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Project: **Market Coke and Co-generation Plant**
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Volume 2 of Environmental Impact Assessment Report
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PROJECT INFORMATION SHEET

PROJECT:

Market Coke and Co-generation Plant

REPORT DETAILS

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

AEL	Atmospheric Emissions Licence
Am ³	Actual cubic metre
AMD	Acid Mine Drainage
APPA	Atmospheric Pollution Prevention Act (No. 45 of 1965)
BID	Background Information Document
BEE	Black Economic Empowerment
CDM	Clean Development Mechanism
CERs	Certified Emission Reductions
CO ₂	Carbon dioxide
COFG	Coke oven flue gas
DC	Direct current
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources (formerly Department of Minerals and Energy (DME))
DWA	Department of Water Affairs
EB	Executive Board

EIA	Environmental Impact Assessment
EAP	Environmental Assessment Practitioner
EMP	Environmental Management Programme / Plan
ESP	Electrostatic precipitators
FeCr	Ferrochrome
GHG	Greenhouse Gas
GN(R)	Government Notice (Regulation)
ha	Hectares
H ₂ O	Water
H ₂ S	Hydrogen sulphide
HDPE	High density polyethylene (plastic)
IAPs	Interested and Affected Parties
IWUL(A)	Integrated Water Use Licence (Application)
IWWMP	Integrated Water and Waste Management Plan
kPa	Kilo Pascal (unit of pressure)
ktpa	Kilo ton per annum
kVA	Kilo volt ampere
LEDET	Limpopo Department of Economic Development, Environment and Tourism
MCWAP	Mokolo and Crocodile Water Augmentation Project
Ml	Mega (million) litres = 1000 m ³
MPRDA	Minerals and Petroleum Resources Development Act
MVA	Mega volt ampere
MW	Megawatt
MWe	Megawatt electrical
MWt	Megawatt thermal
NAAQS	National Ambient Air Quality Standards
NEMA	National Environmental Management Act, 1998
NEM:AQA	National Environmental Management: Air Quality Act, 2004
NEM:BA	National Environmental Management: Biodiversity Act, 2004
NEM:WA	National Environmental Management: Waste Act, 2008
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act, 1999
Nm ³	Normalized cubic metre
NO _x	Nitrogen oxides
NWA	National Water Act
O ₂	Oxygen
PCD	Pollution control dam
PDD	Project Design Document
PM ₁₀	Fine particulate matter with diameter less than 10 microns
SAHRA	South African Heritage Resources Agency
SLA	Service level agreement
SO ₂	Sulphur dioxide
TOPS	Threatened or Protected Species
tph	Tons per hour
UNFCCC	United Nations Framework Convention on Climate Change
WHRB	Waste heat recovery boiler
WWTW	Waste Water Treatment Works

EXXARO REDUCTANTS (Pty) Ltd
MARKET COKE AND CO-GENERATION PLANT PROJECT
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Volume 2 of Environmental Impact Assessment Report

1 INTRODUCTION

1.1 Background and Location

Coke, a carbonaceous agent, is used in the metals industry as a reductant of iron ore and other metal ores (rock containing iron and its oxides and other metals and their oxides) in the presence of heat at melting point, by allowing the oxides contained in the ore to react with the carbon. The proposed Market Coke and Co-generation Plant will produce 435 ktpa of dry coke product using 810 ktpa of wet coal.

About 18% of the Grootegeluk Mine's production consists of semi-soft coking and metallurgical quality coal, which is sold to local and international steel and ferro-chrome alloy plants. The proposed Market Coke Plant will process some of the coking coal to form coke before transporting it to customers. Coke is made by heating suitable coal in coke ovens in the absence of oxygen, to a temperature of around 1200°C for an extended period of time. During this heating cycle, coke is formed and volatile materials in the coal are released in the form of vapour, gas and smoke. The electricity Co-generation Plant will produce 55 MW of electricity from the hot waste gas, called coke oven flue gas (COFG), produced in the coking process. It is anticipated that approval to negotiate agreements for the possible sale of electricity, with institutions like Eskom and the National Energy Regulator of South Africa (NERSA) will be granted following completion of the Bankable Feasibility Phase by February 2013.

The Market Coke and Co-generation Plant will be located adjacent to the existing Char Manufacturing Plant, within the boundaries of the Grootegeluk Coal Mine (Figures 1.1 and 1.2). The Grootegeluk Mine is on the farm Daarby 458 LQ, approximately 20 km west of Lephalale (formerly Ellisras) in the Limpopo Province. Access to the mine and the existing Char Manufacturing Plant is from an east-west aligned provincial tarred road, the D2001, between Lephalale and Stockpoort.

The proposed site of the Market Coke and Co-generation Plant is on a 49.4 ha portion of an old coal stockpile area (also known as the old coal middling stockpile area), which is currently being used as a laydown area, and portion of a disused railway loop (the site layout is shown in Figure 1.4). The railway loop area will be used as a product stockpiling area. This site is also adjacent to an existing Char Manufacturing Plant which has been operational since 2009 (refer to Figure 1.2). The Char Manufacturing Plant is owned by Exxaro Reductants, on land leased from the Grootegeluk Mine (refer to Appendix 16 of the EIA). The proposed Market Coke Plant and the proposed Co-generation Plant will also be owned and operated by Exxaro Reductants and will also be constructed on land leased by Exxaro Reductants from the Grootegeluk Mine. The new Exxaro Reductants entrance gate will also be located on Grootegeluk Coal Mine property, near the existing coal tailings dams near the D2001 road (refer to Figure 1.3). The gate, including the parking areas and offices will be approximately 3725 m² in area. The roads going to and from the new entrance gate have already received environmental authorisation as part of a separate project.

As the expanded plant will be within the Grootegeluk Mine's property, the mine and the Char Manufacturing Plant will be the main neighbours which may be affected by the Market Coke and Co-generation Plant. Neighbouring properties around the Grootegeluk Mine include private farms, which are mainly used as game farms, and the Manketti Reserve on the Grootegeluk Mine's property that is

managed by Ferroland (a subsidiary of Exxaro). Other receptors which have been identified are the Marapong, Onverwacht and Lephalale residential areas located approximately 6 km, 15 km and 20 km to the south-east, respectively. The other developments and land uses nearby include two major Grootegeluk Coal Mine clients - the Eskom Matimba and Medupi Power Stations.

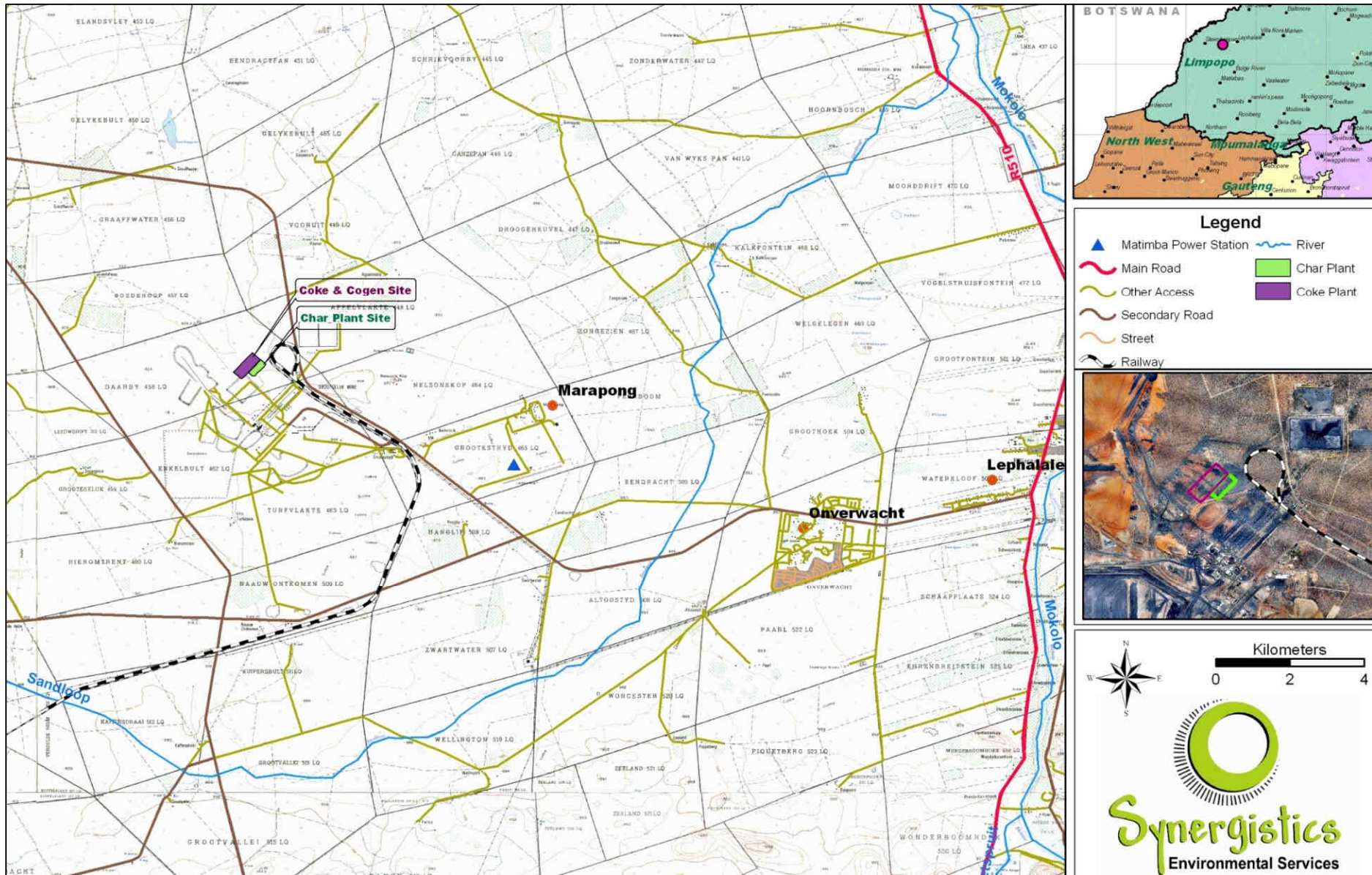


Figure 1.1: Approximate location of the Market Coke and Co-generation Plant at Grootegeeluk Mine (In purple)

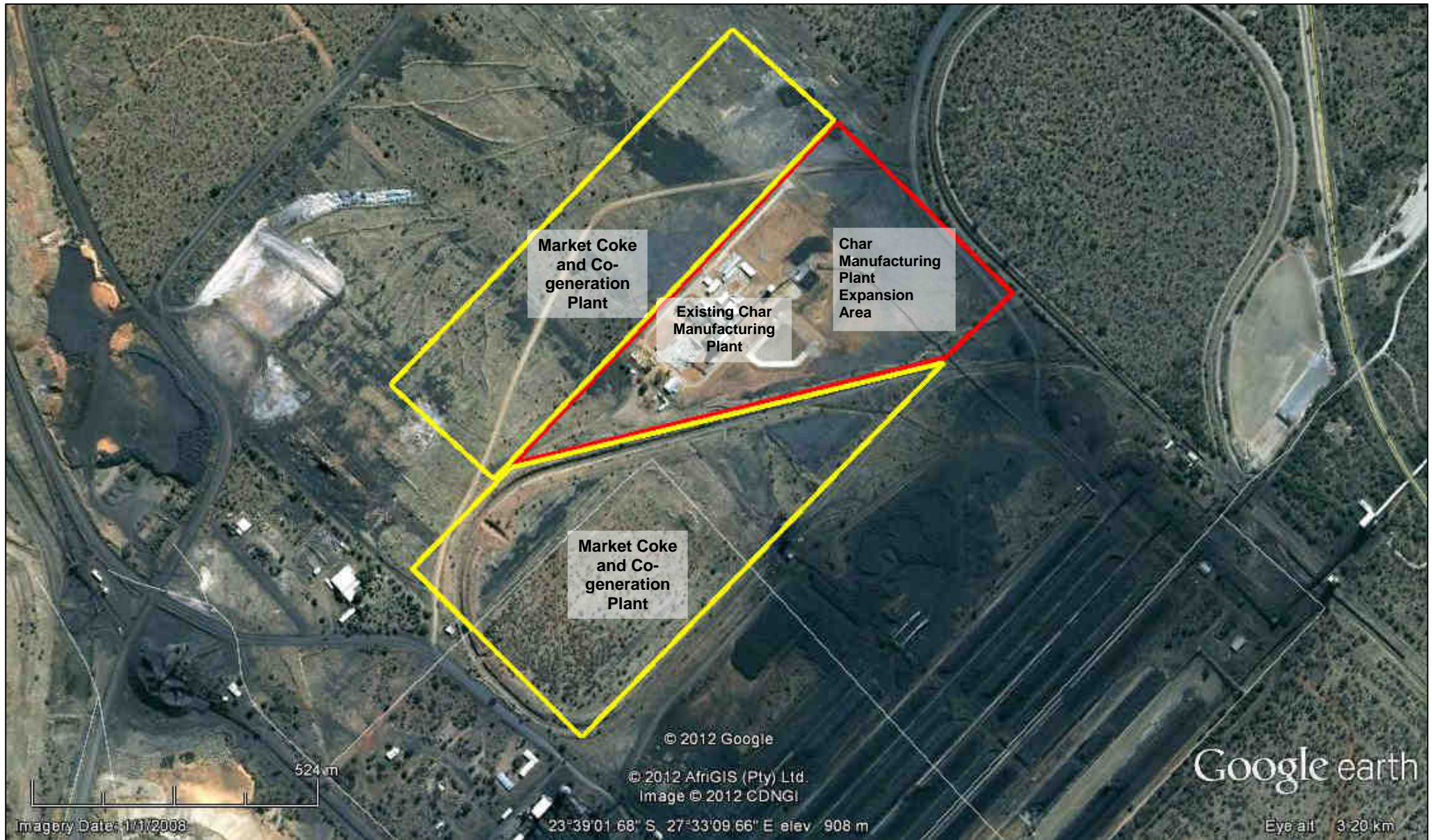


Figure 1.2: Market Coke and Co-generation Plant site (yellow outline) within the Grootegeluk Mine (aerial view)

