ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED NUCLEAR POWER STATION ('NUCLEAR-1') AND ASSOCIATED INFRASTRUCTURE

Transport Specialist Study
Impact Assessment Phase

Volume 1
Status Quo Assessments




Prepared by: Arcus GIBB (Pty) Ltd

Prepared for: Arcus GIBB (Pty) Ltd

On behalf of: Eskom Holdings Ltd

Version 12
August 2012

FOREWORD

In response to internal comments and feedback from the public process, a thorough and in-depth revision of Versions 10 and 11 of the Transport Impact Assessment Report has been undertaken in accordance with the following scope guidelines:

1. On a Broad Level:

1.1 The Department of Transports *Manual for Traffic Impact Studies* (RR93/635).

1.2 The PGWC's *Transport Impact Assessments: Draft Regulations on minimum requirements in terms of the National Land Transport Transition Act, 2000*.

2. More Specifically:

2.1 Methodology received from Eskom including the Terms of Reference (ToR) for the Transportation Impact Assessment - 27 June 2006;

2.2 Proposal for Traffic and Transportation Assessment as formed part of the original EIA proposal - July 2006;

2.3 Proposal accepted by Eskom and Contract signed – February 2007;

2.4 Eskom provided information for transportation routes at Specialist Integration Meeting – February/ March 2007;

2.5 Proposal submitted to Eskom for the Thyspunt Access Investigation - 4 June 2008;

2.6 Report received from Eskom entitled Main Road Access to Site - 9 May 2008;

2.7 Letter received from Eskom on 11 December 2008 in terms of the 2009 Scope Change;

2.8 Plan of Study for EIA requirements in terms of Traffic and Transportation as received from the GIBB EIA Team and approved by the Department of Environmental Affairs and Tourism;

2.9 Public comment in the form of Issues and Response Reports (IRRs) and minutes of meetings;

2.10 Meeting 1 June 2011 regarding the bypasses of Humansdorp and St. Francis Bay Sea Vista attended by Eskom and GIBB, during which GIBB motivated for the investigation of these alternative bypasses;

2.11 Aurecon Road Investigations for EIA Process Addendum Report – 20 June 2011;

2.12 Aurecon Abnormal Load Haul Route Investigation Report – 23 March 2011

2.13 Aurecon Thyspunt Site Proposed Site Access Roads Report – 16 March 2011 Rev 2

2.14 Scope change G (which included the revision of the TIA to include traffic counts) submitted to Eskom - September 2011

2.15 Eskom comments on Versions 10 and 11 of the Transport Specialist Study -

The revision of the Traffic Impact Assessment Report includes, *inter alia*:

- Correction of all technical, calculation, grammatical and formatting errors identified in the reviews.
- Inclusion of all comments received from Eskom, where appropriate.

- Addressing comments and questions received from the public and recorded in the IRRs received up until July 2012.
- Amendment of previously provided construction starts date of 2011 to end of 2013 as advised by Eskom.
- Analysis of new access routes at Thyspunt as recommended in the various Aurecon reports.
- Additional off-peak traffic accounts for these routes.
- Inclusion of a peak season (December) traffic count at Thyspunt as requested in the public comments.
- Removal of access to the Pebble Bed Modular Reactor (PBMR) site from the Duynefontein assessment.

In terms of the above correspondence and guidelines, the Transport Impact Assessment Report does not include in-depth consideration of vehicle emissions, vehicle noise and socio-economic impacts of increased traffic in close proximity to existing residential areas. The report also does not include cost estimates for any of the external road upgrades, as separate EIAs for the road upgrades / construction will be undertaken in future by independent consultants appointed by Eskom.

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15 August 2012

DECLARATION OF INDEPENDENCE

I, Andrew Bulman as duly authorised representative of Arcus GIBB (Pty) Ltd hereby confirm my independence as well as that of Arcus GIBB as a specialist and declare that neither I nor Arcus GIBB have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which Arcus GIBB was appointed as environmental assessment practitioner in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), other than fair remuneration for worked performed, specifically in connection with the Environmental Impact Assessment for the proposed conventional nuclear power station ('Nuclear 1'). I further declare that I am confident in the results of the studies undertaken and conclusions drawn as a result of it – as is described in my attached report.

Signed on Behalf of Arcus GIBB (Pty) Ltd

Andrew Bulman
Technical Executive

Report Authors: Nuran Nordien (BSc Eng (UCT)), 9 years experience
Yusry Frizlar (Pr.CPM, BSc Eng (UCT), BSc (Hon) Transport (UP)), 20 years experience
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Reviewer and Approver: Andrew Bulman (Pr.Eng, BSc Eng Transport (Stell)), 17 years experience

EXECUTIVE SUMMARY

Arcus GIBB (Pty) Ltd (Arcus GIBB) was appointed by Eskom Holdings SoC (Eskom) to undertake an Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the proposed construction of a nuclear power station and associated infrastructure on one of three selected sites that are located in the Eastern and Western Cape Provinces, namely:

- Duynefontein (Existing Koeberg Nuclear Power Station Site) – Western Cape;
- Bantamsklip – Western Cape;
- Thyspunt – Eastern Cape

Two other sites in the Northern Cape, namely Brazil and Schulpfontein, were excluded from further study, in the Scoping Phase of the EIA process. The three sites were accepted by the Department of Environmental Affairs (DEA) in the Scoping phase.

This Traffic Impact Assessment Report details the Impact Assessment Phase of Nuclear-1's Transport Specialist Study.

The **Duynefontein** site requires no significant upgrades during the construction and operational phases of Nuclear-1 with regard to intersection upgrades, heavy load transport road upgrades and emergency evacuation upgrades. Duynefontein, however, requires a significant number of stand-by evacuation vehicles to ensure safe evacuation of construction workers if an accident does occur at the adjacent Koeberg Nuclear Power Station during the construction period. These vehicles can also be used to shuttle the construction workers to and from the site during the AM and PM peak periods.

The **Bantamsklip** site will have a significant impact on the transport network, with upgrades required to the public transport system, heavy load routes and road upgrades required for emergency evacuation purposes and bypassing Gansbaai. Due to the Bantamsklip site's isolated location, transporting heavy loads by road will require significant upgrades and the alternative transport by sea should be considered. A suitable site on the beach near to Bantamsklip will have to be identified and a landing with loading / off-loading facilities will have to be constructed.

The **Thyspunt** site requires significant transport upgrades with regard to public transport, access and emergency evacuation, during the construction phases. The recommended routes in Version 9 of this Report were revised as a result of public input and recommendations received between 29 May 2011 and 2 June 2011. Based on the feedback received, the R330 is now proposed to be used for light vehicle traffic and abnormal load transport, and sections will require upgrading for this purpose. The Oyster Bay Road is now proposed to be upgraded to a surfaced road to be used during the construction and operations phases for staff access, light vehicle traffic, heavy vehicle traffic and as an emergency evacuation route for areas such as Oyster Bay. DR1762, which links the R330 and Oyster Bay Road is now proposed to be surfaced to provide improved east-west connectivity. Bypass roads to the east and west of Humansdorp are also now proposed to be constructed to reduce the traffic impact on central Humansdorp.

NUCLEAR-1 ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN

TRANSPORTATION SPECIALIST STUDY ASSESSMENT PHASE

VOLUME 1
STATUS QUO ASSESSMENTS

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ABBREVIATIONS

AADT	Average Annual Daily Traffic
AFB	Air Force Base
AIS	Automatic Identification System
CPTR	Current Public Transport Record
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPZ	Emergency Protective Zone
IRT	Integrated Rapid Transport
ITP	Integrated Transport Plan
KNPS	Koeberg Nuclear Power Station
LOS	Level of Service (*See p.23 for definition*)
NDoT	National Department of Transport
NM	Nautical Miles
NMT	Non-motorist Transport
NNR	National Nuclear Regulator
NSIP	Nuclear Siting Investigation Programme
PAZ	Protective Action Zone
PBMR	Pebble Bed Modular Reactor
PE	Port Elizabeth
PGWC	Provincial Government of the Western Cape
SAMSA	South African Maritime Safety Authority (SAMSA)
SDF	Spatial Development Framework
SID	Standard Instrument Departure
SPMT	Self Propelled Modular Transporter
STAR	Standard Instrument Arrival
TCA	Terminal Control Area
TIA	Transport Impact Assessment
TFTC	Test Flight and Development Centre
TSS	Traffic Separation Schemes
UPZ	Urgent Protective Action Zone

1 INTRODUCTION

1.1 Project Background

Arcus GIBB (Pty) Ltd (Arcus GIBB) was appointed by Eskom Holdings SoC (Eskom) to undertake an Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the proposed construction of a nuclear power station and associated infrastructure on one of three selected sites located in the Eastern and Western Cape Provinces.

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

The Scoping Phase of the EIA process resulted in the two sites in the Northern Cape being excluded from further investigation.

1.2 Outcomes of Transport Impact Scoping Study

In August 2007, an Inception Report for the transportation specialist study was prepared as part of the screening and scoping phase. The following five potential sites were considered in the EIA process, as shown in **Figure 1.1**:

- Duynefontein (Existing Koeberg Nuclear Power Station Site) – Western Cape;
- Bantamsklip – Western Cape;
- Thyspunt – Eastern Cape;
- Brazil – Northern Cape; and
- Schulpfontein – Northern Cape.

The transportation specialist Scoping Report presented the preliminary determination of impacts of Nuclear-1 on the environment and its relevant significance (sensitivity) and possible mitigation measures.

It was recommended that the following transportation impacts be investigated in more detail in the assessment phase of the Nuclear-1 EIA process for the Duynefontein, Bantamsklip and Thyspunt sites:

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

Project : Nuclear 1 Environmental Impact Assessment and Environmental Management Programming	Prepared by : P.Smith	Checked by : K.Maneveld	Reviewed by : N.Nordien
	Scale : N.T.S.	Date : August 2008	
Detail : Location of Proposed Nuclear 1 Sites	Project No. : J27035	Drg No. : Figure 1.1	Rev : _

ARCUS GIBB ENGINEERING & SCIENCE

1.3 Aim of the Transport Impact Assessment Study

The aim of the Transport Impact Assessment (TIA) is to determine the transport impact on the existing transport network during all phases, i.e. construction, operation and decommissioning, within 5 km to 20 km (as appropriate to the site) of the proposed Nuclear-1 Power Station. This takes into account the impacts and possible mitigation measures for the development of Nuclear-1 for each of the proposed sites as listed below:

- Duynefontein;
- Bantamsklip; and
- Thyspunt

This Report serves as the transportation output of the assessment phase and presents the detailed transportation findings of each site.

1.4 Scope of this Transport Impact Assessment Study

This Transportation Specialist Study will amongst others, answer the following question:

> *What impact will activities associated with the construction and operation of the proposed nuclear power station have on traffic in the surrounding environment (extent determined uniquely for each site), and along the access routes to be used for the transportation of equipment and materials?*

The transportation impacts of the Nuclear-1 Power Station during the construction, operational and decommissioning phases of the development are assessed through the following processes and tasks.. This Report is compiled based on the results of these processes and tasks.

- Site visits and traffic counts at critical road links in the area of each site under consideration;
- Description of the background traffic flow based on traffic counts;
- Calculation of future traffic flow based on the background traffic flow;
- Discussion of access location in terms of access spacing, sight distance and operational requirements;
- Conceptual design of the required road / rail upgrades for the facility or to improve evacuation times;
- Description of the proposed development and operation including routing of heavy vehicles;
- Calculation of trip generation and heavy vehicle movement frequency;
- Analysis of the existing and future operation of the road network;
- Existing and future upgrades to the transport network;
- Analysis of possible evacuation times of the local population using the road network;

- Description of the surrounding road / rail network and future transportation planning proposals for each site;
- The frequency and type of rail use;
- Description of the surrounding aviation air routes, within 80 km radius of each site;
- Description of the future development proposals for new, extensions and / or closure of airports affecting each site;
- Description of the shipping line network affecting each site; and
- Description of the activities and functions at the ports and harbours affecting each site.

1.5 Revisions of Version 12

This version of the Traffic Impact Assessment Report includes the following revisions made to versions 10 and 11 of the previous reports:

- Correction of all technical, calculation, grammatical and formatting errors identified in the reviews.
- Inclusion of all comments received from Eskom, where appropriate.
- Addressing comments and questions received from the public and recorded in the IRRs.
- Amendment of previously provided construction starts date of 2011 to end of 2013 as advised by Eskom.
- Analysis of new access routes at Thyspunt as recommended in the various Aurecon reports.
- Additional off-peak traffic accounts for these routes.
- Inclusion of a peak season (December) traffic count at Thyspunt as requested in the public comments.
- Removal of access to the PBMR site from the Duynefontein assessment

1.6 Limitations

This Report does not include the following:

- In-depth consideration of vehicle emissions, vehicle noise and socio-economic impacts of increased traffic in close proximity to existing residential areas. These are covered in separate specialist studies.

Cost estimates for any of the external road upgrades, as separate EIAs for the road upgrades / construction will be undertaken in future.

2 FRAMEWORK

2.1 Legislative Framework

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

- National Nuclear Regulator Act, 1999 (Act No. 47 of 1999);
- National Road Traffic Act, 1996 (Act No. 93 of 1996);
- National Department of Transport (NDoT) Manual for Traffic Impact Studies, October 1995;
- Provincial Government: Western Cape (PGWC) Road Access Guidelines, May 2001;
- Department of Transport (DoT) Dimensional and Mass Limitations and Other Requirements for Abnormal Load Vehicles, March 2010;
- Hazardous Substances Act, 1973 (Act No. 15 of 1973);
- National Land Transport Act, 2009 (Act No. 5 of 2009);
- Sea-Shore Act, 1935(Act No. 21 of 1935); and
- South African Civil Aviation Authority Obstacle Limitations and Markings Outside Aerodrome or Heliport (2010)

2.2 Assumptions and Limitations

The following assumptions were made while compiling this Report:

- A Protective Action Zone (PAZ) of 0.8 km radius is to be implemented around the boundary (the exact definition of boundary will require clarification) of Nuclear-1. No further development will be allowed within the PAZ. Employees within the PAZ need to be evacuated within 4 hours.
- A 0.8 km to 3 km Urgent Protective Action Zone (UPZ) is to be implemented around the boundary of Nuclear-1. Public within the UPZ need to be evacuated within 16 hours.
- Low to medium level radioactive waste will be stored at Vaalputs (Northern Cape Province).
- High level radioactive waste (spent fuel) will be stored within the proposed nuclear power station for a period of approximately 60 years, as is currently practised at the existing Koeberg Nuclear Power Station.
- Nuclear fuel delivery to Nuclear-1 will occur during the operational stage approximately 2 to 3 times a year as for Koeberg Nuclear Power Station. The fuel will be manufactured internationally and will enter South Africa via a major port and transported by road to the proposed Nuclear-1 site. Due to the infrequent annual fuel delivery consignments, the road transport impacts are expected to be negligible and are required to conform to the regulations for the transport of hazardous materials.
- From the information provided by Eskom, the transport activities expected to occur during the decommissioning phase of Nuclear-1 are expected to be less

than the transport activities expected to occur during the construction phase of the project and will likely occur approximately 60 years after the commissioning phase. The decommissioning phase transport impacts should be assessed at a later stage closer to the time of decommissioning and are therefore not considered further in this Report.

