

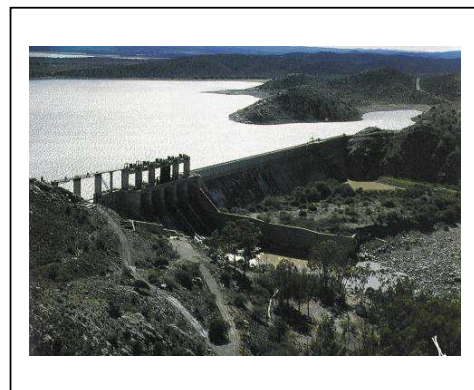
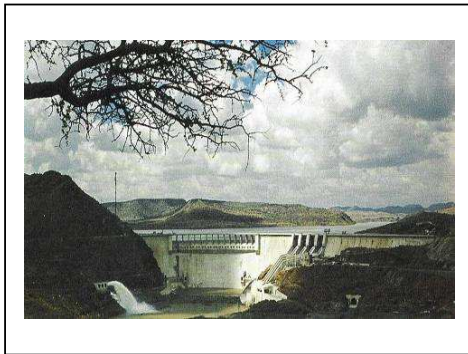


**ESKOM HOLDINGS LIMITED
GENERATION DIVISION**

**NUCLEAR 1 ENVIRONMENTAL IMPACT
ASSESSMENT AND ENVIRONMENTAL
MANAGEMENT PROGRAMME**

FINAL

**SPECIALIST STUDY FOR
SCOPING REPORT**



SPECIALIST STUDY: FRESHWATER SUPPLY
NSIP-NSI-020567#P1-23

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**NUCLEAR 1 ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL
MANAGEMENT PROGRAMME**

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1 EXECUTIVE SUMMARY

This EIA entails the construction and operation of a Conventional Nuclear Power Station and associated infrastructure in the Eastern, Northern or Western Cape areas. The sites, which will be investigated during this Environmental Impact Assessment, have been identified based on previous site investigations undertaken since the 1980s.

Should the proposed project be authorised, it is estimated that the construction of the nuclear power station could commence in 2009/10- with the first unit being commissioned in 2016.

This study will provide a brief description of the water supply to the site and describe the reticulation system in terms of its location capacity. An indication of the quality of water supply will be provided.

The ToR for the specialist **Fresh Water Supply Assessment** are to assess:

- Local authority supply of fresh water;
- Hydrocensus and potential water yield;
- Community supply; and
- Water analysis.

Fresh Water requirements for a nuclear site are assumed to be ~8000 m³/day (Eskom 1994). This is based on the following estimates:

- Normal requirement : 6000 m³/day
- Commissioning peak : 8000 m³/day
- Eskom village : 2000 m³/day

South Africa is a water scarce country with an average rainfall of some 460 mm per annum compared to a World average of 880 mm. Droughts are common and often severe. An additional demand of 8000 m³/day will therefore have a significant impact on local water resources, but less of an impact on main regional sources/schemes, such as the Orange River.

Koeberg is already connected to the municipal reticulation system but pipelines will have to be constructed to the other four sites for surface water supply.

Groundwater could possibly be used during the site construction phase to meet potable water demands.

Desalination could have the least environmental impact and be cost effective as there could be a ready supply of sea water and power at each site. Disposal of brine would have an environmental impact on marine ecology but this would be offset by blending with the very large volumes of cooling water effluent.

In terms of obtaining fresh water supply from conventional sources, an additional demand of 8000 m³/day means that all sites will have a high sensitivity. Groundwater is only a potential option for partial contribution to this supply. Supply from major

schemes/sources such as the Orange River (Thyspunt, Brazil, Schulpfontein), Berg (Koeberg) and Riviersonderend/Breë (Bantamsklip) are the likely options for full fresh water supply. This would be subject to application of the principles contained in the National Water Act and other relevant legislation. Desalination is a potential cost effective option at all sites.

2 INTRODUCTION

2.1 Description of Proposed Project

This EIA entails the construction and operation of a Conventional Nuclear Power Station and associated infrastructure in the Eastern, Northern or Western Cape areas. The sites, which will be investigated during this Environmental Impact Assessment, have been identified based on previous site investigations undertaken since the 1980s.