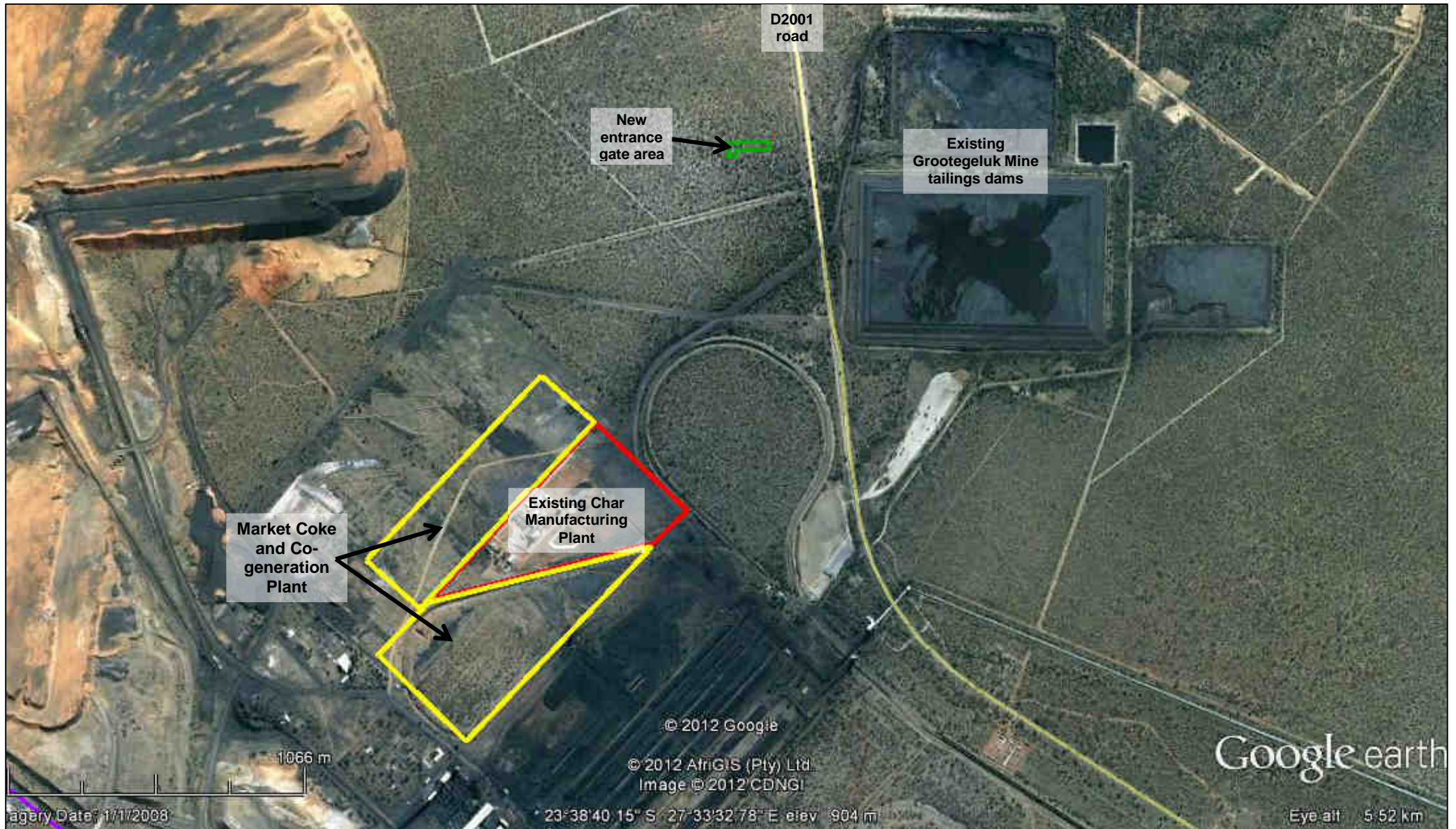
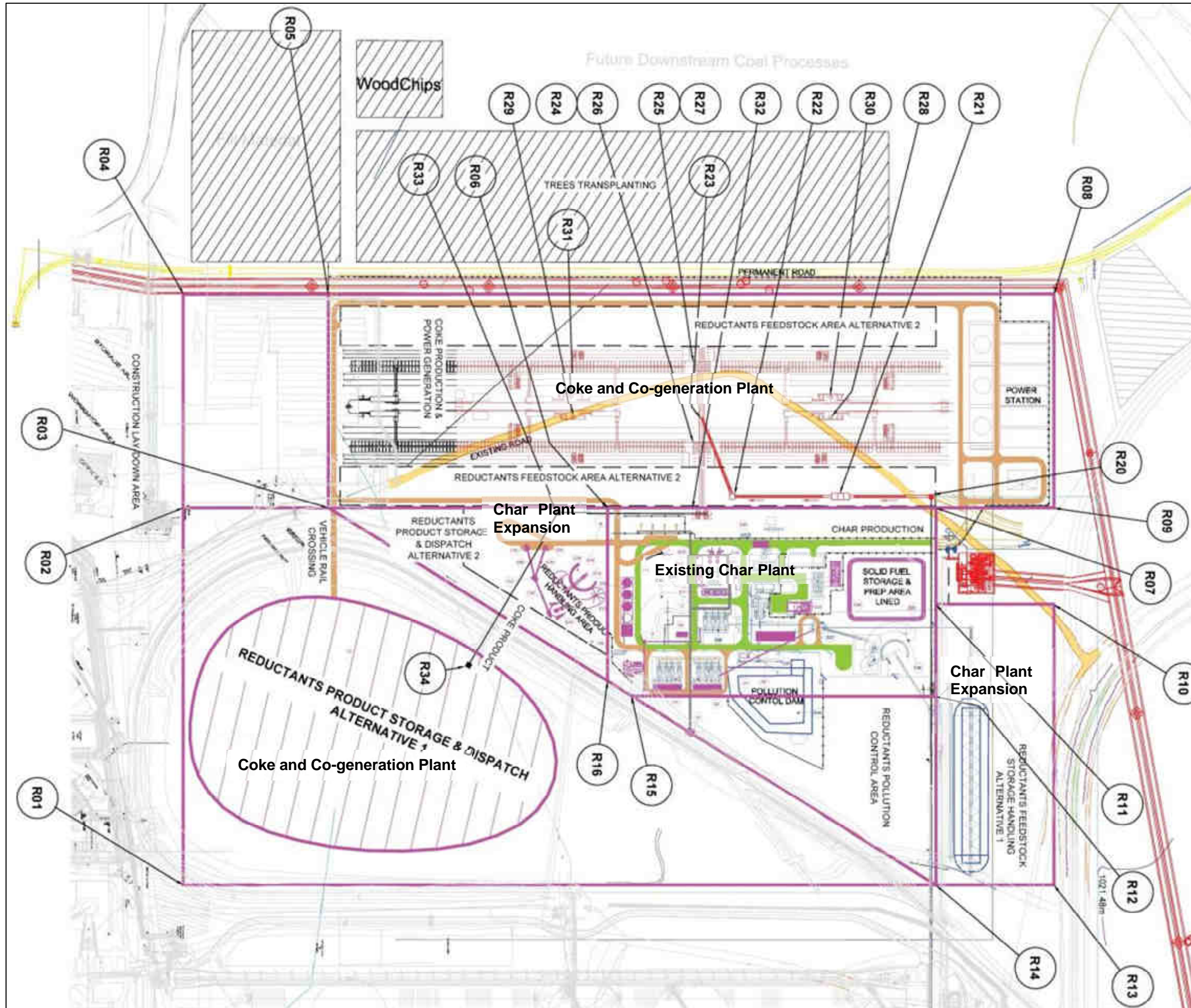


Figure 1.3: Market Coke and Co-generation Plant site (yellow outline) and New Reductants Entrance Gate (green) (aerial view)



Way Point No	Item Description
R 17	Equalizing Coal Feedstock Silo
R 18	Feedstock Battery Limit (Conveyor Pick-up point)
R 19	ROM Stockpile Transfer (to Feedstock Conveyor)
R 20	Main Transfer Point to Screen
R 21	Screen & Crusher
R 22	Transfer Point to Coal Tower
R 23	Tower Conveyor Transfer Point
R 24	Coal & Quench Tower Phase 1
R 25	Coal & Quench Tower Phase 2
R 26	Wharf Phase 1
R 27	Wharf Phase 2
R 28	Chimney Stack No1 (Phase 1)
R 29	Chimney Stack No2 (Phase 1)
R 30	Chimney Stack No 3 (Phase 2)
R 31	Chimney Stack No 4 (Phase 2)
R 32	Coke Crushing Station
R 33	Transfer Point Coke Crusher to Product Conveyor
R 34	Product Conveyor Off-load point
R 35	Gypsum Handling and Load Area
	Coke Oven Batteries Phase 1
	Coke Oven Batteries Phase 2

Figure 1.4: Site Layout of Market Coke and Co-generation Plant showing plant only

2 PROPOSED MARKET COKE AND CO-GENERATION PLANT AND ASSOCIATED INFRASTRUCTURE

2.1 Description of the proposed development

2.1.1 Overview of the Market Coke and Co-generation Plant

Coke is made by heating suitable coal in coke ovens, in the absence of oxygen, to a temperature of around 1200°C for an extended period of time. During this heating cycle, coke is formed and volatile materials in the coal are released in the form of vapour, gas and smoke. The coke oven flue gas (COFG) will be burned in the coke oven to provide process heat and surplus heat energy which will be converted into electrical energy (co-generation). An overview of the process is shown in Figure 2.1 and Figure 2.2. The Market Coke and its Co-generation Plant consist of the following sub-systems which are described in further detail in the sections below:

- The material handling system; coal stockpiles, conveyors, mineral sizing
- 3 x 1000 ton (approximate) day silos at the Coke plant site
- Coal crushing and compaction system
- Push-charge and discharge machines and rail system
- Coke oven batteries (a total of 120 coke ovens), structures and door mechanisms
- Coke oven flue gas ducting system
- Coke quench car and rail system
- Coke quench tower and water pumps
- Settling and clarifying ponds for quench water
- Sediment extraction system
- Coke wharf
- Product conveyor and coke stockpile
- Product screen and mineral sizing system
- Product Weigh bridge
- Product loading and despatch (transport by truck or rail)
- Waste heat recovery boilers (WHRB)
- Flue Gas Desulphurising (FGD) Plant
- Gypsum by-product stockpile and loading area
- Chimney stack system
- Common steam header system
- Steam turbine system
- Dry steam condensing system
- Demineralization plant (for steam cycle)
- Electricity generation system
- The electricity connecting and transmission equipment.

The proposed Market Coke Plant will involve an energy recovery coke making process, which has fewer environmental impacts than traditional coke making processes in respect of air quality, effluent and solid waste.

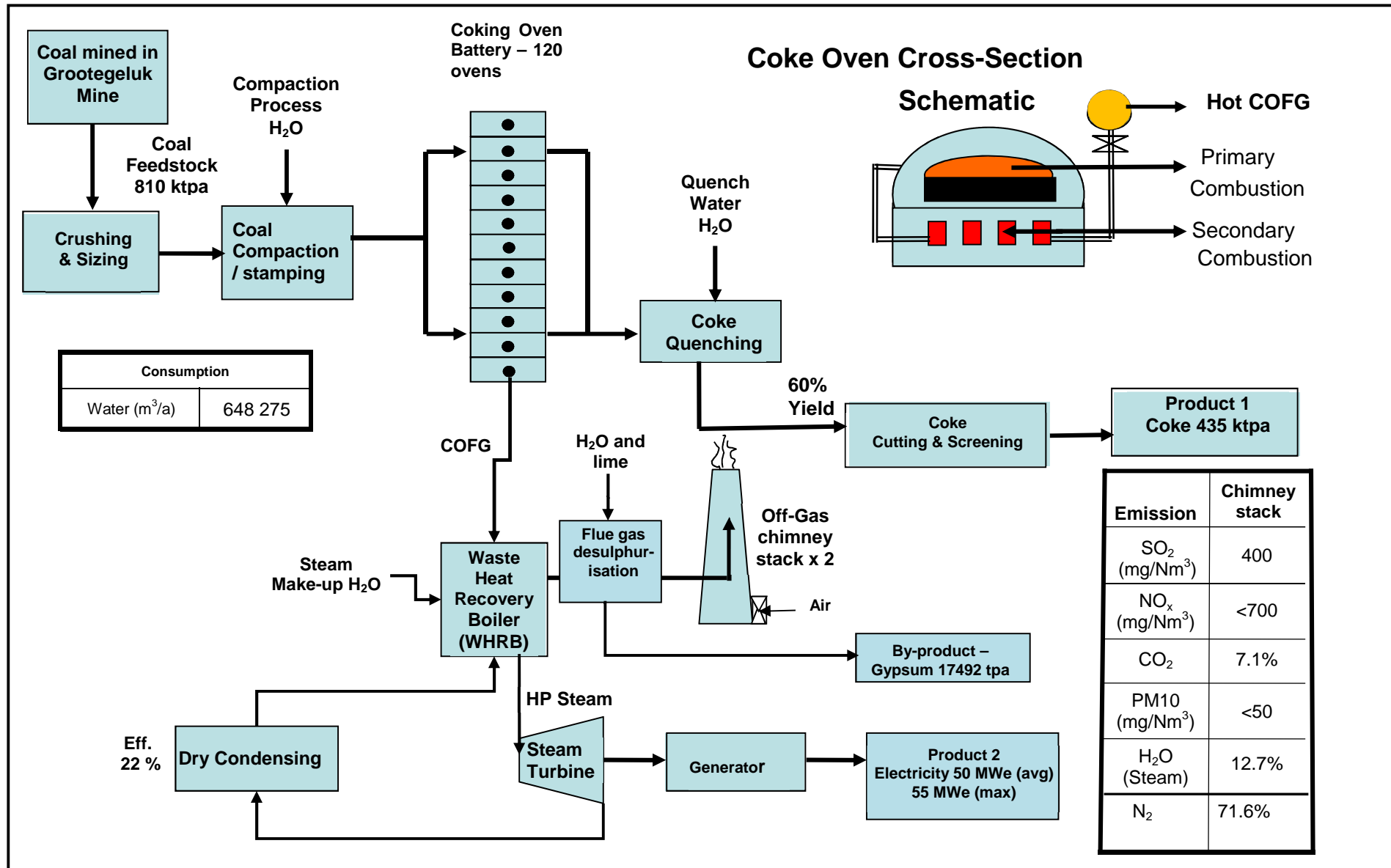


Figure 2.1: Schematic Market Coke and Co-Generation Power Plant – Process Block Diagram

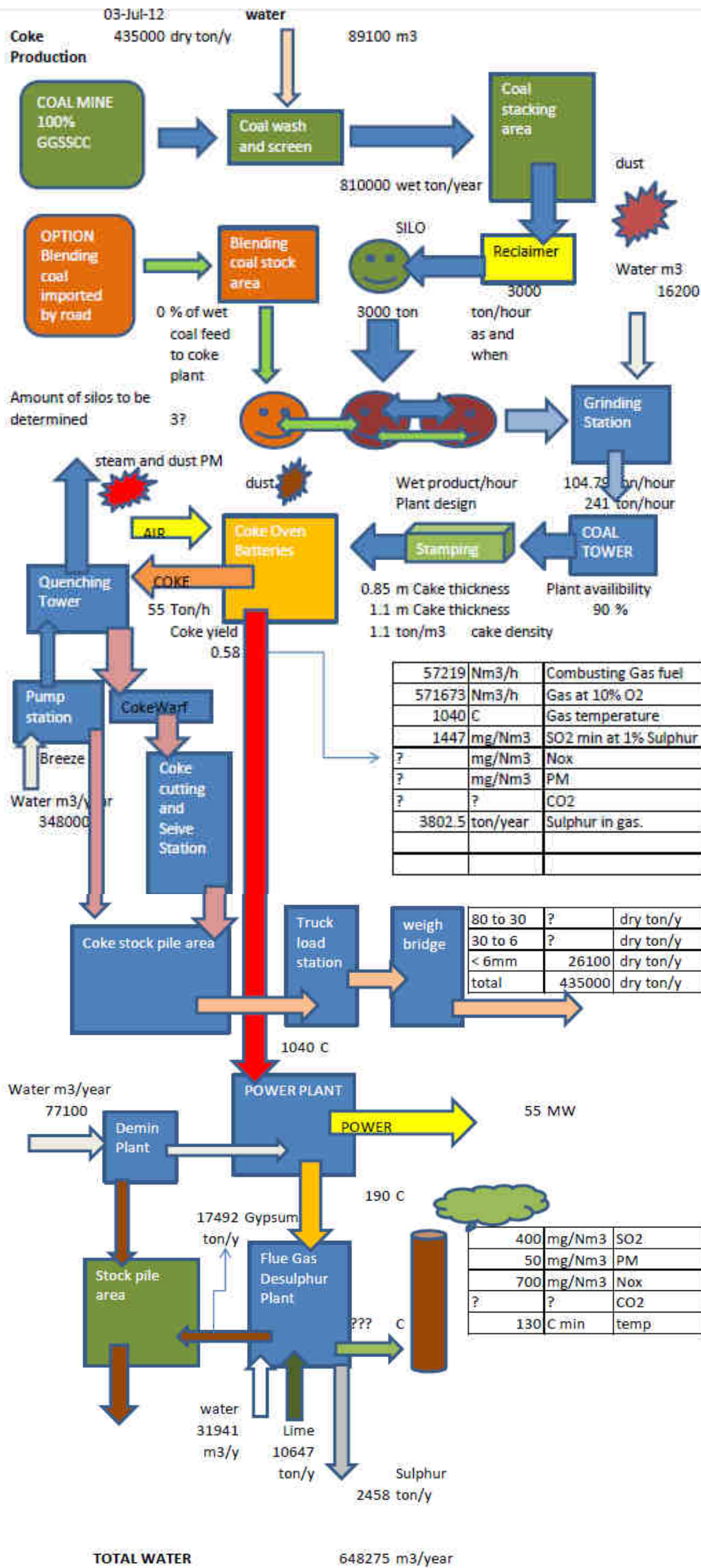


Figure 2.2: Process flow diagram for Market Coke and Co-Generation Power Plant (preliminary)

2.1.2 Market Coke Manufacturing Process

2.1.2.1 Coal Feed System

Exxaro Reductants intends to use the Grootegeluk Mine's semi-soft coking coal as the only feedstock to the plant. Using only one type of coal significantly simplifies the feedstock handling for the plant. The Market Coke oven plant will be supplied with coal from the existing Grootegeluk metallurgical coal stockpiles. The coal will be delivered to the coking coal silos via conveyor belts from the mine.

