

# KAROO URANIUM PROJECTS

## MINING WORK PROGRAMME SUMMARY



# PROJECT SUMMARY

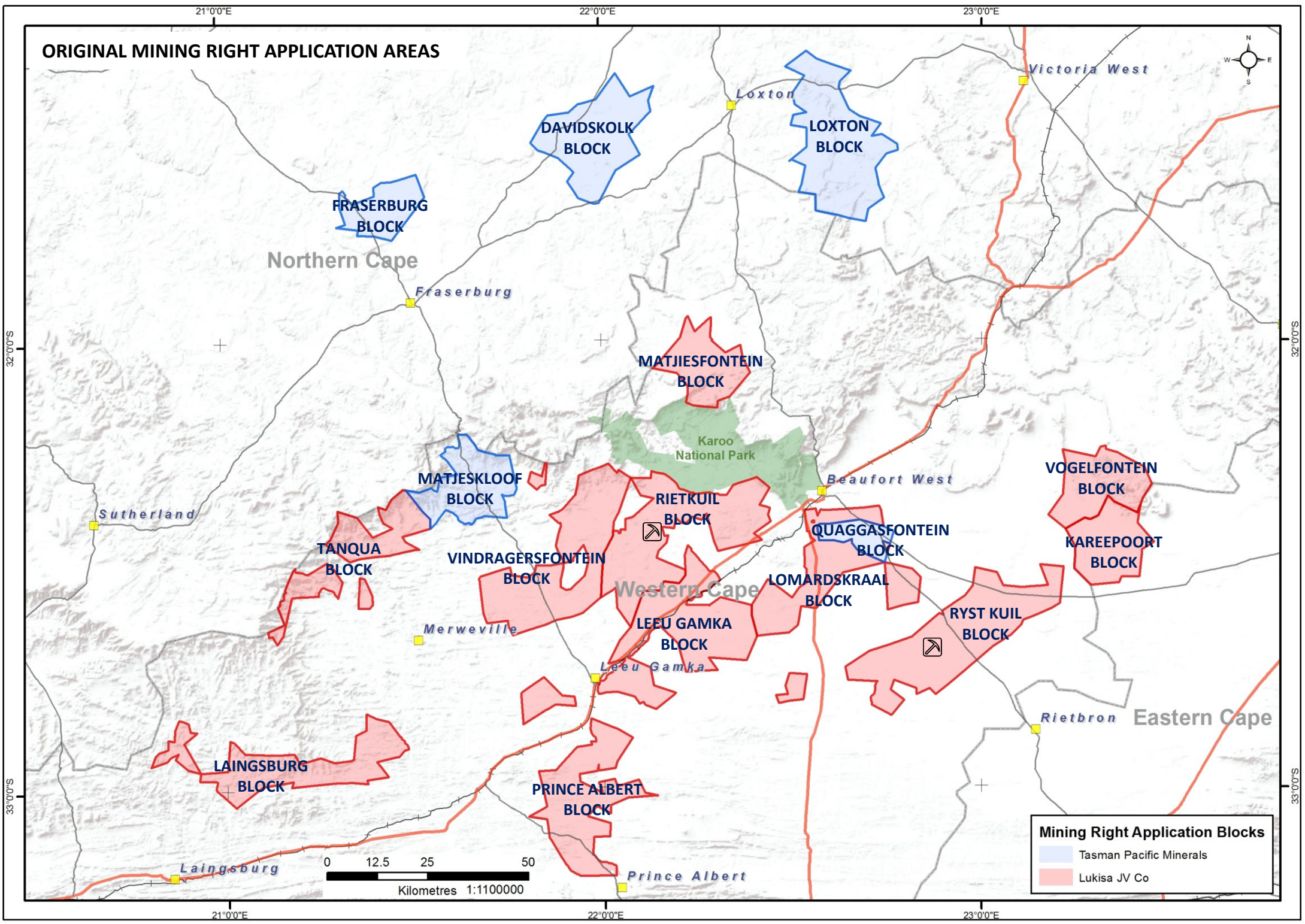
- Mining Right applications submitted in terms of Section 22 of the Mineral and Petroleum Resources Development Act, 2002 (MPRDA) by Tasman Pacific Minerals Limited (Tasman Pacific) and Lukisa JV Company (Pty) Ltd (Lukisa JVCo) for uranium (U) and molybdenum (Mo):