Eskom proposes to construct a nuclear power station of the Pressurised Water Reactor type technology. In many ways the structure of the nuclear plant resembles that of a conventional thermal power plant. The difference between such plants is in the manner in which heat is produced. In a fossil plant, oil, gas or coal is fired in the boiler, which means that the chemical energy of the fuel is converted into heat. In a nuclear power plant, however, energy from the fission chain reaction is utilized. Cooling water for the nuclear power station will be utilised directly from the sea. Although detail design still needs to be completed, it is estimated that the entire development will require in the order of 31 ha, including all auxiliary infrastructure,. The proposed nuclear power station will include nuclear reactor, turbine complex, spent fuel, nuclear fuel storage facilities, waste handling facilities, intake and outfall basin and various auxiliary service infrastructure.

Should the proposed project be authorised, it is estimated that the construction of the nuclear power station could commence in 2009/10, with the first unit being commissioned in 2016.

2.2 Terms of Reference

The assessment of impacts will broadly be undertaken in accordance with the guidelines provided in the Guidelines Document: EIA Regulations (DEAT, 1998), the NEMA principles and Section 24(4) of NEMA (as amended), as appropriate to the specific field of study. This study will provide a brief description of the water supply to the site and describe the reticulation system in terms of its location capacity. An indication of the quality of water supply will be provided.

The ToR for the specialist ***Fresh Water Supply Assessment*** are to assess:

- Local authority supply of fresh water;
- Hydrocensus and potential water yield;
- Community supply; and
- Water analysis.

3 BACKGROUND

3.1 Legislative Framework

Key legislation relating to Fresh Water Supply comprises the following:

1. National Water Policy for South Africa, 1997
2. National Water Act, 1998 (No 36 of 1998).
3. Strategic Framework for Water Services, 2003.
4. The Water Services Act, 1997 (No 108 of 1997).
5. National Environmental Management Act, 1998 (No 107 of 1998).
6. SABS Guidelines for Drinking Water (241-2006).
7. DWAF's Water Quality Guidelines, 1996.

The National Water Act is the principal legal instrument relating to water resource management in South Africa and contains comprehensive provisions for the protection, use, development, conservation, management and control of the country's water resources. In addition, the management of water as a renewable resource must be carried out within the framework of environmental legislation, i.e. the National Environmental Management Act.

A key aspect of the National Water Policy is Integrated Water Resources Management (IWRM). This recognises that water resources can only be successfully managed if the natural, social, economic and political environments in which water occurs and is used are taken into consideration. IWRM aims to strike a balance between the use of water resources for livelihoods and conservation of the resource whilst promoting social equity, environmental sustainability and economic growth and efficiency.

The above principles will need to be applied in the investigation and supply of fresh water to any new nuclear power station.

3.2 Assumptions & Limitations

This Scoping report has been based on a limited scale desk study and a reconnaissance visit to each site by SRK Consulting. Extensive, detailed work has been carried out at the Duynefontein (Koeberg Nuclear Power Station) site. Less detailed, reconnaissance level investigations were carried out by Eskom in the late 1980's, early 1990's in the Eastern, Southern and Northern Cape areas covering the other sites. A list of references sourced for the study is given in Section 8.

Fresh Water requirements for a nuclear site are assumed to be ~8000 m³/day (Eskom 1994). This is based on the following estimates:

- Normal requirement : 6000 m³/day

- Commissioning peak : 8000 m³/day
- Eskom village : 2000 m³/day

4 DESCRIPTION OF THE SITE AND SURROUNDING ENVIRONMENT

The locations of the five sites are shown on Figure 4.1.

4.1 Thyspunt

4.1.1 Local Authority Supply

The Site falls within the Fish-Tsitsikamma Water Management Area (WMA) but large quantities of water are imported from the Upper Orange River Water Management Area.

According to water requirement projections in Appendix D of the DWAF's National Water Resource Strategy (2004), there is no allowance for water requirements for power generation for this WMA.

