December 2009

EXXARO RESOURCES LIMITED

Closure Framework for the EIA and EMP for the Belfast Project

Submitted to:
Exxaro Resources Limited
Roger Dyason Road
Pretoria

Report Number: 12484-9295-3

Distribution:

1 x Exxaro Resources Limited
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REPORT

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1.0 INTRODUCTION

Exxaro Resources Limited (Exxaro) is involved in both underground and opencast coal mining operations within the North Block Complex (NBC), located between towns of Carolina and Belfast in the Mpumalanga Province. The NCB currently consists of the Glisa and Strathae collieries as well as the Eerstelingsfontein and Belfast coal projects.

As part of the NBC, the proposed new Belfast operations (Belfast Project), situated approximately 10 km south-west of the town of Belfast entails the development of an open pit mine to produce 2.0 million tons per annum (Mtpa) of coal for Eskom and 1.5 Mtpa of A-grade thermal coal for export.

It is planned to execute the mining operations as follows:

- Phase 1: Initiation of mining of the East block reserves and crushing and screening of run-of-mine (ROM) for a period of approximately two years (2011 to 2013); and
- Phase 2: Expansion of mining to the West block reserves (2013) and implementation of a beneficiation plant with associated co-disposal of coarse discard and fines. Phase 2 will result in an overall life-of-mine (LOM) of approximately 27 years, to 2038.

Exxaro submitted a mining rights application for Belfast Project to the Department of Mineral Resources (DMR, previously known as the Department of Minerals and Energy), Mpumalanga Province, which was approved on 10 July 2009 [MP 30/5/1/2/2/431 MR]. As per Regulations 49, 50 and 51 of the Mineral Petroleum Resources Development Act, No. 28 of 2002 (MPRDA), Exxaro is required to submit an Environmental Impact Assessment(EIA) and Environmental Management Plan (EMP) for the proposed operation in support of the mining rights application.

In addition, in terms of Section 43 and, more specifically, Regulation 57 promulgated under the MPRDA, a mine closure plan conforming to the requirements of Regulations 61 and 62 needs to be compiled and submitted to the DMR for consideration.

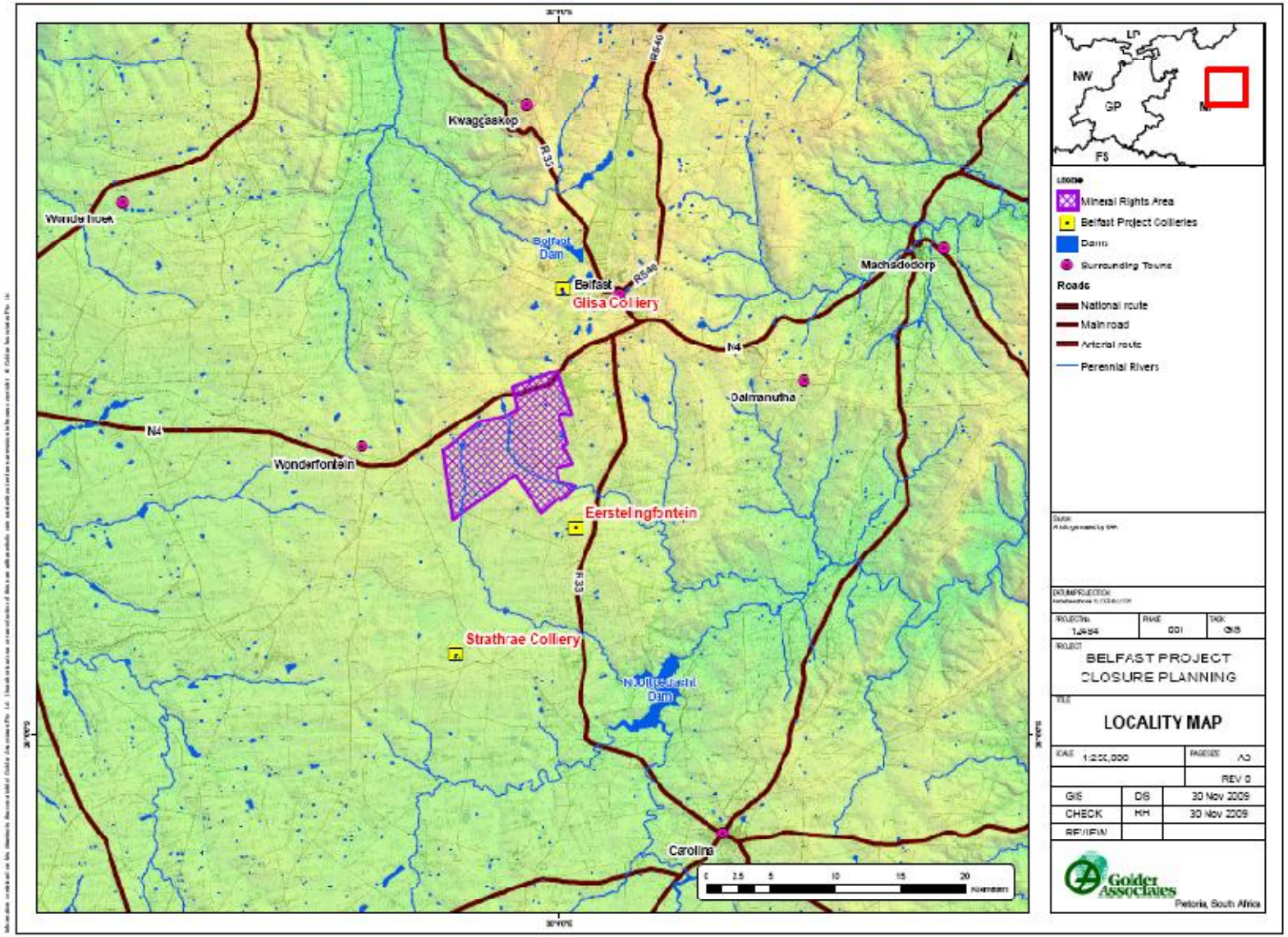
The above closure plan will be compiled for submission to the DMR early 2010, once the required information from the specialist studies conducted as part of the EIA is available. In the interim, in order to inform the EIA/EMP, this closure framework that outlines the planned closure approach has been compiled.

2.0 BACKGROUND

2.1 Location

The Belfast Project has an extent of approximately 5819.18 ha on various portions of the farms Zoekop 426JS, Leeuwbank 427JS and Blyvooruitzicht 383 in the Magisterial district of Belfast, Mpumalanga. The associated mineral rights area represents approximately 7 500 ha.

The area is located approximately 10 km south-west of the town of Belfast, adjacent to the N4 highway, running past Middleburg towards Machadodorp. Figure 1 provides a geographic setting of the Belfast Project site.


