ESKOM HOLDINGS LIMITED
GENERATION DIVISION

NUCLEAR 1 ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME

SPECIALIST STUDY FOR SCOPING REPORT




SPECIALIST STUDY: TRANSPORTATION

J27035A

AUGUST 2007

NUCLEAR 1 ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME

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1 EXECUTIVE SUMMARY

ARCUS GIBB was appointed by Eskom Holdings Ltd Generation Division to undertake the Environmental Impact Assessment (EIA) for the proposed Nuclear Power Station in December 2006, referred to herein as Nuclear 1.

Transportation was identified as one of the areas requiring a specialist study. The following five potential sites are being considered in the EIA process:

- Thyspunt – Eastern Cape
- Bantamsklip – Western Cape
- Duynefontein (Existing Koeberg Site) – Western Cape
- Brazil – Northern Cape
- Skulpfontein – Northern Cape

This screening report seeks to present the preliminary determination of the transport impacts of the Nuclear 1 on the environment and its relevant significance (sensitivity) and possible mitigation measures.

The five sites being considered in this EIA process are located across three provinces. Low to medium-level radioactive waste produced by Nuclear 1 will be stored at Vaalputs, which is located in the Northern Cape Province, 90 km southeast of Springbok. It is assumed that the Pelindaba Fuel Plant, which is located approximately 25 km west of Pretoria will supply Nuclear 1 with fuel.

A 0 to 5 km Protective Action Zone (PAZ) and a 5 to 16 km Urgent Protective Action Zone (UPZ) are required by the National Nuclear Regulator (NNR) to be implemented around a nuclear facility for safety purposes. No developments are allowed to be located within the PAZ and existing and planned developments situated within UPZ are required to be included in the facility's emergency evacuation plan. The evacuation plan has to demonstrate the ability to evacuate of the public within the PAZ within 4 hours and UPZ within a 16-hour period.

The project impacts and associated mitigation measure on the transportation environment assessed are as follows for the majority of the sites:

- Site access: New access roads should be built
- Emergency evacuation: Emergency evacuation plans should be provided
- Heavy load transport routing: Possible transport network (road, sea, air) upgrades
- Fuel transport routing: Possible transport network (road, sea, air) upgrades
- Radioactive waste transport routing: Possible transport network (road, sea, air) upgrades
- Normal daily travel: Possible transport network (road, sea, air) upgrades

The transportation environmental impacts and associated mitigation measure on the project assessed are as follows for the majority of the sites:

- Planned transportation infrastructure should be investigated
- Flight paths and shipping lines may be required to be altered

The following table illustrates the initial site sensitivity analysis:

Table 6.1: Initial site sensitivity

SITE SENSITIVITY									
Key									
	Uncertain, not enough info at present								
	Significant concern at present								
	Some concern at present								
	No concern at present								
CRITERIA	**SITE**								
	Koeberg		Thyspunt		Bantamsklip		Skulpfontein		Brazil
Traffic and Transport									
Site access									
Waste vehicle routing									
Fuel vehicle routing									
Heavy load routing									
Proximity to waste site									
Proximity to port									
Existing and planned flight paths									
Existing and planned shipping lines									
Future transport network capacity: normal operation									
Future transport network capacity: emergency evacuation									
Transportation upgrades required									
Other access (light planes etc)									

2 INTRODUCTION

2.1 Description of Proposed Project

ARCUS GIBB was appointed by Eskom Holdings Ltd Generation Division to undertake the Environmental Impact Assessment (EIA) for the proposed Nuclear Power Station in December 2006, referred to herein as Nuclear 1. The EIA process consists of three phases, namely:

- Screening
- Scoping
- Assessment

Transportation was identified as one of the areas requiring a specialist study. ARCUS GIBB Transportation forms part of the Nuclear 1 EIA team and is responsible for the transportation specialist study component of the EIA.

The following five potential sites are being considered in the EIA process:

- Thyspunt – Eastern Cape
- Bantamsklip – Western Cape
- Duynefontein (Existing Koeberg Site) – Western Cape
- Brazil – Northern Cape
- Skulpfontein – Northern Cape

The transportation study takes into account the impacts and possible mitigation measures for the construction, operation and decommissioning phases of Nuclear 1 for each of these sites.

2.2 Objectives of this Document

This report serves as the transportation output of the screening phase and presents the initial transportation findings and issues, which have been identified through the site visits and documentation review process. This screening report seeks to present the preliminary determination of impacts of the Nuclear 1 on the environment and its relevant significance (sensitivity) and possible mitigation measures.

These findings and issues will be investigated in more detail in the scoping and assessment phases.