The local authority (Nelson Mandela Metropole) supplies water to Humansdorp and St Francis Bay via the Churchill Pipeline from the Churchill Dam (26.3 million m³ capacity). This pipeline runs in an E-W direction to the south of the N2 from Churchill Dam to Port Elizabeth.

The current capacity of this pipeline to St Francis Bay is 11 L/s, with no spare capacity at present. The pipeline is currently being upgraded by Ninham Shand (C Roberts pers comm.) with a planned capacity of 100 L/s. The upgrade is due for completion by December 2007.

The best option for supply to the Site from this scheme would be a new pipeline running due south, possibly allowing capacity to provide Oyster Bay with additional water to upgrade their system. An alternative is supply from the Orange River via Port Elizabeth (Eskom, 1994). The estimated annual demand of ~3 million m³ is small in comparison with the estimated demand of ~340 million m³ by 2020 for Port Elizabeth (Eskom, 1994).

4.1.2 Community Supply

The local authority supplies water to the residential areas of Humansdorp, St Francis Bay and Oyster Bay. These towns all derive some water supply from groundwater sources, with Oyster Bay being totally reliant on groundwater.

Groundwater is used extensively in the Thyspunt buffer zone. Numerous farms, homesteads and villages use groundwater for domestic consumption, crop and stock watering. Springs to the north of Humansdorp are utilised for municipal water consumption. Borehole groundwater in the TMG fractured rock aquifer and from the intergranular aquifer surrounding the non-perennial Sand River between Ashton Bay and Cape St Francis is utilised for domestic consumption and golf course irrigation purposes.