Kwaggaskop
R37
R540
Wonderfontein
Belfast Dam
Belfast
Glisa Colliery
Machadodorp
N4
Dalmanutha
Wonderfontein
Eerstelingfontein
R33
Strathrae Colliery
Carolina
Mineral Rights Area
Belfast Project Collieries
Dams
Surrounding Towns
Roads
National route
Main road
Arterial route
Perennial Rivers
BELFAST PROJECT
CLOSURE PLANNING
LOCALITY MAP
1:200,000
A3
REV 0
GIS
DS
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Golder Associates
Pretoria, South Africa

2.2 Mining areas and related infrastructure

The key mine infrastructure is listed below and indicated on Figure 2.

- East- and west open pits with associated stockpiles of overburden material;
- Co-disposal facility for the disposal of coarse discard and fines arising from the planned coal beneficiation;
- Crushing and screening plant;
- Beneficiation plant (crushing, screening and washing);
- Borehole water supply and reservoirs;
- Haul roads; and
- Various administrative buildings.

2.3 Operational period

The Belfast Project reserves will be exploited as two mining areas, the East- and West blocks, separated by a tributary of the Klein-Komati River. The general direction of mining will be from south to north over a LOM of approximately 27 years until 2038 (Figure 3). No mining will take place underneath or through the tributary of the Klein-Komati River.

2.3.1 Phase 1

Mining is planned to commence during 2011 with the East block pit, producing coal for Eskom.

A box-cut will be established during the construction phase during which topsoil and overburden from the area will be stockpiled to the south of the open pit (P1 – D1, Figure 2). Operations will involve conventional strip mining during which overburden would be removed to expose the underlying coal. Mining will be conducted using conventional truck and shovel operations, assisted by roll-over dozing to allow for continuous back-filling and rehabilitation of the mined-out areas.

Rehabilitation of the mined-out areas would commence once the first strip is mined.

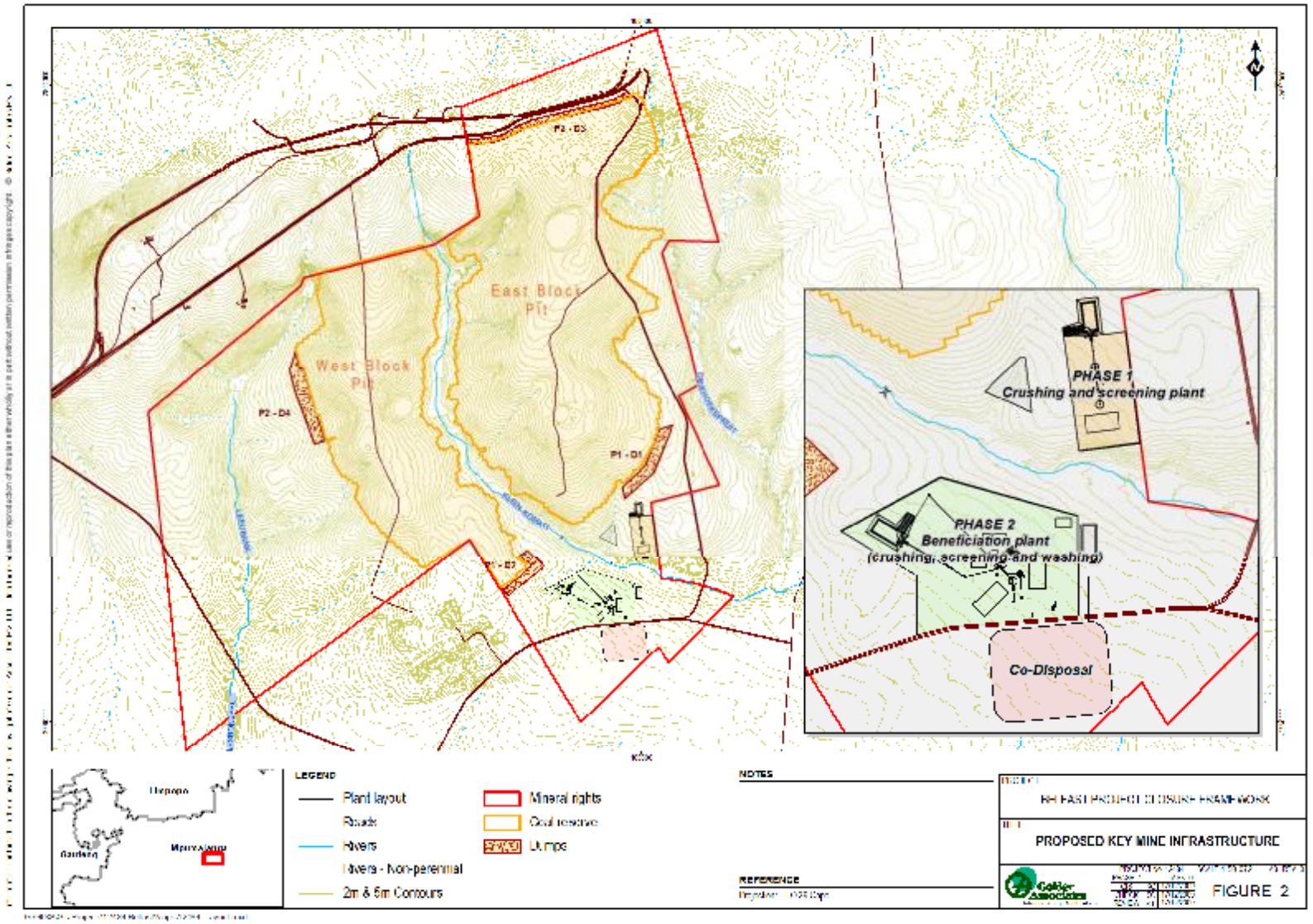
2.3.2 Phase 2

Mining operations will be expanded in Phase 2 by also initiating the West Block pit during which strip mining activities similar to those undertaken at the East block pit would be employed. Overburden from the West block pit would be stockpiled south of the open pit (P1 – D2, on Figure 2).

The construction and commissioning of a coal beneficiation plant to supply Eskom and the export market will also take place during this phase.

2.4 Decommissioning and closure period

It is envisaged at mine decommissioning that only the East block pit will have a final void that would need to be backfilled and rehabilitated. It is expected that the West block pit would be completely backfilled and rehabilitated at this point because mining of this pit would have ceased approximately ten years before the conclusion of mining at the East block pit.