3 BACKGROUND

3.1 Legislative Framework

The following legislation and guideline documents forms the framework for the transportation specialist study:

- National Nuclear Regulatory Act
- National Road Traffic Act
- National Department of Transport (NDoT) Manual for Traffic Impact Studies
- Hazardous Substance Act
- National Land Transport Transition Act
- Provincial Land Transport Framework (If available for each province)

3.2 Assumptions & Limitations

The following assumptions were made while compiling this report:

- Report was compiled from information obtained through site visits and a document review process
- Preliminary impacts were considered for the construction, operation and decommissioning of Nuclear 1
- Staff compliment and shift periods are currently unknown
- A 0 to 5 km Protective Action Zone (PAZ) is to be implemented around Nuclear 1. No further development will be allowed within the PAZ. Evacuation of public within the PAZ to be within 4 hours
- A 5 to 16 km Urgent Protective Action Zone (UPZ) is to be implemented around Nuclear 1. Evacuation of public within the UPZ to be within 16 hours
- Pelindaba (Gauteng Province) is the fuel plant which will provide Nuclear 1's fuel
- Low to medium level radioactive waste will be stored at Vaalputs (Northern Cape Province)
- Detailed investigation into aviation and shipping lines will be undertaken in following EIA phases

4 DESCRIPTION OF THE SITE AND SURROUNDING ENVIRONMENT

4.1 Overview

The five sites being considered in this EIA process are located across three provinces. Low to medium-level radioactive waste produced by Nuclear 1 will be stored at Vaalputs, which is located in the Northern Cape Province, 90 km southeast of Springbok. It is assumed that the Pelindaba Fuel Plant is located approximately 25 km west of Pretoria will supply Nuclear 1 with fuel. These locations are illustrated in **Figure 4.1**.

A 0 to 5 km Protective Action Zone (PAZ) and a 5 to 16 km Urgent Protective Action Zone (UPZ) are required by the National Nuclear Regulator (NNR) to be implemented around a nuclear facility for safety purposes. No developments are allowed to be located within the PAZ and existing and planned developments situated within UPZ are required to be included in the facility's emergency evacuation plan. The evacuation plan has to demonstrate the ability to evacuate of the public within the PAZ within 4 hours and UPZ within 16-hour periods.

A description of each site is provided below with regard to its location, surrounding land use and the relevant transportation network.

4.2 Thyspunt

4.2.1 Location

Thyspunt is situated on the east coast of South Africa and lies within the Eastern Cape Province approximately 160 km west of Port Elizabeth. Vaalputs is situated in the Northern Cape Province cross-country from Thyspunt and Pelindaba is located in the Gauteng Province.

Humansdorp is located 15 km north and Oyster Bay is located 7 km west of Thyspunt as shown in **Figure 4.2**.

4.2.2 Surrounding Land Use

The surrounding coastal towns such as Oyster Bay and Cape St. Francis are mainly low-density holiday and tourist destinations with Humansdorp being the closest major town. The inland areas are utilised mainly for farming.

Oyster Bay falls just outside the 5 km PAZ. No developments fall within this 5 km radius from Thyspunt. St. Francis Bay, Oyster Bay and Seal Point are the main developments that fall within the 16 km evacuation radius.

4.2.3 Transportation Network

The closest commercial harbour and airport to Thyspunt is in Port Elizabeth. The railway line runs from Cape Town up the east coast parallel to the N2 with the closest railway station being in Humansdorp.

The N2 runs in an east-west direction connecting the main centres along the east coast, such as Port Elizabeth, George and Cape Town. The N2 links to the N7 via Cape Town. Vaalputs is located off the N7 in the Northern Cape Province.

Access to the N2 from Thyspunt is via Humansdorp along the R330 or the unsurfaced Oyster Bay Road. The R330 is a surfaced road that runs from Humansdorp in a southerly direction past St. Francis Bay to Seal Point on the coast. The existing unsurfaced road, which runs from Humansdorp south to Oyster Bay, is in fairly good condition as shown in **Figure 4.3**

Figure 4.3: South view of gravel road connecting Humansdorp and Oyster Bay

Figure 4.4: On site off road vehicle tracks

The Thyspunt site can currently be accessed via off road vehicle tracks from either Oyster Bay or the R330 near St Francis Bay as shown in **Figure 4.4**. A mobile dune system runs in an east – west direction just north of the proposed site position as shown in **Figure 4.5**. The dune system could affect future access to the site.

Figure 4.5: East view from the top of the dune

4.3 Bantamsklip

4.3.1 Location

Bantamsklip is situated on the southern coast of South Africa and lies within the Western Cape Province approximately 250 km southeast of Cape Town. Vaalputs is situated on the west coast cross-country from Bantamsklip and Pelindaba is located inland north east of Bantamsklip.

Pearly Beach is located 10 km northwest and Bredarsdorp is located 60 km northeast of Bantamsklip as shown in **Figure 4.6**.

4.3.2 Surrounding Land Use

Fishing and holiday towns are scattered along the southern coast in the vicinity of Bantamsklip. The surrounding main towns are Bredarsdorp, Stanford and Hermanus. The Bantamsklip site is situated within a nature reserve.

No developments fall within the 5 km PAZ radius from Bantamsklip. Pearly Beach is the only town that falls within the 16 km radius evacuation zone.

4.3.3 Transportation Network

The closest commercial harbour and airport to Bantamsklip is in Cape Town. The N2 runs in an east-west direction approximately 60 km north of Bantamsklip and links to the N7 via Cape Town. Vaalputs is located off the N7 in the Northern Cape Province.

The N2 can be accessed from Bantamsklip via several routes along the R43, R326 and the R320. The R43 is a surfaced road, which runs adjacent to the Bantamsklip site, which gives direct access to the site as shown in **Figure 4.6**. The site can currently be traversed via off road tracks as shown in **Figure 4.7**.

