3</sup> /a	Million cubic metres per year
NamWater	Namibia Water Corporation
NDP4	Fourth National Development Plan
NSA	Namibia Statistics Agency
RUL	Rössing Uranium Limited
SOE	State Owned Enterprise

## Executive Summary

This socio-economic study considers the socio-economic impact on the receiving environment of the proposed Rössing Uranium Limited (RUL) desalination plant. The plant aims to meet the Rössing mine's water supply needs estimated to be 3 million cubic metres of water per annum (3Mm<sup>3</sup>/a). The baseline and assessment was undertaken by Ms Auriol Ashby, a Namibian-based socio-economist.

The proposed desalination plant is sited approximately 6 km north of Swakopmund on the coast of the Erongo Region where the biggest users of water are the Municipalities of Swakopmund, Arandis and Henties Bay and the mines of RUL, Langer Heinrich Uranium (LHU) and the future Husab uranium mine currently under construction. NamWater sells the municipalities relatively cheap groundwater from the Omdel aquifer whilst the mines are sold very expensive water produced from Areva's desalination plant.

In 2011, Swakopmund had a total population of 44,700, compared to Arandis which had 5,170 people and Henties Bay which had 4,720. Approximately three quarters of households in both constituencies rely on wages and salaries as their main source of income. Unemployment in the two constituencies is 26% and 28%, compared to the national average estimated between 29% and 37% (NSA 2014a and 2014b). The region boasts the second highest living standards in the country, estimated at an annual N\$22,700 per capita consumption in 2009/10. The region's growth, in both population and economy, has been largely due to the mining sector, the harbour and fishing industry based in Walvis Bay, and the tourism sector.

The mining sector in this area is dominated by uranium mining and exploration which has suffered from low global uranium prices and over supply since the Fukushima disaster of 2011. Mines with long term contracts at higher prices have weathered the market despite the low spot price currently at US\$35/lb. The two operating mines of RUL and LHU jointly employ about 2,000 permanent employees and the Husab mine will employ a further 1,600 employees once in full production in 2016. There are likely to be at least a further 5,400 jobs created through the supply chain. The mines also contribute to the national, regional and local economy as illustrated by RUL's accounts for 2013, when RUL:

- Spent N\$1.9 billion on goods and services
- Generated N\$83 million in royalty payments
- Generated N\$143 million in PAYE payments
- Made N\$289 million of payments to state owned enterprises, and
- Paid N\$783 million in employment costs.

The mining sector is dependent on desalinated water for its survival as sustainable yields from the Omdel aquifer are insufficient. NamWater predicts that the demand for affordable water at the coast will outstrip supply by 2016 when Husab becomes fully operational, unless Areva's plant works close to full capacity.

The issue is not only about inadequate supply of water but also the cost at which it is being produced and sold to NamWater by Areva. RUL is currently paying N\$45 to N\$50/m<sup>3</sup> for desalinated water. However, these contracts are on a take or pay basis and therefore during periods of low usage, the actual water tariff can be much higher. Anticipated water production costs from the proposed project is substantially lower and affordable for RUL. Preliminary indications are that it can produce water at below US\$2/m<sup>3</sup> (~N\$22/m<sup>3</sup>), before conveyancing costs. By constructing its own desalination plant, RUL is anticipating a saving in water costs of approximately N\$40m to N\$60m per year against the current water cost and anticipates recovering the cost of construction within three and a half years.

The results of the main potential socio-economic impacts which were assessed are summarised in *Table 1*.

**Table 1. Summary of all Impacts Assessed**

Impact No.	Impact description	Type	Extent	Magnitude	Duration	Probability	Confidence	Reversibility	Significance
1	No-Go Alternative	-ve	National	High negative	Long term	Probable	Sure	Irreversible	High (-)
2	Survival of RUL	+ve	National	High positive	Long term	Probable	Certain	Reversible	High (+)
3	Impact on NamWater and other users	-ve	National	Low negative	Long term	Probable	Sure	Reversible	Medium (-)
4	More desalinated water available	+ve	National	High positive	Long term	Definite	Sure	Reversible	High (+)
5	Increased traffic	-ve	Regional	Low negative	Short term	Definitely	Certain	Reversible	Very Low (-)
6	Reduction of guano production	-ve	National	Low negative	Short term	Probable	Unsure	Reversible	Low (-)

1. A No-Go alternative to the project is a possibility as NamWater informed us that their shareholder, Government, was not in favour of the proposal. The impact of a No-Go alternative could mean closure of RUL, ten years earlier than necessary as RUL has already implemented major cost-cutting including making 21% of its workforce redundant. Closure of RUL would create widespread negative impacts. NamWater, other SOEs, Government, regional industry, towns, communities and families would lose the economic benefits brought about by a large mine. Only if uranium prices rise significantly, would RUL be able to carry the current high cost of water and make a profit. The continuing economic uncertainty for RUL is not good for business.
2. Survival of RUL: By contrast, the proposed project will bring down RUL's operating costs so that it can survive the on-going low uranium prices. This will extend the current benefits to Namibia brought about by its mining operations for a further 10 years until the mine is exhausted.
3. Impact on NamWater and other users: NamWater would lose some revenue as it would no longer be able to charge RUL conveyancy costs of piping water from Areva to the pipeline junction of the proposed plant. Should NamWater eventually build the Mile 6 desalination plant, RUL will not be one of their customers. LHU and Husab would experience a small increase in operating costs (approximately a fifth share charged of Areva's financing costs); Husab would be charged the bulk of this as their water requirement will be considerably more than LHU's. Compared with their other operating costs, the overall magnitude is estimated to be low.
4. More desalinated water available: The RUL plant will provide much needed potable water to the coast.
  - a. Short-term: In the first two years of operating RUL's plant, the mine will only require about 2.3 – 2.4Mm<sup>3</sup>/a and NamWater could purchase the surplus of 600 – 700Mm<sup>3</sup>/a at a lower cost than Areva's water which would benefit LHU and Husab.
  - b. Medium term: If NamWater did build a plant at Mile 6, it would not have to build to provide for RUL and a lower specification would reduce the financing requirement.
  - c. Decommissioning: Once RUL closes after 10 years, the plant would probably need some asset replacement to continue beyond its design life but this would be feasible and the plant would then be available to provide water for a growing coastal economy and population at a greatly reduced cost for government.

5. Increased traffic and risk to road safety: During construction, traffic volumes on the C34 between Swakopmund and the desalination plant are likely to increase with the transport of approximately 50 construction workers, construction material and equipment to site. However, with mitigation measures the risk is assessed as very low.
6. Reduction of guano production: There is a possibility that the construction phase will disrupt the roosting patterns of birds on the guano platform at the Salt Works which could reduce the production rate of guano over an 18 month period. Very little is known about the potential size of this impact but it is estimated to be of low significance.

The only mitigation measure of great significance would be a successful outcome to negotiations with the French Government for Areva to charge realistic and affordable rates for its desalinated water.

In conclusion, the need for the proposed desalination plant is to enable RUL to continue operating while uranium prices remain low and in the absence of a long-term realistic pricing agreement for water from Areva's desalination plant. The socio-economic assessment has found that the No-Go alternative of not building the RUL plant, could possibly result in closure of the Rössing mine, 10 years earlier than necessary. This would have far-reaching negative local, regional and national consequences.

Considering all the impacts, the socio-economic benefits associated with the proposed project significantly out-weigh the potential negative socio-economic impacts, and so this study concludes that the project should go-head.

## 1 Introduction

Rössing Uranium Limited (RUL) is investigating the feasibility of building a sea water desalination plant near the salt works, 6 km north of Swakopmund, Namibia (*Figure 1*). As a result of on-going low uranium market prices, in 2014 it made 24% of its workforce redundant and it is looking at ways to reduce the cost of its water supply in order to continue with mining operations.

The Namibia Water Corporation (NamWater) has been pursuing the development of a new desalination plant at Mile 6 (about 10km North of Swakopmund) but the outcome, timelines and commercial aspects to this project remain uncertain. The proposed RUL reverse osmosis plant is much smaller than that of the Mile 6 desalination plant (approximately 15% in output volume), but it will be sufficient to meet the RUL mine's current water demand.

Ashby Associates cc has been commissioned by SLR Environmental Consulting (Namibia) (Pty) Ltd in association with Aurecon Namibia (Pty) Ltd (SLR/Aurecon) to conduct a socio-economic baseline and impact study which will contribute to their Social and Environmental Impact Assessment of the project required by the Environmental Management Act 7 of 2007.

This socio-economic study considers the construction, operation and decommissioning of the new desalination plant. The baseline was undertaken by Auriol Ashby, who has conducted over 100 socio-economic consultancies in Namibia of which 14 were Environmental Impact Assessments. The baseline was peer reviewed by Dr Jonathon Barnes who sadly died before contributing to the impact assessment.

The Erongo Region is a water scarce environment, relying on the Omdel aquifer and desalinated water from the Areva desalination plant near Wlotzkasbaken. Since November 2013, NamWater has supplied RUL and other mines in the region with only desalinated water; however, an agreement to secure water on a long-term basis from Areva's plant at economically feasible terms has not been reached which is placing economic pressure on the mines during a depressed uranium market period. To retain economic feasibility, RUL is investigating measures to reduce mine overheads, with one of the possible interventions being the proposed desalination plant.

## 2 Basic Project Description

The desalination plant will take a volume of seawater, remove its dissolved mineral salts and other solids and make it suitable for human consumption, while returning a little more than half of the seawater at an almost double salinity concentration to the ocean.

The project will comprise of:

- A seawater intake system and associated infrastructure. The water intake will be located just south of the existing Swakopmund Salt Works intake. Seawater will gravitate toward the desalination plant on the eastern side of the salt pans, where it will enter a new buffer pond supplying the plant.
- The pre-treatment system that will remove sediments, solids and organic matter before the desalination process.
- A modular seawater desalination plant with a capacity of approximately 3Mm<sup>3</sup>/year (an average of 8,200m<sup>3</sup>/day). At peak production the plant will abstract up to 25,000 m<sup>3</sup>/day of seawater, produce 10,000 m<sup>3</sup>/day of potable water and discharge 15,000 m<sup>3</sup>/day back to the ocean as brine. This will be housed together with the post- and pre-treatment infrastructure in an enclosed and fenced off plant area. Three site location alternatives for the desalination plant are being assessed.
- The waste water outlet system and associated infrastructure. Various discharge alternatives were investigated, including 'beach disposal' and 'sea disposal' options, within the Mining Licence area of the Salt Works. The surf discharge option was found to be the only feasible discharge methodology but two of the five discharge sites were found to be feasible and will be assessed in the process. The preferred discharge site is located just south of the existing salt works bitterns discharge area and the alternative is situated at the concrete structures for the old salt works seawater intake.