- Several construction phase details such as the location of laydown and location of worker's villages will be assessed in a separate EIA process and are not included in this TIA.
- Eskom has provided an estimation of construction phase traffic in the document *Nuclear-1 Traffic Estimates during Construction and Operation to the Thyspunt site, (June, 2010)*. The provided estimation was used in the analysis and it is assumed to be accurate.
- The access to the previously proposed Pebble Bed Modular Reactor (PBMR) opposite the Duynefontein site is removed from the analysis as it will no longer be constructed.
- Recommended access routes for the general construction vehicles, abnormal loads and emergency evacuation for the Thyspunt site were provided by Aurecon in 2011 and were used in the analysis.
- The construction phase of Nuclear-1 is expected to commence from the end of 2013 into 2014. The construction period is expected to last for 9 years, of which 2019 (year 6 of the construction period) is considered the peak construction period.

2.3 Methodology

Each site was assessed from a transportation perspective for the different Nuclear-1 development phases as follows:

- Status Quo Assessment (No-Go Alternative);
- Construction Phase Assessment; and
- Operational Phase Assessment.
-

2.3.1 **Status Quo Assessment (No-Go Alternative)**

The Status Quo Assessment determines the status quo of the existing transport system for the three sites. Each site has been assessed in terms of the following criteria:

- Traffic analysis;
- Access;
- Public transport;
- Non-motorised transport;
- Parking (if applicable);
- Waste transport (if applicable);
- Heavy load transport (if applicable);
- Emergency evacuation (if applicable);
- Air routes (if applicable);

- Shipping lanes (if applicable).

2.3.2 **Construction Phase Assessment**

The following Nuclear-1 construction phase transport impacts were identified for investigation:

- Daily construction related transport impacts:
  - Access;
  - Traffic analysis;
  - Parking;
  - Public transport; and
  - Non-motorised transport

- Impacts of abnormal load transport to the Nuclear-1 site; and
- Emergency evacuation impacts (Duynefontein only, as it is an operating nuclear power station)

2.3.3 **Operation Phase Assessment**

The following Nuclear-1 operational phase transport impacts were identified for investigation:

- Normal daily transport impacts
  - Access;
  - Traffic analysis;
  - Parking;
  - Public transport;
  - Non-motorised transport;

- Low to medium nuclear waste transport;
- Emergency evacuation impacts; and
- Air and shipping route impacts.

It is assumed that the mitigation actions required for the Construction Phase of the development are undertaken before the Operational Phase commences.

3 DESCRIPTION OF THE SITES AND SURROUNDING ENVIRONMENT

3.1 Duynefontein

3.1.1 Locality of the Site

The Duynefontein site is situated on the west coast of South Africa in the Western Cape Province and falls within the City of Cape Town's municipal boundary, approximately 35 km north of Cape Town, as shown in **Figure 3.1**.

The Duynefontein site currently houses Eskom's Koeberg Nuclear Power Station, with a visitor's centre, various offices and conference facilities and is also a registered nature reserve. Nuclear-1 is proposed to be situated on the Duynefontein site adjacent and to the north of to the existing Koeberg Nuclear Power Station, north of Koeberg nuclear power station. The Duynefontein site is located approximately 400 km south of Vaalputs, where the nuclear waste will be stored.

3.1.2 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 to the north of the site. The Duynefontein residential area is located on the outskirts of the Koeberg Nuclear Power Station and is the closest residential area to the site. Saldanha is located approximately 100 km north of Duynefontein and is mainly an industrial centre.

Koeberg Nuclear Power Station has a wider Protective Action Zone (PAZ) and Urgent Protective Action Zone (UPZ) than prescribed by the European Utility Requirements (EUR) for light water reactors as proposed for Nuclear-1. The PAZ is a 5 km zone and the UPZ is a 16 km zone at Koeberg Nuclear Power Station. Due to the existing Koeberg 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. The Duynefontein residential area falls within this 5 km PAZ radius. Melkbosstrand and Bloubergstrand fall within the 16 km UPZ.

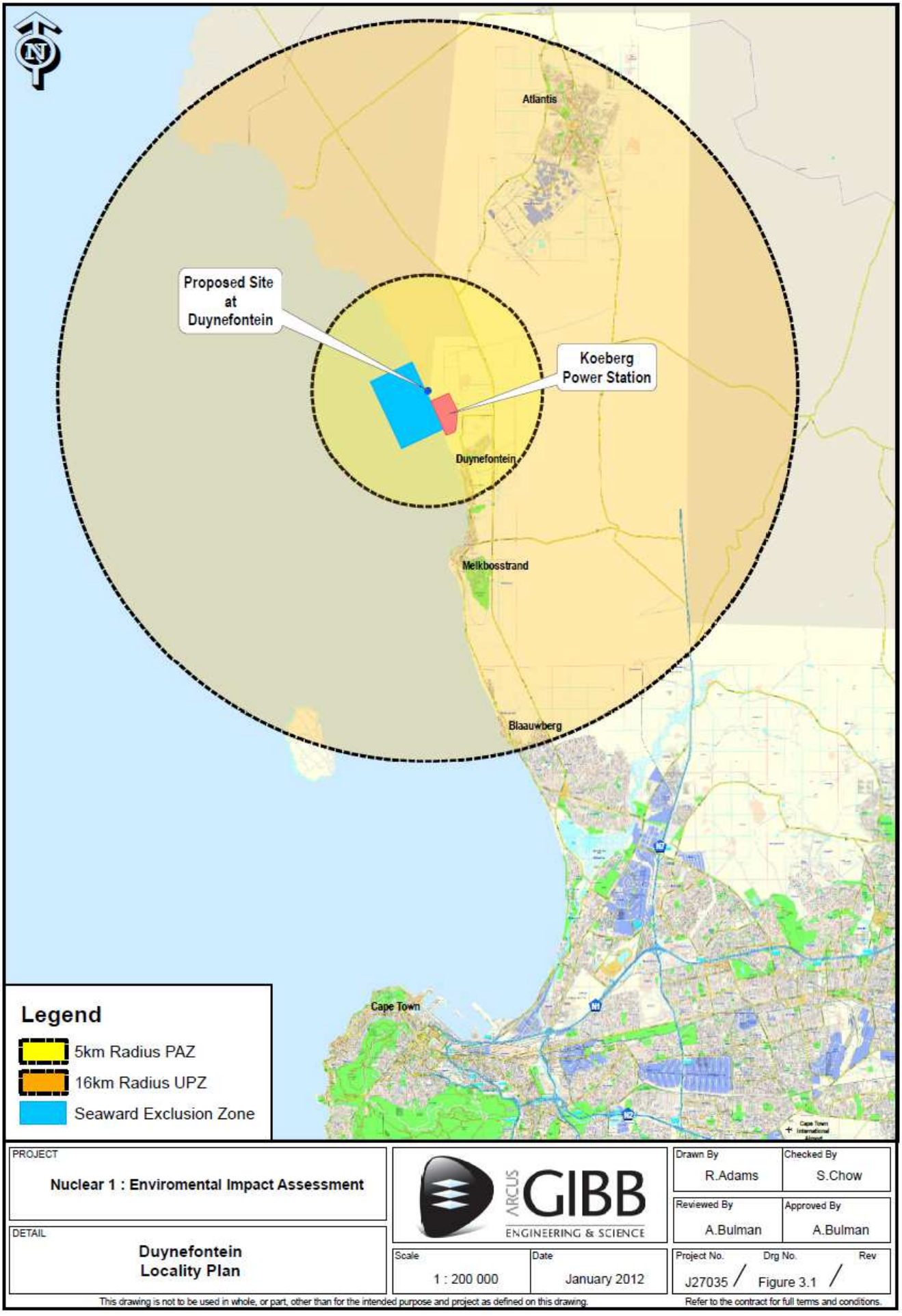
Currently a 2 km seaward exclusion zone exists around the sea shore bordering the Koeberg Nuclear Power Station as per the Sea-Shore Act, 1935 (Act No. 21 of 1935). No general activity (swimming, operation of sea vessels etc.) is allowed within the 2 km by 3.2 km area of the sea shore adjacent to Koeberg Nuclear Power Station.

Many of the Koeberg Nuclear Power Station staff resides in the Duynefontein and Melkbosstrand residential areas located south of the site.

3.1.3 Road Network

The West Coast Road (R27) and N7 are the primary regional and national distributors, as shown in **Figure 3.2**. The R27 runs in a north-south direction and links Cape Town with the west coast towns of Langebaan, Vredeburg, Saldanha and Velddrif. It is located approximately 2.5 km east of the site and provides the main access to the Duynefontein site.

The N7 also runs in a north-south direction linking the main towns of the Western Cape and Northern Cape.



PROJECT: Nuclear 1 : Enviromental Impact Assessment	ARCUS GIBB ENGINEERING & SCIENCE	Drawn By: R.Adams	Checked By: S.Chow
		Reviewed By: A.Bulman	Approved By: A.Bulman
DETAIL: Duynefontein Locality Plan	Scale: 1 : 200 000	Date: January 2012	Project No.: J27035 / Drg No.: Figure 3.1 / Rev:

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Project : Nuclear 1 : Environmental Impact Assessment						
Detail : Duynefontein Transport Network						
Prepared by : R.Adams	Checked by : S.Chow	Reviewed by : A.Bulman	Scale : N.T.S	Date : January 2012	Project No. : J27035 / Drg No. : Fig. 3.2	Rev : / _

3.1.4 Rail Network

There are two railway line branches, as shown in **Figure 3.2**, running in north-south directions from Cape Town.

The line from Cape Town to Namaqualand runs past Kalbaskraal and has two branches to Malmesbury and towards Saldanha. This line is approximately 24 km east of the site.

The Atlantis goods line runs approximately 6 km east of the site, from Cape Town's CBD, traversing Table View and ending in Atlantis. It connects with the suburban rail system at Chempet Station in Cape Town.

3.1.5 Airports

The existing major and minor airports and landing strips in the vicinity of the site are shown in **Figure 3.2** and are listed as follows:

- Major airports and landing strips:
  - Cape Town International Airport;
  - Ysterplaat and Langebaan (Military airfields); and
  - Stellenbosch airfield.
- Minor airports and landing strips:
  - Diepkloof airfield;
  - Rosenburg farm airstrip;
  - Saldanha airfield; and
  - Kersefontein airfield.

3.1.6 Harbours

The existing major harbours in the vicinity of the proposed Nuclear-1 are shown in **Figure 3.2** and are listed as follows:

- The Port of Cape Town; and
- The Port of Saldanha.

3.2 Bantamsklip

3.2.1 Locality of the Bantamsklip Site

Bantamsklip is situated on the southern coast of South Africa, as shown in **Figure 3.3**, and lies within the Western Cape Province approximately 250 km southeast of Cape Town. It forms part of the Overstrand Local Municipality and is within the Overberg District Municipality Area. Bantamsklip is situated to the east of Gansbaai and is currently a vacant site covered with vegetation.

Vaalputs is located approximately 500 km to the north-west of the site. Pearly Beach is located less than 10 km to the north-west and Bredasdorp is located 60 km to the north-east of the site.


Houwhoek Nature Reserve
Caledon
N2
R43
R44
R316
R320
R326
R317
R319
Babilonstoring Nature Reserve
Fernkloof
Hermanus
Maanschynkop Nature Reserve
Hawston
Onrus
Salmonsdam Nature Reserve
Stanford
Napier
Walker Bay Nature Reserve
Bredasdorp
De Kelders
Gansbaai
Uilkraalsmond Nature Reserve
Pearly Beach
Agulhas National Park
Soetendalsvlei
Andrewsfield Private Nature Reserve
De Mond Nature Reserve
Struis Bay
Quoin Point Nature Reserve
Suiderstrand
Agulhas
Proposed Site at Bantamsklip
Legend
0.8km Radius PAZ
3km Radius UPZ
PROJECT
Nuclear 1 : Enviromental Impact Assessment
DETAIL
Bantamsklip Locality Plan
Approved By
A.Bulman
Drawn By
R.Adams
Checked By
S.Chow
Reviewed By
A.Bulman
ARCUS GIBB ENGINEERING & SCIENCE
Scale
1 : 40 000
Date
January 2012
Project No.
J27035
Drg No.
Figure 3.3
Rev
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3.2.2 **Surrounding Land Use**

Fishing and holiday towns are scattered along the southern coast within a 70 km of the site. The main towns are Gansbaai, Bredasdorp, Stanford and Hermanus.

3.2.3 **Road Network**

The N2 runs in an east-west direction approximately 60 km north of Bantamsklip and links to the N7 via Cape Town, as shown in **Figure 3.4**. 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 and gives direct access to the site. The site can currently be accessed via off-road tracks.

The Overstrand Local Municipality experiences a large influx of holiday makers during the summer holidays. On average, a 50% increase in vehicular traffic and a 100% increase in pedestrians are experienced during this period.

The existing road network has sufficient capacity to carry existing traffic and should be able to do so in the foreseeable future. One outstanding exception, however, is the portion of the R43, between Hawston and Hermanus. Delays in excess of 30 minutes are experienced during weekday peak hours, with significantly increased delays during holiday periods.

The Overstrand Municipality and the Provincial Government Western Cape are in discussion over the upgrading of this road section. Delays are also experienced on the N2, in the Grabouw / Sir Lowry's Pass region, but this is generally limited to holiday periods.

3.2.4 **Rail Network**

A number of railway lines run through the Overberg District Municipality, as shown in **Figure 3.4**. However, very few of these are operational and are mostly limited to the transportation of goods.

Project :
Nuclear 1 : Environmental Impact Assessment

Detail :
Bantamsklip Transport Network

ARCUS GIBB ENGINEERING & SCIENCE

Prepared by :	Checked by :	Reviewed by :	Scale :	Date :	Project No. :	Drg No. :	Rev :
R.Lamera	N.Ciko	K.Maneveld	N.T.S	August 2008	J27035	Figure 3.4	_

3.2.5 **Airports**

The Overberg District Municipality has a number of airstrips. The largest is located at the Test Flight and Development Centre (TFTC) Airforce base between Bredasdorp and Waenhuiskrans in the Cape Agulhus municipal area, as shown in **Figure 3.4**.

The Cape Agulhus municipal area also has a second private airstrip at Andrew's Field, between Bredasdorp and Struisbaai. There is also an airstrip at the Bontebok National Park in the Swellendam municipal area, which is used for the transportation of tourists. The Theewaterskloof municipal area, situated to the west of the Overstrand municipal area, also has an airstrip in Caledon.

The closest major commercial airport is at Cape Town International Airport. The TFTC Airfield is planned to be upgraded to provide domestic and international aeronautical transportation capacity for the development of the region's tourism and industrial sectors.

3.2.6 **Harbours**

The Port of Cape Town is the closest major harbour in the vicinity of the Bantamsklip site. The harbour is 250 km away from the site.

There are small boat harbours at Hermanus and Gansbaai, but these are mainly used for recreational purposes and commercial fishing.

3.3 Thyspunt

3.3.1 **Locality of the Site**

Thyspunt is situated on the east coast of South Africa and lies within the Eastern Cape Province, approximately 80 km west of Port Elizabeth, as shown in **Figure 3.5**. It is located in the Cacadu District Municipality on the Kouga Coast.

Vaalputs is located in the Northern Cape Province cross-country from Thyspunt approximately 750 km to the north-west. Humansdorp is located 15 km to the north, Oyster Bay is located 7 km west of the site and St. Francis Bay is located 5 km east of the site.

3.3.2 **Surrounding Land Use**

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

3.3.3 **Road Network**

The N2 runs in an east-west direction connecting the main centres along the east coast, such as Port Elizabeth, George and Cape Town, as shown in **Figure 3.6**. The N2 links to the N7 via Cape Town. The R102 runs parallel to the N2 from Humansdorp through Jeffrey's Bay to Port Elizabeth.


