# Traffic Impact Assessment Report

# for the proposed CCPP Power Plant, Richards Bay, KwaZulu-Natal Province

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February 2019

# Summary Sheet

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|---|---|
| Report Type: | Traffic Impact Assessment Report |
| Title: | Traffic Impact Assessment Report for the proposed CCPP Power Plant, Richards Bay, KwaZulu-Natal |
| Location: | Site in Richards Bay, within the Mfolozi and the City of uMhlathuzi Local Municipalities in KwaZulu-Natal were identified |
| Client - Contact person: | Savannah Environmental (Pty) Ltd – Ms. Sharon Meyer |
| Reference Number: | TJ1625WC |
| Project Team: | Mr. Stephen Fautley (Pr. Tech Eng. 200270171) |
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*This Traffic Screening Report has been prepared in accordance with the requirements in the TMH 16 Vol 1 & 2 South African Traffic Impact and Site Traffic Assessment Manual, August 2012, compiled by the Committee of Transport Officials (COTO) by a suitably qualified and registered professional traffic engineering technologist. Details of any of the calculations on which the results in this report are based will be made available on request.*

**CONTENTS** **PAGE**


1. Project Description ..... 5
2. Purpose of Report ..... 6
3. Traffic Specialist Credentials ..... 6
4. Methodology ..... 6
5. Development Location ..... 7
6. Site Access ..... 7
7. Traffic Impact ..... 10
7.1. Trip Generation ..... 10
7.2. Traffic Counts ..... 15
7.3. Trip Distribution and Trip Assignment ..... 16
7.4. Intersection Analysis ..... 18
7.4.1. Intersections to be Analysed ..... 18
7.4.2. Intersection Analysis Software ..... 19
7.4.3. Sidra Default Settings: ..... 19
7.4.4. Intersection Levels of Service ..... 19
7.4.5. Results of Intersection Analysis ..... 19
8. Environmental Impact Assessment ..... 20
8.1. Impact Assessment Methodology ..... 20
8.2. Determination of Significance of Impacts ..... 20
8.3. Impact Rating System ..... 20
8.4. Assessment of Impacts ..... 21
9. Conclusions and Recommendations ..... 26
10. References ..... 28
Annexure A – SITE LAYOUT ..... 29
Annexure B – INTERSECTION ANALYSIS ..... 30
Annexure C – ACCESS ANALYSIS ..... 34

## LIST OF TABLES PAGE


Table 1- Construction Period Years 1 and 3 – Worker transport ........................................................ 11
Table 2 - Construction Period Year 2 – Worker transport .................................................................. 11
Table 3 - Operational Period Workers transport ................................................................................ 11
Table 4 - Decommissioning Period Workers transport ........................................................................ 12
Table 5 – Trip Generation - Construction in Years 1 and 3 ................................................................. 12
Table 6 – Peak Hours Trip Generation (equivalent vehicle units (evu)) - Construction in Years 1 and 3 ........................................................................................................................................................ 12
Table 7 - Trip Generation - Construction in Year 2 ............................................................................. 13
Table 8 – Peak Hours Trip Generation (evu) - Construction in Year 2 ................................................ 13
Table 9 - Trip Generation - Operational Period .................................................................................... 13
Table 10 – Peak Hours Trip Generation - Operations ........................................................................... 14
Table 11 - Trip Generation – Decommissioning .................................................................................... 14
Table 12 **– Peak Hours Trip Generation - Decommissioning** ............................................................ 14
Table 13 - Level of Service (LOS) ........................................................................................................... 19
Table 14 - Traffic impacts relating to the Construction Phase of the CCPP Plant ................................ 22
Table 15 - Traffic impacts relating to the Operation Phase of the CCPP Plant .................................... 24
Table 16 - Traffic impacts relating to the Decommissioning of the CCPP Plant .................................. 25
Table 17 – Cumulative Traffic Impacts due to other nearby developments of a similar nature .......... 26


## LIST OF FIGURES PAGE


Figure 1 – Locality Map illustrating the location for the site proposed for the development of the CCPP near Richards Bay ......................................................................................................................... 7
Figure 2 - Locality Map showing the proposed site and indicative layout for the CCPP. ....................... 8
Figure 3 - Locality Map showing Intersection Analysed ........................................................................ 15
Figure 4 - Traffic Counts at John Ross Highway / Western Arterial on 01 February 2018 .................... 15
Figure 5 - Trip Distribution ..................................................................................................................... 16
Figure 6 - Trip Assignment – Peak Hours - Construction (Years 2019 & 2021) ..................................... 16
Figure 7 - Trip Assignment – Critical Construction Period - Peak Hours (Year 2020) ........................... 17
Figure 8 - Trip Assignment – Peak Hours - Operations ......................................................................... 17
Figure 9 - Trip Assignment – Peak Hours - Decommissioning .............................................................. 18
Figure 10 - Layout of John Ross Highway / Western Arterial Intersection Analysed ............................ 30
Figure 11 - Layout of CCPP Access / Western Arterial Intersection Analysed ...................................... 34


## LIST OF PICTURES PAGE


Picture 1 – Western Arterial ..................................................................................................................... 9
Picture 2 – Western Arterial ..................................................................................................................... 9
Picture 3 – Western Arterial ..................................................................................................................... 9
Picture 4 – Western Arterial signalised junction with the John Ross Highway .................................... 10

## 1. PROJECT DESCRIPTION

The Richards Bay Combined Cycle Power Plant (CCPP) involves the construction of a gas-fired power station which will provide mid-merit[1] power supply to the electricity grid. The weekly mid-merit power supply will be between a range of 20% to 70% of the total electricity supply produced by the Richards Bay CCPP. The power station will have an installed capacity of up to 3 000MW, to be operated on natural gas, with diesel as a back-up fuel. The natural gas is to be supplied by potential gas suppliers via a gas pipeline to the CCPP from the supply take-off point at the Richards Bay Harbour. The Liquefied Natural Gas (LNG) terminal infrastructure at the port and the gas supply pipeline to the boundary fence of the Richards Bay CCPP does not form part of the scope of this assessment as this project focuses only on the footprint activities inside Eskom's boundary fence on site 1D of the Richards Bay Industrial Development Zone (IDZ).

The main infrastructure associated with the facility includes the following:

- Gas turbines for the generation of electricity through the use of natural gas or diesel (back-up resource).
- Heat recovery steam generators (HRSG) to capture heat from high temperature exhaust gases to produce high temperature and high-pressure dry steam to be utilised in the steam turbines.
- Steam turbines for the generation of additional electricity through the use of dry steam generated by the HRSG.
- Bypass stacks associated with each gas turbine.
- Dirty Water Retention Dams.
- Exhaust stacks for the discharge of combustion gases into the atmosphere.
- A water treatment plant for the treatment of potable water and the production of demineralised water (for steam generation).
- Water pipelines and water tanks to transport and store water of both industrial quality and potable quality (to be supplied by the Local Municipality).
- Dry-cooled system consisting of air-cooled condenser fans situated in fan banks.
- Closed Fin-fan coolers to cool lubrication oil for the gas and steam turbines.
- A gas pipeline and a gas pipeline supply conditioning process facility for the conditioning and measuring of the natural gas prior to being supplied to the gas turbines. It must be noted however that the environmental permitting processes for the gas pipeline construction and operation will be undertaken under a separate EIA Process
- Diesel off-loading facility and storage tanks.
- Ancillary infrastructure including access roads, warehousing, buildings, access control facilities and workshop area, storage facilities, emergency back-up generators, firefighting systems, laydown areas and 132kV and 400kV switchyards.

[1] Mid-merit electricity generation capacity refers to the generation of electricity which is adjusted according to the fluctuations in demand in the national grid.

- A power line to connect the Richards Bay CCPP to the national grid for the evacuation of the generated electricity. It must be noted however that the due environmental permitting processes for the development of the power line component are being undertaken under a separate EIA Process.

## 2. PURPOSE OF REPORT

This Traffic Impact Assessment Report considers the proposed development access; trip generation and traffic impact on the existing affected road network.

## 3. TRAFFIC SPECIALIST CREDENTIALS

This Site Assessment is undertaken by Mr. S Fautley, who is a Professional Engineering Technologist registered with the Engineering Council of South Africa (ECSA).

His career encompasses the civil, traffic and transportation engineering discipline for ten (10) years at the Western Cape Government, 1,5 years with Kantey and Templer Consulting Engineers and 10 years at local authority (City of Cape Town) before joining Techso in 2008, as a Senior Transport Engineer.

He has extensive experience in Traffic Impact Assessments, and Site Assessments, including various renewable energy Plants in South Africa and is a registered Road Safety Auditor.

## 4. METHODOLOGY

The methodology followed in this assessment is as follows:

- The scope of the project was considered to ascertain the anticipated traffic during construction and operations of the RB CCPP development, and similar developments were considered to ascertain anticipated trip generation;
- A site visit was undertaken on 1 December 2016 to view road transport access routes and access implications for the site, in relation to the anticipated development traffic;
- Road conditions and road environment serving the site was assessed and documented;
- Traffic counts were undertaken at the John Ross Highway / Western Arterial intersection on 1 February 2018;
- The road conditions and road environment, which were subject to a qualitative assessment, are expected to be largely similar to that assessed in December 2016. Traffic counts undertaken in February 2018 are less than three years old and are acceptable for intersection analysis.
- Development trip generation for the project lifecycle was ascertained, with input from Eskom;
- Development trips were distributed and assigned to the road network largely in accordance with background traffic patterns;
- The intersection of John Ross Highway / Western Arterial and the development access on Western Arterial were analysed using SIDRA software, for the relevant development stages;
- An Environmental Impact Assessment was carried out, for the project construction, operations and decommissioning stages, and mitigation measures are proposed where required.

## 5. DEVELOPMENT LOCATION

The project site is situated near Richards Bay, between the N2 and the Atlantic Ocean, just west of the Richards Bay Harbour. The site falls within the jurisdiction of the uMhlatuze Local Municipality within the greater KwaZulu-Natal Province (see Figure 1 below).


**Figure 1** – Locality Map illustrating the location for the site proposed for the development of the CCPP near Richards Bay

## 6. SITE ACCESS

The site is located to the south of Alton Industrial Area (see Figure 2 below).