Figure 4.7: Internal Bantamsklip off road tracks

4.4 Duynefontein (existing Koeberg Power Station)

4.4.1 Location

The Duynefontein site is situated on the west coast of South Africa in the Western Cape Province approximately 35 km north of Cape Town as shown in **Figure 4.8**. The existing Koeberg power station is located on the Duynefontein site. Vaalputs is located approximately 450 km north of the Koeberg Power Station. Pelindaba is located approximately 1500 km north east of Koeberg.

Nuclear 1 is proposed to be situated on the Duynefontein site adjacent to the existing Koeberg Power Station, north of Koeberg's reactor building as shown in **Figure 4.9.**

4.4.2 Surrounding Land Use

Several residential centres are located in the vicinity of Duynefontein. Melkbosstrand and Bloubergstrand are situated to the south and Atlantis is located approximately 15 km north of the site. Duynefontein is located on the outskirts of Cape Town, which is the largest centre in close proximity to the site. Saldanha is mainly an industrial centre and is located approximately 100 km north of Duynefontein.

Due to the existing nuclear power station on the Duynefontein site the proposed Nuclear 1 exclusion and evacuation zones will be concurrent with Koeberg's existing exclusion and evacuation zones. No developments fall within this 5 km PAZ radius of Duynefontein. Melkbosstrand and Bloubergstrand, however, fall within the 16 km UPZ.

4.4.3 Transportation Network

Cape Town harbour is the closest commercial harbour to Duynefontein with Saldanha Bay harbour primarily being used for the exporting of iron ore and as a bulk export port. Cape Town International Airport (CTIA) is the largest commercial airport in close proximity to Duynefontein and handles most of the international and national flights for the Western Cape. A closest railway line runs in a north-south direction from Saldanha to Cape Town approximately 40 km to the east of Duynefontein.

The R27 runs in a north-south direction along the west coast connecting Cape Town to the west coast towns of Langebaan, Vredenberg, Saldanha and Velddrif. The N7 also runs in a north-south direction linking the main towns of the Western Cape and Northern Cape. Duynefontein is currently accessed directly off the R27 via two access points shown in **Figure 4.10 and 4.11**. The west coast public transport system, which connects the west coast areas of Blaauwberg and Table View to Cape Town's CBD, is currently in the planning stage for implementation.

4.5 Brazil

4.5.1 Location

The Brazil site is situated on the west coast of South Africa in the Northern Cape Province approximately 500 km north of Cape Town and 100 km southwest of

Springbok. Vaalputs is located approximately 150 km east and Pelindaba is located 900 km north east of Brazil.

Kleinsee is located 15 km north, Koingnaas is 90 km south and Kamieskroon is located 90 km southeast of the Brazil site as shown in **Figure 4.12**.

4.5.2 Surrounding Land Use

The surrounding coastal areas are currently mainly being utilised for diamond mining by De Beers Consolidated Mines (Ltd) with the surrounding rural towns of Kleinsee and Koiingnaas mainly housing the diamond mining industry staff. Springbok is largest town located 100 km northeast of the site. The inland areas are utilised mainly for farming.

Kleinsee, which is 15 km north of the site, falls just outside the 5 km PAZ. No developments fall within this 5 km radius from Brazil. Kleinsee and Grootmis are located within the 16 km UPZ.

4.5.3 Transportation Network

The closest commercial harbour and airport to Brazil is in Cape Town. Saldanha Bay harbour, which is primarily used for the exporting of iron ore and as a bulk export port, is approximately 650 km from the Brazil site. Springbok has a light aircraft landing strip and the closet railway station is in Bitterfontien, 170 km south of Springbok. The road network is the dominant means of transport in this area.

The N7 runs in a north-south direction linking the main towns in Northern Cape and the Western Cape as well as Vaalputs, which is located west of the N7. A surfaced road, built by De Beers for their mining operations, runs along the coast between Kleinsee and Koiingnaas. This road is access controlled at Koiingnaas as shown in **Figure 4.13**

Figure 4.13: Access control at Koiingnaas

The Brazil site is accessed directly off this De Beers road as shown in **Figure 4.14and 4.15**.

Figure 4.14: Left view from Brazil access road

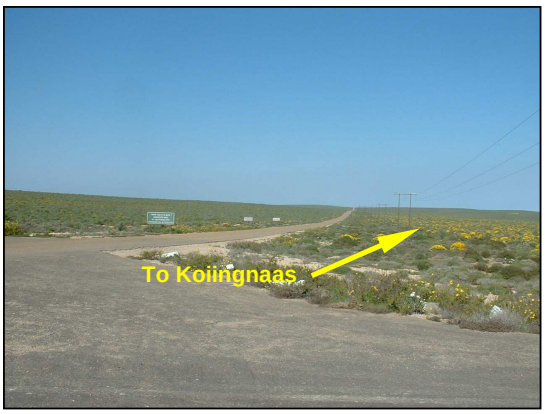

Figure 4.15: Right view from Brazil access road

The N7 can be accessed from the Brazil site via two routes. The shortest route is via Kleinsee along the R355 to Springbok, which is located along the N7. The section of the R355 linking Springbok and Kleinsee up the turn off to Kommaggas is currently surfaced. The second route is south via Koiingnaas and Wallekraal to Garies, which is located along the N7. The roads along this route are currently unsurfaced.

4.6 Skulpfontein

4.6.1 Location

The Skulpfontein site is located 30 km south of the Brazil site. The Skulpfontein site is situated on the west coast of South Africa in the Northern Cape Province approximately 500 km north of Cape Town and 100 km southwest of Springbok. Vaalputs is located approximately 150 km east and Pelindaba is located 900 km north east of Skulpfontein.