2.1.2.2 Coal Stockpiles and Storage

Storage of the coking coal will take place in two stages. The first stage will be in a concrete surge silo with a likely capacity of 3000 tonnes, which will be built along the route of the conveyor from the mine's washing and screening plant. From there it will be conveyed to 3 x 1000 ton (approximate) silos at the coke plant.

The second stage will be the conveying of the coking coal to the Market Coke Plant's two 1000 ton day-silos. The storing of coking coal in silos and not stockpiling is to limit ageing (oxidizing) of the coal so as to prevent deterioration of the coal's coking capabilities. Thus stockpiling is to be carefully managed and any storage will be of the first in, first out type. This implies feeding coal storage bins (hoppers) at the top and withdrawing material at the bottom.

The feed coal is crushed to obtain 80% smaller than 3 mm particle size. The coal is wetted to an optimum moisture content of normally 10% by mass. The coal is conveyed to the coal tower bin.

2.1.2.3 Coal Compaction

The quality of coke made from any given coal blend, can be dramatically improved by compacting the coal before feeding it into the oven. Coal is loaded from the coal tower into a compacting box where compaction takes place. This will involve the compression of the coal layers (refer to the example in Figure 2.3). Practical considerations of reliability, availability and operating constraints demand two compaction stations. There will be two stationary compaction stations placed next to one another in the middle of the coke oven battery.

Compaction, and consequently the strength of the resulting coal cake, is improved by increasing the moisture content of the crushed coal. The moisture content of the feed coal is controlled by the addition of water, providing an opportunity for disposal of contaminated water which can be used as compacting fluid and for coke quenching. Recycled, contaminated water will be used for this purpose, as the contaminants are destroyed in the coking process. The high temperatures in the oven, the passage of the gas and vapour combination through the high temperature coking zone and the high temperatures in the combustion process all combine to break down and oxidise any contaminants brought in by the water.

The size of the coal cake is determined by the size of the coke oven (refer to Figure 2.4 and Figure 2.5). Additional constraints on the coal cake size are the door design and the sizes and capacities of the push-charging and discharge machines and the quenching towers. Mechanical loading and unloading of the coal cakes limits the size to approximately 12 m in length. The thickness of the cake varies between 800 mm and 1100 mm and is governed by temperatures, coke oven floor conductivity, radiation from the oven dome, heat capacity of the oven and operating schedules and settings. A typical coal cake would have a mass between 30 and 45 tonnes with the wet density of the coal cake after compaction being up to 1.1 ton/m³.



Figure 2.3: Coal cake being compressed by stamping machine (Courtesy Sinosteel)



Figure 2.4: Part of a coke oven battery (similar to proposed Market Coke Plant).

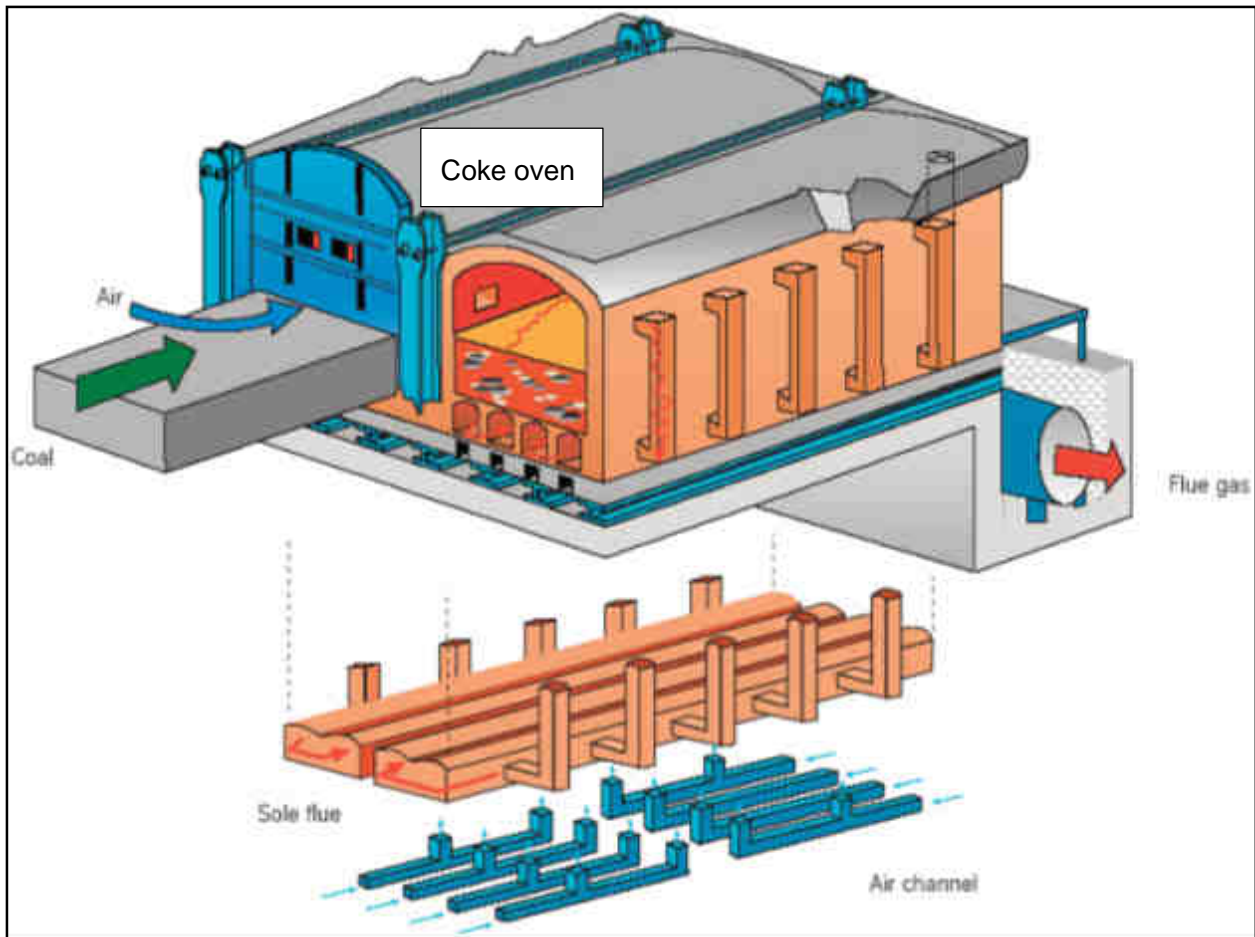


Figure 2.5: Proposed design of the Market Coke Plant coke ovens with underground common gas flue.

2.1.2.4 Loading the Coal Cake (Charging) and Unloading the Coal Cake (Pushing)

After stamping, the shaped and compacted coal cake is transferred to the charging / pushing car and is transported to the coke oven to be charged. The coke ovens are combined to form batteries (18 to 30 coke ovens form one battery) (see Figure 2.4) which are designed to give mechanical structural strength to contain the expansion of the ovens on heating.

Before charging (loading) an oven with a new coal cake, the coke already in the oven is pushed out onto the quenching car that is to receive the coke on the opposite side of the oven (refer to Figure 2.6 and Figure 2.7).



Figure 2.6: A coke cake which has been heated and is being pushed out of the coke oven (Courtesy Sinosteel).



Figure 2.7: A coke cake which has been pushed out of the coke oven onto the quenching car (Courtesy Sinosteel).

The oven is charged horizontally from the front with coal in the form of a stamped cake with dimensions to suit the oven. The combined charging / pushing machine loads and transports the coal cake to the selected oven, removes the coke oven door, checks with the control system for proper alignment of the quenching car, pushes out the coke already in the oven, pushes the new coal cake into the oven and closes the door (see Figure 2.8). The charging / pushing car is a large travelling machine (200 to 400 tonnes) running on rail tracks spaced about 10 to 15 m apart. It has a mechanism for opening oven

doors, a long ram for pushing the already coked cake out of the oven and a mechanism for charging the fresh stamped cake into the oven (shown in Figure 2.8).



Figure 2.8: Pushing/charging machine opening coke oven door. View of heated coke cake in oven (Courtesy Sinosteel)

The pushing-charging process is the one part of the coking cycle when pollutants (such as unburnt hydrocarbon gas) could be released to the outside air when the coke is pushed before complete coking has taken place. In the waste heat recovery type of coke oven, this problem has been greatly reduced, mainly by operating the coke oven under a slight negative pressure (vacuum) with positive draft. This negative pressure is much more easily maintained because there is no cooling water obstruction in the off-gas ducts.

2.1.2.5 Heating the Coal Cake

The coke heating time is mainly determined by the smallest dimension of the coal cake, and the coking temperature. Coke quality is partially dependent on attaining a high oven temperature. Insufficient time inside the oven causes the coke to release smoke and other pollutants when discharged too soon (so called “green coke”). The maximum achievable coking temperature is constrained by the oven construction. The coke is heated by the combustion of the volatile gas which is released from the coke during heating (refer to Figure 2.5). With the 37% volatile gas content of the Grootegeluk coking coal, the “fuel” energy (i.e. coke oven flue gas) for reaching high temperatures is available. Once the volatile gas has been driven off the coal cake, the cake should be kept at a temperature above 800°C for a number of hours to allow the sintering (solidifying) process to complete.

Figure 2.5 shows that above the coal cake there is an arched free space where the released vapours are partially combusted, heating the coal cake from above. The hot gas is drawn through side ducts to the space below the oven floor where all combustion takes place; controlled by the amount of air added. This process heats the coal cake from below by heat conducted through the coke oven floor. From the ducts below the floor, the hot gas is drawn into the flues that run across the length of the coke oven battery. The flues, also termed COFG ducts, conduct the hot gas to the WHRBs.

2.1.2.6 Quenching the Coke

Coke is pushed out of the oven by the pushing-charging car onto a quenching car (Figure 2.7). Coke is pushed from the oven red hot (temperatures higher than 900°C) and would burn away if not quenched. Quenching is done by stopping the quenching car under a quenching tower (Figure 2.9), where the load of coke is sprayed with water. Approximately 700 l of quenching water evaporates for each ton of coke quenched (shown in Figure 2.10). The remaining water condenses in the quenching tower and is recycled after particulates are removed by means of a settling pond. This is a convenient way of disposing of plant effluents, but most of the soluble contaminants remain. Once the concentration of pollutants becomes too high, the re-cycled water is added to coal cake as compaction fluid. The quenching cycle duration is controlled to adjust the moisture content of the quenched coke to the desired value.

The quenching system comprises pumps for quenching water, a quenching tower, settling tank and a means of extracting fine coke sediment from the quenching water, typically a moving chain grate system. A typical quenching tower would be between 20 m and 30 m high, the lower part of concrete with a steel structure for the top part (Figure 2.9).



Figure 2.9: Typical quenching tower with quenching car underneath the tower (similar to proposed Market Coke Plant) (Courtesy Sesa Goa Ltd).



Figure 2.10: Coke cake undergoing quenching (Courtesy Sinosteel).

2.1.2.7 Market Coke Processing

After quenching, the quenching car dumps the load of coke onto a coke wharf (see Figure 2.11). This comprises a door opening mechanism, coke receiving tank and control mechanisms. The bin receiving the hot coke measures about 15 m by 3.6 m by 1.3 m and can be tilted to more than 30 degrees. The two side plates and base plates are lined with heat-resistant cast iron sheet.



Figure 2.11: Discharging quenched coke on to a coke wharf (similar to proposed Market Coke Plant) (Courtesy Sinosteel).

Coke is discharged from the coke wharf onto the wharf discharge conveyor and transported to a cutting and screening plant. The sizing screen will be equipped with a double screening deck with an aperture of 80 and 30 mm. Coke is sold either as lumps of coke sized between 30 mm and 80 mm, or as fines - pieces smaller than 6 mm. Coke lumps larger than about 80 mm are cut with a coke cutter to required sizes. The coke will be stored in the different sizes. Depending on conditions, storage can be in separate bins or separate heaps. The stockpiles (shown in the plant layout Figures 3.1 and 3.2) will be located on a concrete base to facilitate the operation of a front-end loader in reclamation and feeding the screening plant. The coke product will be loaded onto trucks, weighed on a weighbridge and dispatched.

2.1.3 Electricity Co-generation from the Coking Process

In the energy recovery coke making process the volatile off-gas released during coal carbonisation is fully combusted in the coke oven by the controlled introduction of air (oxygen) to the different stages. The heat generated is used for coking the coal cake, so no external heating is required. The high temperatures and controlled addition of air combust the volatile hydrocarbon off-gas.

Only a portion of the heat generated by combustion is required for maintaining the coke oven temperatures for the coking process; the remaining heat is used downstream for raising steam in waste heat boilers. The steam is used to drive turbine-generators for generating electric power (refer to the process flow diagram in Figure 2.1).

2.1.3.1 Coke gas collection

A coke oven battery has large COFG ducts running the length of the battery (refer to Figure 2.5). All of the coke ovens in the battery discharge their hot off-gas into these flues. The flues transport the hot gas to the waste heat recovery boilers. In order to maximise the amount of energy that can be obtained from the gas, the flues are well-insulated and lined with refractory material. It is envisaged that each oven battery (of 30 ovens) will be equipped with a waste heat boiler.

2.1.3.2 Gas composition

COFG, which is produced during the heating of soft coking coal, is the primary source of energy available for co-generation. The expected temperature and flow rate of the gas is given in Table 2.1 below.

Table 2.1: Coke oven flue gas conditions at oven exit.

Description	Min	Max	Unit
COFG Temperature at Oven Exit	1100	1250	°C
COFG Volumetric Flow Rate per Oven	1940	2143	Nm ³ /hr

After combustion, the COFG exits the WHRBs with a temperature of 130 °C minimum at a rate of 488 530 Am³/h. After desulphurizing and dust filtering the gas will exit the two boiler chimneys at a height of 50 m above the ground. The chimney stacks will be 5 m wide at the base and 2.5 m wide at the tip.

The flue gases which exit the WHRBs contain relatively high concentrations of sulphur dioxide (SO₂). In order to decrease the SO₂ gas emissions, the flue gas will pass through a Flue-Gas Desulphurisation (FGD) Plant where the majority of the SO₂ will be removed. The removal of SO₂ in the FGD plant occurs through a semi-dry recirculating fluidized bed scrubbing process, which involves spraying the flue gas

with a scrubbing liquid so as to remove the SO₂. A lime (Calcium carbonate, CaCO₃) scrubbing reagent will be used for the wet scrubbing which will produce calcium sulphate (CaSO₄). The calcium sulphate (more commonly known as gypsum) will form a by-product which will be sold.

The following estimated gas and dust levels (see Table 2.2) will exit the boiler chimney stacks after flue gas desulphurisation. The coke oven flue gas has no calorific value.

Table 2.2: Gas and Dust Levels in emissions from COFG after flue gas desulphurisation and WHRB Heat Extraction.

Description	Value	Unit
Sulphur Dioxide (SO ₂)	400	mg/Nm ³
Nitrogen Oxides (NO _x)	700	mg/Nm ³
Dust (PM ₁₀)	50	mg/Nm ³
Hydrogen Sulphide (H ₂ S)	0	mg/Nm ³
Carbon dioxide (CO ₂)	7.1%	%

2.1.4 Steam System

The steam header and power generation system includes the waste heat recovery boilers, turbines, generators, ducting, pumps, piping, cladding and associated equipment such as valves, electrical switch gear, automation, instrumentation, de-aerators, dust disposal systems, fans, stacks, dry cooling condensers and water demineralisation treatment plants.