PROPOSED RICHARDS BAY CCPP SITE AND PLANT LAYOUT OPTION

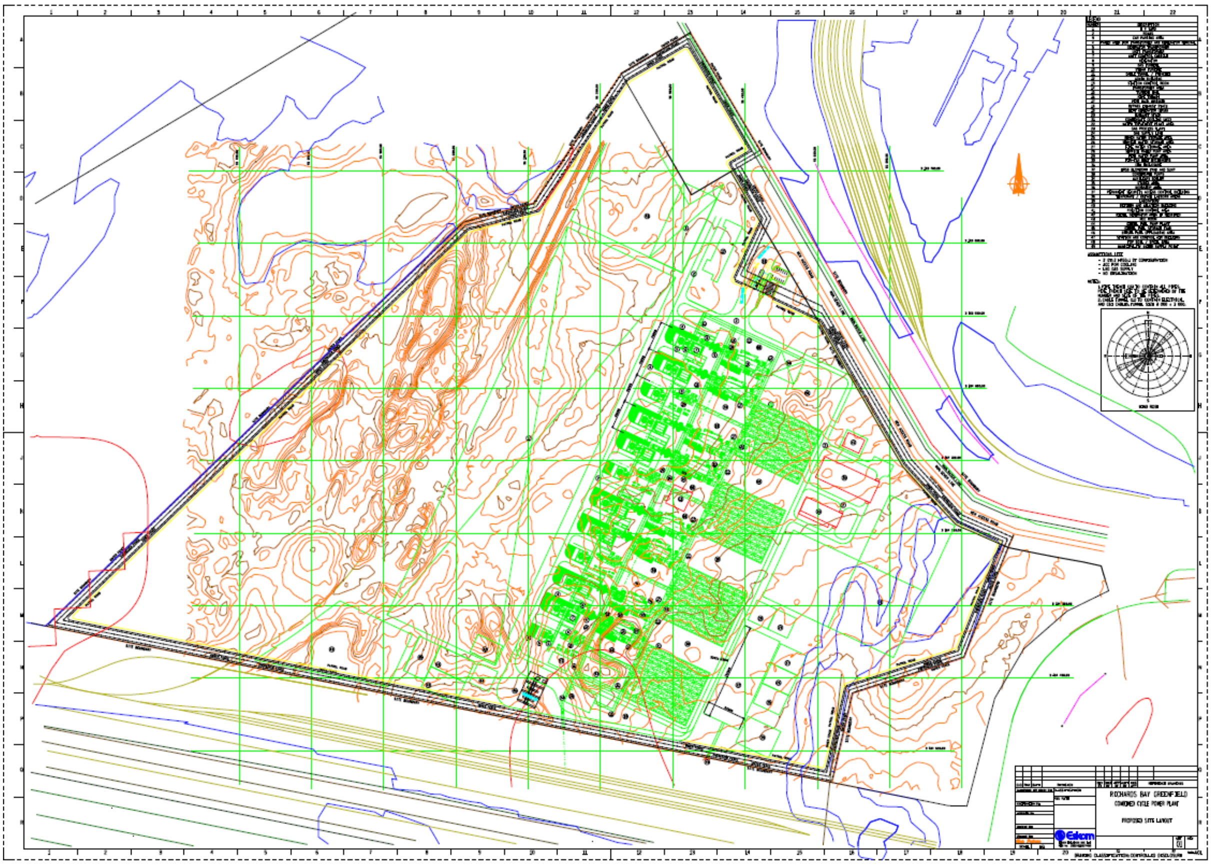


**Figure 2** - Locality Map showing the proposed site and indicative layout for the CCPP.

The site is approximately the shape of a triangle, where two sides are bounded by a railway line, and the third side by the Western Arterial. The site will take access from the Western Arterial. The Western Arterial is a Class 3 two lane road providing access to Alton Industrial Area with some large industrial sites (like the Mondi Factory) in the vicinity of the site.

**Picture 1** – Western Arterial

**Picture 2** – Western Arterial

**Picture 3** – Western Arterial

**Picture 4** – Western Arterial signalised junction with the John Ross Highway

The site is ideally located next to existing industrial sites along the Western Arterial, and is approximately 900 m from the John Ross Highway. There are no communities in the area and it is centrally located between the N2, the CBD and the suburbs of Richards Bay.

The proposed site access on Western Arterial affords the site good access to the metropolitan road network.

## 7. TRAFFIC IMPACT

### 7.1. Trip Generation

Trip generation hereunder is based on the project programme, planning and information made available by the developer. While care is taken to present a realistic / expected trip generation, it is possible that the figures could change with different build strategies, a revised project programme or different transport logistics.

It is assumed that during Year 1 and Year 3 some 900 workers will be on-site each day and that construction activity will peak in year 2 with some 1700 workers on-site (in two shifts).

The plant is expected to accommodate some 120 employees during the operational period of 30 years.

It is anticipated that decommissioning the plant may take a year or more, and that the ensuing trip generation will be slightly less than realised during the construction period.

The majority of vehicle trips for the plant lifecycle are based on staff numbers are shown in Tables below:

**Table 1**- Construction Period Years 1 and 3 – Worker transport

| VEHICLES REQUIRED FOR WORKER TRANSPORT - DURING CONSTRUCTION (Year 1 & Year 3) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Shift** | **# per shift** | **Skill level** | **%** | **#** | **Vehicle Type** | **Person Ratio per vehicle** | **# Vehicles** |
| Daytime | 900 | Skilled | 10% | 90 | Light | 1.2 | 75 |
| | | Un-skilled | 20% | 180 | Bus | 80 | 2 |
| | | Semi-skilled | 70% | 630 | Bus | 80 | 8 |
| **SUM** | | | **100%** | **900** | | | **85** |
| Evening | 0 | Skilled | 10% | 0 | Light | 1.2 | 0 |
| | | Un-skilled | 20% | 0 | Bus | 80 | 0 |
| | | Semi-skilled | 70% | 0 | Bus | 80 | 0 |
| **SUM** | | | **100%** | **0** | | | **0** |

**Table 2** - Construction Period Year 2 – Worker transport

| VEHICLES REQUIRED FOR WORKER TRANSPORT - DURING CONSTRUCTION (Year 2) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Shift** | **# per shift** | **Skill level** | **%** | **#** | **Vehicle Type** | **Person Ratio per vehicle** | **# Vehicles** |
| Daytime | 2500 | Skilled | 7% | 175 | Light | 1,2 | 146 |
| | | Un-skilled | 23% | 575 | Bus | 80 | 7 |
| | | Semi-skilled | 70% | 1750 | Bus | 80 | 22 |
| **SUM** | | | **100%** | **2500** | | | **175** |
| Evening | 200 | Skilled | 10% | 20 | Light | 1,2 | 17 |
| | | Un-skilled | 20% | 40 | Bus | 80 | 1 |
| | | Semi-skilled | 70% | 140 | Bus | 80 | 2 |
| **SUM** | | | **100%** | **200** | | | **19** |

**Table 3** - Operational Period Workers transport

| VEHICLES REQUIRED FOR WORKER TRANSPORT - DURING OPERATIONS | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Shift** | **# per shift** | **Skill level** | **%** | **#** | **Vehicle Type** | **Person Ratio per vehicle** | **# Vehicles** |
| Daytime | 85 | Skilled | 30% | 25.5 | Light | 1.2 | 21 |
| | | Un-skilled | 10% | 8.5 | Bus | 8 | 1 |
| | | Semi-skilled | 60% | 51 | Bus | 8 | 6 |
| **SUM** | | | **100%** | **85** | | | **29** |
| Night-time | 35 | Skilled | 40% | 14 | Light | 1.2 | 12 |
| | | Un-skilled | 0% | 0 | Mini-van | 8 | 0 |
| | | Semi-skilled | 60% | 21 | Mini-van | 8 | 3 |
| **SUM** | | | **100%** | **35** | | | **14** |

**Table 4 - Decommissioning Period Workers transport**

| VEHICLES REQUIRED FOR WORKER TRANSPORT - DURING DECOMMISIONING | | | | | | | |
|---|---|---|---|---|---|---|---|
| Shift | # per shift | Skill level | % | # | Vehicle Type | Person Ratio per vehicle | # Vehicles |
| Daytime | 400 | Skilled | 10% | 40 | Light | 1.2 | 33 |
| | | Un-skilled | 40% | 160 | Bus | 60 | 3 |
| | | Semi-skilled | 50% | 200 | Bus | 60 | 3 |
| **SUM** | | | **100%** | **400** | | | **39** |

Some abnormal load vehicles will transport particular heavy equipment, from Richards Bay Harbour to the site. These trips are expected to be minimal, and would be subject to abnormal load permits. These trips should be scheduled outside of the commuter peak periods.

The worker trip generation is added to the expected heavy vehicle trips to determine the total trip generation, during the critical commuter peak periods, for the plant life cycle, as shown below.

**Table 5** – Trip Generation - Construction in Years 1 and 3

| TRIP GENERATION FOR 3000 MW GAS FIRED COMBINED POWER PLANT DURING CONSTRUCTION (Year 1 & Year 3) | | | | | |
|---|---|---|---|---|---|
| Vehicle Type | Trips | | | | |
| | Daytime Shift | | Evening Shift | | Co-inciding |
| | Vehicles / Peak hr | Total during Shift | Vehicles / Peak hr | Total during Shift | Trips in Peak Hr |
| Heavy Goods | 10 | 100 | 0 | 0 | 20 |
| Buses | 10 | 20 | 0 | 0 | 20 |
| Light Vehicles | 75 | 150 | 0 | 0 | 75 |
| Abnormal Loads | 0 | 4 | 0 | 0 | 0 |
| **TOTAL** | **95** | **274** | **0** | **0** | **115** |

**NOTE -** Peak Hour day time trips coincide with night time trips at shift changeover

**Table 6** – Peak Hours Trip Generation (equivalent vehicle units (evu)) - Construction in Years 1 and 3

| TRIP GENERATION (evu) - AM Peak Hour - Construction (Year 1&3) | | | |
|---|---|---|---|
| **Vehicle Type** | **In** | **Out** | **Sum** |
| Heavy Goods | 17 | 17 | 33 |
| Buses | 17 | 17 | 33 |
| Light Vehicles | 75 | 0 | 75 |
| Abnormal Loads | 0 | 0 | 0 |
| **TOTAL** | **108** | **33** | **141** |

| TRIP GENERATION (evu) - PM Peak Hour - Construction (Year 1&3) | | | |
|---|---|---|---|
| **Vehicle Type** | **In** | **Out** | **Sum** |
| Heavy Goods | 17 | 17 | 33 |
| Buses | 17 | 17 | 33 |
| Light Vehicles | 0 | 75 | 75 |
| Abnormal Loads | 0 | 0 | 0 |
| **TOTAL** | **33** | **108** | **141** |

**Table 7** - Trip Generation - Construction in Year 2

| TRIP GENERATION FOR 3000 MW GAS FIRED COMBINED POWER PLANT DURING CONSTRUCTION (Year 2) | | | | | |
|---|---|---|---|---|---|
| Vehicle Type | Trips | | | | |
| | Daytime Shift | | Evening Shift | | Co-inciding |
| | Vehicles / Peak hr | Total during Shift | Vehicles / Peak hr | Total during Shift | Trips in Peak Hr |
| Heavy Goods | 10 | 100 | 10 | 0 | 20 |
| Buses | 10 | 20 | 2 | 10 | 12 |
| Light Vehicles | 146 | 292 | 17 | 33 | 163 |
| Abnormal Loads | 0 | 4 | 0 | 0 | 0 |
| **TOTAL** | **166** | **416** | **29** | **43** | **195** |

**NOTE** - Peak Hour day time trips coincide with night time trips at shift changeover

**Table 8** – Peak Hours Trip Generation (evu) - Construction in Year 2

| TRIP GENERATION (evu) - AM Peak Hour - Construction (Year 2) | | | |
|---|---|---|---|
| **Vehicle Type** | **In** | **Out** | **Sum** |
| Heavy Goods | 17 | 17 | 33 |
| Buses | 17 | 17 | 34 |
| Light Vehicles | 146 | 17 | 163 |
| Abnormal Loads | 0 | 0 | 0 |
| **TOTAL** | **179** | **50** | **229** |

| TRIP GENERATION (evu) - PM Peak Hour - Construction (Year 2) | | | |
|---|---|---|---|
| **Vehicle Type** | **In** | **Out** | **Sum** |
| Heavy Goods | 17 | 17 | 33 |
| Buses | 17 | 17 | 34 |
| Light Vehicles | 17 | 146 | 163 |
| Abnormal Loads | 0 | 0 | 0 |
| **TOTAL** | **50** | **179** | **229** |

**Table 9** - Trip Generation - Operational Period

| TRIP GENERATION FOR 3000 MW GAS FIRED COMBINED POWER PLANT DURING OPERATIONS | | | | | |
|---|---|---|---|---|---|
| Vehicle Type | Trips | | | | |
| | Daytime Shift | | Evening Shift | | Co-inciding |
| | Vehicles / Peak hr | Total during Shift | Vehicles / Peak hr | Total during Shift | Total in Peak Hr |
| Diesel Delivery Tanker | 0 | 0 | 0 | 0 | 0 |
| Buses | 0 | 0 | 0 | 0 | 0 |
| Mini Vans | 7 | 15 | 3 | 5 | 15 |
| Light Vehicles | 21 | 43 | 10 | 20 | 31 |
| **TOTAL** | **29** | **57** | **13** | **25** | **46** |

**NOTE** - 10 Diesel tanker deliveries per day for 5 days for two weeks during a year, except in exceptional power outage situations.