Kleinsee is located 45 km north, Koiingnaas is 20 km south and Kamieskroon is located 90 km southeast of the Skulpfontein site as shown in **Figure 4.16**.

4.6.2 Surrounding Land Use

The surrounding coastal areas are currently mainly being utilised for diamond mining by De Beers Consolidated Mines (Ltd) with the surrounding rural towns of Kleinsee and Koiingnaas mainly housing the diamond mining industry staff. Springbok is largest town located 120 km northeast of the site. The inland areas are utilised mainly for farming.

Koiingnaas, which is 20 km south of the site, falls outside the 5 km PAZ. No developments fall within this 5 km radius from Skulpfontein. Koingnaas is located within the 16 km UPZ.

4.6.3 Transportation Network

The closest commercial harbour and airport to Skulpfontein is in Cape Town. Saldanha Bay harbour, which is primarily used for the exporting of iron ore and as a bulk export port, is approximately 620 km from the Brazil site. Springbok has a light aircraft landing strip and the closet railway station is in Bitterfontien, 170 km south of Springbok. The road network is the dominant means of transport in this area.

The N7 runs in a north-south direction linking the main towns in Northern Cape and the Western Cape as well as Vaalputs, which is located west of the N7. A surfaced road, built by De Beers for their mining operations, runs along the coast between Kleinsee and Koiingnaas. Access to the Skulpfontein site is currently taken directly off this De Beers road as shown in **Figure 4.17**.

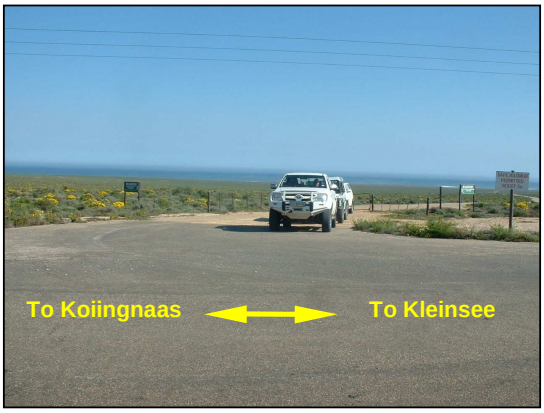

Figure 4.17: Current Skulpfontein access road

The N7 can be accessed from the Skulpfontein site via Koiingnaas and Wallekraal to Garies, which is located along the N7. The roads along this route are currently unsurfaced.

5 IMPACTS AND MITIGATION MEASURES

The following section details the preliminary transportation impacts and possible mitigation measures of the construction, operation and decommissioning of Nuclear 1. These preliminary impacts and mitigation measures have been identified through on-site observations and the document review process for each site respectively.

The preliminary impacts and initial findings identified through this screening process will be further investigated in the scoping and assessment phases.

5.1 Project Impacts and Mitigation Measures

5.1.1 Project Impacts on the Environment

The project impacts on the transportation environment discussed in the following section are broadly associated with the following criteria:

- Site access
- Emergency evacuation
- Heavy load transport routing
- Fuel transport routing
- Radioactive waste transport routing
- Normal daily travel

(a) Thyspunt

The **site is currently accessed** via off-road tracks from either Oyster Bay or St Francis Bay. It is assumed that Humansdorp will house the majority of the construction and power station personnel, as it is the closest main town to Thyspunt.

The Nuclear Siting Investigation Programme (NSIP) Eastern Cape Summary Report[1] has identified two access routing options from Humansdorp to Thyspunt as shown in **Figure 4.2**.

One of the access route options is via the unsurfaced Oyster Bay Road from Humansdorp towards Oyster Bay. A new road will then have to be constructed from the Oyster Bay Road, approximately 5 km from Oyster Bay, crossing the mobile dune system towards the site. The second access route option identified is via the R330 towards St Francis Bay with a new road being constructed just after the Krom River crossing towards the site crossing the mobile dune system.

The Oyster Bay access route option would require the unsurfaced Oyster Bay Road to be upgraded to a surfaced road and the construction of the new road from the Oyster Bay Road to the site. The St Francis Bay access route would only require the construction of the new road from the R330 to the site. The relative sensitivity and

viability of constructing either of the new roads crossing the mobile dune system will have to be investigated further.

Due to Oyster Bay falling within the 16 km UPZ **(emergency evacuation zone)** the upgrade of the Oyster Bay Road could be required for emergency evacuation purposes regardless of access requirements. The transportation requirements relating to the evacuation of the public within the PAZ and UPZ will have to be investigated further.

The transit of **heavy loads** to the Thyspunt site is expected to occur throughout Nuclear 1's three life cycle stages (construction, operations and decommissioning).

According to the NSIP Eastern Cape Summary Report[1] Drennan, Maud and Partners investigated in 1986 the feasibility of transporting heavy loads from Port Elizabeth (PE) Harbour to the Thyspunt site. According to this study, no off-loading crane facility exists at PE harbour and either Ro-Ro vessels or vessels with high capacity ship's derricks would have to be used. The main section of the heavy vehicle route will be the N2 from Humansdorp to PE. The loading and off-loading capabilities of Port Elizabeth harbour and existing / planned surrounding harbours will be investigated further. The detailed heavy vehicle route and its impacts on the relevant transportation network will also be investigated.

