Savannah Environmental (Pty) Ltd.

Expansion of Ankerlig Power Station, Atlantis Industrial

Review and Update of Traffic Impact Study

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Review and Update of Traffic Impact Study

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Arup (Pty) Ltd
Reg No. 1994/004081/07
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SA Association of Consulting Engineers

Arup (Pty) Ltd
Phase 2c of the Foundry, cnr Ebenezer & Prestwich Street, Greenpoint,
PO Box 3228, Cape Town 8000, South Africa
Tel +27 21 4216399 Fax +27 21 4216502
www.arup.com

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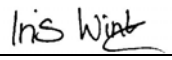
		Signature			
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1 INTRODUCTION

1.1 Background

Savannah Environmental (Pty) Ltd appointed Arup TransportPlanning on behalf of Eskom to review and update the previous traffic studies conducted for this project by GOBA (Goba Moahloli Keeve Steyn) in 2005 and SSI (Stewart Scott International) in 2007. The site is located on Farm 1183 and Portion of Farm Witzand 2 in the Atlantis Industrial Zone approximately 45km from Cape Town's CBD on the R307 Dassenberg Road as shown in Figure 1 and Figure 2. This report has been prepared as specialist input into the EIA for the increase in capacity of the existing open cycle gas turbine (OCGT) power station in Atlantis (see picture below) by converting the facility to a combined cycle gas turbine (CCGT) power station. Eskom is also proposing the construction of a 400kV transmission power line between the Ankerlig Power Station and the Omega Substation to transmit the additional power generated at this power station into the national grid.

This report was prepared by Mr M J Pinder (Pr Eng), an Associate Engineer with 19 years experience, specialising in infrastructure and transportation planning. He is considered an independent professional as may be specified by the competent authority. This report has been prepared in partial fulfilment of the requirements of Section 33 of the EIA Regulations in terms of the National Environmental Management Act (NEMA; Act No 107 of 1998).

The Existing Ankerlig OCGT Power Station

1.2 Methodology

Essentially this report is a review and update of two previous transport impact studies produced by GOBA (2005) and SSI (2007). The report extracts various statements and information from these reports and updates where necessary.

The significance of direct, indirect and cumulative impacts are assessed in terms of :- Nature, Extent, Duration, Probability, Severity / Beneficial Scale, Significance, Status, Degree to which the impact (can be reversed / may cause irreplaceable loss of resources / can be mitigated)

1.3 Scope of Report

The scope of this report will focus on the following:

- Existing Conditions / Transportation Environment
  - Surrounding road network
  - Existing traffic operations
  - Future road network
  - Future traffic volumes

- Proposed Development
  - Construction traffic impact

- Development traffic
  - Trip generation
  - Trip assignment and distribution
  - Fuel supply traffic impact

- Intersection Capacity Analysis

- Site Accesses

- Public Transport and Non-motorised Transport

2 EXISTING CONDITIONS / TRANSPORTATION ENVIRONMENT

2.1 Surrounding road network

The surrounding road network is briefly described below:

R27 West Coast Road

In the vicinity of the site, the R27 is classified as a Class 1 Expressway running from the Northern Suburbs of Cape Town to the Silverstream Road intersection after which is classified a Freeway all the way along the West Coast to Langebaan.

Next to the N7 Highway it is the main road for vehicles travelling up north and shows high traffic volumes on weekends or in holiday times as well as a higher number of heavy vehicles.

R307 Dassenberg Road

Dassenberg Road (R307) is classified as a Class 2 Primary Distributor.

This road links the R27 with the town centre of Atlantis and further with the R304 in a north-east direction.

The R307 is a two-way single carriageway with wide tarred shoulders.

Neil Hare Road

Neil Hare Road can be classified as a Class 4 Local Distributor.

This road is a two-way single carriageway with gravel shoulders. Neil Hare Road intersects with Charel Uys Drive at a four-way stop to the north-east and with the R307 to the south-west.

The Ankerlig Power Station gains access from Neil Hare Road.

Charel Uys Drive

Charel Uys Drive (R304) is defined as a Class 3 Secondary Arterial.

It carries medium traffic in both peak periods. It is an important link through Atlantis Industrial to Dassenberg Road (R307) in the west and to the Atlantis Town Centre to the north.

2.2 Existing traffic operations

This review report focuses on the information and data given in the previous traffic study conducted by SSI in 2007. In a first traffic study done by GOBA in 2005, daily traffic data was collected for the provincial and national roads in the study area around Atlantis. Using this data, SSI made an assumption for their expected traffic demand in 2007. These traffic volumes include construction, employees and heavy construction vehicles. Very little economic growth is being experienced in Atlantis as it was assumed that overall traffic growth rate from 2007 to 2008 is 1%. This percentage was applied to the traffic counts conducted by SSI to provide an "updated" indication of the 2008 traffic volumes in the vicinity of the site. The following intersections were then re-analysed using aaSIDRA software:

- R27 West Coast Road / R307 Dassenberg Road
- R307 Dassenberg Road / Neil Hare Road
- R307 Dassenberg Road / Charel Uys Drive
- Charel Uys Drive / Neil Hare Road

The capacity analysis and resulting level of services (LOS) are discussed in the remainder of this report.

As indicated in the SSI report, the traffic distribution on the R307 (Dassenberg Road) shows that 25% of the present traffic accesses the first Neil Hare intersection into the Atlantis Industrial area and a further 40% make use of the Charel Uys intersection to access Atlantis.

2.3 Future road network

The existing road network is well established in the local area consisting of Provincial Roads (Proclaimed Truck, Main, Divisional and minor roads – in terms of the Roads Ordinance) and many of which that now fall within the "Inner Municipal Area" of the City of Cape Town. The Provincial Government is the controlling authority for the N7 and the R27 while all other roads in the vicinity fall under the City of Cape Town. In the immediate vicinity of the Atlantis Industrial area, it is understood that there are no future road alignments that are going to affect the site in future or have any implications for traffic patterns in the area.

3 PROPOSED DEVELOPMENT

The existing site is located on Farm 1183 and Portion of Farm Witzand 2 in the Atlantis Industrial Zone approximately 45km from Cape Town's CBD on the R307 Dassenberg Road as shown in Figure 1 and Figure 2. The power station currently consists of four OCGT units and five additional units are currently under construction, each with a nominal capacity of ~150MW.

The upgrades of the Ankerlig Power Station include:

- Conversion of the facility to a CCGT power station
- A new 400kV transmission power line between power station and already authorized Omega Substation
- New fuel offloading skids
- Additional fuel storage tanks

A CCGT power station will be operated at a higher load factor (i.e. longer hours) and will therefore consume more fuel. It is understood that Eskom currently has authorisation to store 16.2 million litres of fuel (diesel) on their site and proposes additional 43.2 million litres storage. Therefore, a total of 59.4 million litres of fuel needs to be stored on site.
It is expected that the implementation of the above-mentioned upgrades will take approximately 32 months to complete.