- A new 11kV power line of approximately 6km would need to be constructed, together with a new substation at the plant. Two alternatives are being considered, the preferred alternative involves an underground cable from the Tamarisk substation in Swakopmund to the plant, and the alternative involves using the existing transmission poles along the C34 and stringing an overhead transmission line for that section.
- A water supply line of roughly 850m connecting to the existing NamWater pipeline, transporting desalinated water. This system is connected to the NamWater supply system and therefore product water must meet potable water standards. RUL would withdraw an equivalent volume of water from the existing NamWater supply line to the mine.
- Related services and structures i.e. offices, access road, etc.

The desalination plant will be approximately 60m x 20m x 6m high, while the post treatment and pre-treatment plants, and the storage tanks would be located adjacent to the plant building. The equipment room, offices, and chemical storage room would also be housed in a 13m x 20m x 6m high building that is connected, or is immediately adjacent, to the main plant building.

**Figure 1.** Site of Proposed project in relation to Swakopmund



The construction period is expected to be approximately 18 months. During the operational phase, the plant will be staffed with an estimated 12 to 18 contract staff working on a shift basis as required. It is

likely that the plant will be operated by Gecko under an Operation and Maintenance Contract with Rössing Uranium.

The plant will be designed to have a 10 year operational life, which ties in with the current Rössing Life of Mine plan. At the end of the design life period, the plant may be refurbished for continued operation, or may be decommissioned, broken down and the site rehabilitated, or sold as a going concern to another mining house or NamWater, depending on the situation and needs at that time<sup>1</sup>.

### 3 Terms of Reference

The Terms of Reference (TOR) for the Socio-economic assessment expands on the baseline report and aims to compile a specialist report including the following:

- Legal requirements and relevant national and or international standards relevant to the field of study.
- Expand and refine the social-economic baseline description where and if required;
- A description of the key socio-economic impacts for the planning, construction, operations and decommissioning phases of the project;
- Assess the study area and surrounding land uses with the aim of identifying and describing the potential cumulative impacts associated with the project and surrounding land uses;
- Undertake an assessment of the identified impacts using the standard assessment methodology, for the “No-Go” alternative, the preferred and any other feasible alternative presented by the proponent in the impact phase project description;
- Identify and propose reasonable mitigation measures and management interventions (Including monitoring) for inclusion into the SEMP;
- Undertake an assessment of the identified impacts, assuming that proposed mitigation measures are implemented to determine a “residual” impact significance rating;
- As part of the investigation the specialist will also consider the following gaps or aspects in greater detail:
  - The under-utilised capacity of the Areva desalination plant.
  - NamWater’s ability to provide water to users when a considerable proportion of the total supply rests in the hands of private producers.
  - NamWater’s plans to build a desalination plant.
  - The future cost and pricing of water for other industrial and domestic users.

### 4 Methodology and Limitations

The methods used for the study included desk-top research, a site visit and communications with RUL, NamWater and the Swakopmund Municipality. The data to compile the demographic section were sourced from the 2011 Population and Housing Census and the Namibia Household Income and Expenditure Survey 2009-2010 and 2003/04 (NSA 2012 and CBS 2006). Information for the water supply and demand sections was sourced from government, NamWater, the Swakopmund Municipality and research documents available on the Internet. The assessment methodology is detailed in the assessment section.

The following gaps in information are noted:

- Swakopmund Municipality is planning to extend its boundaries eastwards but the decision to extend northwards, beyond the Swakopmund Salt Works has not been taken.
- NamWater did not wish to provide any information or insights into the potential impact of the proposed project on water tariffs to domestic and industrial users. The assessment of this impact is therefore based on assumptions.

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<sup>1</sup> Aurecon/SLR 2014

## 5 Legislative, Institutional and Development Context

Institutions that oversee laws and policies of socio-economic relevance to the proposed project are:

- NamWater is a parastatal wholly owned by the Ministry of Agriculture, Water and Forestry. The Namibia Water Corporation Act (12 of 1997) charges the corporation to supply bulk water, based on need and availability. The corporation is also charged with the duty of conserving water resources in the long-term.
- The Ministry of Agriculture, Water and Forestry (MAWF) is mandated to promote, develop, manage and utilize agricultural, water and forestry resources. Among many responsibilities, it aims to ensure potable water and basic sanitation services, promote integrated environmental management, improve regulatory environment and most of all, ensure food security. Under the Water Resources Management Act 24 of 2004, RUL will have to obtain a licence to abstract and use sea water and to obtain a permit to discharge effluent from the plant.
- Under the Local Authorities Act of 1992 and the Regional Councils Act of 1992, the Local Authorities, such as Swakopmund, Arandis and Henties Bay, are responsible for the management of proclaimed Municipalities, Towns or Villages. The Regional Councils are responsible for proclaimed and un-proclaimed settlement areas, such as Wlotzkasbaken. The project falls within the Swakopmund Municipality.
- The Erongo Regional Council's development plans are aligned with national development plans and Vision 2030. The leader of the Regional Council is the Governor who is appointed by the President of Namibia. The seven regional councillors represent each of the constituencies in the region. The proposed project would clearly contribute to the development of regional infrastructure.
- The Ministry of Labour and Social Welfare is responsible for the execution of the Labour Act No. 11 of 2007, the Social Security Act No. 34 of 1994, the Employees Compensation Amendment Act No. 5 of 1995 and the Affirmative Action Act (Employment) No. 29 of 1998. The various Acts stipulate, amongst other things, sound labour relations, employment equity, fair employment practices, training, minimum basic conditions of service, workplace health and safety and retrenchment. Compliance is enforced and monitored by the Ministry of Labour through the office of the Labour Commissioner.
- RUL will also have to involve other State Owned Companies such as NamPower, Roads Authority and Telecom in the project's development.

Namibia's Vision 2030 aims to achieve "*a prosperous and industrialised Namibia*" to be realised through its national development plans. The Fourth National Development Plan 2012- 2017, NDP4, has three overarching goals which are adopted from Vision 2030:

- High and sustainable growth;
- Employment creation; and
- Increase in income equality.

The national plan is to put basic enablers in place and thus create an enabling environment, improve education and skills management, and establish a quality health system. These enablers will assist in addressing extreme poverty, and will upgrade the public infrastructure needed for industries to perform at the required level of output to reach Vision 2030 (NPC 2012).

## 6 The Socio-Economic Environment

### 6.1 The Erongo Region

The 2011 Population and Housing Census found that the population of the Erongo Region was 150,809 which is a considerable increase of 43,146 from 107,663 in 2001. This represents an overall annual growth rate of 3.4% but the towns of Swakopmund and Walvis Bay have experienced growth rates of 5.3% and 5% respectively. More than three quarters of the region's population live in the coastal towns of Walvis Bay, Swakopmund and Henties Bay and in Arandis which is slightly inland.

Walvis Bay sources its water from the Kuiseb aquifer while the other three towns and three big mines source their water from the Swakopmund and Omdel aquifers and more recently the Areva desalination plant. Of relevance to this project is therefore the socio-economic description of the activities reliant on the Omdel aquifer; for this reason Walvis Bay's activities are not detailed.

The region has seven constituencies and the planned project is within the northern boundary of Swakopmund, adjacent to the very elongated Arandis constituency (*Figure 2*).

**Figure 2.** Constituencies in the Erongo Region



Source: <http://www.erc.com.na/maps/constituencies/>

The main employment sectors in the Erongo Region are manufacturing (11.5%), mining (11.7%), fishing and agriculture (11.5%), construction (9%), repair of motor vehicles (9%) and administrative / support services (8%). The region's growth has been largely due to the mining sector, the harbour and fishing industry based in Walvis Bay, and the tourism sector which is focused around Swakopmund. All these industries are dependent on a reliable supply of fresh and potable water and the mining industry will be the biggest water consumer followed by the municipalities once Husab mine is operational.

As a measure of living standards, the Erongo Region has the second highest per capita consumption of all Namibia's regions, estimated at N\$22,700 per person per year in 2009/10 and this has grown by 54% in 5 years from N\$14,700/person/year (NSA 2012 and CBS 2006). When this is compared to six of the northern regions where rates are below N\$9,000/person, it partly explains why the region experiences high in-migration (NSA 2012); Oshiwambo languages are the most common, used by 39% of households. Other main language groups are Afrikaans (20%) and Nama/Damara (19%) with English (5%) and German (3%) making up a small minority.

## 6.2 Swakopmund

The Swakopmund Constituency has a total population of 44,700 in 2011, made up of slightly more males than females (23,700 to 21,000), largely due to the inward migration of men seeking work in the mines and supporting industries. The constituency is entirely urban and Swakopmund is the fourth largest town in Namibia (after Windhoek, Rundu and Walvis Bay). The town grew by 18,000 people from 2001 – 2011; however, it is much less densely populated with 228 people/km<sup>2</sup> than Walvis Bay which has a population of 62,096 and a density of almost 1,900 people/ km<sup>2</sup>.

Swakopmund's spatial development is constrained by the Swakop River to the south which is the border with Walvis Bay constituency, the Atlantic to the west and the desert to the north and east. The town's growth northwards along the coast has developed the middle to upper income residential suburbs of Vineta, Hage Heights and Mile 4, with the Swakopmund Salt Works and site for the proposed project, being the only large scale industrial site (*Figure 1*).