Paardekop Game Farm
R75
Grassridge Private Nature Reserve
Tregathlyn Game Farm
Springs Local Authority Nature Reserve
R335
Groendal Nature Reserve
Uitenhage
R334
Kwa Nobuhle
Despatch
Motherwell
R332
R331
Hankey
R330
Loerie Dam Local Authority Nature Reserve
Longmore State Forest
R368
R367
Bethelsdorp
Ibhayi
N2
R102
Port Elizabeth
M4
M15
M9
M7
M18
Port Elizabeth Airport
Upe Private Nature Reserve
Gamtoos River Mouth
Gamtoos River Mouth Local Nature Reserve
Thaba Manzi Game Farm
Humansdorp
Jeffreys Bay
Sardinia Bay MPA
Lombardini Game Farm
Oyster Bay
Cape St Francis
Proposed Site at Thyspunt
Legend
0.8km Radius PAZ
3km Radius UPZ
PROJECT
Nuclear 1 : Environmental Impact Assessment
Approved By
A.Bulman
DETAIL
Thyspunt
Locality Plan
Drawn By
R.Adams
Checked By
S.Chow
Reviewed By
A.Bulman
ARCUS GIBB
ENGINEERING & SCIENCE
Scale
NTS
Date
January 2012
Project No.
J27035
Drg No.
Figure 3.5
Rev
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Baviaanskloof Wilderness Area
Cambria
Groendal Wilderness Nature Reserve
Patensie
Uitenhage
Hankey
R102
N2
Bethelsdorp
Port Elizabeth
Port Elizabeth Harbour
Port Elizabeth Airport
Humansdorp
Jeffreys Bay
Humansdorp Airstrip
Paradise Airstrip
Port St Francis Harbour
R330
Slangrivier
St Francis Bay Airstrip
Oyster Bay
Cape St Francis
THYSPUNT
Legend
National Roads
Main Roads
Minor Roads
Railway Line
Airport
Harbour
PROJECT
Nuclear 1 : Environmental Impact Assessment
Approved By
A.Bulman
DETAIL
Thyspunt
Transport Network
Drawn By
R.Adams
Checked By
S.Chow
Reviewed By
A.Bulman
ARCUS GIBB
ENGINEERING & SCIENCE
Scale
NTS
Date
January 2012
Project No.
J27035
Drg No.
Figure 3.6
Rev
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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 recently upgraded Oyster Bay Road is a gravel road that runs from Humansdorp south to Oyster Bay. It is in fairly good condition during the dry season, but requires more maintenance during the wet season.

The Cacadu Municipality experiences a large influx of holiday makers during the summer holidays. An average of 50% increase in vehicles and 100% increase in pedestrians is experienced during this period.

3.3.4 **Rail network**

There are currently two railway services operating on railway lines in the Cacadu District Municipality as follows:

- Alicedale – Grahamstown; and
- Port Alfred – Bathurst.

The Alicedale – Grahamstown service is mostly used by work seekers and shoppers travelling to Grahamstown, whereas the Port Alfred – Bathurst service is mostly used by tourists to explore the Bathurst area.

3.3.5 **Airports**

The main air access to the Cacadu District is via the Port Elizabeth Airport, as shown in **Figure 3.6**. However, there are other airports in the district which perform significant regional functions.

The provincial government owned air landing field in Ndlambe Municipality is leased by a private company that owns the property around the facility and is utilised for training pilots. About 200 to 250 learners are taught to fly an aircraft per year for both commercial and air transport plane licenses.

The facility has three grass runways and no sophisticated landing instruments are used due to unavailability of tarred runways and other facilities. The private company has requested funding from the Province to surface one of the runways.

Airports that can accommodate light aircraft are located at St. Francis Bay, Humansdorp and Paradise Beach, as shown in **Figure 3.6**.

3.3.6 **Harbours**

The main sea access to the Cacadu District is via the national harbour in Port Elizabeth in the Nelson Mandela Metro, as shown in **Figure 3.6**. However, there are other harbours, such as Coega, that perform significant regional functions in the district.

There are small boat harbours, which have been constructed by private developers, at Port Alfred and Port St. Francis. These are mainly used for recreational purposes and commercial fishing.

4 DUYNEFONTEIN TRANSPORT STATUS QUO ASSESSMENT

4.1 Access and Internal Road Network

4.1.1 Current Access

The Duynefontein site can be accessed via the following three access points, as shown in **Figure 4.1**.

- R27 / Main Access Road (Access 1);
- R27 / Emergency Access Road (Access 2); and
- Narcissus Avenue / Ou Skip Road (Access 3).

The three access points are currently unsignalised. Access 1 operates as a main access, Access 2 operates as an emergency access point only and Access 3 operates as a secondary access to the Koeberg Nuclear Power Station.

4.1.2 Access Spacing

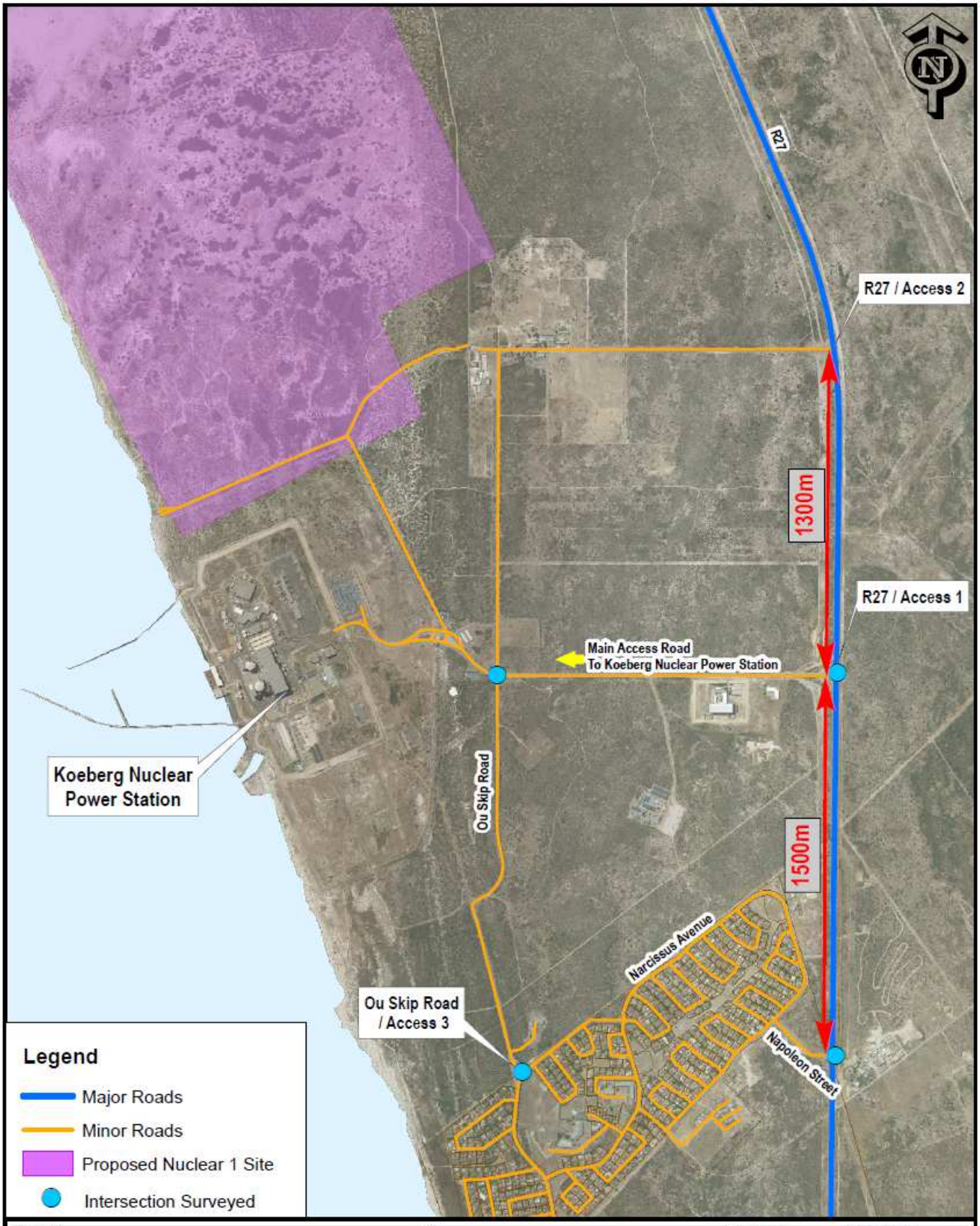
In accordance with the *Road Access Guidelines (PGWC, 2001)*, the minimum spacing requirement between unsignalised intersections along the R27 in a semi-rural development environment is as follows:

- Class 1 Expressway: 1600 m

The current spacing along the R27, as shown in **Figure 4.1**, between:

- Access 1 and Access 2 is 1300 m; and
- Access 1 and Napoleon Street is 1500 m.

The existing unsignalised intersection spacings shown above are below the minimum requirement of 1600 m.



PROJECT
Nuclear 1 : Enviromental Impact Assessment

DETAIL
Duynefontein
Traffic Count Location and Access Spacing

ARCUS GIBB ENGINEERING & SCIENCE

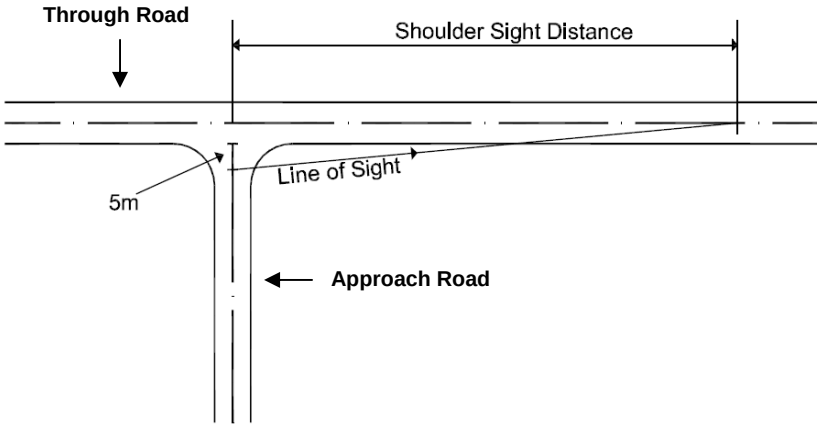
Drawn By	Checked By
R.Adams	S.Chow
Reviewed By	**Approved By**
A.Bulman	A.Bulman

Scale	Date	Project No.	Drg No.	Rev
1 : 20 000	January 2012	J27035	Figure 4.1	/

4.1.3 **Sight Distance**

Shoulder sight distance according to the Geometric Design of Rural Road: TRH 17 (NDoT, 1988), can be defined as follows and is shown in the diagram below:

"At a stop-controlled intersection, the driver of a stationery vehicle along an approach road must be able to see enough of the through road to be able to cross before an approaching vehicle reaches the intersection, even if this vehicle comes into view just as the stopped vehicle starts to cross. The line of sight is taken from a point on the centre line of the crossing road and 5 m back from the edge of the through road to a point on the centre line of the through road."



According to the *Geometric Design of Rural Roads: TRH 17 (NDoT, 1988)* at the 120 km/hr design speed on the R27, the shoulder sight distance for a stop-controlled intersection is 250 m for passenger vehicles and 450 m for trucks. The shoulder sight distance available at both Access 1 and Access 2 is in excess of 450 m and is therefore acceptable.

4.1.4 **Internal Road Network**

Currently the internal vehicular speed limit is 50 km/hr with traffic calming measures, such as speed bumps present. The internal road lane widths vary from 3.5 m to 6 m.

4.2 Traffic Analysis

4.2.1 **Background Traffic**

Manual traffic counts were undertaken on 18 June 2008 during the AM (06:00 - 09:00) and PM (16:00 - 18:00) peak periods. The locations of the surveyed intersections are shown in **Figure 4.1** and the intersections are as follows:

- R27 / Main Access Road (Access 1);
- R27 / Napoleon Street;
- Ou Skip Road / Narcissus Avenue (Access 3); and

- Ou Skip Road / Main Access Road.

The R27 / Access 2 is an emergency access only and was therefore not analysed in this section.

The AM and PM peak hours based on the intersections surveyed are:

- AM peak hour – 07:00 to 08:00; and
- PM peak hour – 16:30 to 17:30

The results of the 2008 AM and PM peak hour background traffic counts are shown in **Annexures A1 and A2.**

It is proposed that Nuclear-1 will be operational in 2023. The 2008 background traffic volumes were used to determine the 2023 background traffic by applying an annual growth rate of 2%. No annual growth rate was applied to the background traffic turning movements into the existing Koeberg Nuclear Power Station site as the staff compliment is expected to remain constant.

The growth rate in private car trips was derived from a comparison of the historical data obtained from the Western Cape Provincial Government (PGWC) road network information reports website. This growth rate was applied to the counted through traffic volumes on the R27.

The Koeberg Administrative Complex and Training Centre Campus is proposed as part of the Koeberg Power Station infrastructure and will be operational in 2018. The traffic estimated to be generated by the development was obtained from the *Koeberg Administrative Complex and Training Centre Campus TIA (HHO, 2007)* and were superimposed onto the 2018 background traffic volumes.

The calculated 2023 background traffic volumes for the AM and PM peak hours are shown in **Annexure A3 and A4.**

4.2.2 Intersection Capacity Analysis

Intersection analysis was performed using the SIDRA 3.2 Computer Programme for the following intersections:

- R27 / Main Access Road (Access 1);
- R27 / Napoleon Street;
- Ou Skip Road / Narcissus Avenue (Access 3); and
- Ou Skip Road / Main Access Road.

The following traffic scenarios were analysed during the AM and PM peak periods:

- 2008 Background Traffic; and
- 2023 Background Traffic.

Indexes such as Level of Service (LOS) and 95th percentile vehicle queues are used to indicate the operation at the intersections. Level of Service is a measure of delay and associating parameters experienced by motorists, i.e. discomfort, fuel consumption and increased travel time. LOS ranges between A to F, where LOS A describes operations with low control delay and extremely favourable progression and LOS F describes operations with control delay that is unacceptable to most drivers.

95th percentile vehicle queues indicate the maximum traffic queue at the intersection 95% of the time, which is considered as the worst case scenario.

The LOS and 95th percentile vehicle queues for the above scenarios are summarised in **Annexure A5 to A8**. The analysis results are summarised hereafter. Detailed results are available on request.

(a) R27 / Main Access Road (Access 1)

The existing geometry of the R27 / Main Access Road is shown in **Figure 4.2**. The intersection is currently a stop-controlled intersection at the Main Access Road.

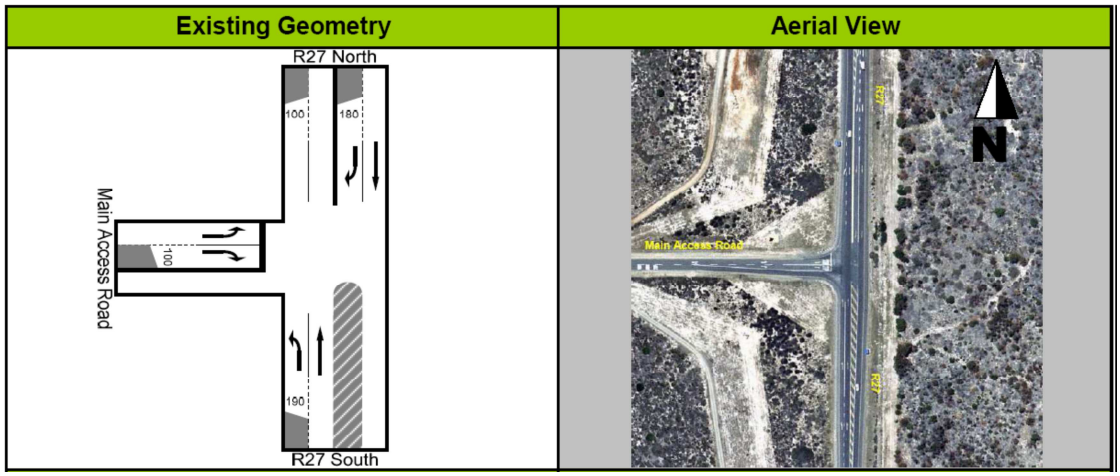


Figure 4.2: R27 / Main Access Road Existing Intersection Geometry

(i) 2008 Background Traffic

All approaches operate acceptably at LOS A to LOS C during the AM and PM peak hours with no significant vehicle queues.