**NOTE** - Peak Hour day time trips coincide with night time trips at shift changeover

**Table 10** – Peak Hours Trip Generation - Operations

| TRIP GENERATION (evu) - AM Peak Hour - Operations | | | |
|---|---|---|---|
| **Vehicle Type** | **In** | **Out** | **Sum** |
| Heavy Goods | 0 | 0 | 0 |
| Buses | 0 | 0 | 0 |
| Light Vehicles | 29 | 17 | 46 |
| Abnormal Loads | 0 | 0 | 0 |
| **TOTAL** | **29** | **17** | **46** |

| TRIP GENERATION (evu) - PM Peak Hour - Operations | | | |
|---|---|---|---|
| **Vehicle Type** | **In** | **Out** | **Sum** |
| Heavy Goods | 0 | 0 | 0 |
| Buses | 0 | 0 | 0 |
| Light Vehicles | 17 | 29 | 46 |
| Abnormal Loads | 0 | 0 | 0 |
| **TOTAL** | **17** | **29** | **46** |

**Table 11** - Trip Generation – Decommissioning

| TRIP GENERATION FOR 3000 MW GAS FIRED COMBINED POWER PLANT DURING DECOMMISSIONINIG | | | |
|---|---|---|---|
| **Vehicle Type** | **Trips** | | |
| | **Daytime Shift** | | **Co-including** |
| | **Vehicles / Peak hr** | **Total during Shift** | **Trips in Peak Hr** |
| Heavy Goods | 10 | 120 | 20 |
| Buses | 6 | 12 | 6 |
| Light Vehicles | 33 | 67 | 33 |
| Abnormal Loads | 0 | 0 | 0 |
| **TOTAL** | **49** | **199** | **59** |

**NOTE -** Peak Hour day time trips coincide with night time trips at shift changeover

Table 12 **– Peak Hours Trip Generation - Decommissioning**

| TRIP GENERATION (evu) - AM Peak Hour - Operations | | | |
|---|---|---|---|
| **Vehicle Type** | **In** | **Out** | **Sum** |
| Heavy Goods | 17 | 17 | 33 |
| Buses | 7 | 7 | 15 |
| Light Vehicles | 33 | 0 | 33 |
| Abnormal Loads | 0 | 0 | 0 |
| **TOTAL** | **57** | **24** | **81** |

| TRIP GENERATION (evu) - PM Peak Hour - Operations | | | |
|---|---|---|---|
| **Vehicle Type** | **In** | **Out** | **Sum** |
| Heavy Goods | 17 | 17 | 33 |
| Buses | 7 | 7 | 15 |
| Light Vehicles | 0 | 33 | 33 |
| Abnormal Loads | 0 | 0 | 0 |
| **TOTAL** | **24** | **57** | **81** |

### 7.2. Traffic Counts

Peak hour traffic counts were undertaken at the intersection of Western Arterial and John Ross Highway (R34) intersection on 2018/02/01. This was to determine traffic flow at the intersection and at the proposed CCPP access on Western Arterial, for analysis purposes (see Figure 3 and Figure 4 below).

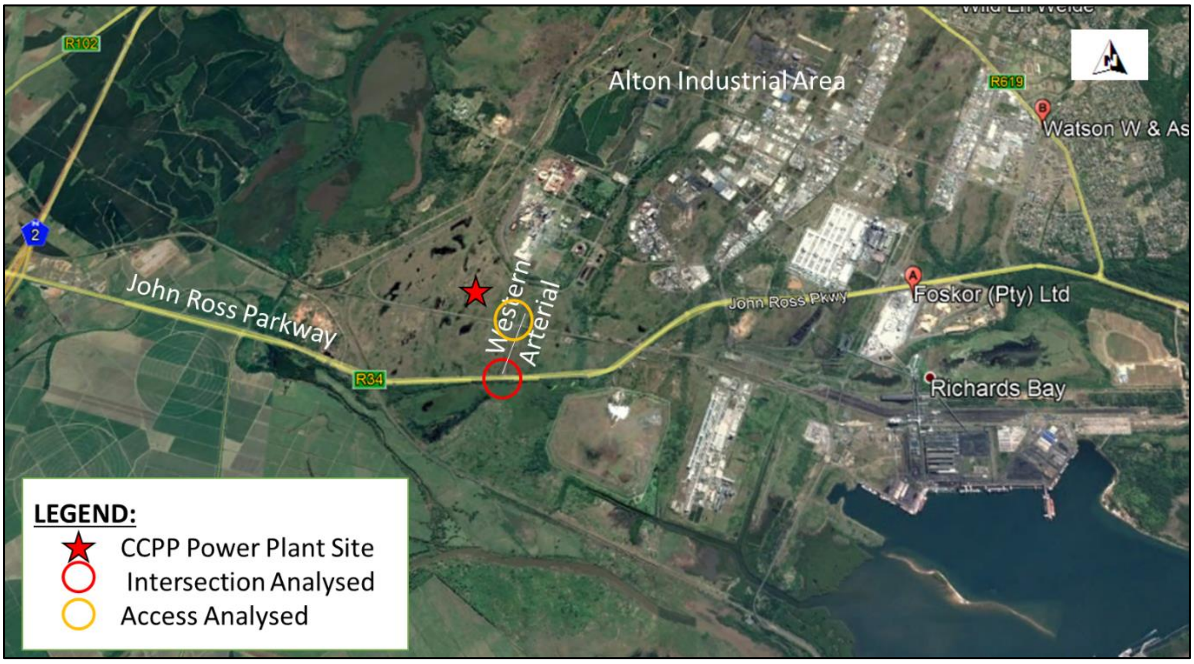



Figure 3 - Locality Map showing Intersection Analysed

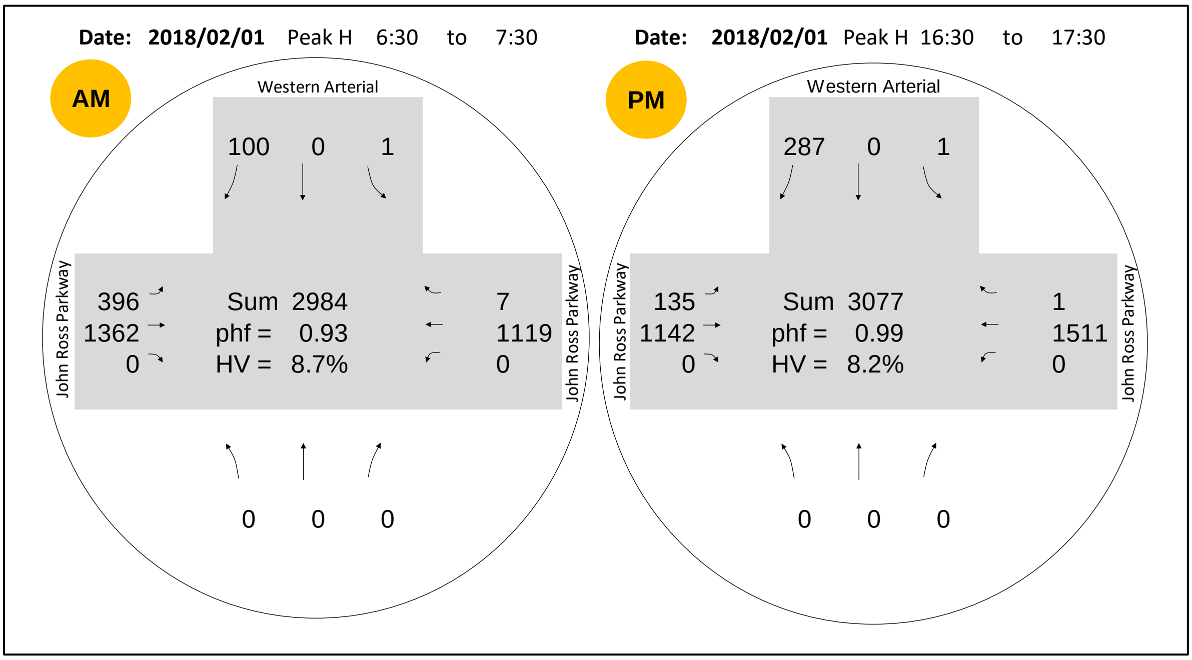



**Figure 4** - Traffic Counts at John Ross Highway / Western Arterial on 01 February 2018

### 7.3. Trip Distribution and Trip Assignment

Development trips are distributed in accordance with the peak hour background traffic patterns (see Figure 5 below).