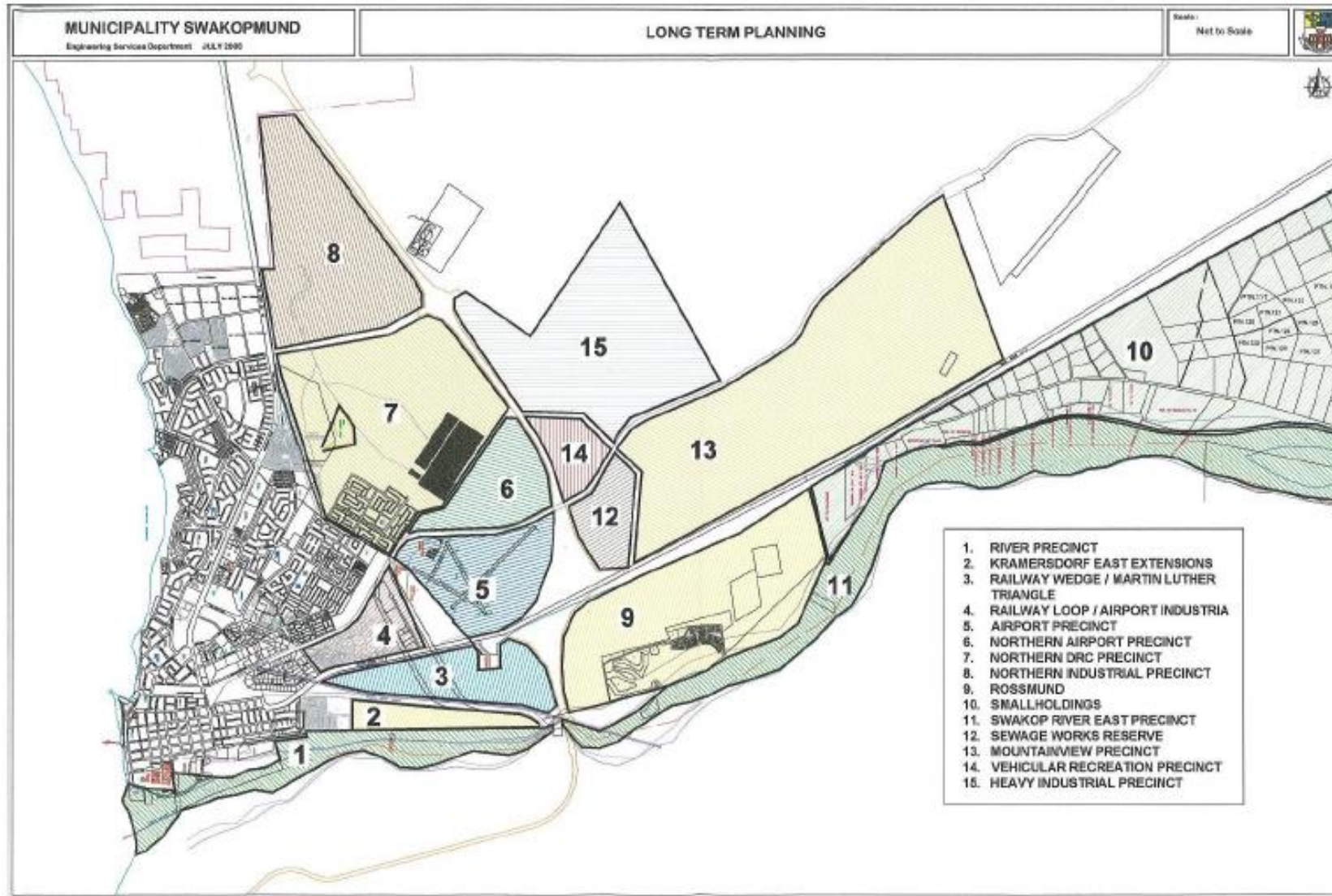
The lower income suburbs of Mondesa and the DRC have smaller erven (plots) and are to the east of the town centre. Industrial precincts are north and eastwards of the DRC, with good road access to the B2 main road which links Swakopmund to Walvis Bay and the Trans-Caprivi and Trans Kalahari Highways. Further up-market residential developments are spreading eastwards where there are views of the Swakop River valley and dunes beyond.

The long term town plan of 2008 has not yet been updated (*Figure 3*). Note that the proposed site is off the map, to the north.

Households in Swakopmund are the smallest in the region with 3.1 persons, compared to a regional average of 3.3 people per household. Forty four percent of households own their own home (with or without mortgage/ bond) compared to those who rent (42%). The large majority of households use electricity as their main fuel source for cooking (81%) and lighting (84%). Almost all households (99.7%) have access to safe drinking water.

Almost 80% of Swakopmund's population over the age of 15 is economically active – i.e. they are part of the potential labour force. Of those, three quarters (over 19,000 people) are employed while over 6,600 people are unemployed. About 5,000 people are economically inactive, being pensioners, students or homemakers. As a result of this high employment, 77% of households rely on wages and salaries as their main source of income and a further 10% rely on income from business.

Figure 3. Long term growth directions for Swakopmund



Source: CSIR 2009 p.4-23

### 6.3 Arandis and Henties Bay

Arandis is located about 60 km east of Swakopmund, off the main B2 road to Windhoek, and the national railway to Walvis Bay. The 2011 Population Census found that Arandis had a population of 5,170 people in 2011 while Henties Bay, a small town 67km north of Swakopmund had a population of 4,720. Both towns are dependent on water from the Omdel aquifer.

Arandis was established in 1970 to house employees of the Rössing mine and it has always been very economically dependent on RUL with most residents either working at the Rössing mine or for contractors of RUL. The higher income employees tend to prefer to live in Swakopmund, thereby causing the local buying power in Arandis to be insufficient for some basic commodities such as fuel, until recently. During the depressed uranium prices of the 1990s, the mine was threatened with closure and the town barely survived. Since then, the Town Council, RUL and the Rössing Foundation have made great strides in trying to diversify the town's economy.

New life has been breathed into the town with RUL's mine extension, the development of Areva's Trekkopje mine, the Husab mine and the forthcoming Arandis Power Heavy Fuel Oil Plant. These have spurred the town to plan for expansion and the constituency has showed a population annual growth rate of 2.9% since 2001.

Henties Bay, at the Omaruru River mouth, is primarily a holiday town with the ocean and miles of beaches as its main attractions. It is a thriving angling community and it is one of the few places from where 4x4 driving and quad biking is still permitted in designated areas within the Dorob National Park. The University of Namibia has established the Sam Nujoma Marine and Coastal Resources Research Centre at Henties Bay which focuses on mushroom development, coastal agriculture and plant biodiversity, renewable energy sources, water resources, as well as the coastal environment.

Nearly three quarters of the constituency's labour force is employed (72%) compared to the national average of 63%. Seventy two percent (72%) of households depend on wages and salaries. Unemployment is 28% compared to the national average of 37% (NSA 2014a).

### 6.4 The Mining Economy

The contribution of the mining economy to the Erongo Region and to Namibia's Gross Domestic Product (GDP) as a whole is significant. Non-diamond mining contributes about 50% of its annual total profits to government in the form of direct and indirect taxes. The mining sector in the coastal region is dominated by uranium mining and exploration. Since the March 2011 tsunami and subsequent severe damage to the Fukushima reactors in Japan, the uranium industry has suffered from low global uranium prices. Although some countries have cut back their nuclear energy programme, there are still 1,100 nuclear reactors worldwide with a further 72 under construction, 173 planned and 309 proposed. Morgan Stanley Research predicts that supply cutbacks (from Paladin and Cameco) are likely to cause a gradual increase in uranium price. It also expects nine nuclear plants to restart by year end 2014 and another seven in 2015 (Japan) (CoM 2014)<sup>2</sup>.

Although the current spot price is about US\$35/lb for uranium oxide<sup>3</sup>, most uranium transactions and mines depend on longer term contracts rather than the spot price, hence the continued development of the Husab mine and the survival of LHU and RUL. Rössing's sales portfolio has a mix of long-term and short-term price exposures including a number of sales contracts running beyond 2017. In April 2014, RUL reported to stakeholders that it has embarked on severe cost-cutting measures, including the retrenchment<sup>4</sup>. In June 2014, it further announced that to survive the low spot price and market over-supply, RUL will only produce sufficient quantities to supply into existing long term contracts where official

<sup>2</sup>CoM 2014. *Mining Industry Performance and Challenges during 2013*; accessed on [http://www.chamberofmines.org.na/fileadmin/user\\_upload/May\\_2014/1\\_Mining\\_Industry\\_Performance\\_and\\_Challenges\\_during\\_2013.pdf](http://www.chamberofmines.org.na/fileadmin/user_upload/May_2014/1_Mining_Industry_Performance_and_Challenges_during_2013.pdf)

<sup>3</sup> <http://www.infomine.com/investment/metal-prices/uranium-oxide/> accessed on 22 Oct 2014.

<sup>4</sup> RUL. 30 April 2014. *RUL's Report to Stakeholders* accessed on [http://www.rossing.com/md\\_message.htm](http://www.rossing.com/md_message.htm)

prices are US\$45/lb. This will make RUL insensitive to further spot price reductions but will still keep options open in the event that spot prices increase significantly.<sup>5</sup>

In 2013, RUL employed about 1,140 employees of whom 98% were Namibian and after the 2014 retrenchments, it now has 901 employees and approximately 500 – 600 contractors. The Rössing mine will require approximately 3 million cubic metres of water per annum ( $\text{Mm}^3/\text{a}$ ) for the next 10 years when the life of mine is expected to end.

The Husab mine is in the construction phase; mining operations have begun to remove the overburden and the processing plant is to be commissioned into operation by the fourth quarter 2015. At full production, it expects to produce 15Mlb of uranium oxide per annum, which will require 8 - 10  $\text{Mm}^3/\text{annum}$  of water<sup>6</sup>. It is 90% Chinese-owned and 10% owned by the Namibian State-owned mining company Epangelo Mining Company. The Husab mine expects to provide 1,600 permanent employees (Chinese and Namibian) and a further 8,000 indirect jobs in Namibia through the multiplier effect estimated at seven additional jobs to every mining job. The life of mine for zones 1 and 2 is 20 years. During operations, employees are expected to find housing in the nearby towns of Swakopmund, Arandis and Walvis Bay. It anticipates contributing N\$1.1 - 1.7 billion per year in corporate tax including N\$220-million per year in royalty payments and pay employee PAYE, duties, withholding and other taxes<sup>7</sup>.

Langer Heinrich Uranium (LHU) has completed two expansions and is now producing uranium oxide at a rate of 5.7Mlb per annum. In January 2014, Paladin entered into an agreement to sell a 25% stake in the Langer Heinrich Mine to a wholly owned subsidiary of China National Nuclear Corporation (CNNC). The offtake component of the agreement allows CNNC to purchase its pro-rata share of product at the prevailing market spot price. There is also opportunity for Paladin to secure additional long-term offtake agreements with CNNC. It is expected that the agreement will enhance the long-term growth and development of the Langer Heinrich operation. A Stage 4 expansion could increase production up to 8.7Mlb uranium oxide per annum, when higher uranium prices occur to justify expansion<sup>8</sup>. Including Stage 4, the life of mine is 17 years.

In 2013, LHU provided jobs for over 1,100 permanent staff and contractors<sup>9</sup>. Its water use in 2012/13 was approximately 2  $\text{Mm}^3$  per annum, supplied from NamWater (1.69  $\text{Mm}^3/\text{a}$ ), a bore field, runoff water collected in the mine pits, and supernatant recovery from the tailings storage facilities. The licence limit for abstraction from the groundwater is 0.5 $\text{Mm}^3$  per year although the total abstraction during 2012/13 was 0.28 $\text{Mm}^3$  which is 57% of the limit<sup>10</sup>. LHU's water demand would increase to approximately 7  $\text{Mm}^3$  per annum once the Stage 4 expansion is operational<sup>11</sup>.

The Strategic Environmental Assessment for the central Namib Uranium Rush of 2010 constructed various scenarios of mining and associated industrial development up to 2020<sup>12</sup>.

- Scenario 1: the 2010 situation with two operating mines (RUL and Langer Heinrich Uranium and two other mines under construction (Trekopje and Valencia).
- Scenario 2 included these four mines (and their expansions) plus two others e.g. Bannerman's Etango Project and the Husab mine. It predicted that these projects are likely to be accompanied by the construction of NamWater's desalination plant, an emergency diesel power plant, a 400 mw coal-or gas-fired power station and two chemical plants to supply the mines with reagents.