The design of the boilers requires all the gas to be completely combusted in the coke ovens. The steam produced by heating water in the boilers drives the turbines. Four 80 MWt (thermal energy) boilers will be installed which will provide heat for the 55 MWe (electrical energy) rated capacity turbines. The nominal electrical power output is estimated at 50 MWe.

2.1.4.1 Condensers and cooling

The preferred method for cooling the condensers of the co-generation plant, will be dry cooling, due to the scarcity of water in the region.

2.1.4.2 Electricity transmission

The electricity supply to the Grootegeluk Mine (and therefore to the project site) is through a 132 kV overhead line from the nearby Eskom Matimba power station. Dual 33 kV overhead lines are used for site distribution. The main Grootegeluk transformer sub-station capacity was recently upgraded with the addition of another 80 kVA transformer rendering total capacity of 160kVA. The Co-generation Plant will make use of the existing power distribution network at the Grootegeluk Mine.

2.1.5 Market Coke and Co-generation Plant Infrastructure and Equipment

Infrastructure and equipment associated with the Market Coke and Co-generation Plant that will be constructed as part of this project includes:

2.1.5.1 Market Coke Plant

- Coal storage and reclaiming
- Coal conveyor to Market Coke plant;
- Coal storage silos and hoppers;
- Coal compacting box;

- Hydraulic coal compactor;
- Four coke oven batteries comprising 30 ovens each, i.e. a total of 120 coke ovens;
- Pushing/charging car;
- Coke quenching car;
- Coke quenching tower;
- Coke wharf;
- Coke quench water settling ponds;
- Expansion to existing PCD;
- Coke product stockpile;
- Coke conveyor to screening plant;
- Screening plant;
- Truck loading bins;
- The COFG system;
- Internal roads and pipelines for water, storm water and sewage.

2.1.5.2 Co-generation Plant

- The steam system (waste heat boilers, , turbines, generators and dry condensing system);
- Water demineralization treatment plant, feed water pumps, control and instrumentation switchgear and equipment;
- The electricity generating plant, buildings and associated infrastructure;
- COFG desulphurisation plant (off gas treatment system);
- Exhaust gas dust cyclone and bag filter system;
- Chimney stacks;
- The connecting and transmission equipment;
- Utilities – water, electricity, diesel (for back-up generators).

Other infrastructure such as admin offices, stores and a workshop will also be constructed.

Two new workshops may be constructed, one for plant maintenance and one for the maintenance of the steam turbines and generating plant. They will be located in close proximity to the plants they are to serve. The coke oven workshop will make provision for the maintenance of the coke ovens, conveyors, coal crushers, battery machines and associated plant. The electricity generating plant workshop will make provision for the specialised demands made by the maintenance of plant like steam turbines, large generators, high tension switchgear and control gear for the co-generation system.

2.1.5.3 Reductants Entrance Gate

The new Reductant Entrance Gate will comprise the following structures (refer to Figure 3.15):

- A truck parking area with 6 truck bays;
- A car parking area with 15 car parking bays;
- A reception office which will include a small kitchen, ablution facilities and offices;
- Fencing around the parking and reception areas.

The roads going to and from the new entrance gate have already received environmental authorisation as part of a separate project. Thus the construction of roads at the entrance gate are excluded from this project.

2.1.6 Market Coke and Co-generation Plant Services

The majority of the utilities required for the Market Coke and Co-generation Plant are supplied through the Grootegeluk Mine infrastructure.

2.1.6.1 Water

The Grootegeluk Mine has an allocation of 7.6 million m³ per annum of raw water from the Mokolo Dam of which 1.6 million m³ per annum has been allocated to the Market Coke and Co-generation Plant. The Market Coke and Co-generation Projects when running at full capacity will require approximately 1.5 million m³ of water per annum. This amount of water is available from the mine's raw water supply line and a supplementary source will not be required.

Potable water, raw water and process water will be supplied to the Market Coke and Co-generation Plant via HDPE pipelines.

Potable water

Potable water is used for domestic purposes and washing of small plant spares at the workshop. Potable water is currently supplied to the mine and the Municipality of Lephalale from the Zeeland purification works.

Raw and Process Water

Raw water is suitable for use as process water, though the water for the boilers is demineralised and stabilized in accordance with steam standards and recirculated in the steam cycle. Approximately 1-3% of water used in the steam cycle, is used during boiler blow-down and or turbine control operations.

The boiler / steam turbine systems will be closed re-circulatory systems fed with demineralised water. The demineralised water will be obtained from an on-site demineralisation plant. The effluent from the demineralisation plant (brine) will be added to the water used in the quenching towers of the Market Coke plant and or used in the semi-dry flue gas desulphurization process.

2.1.6.2 Storm Water Runoff and Pollution Control

Run-off from plant areas are classified as polluted water and will be contained in the existing PCD (part of the adjacent Char Plant Site) and the proposed new PCD Extension (adjacent to the existing PCD) at the plant site. Water from the Market Coke and Co-generation Plant area will be directed to the PCD and PCD extension and recycled as part of process water. The PCD extension will also be lined with a 2 mm thick HDPE liner on a compacted clay liner, with sub-soil drainage below the liner system. Storm water channels will consist for the most part of natural earth channels and concrete-lined V-drains. Concrete culverts will be provided at road crossings.

Run-off from the areas outside the plant is classified as unpolluted water and will be prevented from running through the plant site by means of cut-off berms and catchments dams. Concrete culverts will be provided underneath roadways.

Water entering the Market Coke Plant will be retained in the system and will only exit the plant as moisture in the coke product, steam from the coke quenching towers and as moisture in the stack discharge. The plant will have no effluent water leaving the process, as all contaminated water will be treated in the PCDs. Due to re-circulation in the quenching towers the water quality will deteriorate to such extent that corrosion and scaling could occur. The cooling tower design makes provision for this and the water will not require further treatment.

2.1.6.3 Sewage

The domestic waste water system for the Market Coke Plant and Co-generation plant, will be integrated with the existing mine system. The sewage for the Market Coke and Co-generation Plant will be collected in an existing sump at the existing Char Manufacturing Plant. This sump has capacity for a total of 300 people and thus has sufficient capacity to also handle the increased demand. From the sump, two pumps (one duty and one standby – already installed) will pump the sewage via the existing 100 mm diameter HDPE pipeline to the Grootegeluk Waste Water Treatment Works (WWTW).

2.1.6.4 General Waste Management

Solid waste has the potential to impact on surface water through contaminated runoff and the generation of leachate. The waste management proposed for the site is discussed below. The following sources will generate waste on the site:

- Site offices
- Workshops

It is anticipated that both hazardous and general waste will be produced. General and hazardous waste disposal will tie in with the current practices and facilities of the existing Char Manufacturing Plant, adjacent to the Market Coke and Co-generation Plant.

Currently the domestic waste from the existing Char Manufacturing Plant is collected by the Grootegeluk Mine Services Department and taken to the Lephalale Municipal Landfill site for disposal. The Waterberg District Municipality's Integrated Waste Management Plan (IWMP) (2009) indicates that there are unfortunately no permitted landfill sites in Lephalale. The IWMP states that the Waterberg District Municipality has a role to ensure that waste management systems are in place in all its local municipalities.

This same practice will be followed for the Market Coke and Co-generation Plant. The colour coded bin system that is implemented by the existing Char Manufacturing Plant for the recycling of paper, glass, plastic and tins will also be implemented for the Market Coke and Co-generation Plant. The scrap metal produced will also be included in the current contract with Reclam, where the scrap metal is collected in skips and removed from site for processing. All other, commercial, industrial waste, builders' rubble and other waste classified as General Waste (G) under the South African Minimum Requirements for waste disposal (Department of Water Affairs and Forestry, 1998) will be removed from the site by an appropriately licensed waste removal contractor and disposed of at a licensed general waste facility.

2.1.6.5 Hazardous Waste Management

Some of the waste classified as hazardous (H or h), including grease, oils, acids, fluorescent tubes, medical waste etc. of the Market Coke and Co-generation Plant will also be handled and disposed of by the existing Char Manufacturing Plant through their existing systems which will involve disposing of the waste at a licensed hazardous waste site through an authorized Hazardous Waste Service provider like Wastech or Wasteman.

As mentioned previously, a waste management licence (WML) is not required for this project as it does not include any waste management listed activities. The general and hazardous waste stored temporarily on site will not be in sufficient quantities to require a WML.

2.2 Project Implementation Schedule

Construction of the Market Coke and Co-generation Plant is due to begin in July 2013 and operation of

the plants is scheduled to begin in July 2016.

The initial phase of construction (this project) will produce 435 000 tons of coke per annum from 120 coke ovens. Expansions in increments may be proposed in future, up to a production of 1 000 000 tons *per annum*.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

Section 4 of the Environmental Impact Assessment Report (Volume 1) provides a description of the affected environment.

4 ENVIRONMENTAL MANAGEMENT PROGRAMME

4.1 Aims

The aim of the EMP is to detail the actions required to effectively implement the mitigation measures identified in the environmental impact assessment (EIA). These actions are required to minimise negative impacts and enhance positive impacts associated with the operation of the Market Coke and Co-generation Plant. This includes operations throughout the life of the plant, including the construction, operation, decommissioning and post closure phases.

The EMP gives the commitments, which form the environmental contract between Exxaro Reductants and the LEDET.

It is important to note that an EMP is a living document in that it will be updated and amended as new information (e.g. environmental data), policies, authority guidelines and technologies become available.

4.2 Objectives

Specific objectives are given for each of the actions described in the EMP. These objectives relate directly to addressing the impacts identified in the EIA.

4.3 Management Actions

The various actions that need to be implemented in order to ensure that environmental objectives are met are described in the EMP. Each action is given a Reference number. The actions are measurable and are therefore easy to monitor. Compliance with the EMP can thus also be audited.

4.4 Roles and Responsibilities

It is the responsibility of Exxaro Reductants to implement the EMP and to make sure that all the actions are carried out. The successful implementation of the EMP is however dependent on clearly defined roles and responsibilities for each of the management actions given. Roles have been ascribed to the following parties:

Market Coke and Co-generation Plant Manager / Reductants Plants Business Unit Manager:	The person, from Exxaro Reductants, responsible for the overall management of the proposed Market Coke and Co-generation Plant including its construction, operational, decommissioning and post closure phases. Takes overall responsibility for implementation of the EMP.
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Environmental Practitioner:	Environmental Scientist responsible for: <ul style="list-style-type: none"> • Overseeing day to day compliance with the EMP by the contractor's staff and sub-contractors and their staff; • Issuing instructions to remediate non-compliance; • Conducting regular inspection meeting with the Project Manager to report on compliance; • Report non-compliance to the Reductants Plants Business Unit Manager.
Environmental Compliance Officer (ECO):	Responsible for monitoring all environmental aspects relating to the construction phase and auditing construction activities to ensure compliance with this EMP, the Environmental Authorisation and other environmental licences. Report non-compliance to the Environmental Practitioner.
Operations Manager:	Engineer appointed to manage and oversee all Market Coke and Co-generation Plant operations.
Supervisor:	Persons responsible for work teams.
Public Relations Officer:	A designated person to deal with public issues.
Contractors:	Organisations or individuals that contracts with Exxaro Reductants for construction, maintenance, or any other activities required on the Market Coke and Co-generation Plant site during the life of the plant.
Human Resources Manager	Person responsible for employment of persons at the Market Coke and Co-generation Plant.
Procurement Manager:	Responsible for coordinating purchasing of goods and services on behalf of the Plant.

4.5 Schedule

The time period for implementation serves to give the time frame for the environmental action to commence. It is not always possible to implement an action immediately as some actions require planning and the availability of financial and/or human resources before they can be implemented. The successful commencement of the committed action within the specified time frame is to be monitored.

The time periods have been divided into the project phases i.e. Planning and Design, Construction, Operation, Decommissioning and Post Closure. However, certain environmental actions will take place during more than one phase. Where this is the case, it has been stated in the time period column.

4.6 Requirements for Implementation

This component of the EMP details what is required for the action to be implemented successfully. This includes equipment, supplementary documentation, protocols and additional actions that may need to be put into place.

4.7 Protocols and Procedures

Protocols and procedures are developed to supplement the actions given in the EMP and provide a detailed description of how the action is to be implemented. Note that the protocols and procedures are not included as part of the EMP as these are working documents subject to regular updates. These documents are however to be audited as part of the compliance monitoring.

5 ENVIRONMENTAL MANAGEMENT PROGRAMME

5.1 Planning and Design

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
1. AIR QUALITY					
Objective: To ensure adequate planning regarding dust management prior to the construction phase.					
1.1.	Plan methods for the management of dust at coal feedstock and coke product handling areas and on gravel roads.	Reductants Business Manager Plants Unit	Prior to construction	Dust management plan (Appendix 13)	Not included in original EMP.
1.2.	Process design for the Market Coke and Co-generation Plant must ensure that air emissions comply with current atmospheric emission limits in South Africa.	Reductants Business Manager Plants Unit	Prior to construction	Suitable engineering designs to plan for the management of this impact.	Not included in original EMP.
2. SOILS AND GROUNDWATER RESOURCES					
Objective: Protection of utilisable soils and preventing contamination of groundwater.					
2.1.	Plan for impervious surfaces, bunding and dirty water management areas.	Reductants Business Manager Plants Unit	Prior to construction	Suitable engineering designs to plan for the management of this impact.	Not included in original EMP.
2.2.	Plan for facilities for the management of general and hazardous waste.	Reductants Business Manager Plants Unit	Prior to construction	Suitable engineering designs to plan for the management of this impact.	Not included in original EMP.
2.3.	Waste management procedure to be developed including the management of builders' rubble and recyclable wastes.	Reductants Business Manager Plants Unit	Prior to construction	Waste management procedure	Not included in original EMP.
2.4.	Agreements to be sought with the Grootegeluk Mine for the use of sewage treatment facilities.	Reductants Business Manager Plants Unit	Prior to construction	Service agreement with Grootegeluk Mine.	Not included in original EMP.
2.5.	Planning to include provision for the development of topsoil stockpiles (for uncontaminated topsoil).	Reductants Business Manager Plants Unit	Prior to construction	Plant layout to provide for a topsoil stockpile area.	Not included in original EMP.
Objective: To prevent any impact on the Market Coke and Co-generation Plant in terms of geotechnical instability due to high ground water table of the site and immediate surrounding area.					
2.6.	If necessary, appropriate measures will be implemented to ensure the geotechnical stability of the Market Coke and Co-generation Plant due to the high groundwater table.	Reductants Business Manager Plants Unit	As required	Consult a geotechnical engineer.	5.7 (c)
2.7.	Groundwater abstraction could be implemented in order to reduce the level of the groundwater table. The abstracted groundwater could be utilised for dust	Reductants Business Manager Plants Unit	As required	Consult a geohydrologist.	5.7 (d)

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
	suppression during the construction phase or in the Market Coke and Co-generation Plant.	Manager			
2.8.	If ground water abstraction is implemented, then the appropriate water use licence in terms of the National Water Act, 1998 (Act 36 of 1998) must be obtained.	Environmental Practitioner	As required	N/A	5.7 (e)
3. SURFACE WATER QUALITY					
Objective: To ensure adequate planning regarding potential impacts on surface water prior to the construction phase.					
3.1.	The storm water management measures for the Market Coke and Co-generation Plant must be designed by a suitably qualified person and in accordance with the requirements of Regulation GN 704, dated June 1999, under the National Water Act, 1998 (Act 36 of 1998).	Reductants Plants Business Unit Manager	Prior to construction	Specialist surface water engineer to compile a surface water (incl. storm water) management report.	5.2 (d); 5.6 (f)
3.2.	Storm water management for construction must be planned.	Reductants Plants Business Unit Manager	Prior to construction	Ensure that there are designs of suitable structures to contain stormwater runoff.	Not included in original EMP.
4. LAND USE					
Objective: To ensure adequate financial provision for Plant rehabilitation.					
4.1.	Financial provision for rehabilitation of the Market Coke and Co-generation Plant must be made.	Reductants Plants Business Unit Manager	Prior to construction	Assessment of financial provision (Refer to Appendix 10). Making of financial provision.	Not included in original EMP.
5. ENVIRONMENTAL AWARENESS AND TRAINING					
Objective: To ensure that all persons working at the Plant are aware of the objectives of the EMP as well as the consequences of their individual actions					
5.1.	Environmental induction training material must be ready prior to construction period for use in environmental induction training.	Environmental Practitioner	Prior to construction	Review of environmental training requirements.	Not included in original EMP.
5.2.	Where necessary, Exxaro Reductants must develop Environmental Procedures to give effect to the commitments of the EMP.	Environmental Practitioner	Prior to construction	Review of EMP commitments.	Not included in original EMP.
5.3.	Exxaro Reductants procurement contracts to make provision for compliance with EMP by all contractors.	Reductants Plants Business Unit Manager	Prior to construction	Appropriate procurement contract	Not included in original EMP.
6. ENVIRONMENTAL LEGAL COMPLIANCE					
Objective: To ensure the Market Coke and Co-generation Plant is environmentally legally compliant					
6.1.	Exxaro Reductants to make provision for suitably qualified personnel to oversee and monitor EMP compliance during construction and operations (ECO).	Environmental Practitioner	Prior to start of construction.	Appointment of ECO.	Not included in original EMP.
6.2.	Any operational changes or new projects at the Market Coke and Co-generation Plant must be reviewed by a suitably qualified person to ensure the necessary environmental authorisation procedures.	Environmental Practitioner	Prior to operational changes or new projects.	Review of environmental legislation.	Not included in original EMP.