(ii) 2023 Background Traffic

The right-turning movement of the Main Access Road (Access 1) approach will deteriorate from LOS C with a 95th percentile queue of 3 vehicles to LOS F with a 95th percentile queue of 37 vehicles during the PM peak hour.

An upgrade is therefore required to improve the operation of the stop-controlled intersection, which is supported by the *Koeberg Administrative Complex and Training Centre Campus TIA (HHO, 2007)*.

(iii) Upgrades Required

The proposal to upgrade the R27 / Main Access Road (Access 1) intersection from a stop-controlled intersection to a signalised intersection detailed below in **Figure 4.3.**

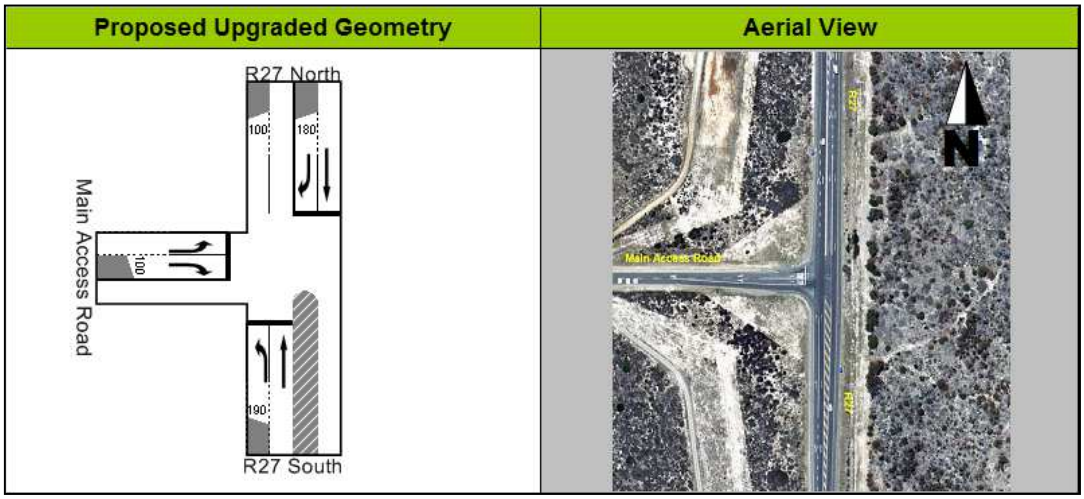


Figure 4.3: R27 / Main Access Road Proposed Intersection Geometry

With the signalisation of the intersection, the right-turning movement of the Main Access Road (Access 1) approach will improve from LOS F with a 95th percentile queue of 37 vehicles to LOS C with a 95th percentile queue of 9 vehicles during the PM peak hour.

Traffic signal warrants contained in the SADC Road Traffic Signs Manual will, however, have to be complied with before this upgrade can be implemented. The appropriate warning signs of an upcoming signal, street lighting and reduction in speed limit on the R27 to 80 km/hr will also have to be implemented if traffic signals are installed.

Subsequent to the submission of the *Koeberg Administrative Complex and Training Centre Campus TIA (HHO, 2007)* the proposed upgrade of The R27 / Main Access Road (Access 1) intersection to signalised intersection was not approved by the Provincial Government Western Cape's (PGWC) Department of Transport and Public Works.

The PGWC has proposed the construction of a grade separated structure (i.e. where each road is constructed at a different grade or level to reduce traffic movement conflicts using ramps, interchanges or bridges) at the R27 / Main Access Road (Access 1) intersection. This proposal is currently under investigation and should be considered once the investigation is complete.

(b) R27 / Napoleon Street

The existing geometry of the R27 / Napoleon Street is shown in **Figure 4.4**. The intersection is currently a stop-controlled intersection at the Napoleon Street approach.

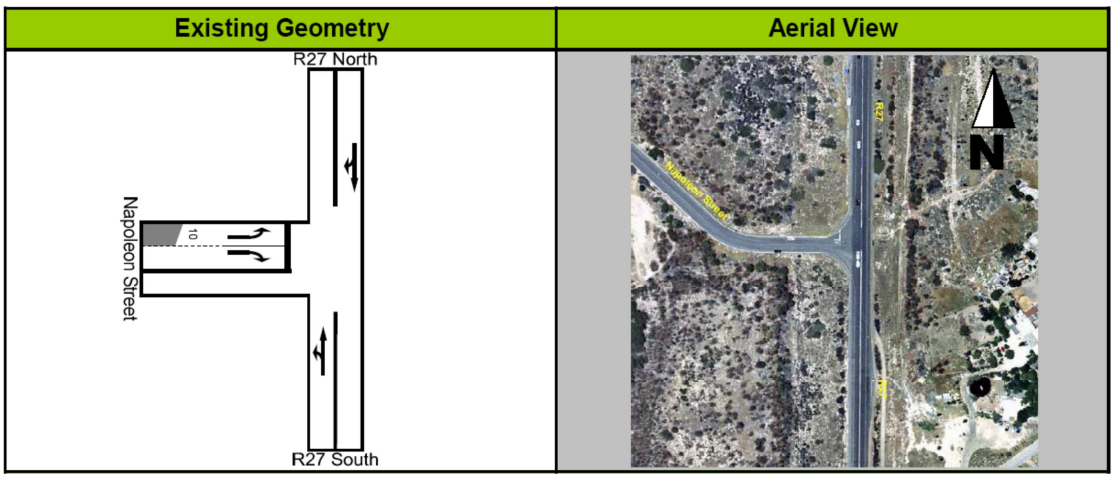


Figure 4.4: R27 / Napoleon Street Existing Intersection Geometry

(i) 2008 Background Traffic

All approaches operate acceptably at LOS A to LOS C during the AM and PM peak hours with no significant vehicle queues. It should be noted, however, that due to the high speed nature of the R27, separate right-turn and left-turn lanes on the R27 should be provided to improve safety.

(ii) 2023 Background Traffic

The Napoleon Street approach will deteriorate from LOS E with a 95th percentile queue of 2 vehicles to LOS F with a 95th percentile queue of 13 vehicles during the AM peak. An upgrade to a signalised intersection with additional turning lanes is therefore required.

(iii) Upgrades Required

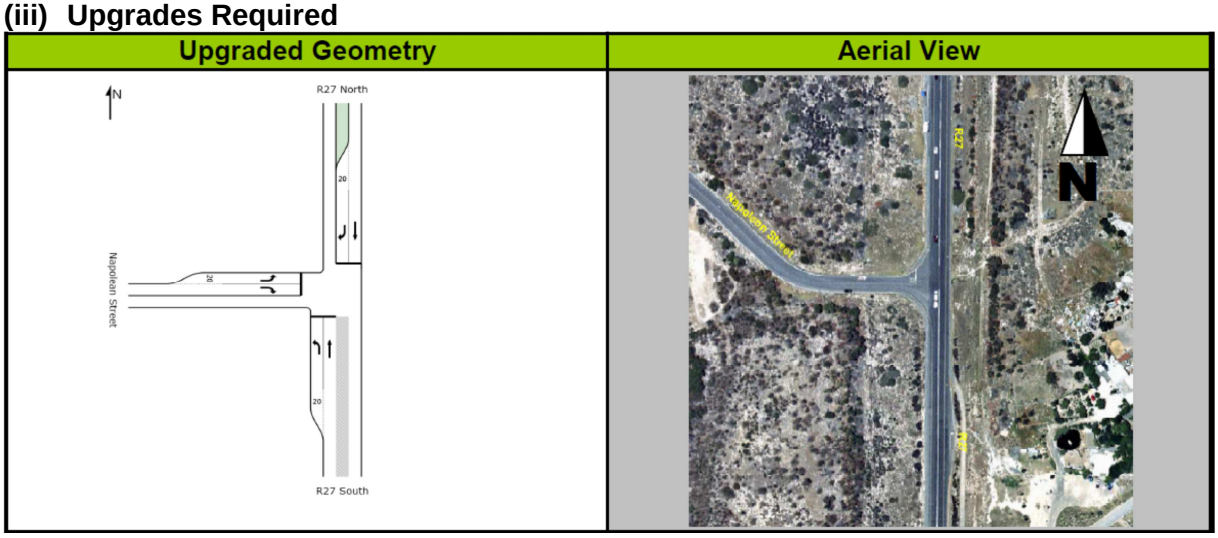


Figure 4.5: R27 / Napoleon Street Proposed Intersection Geometry

The Napoleon Street approach will improve from LOS F with a 95th percentile queue of 13 vehicles to LOS D with a 95th percentile queue of 3 vehicles after the signalisation of the intersection.

Traffic signal warrants contained in the SADC Road Traffic signs manual will, however, have to be complied with before this upgrade can be implemented. The appropriate warning signs of an upcoming signal, street lighting and reduction in speed limit on the R27 to 80 km/hr will also have to be implemented if traffic signals are installed.

Due to the PGWC's reluctance to permit traffic signals on the R27, this upgrade may not be permitted. Traffic volumes will be too low to warrant a grade-separated structure. The final upgrade design of this intersection will therefore have to be agreed with the PGWC in conjunction with the Main Road Access upgrade.

(c) Ou Skip Road / Narcissus Avenue (Access 3)

The existing geometry of the Ou Skip Road / Narcissus Avenue intersection is shown in **Figure 4.6**. The intersection is currently a stop-controlled intersection at the Ou Skip Road approach.

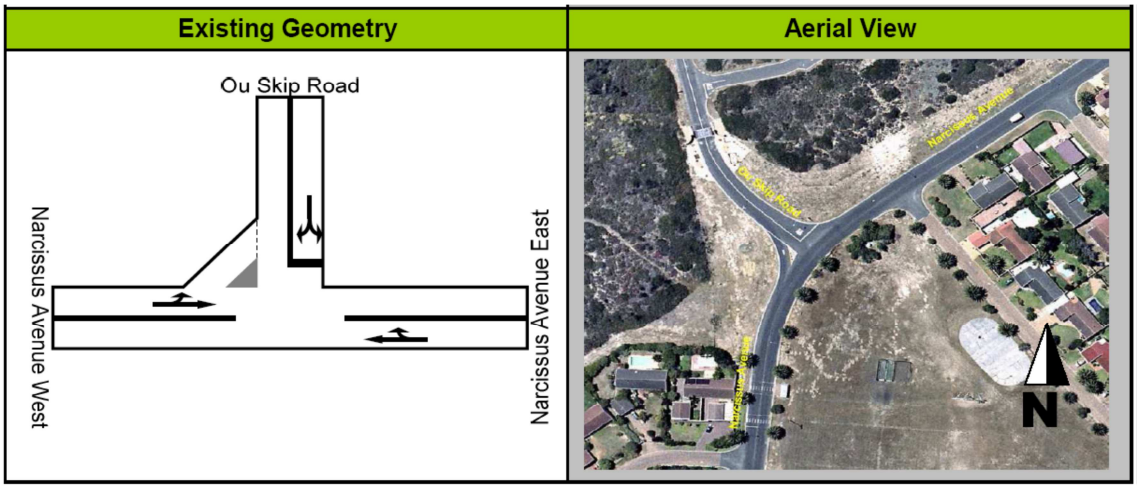


Figure 4.6: Ou Skip Road / Narcissus Avenue Existing Intersection Geometry

(i) 2008 Background Traffic

All approaches operate well at LOS A and LOS B during the AM and PM peak hours with no significant vehicle queues.

(ii) 2023 Background Traffic

The intersection will continue to operate well at LOS A and LOS B during the AM and PM peak hours with no significant vehicle queues. No upgrades are therefore required.

(d) Ou Skip Road / Main Access Road

The existing geometry of the Ou Skip Road / Main Access Road intersection is shown in **Figure 4.7**. The intersection is currently a four-way stop-controlled intersection.

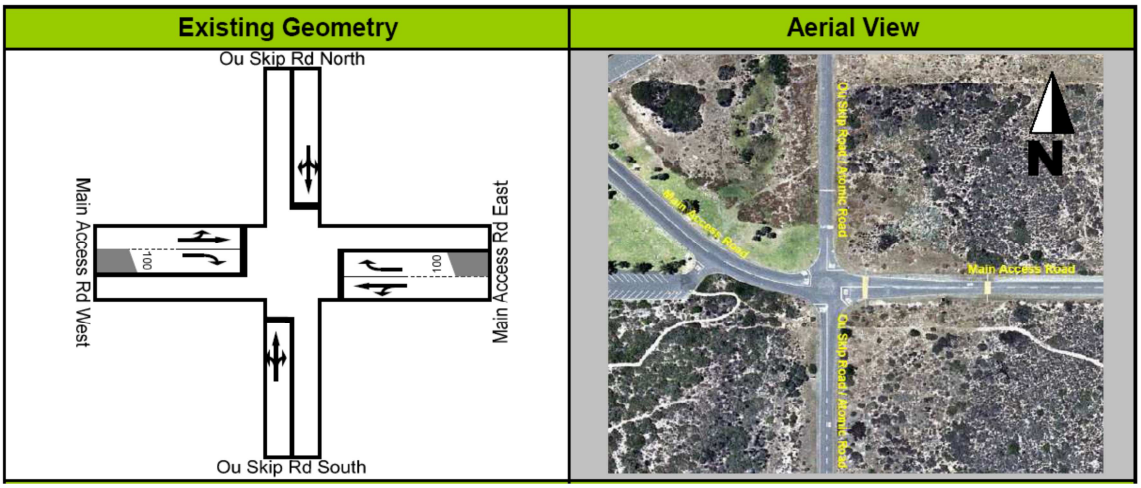


Figure 4.7: Ou Skip Road / Main Access Road Existing Intersection Geometry

(i) 2008 Background Traffic

All approaches operate well at LOS A and LOS B during the AM and PM peak hours with minimal traffic queues.

(ii) 2023 Background Traffic

All approaches will continue to operate at LOS A and LOS B during the AM and PM peak hours with minimal traffic queues. No upgrades are therefore required.

4.3 Parking

The number of parking bays currently provided at the Koeberg Nuclear Power Station is shown in **Table 4.1** below.

Table 4.1 – Current Parking provided at Koeberg Nuclear Power Station

Type	Parking Bays Provided
Staff	780
Visitors	140
Visitors Centre	25
Total	945

The parking provided is adequate to serve the current operation. An additional 800 parking bays are proposed to serve the Koeberg Administrative Complex and Training Centre Campus development.

4.4 Public Transport

4.4.1 Modal Split

The existing modal split to and from Koeberg Nuclear Power Station is currently 70% private transport and 30% public transport obtained from the *Koeberg Administrative Complex and Training Centre Campus TIA (HHO, 2007)*. The existing vehicle occupancy is 1.42 for private transport and 5.12 for public transport.

The proposed MyCiTi Integrated Rapid Transit (IRT) system, which will connect the West Coast areas of Atlantis and Melkbos to Cape Town's CBD, as shown in **Figure 4.8**, is currently under construction and will be in operation by September 2013. The MyCiTi services are expected to improve the public transport access to the area.