4 DEVELOPMENT TRAFFIC

The traffic and transportation impact on the surrounding road network will have a number of related issues and impacts. The transportation issues are:-

- Construction transport related to the transport of very large Power Station components such as 250 ton turbines, which need to be transported from a harbour that can accommodate bulk carriers. As such, components could be landed at either Cape Town or Saldanha Bay Harbours and will be transported to site from there.
- Construction traffic (employees and heavy construction vehicles) related to the construction phase of the project.
- Traffic Impact of permanent employees upon commissioning.
- Road based transport of fuel to supply the power station on a daily / weekly basis from the Caltex Refinery on Plattekloof Road, Milnerton.

These issues have been broadly grouped into two distinct phases, namely the Construction Phase and the Operational Phase.

4.1 Construction Phase Impact

Construction of the expansion is already underway and it is estimated by Eskom that it will take approximately 18 months to complete.

4.1.1 Construction Plant and Delivery of Materials

Nature: This traffic relates to the traffic expected during the conversion of the Ankerlig Power Station. The magnitude and impact of the variety of construction vehicle trips and axle loading associated with heavy construction vehicles on the existing road network is difficult to determine as it is dependent on the many sources of materials, supply of materials, components and the construction programme. All these factors influence the frequency of the construction vehicle trips to and from the site. One can assume that most of these trips will be undertaken outside of the peak hours and will not have a significant impact on traffic operations in the area.

4.1.2 Pavement Loading Impact during Construction

Nature: The cumulative damaging effect of all individual axle loads is expressed as the number of equivalent 80kN single-axle loads (E80s). This is the number of 80kN single-axle loads that would cause the same damage to the pavement as the actual spectrum of axle loads.

For the first phase, the study by GOBA (2005), estimated 20 fully loaded inbound truckloads per day (assumed 3.5 E80's per truck) and empty outbound (1.8 E80's per truck) translates to 70 inbound E80s per day and 36 E80's outbound per day, totalling 106 E80s per day. The report estimated that (in 2005) Niel Hare Road carries approximately 550 E80s per day. This broad assumption is considered reasonable for the conversion phase of the project. Considering the inbound volumes only, this indicated an accumulative loading over an 18 month construction period of 58 035 E80s. This indicates that 19% of the E80 traffic loading during this phase can be attributed to the Power Station construction phase.

With the proposed conversion of the Ankerlig Power Station, the extended construction activity would place additional loading on the road pavements and would shorten the time to the next routine maintenance / rehabilitation intervention. It was assumed by SSI that 15 truckloads per day, which are fully loaded inbound (3.5 E80s per truck) and empty outbound (1.8 E80s per truck), would result in additional **80 E80s** per day along Neil Hare Road. It was observed that currently 550 E80s drive along Neil Hare per day and the accumulative pavement loading for construction vehicles adds up to 186 E80s per day. This indicates that 34% of the E80 traffic loading during construction can be attributed to the construction work at the Power Station. A worst-case scenario with all heavy vehicle trips along the same route were taken into account for the above described assumptions.

Extent: The roads that are going to be affected by construction traffic and deliveries are the roads providing access to Atlantis. Namely West Coast Road (R27), Dassenberg Road (R307), Niel Hare, John Dreyer, Charl Uys, Mamre Road (R304), Philadelphia Road and the N7.

Duration: Construction of the expansion is already underway and the conversion phase is estimated by Eskom that it will take approximately an additional 36 months to complete.

Probability: Definitely will occur.

Severity / Beneficial Scale: The impact should not be severe since the roads were designed to provide access to the Atlantis Industrial area. Older rural roads such as the Philadelphia Road, Mamre-Darling Road have recently (in the last 8 years) partially been rehabilitated to support road-based transport of goods to and from the area. The R27, Dassenberg Drive, Charl Uys and Niel Hare were all designed for heavy vehicle loading as part of the establishment of the Atlantis Industrial Area. The impact of the heavy vehicle loading contributes to the number of E80 axle loads that a road pavement is designed to carry in it's design life and there is very little that can be done to mitigate this impact during the "short" duration of the construction phase. It was indicated by SSI that a concrete batching plant will be available on site during the construction of phase 2 which reduces the number of heavy construction vehicle trips to the site. This operation does however rely on the delivery of the sand, stone and cement from various suppliers and the reduction in trips is not that significant. The demand of construction vehicles is expected not to exceed five to ten trucks (such as delivery trucks, earthmoving trucks, etc.) during peak hours as the bulk of construction vehicles are generally the delivery of premixed concrete which will happen outside of peak hours. A general observation is that the Atlantis Industrial Area is still very under developed and construction traffic will not have a significant impact to the intersection levels of service in the study. It is recommended that heavily laden (and slow moving) delivery vehicles be scheduled for out of peak periods (between 9am and 16pm) to lessen the impact to commuter traffic between Atlantis and the greater Cape Town. Regarding trip distribution, it is assumed the 30% of the construction traffic arrives from Malmesbury side and 70% from Cape Town side (such as Stellenbosch and Montagu Gardens) accessing the site via the R27 travelling along the R307.

Significance: This can be described as a **low to moderate** significance.

Status: The impact on the road pavement structures can be described as negative, but in the sense that it is merely contributing to the overall accumulating axle loadings over the design life of the road pavements. The damaging affect of vehicle loading in general is

mitigated by on-going routine maintenance by the responsible Road Authority (Provincial Government or the Local Authority) and covered by the licensing and fuel levies paid by the transport operator for his fleet of vehicles.

4.1.3 Transport Large Power Station Components - Abnormal Loads

Nature: The transport of abnormal components (by virtue of size (size limitations) or mass (load limitations)) from the local harbours to the site will need to be along recognised abnormal load routes. The Technical Recommendations for Highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads"[1] outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges and culverts. The general conditions, limitations and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the Road Traffic Act and the relevant Regulations.

4.1.2.1 Permits – General Rules

The limits recommended in TRH 11 are intended to serve as a guide to the Permit Issuing Authorities. It must be noted that each Administration has the right to refuse a permit application or to modify the conditions under which a permit is granted. It is understood that:

(a) A permit is issued at the sole discretion of the Issuing Authority. The permit may be refused because of the condition of the road, the culverts and bridges, the nature of other traffic on the road, abnormally heavy traffic during certain periods or for any other reason.

(b) A permit can be withdrawn if the vehicle upon inspection is found in any way not fit to be operated.

(c) During certain periods, such as school holidays or long weekends an embargo may be placed on the issuing or permits. Embargo lists are compiled annually and are obtainable from the Issuing Authorities

4.1.2.2 Load Limitations

The maximum load that a road vehicle or combination of vehicles will be allowed to carry legally of under permit on a public road is limited by:

- the capacity of the vehicles as rated by the manufacturer;
- the load which may be carried by the tyres;
- the damaging effect on pavements;
- the structural capacity on bridges and culverts;
- the power of the prime mover(s);
- the load imposed by the driving axles and

[1] Technical Recommendations for Highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads

- the load imposed by the steering axles.

4.1.2.3. Dimensional Limitations

A load of abnormal dimensions may cause an obstruction and danger to other traffic. For this reason all loads must, as far as possible, conform to the legal dimensions. Permits will only be considered for indivisible loads, i.e. loads that cannot, without disproportionate effort, expense or risk of damage, be divided into two or more loads for the purpose of transport on public roads.