East Block Pit
West Block Pit
P2 - D3
P2 - D4
P1 - D1
P1 - D2
PHASE 1
Crushing and screening plant
PHASE 2
Beneficiation plant
(crushing, screening and washing)
Co-Disposal
LEGEND
Plant layout
Roads
Rivers
Rivers - Non-perennial
2m & 5m Contours
Mineral rights
Coal reserve
Dumps
NOTES
REFERENCE
PROPOSED KEY MINE INFRASTRUCTURE
FIGURE 2

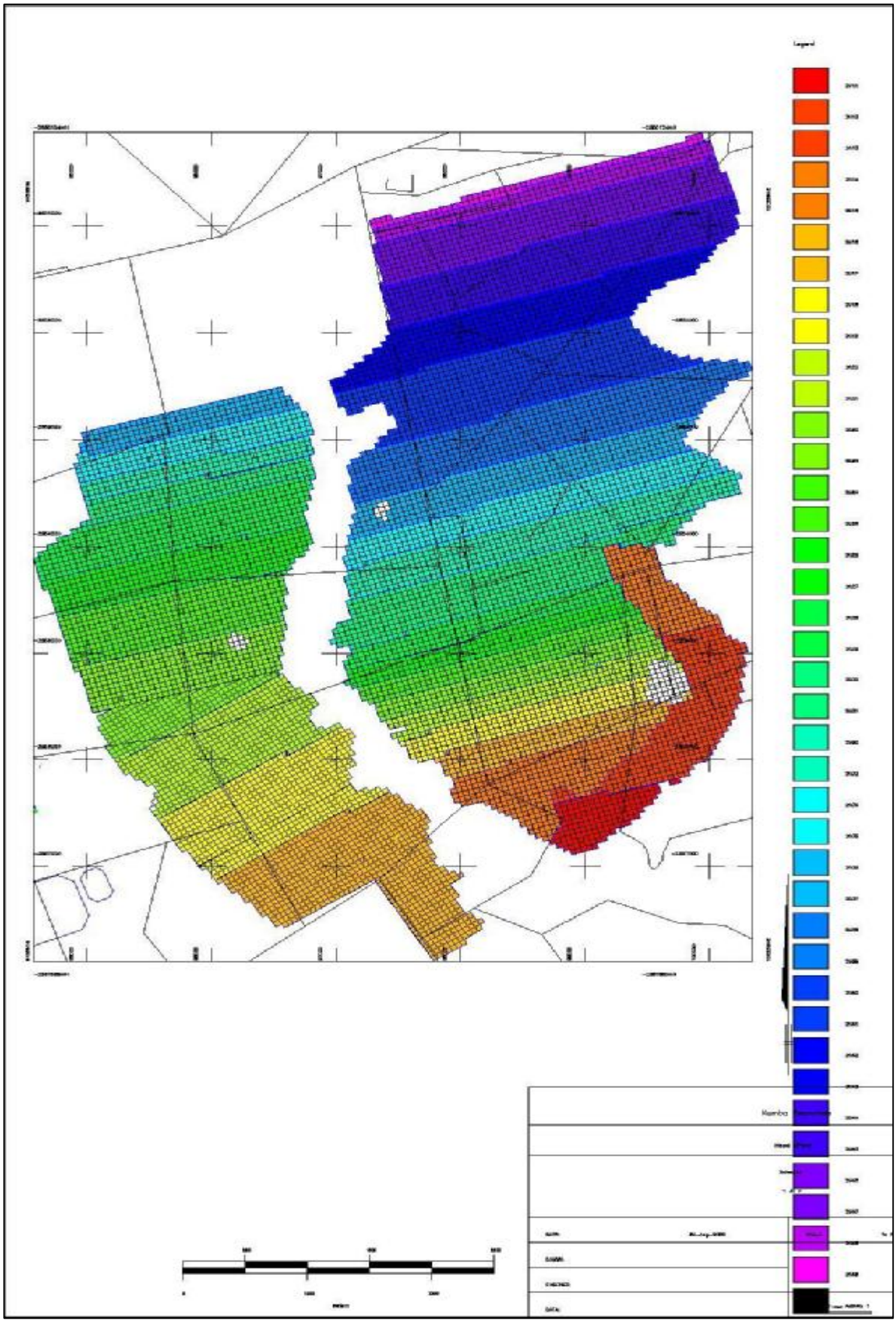


Figure 3: Proposed mining plan over the life-of-mine of approximately 27 years (2011 to 2038)

2.5 Coal beneficiation

During Phase 1 processing of the ROM will only involve crushing and screening to produce an Eskom product.

A beneficiation plant, involving crushing, screening and washing will be implemented in 2013 as part of Phase 2 and will operate until 2038 to produce export as well as A/B-grade Eskom products. The plant will be designed for a feed rate of 5 million tons per annum and beneficiation of the ROM coal will be conducted by means of conventional dense medium separation (DMS).

Fines generated from the beneficiation process will be deposited on the co-disposal facility, together with coarse discard.

The beneficiation plant and co-disposal facility will both be located south of the East- and West block pits (Figure 2).

2.6 Coal handling and transport

During Phase 1 ROM will be transported via conveyor to a temporary stockpile area from which it will be transferred to local Eskom power stations via road.

During Phase 2, on expansion of operations, beneficiated coal would be handled similarly as during Phase 1, and product will be distributed via truck.

2.7 Biophysical environment

The following aspects of the biophysical environment related to the Belfast Project are key to the closure planning:

- Mean temperatures in the project area are conducive to agriculture, with rainfall and evapo-transpiration of approximately 730 and 1 450 mm per annum respectively, and summer temperatures averaging mid-20C's;
- Topography is gently sloping towards the south which contributes favourably to current agricultural and grazing practices;
- The project area is located in the headwaters of the Komati River and drained by the quaternary catchments of the Leeubankspruit (X11C), tributaries of the Klein-Komati River (X11D), and a non-perennial tributary Steelpoort River (B41A). The overall catchment is in good ecological condition;
- Numerous wetlands traverse the project areas which play an important role in moderating the downstream water quantity and quality of local rivers and streams. However, agricultural activities have already led to impacts on these wetlands through the incision of channels, bank slumping, increase in sediment loads and growth of exotic invader plants;
- In addition to the wetland systems, numerous pans are located within and surrounding the project area. Although some impacts such as overgrazing, channelisation, cultivation and growth of exotic plant species have occurred, these pans are largely unmodified, representing largely natural conditions;
- Few red data plant species and, hence, associated faunal species are expected in the area due to current agricultural and grazing practices having already transformed most of the natural habitats to fields and pastures;
- The overall ambient groundwater quality in the project area is good, but displaying some variance due to different co-existing aquifers, impact situations and recharge conditions;
- Groundwater borehole yields vary between 0 and 2 l/s. The dedicated numerical groundwater modelling conducted to predict the annual groundwater seepage rates into the mining blocks indicated a range of between 100 - 950 m^3/d of recharge to the pits when mining occurs at the deepest levels and flow gradients are the steepest;

- The West block pit is estimated to decant at a rate of approximately 2 000 m^3/day to the north-west and south-east, whilst decant from the East block is estimated at 3 600 m^3/day along its south-western boundary. The time to decant for both of the mining blocks is less than one year after cessation of mining; and

- Acid-base accounting on coal and overburden material indicated a high likelihood of acid mine drainage (AMD) formation, most likely resulting in the decant water from the mine being of poor quality.

2.8 Socio-economic environment

The following aspects of the socio-economic environment related to the Belfast Project are key to the closure planning:

- The Emakhazeni Local Municipality (ELM) in which the Belfast Project is situated contributes approximately 45 percent to the economy of the local Nkangala District, through mining and agriculture;

- Although the area is sparsely populated, with 43 percent of people living in rural areas, tourism and the "trout triangle" of Belfast, Dullstroom and Machadodorp contribute a large percentage of the growth in the ELM; and

- The Maputo N4 Corridor is the main economic spine through the area, connecting Gauteng through Belfast by road and rail to Nelspruit and Maputo.

