WESTERN CAPE GOVERNMENT
TRANSPORT AND PUBLIC WORKS

CONTRACT C1039:

N2/BORCHERDS QUARRY INTERCHANGE AND RELATED WORKS

CONCEPTUAL DESIGN REPORT EXECUTIVE SUMMARY

HHO Africa
Infrastructure Engineers
Cape Town

7144
December 2014-Rev 1

EXECUTIVE SUMMARY

Background

The existing Borcherds Quarry interchange on the N2 is located to the southwest of Cape Town International Airport (CTIA), between Airport Approach Road interchange and Swartklip (R300) systems interchange (Refer to Figure 1.1: Locality Sketch). It has a direct link via Borcherds Quarry Road to Robert Sobukwe (Modderdam) Road and Airport Approach Road to the north, and serves the commercial/industrial areas of Airport Industria, Airport City and the CTIA itself on the northern side of the N2. To the south of the N2, it links with Klipfontein Road, which give indirect access to the Philippi East Industrial area further to the east, and to the residential areas of Crossroads and Nyanga via New Eisleben Road directly to the south.

In the planning and development of Airport Industria and Airport City in particular, as well as the commercial / industrial areas surrounding the CTIA, a realignment of Borcherds Quarry Road was envisaged and planned for. The realigned road linked directly with the New Eisleben Road corridor to form a major Class 2 Arterial route between Robert Sobukwe (Modderdam) Road in the north and Govan Mbeki (Lansdowne) Road in the south, where Eisleben Road already existed as a major Arterial route through Mitchell's Plain. The route was planned to have direct access to the N2 via a new interchange, and the existing Borcherds Quarry interchange (± 450m to the west) was to be closed.

Early in 2013, an approach was made by the Philippi Economic Development Initiative (PEDI) group to the MEC for Transport to investigate the possibility of creating improved access to Philippi East Industrial area which, due to a number of reasons including access and security issues, was not developing as had previously been expected in the context of metropolitan planning and development projections.

HHO were appointed by the Western Cape Government in May 2013, to carry out the planning and design of the N2/ New Borcherds Quarry interchange, which included the realignment of Borcherds Quarry Road and New Eisleben Road. Included in the brief was the investigation of the possibility of improved access from the N2 to the Philippi East Industrial area as well as the extension of the Bus/Minibus-Taxi lanes along the N2 up to the R300.

The Borcherds Quarry Road/ New Eisleben Road route has been identified in the City of Cape Town's Integrated Public Transport Network Plan (IPTN) (May 2014), as one of the major north–south IRT public transport corridors in the metropolitan area. The route has also been identified as an important Non-Motorised Transport (NMT) corridor in the Metropolitan NMT Master Plan.

Study Purpose/Objectives

The following study objectives were formulated with the Client as the outset of the study:

- To develop an understanding of the future medium and long term land use and transport planning proposals for the study area.
- To develop transport proposals which would improve metropolitan access and security from the N2 to the Philippi East Industrial area (and other areas) to the south of the N2.
- To allow for the future expansion of the CTIA and surrounding Airport Industrial area.
- To accommodate public transport planning proposals, in particular:
  - A proposed north-south Integrated Rapid Transit (IRT) route and associated NMT facility along the New Borcherds Quarry/ New Eisleben Road corridor.
  - The proposed extension of the Bus/Minibus-Taxi (BMT) lanes along the N2 up to the R300 (with a possible further eastward extension to Mew Way).
- To accommodate previous planning for the future Airport Beltway concept in the transport infrastructure planning for the study area.
- To ensure that the proposed infrastructure improvements support a consistent road network hierarchy in the study area.
- To ensure that all major stakeholders in the study area are informed of the ongoing study and are presented with the alternatives being assessed, and the process through which a preferred alternative would be selected.

Study Area

The study area extends from Airport Approach Road interchange on the N2 in the west to the R300 (Swartklip) interchange in the east; and from Robert Sobukwe (Modderdam) Road in the north to the R300 extension in the south. It includes the CTIA and surrounding commercial/ industrial areas, Airport Industrial area and Airport City on the northern side of the N2, and Philippi East Industrial area, Crossroads and Nyanga to the south of the N2.

Study Process

During the inception phase of the project, a study process was formulated consisting of three phases as follows (Refer to Figure 1.2: Study Process):

- **Phase 1: Definition of Planning Tasks, Study Objectives, Data Collection and Evaluation of Existing Network (2 Months)**

  This phase consists of the following steps:

  - Definition and Scope of Planning Tasks
  - Preliminary Developments of Alternatives
  - Review of Previous Studies
  - Development of Study Objectives and Evaluation Approach
  - Data Collection and Evaluation of Existing Network.

  During this phase, selected stakeholders and IAAP's were informed of the process, and issues, concerns and constraints were identified and documented.

- **Phase 2: Future Transport Network Design and Evaluation at a Conceptual Level of Planning (4 Months)**

  This phase consists of the following steps:

  - Determination of Future Land Use and Traffic Scenarios
  - Development of Alternative Road and Interchange Layouts

Western Cape Government (Transport and Public Works Division) December 2014
N2/Borcherds Quarry Interchange and Related Works HHO Africa