Extent: Regional between the harbours and the site.
Duration: For the duration of delivery of each abnormal component.
Probability: Definitely will occur.
Severity / Beneficial Scale: The route clearance is still to be obtained, but the impact will be slow moving abnormal load carriers hauling along Marine Drive (R27), Boundary Road, Koeberg Road, Blaauwberg Road, West Coast Road (R27), Dassenberg Drive (R307) and Neil Hare to the site. The load is distributed by means of special multi-wheel and multi-axle trailers which reduces the severity of the load impact.
Significance: Low
Status: Negative, although the routing described above is a recognised abnormal load routing and structures have been designed to accommodate the passage of abnormal loads.
Degree to which the impact (can be reversed / may cause irreplaceable loss of resources / can be mitigated): The permit issuing authority will impose conditions that will need to be met during the transportation of the components. It is not known at the time of writing how many abnormal loads will be required, but he impact of the abnormal load on the road pavement is mitigated by using purpose-made trailers with many axles to spread the load on the road pavement.

4.1.4 Construction Employees

Nature: With reference to the GOBA and SSI reports, the anticipated and estimated number of construction employees to/from the construction site will be approximately 350 per day. It is assumed that 250 (71%) are transported to site from local surrounding areas by bus and 100 (29%) make use of private motor vehicles. With 50 persons/bus and a private vehicle occupancy rate of 1.5 persons/car, the above equates to 5 buses and 67 private vehicles during the AM and PM peak hours. It was assumed that two buses travel via the R27, two buses travel from Malmesbury via the R307 (north) and one bus travels from Atlantis to the site. It is furthermore assumed that 50% of the private vehicles travel from the R27 (south), 25% from the R307 (north) and 25% from Atlantis/N7 to the power station.
Extent: Regional
Duration: Short-term (0 – 5 years) since construction of the expansion is already underway and the conversion is estimated by Eskom will take approximately 36 months to complete.
Probability: Definitely will occur.
Severity / Beneficial Scale: This will have no significant impact.
Significance: Not significant
Status: Neutral

4.1.5 Sub-station and Overhead Power lines

Nature: It is understood that the 400kV distribution lines feeding from the Ankerlig Power Station into the electricity distribution network / grid at the Omega Substation will be installed above ground on transmission line pylon-towers. The 400kV cables will be installed on overhead pylon-towers and the impact is limited to the excavation of the holes for the footings which will be at numerous limited locations along the chosen route.

Extent: The extent of the impact external to the site is limited to the cable routes. There may be the need to establish low order access roads for the construction and maintenance of the lines. Where access roads do not exist, they will need to be established.
Duration: Permanent
Magnitude: Minor, since it is a relatively small area.
Probability: Definitely will occur.
Severity / Beneficial Scale: Slight or have no effect.
Significance: Low
Status: Neutral

Nature: Pavement Loading Impact during Construction **Construction Traffic (Abnormal Loads and Construction Employees and not considered significant)**		
	Without Mitigation	**With Mitigation**
Extent	Many roads will be affected, but West Coast Road (R27), Dassenberg Road (R307), Niel Hare, John Dreyer, Charl Uys, Mamre Road (R304), Philadelphia Road and the N7 will carry the more concentrated volumes of construction traffic. Score 2	General construction traffic - no mitigation
Duration	The construction period (approximately 36 months), Score 2.	No mitigation
Magnitude	Low impact on the lifespan of the road pavements, Score 3.	No mitigation
Probability	Definitely will occur, Score 5.	No mitigation
Significance	S = (E+D+M)P = (2+2+3) 5 = 35 i.e. >30 therefore a Low to Moderate Significance	Low
Status (positive or negative)	Negative	Negative
Reversibility	The impact of the loading cannot be reversed and the impact will contribute to the deterioration in riding quality.	By regular route maintenance or re-construction the riding quality of the road can be restored.
Irreplaceable loss of resources?	None, since the road pavement material could be re-cycled / re-used.	No mitigations
Can impacts be mitigated?	No.	Routine maintenance
Mitigation	The onset of degradation / deterioration of the riding quality of the road pavements could be mitigated by a routine maintenance surface treatment (if appropriate). Over the life span of the road pavement, the construction impact will however be minimal.	
Cumulative Impacts:	The axle loading on the road pavement is accumulative and contributes to the deterioration of the road over its life span.	
Residual Impacts:	No since the road can be repaired in future.	

4.2 Operation Phase Impact (Development Traffic)

4.2.1 Trip generation

Employees

- ***Traffic Impact***
  According to Eskom, the maximum number of staff employed after the proposed conversion will most likely not exceed 18 persons at any one time, including operators, maintainers and key personnel due to the automated operational nature of the facility. GOBA states in their study that the number of employees needed during operation of Phase 1 is no more than 15 persons.

- ***Trip assignment and distribution***
  It was assumed that all 18 staff members will arrive and leave in peak times with 55% (10 persons) coming from the R27 direction and 45% (8 persons) coming from Atlantis direction.
  According to the guideline document "Manual for Traffic Impact Studies" of the Department of Transport, less than 50 additional vehicle trips can be understood as negligible in its impact on the road network.

Fuel Supply

- ***Transportation of Fuel to Power Station***
  The fuel supply options to the Ankerlig Power Station are currently the subject of a separate study which is looking at the feasibility of rail transport as well as a fuel pipeline. The Caltex Refinery is the closest supplier of fuel for the Power Station and this report focuses only on the road-based transportation of fuel to the site. The Caltex Refinery is situated on Plattekloof Road (M14) adjacent to the N7 Interchange. The GOBA report indicated that Kerosene fuel is a hazardous material and road-based tankers require a permit to transport fuel along a particular route. It is understood that the fuel required for the CCGT Power Station is now diesel. This has not been re-investigated, but presently delivery is along the Koeberg Road, Blaauwberg Road, West Coast Road (R27) and then via the Dassenberg Drive (R307) to Atlantis Industrial and it is assumed the permit is in place. Although the fuel demand will increase when the Power Station generation is in demand, it is unlikely that an alternative route permit will be necessary. This route is also an established abnormal load route between Cape Town and the West Coast and the roads have been designed with heavy duty pavement structures. An alternative route via the N7, Philadelphia Road (R304), Mamre Road (R304), John Dreyer to Atlantis Industria is feasible but is likely to have a more detrimental impact on the existing roads when compared with the West Coast Road (R27) alternative.

  The distance travelled is approximately 53km for which the tankers need around two hours (average speed of 40km/h). The deliveries for fuel are outside the peak hour between 9h00 and 15h00 as required in the fuel permits.

4.2.2 Future Fuel Tanker Demand and Transport Route Impact

Nature: The operation of the power station at higher load factors following the conversion of the Ankerlig Power Station will demand extra fuel in addition to the fuel tanker demand for the existing power station. The estimated fuel requirements for the 9 OCGT units with 5 units converted and 9 units converted, based on 50% load factors (defined as the average % running time over 1 year(i.e. 8760 hours)) was obtained from Mr Nico Gewers (Eskom) that indicated:-

	(9 Units, 9 Converted)	(9 Units, 5 Converted)
Fuel Type: Diesel		
Litres/MW/h	315.94	315.94
Annual contractual limit (tons)	549 000	300 000
Litres at density 0.87	631 034 483	344 827 586
Inflation	10%	10%
Number of truck deliveries per annum	13062	7138
Average truck deliveries per day	36	20

Therefore, a worst case scenario could be that 252 fuel tankers with a load of 48 000 litres will be needed per week (7 days), which equates to about 36 fuel tankers per weekday (calculated on a 52 calendar weeks per year). It is understood that this facility will not be operating all day, every day, but more as daytime backup during peak electricity demand periods where it will operate between 0 and 8 hours per day.