<b>Application Block</b>	<b>Applicant</b>	<b>DMR Reference Number</b>	<b>Province</b>	<b>Extent (ha)</b>
Kareepoort Block	Lukisa JVCo	EC30/5/1/2/2/10029MR	Eastern Cape	34448.0346
Eastern Block	Lukisa JVCo	WC30/5/1/2/2/10071MR	Western Cape	152353.6718
Quaggasfontein Block	Tasman Pacific	WC30/5/1/2/2/10072MR	Western Cape	10623.9826
Matjeskloof Block	Tasman Pacific	WC30/5/1/2/2/10073MR	Western Cape	33475.103
Western Block	Lukisa JVCo	WC30/5/1/2/2/10074MR	Western Cape	196544.1282
Southern Block	Lukisa JVCo	WC30/5/1/2/2/10075MR	Western Cape	175113.7192
Fraserburg Block*	Tasman Pacific	NC30/5/1/2/2/10070MR	Northern Cape	20574.6708
Davidskolk Block*	Tasman Pacific	NC30/5/1/2/2/10071MR	Northern Cape	48945.4308
Loxton Block*	Tasman Pacific	NC30/5/1/2/2/10072MR	Northern Cape	63687.5216
			<b>Total:</b>	<b>735766.2626</b>

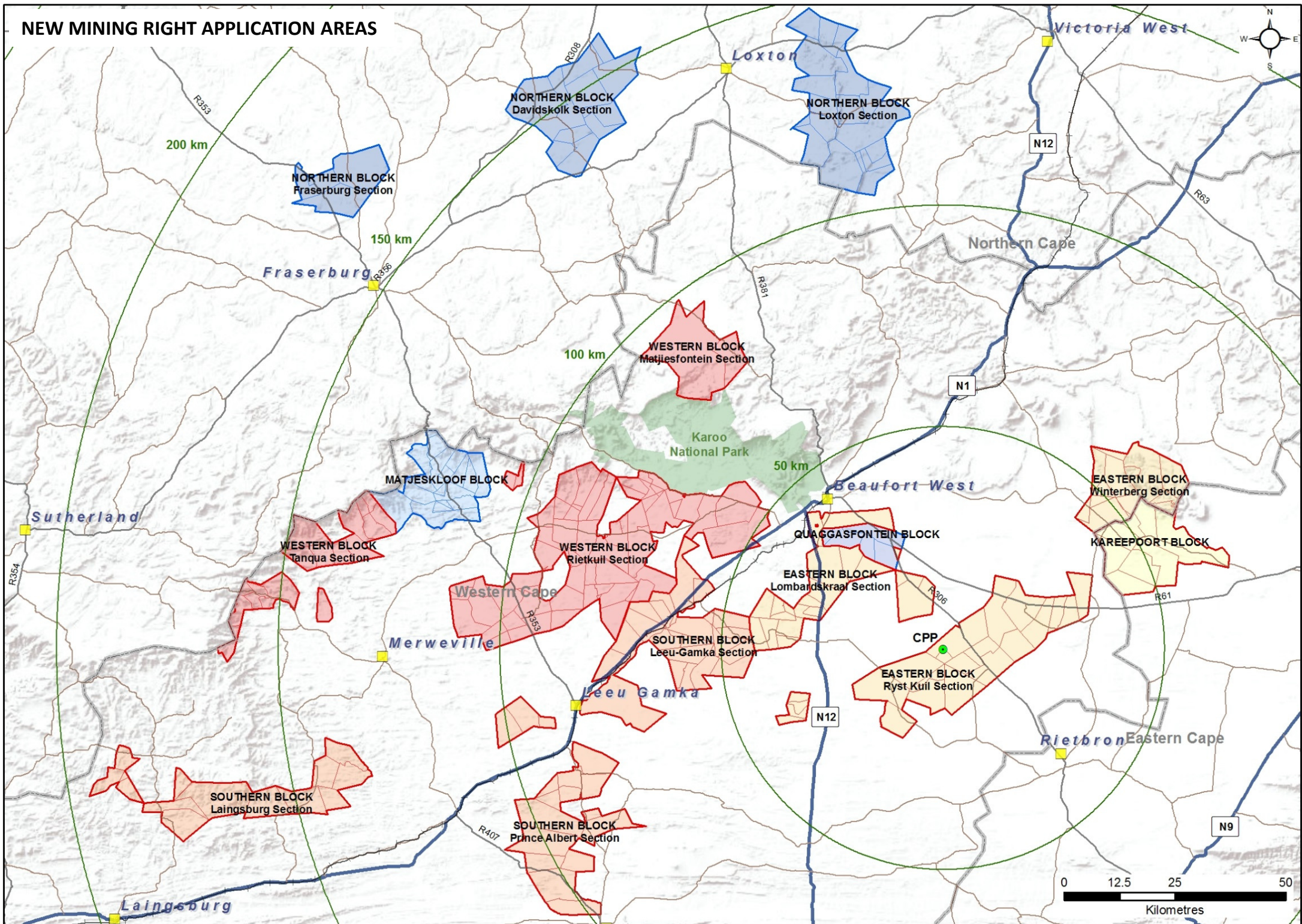
\*To be combined into a single application