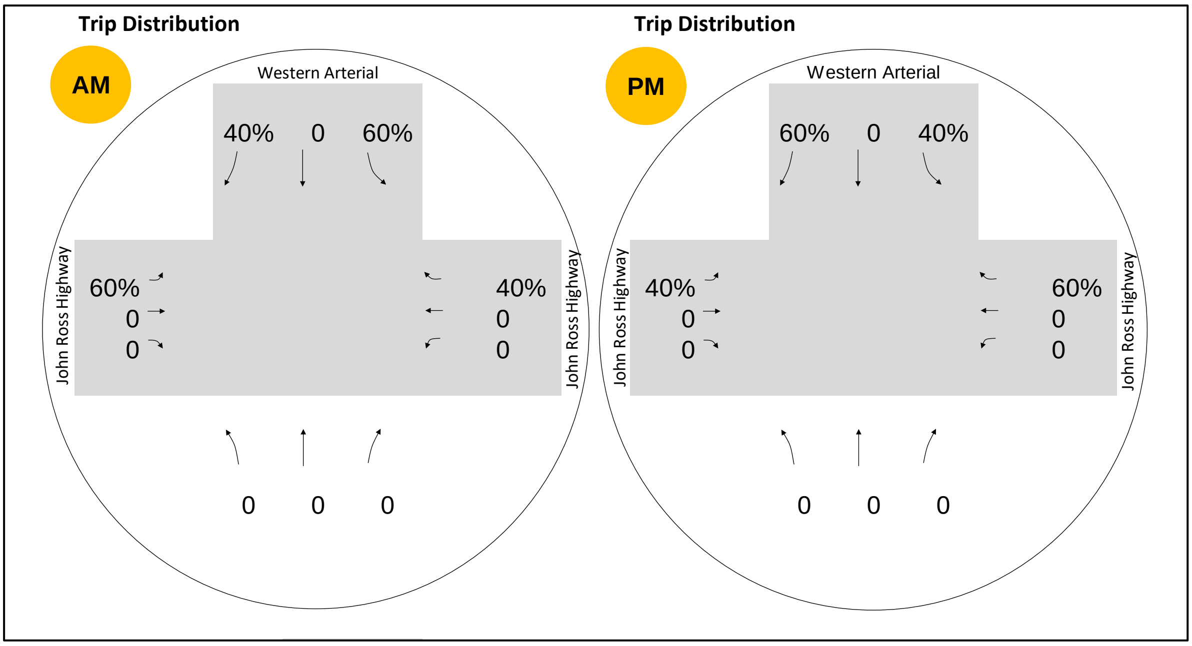



**Figure 5** - Trip Distribution

All development trips are assigned to the Western Arterial / John Ross Highway intersection, which presents the worst-case scenario for the purpose of intersection capacity analysis (see Figure 6 to Figure 9 below).

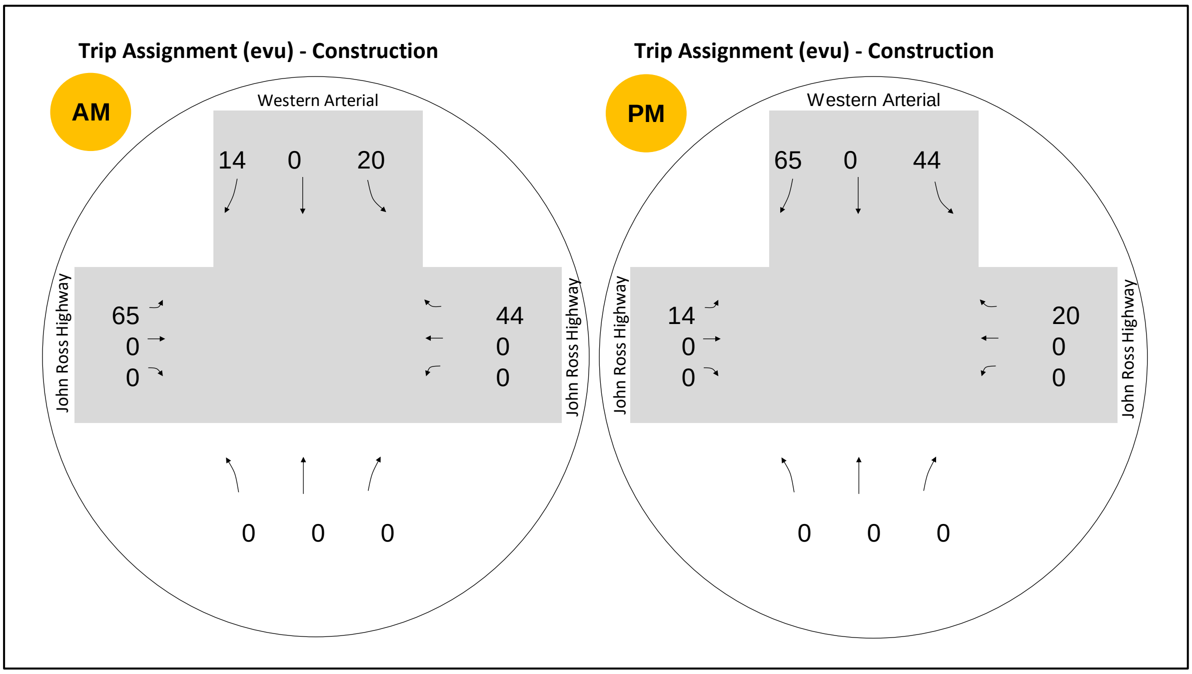



**Figure 6** - Trip Assignment – Peak Hours - Construction (Years 2019 & 2021)

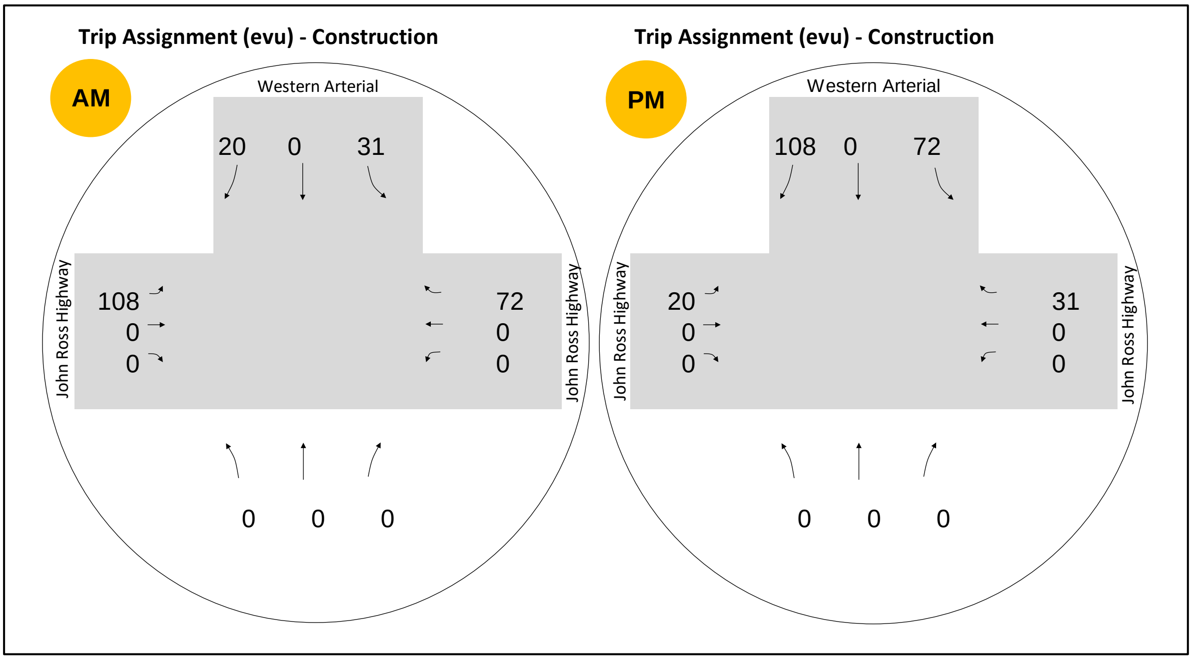



**Figure 7** - Trip Assignment – Critical Construction Period - Peak Hours (Year 2020)

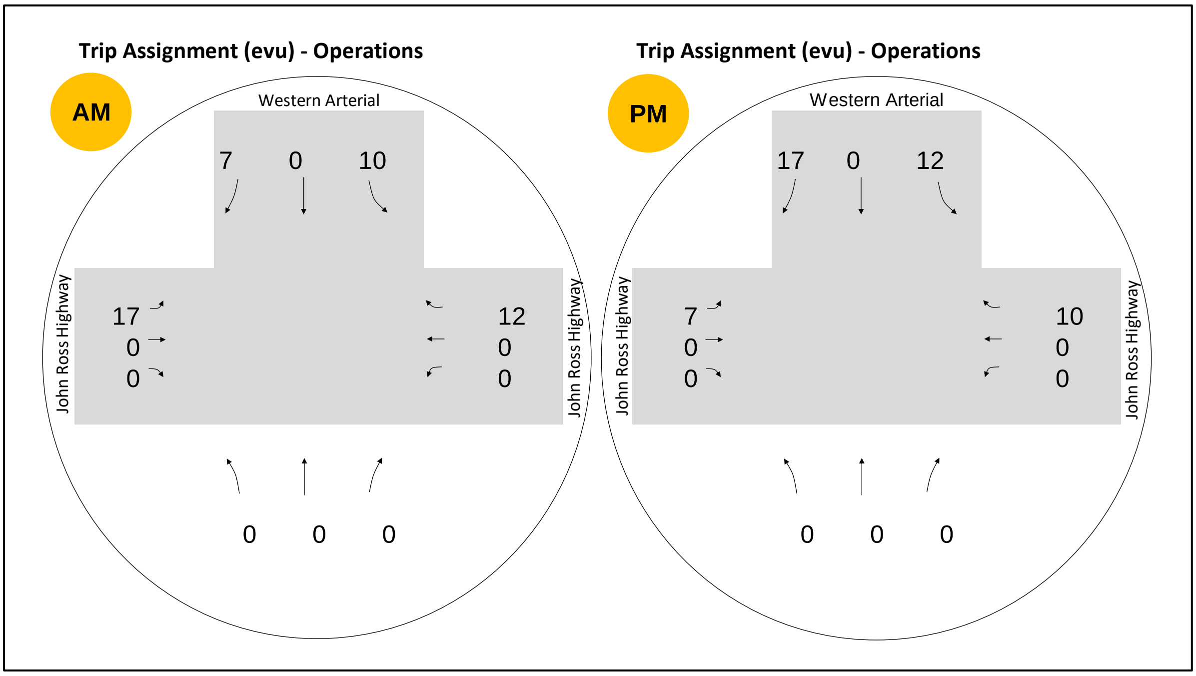



**Figure 8** - Trip Assignment – Peak Hours - Operations

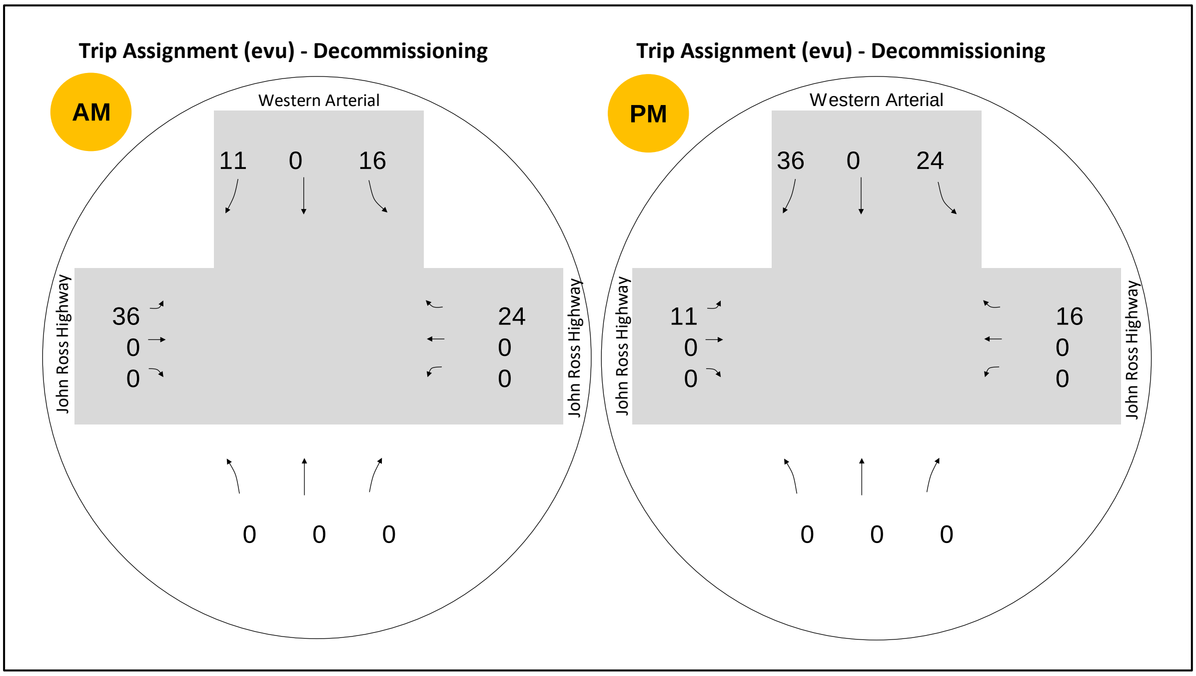



**Figure 9** - Trip Assignment – Peak Hours - Decommissioning

### 7.4. Intersection Analysis

#### 7.4.1. Intersections to be Analysed

Intersection analysis is required where the sum of development trips on a critical approach exceeds 75 vehicles per hour.