Assuming an even spread of deliveries throughout the day (except between the 6am to 9am peak hour), there should be a delivery of 48 000 litres every 35 minutes. This will have no significant effect on the level of service at intersections, but it does introduce significant number of slow moving fuel tankers onto the West Coast Road (R27) throughout the day. Although illegal, there will be the tendency of the tanker drivers to “courteously” travel within the yellow shoulder to allow faster motorists to pass. This practice is potentially hazardous to motorists overtaking and to non-motorised transport users since there are no sidewalks along the West Coast Road (R27) and pedestrians and cyclists use the hard shoulders to commute, exercise and access public transport services (bus stops).

Extent: The extent of the impact external to the site is limited to the local fuel transport routes, particularly north of the West Coast Road / Blaauwberg Road intersection.
Duration: Long-term (>15 years, where the impact will be intermittent and variable during its operational life and cease after the operational life of the plant ceases.)
Probability: Definitely will occur (if the rail or pipeline options are not implemented.)
Severity / Beneficial Scale: Potentially severe but the long-term impact could be mitigated by using alternative means of transporting the fuel.
Significance: High significance to motorists and non-motorised commuters using the West Coast Road (R27).
Status: Negative

Degree: The impact could be completely mitigated by transporting the fuel via rail or pipeline between the Caltex Refinery and the Power Station, and this road based option could be used for emergencies only.

4.2.3 Pavement Loading Impact

Nature: It is necessary to evaluate the impact fuel tankers have on the pavement loading conditions. It was assumed by SSI that the number of E80's per loaded fuel tanker results in 3.5 E80's per truck and 1.8 E80's per empty tankers on their return trip. Therefore, a total of (36 x 3.5) 126 E80's will have an impact on the pavement structure of the northbound lane per day and a total of (36 x 1.8) 65 E80's on the pavement structure of the southbound lane per day. This adds up to approximately 45 865 E80's (126 trucks*7 weekdays*52 weeks) per year. For a design life span of 25 years for the power station, the total number of fuel tankers having an impact on the pavement loading will be around 1 146 600 E80's.

According to GOBA, the highest impact regarding pavement loading occurs on Neil Hare Road with 6.4 million E80's in a 25-year term. The total fuel tanker contribution to the pavement loading is then 17.9%. It is debatable whether this percentage can be covered by the licensing and fuel levies paid by the transport operator for his fleet of vehicles and the City of Cape Town has indicated that a maintenance levy be negotiated. The exact mechanism and calculation of this levy is still to be determined and hinges on the final decision regarding the method of transportation of the fuel. (i.e. Rail or pipeline)

Extent: The extent of the impact external to the site is limited to the local fuel transport routes.

Duration: Long-term (>15 years, where the impact will be intermittent and variable during its operational life and cease after the operational life of the plant ceases.)

Probability: Definitely will occur (if the rail or pipeline options are not implemented.)

Severity / Beneficial Scale: Potentially severe but the long-term impact could be mitigated by using alternative means of transporting the fuel. Alternatively a commitment to routine maintenance that ensures appropriate maintenance is undertaken to prolong the life of the existing road pavement.

Significance: High significance to motorists using roads if maintenance is not undertaken.

Status: Negative

Degree: The impact could be completely mitigated by transporting the fuel via rail or pipeline between the Caltex Refinery and the Power Station.

Nature: Pavement Loading Impact during Operation **Future Fuel Tanker Demand and Transport Route Impact**		
	Without Mitigation	**With Mitigation**
Extent	Plattekloof Road, Koeberg Road, Blaauwberg RoadWest Coast Road (R27), Dassenberg Road (R307), Niel Hare, John Dreyer, Charl Uys, Mamre Road (R304), Philadelphia Road and the N7. Score 2	No roads will be affected if a fuel pipeline or rail transport is used as an alternative means to convey the fuel between the Caltex Refinery and the Ankerlig Power Station. Score 1
Duration	Long-term (>15 years) but the impact will be intermittent and variable during the operational life and cease upon decommissioning of the facility. Score 4	Possibly a combination of road, rail or pipeline could also mitigate the impact on the road pavements. The impact will still occur over the operational life of the power station. Score 4
Magnitude	Low impact where axle loading contributes to the deterioration of riding quality during the lifespan of the road pavements, Score 4.	Should an alternative means of transporting the fuel be used, the impact will be minor, Score 2
Probability	Definitely will occur, Score 5	Road based transport is always an alternative option should there be problems with the rail or pipeline option. Score 3
Significance	S = (E+D+M) P = (2+4+4) 5 = 50 i.e. >30 therefore a Medium Significance.	S = (E+D+M) P = (1+4+2) 3 = 21 i.e. <30 therefore a Low Significance.
Status (positive or negative)	Negative	Negative
Reversibility	The impact of the loading cannot be reversed and the impact will contribute to the deterioration in riding quality.	By regular route maintenance or re-construction the riding quality of the road can be restored.
Irreplaceable loss of resources?	None, since the road pavement material could be re-cycled / re-used.	No mitigations
Can impacts be mitigated?	Yes.	Routine road maintenance / Fuel Pipeline / Rail Transport
Mitigation	1. The onset of degradation / deterioration of the riding quality of the road pavements could be mitigated by a routine maintenance surface treatment (if appropriate). Over the life span of the road pavement, the operational impact will contribute to the deterioration of the road pavements which is mitigated by planned routine maintenance undertaken by the responsible road authority. 2. The implementation of the fuel pipeline or rail transport options will possibly eliminate the impact. However the road based transport option is still available as a back up to the pipeline or rail option.	
Cumulative Impacts:	The axle loading on the road pavement is accumulative and contributes to the deterioration of the road riding quality over its life span.	
Residual Impacts:	No since the road can be repaired in future.	

5 INTERSECTION CAPACITY ANALYSIS

5.1 Capacity Analysis for Present 2008 Peak Hour Traffic

The results of the capacity analyses are summarised in Table 2 below. The detailed results are available on request. The tables summarise the level of service (LOS – see Table 1), volume/capacity ratio (v/c) and delay (in seconds) for each approach as well as for the overall intersections.

All analysed intersections as listed in chapter 4 operate at a good or acceptable level of service with acceptable average delays.