- Period applied for: 30 years
- Initial mining areas located in Eastern, Quaggasfontein and Kareepoort Blocks (additional resource areas from other blocks to be incorporated into the mine design as evaluation and feasibility studies progress to extend the life of mine)
- Applications submitted for environmental authorisation in terms of the National Environmental Management Act, 1998 (NEMA) and National Environmental Management Waste Act, 2008 (NEMWA) in respect of listed activities that have been triggered

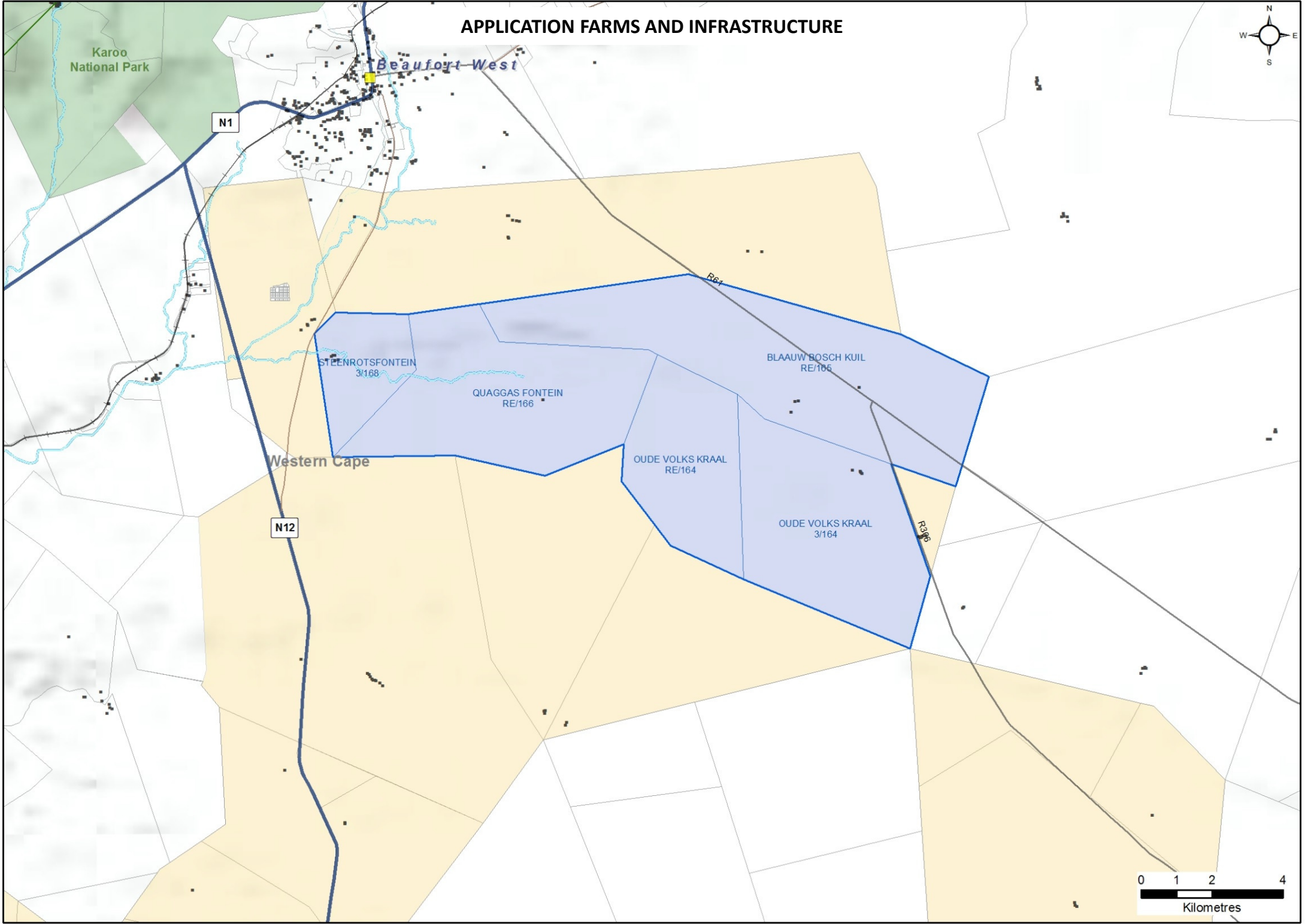
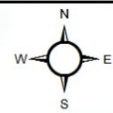
# ORIGINAL MINING RIGHT APPLICATION AREAS