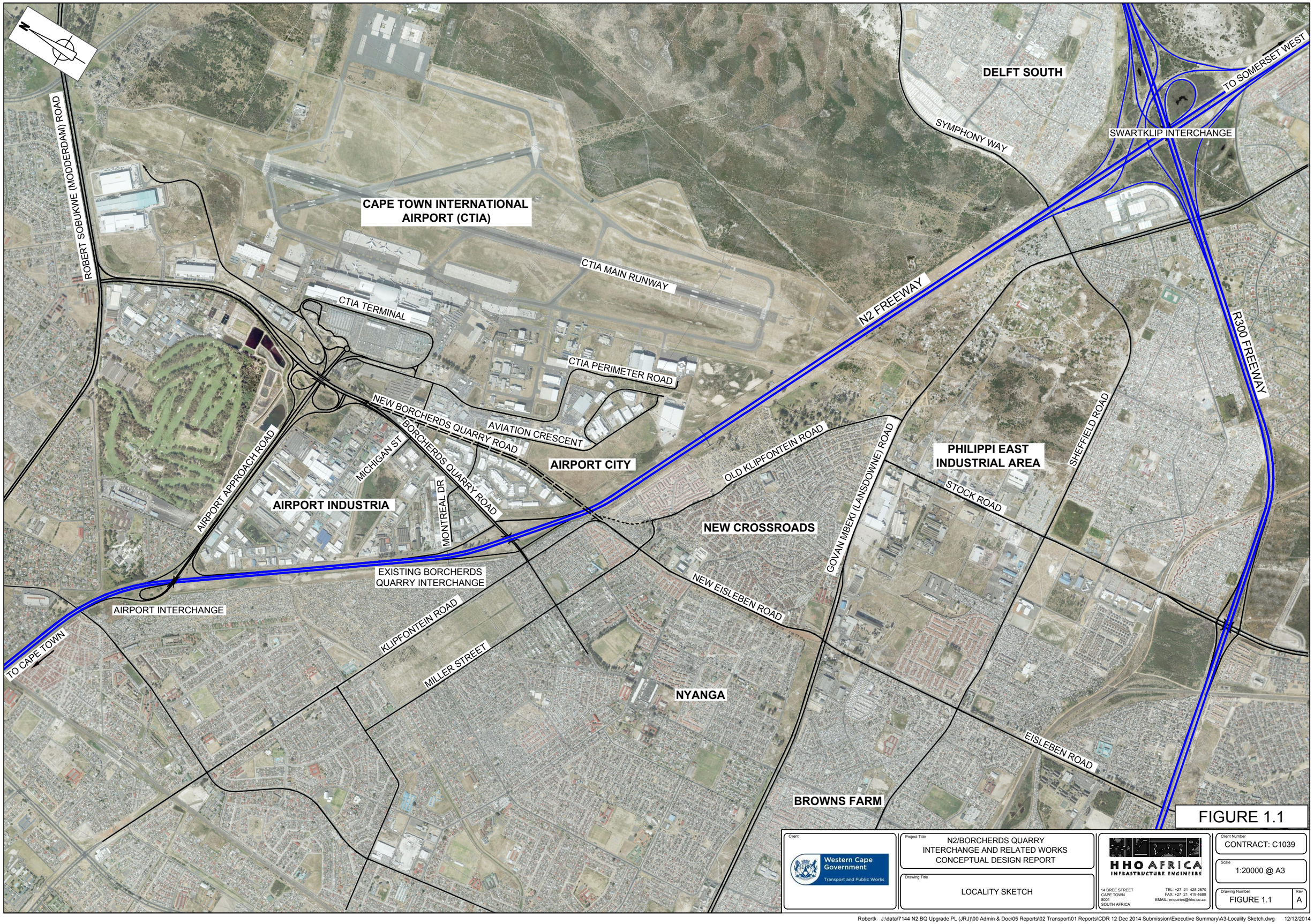

FIGURE 1.1

Client	Western Cape Government, Transport and Public Works
Project Title	N2/BORCHERDS QUARRY INTERCHANGE AND RELATED WORKS CONCEPTUAL DESIGN REPORT
Drawing Title	LOCALITY SKETCH
Client Number	CONTRACT: C1039
Scale	1:20000 @ A3
Drawing Number	FIGURE 1.1
Rev	A

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PHASE 1
DEFINITION OF PLANNING TASKS, STUDY OBEJCTIVES AND DATA COLLECTION & EVALUATION OF EXISTING ROAD NETWORK

1. DEFINITION OF SCOPE OF PLANNING TASKS

- Assembly of project team
  - Transport authorities
  - Planning authorities
  - Consultants team
- Definition & agreement of study area, planning tasks & process
- Identification of existing studies

2. PRELIMINARY DEVELOPMENT OF ALTERNATIVES

- Check against planning objectives
- Check for "No Go / Red Flag" issues
- Preliminary screening of preferred alternatives for further investigation.

3. REVIEW OF PREVIOUS STUDIES

- Land Use
- Road Infrastructure
- Traffic
- Public Transport
- Other Studies

4. DEVELOPMENT OF STUDY OBJECTIVES & EVALUATION APPROACH

- Primary Planning Objectives
  - Understanding the probable medium & long term land use scenarios for study area
  - Improved access to adjoining areas and public transport
  - Develop a more consistent road network for the study area
- Evaluation Approach
  - A multi-criteria approach will be adopted to measure advantages & trade-offs associated with each infrastructure alternative in the context of establishing cost-effective network interventions that address the study objectives.
  - Focused strategic environmental assessment to identify red flag issues.
  - High level economic analysis to determine economic performance
  - Evaluation summary will show cost effectiveness and trade-offs of alternative infrastructure interventions

5. DATA COLLECTION & EVALUATION OF EXISTING NETWORK

- Data Collection (traffic, landuse and bulk services)
- Orthophoto base plans showing existing land use & existing road network (incl. road hierarchy) in study area
- Set-up road network model (VISUM)
- Initial traffic modelling and calibration
- Summary of areas of congestion /delay / network deficiencies
- Highlight key findings of existing network performance and bulk services investigation

STAKEHOLDER ENGAGEMENT: INFORM SELECTED STAKEHOLDERS AND IAAP's OF PROCESS AND IDENTIFY ISSUES, CONCERNS AND CONSTRAINTS (BILATERALS)

- Philippi Industria
- ACSA / CTIA
- Intersite
- Department of Economic Development and Tourism (PGWC)
- Airport Industria
- CoCT Land Use & Spatial Planning
- SANRAL
- IRT Planning Team
- CoCT Roads / Stormwater Planning
- CoCT Informal and Formal Housing

MONTHLY PROGRESS MEETINGS WITH PROJECT MANAGEMENT TEAM (PMT)

PHASE 2
FUTURE ROAD NETWORK DESIGN & EVALUATION AT CONCEPTUAL LEVEL OF PLANNING

6. DETERMINATION OF FUTURE LAND USE & TRAFFIC SCENARIOS

- Agree future land use in study area in a future metropolitan context
- Identification of new areas of development / upgrading / regeneration
- Agreed time horizon, e.g. 20 years: 2013 – 2033
- Development of macro future traffic & public transport demand scenarios in study area