Table 1 Level of Service Definition

Level of Service (LOS)	Delay (d) in seconds	
	Signals and Traffic Circles	Stop and Yield Controlled
A	d ≤ 10	d ≤ 10
B	10 < d ≤ 20	10 < d ≤ 15
C	20 < d ≤ 35	15 < d ≤ 25
D	35 < d ≤ 55	25 < d ≤ 35
E	55 < d ≤ 80	35 < d ≤ 50
F	80 < d	50 < d

Table 2 Capacity Results for 2008 Traffic Demand

Intersection Approach		2008 Existing Traffic Demand					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	Delay (sec)	LOS	V/C	Delay (sec)	LOS
R27 / R307	R27 NB	0.27	7.1	A	0.17	4.5	A
	R307 WB	0.25	11.6	B	0.36	12.2	B
	R27 SB	0.05	0.7	A	0.08	0.2	A
	Overall	**0.27**	**7.6**	**A**	**0.36**	**6.5**	**A**
R307 / Neil Hare	R307 NB	0.25	4.1	A	0.14	2.6	A
	Neil Hare WB	0.09	14.0	B	0.20	12.7	B
	R307 SB	0.12	0.8	A	0.11	0.9	A
	Overall	**0.25**	**3.7**	**A**	**0.20**	**4.7**	**A**
R307 / Charel Uys	R307 NB	0.23	7.9	A	0.07	3.3	A
	Charel Uys WB	0.18	16.1	C	0.33	13.6	B
	R307 SB	0.11	4.4	A	0.03	3.3	A
	Overall	**0.23**	**7.3**	**A**	**0.33**	**8.4**	**A**
Neil Hare / Charel Uys	Charel Uys NB	0.03	12.6	B	0.12	12.1	B
	Neil Hare WB	0.08	4.8	A	0.11	1.5	A
	Charel Uys SB	0.11	12.6	B	0.15	13.2	B
	Neil Hare EB	0.22	4.3	A	0.06	2.3	A
	Overall	**0.22**	**6.1**	**A**	**0.15**	**6.4**	**A**

5.2 Capacity Analysis for Expected 2018 Traffic Demand

Considering the 2017 capacity analysis conducted by SSI (for a 10-year horizon), a 1% growth rate was assumed for the update of this analysis to 2018. The results of the capacity analyses are summarised in Table 3 below. The detailed results are available on request. The tables summarise the level of service, volume/capacity ratio (v/c) and delay (in seconds) for each approach as well as for the overall intersections.

All analysed intersections as listed in chapter 4 operate at a good level of service with low average delays.

Table 3 Capacity Results for Expected 2018 Traffic Demand

Intersection Approach		2018 Existing Traffic Demand					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	Delay (sec)	LOS	V/C	Delay (sec)	LOS
R27 / R307	R27 NB	0.29	6.6	A	0.17	3.8	A
	R307 WB	0.35	11.7	B	0.37	12.3	B
	R27 SB	0.05	0.8	A	0.08	0.2	A
	Overall	**0.36**	**7.8**	**A**	**0.37**	**6.5**	**A**
R307 / Neil Hare	R307 NB	0.33	4.6	A	0.19	2.7	A
	Neil Hare WB	0.16	16.1	C	0.214	13.1	B
	R307 SB	0.16	0.7	A	0.11	1.0	A
	Overall	**0.33**	**4.2**	**A**	**0.21**	**4.8**	**A**
R307 / Charel Uys	R307 NB	0.35	8.9	A	0.09	3.4	A
	Charel Uys WB	0.36	21.2	C	0.46	15.6	C
	R307 SB	0.13	4.0	A	0.05	3.3	A
	Overall	**0.36**	**8.5**	**A**	**0.46**	**9.2**	**A**
Neil Hare / Charel Uys	Charel Uys NB	0.04	12.7	B	0.13	12.8	B
	Neil Hare WB	0.10	4.4	A	0.15	1.8	A
	Charel Uys SB	0.13	12.6	B	0.23	14.4	B
	Neil Hare EB	0.23	4.9	A	0.08	2.7	A
	Overall	**0.23**	**6.5**	**A**	**0.24**	**6.6**	**A**

6 SITE ACCESSES

There are currently two accesses in operation as described below:

Operational and Fuel Supply Access

This access is from Neil Hare being the main entrance point for operational employees and fuel supply vehicles (see picture).

This access is security controlled via a gatehouse and booms. Visitor parking bays are provided in front of this access.

Construction Access

This access is on Stoffel Erasmus Crescent from Neil Hare being the entrance point for construction vehicles to the construction site (see picture).

This access is security controlled via booms and security guards.

7 CONCLUSIONS AND RECOMMENDATIONS

The aim of this study was to assess the traffic impact of the proposed conversion of the Ankerlig Power Station, Atlantis Industrial from an Open Cycle Gas Turbine (OCGT) to a Combined Cycle Gas Turbine (CCGT) facility. The following comments and recommendations are made:

- **Proposed Development**

  The site is located on Farm 1183 and Portion of Farm Witzand 2 in the Atlantis Industrial Zone. The power station consists currently of four OCGT units, each with a nominal capacity of ~150MW.

  The upgrades of the Ankerlig Power Station include:

  - Conversion of facility to CCGT power station
  - A new 400kV transmission power line between power station and already authorized Omega Substation
  - New fuel offloading skids
  - Additional fuel storage tanks

  It is understood that Eskom currently has authorisation to store 16.2 million litres of fuel (diesel) on their site and proposes for an additional 43.2 million litres to be stored.

- **Development Traffic Impact**
  - Construction Phase Impact
    - Construction Plant and Delivery of Materials: No significant impact on intersections and traffic operations.
    - Pavement Loading Impact during Construction: The axle loading on the existing road pavements can be described as negative but there would have been a similar construction traffic impact for the development of any of the industrial sites in Atlantis. The damaging effect of construction vehicle loading is mitigated by the on-going routine maintenance by the responsible Road Authority and covered by the licensing and fuel levies paid by the transport operator for his fleet of vehicles.
    - Transporting Abnormal Loads: A number of Power Station components need to be transported to the site from the local harbours. There are recognised abnormal haul routes along the R27 and permits (with conditions) will need to be obtained prior to transporting. There will be no significant impact on the existing road pavement and the duration of the impact is per trip.
    - Construction Employees: Using both public and private transport, the impact is not significant.
    - Power lines: Depending on the route selected, there may be the need to negotiate access to the proposed power line servitudes across private property. Construction vehicles will need to access each pylon for the erection phase and during cable installation, thereafter the no further affect apart from routine maintenance about twice a year.

- Operational Phase Impact (Development Traffic)
  - Employee Traffic Impact: It is understood that the maximum number of staff employed after the proposed extension and conversion will most likely not exceed 18 persons at any one time, including operators, maintainers and key personnel due to the automated operational nature of the facility. As such the trip generation is negligible.
  - Fuel Supply Traffic Impact: It is understood that the deliveries for fuel are outside the peak hours between 9h00 and 15h00. Fuel tankers take the route from Caltex Refinery via Plattekloof Road, Koeberg Road, Blaauwberg Road, R27 and then via the R307 to Atlantis Industrial. The operation of the Ankerlig Power Station will demand extra fuel in addition to the fuel tanker demand for the existing power station.
  - Pavement Loading Impact: The number of E80 axle loads imposed by the transportation of fuel from the Caltex Refinery to the Power Station Site is very significant and will significantly shorten the life span of the road pavement structure along the transportation route. GOBA estimated in their report that the highest impact regarding pavement loading occurs on Neil Hare Road with 6.4 million E80's in a 25-year term. The increased fuel demand increases Eskom's contribution to 1.15 million E80's (or approximately 17.9%). A more detailed study / assessment is required to investigate ways of monitoring Eskom's contribution to the axle loading on the road network and to quantify Eskom's contribution to the Road Authorities maintenance programmes.