# NEW MINING RIGHT APPLICATION AREAS



# APPLICATION FARMS AND INFRASTRUCTURE



# MINING WORK PROGRAMME

## KEY POINTS

- Central Processing Plant (CPP) to be located at Ryst Kuil in Eastern Block (approx. 40 km SE of Beaufort West)
- During initial 17 year mining period:
  - Total plan area of open pits = 136 ha
  - Total plan area of underground workings = 331 ha
  - Public provincial/secondary roads to be used = 45 km
  - Existing farm roads/tracks to be upgraded for haulage = 75 km
  - New haulage road sections to be built = 21 km
  - Estimated area required for stockpiles (waste/ore) and slimes dam = 535 ha (slimes dam volume = +/- 10.5 million tonnes)
  - CPP area = 25 ha
- Main product to be produced is uranium oxide ( $U_3O_8$ ) in the form of “yellowcake”
  - Main by-product is molybdenum (may not be commercially extractable) and to much lesser degree copper (Cu) and arsenic (As)
- Road and Rail: Product will be road freighted to Beaufort West and then railed to Cape Town on the main national rail carrier
- Electricity Supply: The mining company will apply to Eskom for twelve megavolt-ampere (12 MVA) grid connection for electricity supply
- Water Supply: Ground water is available in the area and this with the makeup water generated through mining should be sufficient to supply the mining and process requirements. A WULA will be applied for. A storage dam will be required to store and hold seven (7) days water supply to ensure there is no shortfall that could hamper mining and process operations
- Marketing and sales of  $U_3O_8$  produced currently focused on major nuclear power electricity generating utilities in international jurisdictions including Western Europe, Asia and the USA, as well as targeting South Africa’s current plans to develop new nuclear power plants under its growing nuclear energy program.

# MINING METHOD

## **SURFACE (OPEN PIT) MINING METHOD**

- The open cast surface mining will be standard opencast pit structures with access roads to a depth of not more than  $\pm 85$  meters. Mining method will be traditional drill, blast, load and haul using trucks to deliver the material to the processing plant.
- Topsoil (if any) will be removed to a maximum depth of 30cm where possible from all open pit and dump areas. This will be done by bulldozing the material onto windrows, loaded by an excavator and trucked to a topsoil stockpile for storage. No vegetation will be removed prior to this operation. All vegetation will be stockpiled together with the topsoil.
- The hard overburden will be mined in benches of 10m. These benches will be drilled and blasted prior to an excavator and truck fleet loading and hauling to an appropriate dump site. The possible dump site consists of ex-pit overburden dumps adjacent to the open pit and old mined-out open pits from which no mining is taking place or are planned to take place in future. Overburden on the last bench above the ore will only be drilled and blasted down to the ore/waste contact. Ore and overburden will not be drilled and blasted together.
- Due to the thin tabular nature of the ore deposit and the small size of the various open pits, virtually all the overburden will have to be mined before any ore production from any given pit will be possible. Because no clear visual distinction have been identified between the ore and waste material, strict grade control measure will need to be implemented using handheld instruments by the production geological department. All mined ore will be loaded by an excavator or front-end loader onto a truck and transported directly to the processing plant run of mine tip.