7. DEVELOPMENT OF ALTERNATIVE ROAD & INTERCHANGE LAYOUTS

- Existing N2 / Borcherds Quarry Interchange
- N2 / New Borcherds Quarry Interchange
- N2 / Stock Road Interchange
- N2 / Symphony Way (partial) Interchange

8. DEVELOPMENT OF A PREFERRED ROAD NETWORK / HIERARCHY

- Principles of road network planning
- Interface between interchange location and road network.
- Development of alternative road networks with a consistent road hierarchy

9. EVALUATION OF ALTERNATIVE ROAD NETWORK / INTERCHANGE INTERVENTIONS

- Preliminary screening/evaluation of alternatives
- Detailed multi criteria evaluation of alternatives including traffic modelling and economic evaluation findings
- Determination of preferred alternative
- Determination of priorities for phased implementation
- Presentation of findings to PMT for approval

STAKEHOLDER ENGAGEMENT: PRESENT TO SELECTED STAKEHOLDERS THE EVALUATION OF ALTERNATIVES AND SELECTION OF PREFERRED ALTERNATIVE

- Present evaluation of alternatives
- Present advantages & trade-offs
- Stakeholder feedback, additional comments / inputs
- Evaluation of stakeholder feedback
- Re-evaluation to determine overall preferred scenarios
- Recommended phased implementation strategy

MONTHLY PROGRESS MEETINGS WITH PROJECT MANAGEMENT TEAM (PMT)

PHASE 3
IMPLEMENTATION OF PRIORITY INFRASTRUCTURE

10. DESIGN AND TENDER PHASE FOR FAST TRACK PROJECT(S)

- Identify project(s)
- Preliminary design & preparation of tender documentation
- Tender process & award
- Detail design on "Just in Time" basis and construction phase

11. PRELIMINARY DESIGN PHASE OF PREFERRED NETWORK

- Preliminary Design of preferred network infrastructure
- Environmental Basic Assessment of priority infrastructure
- Economic evaluation of priority infrastructure
- Approval of Preliminary Design & Environmental Authorisation of priority infrastructure

12. DETAILED DESIGN & CONSTRUCTION PHASE OF PRIORITY INFRASTRUCTURE

- Detail Design of priority infrastructure
- Preparation of tender documentation & tender process & award
- Construction phase(s)

REGULAR PMT MEETINGS

KEY MILESTONES

PHASE 1 TIMEFRAME: *2 MONTHS*

PHASE 2 TIMEFRAME: *4 MONTHS*

PHASE 3 TIMEFRAME: *36 MONTHS*

FIGURE 1.2: STUDY PROCESS

- Development of a Preferred Road Network/Hierarchy
- Evaluation of Alternative Road Network/Interchange Interventions

At the end of this phase, the evaluation of alternatives and the selection of a preferred alternative would be presented to selected stakeholders.

During the course of Phases 1 and 2, regular project management meetings were held where progress to date was presented and discussed.

- **Phase 3 : Implementation of Priority Infrastructure (36 Months)**

This phase of the study consists of the following steps:

- Design and tender for fast track projects identified through the study process
- Preliminary design phase of preferred network elements
- Detailed design and construction phase of priority infrastructure

Scope of the Conceptual Design Report

The report follows closely the steps set out in the Study Process (See Figure 1.2), and includes the following sections:

- Introduction
- Collection of Data and Evaluation of Existing Network
- Future Land Use and Traffic Scenarios
- Generation of Alternative Road and Interchange Layouts
- Traffic Modelling and System Wide Assessments
- Services Investigation
- Stakeholder Engagement
- Multi-criteria Evaluation and Selection of Preferred Alternatives
- Detailed Traffic Assessment of Preferred Alternative
- Economic Evaluation and Finalisation of Preferred Alternative
- Identification of Risks to Implementation
- Project Programmes
- Summary of Findings and Recommendations

Format of the Conceptual Design Report

For ease of reference, the report consists of the following three volumes:

- Volume 1: Conceptual Design Report
- Volume 2: Appendices
- Volume 3: Book of Plans

Volumes 1 and 2 are in A4 format, while Volume 3 is in A3 format.

Summary of Findings

The findings of the report can be summarised as follows:

- HHO Africa were appointed in May 2013 to carry out the planning and design of the N2/ New Borcherds Quarry interchange on the N2 which included the realignment of Borcherds Quarry Road to link with New Eisleben Road. Also included in the brief was the investigation of the possibility of improved access from the N2 to the Philippi East Industrial area, as well as the extension of the Bus/ Minibus-Taxi lanes along the N2 up to the R300. The investigation also included a possible east to north directional ramp from the N2 to the realigned Borcherds Quarry Road.

- A study process was formulated which consisted of the following phases:

  - Phase 1: Definition of planning tasks, formulation of study objectives, data collection and evaluation of existing network.

  - Phase 2: Future transport network design and evaluation at conceptual level of planning.

  - Phase 3: Implementation of priority infrastructure.

- The study area extends from Airport Approach Road interchange on the N2 in the west to the R300 (Swartklip) interchange in the east; and from Robert Sobukwe (Modderdam) Road in the north to the R300 extension in the south. It includes the Cape Town International Airport (CTIA) and surrounding commercial/ industrial areas, Airport Industria and Airport City on the north side of the N2, and Philippi East Industrial area, Crossroads and Nyanga to the south of the N2.

- Regular Project Management Team (PMT) meetings were held during the conceptual design process which included key representatives from the client: PGWC (Transport and Public Works) and various City of Cape Town Departments. ACSA joined the PMT meetings midway through the process, and PRASA attended the final meeting. Stakeholder meetings were held with a number of key stakeholders through the course of the study in order to gain critical information on the study area and to obtain feedback on the proposals as they evolved.

- Two future land use scenarios were formulated for the study based on the City's Pragmatic Densification (PD) Scenario, which includes the 20 Year Development Scenario for the CTIA. The PD Scenario was modified to include an "optimistic" scenario and one including "wildcard" sites for the Philippi East Industrial area, and a passenger throughput of 25 million air passengers/year (MAP) for CTIA. The two future scenarios were called the "Mid Road" and the "High Road" Scenarios.

- The High Road Scenario was used to assess the performance of the road network on a system-wide basis for the purpose of the multi criteria evaluation, while the Mid Road Scenario was used for the detailed traffic assessment of critical links and intersections.