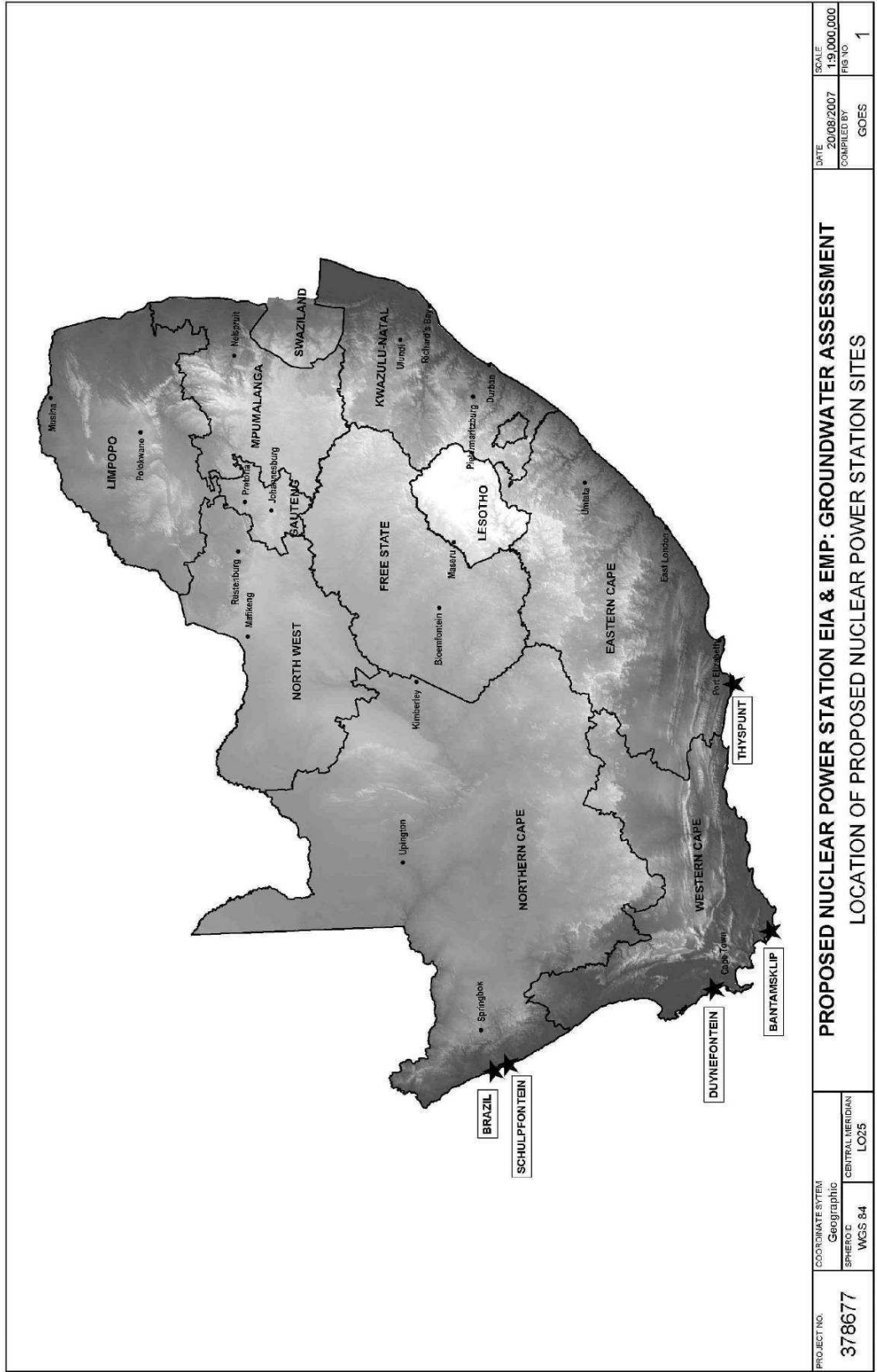


Figure 4.1: Location of the Proposed Nuclear Power Station Sites

A strong coastal spring of 8 L/s occurs west of Cape St Francis at Mostert's Hoek and is currently used on a limited basis. Borehole water from the fractured rock aquifer in TMG supplies Oyster Bay with groundwater for domestic consumption. Small seeps and springs commonly occur along the coast from under the Algoa Formation and dune rocks but no high yielding springs are reported from the immediate area surrounding Thyspunt. The majority of these seeps and springs flow directly onto rocky outcrop or sandy beaches and from there directly into the ocean.

The potential to use groundwater in the Thyspunt area is considered to be good and the underlying TMG aquifer is of medium potential while the major intergranular aquifer of the Algoa Group is considered to be of high potential. However, in the Eskom (1994) Eastern Cape Summary Report, it was stated that, "The availability of fresh groundwater for the power station was investigated and it appears that the quantities envisaged will exceed that which could be easily pumped from boreholes." While this statement is reasonable in terms of meeting the full supply requirements, significant groundwater resources may be exploitable especially during the construction phase.

4.1.3 Water Quality

The quality of groundwater in the TMG is generally between 10 – 100 mS/m and is of a sodium-chloride-magnesium type. The groundwater contained within the TMG aquifer is typically fresh and suitable for domestic consumption, although the low pH makes the water soft and corrosive to steel fixtures. The surface water originating on the inland TMG catchments is of similar quality at the lower end of the EC range.

4.1.4 Desalination

There is a ready supply of sea water at the site and there will be a ready supply of power once the nuclear power station is operational. Desalination could therefore be a cost effective method to provide an assured water supply to the Site. Disposal of brine from the desalination process would have an impact on marine ecology that would require investigation. The brine could be mixed with the very large volumes of cooling water discharged by a Nuclear Power Station to minimise such impacts.

4.2 Bantamsklip

4.2.1 Local Authority Supply

The Site falls within the Breede WMA.

According to water requirement projections in Appendix D of the DWAF's National Water Resource Strategy (2004), there is no allowance for water requirements for power generation in this WMA.

The local authority (Overstrand Municipality) supplies water to the nearby towns of Pearly Beach and Buffelsjag. The former is supplied by springs about 6 km to the north-east of the town. The latter is supplied by boreholes in the town area. Baardkeerdersbos is supplied by a nearby dam of the same name.

Regional scale supply is via a pipeline from Kraaibos Dam to near a treatment works at Franskraal to the north-east of Gansbaai.

In Eskom (1994) it was concluded that any major industrial undertaking would require the supply of fresh water by pipeline from a major source outside of the immediate region. The nearest such system is the Riviersonderend/Breë.