## **UNDERGROUND MINING METHOD**

- For the underground the board and pillar method will be used
  - High wall access roadways from the floor of mined out open pits
  - A single conveyor / access decline & return airway decline
  - A vertical shaft and winder system with ducted return air
- Production sections will be established off from the seven roadway development. A development section consists of between six to nine (6 – 9) roadways (boards), with five metre (5 m) pillars between the boards. Thus the design dimensions of seven metre (7 m) wide boards and five metre (5 m) by five metre (5 m) pillars will be the standard throughout the planned underground working
- The mining method will be Trackless Mechanised Board and pillar run on a two (2) shift cycle. Each stopping section will be made up of six to nine (6 – 9) boards. Board and pillar dimensions vary with depth below surface. For this report, seven metre (7 m) wide boards at one point eight metres (1.8 m) mining height and five metre (5 m) by five metre (5 m) pillars will be used. The pillars are cut by seven metre (7 m) wide holings

# CONSUMABLES

- Diesel mining equipment will be utilised. A diesel Supplier will erect approved (self-bunded) storage facilities at all sites
- Anticipated fuel volume requirements for first 17 years of mining:

Year	1	2	3	4	5	6	7	8	9
Litres	3 328 852	11 404 339	9 236 743	12 495 828	12 875 124	8 154 926	7 548 895	6 860 939	3 666 920
Year	10	11	12	13	14	15	16	17	
Litres	867 348	930 872	935 197	860 254	916 986	768 123	593 028	200 327	

- Approximate reagents required for ore processing:

Description	Unit	ACL - H <sub>2</sub> SO <sub>4</sub>
<b>Sulphuric Acid</b>	t/a	136 579
<b>Pyrolusite</b>	t/a	5 939
<b>Flocculant</b>	t/a	209
<b>Alamine 336</b>	m <sup>3</sup> /a	46
<b>Isodecanol</b>	m <sup>3</sup> /a	46
<b>Kerosene</b>	m <sup>3</sup> /a	291
<b>Sodium Chloride</b>	t/a	2 650
<b>Sodium Carbonate</b>	t/a	1 371
<b>Hydrogen Peroxide</b>	t/a	372
<b>Sodium Hydroxide</b>	t/a	500
<b>Burnt Lime</b>	t/a	6 509

- Approximate water requirement for extraction process: 782,400 m<sup>3</sup> per annum