» The following intersections were identified for capacity analysis:

- John Ross Highway / Western Arterial intersection.
- Western Arterial / CCPP Access.

» The following two critical periods are identified for intersection capacity analysis:

- AM Commuter Peak Hour.
- PM Commuter Peak Hour.

» The following scenarios were considered for analysis:

- Current Traffic (base year - 2018) – John Ross Highway / Western Arterial analysed;
- Critical 2nd Year Construction Peak Period with 2 years traffic growth (year 2020) - analysed;
- Operations (Year 2022 – Start of Operational Period) – not analysed, traffic loading below threshold;
- Operations with 10 years traffic growth (Year 2032) – not analysed, traffic loading below threshold.

### 7.4.2. Intersection Analysis Software

Intersection capacity analysis was undertaken using the Signalised and Unsignalized Intersection Design Research Aid (SIDRA) 6.1 software program, to determine the traffic impact of the proposed development on the intersection.

### 7.4.3. Sidra Default Settings:

Adjustments made to the SIDRA default settings as used for the analysis are described below:

- Period: The analysis considers the 15 minutes peak period during the commuter peak hours.
- Analysis Method: Highway Capacity 2010 methodology was set for the analysis.

### 7.4.4. Intersection Levels of Service

Table 13 below shows various Levels of service (LOS). Level of service A to B are considered to be good where little or no delay is experienced, LOS C and D are acceptable whereas LOS E (where capacity is reached) and LOS F (with excessive delays and where capacity is exceeded) are considered to be poor. Most design or planning efforts typically use service flow rates at LOS C or D, to ensure an acceptable operating service for facility users.

**Table 13** - Level of Service (LOS)

| LOS | Signalised Intersection and Traffic Roundabouts | Unsignalised Intersections |
|---|---|---|
| A | ≤ 10 sec | ≤ 10 sec |
| B | 10-20 sec | 10-15 sec |
| C | 20-35 sec | 15-25 sec |
| D | 35-55 sec | 25-35 sec |
| E | 55-80 sec | 35-50 sec |
| F | ≥80 sec | ≥50 sec |

### 7.4.5. Results of Intersection Analysis

The John Ross Highway / Western Arterial intersection was analysed, for the critical AM and PM commuter peak hours, for the current and critical construction period (Year 2020 including traffic growth).

The analysis of the John Ross Highway / Western Arterial signalised intersection shows that it currently operates at Level of Service A during the AM and LOS B during the PM and that it will continue to do so during 2020, being the busiest period of construction activity (see Annexure B for SIDRA Analysis results).

The analysis of the Western Arterial / CCPP Access shows the access operating at LOS B during both commuter peak periods, for year 2020 (see Annexure C for full results).

Low traffic volumes on Western Arterial and low trip generation, particularly during operations, should see the proposed development access operating at good levels of service in future.

## 8. ENVIRONMENTAL IMPACT ASSESSMENT

### 8.1. Impact Assessment Methodology

The Impact Assessment Methodology assists in evaluating the overall effect of a proposed activity on the environment. The environmental impact is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the environmental impact assessment. The impact evaluation of predicted impacts is undertaken through an assessment of the significance of the impacts.

### 8.2. Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence, as shown in Table 1.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact. Significance is calculated using the Ratings Table as shown in Table 2.

### 8.3. Impact Rating System

Impact assessment takes account of the nature, scale and duration of the effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- » Planning (Not applicable in this instance – no traffic impact).
- » Construction.
- » Operation.
- » Decommissioning (Short term traffic of less intensity than compared to constructing traffic).

Where necessary, the proposal for mitigation or optimisation of an impact is detailed. A brief discussion of the impact and the rationale behind the assessment of its significance is included.

A rating system is used to classify the impacts. The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue, the following criteria (including an allocated point system) is used, as below:

## 8.4. Assessment of Impacts

Impacts were assessed in terms of the following criteria:

- The **nature**, a description of what causes the effect, what will be affected, and how it will be affected.
- The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high).
- The **duration**, wherein it is indicated whether:
    - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
    - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
    - Medium-term (5–15 years) – assigned a score of 3;
    - Long term (> 15 years) - assigned a score of 4;
    - Permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
    - 0 is small and will have no effect on the environment;
    - 2 is minor and will not result in an impact on processes;
    - 4 is low and will cause a slight impact on processes;
    - 6 is moderate and will result in processes continuing but in a modified way;
    - 8 is high (processes are altered to the extent that they temporarily cease);
    - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
    - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
    - Assigned a score of 2 is improbable (some possibility, but low likelihood);
    - Assigned a score of 3 is probable (distinct possibility);
    - Assigned a score of 4 is highly probable (most likely);
    - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- The **status**, which is described as either positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

S = (E+D+M) P; where

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- **< 30 points:** Low (i.e. where this impact would not have a direct influence on the decision to develop in the area).
- **30-60 points:** Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated).
- **> 60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area).

The impact assessment undertaken in accordance with the above is shown below.

**Table 14** - Traffic impacts relating to the Construction Phase of the CCPP Plant

| ***Nature:*** During the construction phase (36 to 48 months) the road network surrounding the CCPP Plant will be affected. There will be an increase in traffic impacting on traffic volumes, congestion and road safety (light vehicles, buses, mini-vans (taxis) and as well as heavy construction vehicles), however the extent of the impact will be small and of a local nature. The traffic expected during the construction phase will temporarily add a relatively insignificant traffic volume to the intersection of John Ross Highway / Western Arterial. | | |
|---|---|---|
| | **Without mitigation** | **With mitigation** |
| ***Extent (E)*** | Local (1) | Local (1) |
| ***Duration (D)*** | Short-term (2) | Short-term (2) |
| ***Magnitude (M)*** | Minor (4) | Minor (3) |
| ***Probability (P)*** | Definite (5) | Definite (5) |
| ***Significance (S = E+D+M)*P*** | **Medium (35)** | **Medium (30)** |
| ***Status (positive, neutral or negative)*** | Negative | Negative |
| ***Reversibility*** | Reversible | Reversible |

| | | |
|---|---|---|
| ***Irreplaceable loss of resources?*** | No, construction traffic will only occur during the construction phase. | No, construction traffic will only occur during the construction phase. |
| ***Can impacts be mitigated*** | Yes, road safety can be enhanced. | |

**Mitigation**

- All construction vehicles must be road worthy.
- All construction vehicle drivers must have the relevant licenses of the use of the vehicles and need to strictly adhere to the rules of the road.
- Heavy construction vehicles should be restricted to off-peak periods.
- Abnormal load vehicles require specific permit for transporting loads, and require liaison with relevant road authorities to ensure route suitability.
- Erect temporary road signage on Western Arterial either side of the site access warning motorists of construction traffic activity in order to enhance road safety during construction.
- Provide flagmen at the access when accommodating abnormal load vehicles.
- The site access road leading into the site should be hard surfaced for 40 m or more to reduce material carry into Western Arterial.
- Road signage and road markings in the vicinity of the site should be well maintained to enhance road safety.
- On-site parking and safe turn-around facilities should be provided for private vehicles and for buses and mini-buses transporting workers to and from site.
- Provide clearly defined roadway, parking and pedestrian walkway areas with adequate lighting
- The access security gate and guardhouse should be set back at least 40 m from Western Arterial to accommodate vehicles stacking outside the gate, and protocols need to be in place to obviate vehicles stacking into Western Arterial whilst ensuring site safety and security requirements are met.

**Cumulative impacts**

- There are no other similar developments planned in close proximity to the subject site and cumulative development impacts are normal and do not require special consideration or specific measures.

**Residual impacts**

- Minor degradation of the local road network due to increased traffic volumes.

**Table 15** - Traffic impacts relating to the Operation Phase of the CCPP Plant

| | | |
|---|---|---|
| ***Nature:*** There will be an insignificant increase in traffic impacting on traffic capacity and road safety at the site access intersection with Western Arterial and at the intersection of John Ross Highway / Western Arterial. The operation phase traffic will add a relatively insignificant traffic volume to the road network without any major traffic impact. | | |
| | **Without mitigation** | **With mitigation** |
| ***Extent (E)*** | Local (1) | Local (1) |
| ***Duration (D)*** | Long-term (4) | Long-term (4) |
| ***Magnitude (M)*** | Small (3) | Small (2) |
| ***Probability (P)*** | Probable (5) | Probable (5) |
| ***Significance (S = E+D+M)*P*** | **Medium (40)** | **Medium (35)** |
| ***Status (positive, neutral or negative)*** | Negative | Negative |
| ***Reversibility*** | Reversible | Reversible |
| ***Irreplaceable loss of resources?*** | No | No |
| ***Can impacts be mitigated*** | Yes, road safety can be enhanced. | |
| **Mitigation**<br>» Road signage and road markings in the vicinity of the site should be well maintained to enhance road safety.<br>» On-site parking and safe turn-around facilities should be provided for private vehicles and for buses and mini-buses transporting workers to and from site.<br>» Provide clearly defined roadway, parking and pedestrian walkway areas with adequate lighting<br>» The access security gate and guardhouse should be set back at least 40 m from Western Arterial to accommodate vehicles stacking outside the gate, and protocols need to be in place to obviate vehicles stacking into Western Arterial whilst ensuring site safety and security requirements are met. | | |
| **Cumulative impacts**<br>» The development will result in an insignificant increase in vehicle trips and its cumulative impact on the road network forms part of normal traffic growth, and does not require and special consideration or measures. | | |
| **Residual impacts**<br>» Minor degradation of the regional and local road network of the surrounding area. | | |