- The traffic modelling for the study area was carried out using the Visum Traffic Model which was calibrated for existing situation. Current areas of congestion in the system were identified for the major routes in the study area as follows:

- N2 Freeway
- Borcherds Quarry Road
- Klipfontein Road
- New Eisleben Road
- Govan Mbeki (Lansdowne) Road
- Robert Sobukwe (Modderdam) Road

- The following network deficiencies were identified

  - The discontinuous nature of the existing Borcherds Quarry Road/ New Eisleben Road corridor which is linked by a section of Klipfontein Road. This route currently has an interchange on the N2 but not on the R300.

  - The discontinuous nature of Stock Road/ AZ Berman Drive Corridor which terminates at its north end at Lansdowne Road. This route has an interchange on the R300 but not on the N2.

- A number of alternative interchange and road network layouts were investigated in order to achieve the objective of providing better access to the Philippi East Industrial Area, as well as to accommodate the future IRT Route along the New Borcherds Quarry Road/ New Eisleben Road Corridor. Of these, a total of eight alternatives were considered in the multi-criteria evaluation:

  - Alternative 1: Existing Borcherds Quarry interchange (west facing ramps only) linked via C-D Roads to a N2/ New Borcherds Quarry Full Diamond Interchange.
  - Alternative 2: Existing Borcherds Quarry Interchange (west facing ramp only) linked via C-D Roads to a N2/ New Borcherds Quarry Single Point Diamond Interchange.
  - Alternatives 3A and 3B: A N2/ New Borcherds Quarry Interchange with the Existing Borcherds Quarry Interchange being decommissioned.
  - Alternative 4C: Existing Borcherds Quarry Interchange (west facing ramp only) linked via C-D Roads to N2/ New Borcherds Quarry Interchange linked to New Philippi Industria Interchange (west facing ramps only).
  - Alternative 5: Existing Borcherds Quarry Interchange retained with a grade separated structure over the N2, linking New Borcherds Quarry Road to N2 via east facing directional ramps and C-D roads.
  - Alternative 7: Existing Borcherds Quarry Interchange (west facing ramps retained) linked to new Borcherds Quarry Interchange (east facing ramps only) to create a N2 Split Diamond Interchange.
  - Alternative 8: Existing Borcherds Quarry Interchange (west facing ramps only) together with New N2/Borcherds Quarry Full Diamond Interchange. No C-D Roads are proposed.

- From a town planning perspective, investigations indicated that the road reserve for the New Borcherds Road Corridor to the north of the N2, was already established, with the exception of a portion of a property owned by ACSA. To the south of the N2, portions of the future road reserve are owned by City of Cape Town and PGWC Public Works and would have to be incorporated into the new road reserve. Currently informal settlements occupy portions of the New Eisleben Road and Klipfontein Road road reserves and would have to be relocated (Plan 9.1). The required statutory processes will be undertaken in terms of the Land Use Planning Ordinance, 1985 (Ordinance 15 of 1985), and the Western Cape Transport Infrastructure Act 2013 (Act 1 of 2013).

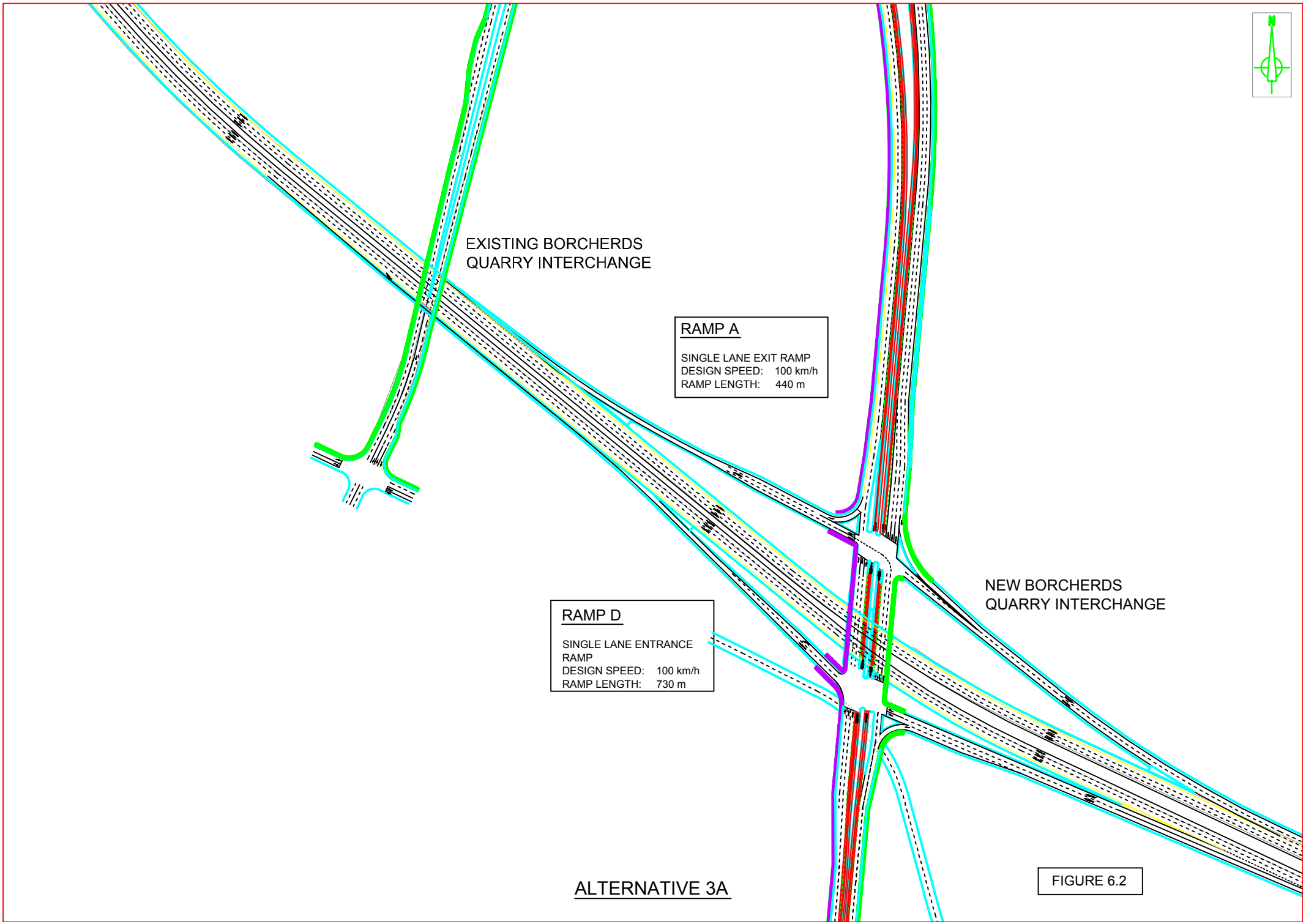
- A full investigation of all services has been carried out and those which will be affected by the road network proposals have been identified. Of particular concern is the impact the N2/ New Borcherds Quarry Interchange will have on bulk watermains along the southern boundary of the N2 road reserve. A meeting has been held with the relevant authority regarding the relocation and protection of these watermains.