4.2.2 Community Supply

There are few boreholes in the buffer zone around the Site and groundwater potential is generally low. Exploration boreholes were drilled at Pearly Beach and Buffelsjag in the early 1990's for town supply but were unsuccessful. In Eskom (1994) it is stated that there were 700 boreholes tapping the aquifer of the coastal plain of which fewer than half yielded >5 m³/h.

4.2.3 Water Quality

Water quality is generally good. For example the water supply to Pearly Beach has an EC of 138 mS/m.

4.2.4 Desalination

There is a ready supply of sea water at the site and there will be a ready supply of power once the nuclear power station is operational. Desalination could therefore be a cost effective method to provide an assured water supply to the Site. Disposal of brine from the desalination process would have an impact on marine ecology that would require investigation. The brine could be mixed with the very large volumes of cooling water discharged by a Nuclear Power Station to minimise such impacts.

4.3 Duynfontein (existing Koeberg Nuclear Power Station)

The Site falls within the Berg WMA.

According to water requirement projections in Appendix D of the DWAF's National Water Resource Strategy (2004), there is no allowance for water requirements for power generation in this WMA.

The site receives its water from one source via the local authority

The Aquarius well field is the closest groundwater abstraction area to the Koeberg 900 MW PWR units 1 and 2 and there used to be around 40 000 m³ water abstracted per month by Eskom to supply the power plant. The well field is approximately 6 km to the north-east of Koeberg 900 MW PWR units 1 and 2. The well field is presently not utilised by Koeberg 900 MW PWR units 1 and 2 because of poor water quality.

Meetings have been held with Eskom to discuss the possible provision of another pipeline and alternative supply options (Reference 1). An investigation has been lodged into finding alternative water supply options to ensure the availability of water.

4.3.1 Local Authority Supply

The local authority (City of Cape Town: Bulk Water Branch) augments the water supply to the greater metropolitan area from the Voëlvlei dam approximately 12,5 km south west of Tulbagh. At the Voëlvlei dam water is treated and pumped to the Plattekloof reservoir, along a 75 km, 1 500 mm diameter pre-stressed concrete pipeline. A head meter is located approximately 8 km north of the Plattekloof reservoir, on the Voëlvlei Dam/Plattekloof reservoir pipeline. At this head meter a

700 mm diameter fibre cement pipe supplies the 40 000 m³ Melkbos reservoir, located on the farm Blaauwberg.

The Melkbos reservoir supplies the Melkbos/Blaauwberg area with water. The water gravitates along a 700 mm diameter fibre cement pipe to a valve chamber north–east of the Melkbosstrand/M14 intersection.

The 700 mm supply pipe feeds both 300 mm and 400 mm diameter fibre cement pipes in the valve chamber.

The 300 mm pipe supplies water to the residences of Bloubergstrand, Melkbosstrand, Van Riebeeckstrand and augments the water supply to Duynefontein. These pipes are predominately installed in the western road reserve along the M14.

The 400 mm pipe is installed in the eastern road reserve along M14 and crosses to the west of the M14, at the intersection with Carmichael Street (south entrance).

This is as a result of redesigning the road layout after the pipeline was installed.

The 400 mm pipe feeds a valve chamber to the west of the M14, between the intersections with Bresford Street and Carmichael Street (north entrance). The 400 mm supply pipe feeds both a 150 mm and 350 mm diameter fibre cement pipe in the valve chamber. The 150 mm pipe supplies water to the residences of Duynefontein and augments the water supply to Van Riebeeckstrand. The 350 mm diameter pipe supplies water to a meter chamber.

The meter chamber is located to the east of the M14 at the power station boundary. The 350 mm pipe is installed in a straight line between the valve and meter chambers. Thus the 350 mm pipe crosses the M14 at the intersection with Dunker Street, before crossing the sports field and crossing the M14 twice at the intersection with Narcissus Avenue.

The water consumption of the Koeberg 900 MW PWR units 1 and 2 is measured at the meter chamber. The 350 mm pipe is installed in the eastern road reserve along the M14 and feeds a valve chamber south-east of Koeberg 900 MW PWR units 1 and 2. In the valve chamber the 350 mm supply pipe feeds two 150 mm and one 250 mm diameter fibre cement pipes. The 150 mm pipe (west) supplies water to the training centre. The 250 mm pipe supplies water to the existing Koeberg site potable plant water system. The 150 mm pipe (east) supplies water to the owner controlled area outside the security fence.