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
6.3.	Exxaro Reductants must ensure overall environmental legal compliance with all relevant legislation.	Environmental Practitioner	Prior to construction.	Review of environmental legislation.	Not included in original EMP.

5.2 Construction

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
7. ENVIRONMENTAL AWARENESS AND TRAINING					
Objective: To ensure that all persons working at the Plant are aware of the objectives of the EMP as well as the consequences of their individual actions					
7.1.	Environmental induction training must be provided to all persons undertaking work at the Market Coke and Co-generation Plant (to be incorporated into normal induction training) including permanent workers, contractors and consultants. As part of the induction all workers on site must be made aware of the conditions of the EMP.	Reductants Plants Business Unit Manager	Prior to site establishment. For all new personnel.	Environmental induction and training material	5.15 (b)
7.2.	All employees and contractors should be exposed to the environmental awareness programme.	Reductants Plants Business Unit Manager	Prior to site establishment.	Environmental awareness plan (Appendix 10)	Not included in original EMP.
7.3.	Compliance with the EMP must be included as a contractual condition in any contract with a contractor.	Reductants Plants Business Unit Manager	In tender documentation	Condition in contract	Not included in original EMP.
7.4.	All contractors must be provided with a copy of the EMP and all Environmental emergency procedures. Compliance with the EMP must be included as a contractual condition in contract with any contractor	Reductants Plants Business Unit Manager	On appointment of each contractor	EMP Environmental emergency procedures	Not included in original EMP.
8. ENVIRONMENTAL MONITORING					
Objective: To recognise impacts on air, ground and surface water resources in the area.					
8.1.	All groundwater monitoring points for the plant shall be monitored. Boreholes to be monitored include WBR 50, WBR 57 and WBR 43. Both groundwater level and groundwater quality are to be measured.	Environmental Practitioner	Quarterly	Groundwater monitoring schedule, protocol and equipment.	Not included in original EMP.
8.2.	All surface water quality monitoring points for the plant shall be monitored. Sampling points include the Pollution Control Dam (PCD), PCD extension and the Bosbok Dam.	Environmental Practitioner	Quarterly	Surface water monitoring schedule, protocol and equipment.	Not included in original EMP.
8.3.	All sampling is to be conducted by suitably qualified and competent persons using appropriate sampling techniques. All samples will be analysed at an	Environmental Practitioner	Quarterly	Check qualifications and competency of persons conducting sampling. Analysis of	Not included in original EMP.

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
	accredited, independent laboratory for chemical and physical constituents normally associated with the presence of coal and carbonaceous material, as well as those which are specific to Market Coke and Co-generation Plant operations, or which are specified in the relevant environmental authorisations.			samples by an accredited laboratory.	
8.4.	Records of monitoring must be kept for the site.	Environmental Practitioner	During construction	Record-keeping.	5.7 (i)
8.5.	Monitoring results must be made available to the Reductants Plants Business Unit Manager on a monthly basis. Potential negative impacts should be identified and addressed as soon as possible.	Environmental Practitioner	During construction	Record-keeping.	5.7 (j)
9. EMP COMPLIANCE					
Objective: To ensure implementation of the required management measures and to ensure compliance with the EMP					
9.1.	A copy of the EMP and all environmental authorisations must be kept at the main site office.	Reductants Plants Business Unit Manager	During Construction	EMP, licences and authorisations,	Not included in original EMP.
9.2.	Each contractor must keep a copy of the EMP at their office and this copy must be available to their staff.	Contractor	Throughout length of contract.	EMP	Not included in original EMP.
9.3.	Contractors must comply with the EMP where it applies to the nature of their activities and their contract with Exxaro Reductants.	Contractor	Throughout the duration of the contract.	Appropriate contract with contractors.	Not included in original EMP.
9.4.	Contractors must implement any procedures and written EMP instructions issued to them by Exxaro Reductants.	Contractor	Throughout the duration of the contract.	Appropriate instructions and contract with contractors.	Not included in original EMP.
9.5.	Contractors must not deviate from the EMP or written instructions without approval from Exxaro Reductants.	Contractor	Throughout the duration of the contract.	Appropriate contract with contractors.	Not included in original EMP.
9.6.	A daily site diary must be kept by each contractor to record any environmental incidents for the day. Environmental incidents must be rectified and reported to the Environmental Practitioner.	Contractor	Throughout the duration of the contract.	Contractor's Environmental site diary	Not included in original EMP.
9.7.	Exxaro Reductants must appoint, in writing, a capable and suitably qualified ECO to monitor all environmental aspects and EMP compliance.	Environmental Practitioner	During construction	Appointment of ECO.	5.15 (a)
9.8.	The ECO will monitor and audit the construction activities to ensure compliance with this EMP and the Environmental Authorisation.	Environmental Compliance Officer	Weekly during construction	EMP Monitoring and auditing. Record-keeping.	5.15 (b)
9.9.	A register of all environmental incidents is to be maintained. The Environmental Practitioner is to be notified of all environmental incidents.	Environmental Practitioner	During construction	Environmental incident register.	Not included in original EMP.
9.10.	All environmental incidents must be investigated to assess: the cause; the effectiveness of the response; the actions taken to rectify the damage and	Environmental Practitioner	For each incident	Environmental incident report.	Not included in original EMP.

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
	measures needed to prevent recurrence. A close-out report must be compiled.				
9.11.	Records relating to the compliance and non-compliance with the conditions of the EMP and Environmental Authorisation will be kept in good order. Such records will be available for inspection at the site office and must be made available to the relevant government departments within seven (7) working days of the date of the written request by the Department for such records.	Environmental Practitioner	During construction	Environmental compliance records.	5.15 (c), 5.15 (e) and 5.15 (f)
10. ENVIRONMENTAL EMERGENCIES AND RISKS					
Objective: To minimise the risk for environmental emergencies occurring and implement controls to deal with situations, should they occur.					
10.1.	Risk assessments are to be undertaken for all construction facilities and activities. Environmental emergency procedures are to be developed in response to potential risks.	Environmental Practitioner	Prior to site establishment. For any new activity or facility.	Risk assessments Environmental emergency procedures (Appendix 10)	Not included in original EMP.
11. GROUNDWATER RESOURCES					
Objective: To reduce the potential impact on the groundwater associated with the site.					
11.1.	The excavated coal layer/carbonaceous material (from the disused coal stockpile) must be removed from the Market Coke and Co-generation Plant site and either returned to the Grootegeluk beneficiation plants or disposed of on the Grootegeluk discard dumps where there is no risk of combustion. The coal/carbonaceous material may not be stockpiled on the surrounding area.	Reductants Plants Business Unit Manager	Commencement of construction	Discussions with Grootegeluk Mine to locate a suitable position for the material.	5.7 (a)
11.2.	Remove the upper soil layer to a depth of 60 cm, where contamination has been identified (Refer to the report by Golder, 2011 – Appendix 2 of the EIA). The contaminated soil must be disposed of on the Grootegeluk Mine discard dumps. Uncontaminated soil should be stockpiled separately for use in rehabilitation.	Environmental Practitioner	Commencement of construction	Discussions with Grootegeluk Mine to locate a suitable position for the material.	5.3 (c)
11.3.	An appropriate sewage system (e.g. Biogeza or Lily put system) will be implemented for the plant in order to reduce any potential impact on the groundwater environment. This system will have sufficient capacity. THIS MITIGATION MEASURE FROM THE ORIGINAL APPROVED EMP IS NO LONGER REQUIRED AS THE SEWAGE WILL BE PUMPED TO THE GROOTEDELUK MINE FOR TREATMENT IN THEIR SEWAGE TREATMENT PLANT.	Reductants Plants Business Unit Manager	During construction	N/A	5.7 (g)
11.4.	Chemical toilets will be provided for construction personnel during the construction phase if the sewage system is found to be insufficient for the number of people on site during construction.	Reductants Plants Business Unit Manager/ Procurement Manager	During construction	Estimation of sewerage system capacity and personnel numbers on site.	5.7 (f)

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
11.5.	Water use is to comply with water use licensing requirements.	Reductants Plants Business Unit Manager	During construction	A copy of the water use licence and regular compliance monitoring.	Not included in original EMP.
12. SURFACE WATER RESOURCES					
Objective: To reduce the potential impact on surface water run-off and reduce water consumption.					
12.1.	Appropriate storm water control measures must be provided for the site, and must comply with the GN704 Regulations on the Use of Water for Mining and Related activities.	Reductants Plants Business Unit Manager	During construction	Designs done according to specifications by a suitably qualified surface water engineer.	5.2 (b); 5.6 (d)
12.2.	A storm water cut-off drain according to the GN704 Regulations must be constructed and maintained around the site.	Reductants Plants Business Unit Manager	During construction	Designs done according to specifications by a suitably qualified surface water engineer.	5.2. (c); 5.6 (e)
12.3.	Designed storm water management measures will be implemented to contain all contaminated runoff generated within the dirty water management area.	Reductants Plants Business Unit Manager	During construction	Designs done according to specifications by a suitably qualified surface water engineer.	5.6 (g)
12.4.	No construction of any water management facilities will be undertaken with any material (such as coal residue or other carbonaceous material) that may cause pollution of water resources.	Reductants Plants Business Unit Manager	During construction	Obtain suitable material for the construction of these facilities.	5.2 (e), 5.6 (h)
12.5.	Sediment originating from construction activities is to be removed from storm water by installing sediment traps.	Reductants Plants Business Unit Manager	During construction	Sediment traps to be included in designs done according to specifications by a suitably qualified surface water engineer.	Not included in original EMP.
12.6.	Uncontrolled discharge of any contaminants such as fuels, oils, detergents, cement and organic materials into any watercourse or storm water drain is prohibited.	Reductants Plants Business Unit Manager	During construction	Include in environmental induction and training material	Not included in original EMP.
12.7.	Grey water from the office, kitchen and bathrooms shall be discharged into the sewage system for treatment.	Reductants Plants Business Unit Manager	During construction	The water reticulation infrastructure must be appropriately designed.	Not included in original EMP.
12.8.	Water used for dust suppression shall be in quantities small enough not to generate significant run-off.	Reductants Plants Business Unit Manager	During construction	Monitoring of dust suppression activities.	Not included in original EMP.
13. SOIL AND LAND CAPABILITIES					
Objective: To ensure that construction activities have the least impact on the apedal sandy soils in terms of soil quality, structure and erosion potential					
13.1.	The proposed Market Coke and Co-generation Plant site must be pegged out and fenced. All construction activities must take place within this area to limit the extent of impacts.	Reductants Plants Business Unit Manager	Prior to and during construction	Fencing and layout map showing site boundary.	5.2 (a); 5.3 (a); 5.5 (a); 5.6 (a) (b)
13.2.	If any non-contaminated soils are found on site, the upper 70 cm of soils should be removed and stockpiled for use in rehabilitation.	Environmental Practitioner	Commencement of construction	Designated topsoil storage area.	Not included in original EMP.

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
13.3.	Once the construction activity has been completed, the remaining disturbed area which will not be used must be topsoiled, sloped and re-vegetated as soon as possible using suitable grass species.	Environmental Practitioner	During and post construction	Topsoil, suitable grass seeds.	5.3.(e)
13.4.	The topsoil will be analysed to determine imbalances prior to the replacement of soil. Inorganic fertilisers will be used to supplement the soils before seeding of the area takes place.	Environmental Practitioner	As required	Topsoil analysis, inorganic fertilisers. Designated area for the safe storage of fertilisers.	5.3 (f)
13.5.	Appropriate soil conservation measures will be provided in order to prevent soil erosion and loss of topsoil.	Environmental Practitioner	Prior and during construction	N/A	5.3.(g)
13.6.	Topsoil stockpiles must be sloped to 1:3. No soil stockpile must be higher than 15 m.	Environmental Practitioner	During soils stockpiling	Topsoil benching and sloping.	Not included in original EMP.
13.7.	Topsoil stockpiles, that will be in place for longer than 3 months must be protected through seeding as soon as possible.	Environmental Practitioner	During soil stockpiling, within 30 days of stockpile formation	Suitable grass seeds.	Not included in original EMP.
13.8.	Topsoil which is contaminated may not be utilised as fill material. It must be suitably disposed of.	Environmental Practitioner	During and post construction.	Suitable disposal location must be found.	Not included in original EMP.
13.9.	All roads and compacted areas used during construction (which are not required for operation) are to be ripped and the establishment of vegetation promoted.	Contractor and Reductants Business Manager Plants Unit	After construction is complete.	Machine which can rip the soil.	Not included in original EMP.
13.10.	All infrastructure including foundations and concrete surfaces that will not be used during Market Coke and Co-generation Plant operations must be removed from site.	Contractor and Reductants Business Manager Plants Unit	After construction is complete.	Demolition equipment.	Not included in original EMP.
14. BIODIVERSITY (FAUNA AND FLORA)					
Objective: To reduce the potential impact on the surrounding vegetation and animal life.					
14.1.	Vegetation clearance must be restricted to footprint areas required for the development of the Plant.	Reductants Business Manager Plants Unit	Commencement of construction	Layout map showing areas to be cleared.	Not included in original EMP.
14.2.	All contractors/ employees will be informed that no hunting/poaching/trapping of animals will be allowed.	Environmental Practitioner	Commencement of construction	Induction and environmental training.	5.5 - Construction Phase (d)
14.3.	All contractors/employees will be informed that no fires will be permitted on site or adjacent to the site.	Environmental Practitioner	Commencement of construction	Appropriate signage Induction and environmental training	5.5 - Construction Phase (e)
14.4.	All contractors/employees will be informed that the collection of plant material or the picking of plants on site or the surrounds is prohibited.	Environmental Practitioner	Commencement of construction	Induction and environmental training.	Not included in original EMP.