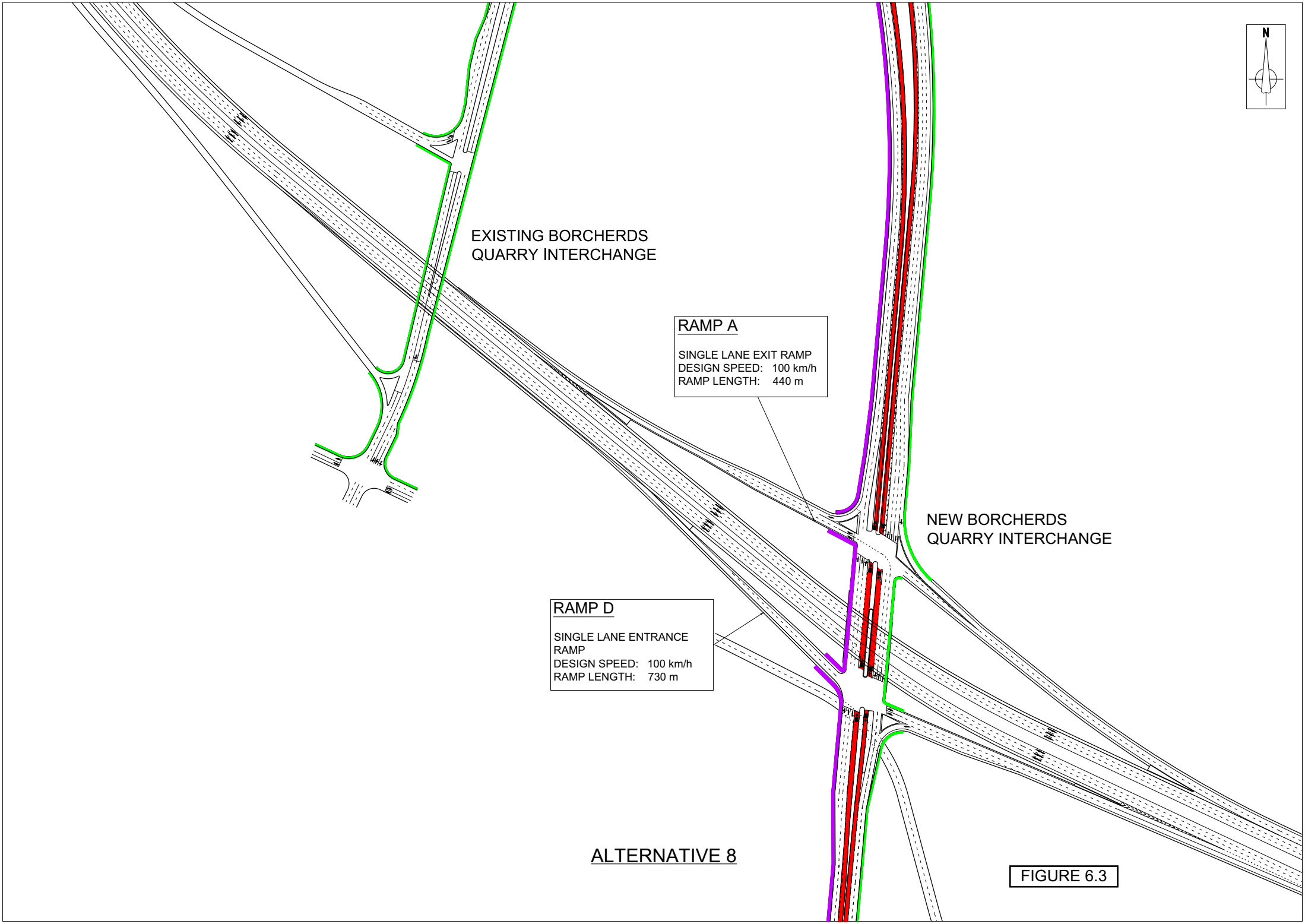
- A multi-criteria evaluation of the alternatives was carried out and each of the alternatives was scored (on a scale of 1 to 5) for selected evaluation criteria. The weightings given to each of the criteria were based on input provided by members of the PMT. Through the evaluation process, two of the alternatives i.e. Alternatives 3A and 8 received very similar scores and were selected as the preferred alternatives to be investigated further as shown in Table 5.7.

TABLE 5.7: MULTI-CRITERIA EVALUATION: SUMMARY OF OVERALL SCORES FOR EACH ALTERNATIVE

WEIGHTING	ALTERNATIVES							
	1	2	3a	3b	4c	5	7	8
HHO Africa (Original Weighting)	3735	3735	4122	4054	3318	3517	3189	4122
Coct IRT Planning	3725	3696	4102	4003	3239	3677	3258	4073
Coct Spatial Planning	3755	3716	4101	4024	3189	3716	3458	4053
HHO Africa (Equal Weighting)	3655	3606	3992	3894	3238	3487	3199	3973
Total	14854	14735	16311	15963	12958	14376	13077	16212

- Conceptual layout plans for the New Borcherds Quarry Road/ New Eisleben Road Corridor have been drawn up. The proposals include the accommodation of the proposed IRT Route and associated NMT facilities along the corridor. Conceptual layout plans have also been drawn up for the two preferred alternatives (i.e. Alternatives 3A & 8 - Refer to Figures 6.2 and 6.3). Alternative 3A consists of the New N2/ Borcherds Quarry Road interchange with the existing Borcherds Quarry Road interchange being decommissioned. Alternative 8 is the same as Alternative 3A, but with the west facing ramps at the existing interchange being retained.