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<sup>5</sup> RUL. June 2014. Media Release: Rössing announcing organisational restructuring accessed on <http://www.rossing.com/bullet/rossing-announces-business-review.pdf>

<sup>6</sup> Metago. 2010. EIA report for the proposed Husab Mine, p.6-24

<sup>7</sup> Swakop Uranium May 2014. *Progress Report to the CoM Mining Conference*; accessed on [http://www.chamberofmines.org.na/fileadmin/user\\_upload/May\\_2014/2\\_Progress\\_of\\_the\\_Husab\\_Uranium\\_Project\\_and\\_the\\_commencement\\_of\\_the\\_Mining\\_Operations.pdf](http://www.chamberofmines.org.na/fileadmin/user_upload/May_2014/2_Progress_of_the_Husab_Uranium_Project_and_the_commencement_of_the_Mining_Operations.pdf)

<sup>8</sup> LHU. *Project Update June 2014*, <http://www.paladinenergy.com.au/default.aspx?MenuID=113>

<sup>9</sup> Chamber of Mines *Annual Review 2013*.

<sup>10</sup> <http://www.paladinenergy.com.au/default.aspx?MenuID=227>

<sup>11</sup> Metago 2011. Environmental Scoping Report for the proposed Stage 4 Expansion Project...at Langer Heinrich Mine. P6-9

<sup>12</sup> SAIEA. 2010. Strategic Environmental Assessment for the central Namib Uranium Rush. The Ministry of Mines and Energy, Namibia.

- Scenario 3 built on Scenario 2 with further expansion of those mines and the addition of at least two more mines, such as Reptile Uranium's Omahola Project and West Australian Metals' Marenica Project.
- Scenario 4 assumed that most or all of the mines will close down at a similar time on an unplanned basis, leaving an un-rehabilitated legacy of mine infrastructure, mass unemployment and excess capacity in all public and private infrastructure (including water supply).

Even with depressed uranium prices, Langer Heinrich and RUL continue to operate and Husab is fast coming on track. These mines require a reliable water supply at a market related price.

## 6.5 Guano Production

There is a commercial guano platform covering 31,000m<sup>2</sup> in one of the northern pans (*Figure 1*) which remains productive. Guano production rates have fallen and this is associated, in part, to the reduction in pelagic shoaling fish species along the coastline, which served as a primary food source for marine birds (Aurecon/SLR 2014).

The most common seabird species occupying the guano platforms is the Cape Cormorant. Its ability to move to different breeding localities enables it to take immediate advantage of good feeding conditions that may arise. It produces three eggs per clutch and so it has the potential to increase rapidly in good feeding years while they also decrease rapidly in periods of reduced availability of prey<sup>13</sup>.

## 7 Water Supply and Demand

### 7.1 Current Water Supply Options

Current water supply sources in Erongo's coastal region are the Omdel and Kuiseb Aquifers and the desalination plant built and owned by Areva.

The Omdel dam and aquifer recharge scheme was completed in 1994 but its sustainable yield is not fully understood. Based on figures in 2000, NamWater calculated that it has a sustainable yield of 9.8M m<sup>3</sup>/a<sup>14</sup>. Water Scarcity Solutions estimated the extractable recharge of Omdel to be about 7.1Mm<sup>3</sup>/a<sup>15</sup>. It concluded that by doubling the natural recharge, the scheme enabled the delay in a desalination plant being built which "*permitted the use of newer and more cost-effective desalination technology than would have been possible in 1990*"<sup>16</sup>. On 31 October 2013, the Ministry of Agriculture, Water and Forestry (MAWF) formally reduced the permissible Omdel aquifer abstraction from 9Mm<sup>3</sup> to 4.5Mm<sup>3</sup><sup>17</sup>. NamWater in agreement with the MAWF, applied to abstract 5.5 Mm<sup>3</sup>/a from Omdel for a period of two years. A permit to that amount has not yet been granted. NamWater has begun to conduct new hydrogeological modelling of the Omdel Dam aquifer which, together with the hydrological modelling already completed, will give them a better figure for its sustainable yield; results are due in April 2015. Current indications are that the 5.5 Mm<sup>3</sup>/a figure may have to be revised downwards.

The Department of Water Affairs estimates that the sustainable yield for the active Kuiseb between Swartbank and the Delta is in the order of 7 Mm<sup>3</sup>/a" (DWA 2008. p15)<sup>18</sup>. As this is the main source for Walvis Bay and its future developments, it is noteworthy only because the DWA cite it as a possible source for LHU: "*The current available natural water resources of the Kuiseb & Omdel scheme, excluding*

<sup>13</sup> Crawford, R.J.M. 1999. *Seabird responses to long-term changes of prey resources off Southern Africa*. In: Adams, N.J. & Slotow, R.H. (eds) Proc. 22 Int. Ornithol. Congr., Durban: 688-705. Johannesburg: BirdLife South Africa.

<sup>14</sup> NamWater. *The Omaruru Delta (Omdel) Scheme*. [http://www.namwater.com.na/index.php?option=com\\_content&view=article&id=105;](http://www.namwater.com.na/index.php?option=com_content&view=article&id=105;) accessed on 16 Aug 2014.

<sup>15</sup> Water Scarcity Solutions 2013. *Groundwater recharge: Omdel Dam, Namibia*; accessed from [http://www.waterscarcitysolutions.org/assets/2030WRG\\_case\\_study\\_omdel\\_dam.pdf](http://www.waterscarcitysolutions.org/assets/2030WRG_case_study_omdel_dam.pdf)

<sup>16</sup> Ibid

<sup>17</sup> Aurecon/SLR 2014. Draft Scoping Report

<sup>18</sup> <http://www.iwrm-namibia.info.na/downloads/4-kuiseb-basin-wm-plan-geo-hydrology.pdf>

the recent upgrades at Omdel to accommodate Langer Heinrich, are 12.9 Mm<sup>3</sup>/a. This can be increased to a max. of 15.9 Mm<sup>3</sup>/a by developing other natural resources within both catchments” (DWA 2008 p12).

To conclude, the sustainable yield of aquifer water available for all coastal users ranges from 10.9Mm<sup>3</sup>/a (Water Scarcity Solutions<sup>19</sup>) to 12.5Mm<sup>3</sup>/a (Table 1).

The Areva desalination plant was financed by the French government to serve the Trekkopje mine. It was built to serve a capacity of 20 million m<sup>3</sup> per annum and the water inlet pipe and power supply were built to allow for more than double that capacity, at the request of NamWater<sup>20</sup>, with the view of NamWater building a second plant to prepare for the predicted boom years of uranium mining. The construction of the marine intake and discharge structures is a significant component of the capital cost of a desalination plant. This additional infrastructure could bring the total water production at Wlotzkabaken to 40Mm<sup>3</sup>/a. Areva planned that if the Trekkopje mine reached full production, there would still be a surplus of 8Mm<sup>3</sup>/a of water available for other users<sup>21</sup>. In the present global climate, the plant is essentially over specified and unlikely to be ever commercially viable.

Since then, NamWater has planned to develop a desalination plant nearer to the mining areas, at Mile 6 with the aim of supplying 15 Mm<sup>3</sup>/year to be increased to 25 Mm<sup>3</sup>/year as the demand increased. It would have a minimum lifespan of 20 years. If NamWater decided to build that plant, Government would have to raise billions of dollars; the predicted capital cost in 2009 was approximately N\$1.8 billion. By April 2014, the project was in an advanced planning stage with three shortlisted bid teams with base offers ranging from US\$2.06/m<sup>3</sup> to US\$2.31/m<sup>3</sup>. However, the Tender Board of Namibia cancelled the tender reportedly saying that “the bidders did not meet tender conditions”<sup>22</sup>.

In January 2014, *GWI Desalination* reported that Areva SA has reportedly offered to sell its N\$2.9 billion (US\$276.3) plant to the GRN and Areva wished to retain a 10 to 20 percent stake in the facility<sup>23</sup>. The Government’s cancellation of the Mile 6 tender and its apparent silence on Areva’s offer to purchase their plant suggests that government does not have the funds to proceed: “It’s not a lack of political will that the project is yet to get off the ground, but a question of the availability of resources as the construction of a desalination plant is not a cheap undertaking.” MWA Minister John Mutorwa said<sup>24</sup>.

The over-specified Areva plant (*Section 7.1*) and therefore its financing, coupled with the current small off-take of 6Mm<sup>3</sup>/a, makes the fixed charges and related finance charges very costly to run. Negotiations between Areva and NamWater are not made public but Areva seems to be insisting that NamWater and therefore end users must pay for this over capitalisation. NamWater and the mines have no alternative available water supply so they are forced to accept the unfair and uneconomic prices.

## 7.2 Balancing Water Demand and Supply

In 2009, the Erongo Region consumed about 12 Mm<sup>3</sup> of water annually, with the main users being Walvis Bay, 4.3 Mm<sup>3</sup>, the RUL mine used 3.3 Mm<sup>3</sup> and Swakopmund used 3 Mm<sup>3</sup>. (CSIR. 2009 p.2-2).

Currently, demand is very close to the supply capacity. No-one can predict when demand will outstrip supply as over the medium term it depends to a large extent on how much water can be obtained and conveyed from the Areva plant and on how the mining demand will develop. Predictions of mining demand change frequently as the mines adjust their operational plans to adapt to their customers and the sales price.

NamWater is working on the predictions shown in *Table 1*. It shows that the domestic demand in the coastal region is estimated to be 12.4 Mm<sup>3</sup>/a in 2014 and could rise to 14.7Mm<sup>3</sup>/a by 2018. The demand in the mining and industrial sectors is predicted to be 5.4Mm<sup>3</sup>/a in 2014 and could rise to 13,7Mm<sup>3</sup>/a by

<sup>19</sup> [http://www.waterscarcitysolutions.org/assets/2030WRG\\_case\\_study\\_omdel\\_dam.pdf](http://www.waterscarcitysolutions.org/assets/2030WRG_case_study_omdel_dam.pdf)

<sup>20</sup> CSIR 2009

<sup>21</sup> Areva Resources Namibia <http://www.areva.com/EN/operations-595/areva-resources-namibia-training-and-mining-projects.html> accessed on 16 August 2014

<sup>22</sup> *GWI Desalination.com* accessed from <http://www.desalination.com/wdr/50/16/namwater%E2%80%99s-mile-6-swro-tender-cancelled>

<sup>23</sup> *Ibid* - as above

<sup>24</sup> *Informante* Thursday, August 21, 2014

2018 with just the certain users, including RUL. When these demand predictions are balanced with the supply, including being supplied 10Mm<sup>3</sup>/a from Areva, there could be a shortfall of about 5Mm<sup>3</sup>/a in 2016 which would rise to 8Mm<sup>3</sup>/a from 2017.