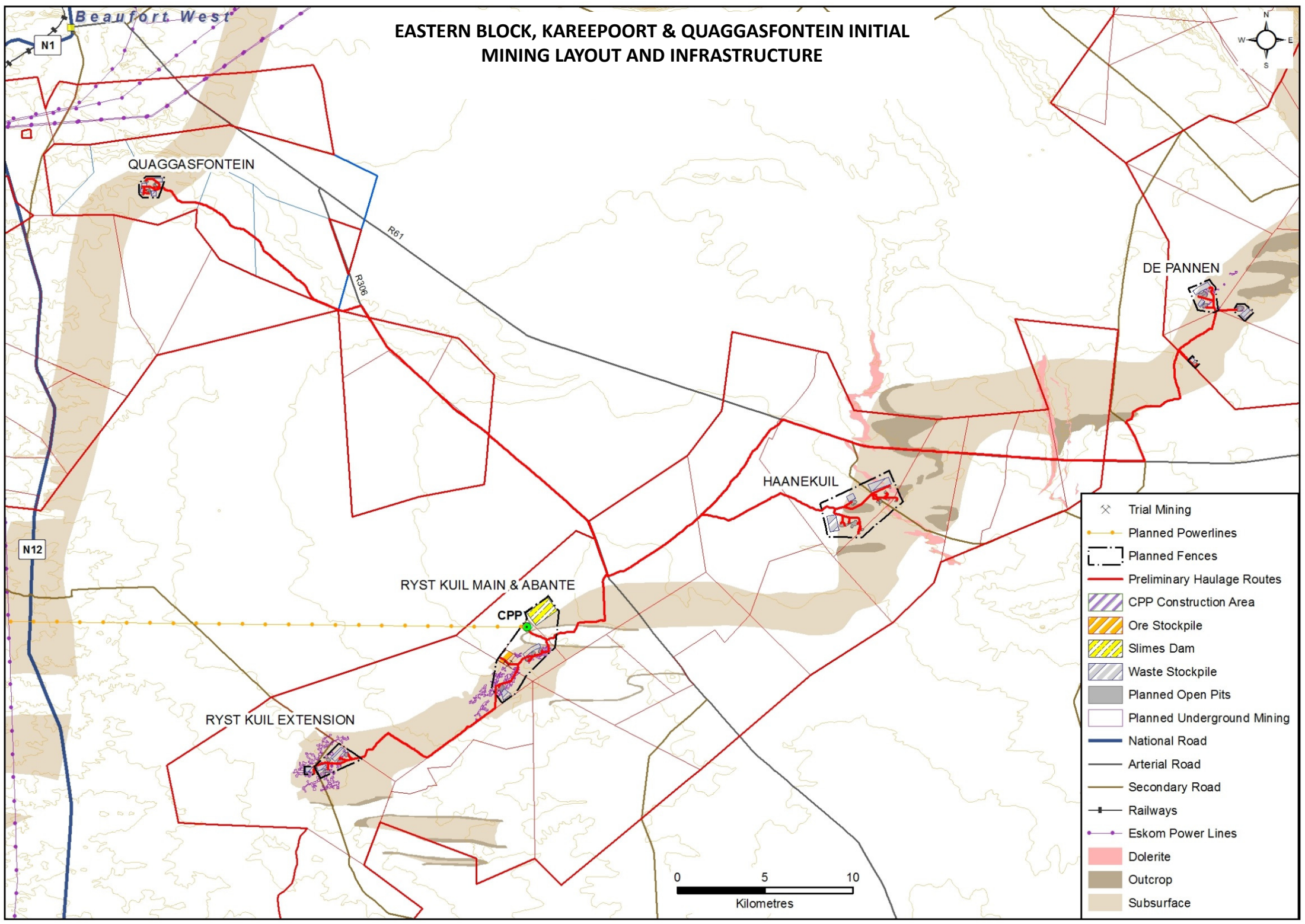
# YELLOW CAKE PRODUCT

Typical composition of uranium (yellowcake) concentrate (actual composition from Karoo ores to be determined during feasibility studies)

Component	“Standard Concentrates”	Component	“Standard Concentrates”
Uranium (U)	75 %	Moisture (H <sub>2</sub> O)	1 %
Arsenic (As)	0,01 %	Molybdenum (Mo)	0,10 %
Barium (Ba)	0,01 %	Phosphorus (PO <sub>4</sub> )	0,10 %
Boron (B)	0,01 %	Potassium (K)	0,20 %
Cadmium (Cd)	0,01 %	Selenium (Se)	0,01 %
Calcium (Ca)	0,05 %	Silica (SiO <sub>2</sub> )	0,50 %
Carbonate (CO <sub>3</sub> )	0,20 %	Silver (Ag)	0,01 %
Chromium (Cr)	0,01 %	Sodium (Na)	0,50 %
Fluoride (F)	0,01 %	Sulphates (SO <sub>4</sub> )	1,00 %
Halides (Br, Cl, I)	0,05 %	Thorium (Th)	0,10 %
Iron (Fe)	0,15 %	Titanium (Ti)	0,01 %
Lead (Pb)	0,01 %	Uranium 234 (U <sub>234</sub> )	56 µg / gU
Magnesium (Mg)	0,02 %	Vanadium (V <sub>2</sub> O <sub>5</sub> )	0,10 %
Mercury (Hg)	0,01 %	Zirconium (Zr)	0,01 %