N
EXISTING BORCHERDS
QUARRY INTERCHANGE
RAMP A
SINGLE LANE EXIT RAMP
DESIGN SPEED: 100 km/h
RAMP LENGTH: 440 m
RAMP D
SINGLE LANE ENTRANCE
RAMP
DESIGN SPEED: 100 km/h
RAMP LENGTH: 730 m
NEW BORCHERDS
QUARRY INTERCHANGE
ALTERNATIVE 3A
FIGURE 6.2



ALTERNATIVE 8

FIGURE 6.3

- A detailed level of service analysis has been carried out on all major links in the road networks for Alternatives 3A & 8. Links which are operating at close to capacity have been noted, and where required, road widening proposals identified for future traffic flows to be accommodated.

- An intersection level of service analysis has also been carried out on the major intersections along New Borcherds Quarry Road including the north and south ramp terminals at the new interchange as shown in Table 10.2. Critical intersections along New Borcherds Quarry Road, including the ramp terminal intersections, can be expected to operate at acceptable performance levels during peak hours.

TABLE 10.2 : SUMMARY OF RESULTS OF INTERSECTION ANALYSIS

INTERSECTION	PEAK HOUR	ALTERNATIVE 3A			ALTERNATIVE 8		
		V/C RATIO	DELAY	LOS	V/C RATIO	DELAY	LOS
New Borcherds Quarry Road/N2 North Ramp Terminal	AM	0.72	20.7	C	0.78	20.8	C
	PM	1.00	19.5	B	0.96	19.9	B
New Borcherds Quarry Road/N2 South Ramp Terminal	AM	0.82	25.3	C	0.67	24.1	C
	PM	0.88	20.7	C	0.69	17.6	B
New Borcherds Quarry Road/ Michigan Street	AM	0.77	27.5	C	0.64	24.3	C
	PM	0.89	29.4	C	0.90	32.0	C
New Borcherds Quarry Road/ Montreal Drive	AM	0.91	26.3	C	0.83	24.9	C
	PM	0.74	28.5	C	0.77	28.0	C

Note 1: Of the performance measures, "volume/ capacity (v/c) ratio" is given for the worst performing movement only. For "delay" and "level of service" (LOS), aggregate values are given for intersection as a whole.

- The analysis in the report indicates that a future east-to-north directional ramp at the N2/ New Borcherds Quarry interchange is not warranted from a traffic perspective for the "Mid Road" traffic scenario. However, the future interchange bridges would be designed to accommodate the possibility of the ramp being constructed at some time in the future if traffic flows warranted this facility.

- A further assessment of future ramp flows on the N2/ New Borcherds Quarry Interchange, and also the west facing ramps at the existing interchange has been carried out. Alternative 3A could require widening of the existing Borcherds Quarry Bridge, due to the possible need for two lane on and off ramps on the west facing ramps in the future.

- An assessment of both ramp spacing and sign spacing for each of the alternatives has also been carried out. The required ramp spacing, and also the directional sign sequence and spacing as recommended by SANRAL & SARTSM respectively, are easily satisfied for Alternative 3A, and are substandard for Alternative 8.

- A preliminary assessment of the existing pavement structure of the N2 has been carried out and recommendations given in order to guide future rehabilitation strategies. Similarly preliminary assessments of the existing interchange bridge, and the requirements for the new interchange bridge, has been carried out.

- An economic analysis has been carried out for both alternatives by Prof. Christo Bester of University of Stellenbosch. The results indicate that both alternatives are viable with relatively high IRR's and B/C ratios. However, there is very little difference in the economic benefits between the two alternatives as shown in Table 11.1.

TABLE 11.1: SUMMARY OF RESULTS OF ECONOMIC ANALYSIS

INDICATORS	ALTERNATIVE 03A		ALTERNATIVE 08	
	VOC	ALL	VOC	ALL
IRR (%)	16,2	26,9	17,1	27,9
NPV (Rmill)	336	1 197	395	1 291
B/C Ratio	2,5	5,2	2,7	5,5
FYRR (%)	13,2	27,2	14,8	29,6

- Project programs have been drawn up for the planning and design of priority infrastructure (including "fast track projects"), and a phased implementation programme has been suggested, with construction taking place over a 4 year period i.e. 2015 to 2019. Included in the programs are critical items relating to the relocation of informal settlements out of existing road reserves required for the project, and also the relocation of bulk watermains, both of which have been identified as "risks to implementation".

- Construction cost estimates have been drawn up, and costs have been allocated between the three Authorities involved i.e. PGWC, CoCT and SANRAL.

Summary of Recommendations

The following recommendations emanating from the report should be considered:

- The findings of the conceptual design report as listed in Section 13.1 should be presented to the members of the Project Management Team (PMT), as well as to relevant key stakeholders in order to obtain feedback which will inform the selection of the preferred network alternative.

- The preliminary and detail design of the priority projects identified in Section 12.0 should proceed in accordance with the programmes presented in Figures 12.1 & 12.2. The decision as to which of the Alternatives 3A or 8 is the preferred alternative will be confirmed at the start of the preliminary design process.

- The process which has been established for expediting the relocation of informal settlements out of the affected road reserves on the south side of the N2 in the vicinity of the new interchange, must be actively pursued by the relevant parties in order to minimize the risks to implementation of this important aspect of the study.

- Other risks to implementation identified in the report must be addressed as a matter of priority.

While this project has been initiated by PGWC, it will require funding input for implementation from other sources, in particular the City of Cape Town, with respect to the section of New Eisleben Road between the N2 and Lansdowne Road. This section of the route is linked to the planned rollout of the high volume, T17 IRT trunk route which, as indicated during the PMT process, could be operational by 2018.