This scenario depends on a number of assumptions about what mining developments will actually take place. If the uranium price were to recover significantly (such as over US\$80/lb), development of a number of new mines including Trekkopje, Etango, Omahola and Marenica could significantly increase demand resulting in a further shortfall. If Areva started mining at full production at Trekkopje, it would need 12 Mm<sup>3</sup>/a for its own use and therefore only a maximum of 8 Mm<sup>3</sup>/a of water would be available for others, increasing the shortfall further.

**Table 1.** Predicted water demand, sources and surplus for the Erongo Coast

Consumer		Predicted Water Demand (m <sup>3</sup> )				
		2014*	2015	2016	2017	2018
Domestic Demand	Municipality of Walvis Bay	5,888,343	6,056,760	6,238,463	6,425,617	6,618,385
	NamPort	266,387	271,715	277,149	282,692	288,346
	Smaller consumers fed from Kuiseb	274,074	279,555	285,147	290,849	296,666
	Municipality of Swakopmund	4,298,566	4,803,390	5,151,366	5,305,907	5,465,084
	Municipality of Henties Bay	549,604	577,084	605,938	636,235	668,047
	Arandis Town Council	432,000	480,000	500,000	550,000	605,000
	Smaller consumers fed from Omdel	99,520	101,510	103,541	105,612	107,724
	Plus 5% Losses	590,425	628,501	658,080	679,846	702,463
	<b>Total Domestic/Municipal</b>	<b>12,398,919</b>	<b>13,198,516</b>	<b>13,819,684</b>	<b>14,276,758</b>	<b>14,751,715</b>
Mining & Industrial Demand	Rössing	2,715,634	2,715,634	2,715,634	2,715,634	2,715,634
	Langer Heinrich	1,677,290	1,438,964	1,426,815	1,441,294	1,441,294
	Husab	775,025	1,661,000	6,201,000	8,419,000	8,600,000
	Zhonghe					
	Sandpiper Phosphate					
	Etango					
	Valencia					
	Omahola					
	Namib Lead & Zinc		50,000	200,000	250,000	250,000
	Plus 5% Losses	258,397	293,280	527,172	641,296	650,346
<b>Total Mines &amp; Industry</b>	<b>5,426,346</b>	<b>6,158,878</b>	<b>11,070,621</b>	<b>13,467,224</b>	<b>13,657,274</b>	
<b>Total Domestic &amp; Mines</b>	<b>17,825,265</b>	<b>19,357,393</b>	<b>24,890,305</b>	<b>27,743,982</b>	<b>28,408,990</b>	
Sources	Omdel	5,500,000	5,500,000	2,700,000	2,700,000	2,700,000
	Kuiseb	7,000,000	7,000,000	7,000,000	7,000,000	7,000,000
	Swartbank J-line					
	New Source - Areva	5,426,000	5,426,000	10,000,000	10,000,000	10,000,000
	<b>Total Sources</b>	<b>17,926,000</b>	<b>17,926,000</b>	<b>19,700,000</b>	<b>19,700,000</b>	<b>19,700,000</b>
<b>Total Surplus</b>	<b>100,735</b>	<b>-1,431,393</b>	<b>-5,190,305</b>	<b>-8,043,982</b>	<b>-8,708,990</b>	

Note: \* calendar year starting in January.

Source: Drews H., Senior Manager: Planning & Water Resources E&SS NamWater. October 2014

## 7.3 Water Tariffs

NamWater supplies the Swakopmund, Arandis and Henties Bay municipalities with Omdel aquifer water, and currently only the mines receive the very expensive desalinated water. NamWater and Municipalities have significantly increased their charges above inflation in recent years. Water Scarcity Solutions estimated the cost of Omdel water is N\$2.5/m<sup>3</sup> (WSS 2013). Swakopmund water tariffs for domestic and business users are similar, with the lowest cost being about N\$7/m<sup>3</sup>. Domestic tariffs increased from May 2014 to the following (pers. comm. Swakopmund Municipality):

0-9 m <sup>3</sup>	N\$61.75
9m <sup>3</sup> -30 m <sup>3</sup>	N\$11.65/m <sup>3</sup>
30m <sup>3</sup> -60 m <sup>3</sup>	N\$16.30/m <sup>3</sup>
60 m <sup>3</sup> and above	N\$24.10/ m <sup>3</sup>

In 2011, NamWater added a 15% mark-up to its conveyancing cost to the mines only. NamWater did not reply to our request for information but it is possible that this mark-up not only contributes to coastal water infrastructure but it could also subsidise other users in the region or elsewhere in the country.

The three mines (RUL, LHU and Husab) in operation / development currently require approximately 6Mm<sup>3</sup>/a, and the demand will grow to approximately 12.5Mm<sup>3</sup>/pa over the next three years. The smaller off-take than the Areva plant was built for makes the repayment of investment costs - the fixed charges and related finance charges very costly. As RUL uses approximately half of the current off-take, it effectively carries half the cost of this plant. Rössing is currently paying N\$45 to N\$50/m<sup>3</sup> for desalinated water. However, these contracts are on a take or pay basis and therefore during periods of low usage, the actual water cost exceeded N\$90/m<sup>3</sup>.

In 2012 (the last full year on aquifer water), RUL's water cost was N\$32 million. In 2014 (the first full year on desalinated water), the cost for water is expected to be N\$132 million. For RUL, this is a commercially unsustainable situation and hence it proposes a smaller, more efficient desalination plant. RUL's preliminary indications are that it can produce water at below US\$2/m<sup>3</sup> (~N\$22/m<sup>3</sup>), before conveyancing costs. (The accepted benchmark for desalinated water is between US\$2.00/m<sup>3</sup> and US\$2.50/m<sup>3</sup>)<sup>25</sup>. This is substantially less than the existing water price, which is well above US\$3/m<sup>3</sup> (~N\$33/m<sup>3</sup>), before conveyancing costs. (As the cost of conveyancing will exist whether it is Areva's water or RUL-produced water, RUL assumes conveyancing costs to be cost neutral). By constructing its own desalination plant, RUL is anticipating a saving in water costs of approximately N\$40m to N\$60m per year against the current water cost.

The key issues revolve around inadequate supply of desalinated water, as well as the cost at which it is or can be produced and sold to users.

## 8 Socio-economic Impact Assessment

In this chapter, the predicted positive and negative impacts associated with the proposed project will be explained and assessed. Measures are proposed to enhance and maximise positive socio-economic impacts while mitigation measures aim to reduce negative impacts.

### 8.1 Assessment Methodology and Limitations

The assessment is largely dependent on data which has been supplied by Rössing Uranium, as NamWater declined to provide any.

Assessment of predicted significance of impacts for a proposed development is by its nature, inherently uncertain – environmental assessment is thus an imprecise science. To deal with such uncertainty in a comparable manner, Aurecon/SLR Consulting has provided a standardised and internationally recognised

<sup>25</sup> Aurecon/SLR 2014. Draft Scoping Report p.17

methodology<sup>26</sup> which is applied in this study to assess the significance of the potential environmental impacts. The method is as follows:

For each impact, the EXTENT (spatial scale), MAGNITUDE (size or degree scale) and DURATION (time scale) are described. These criteria are used to ascertain the SIGNIFICANCE of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The tables on the following pages (Tables 2 - 6) show the scale used to assess these variables, and define each of the rating categories.

**Table 2.** Assessment criteria for the evaluation of impacts

CRITERIA	CATEGORY	DESCRIPTION
Extent or spatial influence of impact	National	Within the country
	Regional	Within the province/recognised region
	Local	On site or within 1,000m of the impact site
*Magnitude of impact (at the indicated spatial scale)	High	Social and/or natural functions and/ or processes are severely altered (i.e. function is severely hampered and processes are unlikely to function)
	Medium	Social and/or natural functions and/ or processes are notably altered (i.e. function is affected to a noticeable degree and processes struggle to function effectively)
	Low	Social and/or natural functions and/ or processes are slightly altered (i.e. while function is affected in a measurable way, processes are likely to function, albeit sub-optimally)
	Very Low	Social and/or natural functions and/ or processes are negligibly altered (i.e. function is slightly affected and processes are likely to function effectively)
	Zero	Social and/or natural functions and/ or processes remain unaltered
Duration of impact	Long Term	More than 10 years
	Medium Term	Up to 10 years
	Short term (construction period)	Up to 3 years

\*NOTE: Where applicable, the magnitude of the impact has to be related to the relevant standard (threshold value specified and source referenced).

The magnitude of impact is based on specialist knowledge of that particular field.

The SIGNIFICANCE of an impact is derived by taking into account the temporal and spatial scales and magnitude. Such significance is also informed by the context of the impact, i.e. the character and identity of the receptor of the impact. The means of arriving at the different significance ratings is explained in the following table, developed by Ninham Shand in 1995 as a means of minimising subjectivity in such evaluations, i.e. to allow for replicability in the determination of significance.

**Table 3.** Definition of significance ratings

SIGNIFICANCE RATINGS	LEVEL OF CRITERIA REQUIRED
High	<ul style="list-style-type: none"> <li>• High magnitude with a regional extent and long term duration</li> <li>• High magnitude with either a regional extent and medium term duration or a local extent and long term duration</li> <li>• Medium magnitude with a regional extent and long term duration</li> </ul>
Medium	<ul style="list-style-type: none"> <li>• High magnitude with a local extent and medium term duration</li> <li>• High magnitude with a regional extent and construction period or a site specific extent and long term duration</li> <li>• High magnitude with either a local extent and construction period duration or a site specific extent and medium term duration</li> <li>• Medium magnitude with any combination of extent and duration except site specific and construction period or regional and long term</li> <li>• Low magnitude with a regional extent and long term duration</li> </ul>

<sup>26</sup> As described, inter alia, in the South African Department of Environmental Affairs and Tourism's Integrated Environmental Management Information Series (Gov. of SA, 2002).

SIGNIFICANCE RATINGS	LEVEL OF CRITERIA REQUIRED
<b>Low</b>	<ul style="list-style-type: none"> <li>• High magnitude with a site specific extent and construction period duration</li> <li>• Medium magnitude with a site specific extent and construction period duration</li> <li>• Low magnitude with any combination of extent and duration except site specific and construction period or regional and long term</li> <li>• Very low magnitude with a regional extent and long term duration</li> </ul>
<b>Very low</b>	<ul style="list-style-type: none"> <li>• Low magnitude with a site specific extent and construction period duration</li> <li>• Very low magnitude with any combination of extent and duration except regional and long term</li> </ul>
<b>Neutral</b>	<ul style="list-style-type: none"> <li>• Zero magnitude with any combination of extent and duration</li> </ul>

Once the significance of an impact has been determined, the PROBABILITY of this impact occurring as well as the CONFIDENCE in the assessment of the impact has been determined using the rating systems outlined in the following two tables. It is important to note that the significance of an impact should always be considered in concert with the probability of that impact occurring.