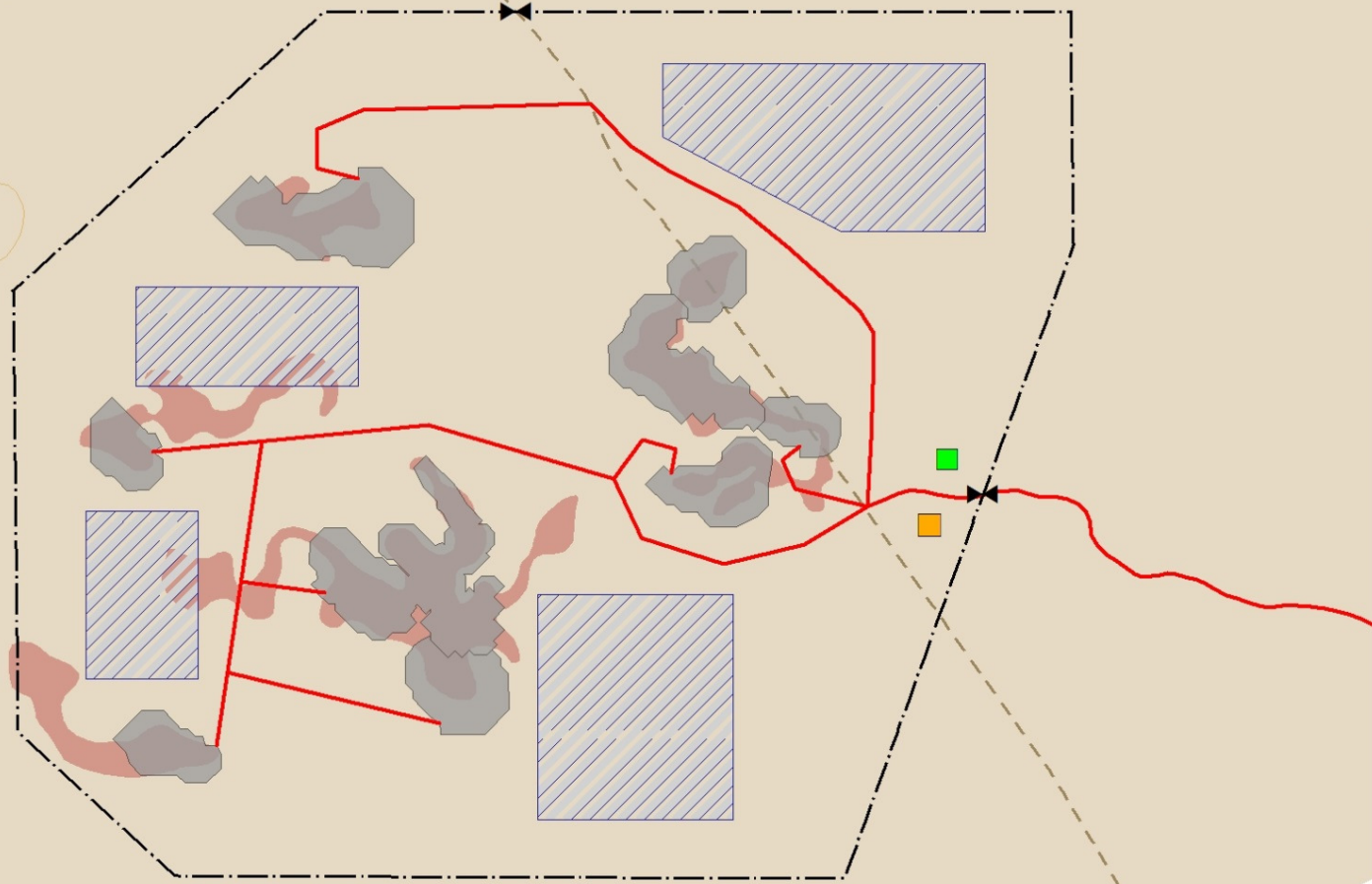
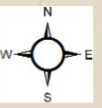
# EASTERN BLOCK, KAREEPOORT & QUAGGASFONTEIN INITIAL MINING LAYOUT AND INFRASTRUCTURE



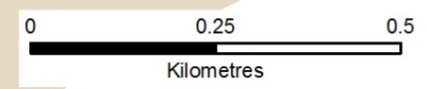
- ✕ Trial Mining
- Planned Powerlines
- - - Planned Fences
- Preliminary Haulage Routes
- ▨ CPP Construction Area
- ▨ Ore Stockpile
- ▨ Slimes Dam
- ▨ Waste Stockpile
- Planned Open Pits
- Planned Underground Mining
- National Road
- Arterial Road
- Secondary Road
- +— Railways
- Eskom Power Lines
- Dolerite
- Outcrop
- Subsurface