ID	Task Name	Start	Finish
1	**PHASE 1: SCOPE, STUDY OBJECTIVES & DATA COLLECTION**	**Mon 13/05/13**	**Fri 19/07/13**
2	Definition of scope of planning tasks	Mon 13/05/13	Fri 17/05/13
3	Preliminary development of alternatives	Mon 20/05/13	Fri 07/06/13
4	Review of previous studies	Mon 20/05/13	Fri 07/06/13
5	Development of study objectives & evaluation approach	Mon 20/05/13	Fri 31/05/13
6	Data collection & evaluation of existing road network	Mon 20/05/13	Fri 19/07/13
7	**PHASE 2: EVALUATION OF FUTURE ROAD NETWORK**	**Mon 22/07/13**	**Wed 17/12/14**
8	Determination of future land use & traffic scenarios	Mon 22/07/13	Fri 28/02/14
9	Development of alternative road & interchange layouts	Mon 22/07/13	Fri 20/12/13
10	Development of a preferred road network/hierarchy	Tue 01/10/13	Fri 20/12/13
11	Evaluation of alternative road network/interchange interventions	Tue 01/10/13	Fri 28/02/14
12	Selection of preferred alternative(s)	Fri 28/02/14	Fri 28/02/14
13	**Identification of implementation risks**	**Mon 06/01/14**	**Mon 31/03/14**
14	Relocation of informal settlements from road reserve	Mon 06/01/14	Mon 31/03/14
15	Possible EIA (Basic Assessment) for filling in of wetland along north side of N2	Mon 06/01/14	Mon 31/03/14
16	Possible EIA (Basic Assessment) for relocation of bulk services (Steenbras mains) along south side of N2	Mon 06/01/14	Mon 31/03/14
17	**Submission of Conceptual Planning Report (Draft 1)**	**Wed 09/04/14**	**Wed 09/04/14**
18	Review of Conceptual Planning Report by client	Thu 10/04/14	Tue 29/07/14
19	**Submission of Conceptual Design Report (Draft 2)**	Tue 02/09/14	Tue 02/09/14
20	Review of Conceptual Design Report by client	Wed 03/09/14	Fri 12/12/14
21	**Circulation of Conceptual Design Report**	**Wed 17/12/14**	**Wed 17/12/14**