2.9 Land use

2.10 Current situation

The land use assessment undertaken for the Belfast Project indicated the following:

- Regionally, the prominent land use is agriculture comprising grazing, horticultural, animal husbandry, forestry and some fishing;

- Locally, (within the Belfast Project area), agriculture is predominant with the focus being on cultivation of maize, potatoes and sunflowers. Grazing also occurs in areas too wet (wetlands) or rocky (rocky outcrops) to plough; and

- The area around the town of Belfast is recognised as having mining potential, with other notable mines close to the Belfast Project including Exxaro's Glisa and Strathrae Collieries and the Umcebo Onverwacht Colliery.

2.11 Post mining

Although other land uses may present other opportunities, these depend heavily on external factors such as local economic and urban growth of the town of Belfast. It is noted that as the Belfast Project is only at the planning stage, these other identified land uses should be re-visited periodically throughout the mine's life to ensure alignment with the overall spatial development planning which will no doubt occur concurrent to the project.

The Belfast Project area was delineated into the following six base-case land use zones (Figure 4):

- **Zone 1 Areas least affected by mining:** Located on the outskirts of the Belfast Project operational area, some unplanned mining activities may take place and thereby reduce current land capability. These areas should be kept clear of intensive mining to retain their arable value. The possible post-closure land use for this zone is arable agriculture;

- **Zone 1a Western riparian zone:** Located within eastern portion of Zone 1, some unplanned mining activities may take place which could transform the riparian zone. However, due to the nature of the riparian area, recreation in the form of hiking, biking and fishing could take place. Hence, the possible post-closure land use for this zone is eco-tourism / recreation.

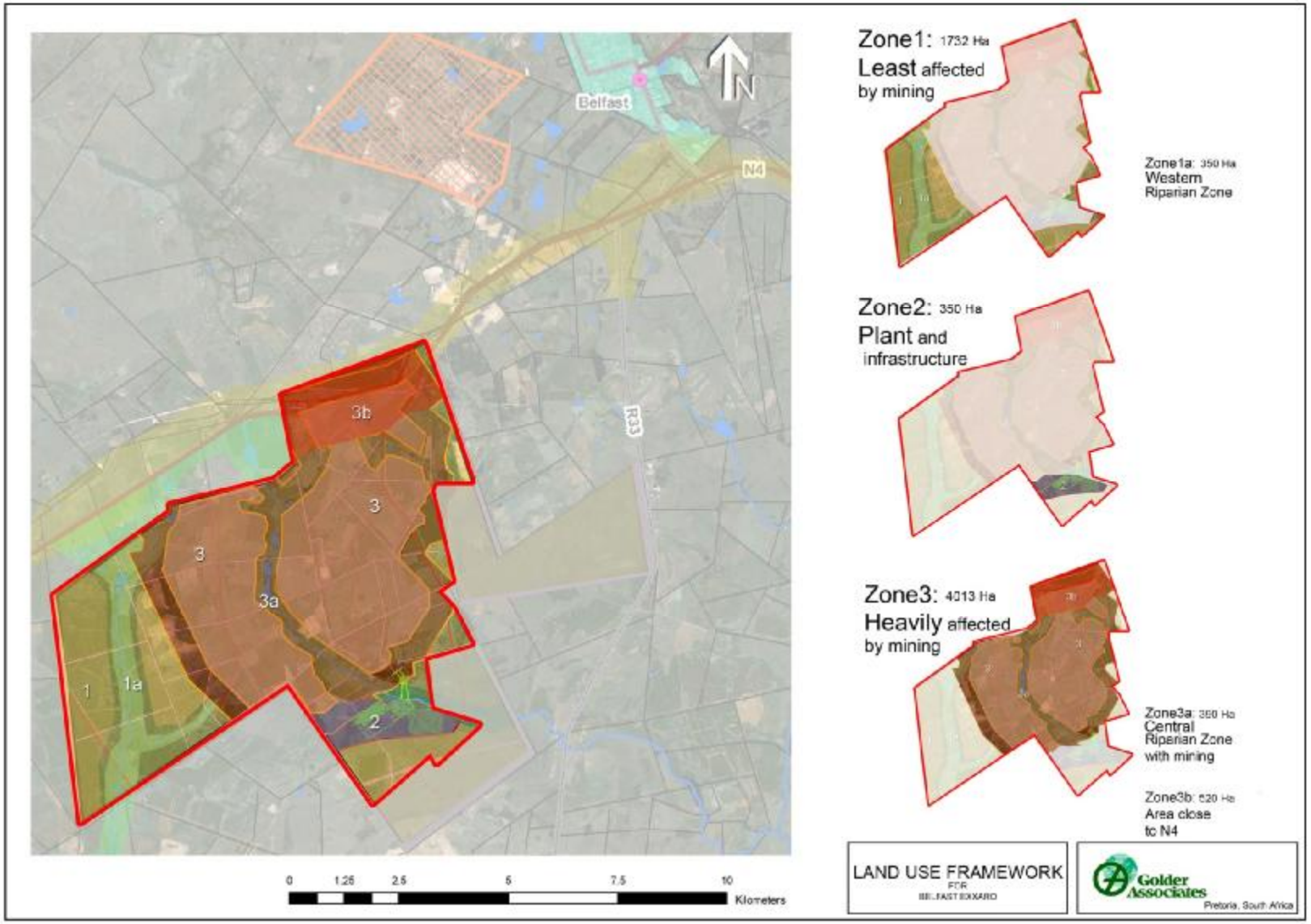
- **Zone 2 Plant and associated infrastructure:** Comprising the Belfast Project's plant and related processing infrastructure, this zone would be subject to process-related pollution and contamination. No significant opportunities for the zone could be identified and hence the possible post-closure land use for this zone is grazing / wilderness;

- **Zone 3 Areas heavily affected by mining:** This zone comprises the operational pit areas and possible post-closure risks could include prevalence of spontaneous combustion, decant of AMD and reduction of surface water quality. Post-closure, the zone could be utilised for peri-urban recreation uses, such as golf course, sports fields, etc. The possible post-closure land use for this zone is grazing / recreation;

- **Zone 3a Central riparian zone within mining area:** This Zone comprises the tributary of the Klein-Komati River and, located in between the East- and West block pits, transformation of the riparian zone is eminent. Identified post-closure land uses are similar to that of Zone 1a and include recreation (hiking, biking and fishing) and eco-tourism potential. Hence, the possible post-closure land use for this zone is eco-tourism / recreation.

- **Zone 3b Area close to N4:** This zone comprised the northern portion of the Belfast Project's operational area, located adjacent to the N4. As for Zone 3, spontaneous combustion, decant of AMD and reduction of surface water quality could all pose post-closure risks. However, due to this zone's proximity to the N4, the area could be incorporated into the identified Maputo N4 Corridor initiative, focussing on the development of small commercial and/or light industry. Mine infrastructure and buildings should preferably be placed in this area for beneficial post-closure re-use. The possible post-closure land use for this zone is commercial / light industry.