**Table 4.** Definition of Probability Ratings

PROBABILITY RATINGS	CRITERIA
<b>Definite</b>	Estimated greater than 95% chance of the impact occurring.
<b>Probable</b>	Estimated 5% to 95% chance of the impact occurring.
<b>Unlikely</b>	Estimated less than 5% chance of the impact occurring.

**Table 5.** Definition of Confidence Ratings

CONFIDENCE RATINGS*	CRITERIA
<b>Certain</b>	Wealth of information on and sound understanding of the environmental factors potentially influencing the impact.
<b>Sure</b>	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact.
<b>Unsure</b>	Limited useful information on and understanding of the environmental factors potentially influencing this impact.

\* The level of confidence in the prediction is based on specialist knowledge of that particular field and the reliability of data used to make the prediction.

Lastly, the REVERSIBILITY of the impact has been estimated using the rating system outlined in the following table.

**Table 6.** Definition of reversibility ratings

REVERSIBILITY RATINGS	CRITERIA
<b>Irreversible</b>	The activity will lead to an impact that is permanent.
<b>Reversible</b>	The impact is reversible, within a period of 10 years.

Despite attempts at providing a completely objective and impartial assessment of the environmental implications of development activities, environmental assessment processes can never escape the subjectivity inherent in attempting to define significance. The determination of the significance of an impact depends on both the context (spatial scale and temporal duration) and intensity of that impact. Since the rationalisation of context and intensity will ultimately be prejudiced by the observer, there can be no wholly objective measure by which to judge the components of significance, let alone how they are integrated into a single comparable measure.

Although these measures may not totally eliminate subjectivity, they provide an explicit context within which to review the assessment of impacts.

In addition, when assessing the significance of the project level impacts, CUMULATIVE EFFECTS are also considered as far as it is possible in striving for best practice. The sustainability of the project is closely linked to assessment of cumulative impacts.

## 8.2 The No-Go Alternative: Likely closure of Rössing Uranium

### *Description of Impact*

A No-Go alternative to the project is a possibility as NamWater informed us that their shareholder, Government, was not in favour of the proposal.

In order to survive on-going, low uranium prices, RUL is implementing a “curtailment strategy” whereby it only produces sufficient quantities to supply existing long term contracts where official prices are US\$45/lb. This will still keep options open in the event that spot prices increase significantly<sup>27</sup> and operations could be expanded. As part of this survival strategy, RUL was forced to retrench 276 people who brought an operational cost saving of approximately N\$100 million. With the current water purchase agreement, RUL is expecting to pay NAD132 million in 2014 for water so the savings made from retrenchments are being transferred to pay Areva’s high water charges.

NamWater is contracted to supply a certain volume of water to RUL monthly. If RUL does not use its full volume, the unit price becomes more expensive. When RUL takes its full allocation of water in terms of the take or pay arrangement with NamWater, the average cost of the water is approximately N\$33/m<sup>3</sup> before conveyancing costs and N\$47.5/m<sup>3</sup> inclusive of conveyancing costs. However, in the two months where RUL suffered curtailed operations, the unit cost of water became approximately over N\$90/m<sup>3</sup>.

Since 2009, despite negotiations, Areva has not been willing to adjust the tariff and NamWater has not produced a feasible commercially viable alternative solution. In order to continue operating RUL has no alternative but to reduce its water costs; further redundancies will not be sufficient.

When the uranium price dipped to US\$28/lb, RUL evaluated all the options and concluded that with only 10 years life of mine remaining, it would be too expensive to adopt a “Care and Maintenance strategy” as Areva has done. It implemented the curtailment strategy and made plans to build a cheaper water supply.

The No-Go alternative could force RUL to close, ten years before necessary. This would not only affect the whole RUL workforce but would be a loss to the local, regional and national socio-economic economy.

When fully operating, as in 2013, RUL reported a profit for the first time in three years, amounting to a net profit of N\$32 million with a turnover of N\$2.96 billion. Its spending in Namibia leads to a long chain of value addition throughout the economy. In 2013 RUL:

- Spent N\$1.9 billion on goods and services
- Generated N\$83 million in royalty payments
- Generated N\$143 million in PAYE payments
- Made N\$289 million of payments to state owned enterprises, and
- Paid N\$783 million in employment costs<sup>28</sup>.

Closure of the Rössing mine would mean these socio-economic contributions to the country would be lost as it would be too costly to re-commission the mine after closure.

A No-Go option could result in redundancy for RUL’s current 901 direct employees which would be a loss of N\$650 million per annum in employment costs to the economy.

Also at stake are the indirect economic impacts arising through the provision of all inputs purchased by the mine (N\$1.9 billion in 2013) in order to produce uranium oxide, as well as the inputs purchased by their suppliers to produce their inputs, and so on, along the production chain. This backward chain is usually very extensive and includes the energy needed to produce inputs, the replacement parts, and a wide variety of scientific, financial, accounting and technical services. SOEs such as NamPower a major

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<sup>27</sup> RUL. June 2014. *Media Release: Rössing announcing organisational restructuring* accessed on <http://www.rossing.com/bullet/rossing-announces-business-review.pdf>

<sup>28</sup> RUL. 21 May 2014. *Rössing Uranium – Looking Ahead*. Press Release to members of the Media by Werner Duvenhage, MD, RUL accessed on <http://www.rossing.com/bullet/rossing-looking-ahead.htm>

customer and NamWater would lose income through RUL's conveyancing costs; Government would lose millions of N\$ from lost royalties and a range of other taxes including PAYE.

Simonis Storm<sup>29</sup> surveyed a large number of suppliers of goods and services in the uranium mining industry in Namibia and calculated that for every N\$1.00 spent by a uranium mining company as part of their cost of sales, 81 cents will be injected into the economy via the multiplier. It also calculated that for every job created by a mine, a further additional 1.5 job opportunities are created by suppliers and contractors. Thus closure of RUL employing 901 people could result in a loss of a further 1,350 jobs in staff of suppliers and contractors. However the mining sector has been increasing effort to procure from local suppliers and producers and Husab calculates the multiplier is seven additional jobs are created to every mining job. In this scenario, the closure of RUL could result in job losses of over 6,300 indirect jobs.

A further layer below indirect impacts is the induced economic impact. These are products and services purchased by employees and contractors as a result of their continued employment and therefore spending power stemming from salaries and wages. If they buy Namibian products and services, they create a greater economic impact on the Erongo Region and nationally. Moreover, this induced level has its own backward chain, as these purchased goods and services require further inputs to be produced.

At a local level, although Arandis has made great efforts to diversify its economy, the town is still very reliant on RUL for its well-being as the majority of its breadwinners work for RUL. The impact of RUL closure on Swakopmund will be felt through the unemployment of RUL's employees and through the reduced business turnover of companies which supplied RUL and their employees with goods and services. Thus an early closure of RUL would have severe impacts for over an estimated 2,250 breadwinners and their families directly affected, and through the multiplier effect on the wider community in the coastal region.

While this immediate uncertainty lasts, employees may move to other more secure employment opportunities, adding to the cost if RUL is able to resume full operations.

### **Assessment of Impact**

*Type of Impact:* The impact of a No-Go option could mean closure of RUL, ten years earlier than necessary. This would create direct and indirect negative impacts. NamWater, other SOEs, Government, regional industry, towns, communities and families would lose the economic benefits outlined above. These impacts are direct, indirect and induced; all negative. Only if uranium prices rise significantly, would RUL be able to carry the current high cost of water and make a profit. The continuing economic uncertainty for RUL is not good for job security and business.

*Extent:* The impact of RUL closure will be felt at all levels of the society and the economy.

*Magnitude:* Social and economic processes will be severely altered and many will cease altogether so the magnitude will be high and negative.

*Duration:* The loss of a breadwinner's income can affect the education and wellbeing of his/her children which could have a lifetime's impact. It could take several years for families and businesses to recover, thus the duration of the impact is medium to long term.

*Significance:* The above ratings of high magnitude with a national extent and medium to long term duration results in a highly negative significance rating.

*Probability:* With the current global climate and the lack of recovery in the uranium price since the Fukushima disaster, a forced closure is probable, estimated at between 5 - 95% chance that the impact will occur.

*Confidence:* Sure. This rating is based on a reasonable amount of information being made available by RUL and on a relatively sound understanding of the economic factors potentially influencing the impact. As RUL has made continuous operating efficiencies since the uranium price crash, it is highly plausible that there are no further significant cost-cutting actions remaining.

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<sup>29</sup> Simonis Storm Securities 2010. *The Namibian uranium industry: Economic impact and counter valuation*  
*Socio-economic impact assessment study for the proposed Rössing desalination plant*

*Reversibility:* With only 10 years of the mine remaining, closure would be permanent and therefore deemed irreversible

*Cumulative Impacts:* Namibia has high unemployment levels as jobs are scarce and job creation does not match the number of school leavers entering the market. In 2013, over 290,000 people in Namibia were unemployed. The official national unemployment rate rose by 2.2% between 2012 and 2013 to 29.6%. Female unemployment is higher at 33% and youth unemployment rose from 37.8% to 41.7% (NSA 2014b). The loss of more than 2,000 jobs will contribute to more unemployment.

### **Description of Proposed Mitigation Measures**

The objective of the mitigation measures is to limit the impacts associated with running RUL at an operating loss in the event that RUL is not permitted to build its own desalination plant.

#### *Actions*

RUL could:

- Inform all stakeholders which would be affected by closure or severely reduced operations to lobby NamWater & GRN to reverse the No-Go decision and approve the RUL desalination plant
- Lobby NamWater & GRN to:
  - Hold high level negotiations with the French Government to contract a neutral assessor to ascertain a realistic price for Areva’s water. The assessor should be an experienced and respected worldwide leader in desalination plants and Veolia or Degremont are suggested as they are both based in Paris.
  - Obtain finance to fast-track the development of the Mile 6 desalination plant which will improve the viability and profitability of RUL and Husab mines. This would strengthen the GRN’s hand when negotiating a fairer price for Areva’s water.

The probability of these mitigation measures occurring is unknown. RUL proposal to construct a new desalination plant backs onto a failed attempt by RUL to lobby and reach agreement with NamWater and Areva regarding the exorbitant water tariffs.

The revised impact assessment is based on the assumption that these mitigating measures are successful and that a more realistic cost of desalinated water is available which would enable RUL to resume full operations and mine feasibility.

*The residual impacts* would then be positive as RUL and businesses down the supply chain would remain operating and their employees and contractors would retain their jobs. SOEs would obtain income by selling their services to RUL and their service providers and Government would receive taxes.

A summary of these criteria ratings, before and after mitigation are shown in *Table 7*.