    Condition 11.4.21 of the Record of Decision is that *"a management plan addressing the traffic mitigations and including the recommendations made in the environmental impact assessment report dated 30 April 2007. This must include road rehabilitation programmes and plans to involve relevant authorities in such programmes and potential contributions by Eskom to such programmes."*

- **Intersection Capacity Analysis**

  The traffic counts used by SSI in their 2007 study were taken into account and updated to 2008 traffic volumes. The following intersections were re-analysed:

  - R27 West Coast Road / R307 Dassenberg Road
  - R307 Dassenberg Road / Neil Hare Road
  - R307 Dassenberg Road / Charel Uys Drive
  - Charel Uys Drive / Neil Hare Road

  All analysed intersection as listed in Chapter 5 operate at a good level of service with relatively low average delays in the present 2008 and expected 2018 scenarios.

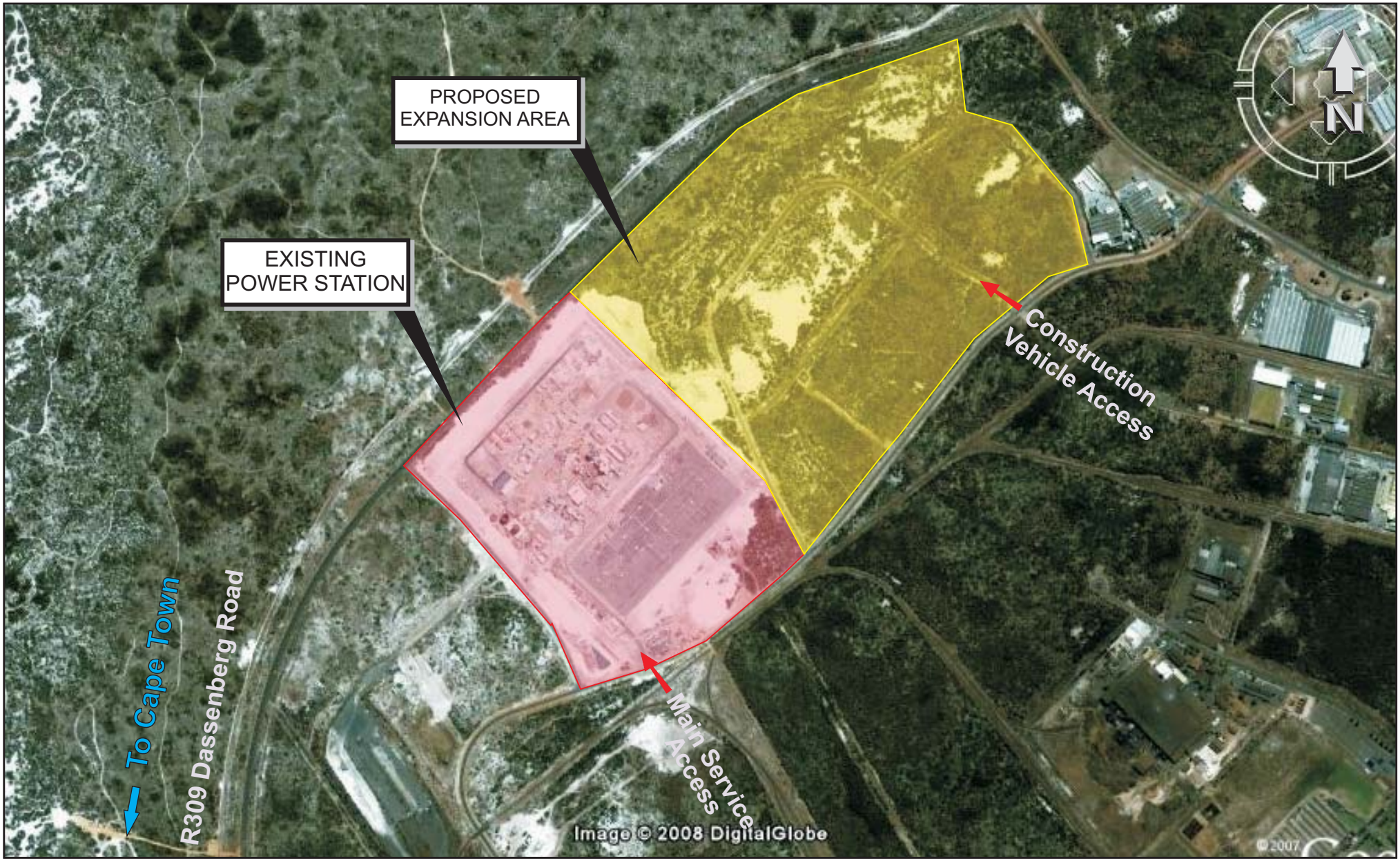
- **Site Accesses**

  There are currently two accesses from Neil Hare Road in operation – one operational and fuel supply access and one access for construction vehicles.

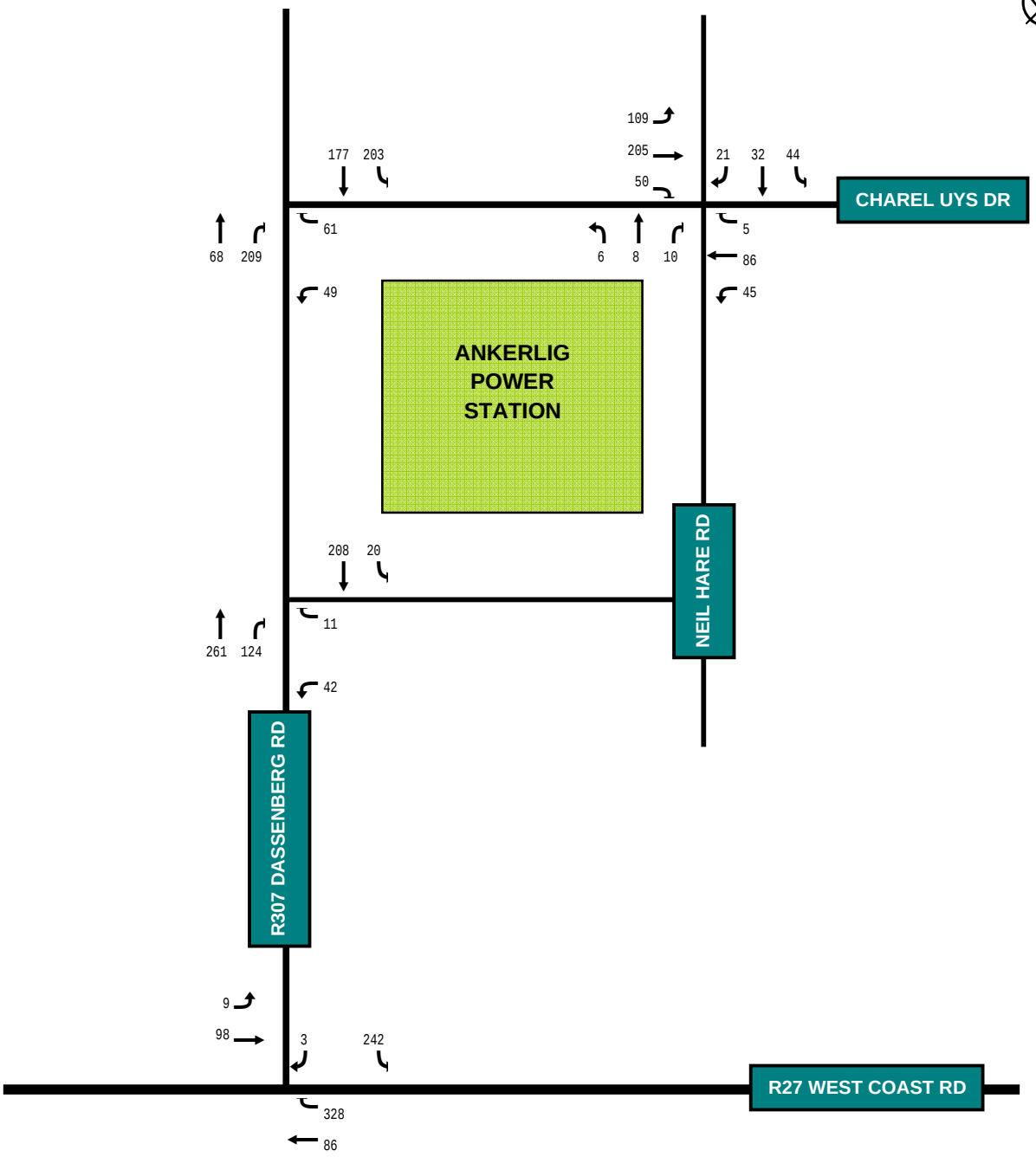
  Both accesses are security controlled via booms and security guards.