In addition to the above six zones, **re-use of treated mine water for potable use in the town of Belfast** has also been identified as a potential opportunity for the Belfast Project. It is foreseen that over the long-term, water decanting from the pit area would require dedicated treatment. The town of Belfast currently utilises groundwater for potable water requirements and, as the town grows/expands, it is possible that treated water from the mine could be utilised to replace/augment these potable and other water requirements. This option requires further investigation.


Belfast
N4
R33
N
3b
3
3
3a
1
1a
2
0
1.25
2.5
5
7.5
10
Kilometers
Zone1: 1732 Ha
Least affected by mining
Zone1a: 350 Ha
Western Riparian Zone
Zone2: 350 Ha
Plant and infrastructure
Zone3: 4013 Ha
Heavily affected by mining
Zone3a: 350 Ha
Central Riparian Zone with mining
Zone3b: 520 Ha
Area close to N4
LAND USE FRAMEWORK
FOR
BELFAST EXXARO
Golder Associates
Pretoria, South Africa

3.0 APPROACH TO CLOSURE PLANNING

Closure planning and the development of the Belfast Projects' closure plan will be ongoing. It is foreseen that this planning would evolve over the following stages:

- **Stage 1:** Compilation of this closure framework to set the context for the closure planning of the mining operation;
- **Stage 2:** Compilation of a conceptual closure plan (once specialist studies informing the EIA/EMP have been finalised) forming part of the project EIA;
- **Stage 2:** Compilation of an interim closure plan once operational activities have begun to guide the closure planning of the mining operation and associated closure-related costing over its operational life;
- **Stage 3:** Execution of the monitoring and investigations/assessments/trials as stipulated in the interim closure plan;
- **Stage 4:** Compilation of final closure plan within three years of decommissioning of mining operations and/or closure of portions of the mining operation;
- **Stage 5:** Execution of the engineering design of closure measures; and
- **Stage 6:** Compilation of a final closure plan within the required regulatory timeframes before decommissioning, taking cognisance of the information/work from the previous stages to finalise closure planning.

The work related to the above stages will take place during Belfast's operational period (roughly 2011 – 2038). Thereafter it will be followed by decommissioning. This will include care and maintenance of the reclaimed portions of the mine site, as well as the demonstration of the performance of the closure measures. Post-closure care and maintenance should continue until the environmental and post-mining land-use objectives have been met, followed by site relinquishment.

4.0 OVERALL CLOSURE GOAL AND OBJECTIVES

The overall closure goal for the Belfast Project area is to progressively re-instate an area that is safe, stable, and non-polluting to be integrated into the current agricultural, eco-tourism and economic initiatives of the Emakhazeni Local Municipality area, utilising the infrastructure created for the project as far as possible for beneficial re-use.

The above overall goal is underpinned by the more specific objectives listed below. These objectives are stated qualitatively and would become more specific as the actual closure measures are devised. The closure objectives apply to the mine site in its final closed state and not whilst it is transformed towards this state.

4.1 Physical stability

To remove and/or stabilise surface infrastructure, unavoidable mining residue and open pits which are present on the mine to facilitate the implementation of the planned land use, by:

- Stabilising the upper surfaces and outer slopes of the co-disposal facility by means the following:
  - Sealing of penstock and plugging the outlet;
  - Constructing a parapet wall around perimeter of upper surface;
  - Constructing a breaker layer and store-and-release cover on the upper surface and outer slopes to limit water ingress; and
  - Establishing vegetation on the cover located on the upper surface and outer slopes.

- Closing, dismantling, removing and disposing of all surface infrastructure that has no beneficial post-closure use; and
- Ripping, shaping, and vegetating of reclaimed footprint areas as well as haul roads with no beneficial post-closure use and the integrating of these into the surrounding areas.

4.2 Environmental quality

To ensure that local environmental quality is not adversely affected by possible physical effects and chemical contamination arising from the mine site as well as to sustain catchment yield as far as possible after closure, by:

- Cleaning up of the sources of possible surface water contamination still present on the mine site to protect the downstream receiving environment;
- Providing the required measures to limit at source the generation of contaminants which could adversely affect local groundwater quality;
- Treating the excess mine water make from the rehabilitated open pits for possible beneficial re-use (if no other alternate to treatment could be found);
- Ensuring that the reclaimed mine site is free-draining and run-off is routed to local/natural drainage lines as far as possible. The final drainage modes and associated profiling of the two open pits would require further attention; and
- Limiting dust generation on the reclaimed mine site that could cause nuisance and/or health effects to surrounding landowners/communities.

4.3 Health and safety

To limit the possible health and safety threats to humans and animals using the reclaimed mine site as it becomes available, by:

- Shaping, covering and vegetating the remaining co-disposal facility to stable and safe outer slopes and upper surfaces;
- Demonstrating by means of suitable sampling and analysis that salts, metals and other potential contaminants over the reclaimed sites allocated in terms of the land use planning for human habitation are acceptable;
- Removing, for safe disposal at the Belfast waste disposal site, all potential process-related contaminants to ensure that no hazardous waste is present on the respective sites once these have been reclaimed; and

Note: *It is envisaged that demolition waste such as concrete and building rubble would be largely inert.*

- Demonstrating, through a review of monitoring data, that no possible surface and/or groundwater contaminant sources remain on the reclaimed mine site that could compromise the planned land use and/or pose health and safety threats.

4.4 Land capability/land-use

To re-instate suitable land capabilities over the various portions of the mine site to facilitated the progressive implementation of the planned land use(s), by:

- Upfront zoning of the mine site in terms of the land use plan agreed with stakeholders;
- Ensuring that the reclaimed portions of the mine site are safe and stable in the long-term;
- Cleaning-up and reclaiming of contaminated soil areas, where necessary; and

- Applying the available topsoil as judiciously as possible by committing the available topsoil to key pre-determined rehabilitation areas.

4.5 Aesthetic quality

To leave behind a reclaimed mine site that, in general, is not only neat and tidy giving an acceptable overall aesthetic appearance, but which is also aligned to the agreed final land uses, by:

- Tiding-up the reclaimed mine sites from demolition waste, rubble, etc.;
- Landscaping the covered co-disposal facility to render it “soft”, blending in with the surrounding landscape, as far as possible;
- Shaping and levelling reclaimed areas to create landforms that emulate the surroundings and would facilitate drainage, by giving attention to the profiling of the final rehabilitated landform;
- Ensuring that the reclaimed mine site is free draining and disturbed areas are suitably vegetated, where feasible;
- Ensuring that all other remaining embankments are shaped and trimmed and that these are free draining;
- Shaping of terrace and hard stand areas to roughly emulate the surrounding surface topography; and
- Vegetating the above rehabilitated areas, as required, to be aesthetically pleasing.