0 5 10  
Kilometres

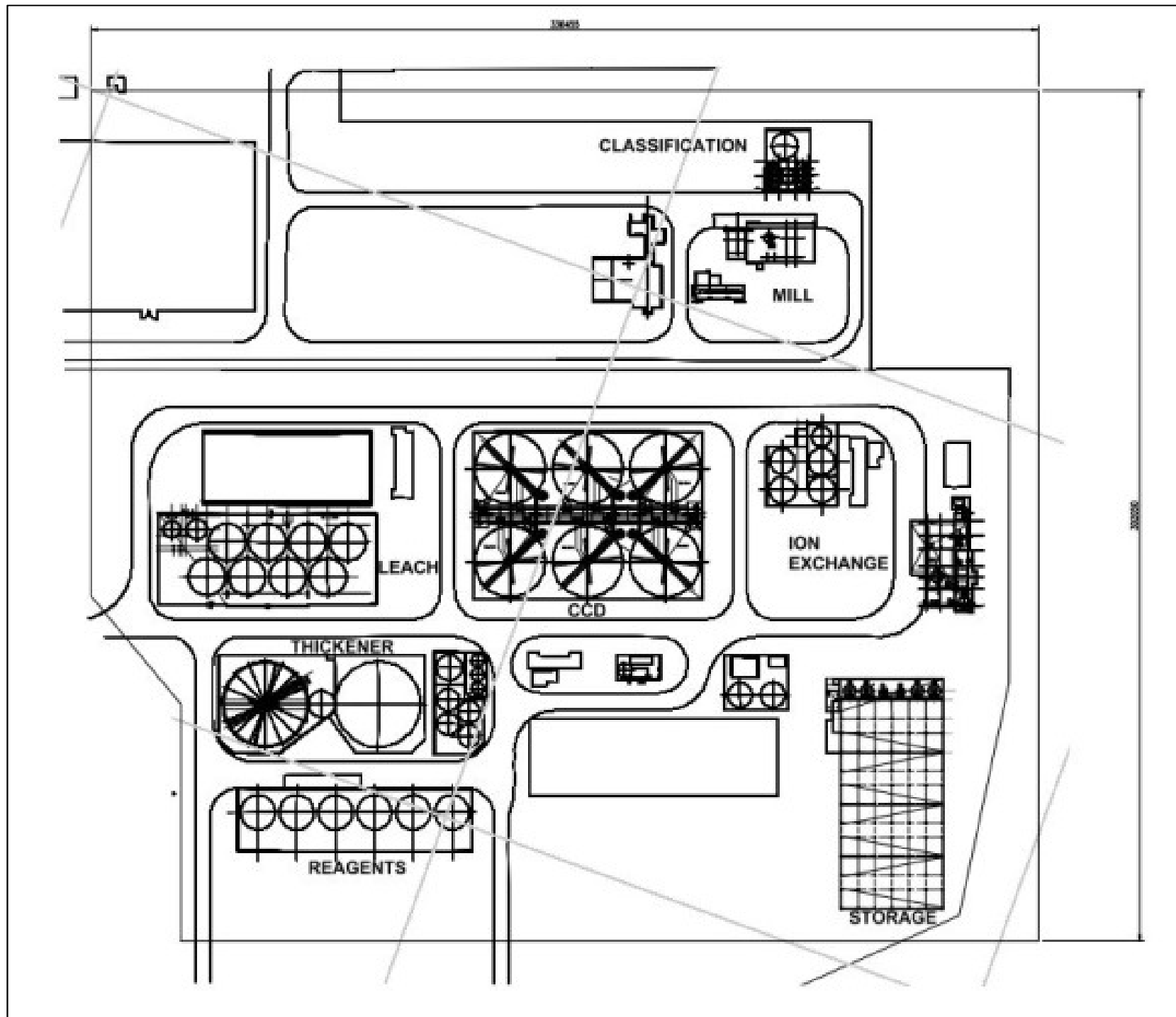
# QUAGGASFONTEIN MINING AREA



- ⊗ Trial Mining
- Changehouse/Ablution
- ⬛ Cameron Decline (Esso)
- ⬜ Ventilation Raise (Esso)
- Planned Decline
- Diesel Storage Tank
- ⬛ Planned Access Gates
- Planned Powerlines
- ⬛ Planned Fences
- Preliminary Haulage Routes
- ▨ CPP Construction Area
- ▨ Ore Stockpile
- ▨ Slimes Dam
- ▨ Waste Stockpile
- Planned Open Pits
- Planned Underground Mining
- National Road
- Arterial Road
- Secondary Road
- Railways
- Eskom Power Lines
- Quaggasfontein Inferred
- Dolerite
- Outcrop
- Subsurface



# PLANT LAYOUT DESIGN



# Process Flow Design