**Table 7.** No-Go Alternative: Summary of Impact Assessment

Impact description	Type	Extent	Magnitude	Duration	Probability	Confidence	Reversibility	Significance
Before mitigation	-ve	National	High negative	Long term	Probable	Sure	Irreversible	High (-)
With mitigation	+ve	National	High positive	Long term	Probable	Certain	Reversible	High (+)

### 8.3 RUL's own desalination plant – Likely survival of RUL

#### *Description of Impact*

As concluded by the Uranium SEA and the EIA report for the NamWater Mile 6 plant, desalination is the only feasible way to meet the future water demands of the mining and other major water users in the coastal region (SAIEA 2010, CSIR 2009). The proposed desalination plant will enable RUL to continue production. Thus the economic impact of the RUL desalination plant is reflected by assessing the benefits derived from RUL continuing to operate.

The impact of the desalination plant would enable the survival of RUL and would retain the benefits that RUL currently brings to the local, regional and national economy, as described above, in the No-Go Alternative.

In addition to the continued operations of the mine, the construction of the proposed RUL desalination plant will contribute to the economy in several ways. Construction is planned to start in 2015 and the investment cost for the plant is estimated to be between N\$180 million and N\$220 Million<sup>30</sup>. As RUL will purchase a prefabricated desalination plant which will be imported, approximately N\$100 million of the cost will be imported, benefitting government through import taxes and NamPort. This cost does not include constructing an RUL own pipeline from the plant to the mine. RUL's cost of capital is much cheaper than that of NamWater or a project company, and accordingly, the financing portion would be much cheaper as well.

The construction period is estimated to be 18 months and will create approximately 50 jobs at peak times. Indirect economic benefits will include purchases of local supplies such as concrete which will require cement (assumed to be Namibian), gravel, sand and transport.

The operational cost estimate of the desalination plant is N\$26.1 million per year. The plant operation will require approximately 12-18 contract staff working on a shift basis as required, of which most is likely to be in highly skilled positions with only a marginal number of unskilled or semi-skilled positions. It is likely that the plant will be operated by Gecko under an Operation and Maintenance Contract with Rössing Uranium.

**Table 8.** Estimated Annual Operating Expenditure of te RUL plant

<u>Opex</u>		NAD
Electricity (Variable)	Cost/a	12,890,040
Electricity (Fixed)	Cost/a	3,481,022
Chemicals	Cost/a	4,095,000
Spare Parts and Consumables (Revamp)	Cost/a	1,701,000
<u>Labour</u> (Salaries)	Cost/a	2,457,000
Membranes and Cartridge	Cost/a	425,250
SHEQ	Cost/a	75,600
Maintenance	Cost/a	567,000
Laboratories	Cost/a	472,500
Asset Replacement	Cost/a	-
<b>Sub-Total: OPEX</b>	Cost/a	<b>26,164,412</b>
<b>Sub-Total: OPEX</b>	Cost/m3	<b>8.72</b>

Source: Gecko 2014. Pre-Feasibility Study Report for Rössing Desalination Plant at Swakopmund Salt Works

Table 8 shows the estimated value of inputs required to operate the plant annually. This includes an estimated N\$2.4 million in wages/salaries, N\$1.6 million for electricity to NamPower, N\$4 million in chemicals and N\$2.1 million of parts and consumables which would include those produced locally (requiring the backward chain of inputs) and others to be imported through NamPort.

<sup>30</sup> Rio Tinto 1 August 2014. Employee Brief "Update - Rössing considering own desalination plant".

RUL's preliminary indications are that it can produce water at below ~N\$22/m<sup>3</sup> (US\$2/m<sup>3</sup>), before conveyancing costs. For 3Mm<sup>3</sup> of water from the proposed desalination plant RUL is expecting to save between N\$40 million to N\$60 million per year. It anticipates recovering the cost of constructing the plant within three and half years.

The RUL desalination plant will have immediate commercial benefits to RUL on the current situation as it will be more economical to run and it will be under RUL control. Since the desalination plant will be modular, it would be easy to increase or decrease capacity in line with mine requirements that may vary from month to month, without having to incur a take or pay penalty.

### **Assessment of Impact**

*Type of Impact:* Direct, indirect and induced; all positive.

*Extent:* This will be felt at all levels of the society and economy as it will enable RUL to continue mining.

*Magnitude:* The remaining operations phase for the mine is 10 years and that will bring about permanent improvements in the quality of life of the workers and their families through being able to afford better livelihoods, education and housing. Service companies and the government will also gain which revenue which could be invested. Thus, the magnitude of the impacts is rated as high.

*Duration:* The impact of RUL being able to operate for a further 10 years and the positive benefits this bring to employees, their families, businesses and government is a long-term.

*Significance:* The above ratings of high magnitude with a national extent and long term duration results in a highly positive significance rating.

*Probability:* RUL is confident that it will be able to meet its long term sales agreements with the reduced operating costs which the desalination plant provides. Its survival is estimated at greater than 95% chance that the impact will occur.

*Confidence:* Certain. RUL would only be prepared to make such a large investment if it was very confident that it would remain in operation afterwards.

*Reversibility:* The action is reversible in that the plant can be decommissioned and RUL close.

*Cumulative Impact:* Areva has built one desalination plant which has resulted in a monopoly situation where it can charge exorbitant prices. In the absence of a NamWater plant, it makes economic sense for RUL to build one and the cumulative impact will be that other mines, e.g. Husab may want to follow suit. This would reduce the current monopoly on the supply of desalinated water which would benefit all future consumers.

### **Description of Proposed Enhancement Measures**

The objective of the enhancement measures is to increase positive impacts associated with building RUL's own desalination plant.

#### **Actions**

RUL should contractually ensure that the company which builds its plant gives preference to Erongo Region-based companies and employees.

The impact ratings above would remain the same (*Table 9*).

**Table 9. Survival of RUL: Summary of Impact Assessment**

Impact description	Type	Extent	Magnitude	Duration	Probability	Confidence	Reversibility	Significance
Before mitigation	+ve	National	High - positive	Long term	Very likely	Certain	Reversible	High (+)
With mitigation	+ve	National	High - positive	Long term	Very likely	Certain	Reversible	High (+)

## 8.4 Impact of RUL's plant on NamWater and other users

### *Description of Impact*

At present, the two sources of water available for mining, industrial and domestic use are the Omdel aquifer and Areva's desalination plant. Only the mines pay for desalinated water as the Omdel aquifer's permissible offtake of 4.5Mm<sup>3</sup>/a can supply all the municipalities' needs.

Under the Namibia Water Corporation Act (12 of 1997), NamWater is legally bound to supply bulk water, based on need and availability and it sells water to the mines and municipalities. NamWater and municipalities have significantly increased their charges above inflation in recent years. The poorest end-consumers in Swakopmund are charged ~N\$7/m<sup>3</sup> (compared to the estimated cost of that water at source at N\$2.5/m<sup>3</sup>). By comparison, the average cost of desalinated water to RUL is approximately N\$33/m<sup>3</sup> before conveyancing costs and N\$47.5/m<sup>3</sup> inclusive of conveyancing costs. RUL is convinced that NamWater does not mark-up the price of Areva water; NamWater profits through the conveyance cost, which it would gain whether it supplies Areva or RUL-produced water. However NamWater would lose some revenue as it could no longer charge RUL for conveying water between the Areva or its potential Mile 6 plant and the proposed plant.

#### *Impact on NamWater:*

- a. NamWater would lose conveyancing revenue for the loss of volume piped between the Areva or its potential Mile 6 plant and the junction with RUL's proposed supply source.
- b. Should NamWater build the Mile 6 desalination plant, RUL will not be one of their customers.

#### *Impact on the LHU and Husab mines:*

By the time RUL's plant becomes operational, earliest in 2016, the Husab mine will have come into production which should noticeably reduce the unit cost of water for all Areva's consumers. However, Husab and LHU would have to cover RUL's missing contribution to Areva's financing costs which would be approximately one fifth of the share of total water (3Mm<sup>3</sup>/13.6Mm<sup>3</sup>). However, the potential competition and additional supply of water at visibly lower cost could have a favourable impact on overall prices.

#### *Impact on the Municipalities:*

There should be no impact on the municipalities as their water source is from Omdel and not from Areva.

### **Assessment of Impact**

*Type of Impact:* Direct negative on NamWater and other users.

*Extent:* It would be felt regionally by the two mines and nationally on the reduced profits of NamWater and the mines.

*Magnitude:* NamWater would lose some conveyancing income. LHU and Husab would experience a small increase in operating costs (approximately a fifth share charged of Areva's financing costs); Husab would be charged the bulk of this as their water requirement will be considerably more than LHU's. Compared with their other operating costs, the overall magnitude is estimated to be low and negative.

*Duration:* The impact would last the expected remaining lifespan of the RUL mine, i.e. 10 years, which is long term.

*Significance:* The above ratings of low magnitude with a national extent and long term duration results in a medium negative significance rating.

*Probability:* The impact is probable as it is estimated there is a 5% - 95% chance that the impact will occur.

*Confidence:* Sure. This rating is based on a reasonable amount of useful information being made available and on a relatively sound understanding of the economic factors potentially influencing the impact.

*Reversibility:* Other factors could reduce the cost of the Areva water which would reverse the impact of RUL's plant.

*Cumulative Impacts:* RUL's cheaper production rate may encourage other mines to build their own plant.

### **Description of Proposed Mitigation Measures**

The mitigation measure proposed in 8.2, to ascertain a realistic price for Areva's water which would benefit the other mines.

NamWater will be gaining from the increased conveyancing costs of supplying Husab with more water so they would be making more profit during the period. No mitigation measure is therefore proposed.

A summary of these ratings is shown in *Table 10*.

**Table 10.** Impact on NamWater and other Users: Summary of Impact Assessment

Impact description	Type	Extent	Magnitude	Duration	Probability	Confidence	Reversibility	Significance
On NamWater and other users	-ve	National	Low negative	Long term	Probable	Sure	Reversible	Medium (-)
With Mitigation, or LHU / Husab	-ve	National	Very low negative	Long term	Probable	Sure	Reversible	Low (-)

## **8.5 Increased availability of desalinated water**

### **Description of Impacts**

The following scenarios are assessed together as they both bring positive economic benefits.

1. Short-term: In the first two years of operating RUL's plant, the mine will only require about 2.3 – 2.4Mm<sup>3</sup>/a. As the plant can produce 3Mm<sup>3</sup>/a, NamWater could purchase the surplus at a cheaper cost than Areva's water which would benefit LHU and Husab.
2. Medium term: If the uranium price increases and other mines come into operation, the Areva plant would not have capacity to provide enough water. RUL's plant would save NamWater, and its sole shareholder the GRN, from building its required capacity 3Mm<sup>3</sup>/a. The cost of such a module will obviously be less than the N\$180 - 220 million which RUL will pay for a stand-alone plant but nevertheless it will be a capital saving to NamWater / GRN.
3. Decommissioning: The plant's design life of 10 years corresponds to the current remaining lifespan of the RUL mine. The RUL plant would probably need some asset replacement to continue beyond its design life but this would be feasible and the plant would then be available to provide water for a growing coastal economy and population at a greatly reduced cost for government.