4.6 Biodiversity

To encourage, where appropriate, the re-establishment of native vegetation and conduct stream reclamation on the rehabilitated mine site such that the terrestrial and aquatic biodiversity is largely re-instated over time, by:

- Integration of drainage lines from the rehabilitated open pits into the upper reaches of the Klein Komati River;
- Reinstatement (as far as possible) of aquatic habitats and/or mitigation possible conditions which could inhibit the return of aquatic health within the portion of the river traversing the mine site;
- Stabilising disturbed areas, specifically river banks and channels, to prevent erosion which could especially impact on in-stream habitats in the short- to medium-term until a suitable vegetation cover has established and/or other erosion control measures have taken effect;
- Establish buffer areas around sensitive ecological areas (for example, around the three river channels, pans, etc) aligned to the agreed land use plan to limit human access and associated disturbance to these areas; and
- Establishing viable self-sustaining vegetation communities on disturbed areas that will encourage the re-introduction of local fauna, as far as possible.

4.7 Social

To ensure that the infrastructure transfers, measures and/or contributions made by the mine towards the long-term socio-economic benefit of the local communities/municipality are sustainable, by:

- Identifying buildings and other infrastructure that will be of commercial and/or other value/benefit to the local community and transferring these to third parties as agreed between the mine and these parties and/or the stakeholders;
- Communicating and negotiating with local communities and related civil structures on the closure of the mine and the possible transfer of surface infrastructure to them;

- Ensuring effective hand-over of pre-determined mining-related surface infrastructure for future use by other parties;
- Providing, until hand-over of the mining-related surface infrastructure, training and awareness creation to empower the community to effectively manage the financial and/or commercial resources transferred from the mine; and
- Clearly defining the roles of the parties responsible for future management of the transferred facilities.

5.0 CONCLUSION

The closure planning for Exxaro's Belfast Project would be ongoing, building on this closure framework. The required adaptations and updates need to be made as additional information becomes available. It is imperative that the mine aims for "convergence" in closure planning, by ensuring that with each inclusion and/or update of the closure planning that meaningful improvement towards the compilation of the final closure plan is achieved.

It is noted that a conceptual closure plan is currently being developed as part of the progression in closure planning and should be submitted to the DMR early 2010.

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APPENDIX A

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Golder Associates

January 2010

EXXARO RESOURCES LIMITED

Closure Cost Estimates for the Proposed Belfast Project as at December 2009

Submitted to:
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Roger Dyason Road
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REPORT

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Executive Summary

Golder Associates was appointed to assist with the determination of the closure costs for Exxaro Resources Limited's (Exxaro) proposed new Belfast Project for the scheduled closure situation, as at December 2009.

The closure costs reflected in this report are specifically for the Belfast Project, located near Belfast in the Mpumalanga Province. The costs are structured in the format routinely used for the presentation of closure costs for mine sites by reflecting the costs in terms of the following categories:

- Infrastructural areas;
- Mining areas;
- General surface reclamation;
- Water management;
- Post-closure aspects; and
- Additional allowances.

The cost estimate quantities were taken from available plans, maps and other relevant project information supplied by Exxaro and unit rates were obtained from the Golder Associates' data base and/or in consultation with demolition and rehabilitation practitioners.

The estimated closure costs for the above areas for scheduled closure are approximately R289 million as indicated in the table below:

Belfast Project - Closure Costs as at December 2009			
	Closure Components	**Scheduled (2049)**	
	INFRASTRUCTURE AND RELATED ASPECTS	**TOTAL**	
1	Infrastructural aspects	R	15,207,158.43
2	Mining aspects	R	78,055,500.00
3	General surface reclamation	R	5,192,500.00
4	Water management	R	5,580,000.00
	SUB-TOTAL 1 (Infrastructure and related aspects)	R	104,035,158.43
5	Post-closure aspects	R	161,731,652.50
	SUB-TOTAL 2 (Post-closure aspects)	R	161,731,652.50
6	**ADDITIONAL ALLOWANCES**		
6.1	Preliminary and general	R	12,484,219.01
6.2	Contingencies	R	10,403,515.84
	SUB-TOTAL 3 (Additional allowances)	**R**	**22,887,734.85**
	GRAND TOTAL (Sub-total 1+2+3)	**R**	**288,654,545.78**

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APPENDICES

LIST OF TERMS AND ABBREVIATIONS USED

Reclamation	The re-instatement of a disturbed area into a usable state (not necessarily its pre-mining state) as defined by broad land use and related performance objectives
Remediation	To assist in the reclamation process by enhancing the quality of an area through specific actions to improve especially bio-physical site conditions
Rehabilitation	The return of a disturbed area to its original state, or as close as possible to this state
Scheduled closure	Closure that happens at the planned date and/or time horizon
Unscheduled closure	Immediate closure of a site, representing decommissioning and reclamation of the site in its present state
Decommissioning	This relates to the situation after cessation of operations involving the deconstruction/removal and/or transfer of surface infrastructure and the initiation of general site reclamation
Care and maintenance	This involves the maintaining and corrective action as requires as well as conducting the required inspection and monitoring to demonstrate achievement of success of the implemented measures
Closure	This involves the application for closure certificate and initiation of transfer of ongoing care and maintenance to third parties
Site relinquishment	Receipt of closure certificate and handover to third parties for ongoing care and maintenance, if required
Post-closure	The period of ongoing care and maintenance, as per arrangement with third parties
Preliminary and Generals (P&Gs)	This is a key cost item which is directly related to whether third party contractors are applied for site reclamation. This cost item comprises both fixed and time-related charges. The former makes allowance for establishment (and de-establishment) of contractors on site, as well as covering their operational requirements for their offices (electricity/water/communications), latrines, etc. Time-related items make allowance for the running costs of the fixed charged items for the contract period
Contingencies	This allows for making reasonable allowance for possible oversights/omissions and possible work not foreseen at the time of compilation of the closure costs. Allowance of between 10 percent and 20 percent would usually be made based on the accuracy of the estimations. The South African Department of Minerals and Energy Guideline (January 2005) requires an allowance of 10 percent

1.0 INTRODUCTION

Exxaro Resources Limited (Exxaro) is currently investigating the feasibility of undertaking open cast coal mining activities at the proposed Belfast Project which is located south of the town of Belfast, adjacent to the N4 highway. The project forms part of Exxaro's Northern Block Complex (NBC) operations and is expected to start in 2011 with an operational life of the mine of approximately 38 years, until 2049.

Exxaro have launched a mining rights application with the Department of Mineral Resources (DMR) in terms of the Minerals and Petroleum Resources Development Act, No. 28 of 2004 (MPRDA). As part of the Environmental Impact Assessment /Environmental Management Plan (EIA/EMP) required for submitted to the DMR for the mining rights application, an estimation of the scheduled and unscheduled closure costs is needed.

As the mine is still in the planning phase and no infrastructure and/or activities are currently on-site, this closure costing report provides the closure cost estimate for the scheduled situation to ensure adequate financial provision is provided by Exxaro.

2.0 APPROACH TO COST DETERMINATION

The approach followed with the determination of the closure costs is as follows:

- Undertaking a project meeting with Exxaro's Belfast Project planning team on 20 October 2009 to establish/confirm the nature and extent of the project with specific focus on items such as:
  - Area to be mined and the extent of mining operations;
  - Mining method;
  - Layout and type of surface infrastructure;
  - Mine residue;
  - Water management; and
  - Overall mine site in terms of development and related disturbances.