Both of the existing Koeberg 900 MW PWR units 1 and 2 potable water system tanks (9 SEP 001 and 002 BA) have a capacity of 9 056 m³, of which 1 730 m³ is dedicated to the fire fighting water distribution system (JPD system).

In 1998 a 500 mm diameter supply pipe was installed in the eastern road reserve along the R27, to augment the water requirements in Atlantis.

4.3.2 Community Supply

The local authorities supply the required water to the residential areas of Bloubergstrand, Melkbosstrand, Van Riebeeckstrand, and Duynefontein as described in Section 11.2.

Atlantis is supplied with groundwater extracted from two well fields managed by the City of Cape Town: Bulk Water Supply and supported by the CSIR. Silwerstroom well

field is approximately 12 km north of the power station and Witzand wellfield is approximately 6 km north of the power station. In 1995, an estimated 2.0 and 3.3 Mm³ were extracted from the two wellfields, respectively.

The supply from the wellfields, was augmented by a supply from the Voëlvlei pipeline via a 500 mm pipeline.

The farms in the area derive their water requirements from harvested (rain) and extracted (groundwater) water.

4.3.3 Water Quality

An analysis of the Voëlvlei water is presented in Table 4.1 (Reference 2) for both raw and treated water.

Table 4.1: Voëlvlei Filtration Plant – Analysis of Composition: 2003 to 2004

Chemical analysis		Raw (mg/l average)	Treated (mg/l average)
Samples examined		49	49
Physical			
Conductivity @ 20 °C	□S/cm	7,7	14
pH value		7,5	9
Turbidity	NTU	14	0,66
Colour	Plat.Std	26	3
UV Absorbance	300nm/40mm	0,322	0,041
Oxygen absorbed		2,7	0,4
Hardness			
Total	CaCO3 mg/ℓ	15,3	43,7
Mineral			
Alkalinity	CaCO3 mg/ ℓ	10,0	13,2
Chloride	Cl mg/ ℓ	17,2	19,5
Sulphate	SO4 mg/ ℓ	3,7	27,0
Calcium	Ca mg/ ℓ	2,7	13,8
Magnesium	Mg mg/ ℓ	2,06	2,23
Sodium	Na mg/ ℓ	8,9	8,9
Potassium	K mg/ ℓ	0,79	0,72
Trace metals			
Aluminium	Al mg/ ℓ	0,65	0,08
Iron	Fe mg/ ℓ	0,534	0,035
Manganese	Mn mg/ ℓ	0,008	0,002

This analysis is for 2003 to 2004. The results for the subsequent 12 months (2004 to 2005) are available but have not been averaged as they are considered abnormal due to the drought, and low flow conditions. The inlet structure has been under repair

over a period of four months. The raw water is thus abnormally high in turbidity. However, the treated water profile is considered normal.

4.3.4 Desalination

There is a ready supply of sea water at the site and there will be a ready supply of power once the nuclear power station is operational. Desalination could therefore be a cost effective method to provide an assured water supply to the Site. Disposal of brine from the desalination process would have an impact on marine ecology that would require investigation. The brine could be mixed with the very large volumes of cooling water discharged by a Nuclear Power Station to minimise such impacts.

4.4 Brazil

4.4.1 Local Authority Supply

The Site falls within the Lower Orange WMA.

According to water requirement projections in Appendix D of the DWAF's National Water Resource Strategy (2004), there is no allowance for water requirements for power generation in this WMA.

According to Eskom (1994) the area is devoid of any substantial sources of surface water. Underground water is also not a viable source of raw water.

Kleinsee is supplied with Orange River water via a 200 mm pipeline from Springbok. This pipeline is operating at full capacity. The source of this pipeline is at Henkries. From Henkries to Springbok the pipeline is 520 mm and the last 26 km are in poor condition (pers comm. T van der Westhuizen).

Port Nolloth is supplied with Orange River water from Alexander Bay via a 200 mm pipeline.