Nuclear fuel delivery to a nuclear power station will occur during the operation stage approximately 2 to 3 times a year as indicated in the NNR's 2005 / 2006 Annual Report[2]. Due to the inland location of Pelindaba, it is assumed that nuclear fuel (uranium) will be transported by road. The routing from Pelindaba, in the Gauteng province, to the proposed site in the Eastern Cape province, will be investigated as well as the frequency of consignments.

Low-level radioactive waste produced by Nuclear 1 will be stored at Vaalputs in the Northern Province. Maud, Drennan and Partners conducted a preliminary investigation in 1986[1] with regard to the transport of nuclear waste from the Thyspunt site to Vaalputs. The results of this study indicates that road transport is the most viable option. Radioactive waste will be required to be transported cross-country from the Eastern Cape to the Northern Cape. The transport mode (road, air and sea) and routing of radioactive waste to Vaalputs will be investigated further.

During the operations stage of Nuclear 1, **normal daily travel** between main residential centres (eg. Humansdorp), surrounding main towns (eg. Port Elizabeth) and the nuclear power station will result in increased usage of surrounding internal road network and national road network. The transportation impacts on the surrounding road network will be investigated.

(b) Bantamsklip

The proposed Bantamsklip **site can be accessed** directly off the R43 as shown in **Figure 4.6**. It is not known at this point where the construction and power station personnel are to be housed on a temporary or permanent basis. The R43 does however facilitate access to the surrounding towns of Gansbaai, Stanford and Bredarsdorp. The site is linked to the surrounding towns and the N2 entirely via surfaced roads, however, a new access road will have to be constructed from the R43 onto the site.

The transportation requirements relating to the **emergency evacuation** of the public within the PAZ and UPZ (Pearly Beach) will be investigated.

The transit of **heavy loads** to the proposed Bantamsklip site is expected to occur throughout Nuclear 1's life cycle stages (construction, operations and decommissioning).

According to the NSIP Southern Cape Summary Report[3] the feasibility of transporting heavy loads from Table Bay Harbour in Cape Town to the Bantamsklip site was investigated by Drennan, Maud and Partners in 1988. According to this study Table Bay Harbour is ideally situated and has the infrastructure capabilities for loading and off loading of heavy loads.

The main section of the heavy vehicle route from Bantamsklip is along the R43 to the N2 via Sir Lowry's pass into Cape Town. The detailed heavy vehicle route and its impacts on the relevant transportation network will also be investigated.

Nuclear fuel delivery to a nuclear power station will occur during the operation stage approximately 2 to 3 times a year as indicated in the NNR's 2005 / 2006 Annual Report[2]. Due to the inland location of Pelindaba, it is assumed that nuclear fuel (uranium) will be transported by road. The routing from Pelindaba, in the Gauteng province, to the proposed site in the Western Cape province, will be investigated as well as the frequency of consignments.

Low-level radioactive waste produced by Nuclear 1 will be stored at Vaalputs in the Northern Province. Maud, Drennan and Partners conducted a preliminary investigation in 1988 with regard to the transport of nuclear waste from the Bantamsklip site to Vaalputs. The results of this study indicates that road transport is the most viable option. Radioactive waste will be required to be transported cross-country from the Western Cape to the Northern Cape. The transport mode (road, air and sea) and routing of radioactive waste to Vaalputs will be investigated further.

During the operations stage of Nuclear 1, **normal daily travel** between main residential centres (eg. Bredarsdorp and Stanford), surrounding main towns (eg. Cape Town) and the nuclear power station will result in increased usage of surrounding internal road network and national road network. The transportation impacts on the surrounding road network will be investigated.

(c) Duynefontein (existing Koeberg Power Station)

The Duynefontein site, which currently houses the Koeberg Nuclear Power Station, can be **accessed** via two access points off the R27 as shown in **Figures 4.9 to 4.11**. Access Point 1 is the main Koeberg access and Access Point 2 is envisaged as the proposed Nuclear 1 access, however, this will be investigated further.

Koeberg Power Station currently has an **emergency evacuation** plan in place, which complies with the evacuation time requirements for each zone (PAZ and UPZ). The Nuclear 1 evacuation zones will be concurrent with the Koeberg Power Station zones. Therefore if Nuclear 1 is built on the Duynefontein site the only additional persons who would need to be included in the existing emergency evacuation plan is the Nuclear 1 staff and general public within 16 km's of the site as a result of Nuclear 1 (visitors etc.).

The transit of **heavy loads** to the Duynefontein site is expected to occur throughout Nuclear 1's life cycle stages (construction, operations and decommissioning).

Saldanha Bay is the closest harbour, which has the infrastructure capabilities to load and off load heavy loads. It is therefore envisaged that Saldanha Bay Harbour will be utilised in transporting heavy loads to the Duynefontein site. The R27 links Duynefontein to Saldanha directly however the detailed heavy vehicle route and its impacts on the relevant transportation network will also be investigated.

Delivery of **Nuclear fuel** to the Koeberg Nuclear Power Station by road currently occurs approximately 2 to 3 times a year as indicated in the NNR's 2005 / 2006 Annual Report[2]. If Nuclear 1's fuel delivery consignments coincide with the Existing Koeberg Power Stations consignments the impacts on the relevant transportation network should be minimal however, this will be verified in the next stage of the EIA process.