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
14.5.	Dust suppression will be practiced in order to prevent airborne deposition on the surrounding natural vegetation.	Reductants Plants Business Unit Manager	During construction phase	Dust suppression measures and work procedures	5.5 - Construction Phase (f)
14.6.	Source populations of alien plants, if present, must be removed during construction phase. The alien plants should then be disposed of in a manner which will not result in proliferation of the plants.	Environmental Practitioner	During construction phase	Site inspection. Suitable method of disposal of alien plants.	Not included in original EMP.
14.7.	Education of staff on safe driving and protection of animals	Environmental Practitioner	During construction phase	Induction and environmental training.	Not included in original EMP.
Objective: To rehabilitate areas disturbed during construction					
14.8.	No grazing of revegetated areas before climax species are well established. If necessary, the revegetated areas will be fenced in order to avoid grazing.	Environmental Practitioner	During and directly following revegetation	Fencing if required. Inspection of revegetated areas.	5.5 – Construction and Operational Phases (f)
14.9.	Seed mix used for construction rehabilitation is to include only species indigenous to the area.	Environmental Practitioner	Directly following construction or when revegetation is required.	Appropriate seed mix.	Not included in original EMP.
14.10.	Vegetation growth on rehabilitated areas must be monitored to ensure re-growth and sustainable growth. Augment rehabilitation where vegetation growth is unsuccessful.	Environmental Practitioner	Directly following construction or when revegetation is required.	Inspection of revegetated areas. Monitoring schedule and protocol.	5.5 – Construction and Operational Phases (g)
15. AIR QUALITY					
Objective: To ensure that construction activities have the least possible impact on air quality of the site and immediate surroundings.					
15.1.	Minimise the generation of dust as a result of construction activities. Such measures must include regular and effective wetting or chemical dust suppression of gravel access roads and working areas, sweeping of silt from roads and covering of stockpiles.	Reductants Plants Business Unit Manager/ Contractor	During construction phase	Water supply for dust suppression purposes. Dust suppression work procedures and equipment.	5.8 (a) and 5.8 (c)
15.2.	Intensify dust suppression or suspend dust generating activities during windy conditions.	Reductants Plants Business Unit Manager/ Contractor	During construction phase	Dust suppression work procedures and equipment.	5.8 (b)
15.3.	Dust suppression should be done with water hoses in inaccessible areas where vehicular traffic is impossible.	Reductants Plants Business Unit Manager/ Contractor	During construction phase	Dust suppression work procedures and equipment.	5.8 (d)
15.4.	Abstracted groundwater could be used for dust suppression purposes since groundwater quality only marginally exceeds SANS 241: 2011 drinking	Reductants Plants Business Unit	During construction phase	Dust suppression work procedures and equipment.	5.8 (e)

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT	
	standards.	Manager/ Contractor				
15.5.	Roads and loading areas must be regularly cleared of silt with the use of vacuum and/or broom sweepers.	Reductants Business Manager	Plants Unit	During construction phase	Dust suppression work procedures and equipment.	Not included in original EMP.
16. NOISE						
Objective: To ensure that construction activities have an impact of low significance on the construction personnel and noise levels of the surrounding area.						
16.1.	Where possible, construction working hours are to be limited to day time to minimise night time noise levels.	Reductants Business Manager/ Contractor	Plants Unit	During construction	Set appropriate working hours.	Not included in original EMP.
16.2.	The contractors will adhere (at all times) to the noise level requirements of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) and the Mine Health and Safety Act, 1996 (Act 29 of 1996).	Reductants Business Manager	Plants Unit	During construction	Appropriate signage and Personal Protective Equipment (PPE). Environmental induction and training. Work procedures.	5.9 (a)
16.3.	All machinery to be used during the construction phase should be properly muffled and maintained so as to reduce noise generation to a minimum.	Reductants Business Manager	Plants Unit	During construction	Inspection and maintenance schedules	5.9 (b)
16.4.	Work procedures should be structured so as to avoid the unnecessary generation of noise.	Reductants Business Manager	Plants Unit	During construction phase	N/A	5.9 (c)
16.5.	The contractors must ensure that the necessary auditory PPE is worn at all times.	Reductants Business Manager	Plants Unit	During construction phase	Appropriate PPE Induction and training	5.9 (d)
16.6.	An assessment of potential noise exposure of personnel working at the plant must be conducted as per the Occupational Health and Safety Act, 1993 (Act 85 of 1993). Where personnel are exposed to noise levels above the noise-rating limits stipulated in the Act, appropriate action should be taken to rectify the situation.	Reductants Business Manager	Plants Unit	During construction phase	Monitoring protocol Management procedure to lower noise exposure if excessive	5.9 (e)
17. PUBLIC RELATIONS						
Objective: To ensure good relations with all Interested and Affected Parties (IAPs) by creating open channels of communication to address matters of concern that may arise.						
17.1.	The employment policy must give preference to local labour force.	Contractor / Human Resources Manager		During construction phase	Employment Policy	Not included in original EMP.
17.2.	Transparent employment and procurement policies must be in place and clearly communicated to the community leaders.	Human Resources Manager / Procurement Manager		During construction phase	Communication policy and protocol Procurement policy	Not included in original EMP.

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
17.3.	Under no circumstances is recruitment to take place at the gate.	Contractor and Reductants Plants Business Unit Manager	During construction phase	Employment Policy Appropriate signage	Not included in original EMP.
17.4.	Access control must be in place at the construction site.	Project Manager	During construction phase	Site security Appropriate signage Access control procedure	Not included in original EMP.
17.5.	Communication between the contractors, Grootegeluk Coal Mine and the various interested and affected parties will be established and maintained through regular notifications and providing IAPs with a means of providing feedback on an ongoing basis. The general public forum which is conducted by the Grootegeluk Mine, must also allow members of the community to raise their issues of concern regarding the Market Coke and Co-generation Plant project.	Public Relations Officer	During construction phase	Communication policy and protocols.	5.15 (a)
17.6.	Maintain a complaints register at the site entrance. The complaints register will record the following: Date when complaint/concern was received; Name of person to whom the complaint/concern was reported; Nature of the complaint/concern reported; The way in which the complaint/concern was addressed (date to be included).	Environmental Practitioner	During construction phase	Complaints register	5.15 (b) and (c)
17.7.	Any complaints regarding the said development will be brought to the attention of the Environmental Practitioner within 24 hours after receiving the complaint.	Environmental Practitioner	During construction	Complaints register	5.15 (d)
17.8.	The complaints must be investigated and remedied where possible. A response should be provided to the complainant.	Environmental Practitioner	During construction within 72 hours	Environmental Practitioner will determine what is required.	Not included in original EMP.
17.9.	The complaints register will be kept up to date for inspection by members of the LEDET.	Environmental Practitioner	During construction	Complaints register	5.15 (e)
18. SPILL PREVENTION					
Objective: To minimise environmental impact from spills.					
18.1.	Within the construction area, self-contained bunded areas must be provided at: <ul style="list-style-type: none"> Chemical storage facilities Hazardous waste storage facilities (e.g. liquor); Flammable and combustible liquid storage facilities (e.g. hydrocarbons); Electrical transformers containing oil and/or PCBs and Locations where spills are common, including transfer points, workshops, and where hazardous substances are transferred and used regularly. 	Reductants Plants Business Unit Manager	On commencement of construction	Construction of appropriate bunded areas.	5.7 (a)
18.2.	The self-contained bunded areas must be lined with an impermeable material to limit seepage into the ground water environment. Any spillage must either be recycled or transferred to be treated to environmentally acceptable standards.	Reductants Plants Business Unit Manager	On commencement of construction	Work procedure for the recovery, transfer and recycling of spillage.	5.7 (b)

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
18.3.	For flammable substances, bunded areas should have 110% of the capacity of the total storage volume for the substance. Bunds should be provided with valves for the controlled release of rainwater.	Reductants Business Manager Plants Unit	On commencement of construction	Construction of appropriate bunded areas.	Not included in original EMP.
18.4.	Non flammable hazardous substances must be stored within bunded areas with the capacity to contain 100% of the largest container stored.	Reductants Business Manager Plants Unit	On commencement of construction	Construction of appropriate bunded areas.	Not included in original EMP.
18.5.	Ensure adequate signage at hazardous storage areas and Material Safety Data (MSD) sheets for all chemicals must be displayed in close proximity to the area of storage.	Reductants Business Manager Plants Unit	During construction phase	Suitable signs and MSD sheets for all relevant chemicals	Not included in original EMP.
18.6.	Chemical spills are to be regarded as an environmental incident and reported through the incident reporting system.	Environmental Practitioner	During construction phase	Incident reporting system and procedure	Not included in original EMP.
18.7.	Hazardous chemicals (such as those used for cleaning) must not be released into the environment or sewage treatment system. These materials must be contained and disposed of as hazardous waste.	Reductants Business Manager Plants Unit	During construction phase	Hazardous chemical handling procedure. Environmental induction and training	Not included in original EMP.
18.8.	Fuel and other petrochemicals must be stored in receptacles that comply with SANS 100-1:2003 (SABS089-1:2003).	Reductants Business Manager Plants Unit	During construction phase	Construction / use of suitable receptacles.	Not included in original EMP.
18.9.	All fuel tanks used in construction must be above ground and bunded in accordance with the requirements for flammable liquids.	Reductants Business Manager Plants Unit	On commencement of construction	Construction of appropriate bunded areas.	Not included in original EMP.
18.10.	Appropriate containers must be used for storage and transport of hazardous substances.	Reductants Business Manager Plants Unit	During construction phase	Use of suitable receptacles.	Not included in original EMP.
18.11.	Personnel dealing with hazardous substances must be appropriately trained.	Environmental Practitioner	During construction phase	Environmental induction and training.	Not included in original EMP.
18.12.	Manage dedicated areas used for washing, maintenance and repair of vehicles and equipment.	Reductants Business Manager Plants Unit	During construction phase	N/A	Not included in original EMP.
18.13.	Regular inspection is to be carried out on areas where hazardous substances are stored or handled.	Environmental Practitioner	During construction phase	Monitoring schedule and protocol.	Not included in original EMP.
18.14.	Obtain proof from contractors removing hazardous waste (such as used oil) of final destination and disposal.	Environmental Practitioner	During construction phase	Safe disposal certificates.	Not included in original EMP.
18.15.	All vehicles must be checked for leaks before commencing work on site.	Reductants Business Manager Plants Unit	During construction phase	Inspection.	Not included in original EMP.

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
18.16.	Drip trays must be placed beneath parked vehicles which drip oil.	Reductants Plants Business Unit Manager	During construction phase	Inspection schedule and procedure Environmental induction and training	Not included in original EMP.
18.17.	All equipment that leaks fluid must be repaired immediately or removed from site when necessary.	Reductants Plants Business Unit Manager	During construction phase	Inspection. Environmental induction and training	Not included in original EMP.
18.18.	Vehicle and equipment maintenance and repair is only to be undertaken in designated areas.	Reductants Plants Business Unit Manager	During construction phase	Construction of vehicle maintenance area.	Not included in original EMP.
18.19.	Maintenance and workshop areas must be provided with impervious surfaces.	Reductants Plants Business Unit Manager	On commencement of construction	Construction of vehicle maintenance area.	5.7 (d)
18.20.	Hydrocarbon handling areas must be supplied with storm water diversion measures.	Reductants Plants Business Unit Manager	On commencement of construction	Designs done according to specifications by a suitably qualified surface water engineer.	Not included in original EMP.
18.21.	All spills of chemicals or hydrocarbons (oil, grease, diesel, petrol, etc.) will be cleaned with the use of suitable absorbent materials such as Drizit or Oclansorb.	Reductants Plants Business Unit Manager	During construction phase	Spill procedure. Drizit or oclansorb	5.7 (e)
18.22.	All soils that have become contaminated with oils, fuels and lubricants must be removed and managed as hazardous waste. Bioremediation of contaminated soils shall take place should such a facility be available on site.	Reductants Plants Business Unit Manager	During construction phase	Procedure for treatment or disposal of contaminated soils.	Not included in original EMP.
18.23.	Ensure appropriate inspections are conducted to ensure early detection of spills. The integrity of bunds are to be monitored regularly to ensure that no seepage escapes.	Reductants Plants Business Unit Manager	During construction phase	Monitoring schedule and protocol	Not included in original EMP.
19. WASTE MANAGEMENT					
Objective: To effectively manage wastes generated at the Plant.					
19.1.	Provide designated waste collection points and ensure that these have adequate capacity and are frequently cleaned.	Reductants Plants Business Unit Manager	During construction phase	Waste receptacles.	Not included in original EMP.
19.2.	No littering. Regular litter patrol and site clean-up.	Environmental Practitioner	During construction phase	Waste receptacles.	Not included in original EMP.
19.3.	No on-site disposal or burning of wastes.				
19.4.	Ensure regular inspections of waste handling, storage and disposal areas.	Environmental Practitioner	During construction phase	Monitoring schedule and protocol	Not included in original EMP.
19.5.	Records should be kept of quantities delivered, used and/or recycled.	Environmental Practitioner	During construction phase	Record keeping.	Not included in original EMP.

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
19.6.	Separate, signed waste receptacles must be provided for hazardous and general waste. No illegal dumping or disposal will take place.	Environmental Practitioner	During construction phase	Waste receptacles. Appropriate signage	5.7 (c)
19.7.	Separate receptacles should be provided for recyclable materials.	Environmental Practitioner	During construction phase	Waste receptacles. Waste recycling procedure	Not included in original EMP.
19.8.	Provide waste management training to all personnel. All contractors to be provided with a copy of the waste management procedure.	Environmental Practitioner	During construction phase	Waste management procedure Environmental induction and training	Not included in original EMP.
19.9.	General waste must be removed from site on a regular basis and disposed of at a licensed landfill site.	Reductants Plants Business Unit Manager	During construction phase	Waste disposal procedure	Not included in original EMP.
19.10.	All hazardous waste must be handled and stored on impervious surfaces. Max allowable capacity 35m ³ .	Reductants Plants Business Unit Manager	During construction phase	Hazardous chemical handling procedure.	Not included in original EMP.
19.11.	Liquid and solid hazardous waste must be separated.	Reductants Plants Business Unit Manager	During construction phase	Hazardous chemical handling procedure.	Not included in original EMP.
19.12.	Hazardous waste which requires off-site disposal must be disposed of at a licensed hazardous waste site.	Reductants Plants Business Unit Manager	During construction phase	Waste disposal procedure.	Not included in original EMP.
19.13.	Chemical toilets will be provided for construction personnel during the construction phase if the sewage system is found to be insufficient for the number of people on site during construction.	Reductants Plants Business Unit Manager / Procurement Manager	On commencement of construction	Chemical toilets if required.	Not included in original EMP.
19.14.	Sewage must be disposed to a licenced sewage treatment works.	Reductants Plants Business Unit Manager	During construction phase	Waste disposal procedure. Service agreement with Grootegeluk Mine.	Not included in original EMP.
20. OCCUPATIONAL HEALTH AND SAFETY					
Objective: To ensure safety of construction workers at the Market Coke and Co-generation Plant.					
20.1.	The contractors will adhere (at all times) to the requirements of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) and the Mine Health and Safety Act, 1996 (Act 29 of 1996).	Reductants Business Manager/ Plants Unit contractor	During construction phase	Induction and environmental training.	Not included in original EMP.
20.2.	All personnel must wear job-specific PPE at all times.	Reductants Business Manager/ Plants Unit	During construction phase	Induction and environmental training. PPE. Signage at each work area.	Not included in original EMP.

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
		Contractor			
20.3.	Fire fighting equipment must be available and maintained on site at all times, particularly in areas where any flammable substance is stored.	Reductants Business Manager/ Contractor Plants Unit	During construction phase	Appropriate fire fighting equipment.	Not included in original EMP.
21. HERITAGE RESOURCES					
Objective: To prevent any impact on archaeological remains that may be excavated during the construction phase.					
21.1.	If any archaeological remains or artefacts are exposed during the construction phase, the construction must be suspended immediately and the South African Heritage Resources Agency (SAHRA) and LEDET must be informed.	Environmental Practitioner/ Contractor	During construction	In this regard, the applicant must take note of the requirements in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999).	5.10
21.2.	The grave or artefact will not be moved until clearance is given by the heritage specialist / archaeologist. Measures must be taken to prevent damage to the grave / artefact.	Environmental Practitioner/ Contractor	If graves or artefacts are uncovered at any time.	Fencing / caution tape to place around area.	Not included in original EMP.