FIGURES

ARUP TransportPlanning Tel: (021) 421 6399	ANKERLIG POWER STATION - ATLANTIS	Job Ref No.: T988
	LOCALITY	Fig.: **1**



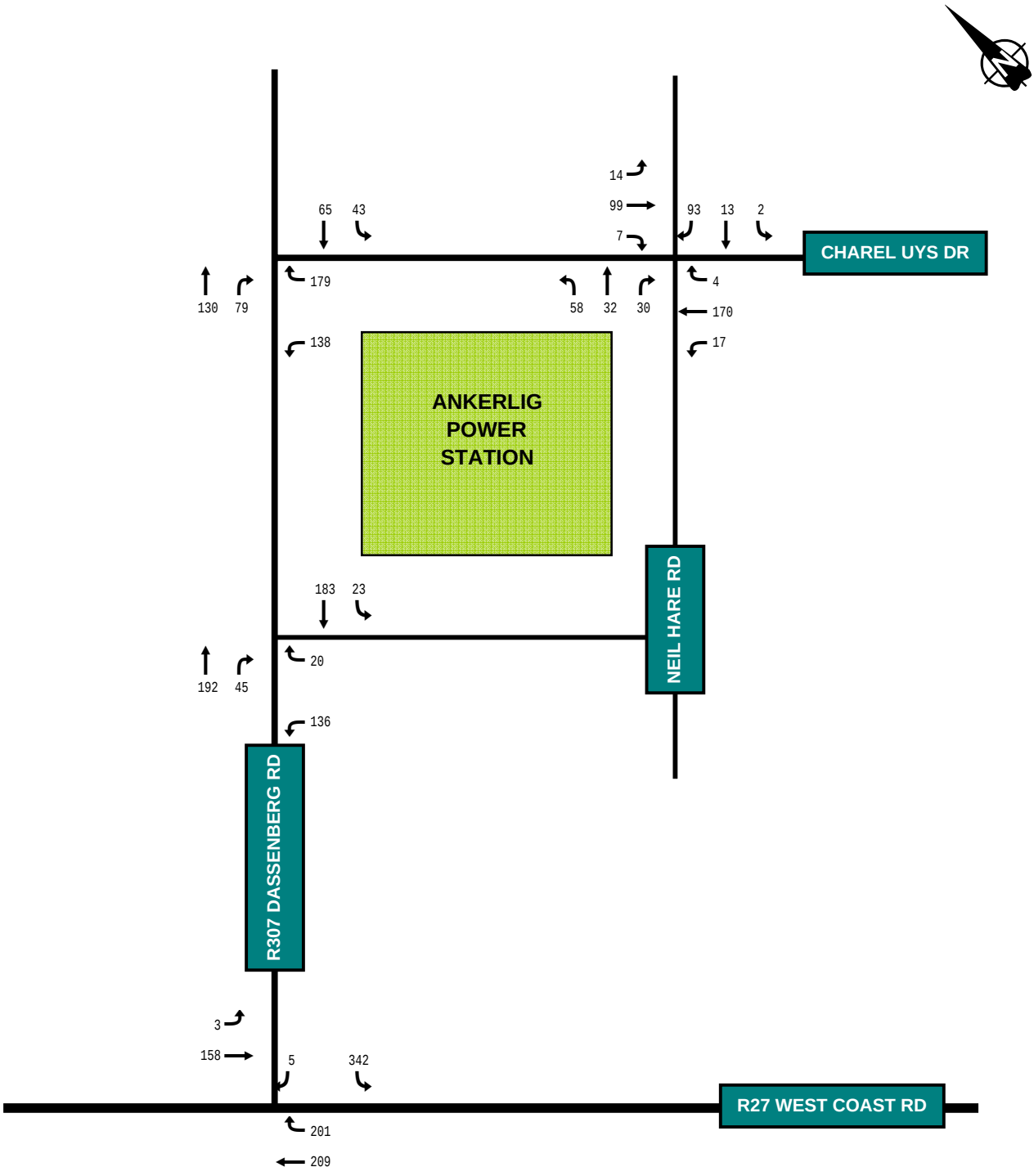
ARUP TransportPlanning Tel: (021) 421 6399	ANKERLIG POWER STATION - ATLANTIS	Job Ref No.: T988
	AERIAL VIEW OF SITE	Fig.: **2**