4.4.2 Existing Bus Service

Data obtained from the *City of Cape Town's 2003/2004 Current Public Transport Record (CPTR)* indicates that the site is located within easy access of the existing bus services. The main public transport mode is bus, serving the existing Koeberg Nuclear Power Station via the Main Access Rd (Access 1) and the Duynefontein Access (Access 3).

The bus routes are concentrated along the R27, as shown in **Figure 4.9**. Two sheltered bus stops are located within 50 m of Access 1 along the R27 and a transport interchange area is located on-site adjacent to the visitors parking.

A total of 51 bus routes are currently operating along the section of R27 at Koeberg Nuclear Power Station, with a maximum utilisation of 115% on the route to Hanover Park. There is adequate capacity on the other routes along the R27 to accommodate additional trips to the site. Additional services may, however, be required on the Hanover Park route.

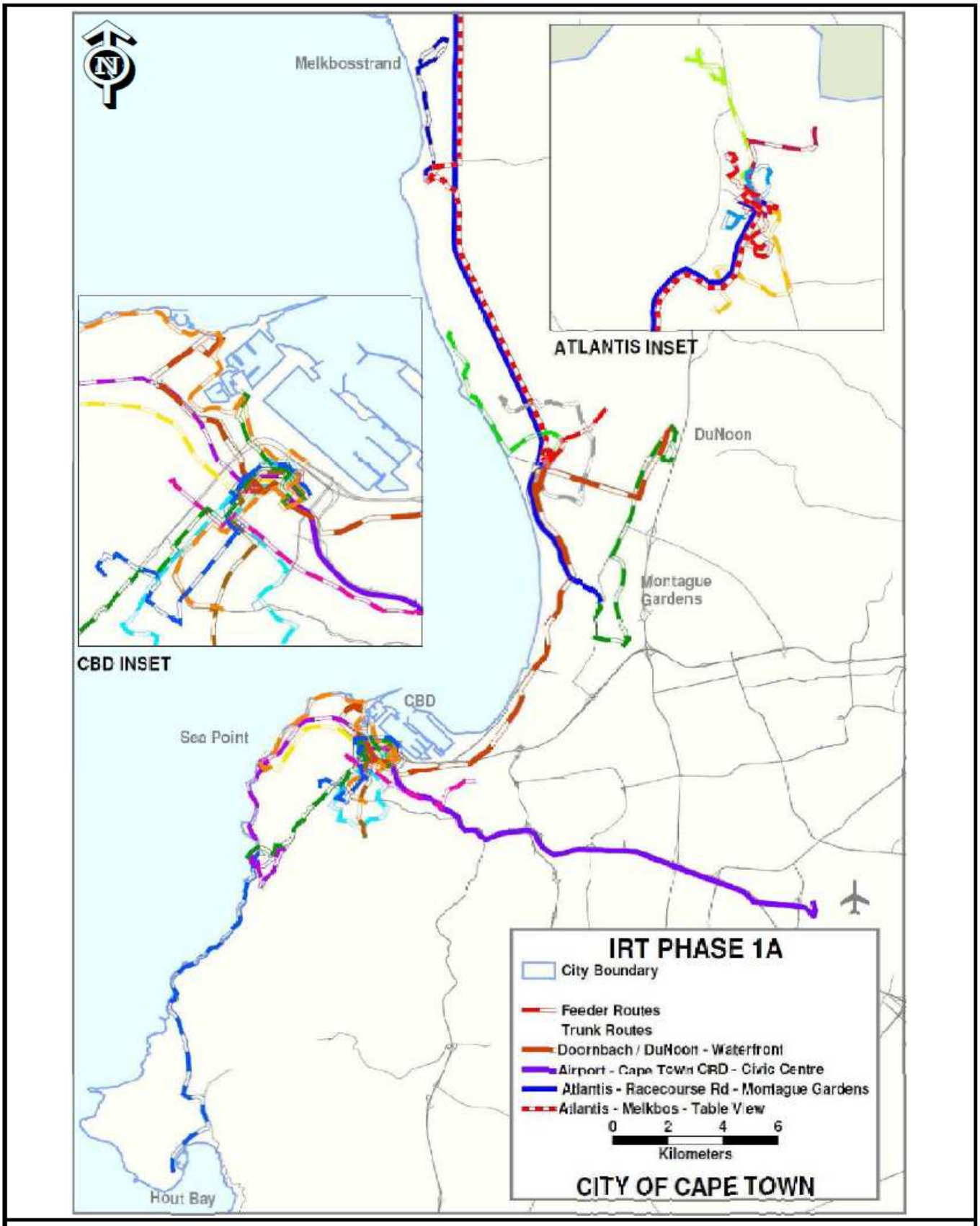
The routes operating along the Main Access Road and Ou Skip Road have adequate capacity to accommodate additional passengers. However, the route from Koeberg Nuclear Power Station to Pella is currently operating close to capacity and additional bus services may be required for this route.

The proposed restructuring of public transport and the introduction of Integrated Rapid Transit (IRT) routes should, however, be taken into account before the introduction of new services.

4.4.3 Existing Minibus Taxi Service

The *Current Public Transport Record (CPTR*) shows that the proposed Nuclear-1 site is also located within easy access of the existing minibus taxi routes. The secondary public transport mode is the minibus taxi service serving the existing Koeberg Nuclear Power Station via the Main Access Rd (Access 1) and the Duynefontein Access, as shown in **Figure 4.10**.

The R27 has 26 minibus taxi routes, with the Main Access Road and Ou Skip Road each with 1 and 4 minibus taxi routes, respectively. However, the bus mode appears to dominate along the R27.



PROJECT: Nuclear 1 : Environmental Impact Assessment	ARCUS GIBB ENGINEERING & SCIENCE	Drawn By: R.Adams	Checked By: S.Chow
DETAIL: Duynefontein Proposed MyCiti IRT Routes		Reviewed By: A.Bulman	Approved By: A.Bulman
	Scale: NTS	Date: January 2012	Project No.: J27035 / Drg No.: Figure 4.8 / Rev:

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PROJECT: Nuclear 1 : Environmental Impact Assessment	ARCUS GIBB ENGINEERING & SCIENCE	Drawn By: R.Adams	Checked By: S.Chow
		Reviewed By: A.Bulman	Approved By: A.Bulman
DETAIL: Duynefontein Existing Bus Routes	Scale: 1 : 44 000	Date: January 2012	Project No.: J27035 / Drg No.: Figure 4.9 / Rev:

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PROJECT
Nuclear 1 : Environmental Impact Assessment

DETAIL
Duynefontein
Existing Taxi Routes

ARCUS GIBB ENGINEERING & SCIENCE

Drawn By	Checked By
R.Adams	S.Chow
Reviewed By	**Approved By**
A.Bulman	A.Bulman

Scale	Date
1 : 44 000	January 2012

Project No.	Drg No.	Rev
J27035	Figure 4.10	

4.4.4 Existing Commuter Rail Services

There are no existing commuter rail stations located in the vicinity of the site.

4.5 Non-Motorised Transport

On-site observations show recreational pedestrians and cyclists present within the Duynefontein farm boundaries. The extensive traffic calming measures and the 50 km / hr speed limit observed on-site is conducive to promoting safe non-motorised travel.

4.6 Low to Medium Radioactive Waste Transport

Currently, approximately 48 low to medium radioactive waste consignments are transported from Koeberg Nuclear Power Station to Vaalputs in the Northern Cape Province annually as part of the normal operations of the existing nuclear power station. The current waste route to Vaalputs is discussed in **Volume 2, Chapter 11** and shown in **Figure 11.8**.

4.7 Emergency Evacuation

An emergency evacuation study and plan entitled *Koeberg Nuclear Power Station Emergency Plan: Transport Modelling and Evacuation Management Plan* was compiled in 2005 by HHO Consultants. This study determined that the evacuation time from the PAZ and UPZ were within acceptable time limits. A summary of the findings is provided in **Table 4.2** below. Further details can be obtained in the HHO report.

Table 4.2 – Koeberg Nuclear Power Stations current evacuation time assessment results

Legislative Requirements				Koeberg Nuclear Power Station Current Evacuation Assessment	
Persons	**Area**	**Safety Zone**	**Time period**	**Assessment Period**	**Time (2005 to 2030)**
All Public	360 degree radius	PAZ 0km to 5km	Within 4 hours	AM Peak "worst case"	1.8 to 2 hours
All Public	Any 67.5 degrees	UPZ 5km to 16km	Within 16 hours		8.2 to 14.3 hours

4.8 Air Route and Shipping Lane Impacts

A Site Safety Report, which details all airports, air routes and shipping lane data, and Koeberg Nuclear Power Station's impacts on those routes was completed for the Koeberg Nuclear Power Station in 2006. Existing information (Restricted flying zones etc.) is provided in **Volume 2, Chapter 11.**

4.9 Mitigating Actions Required

The following mitigating actions are recommended:

- The R27 / Main Access Road intersection is required to be upgraded by 2023, to enable the intersection to cope with the projected traffic demand. If the PGWC's proposal to upgrade to a grade separated intersection is feasible then this option should be implemented. If this option is not feasible, the R27 / Main Access Road intersection signalisation upgrade option, as shown in **Figure 4.3**, should be implemented.

- The R27 / Napolean Street intersection should be upgraded to traffic signals. However, the final upgrading decision must be agreed with the PGWC in conjunction with the above upgrade.

5 BANTAMSKLIP TRANSPORT STATUS QUO ASSESSMENT

5.1 Traffic Analysis

5.1.1 Background Traffic

The 2007 AM and PM peak hour traffic volumes along the R43 were obtained from the Provincial Government's Road Network Information System website for the following intersections:

- R43 / DR01211; and
- R43 / DR01206.

The locations of the above-mentioned intersections are shown in **Figure 5.1**.

The count confirms that AM and PM peak hours are:

- AM peak hour – 08:00 to 09:00; and
- PM peak hour – 16:00 to 17:00.

The results of the 2007 AM and PM peak hour background traffic are shown in **Annexure B1 and B2**.

Nuclear-1 is expected to be operational in 2023. According to the *Overberg District Municipality's Integrated Transport Plan (ITP) (2006)*, the annual growth rate for the area is 3% per annum. This growth rate was applied to the background traffic to determine the 2023 background traffic.

The calculated 2023 background traffic volumes for the AM and PM peak hours are shown in **Annexure B3 and B4**.

5.1.2 Intersection Capacity Analysis

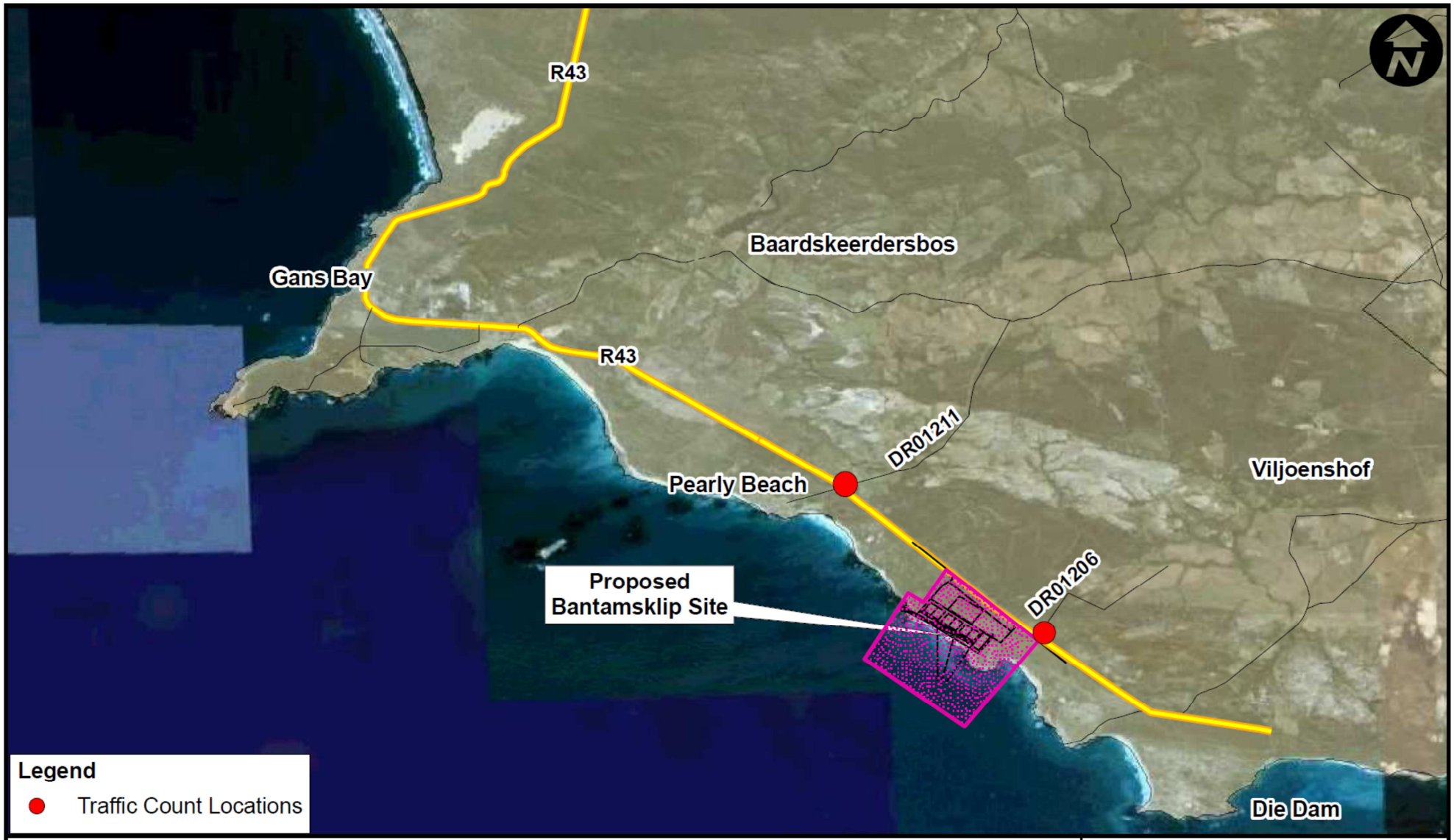
Intersection analysis was performed using the SIDRA 3.2 Computer Programme for the following intersections:

- R43 / DR01211; and
- R43 / DR01206.

The following traffic scenarios were analysed during the AM and PM peak periods:

- 2007 Background Traffic; and
- 2023 Background Traffic.

The LOS and 95th percentile vehicle queues for the above scenarios are summarised in **Annexure B5 to B8**. The analysis results are summarised hereafter. Detailed results are available on request.



Project : Nuclear 1 : Environmental Impact Assessment					
Detail : Bantamsklip Traffic Count Locations					
Prepared by : R.Lamera	Checked by : K.Maneveld	Reviewed by : N.Nordien	Scale : N.T.S	Date : August 2008	Project No. : J27035 / Drg No. : Figure 5.1 / Rev : _

(a) R43 / DR01211

The existing geometry and aerial view of R43 / DR01211 is shown in **Figure 5.2**. The intersection currently acts as a stop-controlled intersection at the DR01211 approaches.