This meeting was followed by another discussion held with Exxaro's Mr Charles Linstrom mid-November to confirm outstanding issues raised since the October meeting.

- Assessment of available project information and specialist reports to understand the project and site-specific issues;
- Identification of areas possibly requiring remediation at closure;
- Conceptualisation of good practice remediation and closure measures;
- Determination of quantities and measurements for the respective components from drawings and plans provided by Exxaro;
- Collation of the quantities and adopted unit rates into costing spreadsheets for each of the components; and
- Compilation of this costing report reflecting the approach and assumptions applicable to the costing.

3.0 AVAILABLE INFORMATION

The information listed in Table 1 was considered as part of the closure cost estimation:

Table 1: Drawings provided for closure costing

Drawing/Report title	Drawing/Report number	Date
Scoping Report for the Belfast Project	MP 30/5/1/2/2/431 MR	06 August 2009
Land use framework for input into the EIA/EMP for the proposed Belfast NCB project, near Belfast	12484-9292-1	24 November 2009
(Proposed mine plan)	MineRightApplication_forWater 20090824(3).dwg	Undated
Proposed plant layout for EIA application	KF2009 034revB EIA Application.dwg	2009-10-04

4.0 BATTERY LIMITS

The closure costs were determined for the Belfast Project area, comprising the following:

- Two (2) mine pits, east and west of a central drainage line;
- Primary and secondary crushers;
- A washing and screening plant;
- Material stockpile areas;
- One co-disposal dump;
- Return water and raw water dam;
- Surface water management infrastructure;
- Conveyors;
- Workshops;
- Offices and change house facilities;
- Electricity supply network; and
- Access and haul roads

A general layout plan of the above-mentioned areas is provided in Appendix B.

5.0 ASSUMPTIONS AND QUALIFICATIONS

The following section provides the general and site-specific assumptions and qualifications related to the closure costing for the Belfast Project.

5.1 General

- The closure cost estimate is aligned to the Guideline Document for the Evaluation of the Quantum of Closure Related Financial Provision Provided by a Mine, by the DMR (January, 2005);
- The closure costs for the site could comprise a number of cost components. This report only addresses the decommissioning and reclamation costs, equating to an outside (third party) contractor establishing on-site and conducting the reclamation-related work. Other components such as staffing of the site after decommissioning, the infrastructure and support services (e.g. power supply, etc) for this staff as well as workforce matters such as separation packages, re- training /re-skilling, etc. are outside the scope of this report;
- Based on the above, dedicated contractors would be commissioned to conduct the demolition and reclamation work on the site. This would *inter alia* require establishment costs for the contractors and hence, the allowance for preliminary and general (P&Gs) in the cost estimate;
- Allowance has also been made for third party contractors and consultants to conduct post-closure care and maintenance work as well as compliance monitoring;
- As no development has yet taken place, closure costs have been determined for only the scheduled closure situation. Scheduled closure takes place at a planned date and/or time horizon, in accordance with overall mine planning;
- In accordance with the DMR guideline, no cost off-sets due to possible salvage values were considered and **gross** reclamation costs are reported; and
- Fixed ratios for P&Gs and contingencies as per the DMR guideline have been applied.

5.2 Site-specific

- Typical quantities of key infrastructure such as sizes, distances, footprint areas, etc., were obtained from measurements conducted by Golder from drawings and plans provided by Exxaro. Where insufficient or limited information was available, estimates are based on knowledge of similar projects;
- No mining will take place underneath or through the central drainage line;
- It is anticipated that due to the bulking of the material and the specific stripping ratios for the opencast mining, the final landform of the backfilled pits will not be lower than the central drainage line;
- Only the eastern pit will have a final void at scheduled closure that needs to be backfilled and rehabilitated. It is expected that the western pit would be completely backfilled and rehabilitated at closure due to the fact that mining of this pit will cease approx 10 years before scheduled closure;
- It is expected that the two pits will decant water at the southern ends if unattended and therefore allowance must be made for ongoing treatment of water;
- Allowance is made to demolish all mine infrastructure at the end of the life of mine if no alternative uses had been agreed upon with third parties;
- It is foreseen that demolition waste would be largely inert, such as concrete and building rubble, and would be disposed of at the Belfast waste disposal site. Steel and related material from the plant demolition which has salvage value will remain on-site for sale to a third parties;

6.0 UNIT RATES

Unit rates were obtained from the Golders' existing data base and in consultation with demolition practitioners. The above key rates are included in Appendix C.

6.1 General surface shaping

It has been assumed that general surface shaping would be required over most of the areas where surface infrastructure has been removed, as part of the overall surface reclamation. This includes the stockpiling of rubble to be removed and the final profiling of the surface afterwards. For this purpose it has been assumed that shaping would involve the movement of material to about 500 to 750 mm average thickness. With an adopted dozing rate of R10.00/m^3, this equates to about R 50 000 to R75 000/ha.

6.2 Roads

It was assumed that the tarred roads are on average 8m wide with a 75 mm thick tar layer with 500mm layer works underneath.

Allowance has been made for the removal of the tar layer from low grade tar roads at a rate of R15/m^2. A further allowance has been made to excavate a 5m^3 trench next to the road at R18/m^3 and cut the layer works into the trench at a further R18/m^3. Material excavated from the trench is then dozed back over the trench and road at R12/m^3. Allowance has been made to re-vegetate a 12m wide strip afterwards at about R2/m^2 calculated per 8m width. These individual rates translate into an overall rate of R46/m^2.

Additional provision has been made for the disposal of the hazardous tar waste at a further R1 000/m^3 at an authorised hazardous waste disposal facility.

6.3 Compaction alleviation

Allowance was made for a mid-sized dozer equipped with 3 ripper tines, ripping to a depth of approximately 500 mm. A rate of R 6 000/ha was estimated based on the dozer ripping at a speed of 1 km/h and a width of 1.8 m. A wet rate of R 1 000/h was used for the dozer.

6.4 Vegetation establishment (general)

The establishment of vegetation on uncompacted growth medium/topsoil includes the amelioration of the soil by applying 0.5 ton/ha fertiliser, 5 ton/ha lime and 15 ton/ha organic material such as well cured cattle manure. It also includes cultivation and seeding, but excludes ripping to alleviate compaction. A rate of R12 500/ha was used.

6.5 Surface water monitoring

It has been assumed that surface water quality has to continue at a monthly frequency for at least five years post-closure at each of the key areas.

If it is assumed that the above monitoring has to be conducted at least six monitoring points in each area and that it would take at least two man-days (including the preparation of sampling equipment) to conduct the sampling at these points, this would equate to about R 8 000 per sampling event for professional fees. If an additional allowance is made for sample analysis for of R 1 500 per sample, this equates to an additional amount of R 9 000, totalling to R 17 000 per event. Taking possible disbursements into account this amount could be rounded as R 20 000 per sampling event, or R 240 000 per year.

6.6 Groundwater monitoring

As for surface water monitoring, it has been assumed that groundwater monitoring will have to continue for at least five years post-closure.