Obtaining water from the Orange River would require not only construction of a new pipeline from Kleinsee, but also upgrading of the pipeline from Springbok to Kleinsee or that from Alexander Bay to Port Nolloth and a pipeline from Porth Nolloth to the Site.

At the time of the 1994 study it was concluded, in conjunction with the Department of Water Affairs, that for the purposes of the siting study it would be assumed that raw water will be pumped from the Orange River at Henkries and conveyed by pipeline to the Site.

At the time of the study sufficient water was available throughout the year from this source for the requirements of a four-unit power station. The results of future studies which take into account possible future industrial demand in the upper catchment and future possible agricultural use on the Namibian side of the river will have to be taken into account (Eskom, 1994).

4.4.2 Community Supply

The local communities of Koingnaas and Hondeklip Bay are supplied by groundwater from the Schulpfontein-Noup Aquifer. Kleinsee is supplied from the Orange River.

4.4.3 Water Quality

Orange River water is of good quality and is treated by filtration, deflocculation and chlorination. Groundwater quality is variable and that from the Schulpfontein-Noup Aquifer has an EC of ~270 mS/m.

4.4.4 Desalination

There is a ready supply of sea water at the site and there will be a ready supply of power once the nuclear power station is operational. Desalination could therefore be a cost effective method to provide an assured water supply to the Site. Disposal of brine from the desalination process would have an impact on marine ecology that would require investigation. The brine could be mixed with the very large volumes of cooling water discharged by a Nuclear Power Station to minimise such impacts.

4.5 Schulpfontein

4.5.1 Local Authority Supply

The Site falls within the Lower Orange WMA.

According to water requirement projections in Appendix D of the DWAF's National Water Resource Strategy (2004), there is no allowance for water requirements for power generation in this WMA.

According to Eskom (1994) the area is devoid of any substantial sources of surface water. Underground water is also not a viable source of raw water.

Kleinsee is supplied with Orange River water via a 200 mm pipeline from Springbok. This pipeline is operating at full capacity. The source of this pipeline is at Henkries. From Henkries to Springbok the pipeline is 520 mm and the last 26 km are in poor condition (pers comm. T van der Westhuizen).

Port Nolloth is supplied with Orange River water from Alexander Bay via a 200 mm pipeline.

Obtaining water from the Orange River would require not only construction of a new pipeline from Kleinsee, but also upgrading of the pipeline from Springbok to Kleinsee or that from Alexander Bay to Port Nolloth with a new pipeline to the Site.

4.5.2 Community Supply

The local communities of Koingnaas and Hondeklip Bay are supplied by groundwater from the Schulpfontein-Noup Aquifer. Kleinsee is supplied from the Orange River.

4.5.3 Water Quality

Orange River water is of good quality and is treated by filtration, deflocculation and chlorination. Groundwater quality is variable and that from the Schulpfontein-Noup Aquifer has an EC of ~270 mS/m.

4.5.4 Desalination

There is a ready supply of sea water at the site and there will be a ready supply of power once the nuclear power station is operational. Desalination could therefore be

a cost effective method to provide an assured water supply to the Site. Disposal of brine from the desalination process would have an impact on marine ecology that would require investigation. The brine could be mixed with the very large volumes of cooling water discharged by a Nuclear Power Station to minimise such impacts.

5 IMPACTS AND MITIGATION MEASURES

5.1 Project Impacts and Mitigation Measures

5.1.1 Project Impacts on the Environment

South Africa is a water scarce country with an average rainfall of some 460 mm per annum compared to a World average of 880 mm. Droughts are common and often severe. An additional demand of 8000 m³/day will therefore have a significant impact on local water resources, but less of an impact on major regional schemes, e.g. Orange River, Riviersonderend/Breë.

Koeberg is already connected to the municipal reticulation system but pipelines will have to be constructed to the other four sites for surface water supply.

Groundwater could possibly be used during the site construction phase to meet potable water demands.

Desalination could have the least environmental impact and be cost effective as there would be a ready supply of sea water and power at each site. Disposal of brine would have an environmental impact on marine ecology.