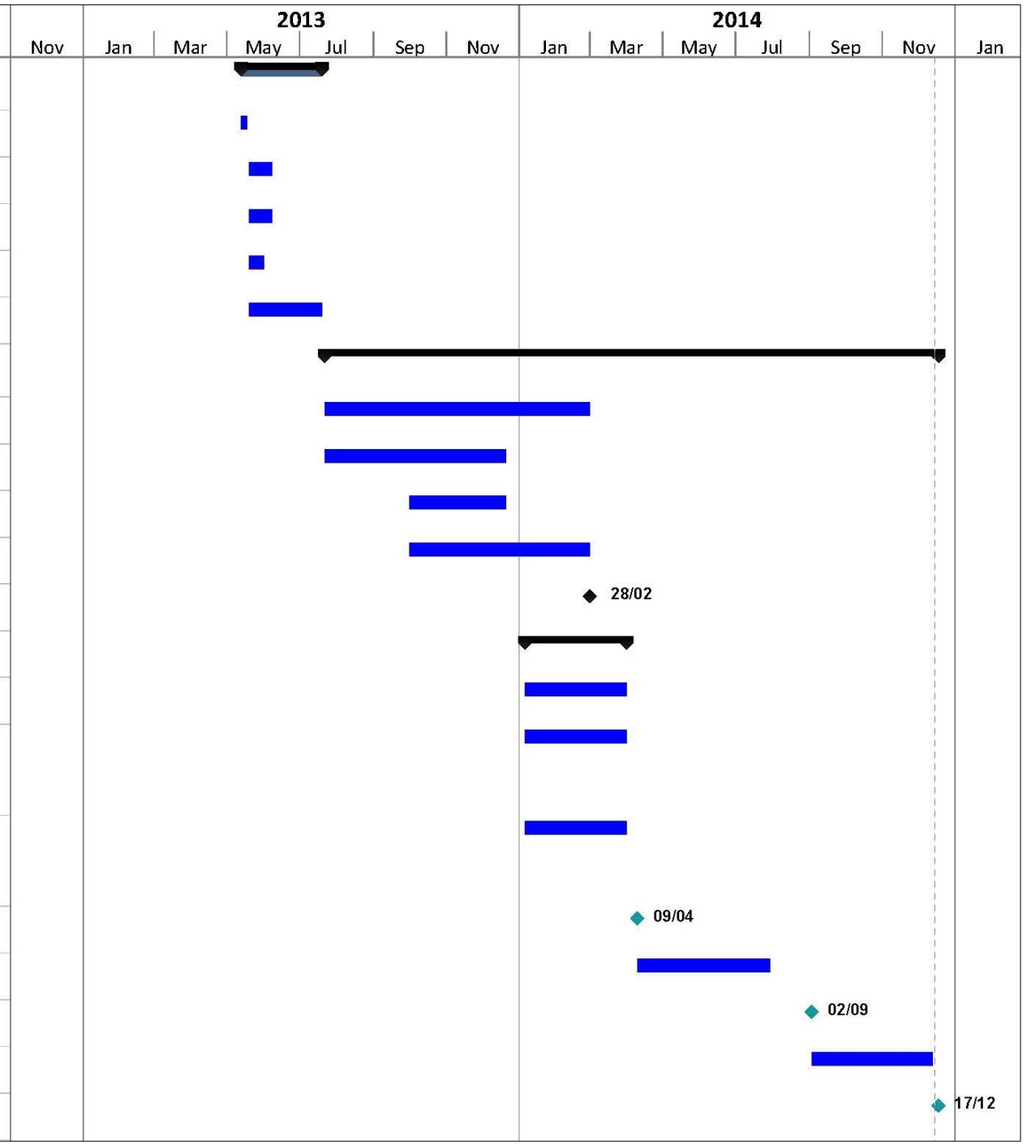


FIGURE 12.1: PROGRAMME FOR CONCEPTUAL DESIGN PROCESS

FIGURE 12.1

ID	Task Name	Start	Finish
1	**PHASE 3: IMPLEMENTATION OF PRIORITY INFRASTRUCTURE**	**28/04/2014**	**29/11/2018**
2	**DESIGN PHASE**	**28/04/2014**	**30/01/2017**
3	**PRELIMINARY DESIGN PHASE**	**28/04/2014**	**30/11/2015**
4	WP 1: N2 Freeway	28/04/2014	30/09/2014
5	WP 2 - WP 5	01/10/2014	30/11/2015
6	**EIA (BASIC ASSESSMENT) (IF REQUIRED)**	**14/10/2014**	**30/03/2015**
7	**PROPERTY ACQUISITION FACILITATION & RELOCATION OF INFORMAL SETTLEMENTS FROM ROAD RESERVE**	**14/10/2014**	**30/01/2017**
8	**DETAILED DESIGN AND TENDER PHASE**	**29/09/2014**	**29/07/2016**
9	Detailed Design and Tender Phase WP 1	29/09/2014	01/05/2015
10	Detailed Design Phase WP 2 - WP 5	01/04/2015	29/07/2016
11	**CONSTRUCTION PHASE**	**05/10/2015**	**29/11/2018**
12	**WP 1: N2 FREEWAY**	**05/10/2015**	**31/05/2017**
13	Extension of W/B BMT lane & E/B traffic lane	05/10/2015	31/05/2017
14	Pavement rehabilitation of N2	05/10/2015	31/05/2017
15	**WP 2: N2/BORCHERDS QUARRY INTERCHANGE (BRIDGE)**	**22/02/2016**	**07/07/2017**
16	**WP 3: NEW BORCHERDS QUARRY ROAD & NORTHERN RAMPS**	**23/01/2017**	**16/11/2018**
17	North side approach fill and ramps	23/01/2017	08/06/2018
18	New Borcherds Quarry Road: Airport Interchange to N2	23/01/2017	16/11/2018
19	**WP 4: KLIPFONTEIN ROAD & SOUTHERN RAMPS**	**03/02/2017**	**18/07/2018**
20	South side approach fill and ramps	03/02/2017	18/07/2018
21	Klipfontein Road Realignment incl. Underpass	03/02/2017	18/07/2018
22	**WP 5: NEW EISLEBEN ROAD: N2 to Lansdowne Road**	**03/02/2017**	**29/11/2018**
23	New Eisleben Road: N2 to Lansdowne Road	03/02/2017	29/11/2018

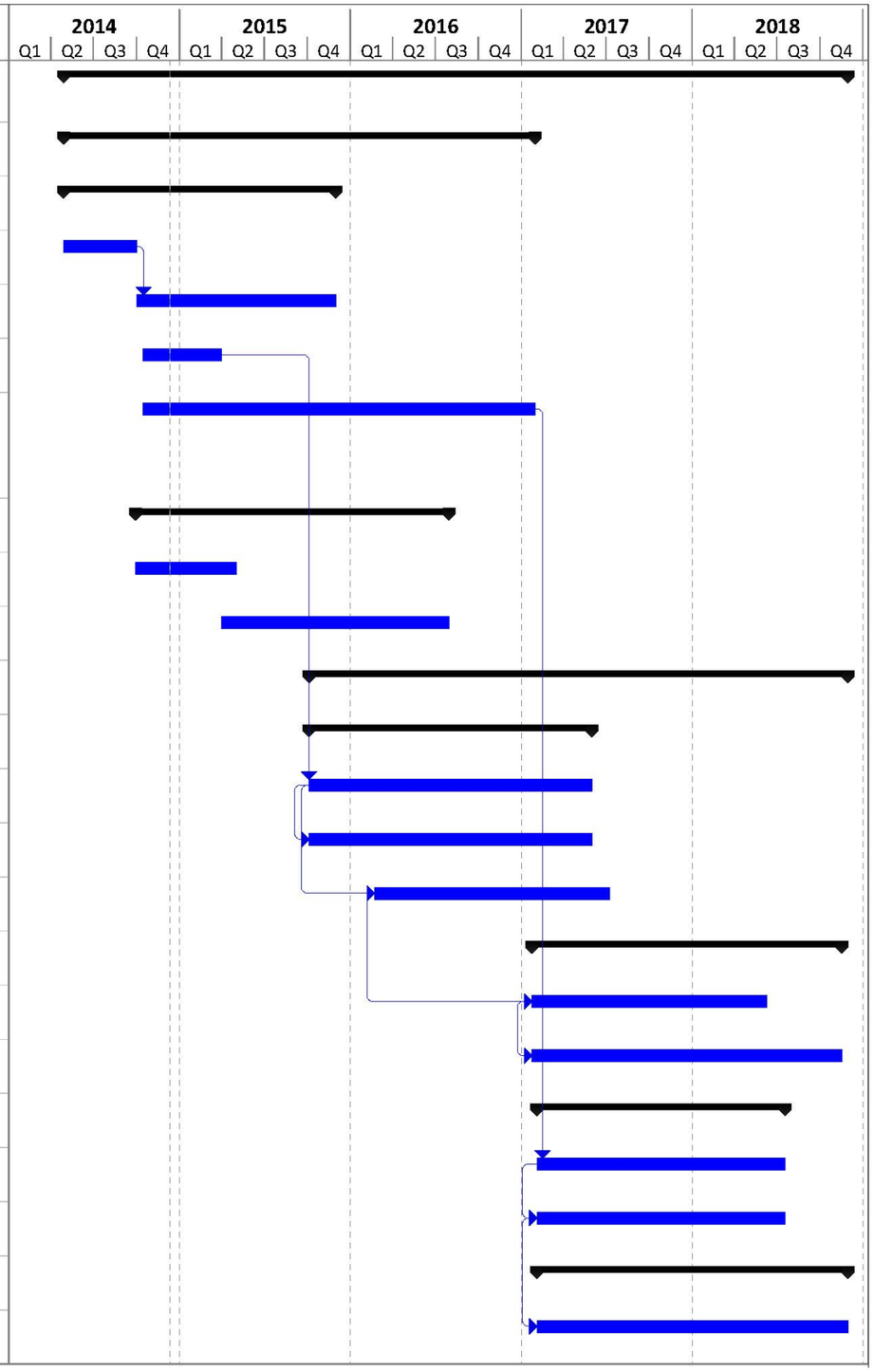


FIGURE 12.2: PROGRAMME FOR PRIORITY PROJECTS: PHASED IMPLEMENTATION

FIGURE 12.2