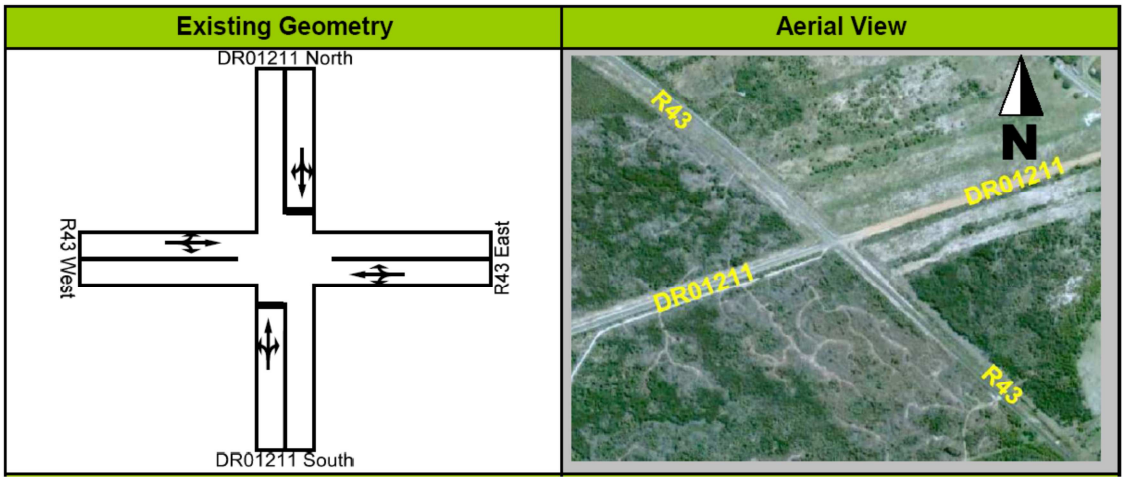


Figure 5.2: R43 / DR01211 Existing Intersection Geometry

(i) 2007 Background Traffic

All approaches operate at LOS A during the AM and PM peak hours with minimal vehicle queues.

(ii) 2023 Background Traffic

All approaches will operate at LOS A and LOS B during the AM and PM peak hours, respectively, with minimal vehicle queues. No upgrades are therefore required.

(b) R43 / DR01206

The existing geometry and aerial view of R43 / DR01206 is shown in **Figure 5.3**. The intersection currently acts as a stop-controlled intersection at the DR01206 approach.

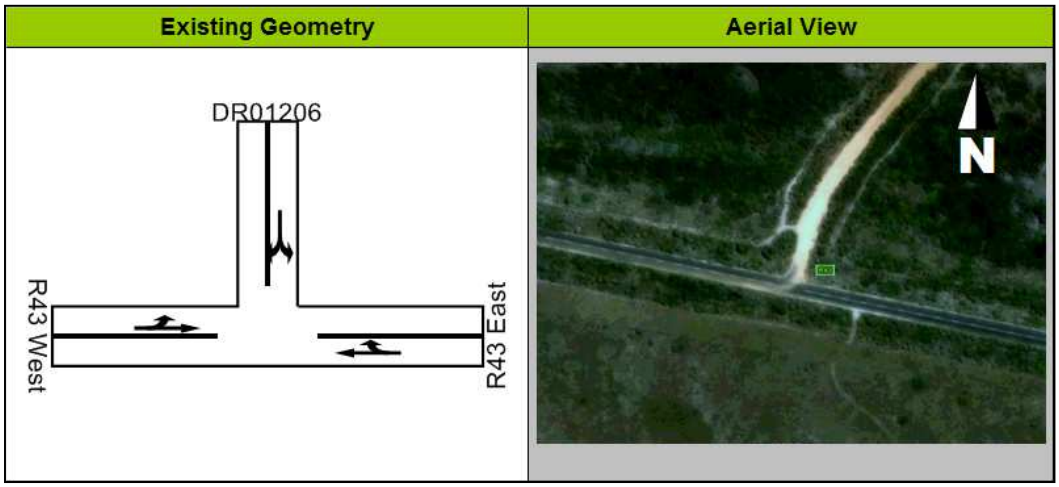


Figure 5.3: R43 / DR01206 Existing Intersection Geometry

(i) 2007 Background Traffic

All approaches operate at LOS A during the AM and PM peak hours, with minimal vehicle queues.

(ii) 2023 Background Traffic

All approaches will continue to operate at LOS A during the AM and PM peak hours with minimal vehicle queues. No upgrades are therefore required.

5.2 Public Transport

Public transport in the Overstrand Local Municipality is exclusively road-based and is more prominent in the major towns and almost non-existent in the smaller towns.

Only 30% of residents use public transport, while the remainder walk, cycle or use private transport. The following problems have added to the low levels of public transport usage in the region:

- The high costs of public transport;
- The high levels of unemployment;
- The unavailability of public transport; and
- Safety / driver behaviour.

The existing bus and minibus taxi routes are shown in **Figure 5.4**. The main public transport mode within the area is minibus taxi, which serves the beach resort towns of Gansbaai and Pearly Beach.

Buses are mostly used for the transportation of learners and organised parties and do not fulfil a commuter function as minibus taxis do. Buses are also contracted to transport employees. Tour buses are used for the transportation of exclusive groups.

Public transport facilities are currently provided in Hawston and Hermanus. No formal public transport facilities are provided in Gansbaai or Pearly Beach or in close proximity to Bantamsklip. Where required, workers are mostly transported by their employers in light delivery vehicles or trucks.

5.3 Non-Motorised Transport

The *Overberg District Municipality's Integrated Transport Plan (2006)* determined that 58% of people who travel use non-motorised transport (bicycle or walking). However, there is a lack of non-motorised transport facilities like pedestrian routes and cycle routes in the area. The ITP identified the promotion of public transport and non-motorised transport as a priority.

PROJECT: Nuclear 1 : Environmental Impact Assessment		Approved By: A.Bulman			Scale: NTS	Date: January 2012
DETAIL: Bantamsklip Public Transport Routes		Drawn By: R.Adams	Checked By: S.Chow	Reviewed By: A.Bulman	Project No.: J27035	Drg No.: Figure 5.4 / Rev: /

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Refer to the contract for full terms and conditions.

5.4 Mitigating Actions Required

No mitigation actions are recommended.

6 THYSPUNT TRANSPORT STATUS QUO ASSESSMENT

6.1 Traffic Analysis

6.1.1 Background Traffic

Manual traffic counts were undertaken on 24 - 26 June 2008 during the AM (06:00 - 09:00) and PM (16:00 - 18:00) peak periods at the following intersections:

- R330 / Main Access Road;
- R330 / St. Francis Bay Access Road;
- R330/ Oyster Bay Access Road;
- R330 / Gravel Road;
- Park Road / Main Street (R330);
- Main Street (R330) / Voortrekker Road (R102);
- R330 / N2 South Off-Ramp; and
- R330 / N2 North Off-Ramp

As Oyster Bay Road is considered as one of the major transport route to the Nuclear-1 site in the later stage of the study. Additional peak and off-peak traffic counts (over a 12 hours period during the day) were therefore undertaken on Tuesday, 16 August 2011 at the following intersections:

- Voortrekker Road (R102) / Westgate Road;
- Oyster Bay Road / Park Street;
- Voortrekker Road (R102) / Johnson Road

The location of the above-mentioned intersections is shown in **Figure 6.1**.

The count confirmed that the AM and PM peak hours are:

- AM peak hour - 07:30 to 08:30; and
- PM peak hour - 16:30 to 17:30

The 12 hours count also confirmed that the off-peak traffic volumes are significantly lower than the peak hour counts and it is therefore considered unnecessary to analyse the off-peak counts.

The results of the 2008/2011 AM and PM peak hour background traffic are shown in **Annexure C1 and C2**.

This area experiences a large influx of holiday makers over the summer holidays. An average of 50% increase in the background traffic can be expected for the PM peak during summer holiday season. This was observed from a follow-up traffic count undertaken on 20 and 21 December 2011.

Units of Nuclear-1 are expected to be completed between 2023 and 2025. According to the *Cacadu District Municipality's Spatial Development Framework (SDF) (2007)*, the annual growth rate for the area is 2% per annum. This growth rate was applied to the 2008/2011 background traffic to determine the 2023 background traffic.

The calculated 2023 background traffic volumes for the AM and PM peak hours are shown in **Annexure C3 and C4**.

6.1.2 Intersection Capacity Analysis

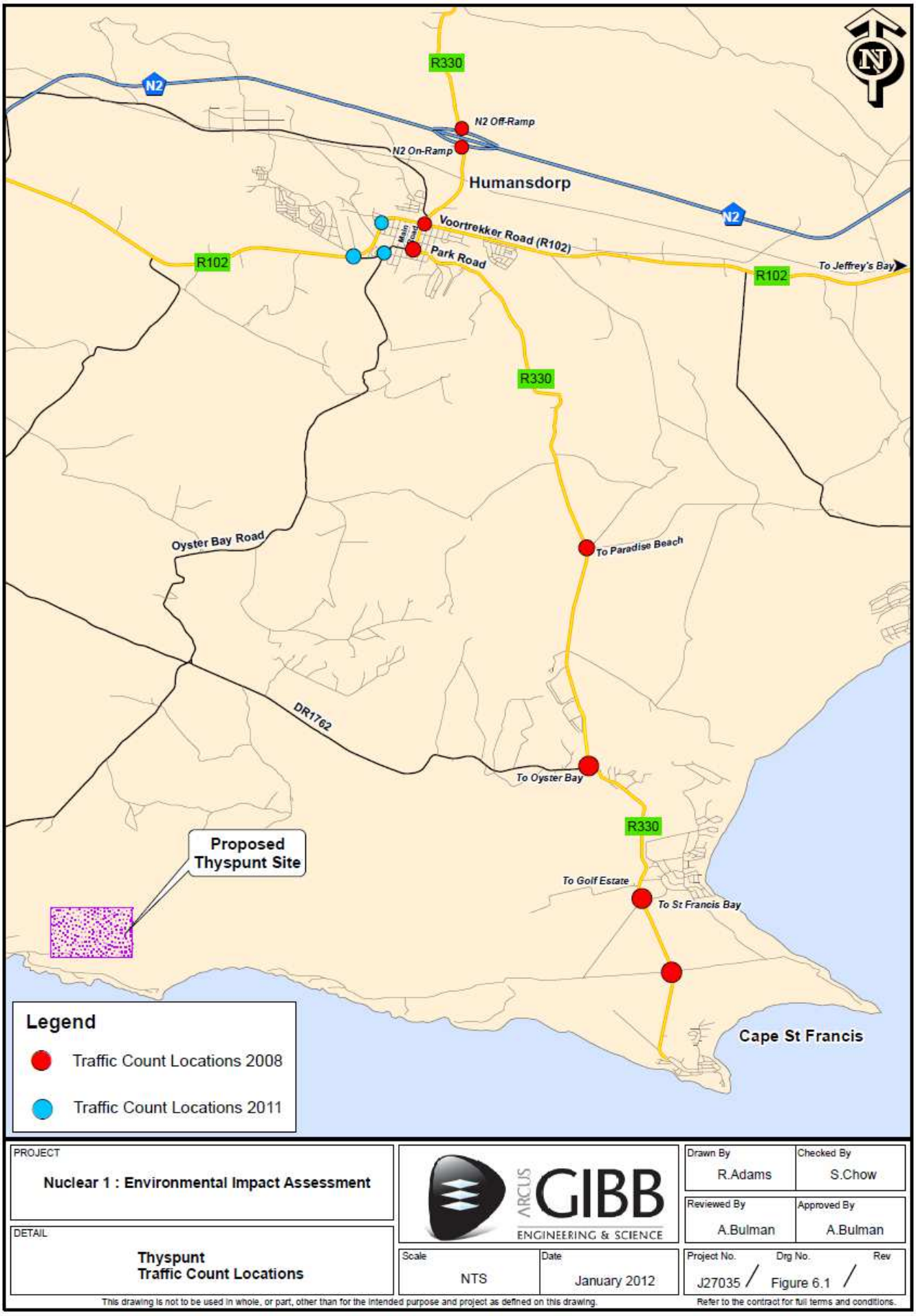
Intersection analysis was performed using the SIDRA 3.2 Computer Programme for the following intersections:

- R330 / St. Francis Bay Access Road;
- R330/ Oyster Bay Access Road;
- R330 / Gravel Road;
- Park Road / Main Street (R300);
- Main Street (R330) / Voortrekker Road (R102);
- R330 / N2 South Off-Ramp; and
- R330 / N2 North Off-Ramp
- Voortrekker Road (R102) / Johnson Street
- Vootrekker Road (R102) / Westgate Road / Koerat Street
- Park Street / Oyster Bay Road

The following traffic scenarios were analysed during the AM and PM peak periods:

- 2008/2011 Background Traffic; and
- 2023 Background Traffic

The LOS and 95th percentile vehicle queues for the above scenarios are summarised in **Annexure C5 to C8**. The analysis results are summarised hereafter.



PROJECT: Nuclear 1 : Environmental Impact Assessment	ARCUS GIBB ENGINEERING & SCIENCE	Drawn By: R.Adams	Checked By: S.Chow
		Reviewed By: A.Bulman	Approved By: A.Bulman
DETAIL: Thyspunt Traffic Count Locations	Scale: NTS	Date: January 2012	Project No.: J27035 / Drg No.: Figure 6.1 / Rev:

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Project : **Nuclear 1 : Environmental Impact Assessment**						
Detail : **Duynefontein Transport Network**						
Prepared by : **R.Adams**	Checked by : **S.Chow**	Reviewed by : **A.Bulman**	Scale : **N.T.S**	Date : **January 2012**	Project No. : **J27035** / Drg No. : **Fig. 3.2** / Rev : **_**	

(a) R330 / St. Francis Bay Access Road

The geometry and aerial view of R330 / St. Francis Bay Access Road in 2008 is shown in **Figure 6.3**. The intersection was a stop-controlled intersection at the golf estate and St. Francis Bay Access Road approaches in 2008.

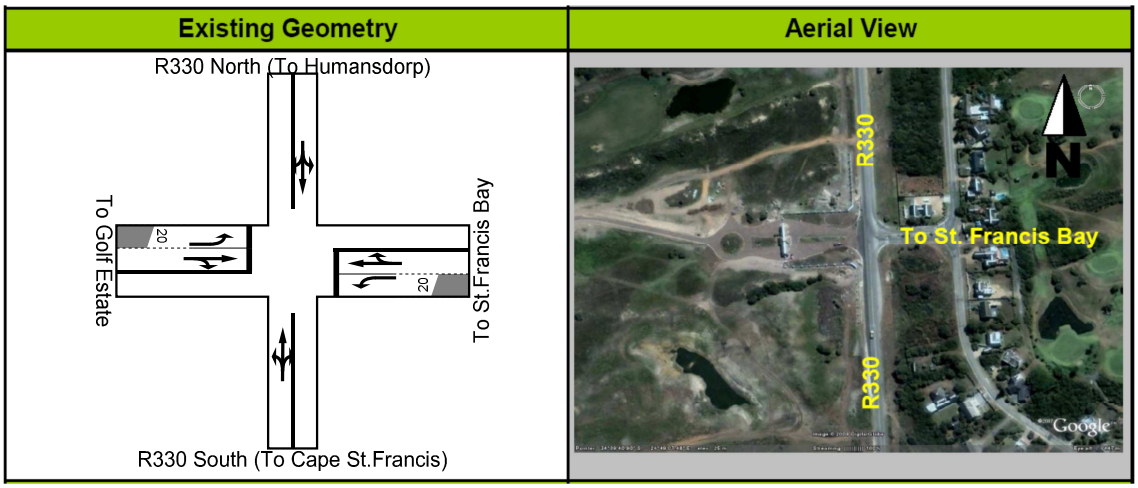


Figure 6.3: R330 / St. Francis Bay Access Road Intersection Geometry 2008

(i) 2008 Background Traffic

All approaches operate at LOS A and LOS B during the AM and PM peak hours with minimal vehicle queues.