Low-level radioactive waste produced by Nuclear 1 will be stored at Vaalputs in the Northern Province. Koeberg's low-level radioactive waste is also stored at Vaalputs therefore if Nuclear 1's waste transport consignments coincides with Koeberg's consignments the impacts on the relevant transportation network should be minimal, however, this will be verified in the next stage of the EIA process.

During the operations stage of Nuclear 1, **normal daily travel** between main residential centres (eg. Melkbosstrand and Atlantis), surrounding main towns (eg. Cape Town) and the nuclear power station will result in increased usage of surrounding internal road network and national road network. The transportation impacts on the surrounding road network will be investigated.

(d) Brazil

The proposed Brazil **site can be accessed** directly off the De Beers Road as shown in **Figure 4.12**. It is assumed that the construction and power station personnel are to be housed at Kleinsee. The R355 links Kleinsee to Springbok situated on the N7. The R355 from Kleinsee to Springbok will have to be upgraded.

The transportation requirements relating to the **emergency evacuation** of the public within the PAZ and UPZ (Kleinsee and Grootmis) will be investigated.

The transit of **heavy loads** to the proposed Brazil site is expected to occur throughout Nuclear 1's life cycle stages (construction, operations and decommissioning).

According to the NSIP West Coast Summary Report[4] the transporting of heavy loads to the Brazil site from Cape Town or Saldanha Bay harbour is possible by road, but at a relatively high cost. The transport network along the heavy load route would probably require major upgrades. The enlarging of the power stations cooling water intake basin to accommodate loading and off loading of heavy loads should be investigated. The transport of heavy vehicles by road and sea will be investigated.

Nuclear fuel delivery to a nuclear power station will occur during the operation stage approximately 2 to 3 times a year as indicated in the NNR's 2005 / 2006 Annual Report[2]. Due to the inland location of Pelindaba, it is assumed that nuclear fuel (uranium) will be transported by road. The routing from Pelindaba, in the Gauteng province, to the proposed site in the Northern Cape Province, will be investigated as well as the frequency of consignments.

Low-level radioactive waste produced by Nuclear 1 will be stored at Vaalputs located approximately 240 km by road from the Brazil site. The detailed routing of

radioactive waste to Vaalputs will be investigated further. The close proximity to Vaalputs is an advantage for the Brazil site.

During the operations stage of Nuclear 1, **normal daily travel** between main residential centres (eg. Kleinsee), surrounding main towns (eg. Springbok) and the nuclear power station will result in increased usage of surrounding internal road network and national road network. The transportation impacts on the surrounding road network will be investigated.

(e) Skulpfontein

The proposed Skulpfontein **site can be accessed** directly off the De Beers Road as shown in **Figure 4.16**. It is assumed that the construction and power station personnel are to be housed at Kleinsee. The R355 links Kleinsee to Springbok situated on the N7 and will have to be upgraded. The alternative route to the N7 is via Koiingnaas and Wallekraal, however all these roads are currently unsurfaced.

The transportation requirements relating to the **emergency evacuation** of the public within the PAZ and UPZ (Koiingnaas and Hondeklipbaai) will be investigated.

The transit of **heavy loads** to the proposed Skulpfontein site is expected to occur throughout Nuclear 1's life cycle stages (construction, operations and decommissioning).

According to the NSIP West Coast Summary Report[4] the transporting of heavy loads to the Skulpfontein site from Cape Town or Saldanha Bay harbour is possible by road but at a relatively high cost. The transport network along the heavy load route would probably require major upgrades. The enlarging of the power stations cooling water intake basin to accommodate loading and off loading of heavy loads should be investigated. The transport of heavy vehicles by road and sea will be investigated.

Nuclear fuel delivery to a nuclear power station will occur during the operation stage approximately 2 to 3 times a year as indicated in the NNR's 2005 / 2006 Annual Report[2]. Due to the inland location of Pelindaba, it is assumed that nuclear fuel (uranium) will be transported by road. The routing from Pelindaba, in the Gauteng province, to the proposed site in the Northern Cape province, will be investigated as well as the frequency of consignments.

Low-level radioactive waste produced by Nuclear 1 will be stored at Vaalputs located approximately 290 km by road from the Skulpfontein site. The detailed routing of radioactive waste to Vaalputs will be investigated further. The close proximity to Vaalputs is an advantage for the Skulpfontein site.

During the operations stage of Nuclear 1, **normal daily travel** between main residential centres (eg. Kleinsee), surrounding main towns (eg. Springbok) and the nuclear power station will result in increased usage of surrounding internal road network and national road network. The transportation impacts on the surrounding road network will be investigated.