### **Assessment of Impacts**

*Type of Impact:* All these are direct and positive impacts and provide cumulative benefits.

*Extent:* The RUL-built plant will impact positively on the national economy as any surplus will reduce operating costs of LHU and Husab. The NamWater/GRN will be spared financing a module of 3Mm<sup>3</sup>/a capacity which will free up the state's money for other projects. At the decommissioning phase, if the RUL's plant is available for other coastal users, it will bring regional and local benefits.

*Magnitude:* Affordable desalinated water is essential for the growing coastal economy and its people. Thus, the magnitude of the impact for both phases is rated as high positive.

*Duration:* The impact of RUL's plant being able to operate for a further 10 years and the positive benefits this bring to the coastal economy is long-term.

*Significance:* The above ratings of high magnitude with a national / regional extent over a long term duration results in a highly positive significance rating.

*Probability:* The probability that the RUL's plant will be an asset to NamWater and other users is over 95% which is definite.

*Confidence:* Sure. The benefits are definite but it is influenced by politics so the confidence level is sure rather than certain.

*Reversibility:* The action is reversible as the plant can be decommissioned.

A summary of these ratings is shown in *Table 11*.

**Table 11.** Increased availability of desalinated water: Summary of Impact Assessment

Impact description	Type	Extent	Magnitude	Duration	Probability	Confidence	Reversibility	Significance
More desalinated water available	+ve	National	High - positive	Long term	Definite	Sure	Reversible	High (+)

No enhancement measures are proposed.

## 8.6 Traffic and Road Safety

### *Description of Impact*

During construction, traffic volumes on the C34 between Swakopmund and the desalination plant are likely to increase with the transport of a maximum of approximately 50 construction workers, construction material and equipment to site.

During operations, the volume of traffic will be significantly less as only 12-18 employees are anticipated, and the delivery of chemicals and other products should not be daily.

### *Assessment of Impact*

*Type of Impact:* Direct negative socio-economic impact and also cumulative.

*Extent:* Slow construction traffic turning at the C34 and site junction will be the most hazardous point. Such traffic could originate in Walvis Bay and Swakopmund so the extent could be regional.

*Magnitude:* Walvis Bay and Swakopmund are already used to high volumes of traffic so the increased risk brought about by this project will be mostly at the site junction and will be of low magnitude.

*Duration:* The most risk is during the construction period which is estimated to be 15 months and therefore short term.

*Significance:* The above ratings of low magnitude, regional extent and short term duration results in a very low significance rating.

*Probability:* Increased traffic volumes and therefore increased risk to road safety will definitely occur.

*Confidence:* *Certain.* This rating is based on a wealth of empirical evidence from previous construction sites.

*Reversibility:* Once construction is complete, the volume of operational traffic will be insignificant therefore this impact is reversible.

### *Description of Proposed Mitigation Measures*

The above impacts are unavoidable so typical environmental measures to reduce the risk of accidents are:

- Temporarily for the construction phase, widen the C34 road at the turn-off point to the desalination plant to allow slow traffic to get off the C34 without causing other vehicles to overtake.

- Erect appropriate road hazard / information signage to warn road users of the turning of heavy vehicles.
- Ensure that construction vehicles switch their headlights on, at all times.

Even with mitigation, a risk to road safety remains which cannot reduce the magnitude to zero. Therefore there are no changes to the ratings in

Table 12.

**Table 12.** Traffic and Road Safety during construction: Summary of Impact Assessment

Impact description	Type	Extent	Magnitude	Duration	Probability	Confidence	Reversibility	Significance
Before mitigation	-ve	Regional	Low negative	Short term	Definitely	Certain	Reversible	<b>Very Low (-)</b>
With mitigation	-ve	Regional	Low negative	Short term	Definitely	Certain	Reversible	<b>Very Low (-)</b>

## 8.7 Reduction of Guano production during construction phase

### *Description of Impact*

There seems to be little available research on the levels of disturbance tolerated by roosting birds which could affect the existing guano production platforms at the salt works. The platform totals about 31,000m<sup>2</sup> but the quantity of guano production is not known. There is a possibility that the construction phase will disrupt the roosting patterns of birds which will reduce the production rate of guano over 18 months (it should however be noted that this bird colony is accustomed to the movement and noise generated by the salt works activities and may therefore be more resistant to this type of disturbance than a bird colony in a more secluded, natural environment). It is possible that the fairly constant noise generated during operations will not disturb them and production rates could recover.

At current figures, Peruvian seabird guano retails for fertiliser from N\$53 – 80/kg (US\$5<sup>31</sup> - US\$7.5<sup>32</sup>).

The negative economic impact on guano production during the construction phase of the RUL plant would be equivalent to the reduction of collecting costs and of sales.

### *Assessment of Impact*

*Type of Impact:* Direct negative impact.

*Extent:* The economic impact of reduced guano production might be felt in Swakopmund if fewer people and less plant hire are needed to collect it. The reduction in taxes to the GRN depends on the value of sales and would be of national impact.

*Magnitude:* By comparison to the impact of the Rössing mine's survival, the overall economic impact is likely to be low.

*Duration:* The reduction in guano production is likely to be short term, only during the construction period which is estimated to be 18 months.

*Significance:* The above ratings of low magnitude of possible national extent (reduced taxes) and short term duration results in a low significance rating.

*Probability:* With little knowledge about the tolerance level of the cormorants to RUL's construction works compared what they are used to with salt works vehicles and machinery, there is a probable chance of 5% to 95% that that the impact will occur.

*Confidence:* *Unsure.* This rating is based on little available information.

<sup>31</sup> <http://www.hydroponics.net/i/133735>

<sup>32</sup> <http://www.planetnatural.com/product/original-seabird-guano/>

*Reversibility:* With a high coastal cormorant population, and the construction period being significantly shorter than their lifespan, it is very likely that this impact will be reversible.

*Cumulative Impacts:* The disturbance of 18 months of construction at the salt works may coincide with the disturbance caused to the guano platform north of Walvis Bay when the second harbour is built. However, it seems that the cape cormorant's population can recover quickly in good feeding years and it seems likely that the birds will return to the guano platforms during operations.

No mitigation measures are proposed.

A summary of these ratings is shown in *Table 13*.

**Table 13.** Reduction of guano production: Summary of Impact Assessment

Impact description	Type	Extent	Magnitude	Duration	Probability	Confidence	Reversibility	Significance
Reduction of guano production	-ve	National	Low negative	Short term	Probable	Unsure	Reversible	Low (-)

## 8.8 Other potential impacts identified during the scoping phase

### *Impact on tourism to the salt pans and fishing from the beach*

The proposed site at Swakopmund Salt Works is a popular bird-watching site for local residents and tourists. It is likely there may be some access restrictions during construction phase however, once completed, the additional buildings and infrastructure are not likely to impact significantly on the birds and therefore tourism activities could resume. The tour operators may have to find alternative activities to offer during the construction phase but it is unlikely that they would experience a significant loss of income.

Beach fishers, whether sport anglers or subsistence fishers, can move to other fishing spots along the coastline and therefore the impact is more of nuisance than economic.

During operations, enabling open access for beach fishers and the popular bird-watching view points at the Swakopmund Salt Works should avoid any impact.

### *Reduction of house prices at Mile 4*

Aurecon/SLR Consulting's draft scoping report shows that the night time wind direction is predominantly from the northern quarter while during the daytime it blows from the northern quarter for approximately 30% of the time between 7:00 to 22:00. The noise impact specialist will determine the predicted noise levels from the desalination plant reaching Mile 4. Unless these are substantial, it is unlikely that the project will cause any economic impact on home owners or developers at Mile 4. The additional infrastructure and operations of the project, on a site where industrial activity has been taking place for a long time, should not affect their house prices.

### *Engineering options*

A number of options were considered for the exact locations of the plant, intake, brine disposal within the salt works area. These options do not impact on socio-economic issues and have not been assessed individually or comparatively.

## 9 Environmental Management Plan

The proposed mitigation measures identified above, are at a high level and will need to be implemented by very senior RUL staff and also their counterparts in NamWater, Husab, Areva, and in local regional and national government.

## 10 Conclusions

Not anticipating such a global collapse of uranium prices, it was unfortunate that NamWater requested Areva to build a larger inlet pipe than it required which significantly increased the capital costs. Areva is transferring its over-specified plant financing costs to NamWater which is passing them directly on to RUL and the other mines. NamWater has not built an alternative source of desalinated water, perhaps expecting that the mines can carry any cost of water. However, as this high water cost coincides with very poor uranium market prices, it jeopardises the financial sustainability of the mine.

This project would not have been necessary if Government had been able to negotiate a fairer price for Areva's water or if NamWater had built a more efficient desalination plant which produced cheaper water at Mile 6.

The need for the proposed desalination plant is to enable the survival of the Rössing mine, while uranium prices remain low and in the absence of a long-term realistic pricing agreement for water from Areva's desalination plant.

The socio-economic assessment has found that the No-Go alternative of not building the proposed desalination plant while excessively high water costs and low uranium prices continue, could result in closure of the Rössing mine, 10 years earlier than necessary. This would have far-reaching negative local, regional and national consequences.

The socio-economic benefits of the proposed project can be summarised as:

1. The RUL desalination plant will enable RUL to continue operating for a further 10 years, providing jobs at the mine and down the supply chain for between 2,250 and 6,300 people. This is aligned to NDP4 in that it will continue to reduce income inequality; it will maintain jobs and generate revenue for economic growth.
2. Approximately 50% of the total profit from RUL mining will be paid to government in the form of royalties, PAYE, VAT, import taxes and other direct and direct taxes.
3. It will bring continued prosperity to Swakopmund and Arandis municipalities and businesses.
4. It will provide an alternative source of desalinated water which will bring benefits in the short, medium and long term. If the uranium price rises and more mines come into operation, production will be hampered by a shortage of water.

By comparison, the negative impacts are much less significant:

1. NamWater would lose some revenue as it would no longer be able to charge RUL conveyance costs of piping water from Areva to the pipeline junction of the proposed plant. There should be no impact on the cost of water to the Municipalities.
2. As the production will only come on line when Husab is in full production, LHU and Husab would experience a small increase in operating costs as a result of RUL not contributing to approximately a fifth share charged of Areva's financing costs.
3. During construction, there will be an increased risk to road safety, particularly at the turn-off to the site.
4. There could be a reduction in guano profits during construction phase but this has not been estimated, since it is very difficult to predict how birds might respond to construction disturbances. The value of this reduction would not be comparable to the loss to the region if RUL were to close early.

Considering all the impacts, the socio-economic benefits associated with the proposed project significantly out-weigh the potential negative socio-economic impacts, and so this study concludes that the project should go-head.

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