Table 5.1: Impacts during Construction

Action	Possible Impacts
Pumping from boreholes	Lowering of the water table Sea water intrusion Drying-up of coastal springs/seeps Increased drawdown/decreased yields in existing production boreholes Ingress of saline groundwater Drying-up of wetlands
Construction of a pipeline	Destruction of vegetation along the servitude Disruption to fauna

Table 5.2: Impacts during Operation

Activity	Possible Impacts
Supply of 8000 m ³ /day from municipal sources	Pressure on scarce water resources, especially during droughts
Partial supply from groundwater	As per Table 5.1
Desalination	Disposal of brine – impact on marine ecology
Wastewater disposal	Contamination of local groundwater

5.1.2 Mitigation Measures

Table 5.3: Mitigation Measures during Construction

Action	Mitigation Measures
Pumping from boreholes	Water Level and Quality monitoring
Construction of a pipeline	EIA Rehabilitation of the servitude/disturbed area Monitoring

Table 5.4: Mitigation Measures during Operation

Action	Mitigation Measures
Municipal Supply	Upgrade of local supply Wastewater treatment and recycling
Desalination	EIA on brine disposal Blending of brine with cooling water effluent
Use of groundwater	Monitoring

5.2 Environmental Impacts and Mitigation Measures

5.2.1 Impacts of the Environment on the Project

These are summarised in Tables 5.5 and 5.6.

Table 5.5: Impacts during Construction

Action	Possible Impacts
Use of groundwater	Supply fails Quality deteriorates to unacceptable level

Table 5.6: Impacts during Operation

Action	Possible Impacts
Municipal Supply	Drought causes water restrictions. Full requirements cannot be supplied
Partial supply from groundwater	Supply fails Quality deteriorates to unacceptable levels

5.2.2 Mitigation Measures

These are summarised in Tables 5.7 and 5.8.

Table 5.7: Mitigation during Construction

Action	Mitigation Measures
Use of groundwater	Thorough scientific evaluation Monitoring Back-up boreholes Back-up municipal supply

Table 5.8: Mitigation during Operation

Action	Mitigation Measures
Restriction of municipal supply	Wastewater treatment and recycling Desalination of sea water
Failure of partial groundwater supply	As above Increased use of municipal supply

6 SITE SENSITIVITY ANALYSIS

6.1 Criteria for Site Sensitivity Analysis

- Length of Pipeline
- Vegetation along servitude
- Fauna along servitude
- Marine ecology
- Pressure on existing municipal water supply

6.2 Site Sensitivity

In terms of obtaining fresh water supply from conventional sources, an additional demand of 8000 m³/day means that all sites will have a high sensitivity. Groundwater is only a potential option for partial contribution to this supply. Supply from major schemes/sources such as the Orange River (Thyspunt, Brazil, Schulpfontein), Berg (Koeberg) and Riviersonderend/Breë (Bantamsklip) are the likely options for full fresh water supply. This would be subject to application of the principles contained in the National Water Act and other relevant legislation. Desalination is a potential cost effective option at all sites.

6.3 Discussion and Recommendations

Extensive further work is required to investigate the various fresh water supply options and evaluate their impacts on the environment and vice versa.

7 CONCLUSIONS

South Africa is a water scarce country with an average rainfall of some 460 mm per annum compared to a World average of 880 mm. Droughts are common and often severe. An additional demand of 8000 m³/day will therefore have a significant impact on local water resources, but less on major regional schemes such as the Orange River.

Koeberg is already connected to the municipal reticulation system but pipelines will have to be constructed to the other four sites for surface water supply.

Groundwater could possibly be used during the site construction phase to meet potable water demands.

Desalination could have the least environmental impact and be cost effective as there would be a ready supply of sea water and power at each site. Disposal of brine would have an environmental impact on marine ecology.

In terms of obtaining fresh water supply from conventional sources, an additional demand of 8000 m³/day means that all sites will have a high sensitivity. Groundwater is only a potential option for partial contribution to this supply. Supply from major schemes/sources such as the Orange River (Thyspunt, Brazil, Schulpfontein), Berg (Koeberg) and Riviersonderend/Breë (Bantamsklip) are the likely options for full fresh water supply. This would be subject to application of the principles contained in the National Water Act and other relevant legislation. Desalination is a potential cost effective option at all sites.

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