(ii) 2023 Background Traffic

The intersection was upgraded to a single-lane roundabout after the traffic count in 2008. The existing geometry of the intersection is shown in **Figure 6.4**.

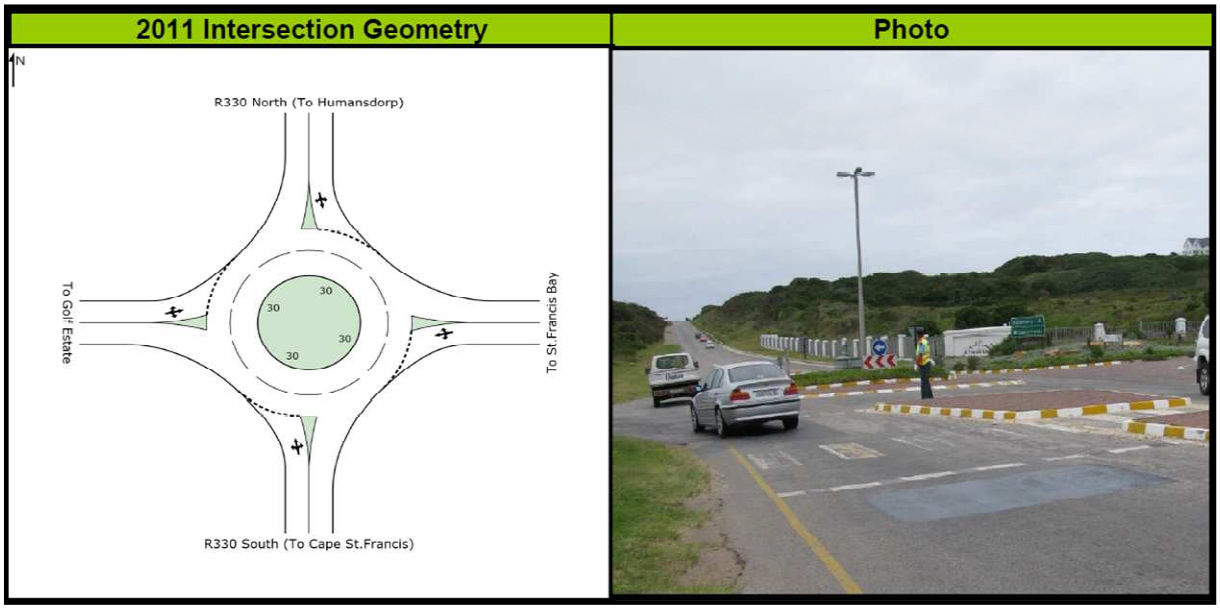


Figure 6.4: R330 / St. Francis Bay Access Road Existing Intersection Geometry

All approaches are still expected to operate at LOS A and LOS B during the AM and PM peak hours with minimal vehicle queues.

(b) R330 / Oyster Bay Access Road

The existing geometry and aerial view of R330 / Oyster Bay Access Road is shown in **Figure 6.5**. The intersection is currently a stop-controlled intersection at the Oyster Bay Access Road approach.

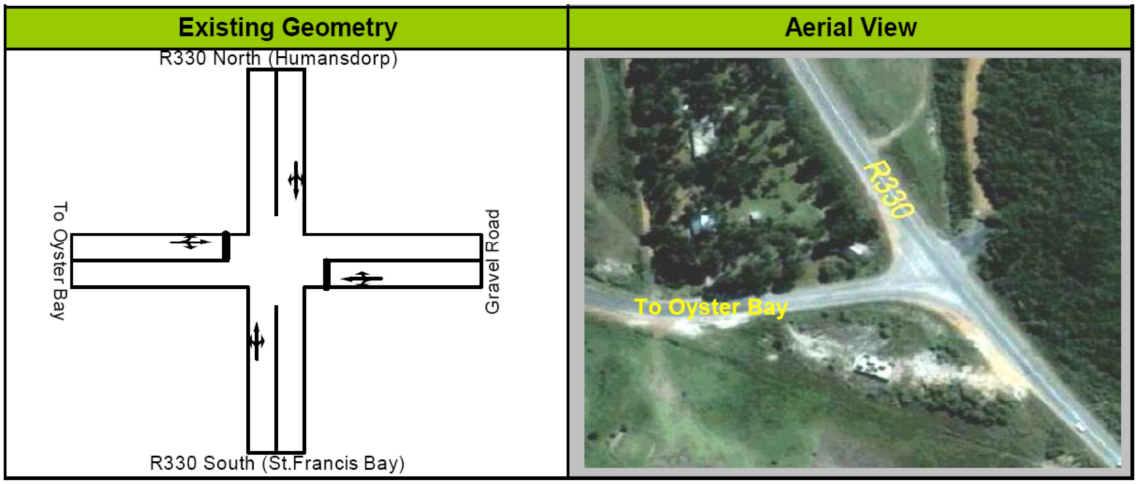


Figure 6.5: R330 / Oyster Bay Access Road Existing Intersection Geometry

(i) 2008 Background Traffic

All approaches on the R330 operate at LOS A during the AM and PM peak hours with minimal vehicle queues. The left and right turns from the Oyster Bay approaches operates at LOS B during both the AM and PM peak periods.

(ii) 2023 Background Traffic

All approaches on the R330 are still expected to operate at LOS A during the AM and PM peak hours with minimal vehicle queues. The left and right turns from the Oyster Bay approach are expected to operate at LOS B during both the AM and PM peak periods. No upgrades are therefore required.

(c) R330 / Gravel Road

The existing geometry and aerial view of R330 / Gravel Road is shown in **Figure 6.6**.

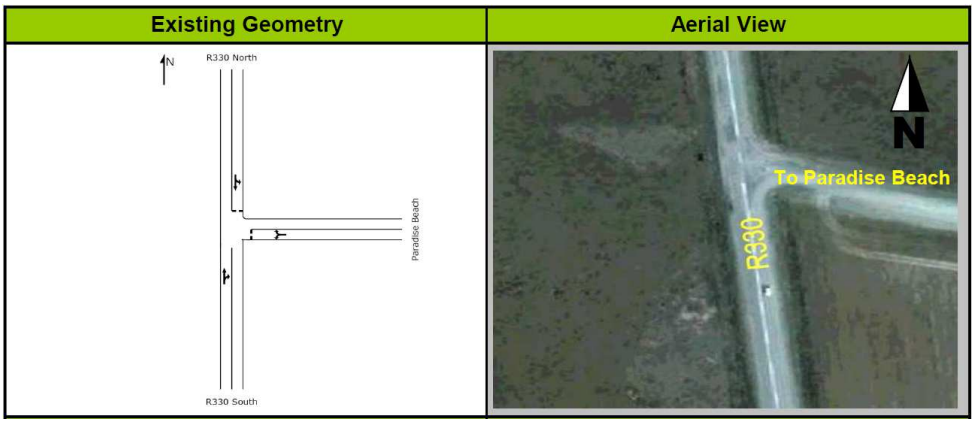


Figure 6.6: R330 / Gravel Road Existing Intersection Geometry

(i) 2008 Background Traffic

All approaches operate at LOS A during the AM and PM peak hours with minimal vehicle queues.

(ii) 2023 Background Traffic

All approaches will continue to operate at LOS A during the AM and PM peak hours with minimal vehicle queues. No upgrades are therefore required.

(d) Park Road (R330) / Main Street (R330)

The existing geometry and aerial view of Park Road / Main Street are shown in **Figure 6.7**. The intersection is currently an all-way stop-controlled intersection.

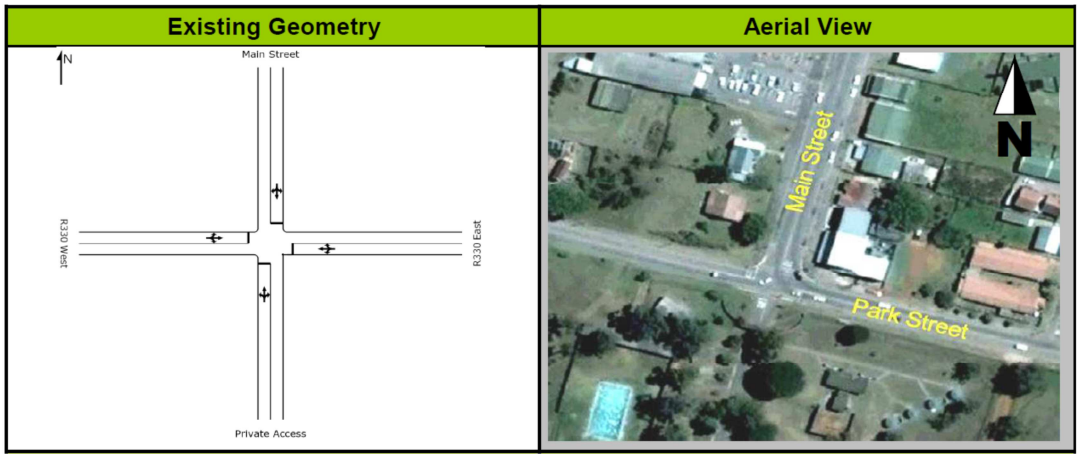


Figure 6.7a: Park Road / Main Street Existing Intersection Geometry

(i) 2008 Background Traffic

All approaches operate acceptably at LOS A and LOS B with minimal vehicle queues during the AM and PM peak hours. This has been confirmed by on-site observations undertaken during the December holiday season, as shown in **Figure 6.7b**.

Figure 6.7b: Traffic condition at the Park Road / Main Street intersection

(ii) 2023 Background Traffic

All approaches will continue to operate acceptably at LOS A and LOS B with minimal vehicle queues during the AM and PM peak hours. No upgrades are therefore required.

(e) Main Street (R330) / Voortrekker Road (R102)

The existing geometry and aerial view of Main Street (R330) / Voortrekker Road (R102) are shown in **Figure 6.8**.

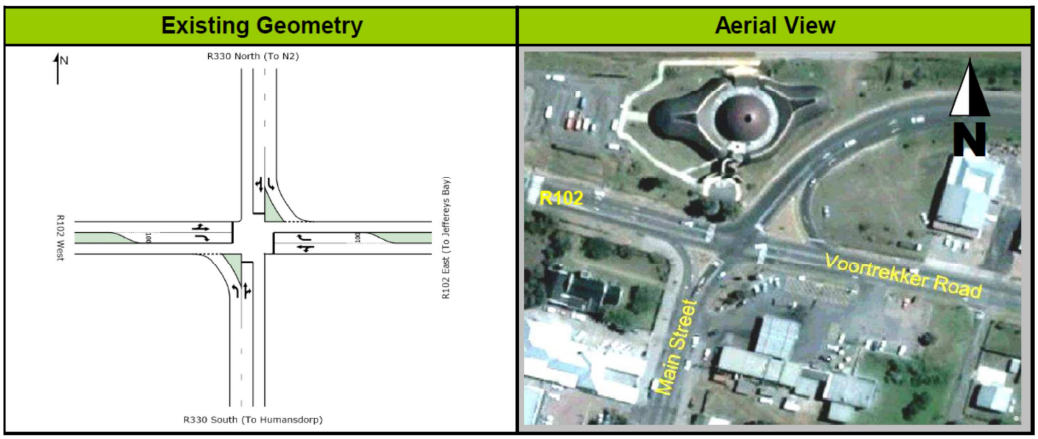


Figure 6.8a: Main Street (R330) / Voortrekker Road (R102) Existing Intersection Geometry

(i) 2008 Background Traffic

All approaches operate acceptably at LOS A to LOS C with minimal vehicle queues during the AM and PM peak hours. This has been confirmed by the on-site observations undertaken during the December holiday season, as shown in **Figure 6.8b**.

Figure 6.8b: Traffic condition at the Voortrekker Road / Main Street intersection

(ii) 2023 Background Traffic

The intersection experiences the highest traffic volumes in the local area and is highly likely to require upgrading before 2023. This upgrade could either be to a roundabout or to a signalised intersection. It has been analysed as a signalised intersection with the existing geometry for the 2023 scenario. All approaches will continue to operate acceptably at LOS A to LOS C with minimal vehicle queues during the AM and PM peak hours.

(f) R330 / N2 South Off-Ramp

The existing geometry and aerial view of R330 / N2 South Off-Ramp is shown in **Figure 6.9**.

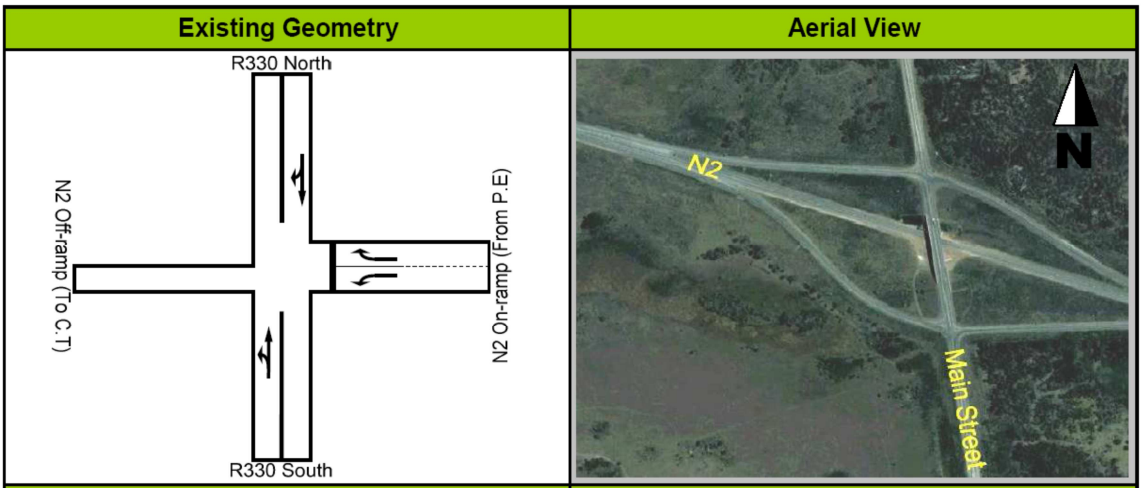


Figure 6.9: R330 / N2 South Off-Ramp Existing Intersection Geometry

(i) 2008 Background Traffic

All approaches operate acceptably at LOS A and LOS B with minimal vehicle queues during the AM and PM peak hours.

(ii) 2023 Background Traffic

All approaches will continue to operate acceptably at LOS A and LOS B with minimal vehicle queues during the AM and PM peak hours. No upgrades are therefore required.

(g) R330 / N2 North Off-Ramp

The existing geometry and aerial view of R330 / N2 North Off-Ramp are shown in **Figure 6.10a**.

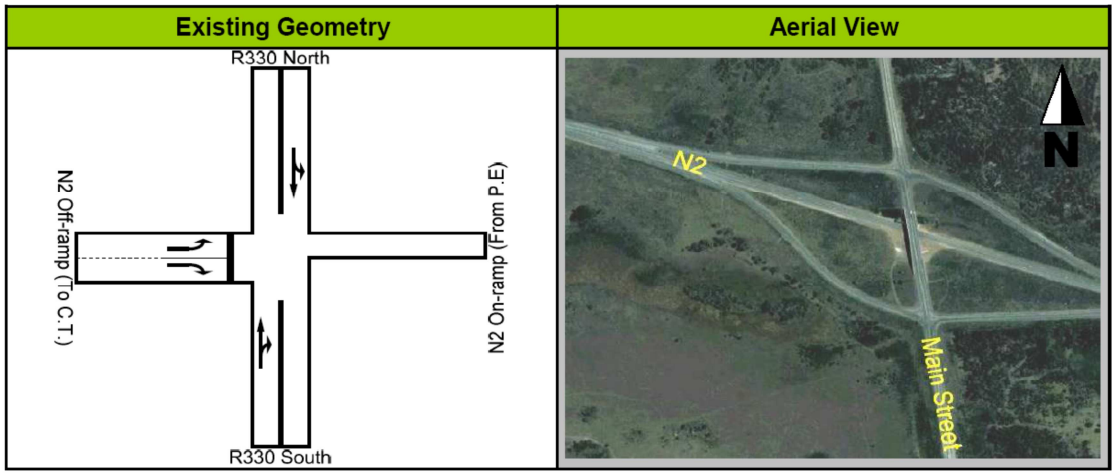


Figure 6.10a: R330 / N2 Off-Ramp Existing Intersection Geometry

(i) 2008 Background Traffic

All approaches operate acceptably at LOS A and LOS B with minimal vehicle queues during the AM and PM peak hours.