WEEKDAY AM PEAK HOUR

Schematic

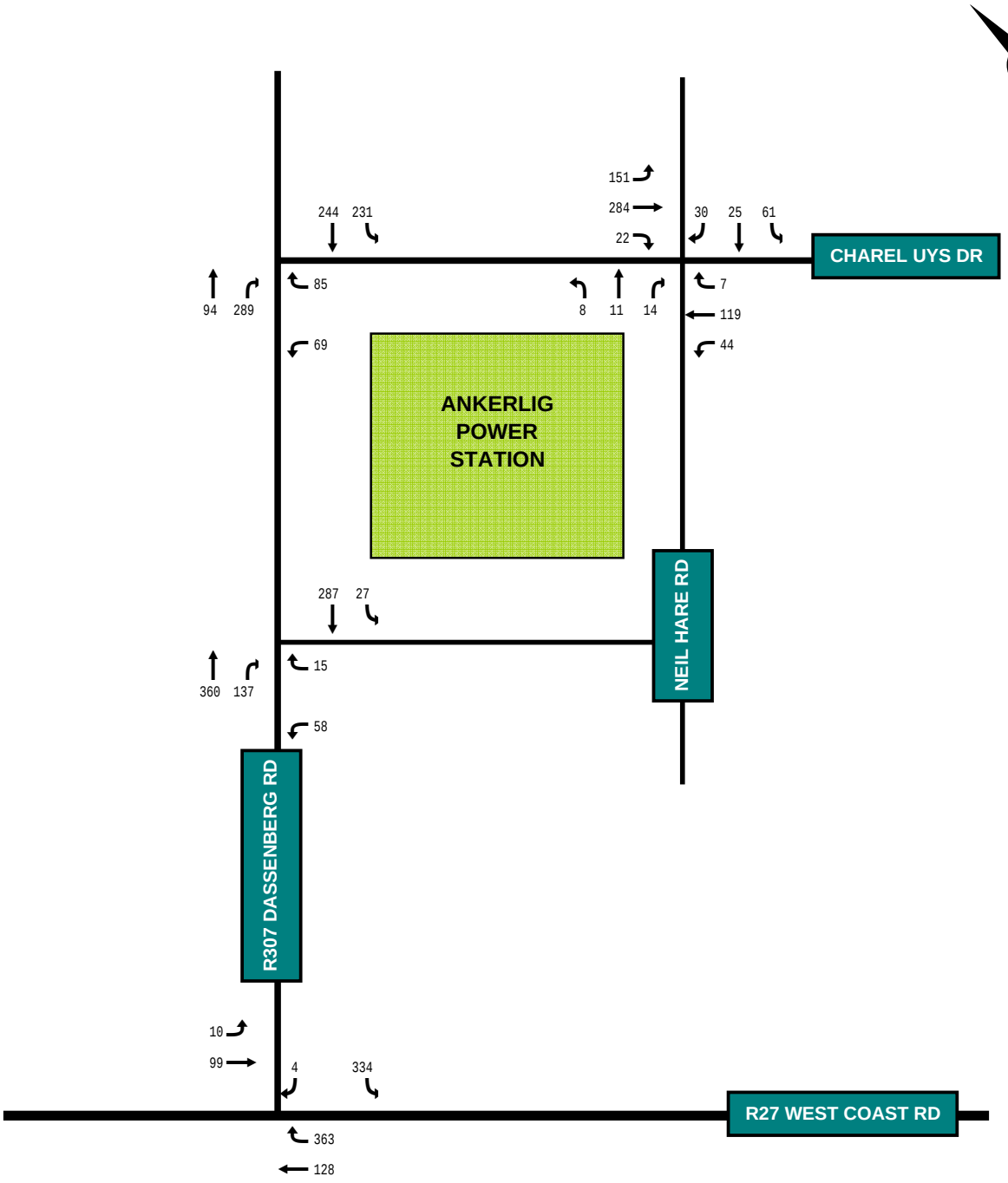
ARUP TransportPlanning	Ankerlig Power Station	Job Ref No: **T988**
	Present Traffic Demand (2008)	Fig: **3**



WEEKDAY PM PEAK HOUR

Schematic

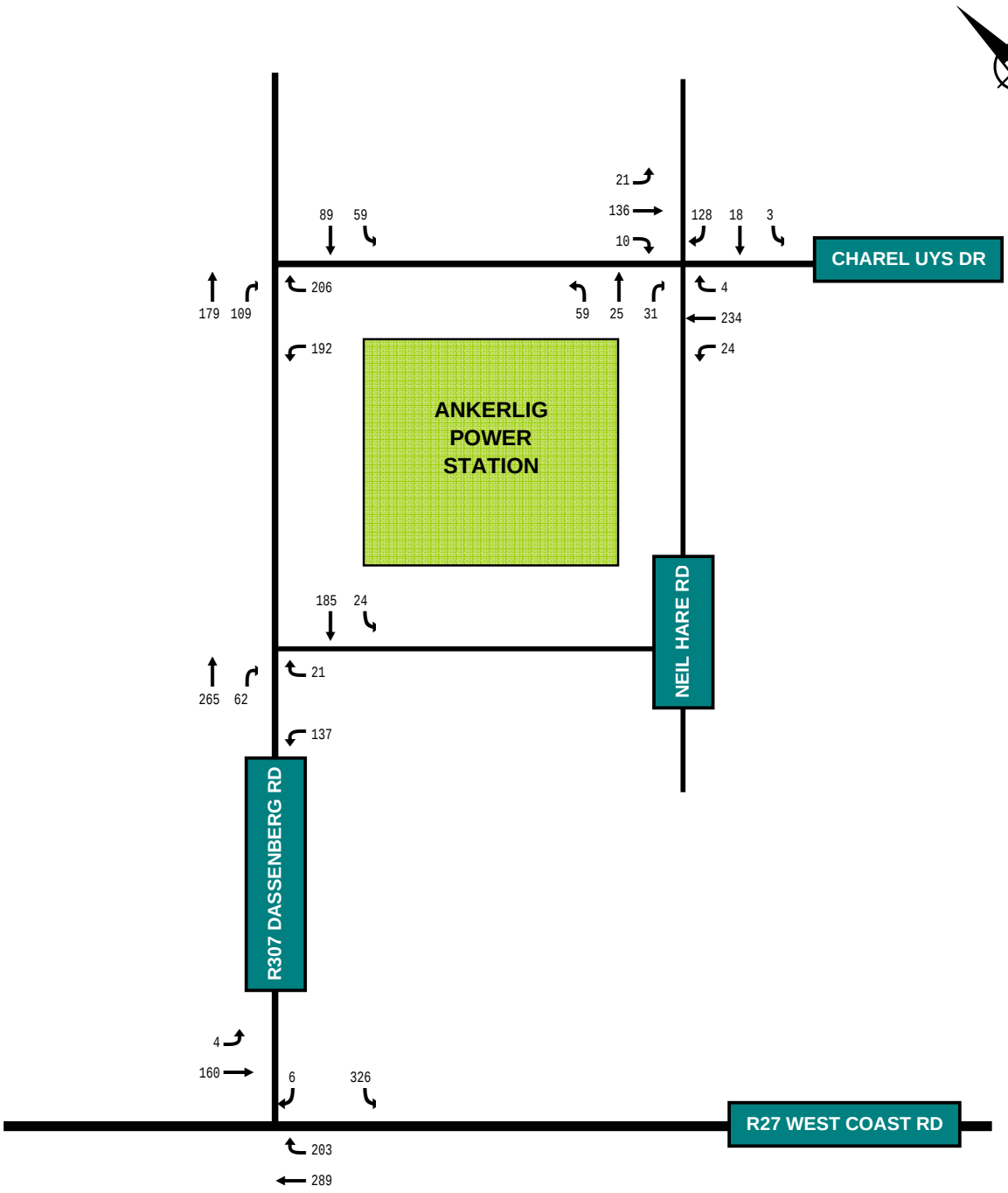
ARUP TransportPlanning	Ankerlig Power Station	Job Ref No: **T988**
	Present Traffic Demand (2008)	Fig: **4**



WEEKDAY AM PEAK HOUR

Schematic

ARUP TransportPlanning	Ankerlig Power Station	Job Ref No: T988
	Expected 2018 Traffic Demand	Fig: **5**



WEEKDAY PM PEAK HOUR

Schematic

ARUP TransportPlanning	Ankerlig Power Station	Job Ref No: **T988**
	Expected 2018 Traffic Demand	Fig: **6**