5.3 Operational Phase

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
22. ENVIRONMENTAL AWARENESS AND TRAINING					
Objective: To ensure that all personnel are aware of the objectives of the EMP as well as the consequences of their individual actions					
22.1.	Environmental induction training is to be undertaken by all persons undertaking work at the plant (to be incorporated into normal induction training) including permanent workers, contractors and consultants. As part of the induction all workers on site must be made aware of the conditions of the EMP.	Environmental Practitioner	On appointment	Environmental induction training material	5.15 (b)
22.2.	On the job environmental training is to be undertaken by each person working at the plant.	Environmental Practitioner/ Supervisors	Throughout life of plant	General Environmental Training/Training of supervisors	Not included in original EMP.
22.3.	An environmental awareness programme is to be implemented for plant work force addressing pertinent topics as required.	Environmental Practitioner	Throughout life of plant	Programme for implementation of awareness topics. Environmental Awareness Plan (Appendix 10).	Not included in original EMP.
22.4.	Environmental emergency procedures should be addressed as part of environmental training.	Environmental Practitioner	Throughout life of plant.	Environmental emergency procedures Environmental induction and training	Not included in original EMP.

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
				material	
22.5.	A copy of the EMP and all environmental authorisations must be kept at the main site office.	Environmental Practitioner	Throughout life of plant.	EMP, licences and authorisations	Not included in original EMP.
22.6.	Compliance with the EMP must be included as a contractual condition in contract with any contractor	Reductants Plants Business Unit Manager	In tender documentation	Condition in contract	Not included in original EMP.
22.7.	If contractors are utilised during operation they must be provided with a copy of the EMP and all environmental emergency procedures.	Reductants Plants Business Unit Manager	On appointment of each contractor	EMP Environmental emergency procedures	Not included in original EMP.
22.8.	Each contractor must keep a copy of the EMP at their office and this copy must be made available to staff.	Contractor	Throughout length of contract.	EMP	Not included in original EMP.
22.9.	Create awareness about water and electricity consumption and encourage staff to use water and electricity sparingly. Appropriate waste disposal should also be explained.	Environmental Practitioner	Throughout life of plant.	Include in environmental awareness and induction and training material (refer to Appendix 10)	Not included in original EMP.
22.10.	Environmental emergency procedures should be addressed as part of environmental induction training.	Environmental Practitioner	Throughout life of plant.	Environmental emergency procedures (Appendix 10). Environmental induction and training material	Not included in original EMP.
22.11.	Operators of specialist equipment must be suitably trained/qualified. Operator training must include awareness of job-specific environmental risks.	Human Resources Manager	Throughout life of plant.	Training/qualification requirements for operators of specialist equipment. Checking training certificates before any job commences.	5.15 (e)
23. ENVIRONMENTAL MONITORING					
Objective: To recognise impacts on air, ground and surface water resources in the area.					
23.1.	All groundwater monitoring points for the plant shall be monitored. Boreholes to be monitored include WBR 50, WBR 57 and WBR 43. Both groundwater level and groundwater quality are to be measured.	Environmental Practitioner	Quarterly during operational phase	Groundwater monitoring schedule, protocol and equipment.	Not included in original EMP.
23.2.	All surface water quality monitoring points for the plant shall be monitored. Sampling points include the PCD, PCD extension and the Bosbok Dam	Environmental Practitioner	Quarterly during operational phase	Surface water monitoring schedule, protocol and equipment.	Not included in original EMP.
23.3.	Ambient air quality and emissions from the flares and stacks must be monitored in accordance with the AEL.	Environmental Practitioner	Quarterly or as required by AEL.	Air quality monitoring schedule, protocol and equipment.	5.8 (e).
23.4.	An air quality monitoring system specific to the plant will be put in place as required in terms of the legislation. The instantaneous peak, the 1-hour and 24-hour average as well as the monthly average will be obtained and the results compared to the limits in the AEL.	Environmental Practitioner	Monthly, or as stipulated in the AEL.	Emissions monitoring protocol and schedule.	5.8 (g)

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
23.5.	An ambient air quality monitoring programme must be set up.	Environmental Practitioner	As required by the AEL or other monitoring requirements.	Ambient air quality monitoring protocol and schedule.	5.8 (k)
23.6.	Ambient baseline PM ₁₀ monitoring as well as passive diffusive sampling of SO ₂ and NO ₂ is to be conducted.	Environmental Practitioner	As required by the AEL or other monitoring requirements.	Ambient air quality monitoring protocol and schedule.	Not included in original EMP.
23.7.	An air quality monitoring report will be forwarded to the province until such time that an air quality officer for the local municipality is appointed in terms of the National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004). A copy thereof will also be forwarded to the National Department of Environmental Affairs and Tourism.	Environmental Practitioner	As required by the AEL or other monitoring requirements.	Reporting requirements as per the AEL and National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004)	5.8 (i)
23.8.	All sampling is to be conducted by suitably qualified and competent persons using appropriate sampling techniques. All samples will be analysed at an accredited, independent laboratory for chemical and physical constituents normally associated with the presence of coal and carbonaceous material, as well as those which are specific to Market Coke and Co-generation Plant operations, or which are specified in the relevant environmental authorisations.	Environmental Practitioner	Quarterly	Check qualifications and competency of persons conducting sampling. Analysis of samples by an accredited laboratory.	Not included in original EMP.
23.9.	Records of air, ground and surface water monitoring must be kept for the site.	Environmental Practitioner	Throughout life of plant.	Record-keeping.	5.7 (i)
23.10.	Air, ground and surface water monitoring results must be made available to the Reductants Plants Business Unit Manager. Potential negative impacts should be identified and addressed as soon as possible.	Environmental Practitioner	Monthly during operational phase.	Record-keeping. Management procedure to address potential negative impacts.	5.8 (h)
24. EMP COMPLIANCE					
Objective: To ensure effective implementation of the EMP					
24.1.	Monthly internal audits of EMP compliance	Environmental Practitioner	Monthly throughout life of plant	EMP checklist	Not included in original EMP.
24.2.	Annual external audit of EMP compliance	Independent Auditor	Annually	EMP	Not included in original EMP.
24.3.	Submission of external annual report to environmental authorities	Environmental Practitioner	Annually	N/A	Not included in original EMP.
24.4.	Performance assessments will be undertaken as required in Regulation 527 of the MPRDA.	Independent consultant	Every two years	EMP	Not included in original EMP.
24.5.	The proponent will appoint a suitably qualified person to conduct EMP Performance Assessments.	Environmental Practitioner	Every two years	N/A	Not included in original EMP.

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
24.6.	Annual update of financial provision for rehabilitation to ensure sufficient funding.	Environmental Practitioner	Annually	N/A	Not included in original EMP.
24.7.	A register of all environmental incidents is to be maintained. The Environmental Practitioner is to be notified of all environmental incidents.	Environmental Practitioner	Throughout life of plant.	Environmental incident register.	Not included in original EMP.
24.8.	All environmental incidents must be investigated to assess: the cause; the effectiveness of the response; the actions taken to rectify the damage and measures needed to prevent recurrence. A close-out report must be compiled.	Environmental Practitioner	For each incident	Environmental incident report.	Not included in original EMP.
24.9.	Records relating to the compliance and non-compliance with the conditions of the EMP and Record of Decision will be kept in good order. Such records will be available for inspection at the site office and must be made available to the LEDET within seven (7) working days of the date of the written request by the Department for such records.	Environmental Practitioner	Throughout life of plant.	Environmental compliance records.	5.15 (c), 5.15 (e) and 5.15 (f)
25. ENVIRONMENTAL RISKS AND EMERGENCIES					
Objective: To minimise the risk for environmental emergencies occurring and implement controls to deal with situations, should they occur.					
25.1.	Risks and emergencies must be managed in accordance with relevant Exxaro Reductants Emergency Procedures.	Environmental Practitioner	Throughout life of plant.	Environmental emergency procedures (Appendix 10)	Not included in original EMP.
25.2.	Telephone numbers of emergency services, including fire-fighting services, shall be clearly displayed on notice boards.	Environmental Practitioner	Throughout life of plant.	The required information should be displayed.	Not included in original EMP.
26. GROUNDWATER RESOURCES					
Objective: To minimise contamination risk to groundwater					
26.1.	Spill prevention measures are to be implemented during operational phase as described in construction phase.	Reductants Plants Business Unit Manager/ Contractor	Throughout life of plant.	As described in construction phase.	As described in construction phase.
26.2.	All spills of chemicals or hydrocarbons (oil, grease, diesel, petrol, etc.) will be cleaned with the use of suitable absorbent materials such as drizit or oclanzorb. Appropriate soil remediation measures will be implemented where soil has been contaminated with oil.	Environmental Practitioner	Throughout life of plant	Suitable cleaning materials. Soil remediation procedure.	5.7 (e)
26.3.	Water abstraction is to comply with water use licensing requirements.	Reductants Plants Business Unit Manager	Throughout life of plant	Water abstraction records. Water Use Licence.	Not included in original EMP.
27. SURFACE WATER RESOURCES					
Objective: To reduce the potential impact on surface water run-off during the construction phase.					
27.1.	Surface water pollution prevention and spill prevention measures are to be implemented as described in construction phase.	Reductants Plants Business Unit Manager/ Environ-	During operation phase.	As described in construction phase.	Not included in original EMP.

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
		mental Practitioner/ Contractor			
27.2.	The storm water control measures will be inspected on a weekly basis for signs of erosion or blockages during the first rainy season. Thereafter, inspections should occur on a monthly basis during the rainy and dry seasons. Any blockages or erosion should be repaired within 24 hours of discovery.	Reductants Plants Business Unit Manager	Throughout life of plant.	Inspection schedule and procedure. Work procedure for the maintenance of storm water control measures.	5.2 C(f); 5.2 O(c); 5.6 O(b) (c);
27.3.	Process water (0.5 m³/h) will be bled into the mine process water system. A water meter would have to be provided in order to record the amount of process water bled from the plant. THIS MITIGATION MEASURE FROM THE ORIGINAL APPROVED EMP IS NO LONGER REQUIRED AS THE MARKET COKE AND CO-GENERATION PLANT PROJECT WILL USE ADDITIONAL WATER FROM THE GROOTEGELUK MINE PROCESS WATER SYSTEM. WATER WILL NOT BE BLED FROM THE MARKET COKE AND CO-GENERATION PLANT TO THE GROOTEGELUK MINE'S WATER SYSTEM.	Environmental Practitioner	During operational phase	Installation of water meters where required	5.6 (e)
27.4.	Monitor the quality of the process water obtained from the Grootegeluk Mine to prevent any impact on the Market Coke and Co-generation Plant water system.	Reductants Plants Business Unit Manager	Monthly during operational phase	Monitoring schedule and protocol	5.6 (f)
27.5.	Washwater will also be returned into the mine water system. A water meter would have to be provided in order to record the amount of washwater returned into the mine water system. THIS MITIGATION MEASURE FROM THE ORIGINAL APPROVED EMP IS NO LONGER REQUIRED AS THE MARKET COKE AND CO-GENERATION PLANT PROJECT WILL USE ADDITIONAL WATER FROM THE GROOTEGELUK MINE PROCESS WATER SYSTEM. WATER WILL NOT BE BLED FROM THE MARKET COKE AND CO-GENERATION PLANT TO THE GROOTEGELUK MINE'S WATER SYSTEM.	Environmental Practitioner	During operational phase	Installation of water meters where required Reporting procedure	5.6 (g)
27.6.	Monitor the quality of the washwater in order to prevent any impact on the mine water system. THIS MITIGATION MEASURE FROM THE ORIGINAL APPROVED EMP IS NO LONGER REQUIRED AS THE MARKET COKE AND CO-GENERATION PLANT PROJECT WILL USE ADDITIONAL WATER FROM THE GROOTEGELUK MINE PROCESS WATER SYSTEM. WATER WILL NOT BE BLED FROM THE MARKET COKE AND CO-GENERATION PLANT TO THE GROOTEGELUK MINE'S WATER SYSTEM.	Environmental Practitioner	During operational phase	Monitoring schedule and protocol	5.6 (h)
27.7.	A water balance will have to be set up for the plant in order to accurately record the water usage and to monitor the potential impact on the overall Grootegeluk	Environmental Practitioner	During operational phase	Monitoring schedule and protocol. Water balance to be calculated by a	5.6 (i)

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
	Coal Mine water system.			suitably qualified geohydrologist.	
27.8.	Dirty water run-off must be contained and not allowed to enter into the surrounding environment.	Reductants Plants Business Unit Manager	During operational phase.	Implementation of surface water control measures	Not included in original EMP.
27.9.	Sediment originating from operation activities is to be removed from storm water.	Reductants Plants Business Unit Manager	During operational phase.	Stormwater infrastructure must be maintained.	Not included in original EMP.
27.10.	Ensure adequate maintenance of water tanks, pipes and taps and repair all drips and leaks as soon as possible.	Reductants Plants Business Unit Manager	Throughout life of plant.	Regular maintenance should include water infrastructure when required.	Not included in original EMP.
27.11.	Maximise the recovery and re-use of water to minimise consumptive water use.	Reductants Plants Business Unit Manager	Throughout life of plant.	Operate the plant in accordance with the design specifications which incorporate water recycling.	Not included in original EMP.
27.12.	Water used for dust suppression shall be in quantities small enough not to generate significant run-off.	Reductants Plants Business Unit Manager	Throughout life of plant.	Monitoring of dust suppression activities.	Not included in original EMP.
28. SOILS AND LAND CAPABILITIES					
Objective: To minimise potential soil erosion and soil pollution during the operational phase.					
28.1.	Areas devoid of vegetation or where soil erosion has taken place should be revegetated or remediated as soon as possible.	Environmental Practitioner	During operational phase.	As described in construction phase.	5.2 (g), (b); 5.3 (a)
28.2.	Spill prevention measures are to be implemented as in construction phase.	Environmental Practitioner/ Contractors	During operational phase.	As described in construction phase.	5.3 & 5.4
28.3.	In addition, the integrity of concrete surfaces is to be checked and maintained on a continuous basis to ensure contaminants do not enter into underlying soils.	Reductants Plants Business Unit Manager	During operational phase.	Stormwater infrastructure must be inspected and maintained if required.	Not included in original EMP.
29. BIODIVERSITY (FAUNA AND FLORA)					
Objective: To reduce the potential impact on the surrounding vegetation and animal life.					
29.1.	All contractors/employees will be informed that only official roads may be used. No off-road driving will be permitted.	Environmental Practitioner	On appointment	Induction and environmental training	5.5 - Construction Phase (c)
29.2.	All contractors/employees will be informed that no poaching/trapping of animals will be allowed.	Environmental Practitioner	On appointment	Induction and environmental training	5.5 - Construction Phase (d)
29.3.	All contractors/employees will be informed that no fires will be permitted on site or adjacent to the site.	Environmental Practitioner	On appointment	Induction and environmental training	5.5 - Construction Phase (e)
29.4.	All contractors/employees will be informed that the collection of plant material or the picking of plants on site or the surrounds is prohibited.	Environmental Practitioner	On appointment	Induction and environmental training	Not included in original EMP.