**Table 16** - Traffic impacts relating to the Decommissioning of the CCPP Plant

| | | |
|---|---|---|
| ***Nature:*** The road network surrounding the CCPP Power Station will be affected. There will be an increase in traffic impacting on traffic capacity and road safety at the intersection of John Ross Highway and Western Arterial. The traffic expected during the decommissioning phase will temporarily add an insignificant traffic volume to the road network. | | |
| | **Without mitigation** | **With mitigation** |
| ***Extent (E)*** | Local (1) | Local (1) |
| ***Duration (D)*** | Short-term (1) | Short-term (1) |
| ***Magnitude (M)*** | Minor (4) | Minor (3) |
| ***Probability (P)*** | Probable (3) | Probable (3) |
| ***Significance (S = E+D+M)*P*** | **Low (18)** | **Low (15)** |
| ***Status (positive, neutral or negative)*** | Negative | Negative |
| ***Reversibility*** | Reversible | Reversible |
| ***Irreplaceable loss of resources?*** | No | No |
| ***Can impacts be mitigated*** | Yes, road safety can be enhanced. | |
| **Mitigation**<br>» All construction vehicles must be road worthy.<br>» All construction vehicle drivers must have the relevant licenses of the use of the vehicles and need to strictly adhere to the rules of the road.<br>» Heavy vehicles should be restricted to off-peak periods.<br>» Erect temporary road signage on Western Arterial either side of the site access warning motorists of construction traffic activity in order to enhance road safety during decommissioning. | | |
| **Residual impacts**<br>» Minor degradation of the regional and local road network. | | |

**Table 17** – Cumulative Traffic Impacts due to other nearby developments of a similar nature

| |
|---|
| ***Nature:*** The road network surrounding the CCPP Power Station will be affected by increased traffic volumes from the proposed CCPP Plant. The traffic has little impact and can be well accommodated on the existing road network.<br>The impact of similar developments in close proximity to the site should also be considered, to determine their cumulative impact on the road network capacity and on traffic safety. |
| **Cumulative impacts**<br>» There are no developments of a similar nature in close proximity to the subject site, and consequently no cumulative impacts, apart from normal traffic growth, are relevant.<br>» The critical construction period (of intense / peak traffic) assessment of the development with background traffic growth, and analysis shows ample spare capacity at the John Ross / Western Arterial intersection, as well as at the site access on Western Arterial.<br>» Abundant spare intersection capacity means that further substantial development could still be accommodated in the vicinity of the subject site. |
| **Residual impacts**<br>» Minor degradation of the regional and local road network of the surrounding area due to increased traffic. |

## 9. CONCLUSIONS AND RECOMMENDATIONS

» It is concluded that;

1. The proposed CCPP plant will generate the most traffic flow during the second year of construction. This traffic can be acceptably accommodated at the John Ross Highway / Western Arterial traffic signal-controlled intersection, as well as at the proposed priority controlled site access on Western Arterial, with good Levels of Service.

2. The proposed CCPP site has good vehicle access to the metropolitan road network.

» It is recommended that;

1. The various mitigation measures contained in this report and as listed below, are implemented in the interests of road safety.

   » All construction vehicles must be road worthy.

   » All construction vehicle drivers must have the relevant licenses of the use of the vehicles and need to strictly adhere to the rules of the road.

   » Heavy construction vehicles should be restricted to off-peak periods.

   » Abnormal load vehicles require specific permit for transporting loads, and require liaison with relevant road authorities to ensure route suitability.

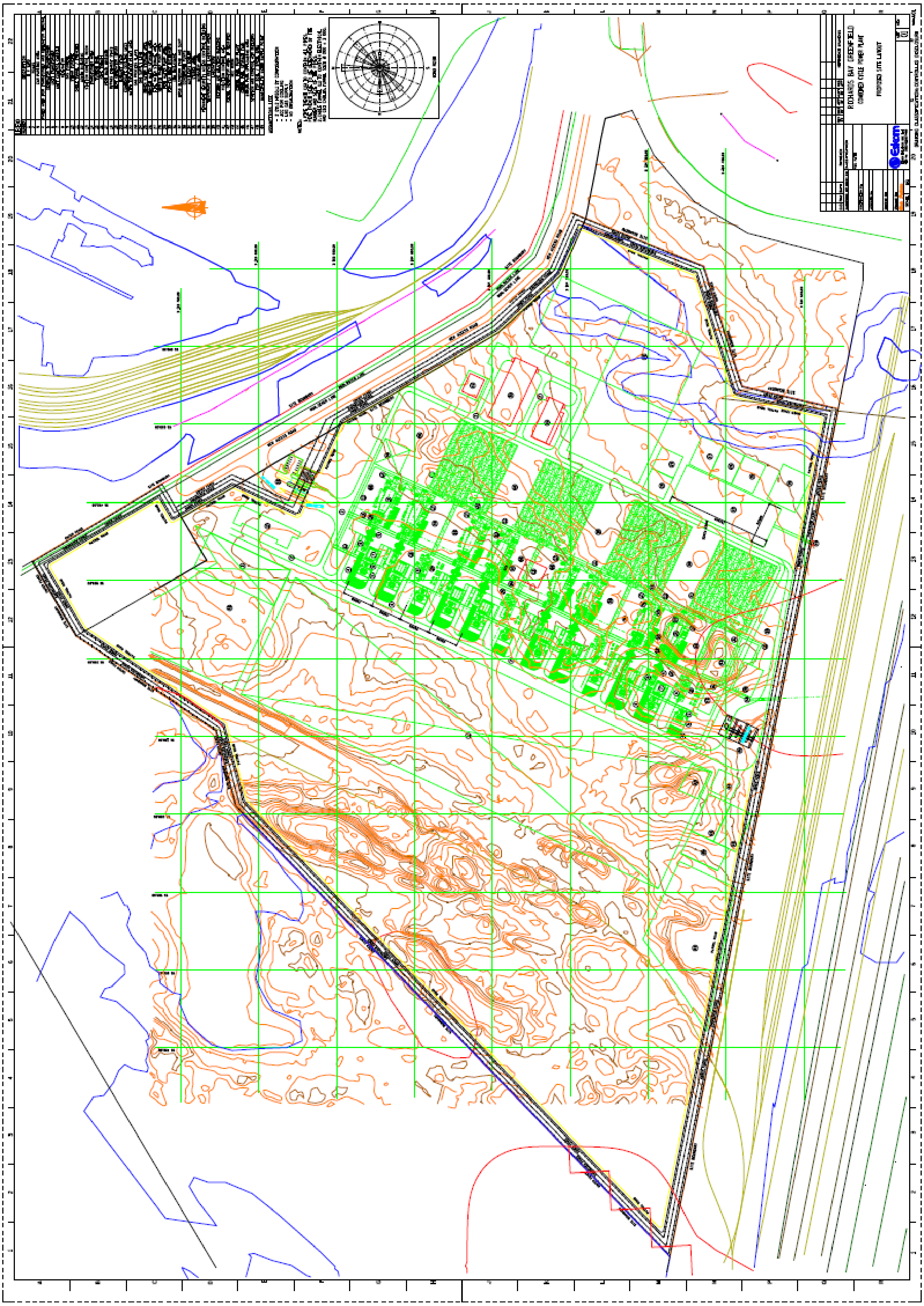
- Erect temporary road signage on Western Arterial either side of the site access warning motorists of construction traffic activity in order to enhance road safety during construction.
- Provide flagmen at the access when accommodating abnormal load vehicles.
- The site access road leading into the site should be hard surfaced for 40 m or more to reduce material carry into Western Arterial.
- Road signage and road markings in the vicinity of the site should be well maintained to enhance road safety.
- On-site parking and safe turn-around facilities should be provided for private vehicles and for and mini-buses transporting workers to and from site.
- Provide clearly defined roadway, parking and pedestrian walkway areas with adequate lighting
- The access security gate and guardhouse should be set back at least 40 m from Western Arterial to accommodate vehicles stacking outside the gate, and protocols need to be in place to obviate vehicles stacking into Western Arterial whilst ensuring site safety and security requirements are met.

2. The proposed CCPP access and parking layout (not yet designed) is to be submitted to the local authority for approval.

## 10. REFERENCES


1. TMH 16 Vol 1 & 2 South African Traffic Impact and Site Traffic Assessment Manual, August 2012, compiled by the Committee of Transport Officials (COTO).
2. South African Trip Generation Rates, Second Edition, Department of Transport – June 1995
3. Institute of Transport Engineers Trip Generation Manual 8th Edition
4. Presentation by Eskom - East Coast CCPP Project: 3000MW - Date: 25 August 2016

## ANNEXURE A – SITE LAYOUT



## ANNEXURE B – INTERSECTION ANALYSIS

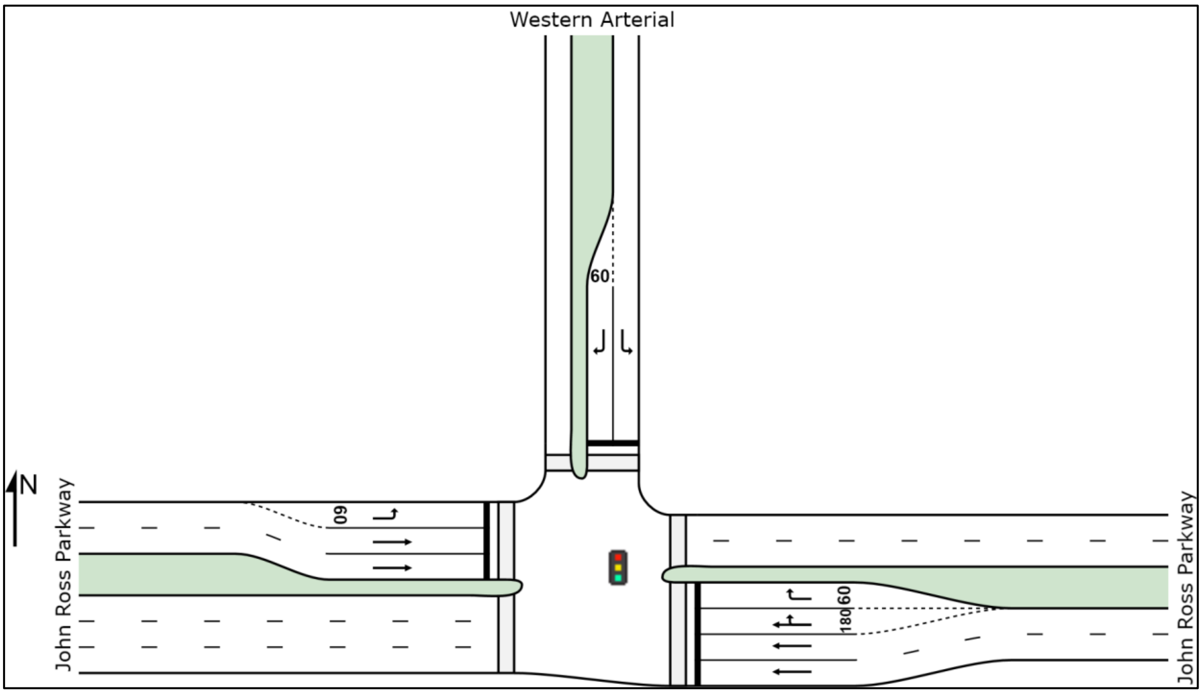



**Figure 10** - Layout of John Ross Highway / Western Arterial Intersection Analysed

# MOVEMENT SUMMARY

## Site: Existing - AM

Richards Bay
Signals - Fixed Time Isolated    Cycle Time = 40 seconds (Practical Cycle Time)