5.1.2 Mitigation Measures

(a) Thyspunt

- Site access: New access road should be built
- Emergency evacuation: An emergency evacuation plan should be prepared
- Heavy load transport routing: Possible transport network (road, sea, air) upgrades
- Fuel transport routing: Possible transport network (road, sea, air) upgrades
- Radioactive waste transport routing: Possible transport network (road, sea, air) upgrades
- Normal daily travel: Possible transport network (road, sea, air) upgrades

(b) Bantamsklip

- Site access: New internal access road should be built
- Emergency evacuation: An emergency evacuation plan should be prepared
- Heavy load transport routing: Possible transport network (road, sea, air) upgrades
- Fuel transport routing: Possible transport network (road, sea, air) upgrades
- Radioactive waste transport routing: Possible transport network (road, sea, air) upgrades
- Normal daily travel: Possible transport network (road, sea, air) upgrades

(c) Duynefontein (existing Koeberg Power Station)

- Site access: Access 2 should be used for Nuclear 1
- Emergency evacuation: A combined evacuation plan should prepared for the existing Koeberg and proposed Nuclear 1 power stations
- Heavy load transport routing: Possible transport network (road, sea, air) upgrades
- Fuel transport routing: Nuclear 1's fuel consignment should coincide with Koeberg's consignment to minimise the transport impacts
- Radioactive waste transport routing: Nuclear 1's waste consignment should coincide with Koeberg's consignment to minimise the transport impacts
- Normal daily travel: Possible transport network upgrades

(d) Brazil

- Site access: New internal access road should be built; R355 should be upgraded
- Emergency evacuation: An emergency evacuation plan should be prepared
- Heavy load transport routing: Possible transport network (road, sea, air) upgrades
- Fuel transport routing: Possible transport network upgrades
- Radioactive waste transport routing: Possible transport network upgrades
- Normal daily travel: Possible transport network (road, sea, air) upgrades

(e) Skulpfontein

- Site access: New internal access road should be built; R355 should be upgraded; alternative route should be investigated
- Emergency evacuation: An emergency evacuation plan should be prepared
- Heavy load transport routing: Possible transport network (road, sea, air) upgrades
- Fuel transport routing: Possible transport network upgrades
- Radioactive waste transport routing: Possible transport upgrades
- Normal daily travel: Possible transport network (road, sea, air) upgrades

5.2 Environmental Impacts and Mitigation Measures

5.2.1 Impacts of the Environment on the Project

The transportation environmental impacts on the project discussed in the following section are broadly associated with the following criteria:

- Existing and planned transportation network
- Existing and planned flight plans
- Existing and planned shipping lines

(a) Thyspunt

The close proximity of the site to the N2 is an advantage however the lack of local access roads is a disadvantage. **Planned transportation** projects affecting the project area of influence will be investigated.

According to the NSIP Eastern Cape Summary Report[1] **flight paths** exists over the proposed site. Flight restrictions or path changes will have to be made. **Shipping lines**, which could impact the project, will be investigated.

(b) Bantamsklip

The close proximity of the R43 to the site impacts the project positively. **Planned transportation** projects affecting the project area of influence will be investigated. **Shipping lines and flight paths**, which could impact the project, will also be investigated.

(c) Duynefontein (existing Koeberg Power Station)

The close proximity of the site to the R27 is an advantage to the site. **Planned transportation** projects affecting the project area of influence will be investigated.

Due to the existing Koeberg Power Station **flight paths and shipping lines** would have been altered to accommodate the existing station however this will be investigated in the next EIA phase.

(d) Brazil

The poor condition of the existing surrounding road network is a disadvantage to the site. **Planned transportation** projects affecting the project area of influence will be investigated.

Shipping lines and flight paths, which could impact the project, will also be investigated.

(e) Skulpfontein

The poor condition of the existing surrounding road network is a disadvantage to the site. **Planned transportation** projects affecting the project area of influence will be investigated.

Shipping lines and flight paths, which could impact the project, will also be investigated.

5.2.2 Mitigation Measures

The following preliminary mitigation measures are relevant to all sites:

- Planned transportation infrastructure should be investigated
- Flight paths and shipping lines may be required to be altered

6 SENSITIVITY ANALYSIS

6.1 Criteria for Site Sensitivity Analysis

The criteria used in the sensitivity analysis for each site are related to the transportation project and environment impacts discussed in **Chapter 5**.

6.2 Site Sensitivity

The following table illustrates the initial site sensitivity analysis as per the criteria.

Table 6.1: Initial site sensitivity

SITE SENSITIVITY									
Key									
	Uncertain, not enough info at present								
	Significant concern at present								
	Some concern at present								
	No concern at present								
CRITERIA	**SITE**								
	Koeberg		Thyspunt		Bantamsklip		Skulpfontein		Brazil
Traffic and Transport									
Site access									
Waste vehicle routing									
Fuel vehicle routing									
Heavy load routing									
Proximity to waste site									
Proximity to port									
Existing and planned flight paths									
Existing and planned shipping lines									
Future transport network capacity: normal operation									
Future transport network capacity: emergency evacuation									
Transportation upgrades required									
Other access (light planes etc)									

7 CONCLUSIONS

The following can therefore be concluded:

General

- Thyspunt, Bantamsklip, Duynefontein (Existing Koeberg Site), Brazil and, Skulpfontein are the five proposed sites being taken through the Nuclear 1 EIA process.

- This report serves as the transportation output of the screening phase and presents the initial transportation findings and issues.

Thyspunt

- Thyspunt is situated in the Eastern Cape Province 160 km west of Port Elizabeth.

- Access to the site is one of the main concerns due to the sensitivity of mobile dune system bordering the site. A new access road will have to be built either from the Oyster Bay or St Francis side crossing the dune.

- The upgrade of the Oyster Bay Road may be required to facilitate the safe evacuation of the public within the specified time periods.

- The loading and off-loading capabilities of Port Elizabeth harbour and the detailed heavy vehicle route and its impacts on the relevant transportation network need to be determined.