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
29.5.	Dust suppression (see Air quality below) will be practiced in order to prevent dust deposition on the surrounding natural vegetation.	Environmental Practitioner	During operational phase.	Work procedure	5.5 - Construction Phase (f)
29.6.	Populations of alien plants, if present, must be removed during operation phase. The alien plants should then be disposed of in a manner which will not result in proliferation of the plants.	Environmental Practitioner	During operational phase.	Environmental training regarding alien plants.	Not included in original EMP.
30. AIR QUALITY					
Objective: To ensure that operations have the least possible impact on air quality of the site and immediate surroundings.					
30.1.	The plant must be operated to achieve known existing atmospheric emission limits that are in accordance with the National Environmental Management: Air Quality Act, 2004 any applicable regulations made under this Act and the AEL when issued.	Reductants Business Manager Plants Unit	During operational phase.	Emissions monitoring protocol and schedule.	5.8 (a)
30.2.	Use water sprays or dust extraction systems to limit coal dust generation when discharging coal at transfer points, into the coal silos/bunkers, at crushing station and compacting process	Reductants Business Manager Plants Unit	During operational phase.	Allocate water for this task.	5.8 (c)
30.3.	Ensure that the coke oven system is operated as follows during charging and discharging, doors shall be operated in prescribed manner so as to minimize fugitive emissions.	Reductants Business Manager Plants Unit	During operational phase	Operate coke oven system in accordance with the design specifications.	5.8 (d)
30.4.	The off-gas treatment system (Flue gas de-sulphurization and dust cyclone and bag filtering system and chimney stack) must be operated to comply with known existing atmospheric emission levels that are in accordance with the National Environmental Management: Air Quality Act, 2004 any applicable regulations made under this Act and the AEL when issued. Monitor as required in the AEL.	Reductants Business Manager Plants Unit	As required by the AEL or other monitoring requirements.	Emissions monitoring protocol and schedule. in accordance with the design specifications.	5.8 (f)
Objective: To minimise dust creation at the Plant during Operations and from plant vehicles.					
30.5.	Trucks should not be overloaded.	Reductants Business Manager Plants Unit	During operational phase	Work procedure for loading of trucks. Environmental induction and training.	Not included in original EMP.
30.6.	Minimise the generation of dust as a result of operation activities. Such measures must include regular and effective wetting or chemical dust suppression of gravel access roads and working areas, sweeping of silt from roads and covering of stockpiles.	Reductants Business Manager/ Contractor Plants Unit	Throughout life of plant	Water supply for dust suppression purposes. Dust suppression work procedures and equipment.	5.8 (a) and 5.8 (c)
30.7.	Intensify dust suppression or suspend dust generating activities during windy conditions.	Reductants Business Manager/ Contractor Plants Unit	Throughout life of plant	Dust suppression work procedures and equipment.	5.8 (b)
30.8.	Dust suppression should be done with water hoses in inaccessible areas where vehicular traffic is impossible.	Reductants Business Manager Plants Unit	Throughout life of plant	Dust suppression work procedures and equipment.	5.8 (d)

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT	
		Manager/ Contractor				
30.9.	Abstracted groundwater could be used for dust suppression purposes since groundwater quality only marginally exceeds SANS 241: 2011 drinking standards.	Reductants Business Manager/ Contractor	Plants Unit	Throughout life of plant.	Dust supression work procedures and equipment.	5.8 (e)
30.10.	Roads and loading areas must be regularly cleared of silt with the use of vacuum and/or broom sweepers.	Reductants Business Manager	Plants Unit	Throughout life of plant.	Dust supression work procedures and equipment.	Not included in original EMP.
31. NOISE						
Objective: To minimise noise disturbance to surrounding communities						
31.1.	Noise mitigation measures are to be implemented as described in Construction Phase.	Reductants Business Manager/ Environmental Practitioner/ Contractors	Plants Unit	Throughout life of plant	Measures to be implemented as described in Construction Phase	5.9
32. TRAFFIC						
Objective: To minimise road safety issues during operation						
32.1.	Measures to be implemented as described in Construction Phase	Reductants Business Manager/ Environmental Practitioner	Plants Unit	Throughout life of plant	Measures to be implemented as described in Construction Phase	Not included in original EMP.
33. PUBLIC RELATIONS						
Objective: To ensure good relations with all interested and affected parties by creating open channels of communication to address matters of concern that may arise.						
33.1.	Measures to be implemented as described in Construction Phase	Public Relations Officer/ Environmental Practitioner		Throughout life of plant	Complaints register, Employment Policy, Procurement policy.	5.15 (c), (d), (e)
34. SPILL PREVENTION						
Objective: To minimise environmental impact from spills.						
34.1.	Ensure adequate signage at hazardous storage areas and Material Safety Data (MSD) sheets for all chemicals must be displayed in close proximity to the area of storage.	Reductants Business Manager	Plants Unit	Throughout life of plant.	Suitable signs and MSD sheets for all relevant chemicals	Not included in original EMP.

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
34.2.	Chemical spills are to be regarded as an environmental incident and reported through the incident reporting system.	Environmental Practitioner	Throughout life of plant.	Incident reporting system and procedure	Not included in original EMP.
34.3.	Hazardous chemicals (such as those used for cleaning) must not be released into the environment or sewage treatment system. These materials must be contained and disposed of as hazardous waste.	Reductants Plants Business Unit Manager	Throughout life of plant.	Hazardous chemical handling procedure. Environmental induction and training	Not included in original EMP.
34.4.	Fuel and other petrochemicals must be stored in receptacles that comply with SANS 100-1:2003 (SABS089-1:2003).	Reductants Plants Business Unit Manager	Throughout life of plant.	Construction / use of suitable receptacles.	Not included in original EMP.
34.5.	Appropriate containers must be used for storage and transport of hazardous substances.	Reductants Plants Business Unit Manager	Throughout life of plant.	Use of suitable receptacles.	Not included in original EMP.
34.6.	Personnel dealing with hazardous substances must be appropriately trained.	Environmental Practitioner	Throughout life of plant.	Environmental induction and training.	Not included in original EMP.
34.7.	Manage dedicated areas used for washing, maintenance and repair of vehicles and equipment.	Reductants Plants Business Unit Manager	Throughout life of plant.	N/A	Not included in original EMP.
34.8.	Regular inspection is to be carried out on areas where hazardous substances are stored or handled.	Environmental Practitioner	Throughout life of plant.	Monitoring schedule and protocol.	Not included in original EMP.
34.9.	Obtain proof from contractors removing hazardous waste (such as oil and diesel) of final destination and disposal.	Environmental Practitioner	Throughout life of plant.	Safe disposal certificates.	Not included in original EMP.
34.10.	All vehicles must be checked for leaks before commencing work on site.	Reductants Plants Business Unit Manager	Throughout life of plant.	Inspection.	Not included in original EMP.
34.11.	Drip trays must be placed beneath parked vehicles which drip oil.	Reductants Plants Business Unit Manager	Throughout life of plant.	Inspection schedule and procedure Environmental induction and training	Not included in original EMP.
34.12.	All equipment that leaks fluid must be repaired immediately or removed from site when necessary.	Reductants Plants Business Unit Manager	Throughout life of plant.	Inspection. Environmental induction and training	Not included in original EMP.
34.13.	Vehicle and equipment maintenance and repair is only to be undertaken in designated areas.	Reductants Plants Business Unit Manager	Throughout life of plant.	Construction of vehicle maintenance area.	Not included in original EMP.
34.14.	All spills of chemicals or hydrocarbons (oil, grease, diesel, petrol, etc.) will be cleaned with the use of suitable absorbent materials such as drizit or oclansorb.	Reductants Plants Business Unit Manager	Throughout life of plant.	Spill procedure. Drizit or oclansorb	5.7 (e)

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
34.15.	All soils that have become contaminated with oils, fuels and lubricants must be removed and managed as hazardous waste. Bioremediation of contaminated soils shall take place should such a facility be available on site.	Reductants Plants Business Unit Manager	Throughout life of plant.	Procedure for treatment or disposal of contaminated soils.	Not included in original EMP.
34.16.	Ensure appropriate inspections are conducted to ensure early detection of spills. The integrity of bunds are to be monitored regularly to ensure that no seepage escapes.	Reductants Plants Business Unit Manager	Throughout life of plant.	Monitoring schedule and protocol	Not included in original EMP.
35. WASTE MANAGEMENT					
Objective: To effectively manage wastes generated at the Plant.					
35.1.	Provide designated waste collection points and ensure that these have adequate capacity and are frequently cleaned.	Reductants Plants Business Unit Manager	Throughout life of plant.	Waste receptacles.	Not included in original EMP.
35.2.	Separate waste receptacles must be provided for hazardous and general waste. No illegal dumping or disposal will take place.	Environmental Practitioner	Throughout life of plant.	Waste receptacles. Appropriate signage	5.7 (c)
35.3.	Separate receptacles should be provided for recyclable materials.	Environmental Practitioner	Throughout life of plant.	Waste receptacles. Waste recycling procedure	Not included in original EMP.
35.4.	Records should be kept of quantities of waste generated, disposed and/or recycled.	Environmental Practitioner	Throughout life of plant.	Record keeping.	Not included in original EMP.
35.5.	Ensure regular inspections of waste handling, storage and disposal areas.	Environmental Practitioner	Throughout life of plant.	Monitoring schedule and protocol	Not included in original EMP.
35.6.	Provide waste management training to all personnel.	Environmental Practitioner	Throughout life of plant.	Waste management procedure Environmental induction and training	Not included in original EMP.
35.7.	General waste must be removed from site on a regular basis and disposed of at a licensed landfill site.	Reductants Plants Business Unit Manager	Throughout life of plant.	Waste disposal procedure	Not included in original EMP.
35.8.	All hazardous waste must be handled and stored on impervious surfaces.	Reductants Plants Business Unit Manager	Throughout life of plant.	Hazardous chemical handling procedure.	Not included in original EMP.
35.9.	Hazardous waste requiring off-site disposal must be disposed of at a licensed hazardous waste site.	Reductants Plants Business Unit Manager	Throughout life of plant.	Waste disposal procedure.	Not included in original EMP.
35.10.	Liquid and solid hazardous waste must be separated.	Reductants Plants Business Unit Manager	Throughout life of plant.	Hazardous chemical handling procedure.	Not included in original EMP.
35.11.	Sewage must be disposed to a licenced sewage treatment works.	Reductants Plants Business Unit Manager	Throughout life of plant.	Waste disposal procedure.	Not included in original EMP.

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT	
35.12.	Control of litter on an on-going basis.	Environmental Practitioner	Throughout life of plant.	Waste receptacles.	Not included in original EMP.	
36. OCCUPATIONAL HEALTH AND SAFETY						
Objective: To ensure safety of workers at the Market Coke and Co-generation Plant.						
36.1.	Exxaro and the contractors will adhere (at all times) to the requirements of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) and the Mine Health and Safety Act, 1996 (Act 29 of 1996).	Reductants Business Manager/ contractor	Plants Unit	Throughout life of plant	Induction and environmental training.	Not included in original EMP.
36.2.	All personnel must wear job-specific PPE at all times.	Reductants Business Manager/ Contractor	Plants Unit	Throughout life of plant	Induction and environmental training. PPE. Signage at each work area.	Not included in original EMP.
36.3.	Fire fighting equipment must be available and maintained on site at all times, particularly in areas where any flammable substance is stored.	Reductants Business Manager/ Contractor	Plants Unit	Throughout life of plant	Appropriate fire fighting equipment.	Not included in original EMP.

5.4 Decommissioning

REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT
37. REHABILITATION AND CLOSURE PLANNING					
Objective: to minimise residual impacts on site and ensure the closure objectives are achieved.					
37.1.	Review closure and rehabilitation objectives.	Environmental Practitioner	At the start of the decommissioning phase.	EMP	Not included in original EMP.
37.2.	Determine costs for implementation of rehabilitation and closure objectives.	Environmental Practitioner	At the start of the decommissioning phase	EMP and previous closure costing.	Not included in original EMP.
37.3.	Develop a preliminary rehabilitation plan, outlining the way forward for rehabilitation and closure planning.	Environmental Practitioner	At the start of the decommissioning phase	EMP and EIA	Not included in original EMP.
37.4.	Closure must be achieved efficiently, cost effectively and in compliance with the law.	Environmental Practitioner	During decommissioning	review of applicable legislation.	Not included in original EMP.

38. NOISE					
Objective: To minimise the production of noise during the decommissioning phase.					
38.1.	Where possible, demolition activities are to be limited to day time to minimise night impacts.	Reductants Plants Business Unit Manager	During demolition of infrastructure	Work procedure Environmental induction and training	Not included in original EMP.
39. AIR QUALITY					
Objective: To minimise the generation of dust during decommissioning.					
39.1.	Dust mitigation measures to be implemented as described in Construction Phase.	Reductants Plants Business Unit Manager/ Environmental Practitioner	During decommissioning phase	As described in construction phase.	Not included in original EMP.
39.2.	Disturbed areas to be rehabilitated and re-vegetated as soon as it is practicable to minimise wind-blown dust.	Reductants Plants Business Unit Manager/ Environmental Practitioner	During decommissioning phase	As described in construction phase.	Not included in original EMP.
40. SOCIO-ECONOMIC					
Objective: To minimise the impacts of job loss.					
40.1.	Measures identified in the SLP for promoting portable skills for workers must be implemented.	Reductants Plants Business Unit Manager / Human Resources Manager	During the Decommissioning phase	SLP	Not included in original EMP.
41. SOILS					
Objective: To minimise the impacts on soils after site closure and facilitate successful rehabilitation					
41.1.	All soils that have become contaminated with oils, fuels and lubricants must be removed and managed as hazardous waste. Bioremediation of contaminated soils shall take place should such a facility be available on site.	Environmental Practitioner/ Contractors	During decommissioning phase	Contaminated land assessment. Spill clean-up protocol. Hazardous chemical handling protocol.	Not included in original EMP.
41.2.	Spill prevention measures to be implemented as described in construction and operational phase.	Environmental Practitioner/ Contractors	During decommissioning phase	Chemical spill clean-up protocol Hazardous chemical handling protocol	Not included in original EMP.
42. LAND CAPABILITY					
Objective: To improve the capability of the rehabilitated land					
42.1.	All disturbed areas must be topsoiled, sloped and re-vegetated as soon as possible using suitable grass species. This re-vegetation will assist in reducing the potential for soil erosion.	Environmental Practitioner	During decommissioning phase	Site rehabilitation plan.	Not included in original EMP.
42.2.	The topsoil will be analysed to determine imbalances prior to the replacement of soil. Inorganic fertilisers will be used to supplement the soils before seeding of the area takes place.	Environmental Practitioner	During decommissioning phase	Site rehabilitation plan.	Not included in original EMP.

42.3.	Appropriate soil conservation measures will be provided in order to prevent soil erosion and loss of topsoil.	Environmental Practitioner	During decommissioning phase	Site rehabilitation plan.	Not included in original EMP.
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5.5 Post Closure




REF.	ACTION	RESPONSIBILITY	TIME PERIOD FOR IMPLEMENTATION	REQUIREMENTS FOR IMPLEMENTATION	REF. IN APPROVED EMP FOR EXISTING CHAR MANUFACTURING PLANT	
43. SOCIO-ECONOMIC						
Objective: To minimise the impacts of job loss.						
43.1.	Measures identified in the SLP for promoting portable skills for workers must be implemented.	Reductants Business Manager	Plants Unit	During post closure phase	SLP	Not included in original EMP.
44. SOIL AND LAND CAPABILITIES						
Objective: To monitor success of rehabilitation.						
44.1.	Success of rehabilitation is to be monitored for at least 3 years after closure. Should rehabilitation not prove successful, a rehabilitation specialist must be included in the rehabilitation process.	Environmental Practitioner		After closure for a minimum of three years	Monitoring protocol	Not included in original EMP.
45. WATER						
Objective: To minimise groundwater and surface water contamination						
45.1.	The groundwater and surface water monitoring programme should be continued for the period stipulated by the relevant authorities.	Environmental Practitioner		After closure for a minimum of three years	Monitoring protocol	Not included in original EMP.

CONSULTANT'S EXPERIENCE AND DECLARATION OF INDEPENDENCE

Synergistics Environmental Services (Pty) Ltd is an independent environmental consultancy that was established in 2004. The company has extensive experience in environmental impact assessments; environmental management plans, programmes and systems; environmental auditing; environmental monitoring reporting; environmental performance assessments; closure and rehabilitation costing and planning; and development of environmental action plans.

Matthew Hemming is an Environmental Assessment Practitioner in South Africa has over 6 years' environmental management and assessment experience, specifically in the mining, waste and infrastructure development sectors.

The undersigned herewith declare that this report represents an independent, objective assessment of the environmental impacts associated with the proposed Market Coke and Co-generation Plant Project:

	Name	Designation	Signature	Date
Prepared by:	Shelley Holt	BSc Hons Zoology Senior Environmental Consultant		8/11/2012
	Chiara D'Egidio	MSc Ecology, Environment and Conservation Environmental Consultant		8/11/2012
Reviewed by:	Matthew Hemming	MSc Conservation Biology Director and EAP		8/11/2012