**Movement Performance - Vehicles**

| Mov ID | ODMov | Demand Flows Total | HV | Deg. Satn | Average Delay | Level of Service | 95% Back of Queue Vehicles | Distance | Prop. Queued | Effective Stop Rate | Average Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | veh/h | % | v/c | sec | | veh | m | | per veh | km/h |
| East: John Ross Highway | | | | | | | | | | | |
| 5 | T1 | 1203 | 0.0 | 0.510 | 6.1 | LOS A | 6.8 | 47.8 | 0.65 | 0.57 | 54.6 |
| 6 | R2 | 8 | 0.0 | 0.034 | 17.0 | LOS B | 0.1 | 0.8 | 0.73 | 0.66 | 45.9 |
| Approach | | 1211 | 0.0 | 0.510 | 6.1 | LOS A | 6.8 | 47.8 | 0.65 | 0.57 | 54.5 |
| North: Western Arterial | | | | | | | | | | | |
| 7 | L2 | 1 | 0.0 | 0.004 | 21.6 | LOS C | 0.0 | 0.1 | 0.87 | 0.59 | 43.4 |
| 9 | R2 | 108 | 0.0 | 0.386 | 23.5 | LOS C | 2.1 | 14.4 | 0.94 | 0.76 | 42.5 |
| Approach | | 109 | 0.0 | 0.386 | 23.5 | LOS C | 2.1 | 14.4 | 0.94 | 0.76 | 42.5 |
| West: John Ross Highway | | | | | | | | | | | |
| 10 | L2 | 426 | 0.0 | 0.417 | 11.3 | LOS B | 5.0 | 34.8 | 0.62 | 0.76 | 49.4 |
| 11 | T1 | 1465 | 0.0 | 0.683 | 7.5 | LOS A | 10.8 | 75.8 | 0.77 | 0.70 | 53.4 |
| Approach | | 1890 | 0.0 | 0.683 | 8.4 | LOS A | 10.8 | 75.8 | 0.74 | 0.72 | 52.4 |
| All Vehicles | | 3210 | 0.0 | 0.683 | 8.0 | LOS A | 10.8 | 75.8 | 0.71 | 0.66 | 52.8 |

# MOVEMENT SUMMARY

## Site: Existing - PM

Richards Bay
Signals - Fixed Time Isolated    Cycle Time = 40 seconds (Practical Cycle Time)

**Movement Performance - Vehicles**

| Mov ID | ODMov | Demand Flows Total | Demand Flows HV | Deg. Satn | Average Delay | Level of Service | 95% Back of Queue Vehicles | 95% Back of Queue Distance | Prop. Queued | Effective Stop Rate | Average Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | veh/h | % | v/c | sec | | veh | m | | per veh | km/h |
| East: John Ross Highway | | | | | | | | | | | |
| 5 | T1 | 1625 | 0.0 | 0.797 | 12.8 | LOS B | 14.7 | 102.7 | 0.88 | 0.88 | 49.6 |
| 6 | R2 | 1 | 0.0 | 0.004 | 18.2 | LOS B | 0.0 | 0.1 | 0.77 | 0.60 | 45.2 |
| Approach | | 1626 | 0.0 | 0.797 | 12.8 | LOS B | 14.7 | 102.7 | 0.88 | 0.88 | 49.6 |
| North: Western Arterial | | | | | | | | | | | |
| 7 | L2 | 1 | 0.0 | 0.003 | 18.6 | LOS B | 0.0 | 0.1 | 0.79 | 0.59 | 45.0 |
| 9 | R2 | 309 | 0.0 | 0.739 | 24.0 | LOS C | 6.4 | 45.1 | 0.98 | 0.92 | 42.2 |
| Approach | | 310 | 0.0 | 0.739 | 24.0 | LOS C | 6.4 | 45.1 | 0.98 | 0.92 | 42.3 |
| West: John Ross Highway | | | | | | | | | | | |
| 10 | L2 | 145 | 0.0 | 0.165 | 12.1 | LOS B | 1.6 | 11.5 | 0.60 | 0.72 | 48.9 |
| 11 | T1 | 1228 | 0.0 | 0.663 | 9.2 | LOS A | 9.7 | 67.6 | 0.82 | 0.73 | 52.1 |
| Approach | | 1373 | 0.0 | 0.663 | 9.5 | LOS A | 9.7 | 67.6 | 0.80 | 0.73 | 51.7 |
| All Vehicles | | 3309 | 0.0 | 0.797 | 12.5 | LOS B | 14.7 | 102.7 | 0.85 | 0.82 | 49.6 |

# PHASING SUMMARY

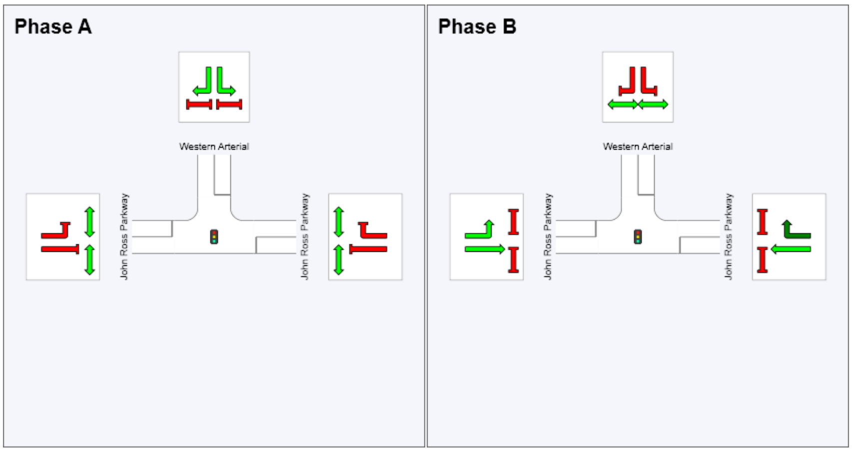
## Site: Year 2020 - Construction - AM

Richards Bay
Signals - Fixed Time Isolated    Cycle Time = 40 seconds (Practical Cycle Time)

**Phase times determined by the program**
**Sequence: Two-Phase**
**Movement Class: All Movement Classes**
**Input Sequence: A, B**
**Output Sequence: A, B**

**Phase Timing Results**

| Phase | A | B |
|---|---|---|
| Reference Phase | Yes | No |
| Phase Change Time (sec) | 0 | 12 |
| Green Time (sec) | 6 | 22 |
| Yellow Time (sec) | 4 | 4 |
| All-Red Time (sec) | 2 | 2 |
| Phase Time (sec) | 12 | 28 |
| Phase Split | 30% | 70% |




| | | | | |
|---|---|---|---|---|
| | Normal Movement | | Permitted/Opposed | |
| | Slip/Bypass-Lane Movement | | Opposed Slip/Bypass-Lane | |
| | Stopped Movement | | Turn On Red | |
| | Other Movement Class Running | | Other Movement Class Stopped | |
| | Mixed Running & Stopped Movement Classes | | | |
| | Undetected Movement | | Phase Transition Applied | |

# MOVEMENT SUMMARY

## Site: Year 2020 - Construction - AM

Richards Bay
Signals - Fixed Time Isolated    Cycle Time = 40 seconds (Practical Cycle Time)

**Movement Performance - Vehicles**

| Mov ID | ODMov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: John Ross Highway | | | | | | | | | | | |
| 5 | T1 | 1263 | 0.0 | 0.535 | 6.2 | LOS A | 7.3 | 51.3 | 0.67 | 0.58 | 54.5 |
| 6 | R2 | 78 | 0.0 | 0.369 | 19.7 | LOS B | 1.4 | 9.7 | 0.85 | 0.76 | 44.4 |
| Approach | | 1342 | 0.0 | 0.535 | 7.0 | LOS A | 7.3 | 51.3 | 0.68 | 0.59 | 53.8 |
| North: Western Arterial | | | | | | | | | | | |
| 7 | L2 | 34 | 0.0 | 0.124 | 22.5 | LOS C | 0.6 | 4.4 | 0.90 | 0.71 | 42.9 |
| 9 | R2 | 134 | 0.0 | 0.482 | 23.9 | LOS C | 2.6 | 18.4 | 0.96 | 0.78 | 42.3 |
| Approach | | 169 | 0.0 | 0.482 | 23.6 | LOS C | 2.6 | 18.4 | 0.95 | 0.76 | 42.4 |
| West: John Ross Highway | | | | | | | | | | | |
| 10 | L2 | 563 | 0.0 | 0.552 | 12.0 | LOS B | 7.3 | 51.1 | 0.69 | 0.79 | 49.0 |
| 11 | T1 | 1539 | 0.0 | 0.717 | 8.4 | LOS A | 12.2 | 85.1 | 0.80 | 0.75 | 52.7 |
| Approach | | 2102 | 0.0 | 0.717 | 9.4 | LOS A | 12.2 | 85.1 | 0.77 | 0.76 | 51.7 |
| All Vehicles | | 3613 | 0.0 | 0.717 | 9.1 | LOS A | 12.2 | 85.1 | 0.74 | 0.70 | 51.9 |

# PHASING SUMMARY

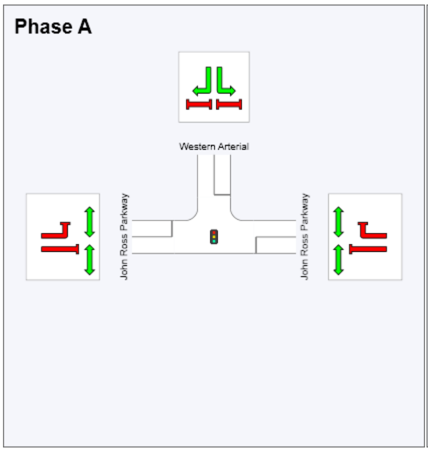
## Site: Year 2020 - Construction - PM

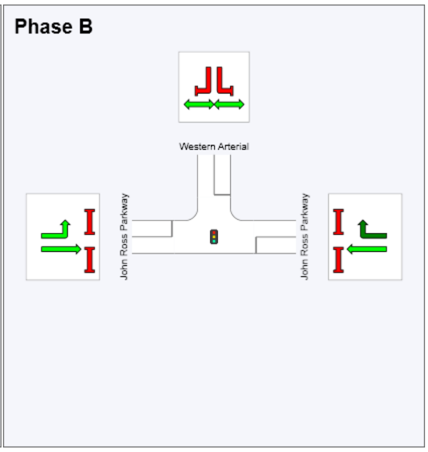
Richards Bay
Signals - Fixed Time Isolated    Cycle Time = 50 seconds (Practical Cycle Time)

**Phase times determined by the program**
**Sequence: Two-Phase**
**Movement Class: All Movement Classes**
**Input Sequence: A, B**
**Output Sequence: A, B**