- The nuclear fuel routing from Pelindaba, in the Gauteng province, to the proposed site in the Eastern Cape province, will be investigated as well as the frequency of consignments.

- The routing and transit of low level radioactive waste by road across the country to Vaalputs in the Northern Cape Province is seen as a major concern, which could require extensive transport upgrades.

- The transport mode (road, air and sea) and routing of radioactive waste to Vaalputs will be investigated further.

- The transportation impacts of normal daily travel on the surrounding road network will be investigated.

Bantamsklip

- Bantamsklip is situated on the southern coast of South Africa and lies within the Western Cape Province approximately 250 km southeast of Cape Town.

- The emergency evacuation plan needs to include Pearly Beach, which falls within the 5 to 16 km Urgent Protective Action Zone (UPZ).

- The main section of the heavy vehicle route from Bantamsklip to Table Bay Harbour is along the R43 to the N2 via Sir Lowry's pass into Cape Town. The

heavy vehicle route and its impacts on the relevant transportation network need to be determined.

- The nuclear fuel routing from Pelindaba, in the Gauteng province, to the proposed site in the Eastern Cape province, will be investigated as well as the frequency of consignments.

- The routing and transit of low level radioactive waste by road across the country to Vaalputs in the Northern Cape Province is seen as a major concern, which could require extensive transport upgrades.

- The transport mode (road, air and sea) and routing of radioactive waste to Vaalputs will be investigated further.

- The transportation impacts of normal daily travel on the surrounding road network will be investigated.

Duynefontein (existing Koeberg Power Station)

- The Duynefontein site is situated on the west coast of South Africa in the Western Cape Province approximately 35 km north of Cape Town and houses the existing Koeberg power station.

- Koeberg Power Station currently has an **emergency evacuation** plan in place, which complies with the evacuation time requirements for each zone (PAZ and UPZ). The Nuclear 1 evacuation zones will be concurrent with the Koeberg Power Station zones. Therefore a combined evacuation plan would be required.

- It is envisaged that Saldanha Bay Harbour will be utilised in transporting heavy loads to the Duynefontein site. The heavy vehicle route and its impacts on the relevant transportation network needs to be determined.

- Koeberg's low-level radioactive waste is also stored at Vaalputs, therefore if Nuclear 1's waste transport consignments coincides with Koeberg's consignments the impacts on the relevant transportation network should be minimal, however, this will be verified in the next stage of the EIA process.

- The transportation impacts of normal daily travel on the surrounding road network will be investigated.

Brazil

- The Brazil site is situated on the west coast of South Africa in the Northern Cape Province approximately 500 km north of Cape Town and 100 km southwest of Springbok.

- The emergency evacuation plan needs to include Kleinsee and Grootmis, which fall within the 5 to 16 km Urgent Protective Action Zone (UPZ).

- The transporting heavy loads to the Brazil site from Cape Town or Saldanha Bay harbour is possible by road but at a relatively high cost. The enlarging of the power stations cooling water intake basin to accommodate loading and off loading of heavy loads should be investigated. Both options will be considered.

- The nuclear fuel routing from Pelindaba, in the Gauteng province, to the proposed site in the Northern Cape province, will be investigated as well as the frequency of consignments.

- The detailed routing of radioactive waste to Vaalputs will be investigated further however the close proximity of the site to Vaalputs will minimise the impacts.

- The transportation impacts of normal daily travel on the surrounding road network will be investigated.

Skulpfontein

- The Skulpfontein site is situated on the west coast of South Africa in the Northern Cape Province approximately 500 km north of Cape Town and 100 km southwest of Springbok.

- The emergency evacuation plan needs to include Koiingnaas and Hondeklipbaai, which fall within the 5 to 16 km Urgent Protective Action Zone (UPZ).

- The transporting heavy loads to the Skulpfontein site from Cape Town or Saldanha Bay harbour is possible by road but at a relatively high cost. The enlarging of the power stations cooling water intake basin to accommodate loading and off loading of heavy loads should be investigated. Both options will be considered.

- The nuclear fuel routing from Pelindaba, in the Gauteng province, to the proposed site in the Northern Cape Province, will be investigated as well as the frequency of consignments.

- The detailed routing of radioactive waste to Vaalputs will be investigated further however the close proximity of the site to Vaalputs will minimise the impacts.

- The transportation impacts of normal daily travel on the surrounding road network will be investigated.

8 RECOMMENDATIONS

It is recommended that the following transportation impacts be investigated in more detail in the scoping and assessment phase of the Nuclear 1 EIA process for each of the five site:

- Site access
- Emergency evacuation
- Heavy load transport routing
- Fuel transport routing
- Radioactive waste transport routing
- Normal daily travel impacts
- Existing and planned transportation infrastructure
- Aviation and shipping line impacts

9 REFERENCES

1. Eskom, 1994. Nuclear Siting Investigation Programme (NSIP): Eastern Cape Summary report. December 1994.

2. National Nuclear Regulator, 2005/2006. The Effective and Efficient Regulation of Nuclear and Radiation Safety. Annual Report 2005/2006

3. Eskom, 1994. Nuclear Siting Investigation Programme (NSIP): Southern Cape Summary report. February 1993.

4. Eskom, 1994. Nuclear Siting Investigation Programme (NSIP): West Coast Summary report. December 1994.