(ii) 2021 Background Traffic

All approaches will continue to operate acceptably at LOS A and LOS B with minimal vehicle queues during the AM and PM peak hours. No upgrades are therefore required.

(h) Voortrekker Road (R102) / Johnson Street

The existing geometry and aerial view of Voortrekker Road (R101) / Johnson Street are shown in **Figure 6.10b**.

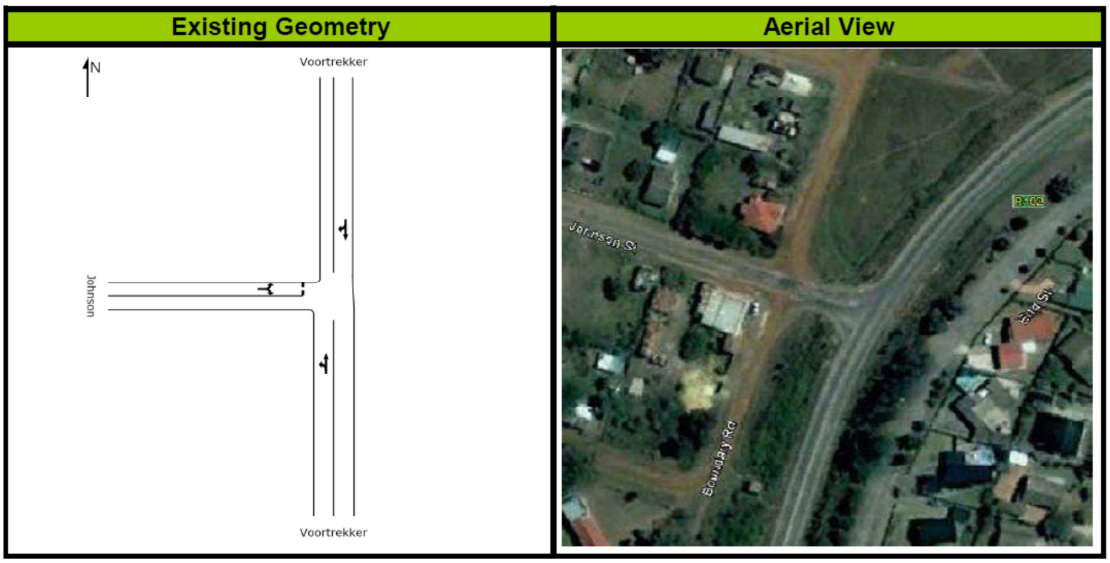


Figure 6.10b: Voortrekker Road (R102) / Johnson Street Existing Intersection Geometry

(i) 2011 Background Traffic

All approaches operate well at LOS with minimal vehicle queues during the AM and PM peak hours.

(ii) 2021 Background Traffic

All approaches will continue to operate well at LOS A with minimal vehicle queues during the AM and PM peak hours. No upgrades are therefore required.

(i) Voortrekker Road (R102) / Westgate Road / Koerat Street

The existing geometry and aerial view of Voortrekker Road (R102) / Westgate Road / Koerate Street are shown in **Figure 6.10c**.

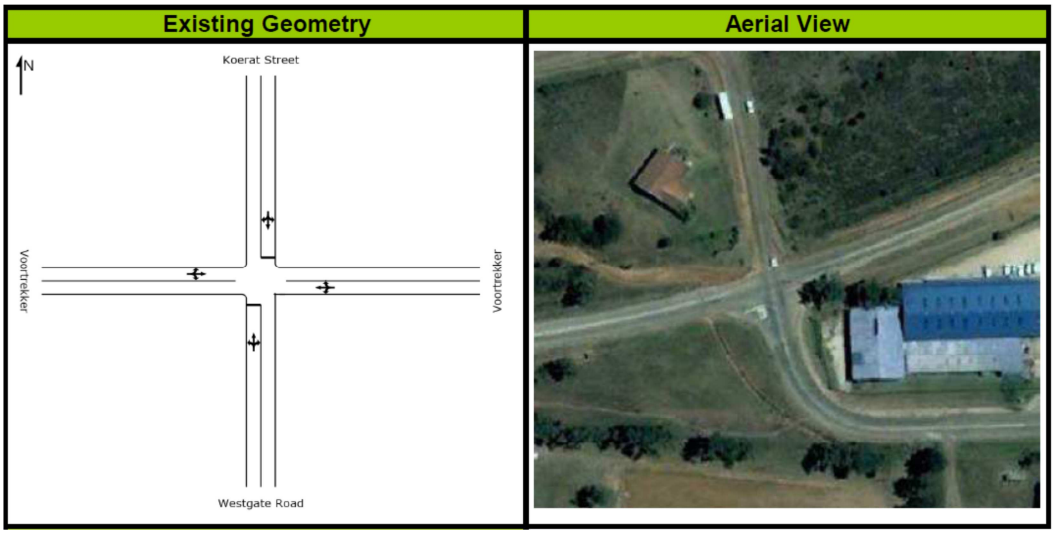


Figure 6.10c: Voortrekker Road / Westgate Road / Koerat Street Existing Intersection Geometry

(i) 2011 Background Traffic

All approaches operate well at LOS A and LOS B with minimal vehicle queues during the AM and PM peak hours.

(ii) 2021 Background Traffic

All approaches will continue to operate well at LOS A and LOS B with minimal vehicle queues during the AM and PM peak hours.

(j) Park Street / Oyster Bay Road

The existing geometry and aerial view of Park Street / Oyster Bay Road are shown in **Figure 6.10d**.

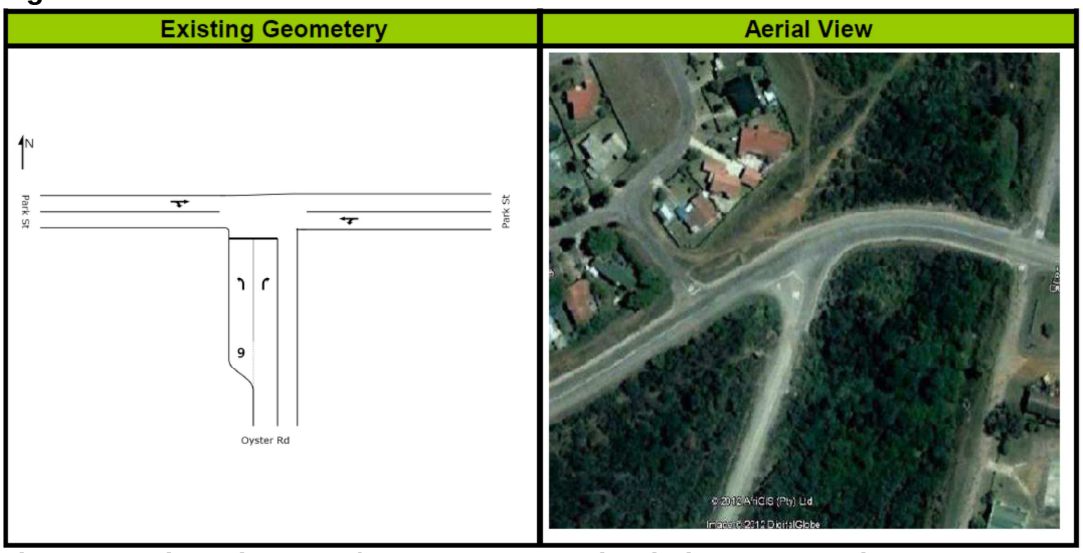


Figure 6.10d: Park Street / Oyster Bay Road Existing Intersection Geometry

(i) 2011 Background Traffic

All approaches operate acceptably at LOS A and LOS B with minimal vehicle queues during the AM and PM peak hours.

(ii) 2021 Background Traffic

All approaches will continue to operate acceptably at LOS A and LOS B with minimal vehicle queues during the AM and PM peak hours.

6.2 Public Transport

The existing modal split, obtained from the *2003 National Household Travel Survey (DoT, 2003)* for the Cacadu District Municipality within the Eastern Cape is shown in **Table 6.1**.

Table 6.1: Modal Split for Cacadu District Municipality

District or metro	% of Households						
	Train	Bus	Taxi	Car	Walk	Other	Can't get there
Cacadu	0	0.1	12.9	27.7	56.1	3.1	0.1

Only 30% of residents use private transport, 13% use public transport and the remainder walk or use other means of transport.

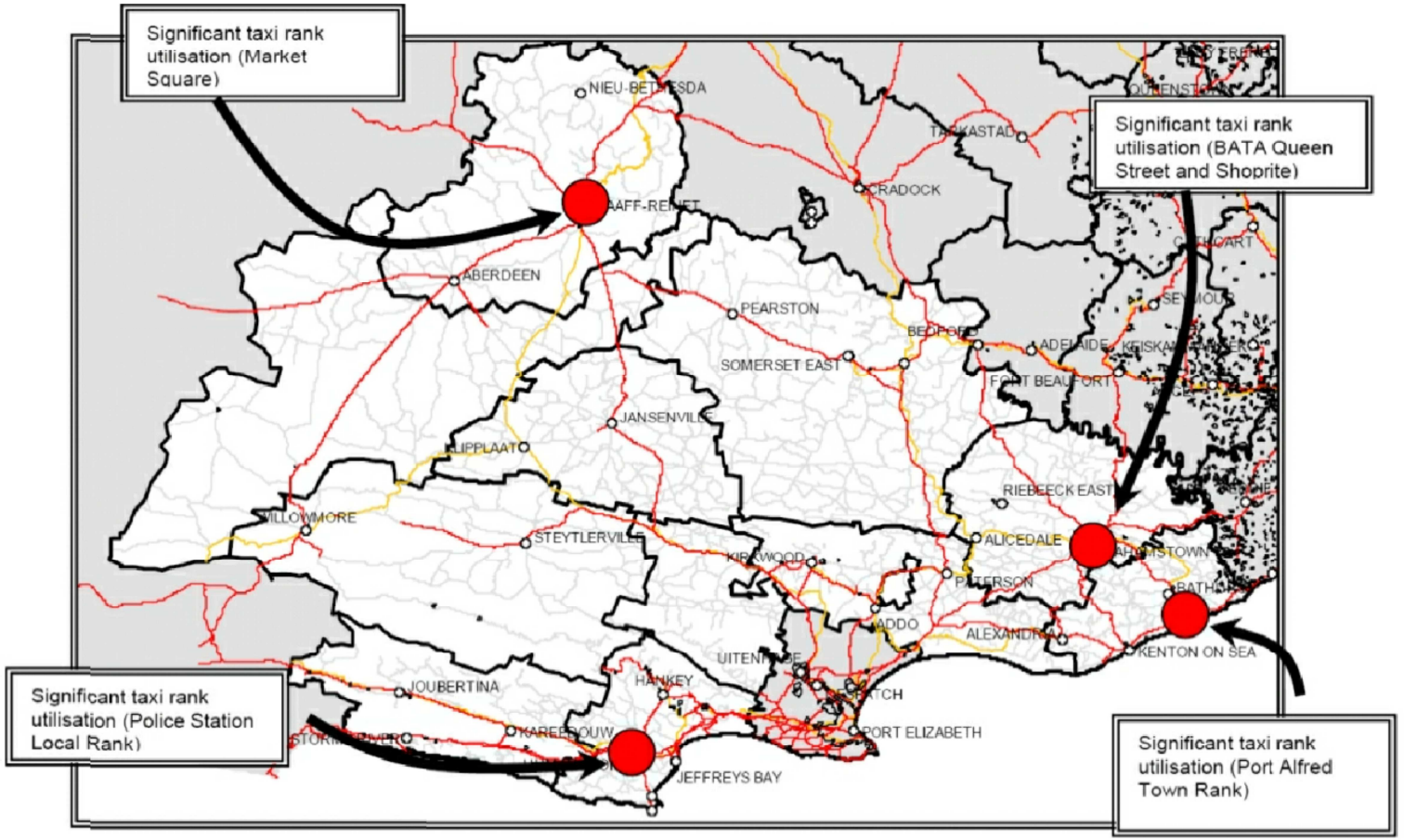
The existing public transportation infrastructure within the Cacadu District is dominated by the use of minibus taxis. Of this usage, 83% of minibus taxi commuters utilise taxis for long distance travelling (defined as a route travelling outside a town's boundary) and 17% use it for local / commuter routes (defined as a route not travelling outside a town's boundary).

Predominant minibus taxi ranks within the Cacadu District are contained within the towns as illustrated in **Figure 6.11**, the determining factor of the predominance being the utilisation of the taxi rank in the form of more than ten outgoing trips a day.

Current trends within the Cacadu District suggest that the utilisation of the bus as a mode of public transportation is declining rapidly. This is particularly evident in the form of local / commuter travel, due to the operation of taxis being far more lucrative and feasible. Long distance bus travel is still typically undertaken by operations such as City to City, Greyhound, Intercape and Translux – all of these service providers only travel on national routes.

In terms of rail transportation only three passenger rail services exist, as shown in **Figure 6.12**, namely:

- The Alicedale / Grahamstown route;
- The Port Alfred / Bathurst route; and
- The Apple Express line.



PROJECT	Nuclear 1 : Environmental Impact Assessment					
DETAIL	Thyspunt Taxi Routes and Taxi Rank Locations					
Prepared By	Checked By	Reviewed By	Scale	Date	Project No.	Drg.No. / Rev.
R. Adams	S.Chow	A.Bulman	N.T.S	January 2012	J27035	Fig. 6.11

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PROJECT: **Nuclear 1 : Environmental Impact Assessment**	Approved By: A.Bulman			Scale: NTS	Date: January 2012
DETAIL: **Thyspunt Passenger Rail Services**	Drawn By: R.Adams	Checked By: S.Chow	Reviewed By: A.Bulman	Project No. / Drg No. / Rev: J27035 / Figure 6.12 /	

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The Alicedale / Grahamstown route is primarily used by work seekers and shoppers and the Port Alfred and Bathurst route is primarily used by tourists exploring Bathurst. The Apple Express line is also predominantly utilised by day visitors / tourists travelling between Port Elizabeth and Thornhill (located within the Local Municipality of Kouga).

6.3 Non-Motorised Transport

There are currently minimal non-motorised transport (NMT) movements in the vicinity of the site. However, in the surrounding towns, such as Oyster Bay, Humansdorp and St. Francis Bay, NMT is limited to low-income users from rural areas and scholars.

Animal-drawn carts are widely used as an alternative to motorised transport by people in low-income areas. This is a particular problem on the N2, north of Grahamstown, where carts are used for transport by the communities situated adjacent to the N2.

6.4 Mitigating Actions Required

The following mitigation action is required:

- The intersection of Voortrekker Road and Main Street is highly likely to require upgrading by 2023 to either a roundabout or a signalised intersection. Further detailed investigation will be required before a final decision can be made.