**Phase Timing Results**

| Phase | **A** | **B** |
|---|---|---|
| Reference Phase | Yes | No |
| Phase Change Time (sec) | 0 | 20 |
| Green Time (sec) | 14 | 24 |
| Yellow Time (sec) | 4 | 4 |
| All-Red Time (sec) | 2 | 2 |
| Phase Time (sec) | 20 | 30 |
| Phase Split | 40% | 60% |




| | | | |
|---|---|---|---|
| | Normal Movement | | Permitted/Opposed |
| | Slip/Bypass-Lane Movement | | Opposed Slip/Bypass-Lane |
| | Stopped Movement | | Turn On Red |
| | Other Movement Class Running | | Other Movement Class Stopped |
| | Mixed Running & Stopped Movement Classes | | |
| | Undetected Movement | | Phase Transition Applied |

# MOVEMENT SUMMARY

## Site: Year 2020 - Construction - PM

Richards Bay
Signals - Fixed Time Isolated    Cycle Time = 50 seconds (Practical Cycle Time)

**Movement Performance - Vehicles**

| Mov ID | ODMov | Demand Flows Total | HV | Deg. Satn | Average Delay | Level of Service | 95% Back of Queue Vehicles | Distance | Prop. Queued | Effective Stop Rate | Average Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | veh/h | % | v/c | sec | | veh | m | | per veh | km/h |
| East: John Ross Highway | | | | | | | | | | | |
| 5 | T1 | 1706 | 0.0 | 0.829 | 16.6 | LOS B | 19.8 | 138.6 | 0.90 | 0.91 | 47.1 |
| 6 | R2 | 34 | 0.0 | 0.176 | 23.3 | LOS C | 0.7 | 5.1 | 0.83 | 0.73 | 42.5 |
| Approach | | 1741 | 0.0 | 0.829 | 16.7 | LOS B | 19.8 | 138.6 | 0.90 | 0.91 | 47.0 |
| North: Western Arterial | | | | | | | | | | | |
| 7 | L2 | 78 | 0.0 | 0.151 | 20.5 | LOS C | 1.5 | 10.4 | 0.79 | 0.73 | 44.0 |
| 9 | R2 | 441 | 0.0 | 0.848 | 30.8 | LOS C | 12.5 | 87.8 | 1.00 | 1.00 | 39.2 |
| Approach | | 519 | 0.0 | 0.848 | 29.3 | LOS C | 12.5 | 87.8 | 0.97 | 0.96 | 39.8 |
| West: John Ross Highway | | | | | | | | | | | |
| 10 | L2 | 174 | 0.0 | 0.195 | 13.7 | LOS B | 2.5 | 17.3 | 0.61 | 0.72 | 47.9 |
| 11 | T1 | 1290 | 0.0 | 0.689 | 11.4 | LOS B | 12.7 | 88.9 | 0.83 | 0.75 | 50.5 |
| Approach | | 1465 | 0.0 | 0.689 | 11.7 | LOS B | 12.7 | 88.9 | 0.81 | 0.75 | 50.2 |
| All Vehicles | | 3725 | 0.0 | 0.848 | 16.5 | LOS B | 19.8 | 138.6 | 0.87 | 0.85 | 47.0 |

**ANNEXURE C – ACCESS ANALYSIS**

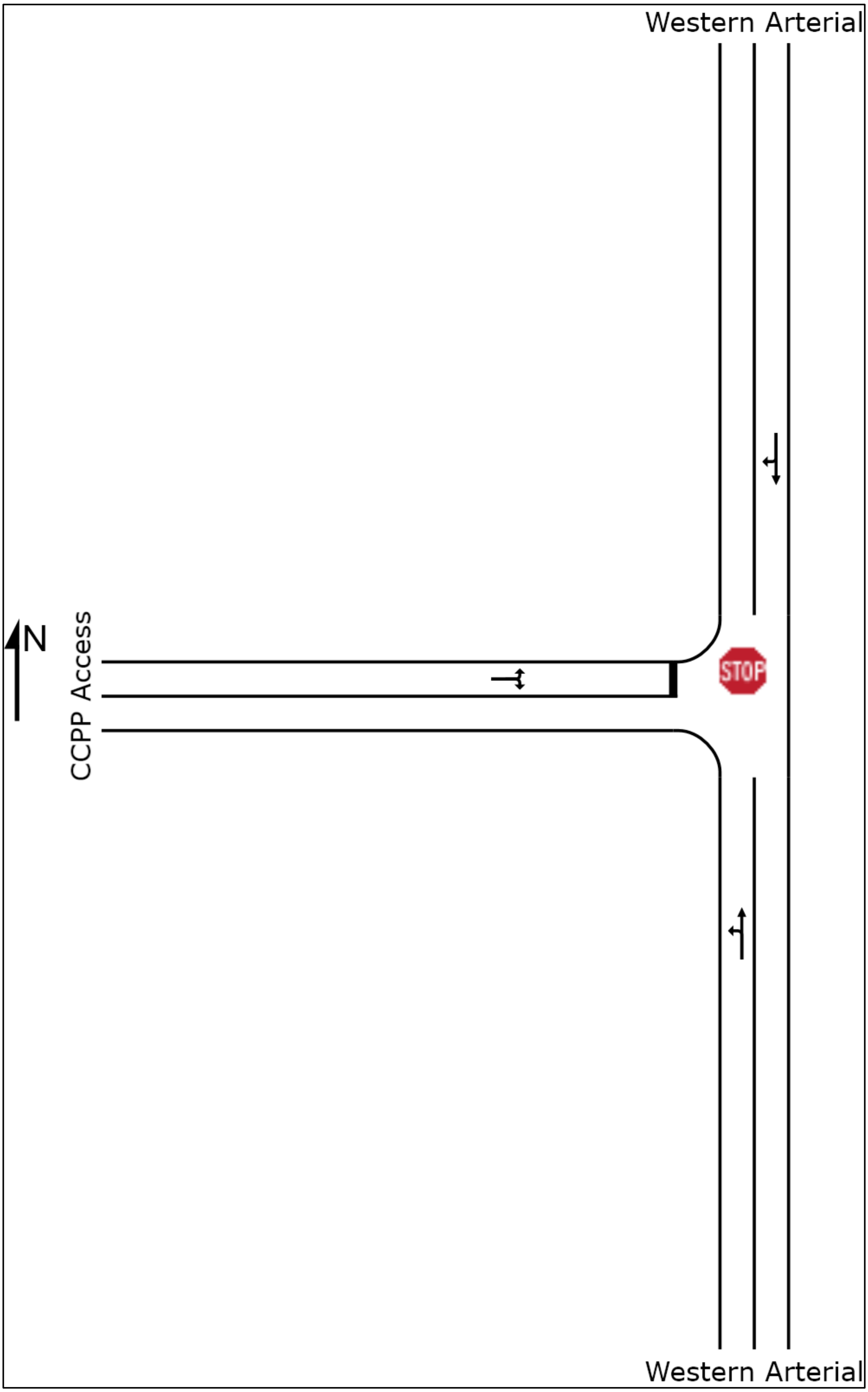



**Figure 11** - Layout of CCPP Access / Western Arterial Intersection Analysed

# MOVEMENT SUMMARY

## Site: AM 2020

Richards Bay CCPP Access
Stop (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | ODMov | Demand Flows Total | Demand Flows HV | Deg. Satn | Average Delay | Level of Service | 95% Back of Queue Vehicles | 95% Back of Queue Distance | Prop. Queued | Effective Stop Rate | Average Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | veh/h | % | v/c | sec | | veh | m | | per veh | km/h |
| South: Western Arterial | | | | | | | | | | | |
| 1 | L2 | 189 | 0.0 | 0.330 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.18 | 56.8 |
| 2 | T1 | 445 | 0.0 | 0.330 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.18 | 58.3 |
| Approach | | 635 | 0.0 | 0.330 | 1.7 | NA | 0.0 | 0.0 | 0.00 | 0.18 | 57.9 |
| North: Western Arterial | | | | | | | | | | | |
| 8 | T1 | 111 | 0.0 | 0.058 | 0.1 | LOS A | 0.0 | 0.1 | 0.02 | 0.01 | 59.9 |
| 9 | R2 | 1 | 0.0 | 0.058 | 8.4 | LOS A | 0.0 | 0.1 | 0.02 | 0.01 | 57.6 |
| Approach | | 112 | 0.0 | 0.058 | 0.1 | NA | 0.0 | 0.1 | 0.02 | 0.01 | 59.8 |
| West: CCPP Access | | | | | | | | | | | |
| 10 | L2 | 1 | 0.0 | 0.099 | 10.2 | LOS B | 0.3 | 2.2 | 0.55 | 1.00 | 49.7 |
| 12 | R2 | 54 | 0.0 | 0.099 | 11.9 | LOS B | 0.3 | 2.2 | 0.55 | 1.00 | 49.3 |
| Approach | | 55 | 0.0 | 0.099 | 11.8 | LOS B | 0.3 | 2.2 | 0.55 | 1.00 | 49.3 |
| All Vehicles | | 801 | 0.0 | 0.330 | 2.2 | NA | 0.3 | 2.2 | 0.04 | 0.21 | 57.4 |

# MOVEMENT SUMMARY

## Site: PM 2020

Richards Bay CCPP Access
Stop (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | ODMov | Demand Flows Total | Demand Flows HV | Deg. Satn | Average Delay | Level of Service | 95% Back of Queue Vehicles | 95% Back of Queue Distance | Prop. Queued | Effective Stop Rate | Average Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | veh/h | % | v/c | sec | | veh | m | | per veh | km/h |
| South: Western Arterial | | | | | | | | | | | |
| 1 | L2 | 54 | 0.0 | 0.106 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.16 | 57.0 |
| 2 | T1 | 151 | 0.0 | 0.106 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.16 | 58.6 |
| Approach | | 204 | 0.0 | 0.106 | 1.5 | NA | 0.0 | 0.0 | 0.00 | 0.16 | 58.2 |
| North: Western Arterial | | | | | | | | | | | |
| 8 | T1 | 319 | 0.0 | 0.164 | 0.0 | LOS A | 0.0 | 0.1 | 0.00 | 0.00 | 60.0 |
| 9 | R2 | 1 | 0.0 | 0.164 | 6.2 | LOS A | 0.0 | 0.1 | 0.00 | 0.00 | 57.7 |
| Approach | | 320 | 0.0 | 0.164 | 0.0 | NA | 0.0 | 0.1 | 0.00 | 0.00 | 60.0 |
| West: CCPP Access | | | | | | | | | | | |
| 10 | L2 | 1 | 0.0 | 0.277 | 8.9 | LOS A | 1.1 | 7.6 | 0.52 | 1.01 | 50.3 |
| 12 | R2 | 189 | 0.0 | 0.277 | 11.0 | LOS B | 1.1 | 7.6 | 0.52 | 1.01 | 49.8 |
| Approach | | 191 | 0.0 | 0.277 | 10.9 | LOS B | 1.1 | 7.6 | 0.52 | 1.01 | 49.8 |
| All Vehicles | | 715 | 0.0 | 0.277 | 3.3 | NA | 1.1 | 7.6 | 0.14 | 0.32 | 56.4 |