If assumed that as in the case of surface water, sampling also has to be conducted at six monitoring points (boreholes), the same professional and analytical fees would apply. However, it is foreseen that groundwater

monitoring would only be conducted at a quarterly frequency and hence the annual costs would amount to R 80 000.

7.0 CLOSURE COST ASSESSMENT

The spreadsheets detailing the closure cost estimates for this report are included in Appendix D. The sub-sections that follow are aligned to these spreadsheets.

7.1 Infrastructural areas

Closure cost component	Closure cost assessment - scheduled closure (2049)
Processing plants, steel structures, reinforced concrete structures, offices, workshops, residential buildings and related structures	• All infrastructure would be completely dismantled. • Inert demolition waste will be disposed of at the Belfast permitted waste disposal site. Allowance was made for a haul distance of 20 km for the disposal of the waste. • All Eskom sub-stations and powerlines were excluded from these calculations. • General surface rehabilitation will be implemented on footprint areas.
Roads	• All non-provincial tar and engineered gravel roads will have to be reclaimed. Engineered layers will be buried in a trenched system next to the roads. • The proposed road extension between District Road 1770 and the R33 will remain after closure. • Allowance is made for 25m wide haul roads to be deep ripped, shaped and levelled (including the safety berms on the roads edge) and the disturbed area vegetated.
Power lines, railways and pipelines.	• All power lines, except the main feed lines leading to Eskom's substations, will be removed. • All pipelines will be removed.

7.2 Mining areas

Closure cost component	Closure cost assessment - scheduled closure (2049)
Open cast mining areas	• Two separate pits will be mined, east and west of the central drainage line. • Mining will be in a northerly direction. • Mining will be done by the strip mining method. • Concurrent rehabilitation will be done on the pits as part of the mining operations. • Only the eastern pit will have a final void at closure due to the fact that mining in the western pit would cease approximately

Closure cost component	Closure cost assessment - scheduled closure (2049)
	12 years before closure. • The final void of the eastern pit is estimated at approx 1.4 million cubic metres. For this it was assumed that 1.5 cuts will remain on 10 percent (280 m) with a depth of 75m. • The final voids will be backfilled with overburden. • Due to various constrains, material for the backfilling of the final void cannot be stockpiled near the proposed final void position. A haul distance of 5km is assumed for final backfilling. • Allowance was made for at closure to do final shaping and levelling on 5 percent (80 ha) of the eastern pit area. • It was assumed that topsoil will still have to be imported on 5 percent (80 ha) of the eastern pit area at closure. • Allowance is made to import 400 mm of topsoil on top of the backfill. • An allowance was made to re-establish vegetation on 80 ha of the eastern pit area.
Overburden stockpile areas	• All material will be backfilled into the pits. • A footprint area of 10 ha was assumed to require rehabilitation at closure. • Allowance is made to rip and re-vegetate the stockpile footprint areas.
Co-disposal facility	• The co-disposal facility will have a 700m x 700m (49 ha) footprint and will be constructed with side slopes of 1:4 (V:H). • The coarse discard and fines will be placed on a dedicated engineered base. • Final height of the facility is assumed at 50 m. • No allowance was made for the reshaping of the side slopes. • The slopes will be rehabilitated as an operational cost. • Provision is made for the construction of a parapet wall (2m high) around the top perimeter (4 x 500 m). • The penstock will be plugged and sealed. • Allowance is made to construct a capillary break layer of 300mm on the top surface. • Provision includes a 900 mm store-and-release cover to be constructed on top of the capillary break layer.

Closure cost component	Closure cost assessment - scheduled closure (2049)
	• Allowance is made to construct stormwater chutes to discharge water from the upper surface of the facility. • Collection and routing of possible seepage along the toe of the engineered base to the planned water treatment plant.
Return water and other surface water dams	• Allowance was made to remove 500 mm of silt from the return water dam basin. This can be disposed of on top of the co-disposal facility before the facility is rehabilitated. • All liners will be removed and appropriately disposed of. • The dam walls will be breached and the wall will be reshaped to at least 1:5 (V:H). Alternatively the material in the dam wall can be utilised as topsoil. • Allowance was made to remove a layer of 200 mm of contaminated material on 50 percent of the return water dam basin to allow for contamination due to leakages in the dam liner. This material can be dumped on top of the co-disposal facility before rehabilitation thereof. • The basin and wall areas will be ameliorated and seeded to establish vegetation.

7.3 General surface reclamation

Closure cost component	Closure cost assessment - scheduled closure (2049)
Topsoil / growth medium	• No allowance was made to import topsoil unless it is expressly stated. It was assumed that the underlying soil can be effectively rehabilitated and ameliorated to sustain vegetation.
Removal of contaminated material.	• An allowance was made to remove 250mm of contaminated material on 6ha of the infrastructural footprint area and to dispose of this material on top of the co-disposal facility before it is rehabilitated.
Disposal of demolition waste	• Allowance is made to dispose of all demolition waste at the Belfast waste disposal site, assuming a maximum haul distance of 20km.
Shaping and levelling of footprint areas	• Allowance was made to stockpile demolition waste for removal, fill excavations through a cut to fill action and re-profile the area to allow free drainage.
Ripping	• Allowance was made to rip the footprint areas to a depth of 500 mm to alleviate compaction.
Establish vegetation	• An allowance was made for soil amelioration, cultivation and seeding with an indigenous grass seed mixture.

7.4 Water management

Closure cost component	Closure cost assessment - scheduled closure (2049)
Re-instatement of drainage lines	; No mining will take place through or underneath the stream/drainage line that runs central to the site and between the two pits. However some damage and degradation of this area can be expected and therefore provision is made to rehabilitate/re-instate this stream.
Water treatment	; Allowance is made to install 4 (2 per pit) abstraction boreholes/wells on the southern side of the pits to abstract water for treatment. ¡ Allowance is made for a 6 Ml/day water treatment facility. ; The water treatment facility will be developed in 2Ml/day modular units that will be expanded over time to the full 6 Ml/day treatment capacity. ; The first 2 Ml/day unit is expected to be required by 2055, with the second and third units by 2065 and 2075 respectively. ; The provision allows for the construction of the treatment facilities as well as the indefinite treatment of water.

7.5 Post-closure aspects

Closure cost component	Closure cost assessment - scheduled closure (2049)
Reclamation monitoring	; An allowance has been included for the reclamation monitoring of both reclaimed areas and dumps for a 5 year period.
Care and maintenance	; Care and maintenance of the reclaimed areas and dumps, over a 5 year period, has been assumed.

7.6 Additional allowances

Closure cost component	Closure cost assessment - scheduled closure (2049)
Preliminary and general	; Additional allowance of 12 percent of the total for infrastructural and related aspects (sub-total 1 on summary costing table) has been made, which is aligned to the DMR guidelines.
Contingencies	; Additional allowance of 10 percent of the total for infrastructure and related aspects (sub-total 1 on summary costing table), which is aligned to the DMR guidelines.

8.0 ASPECTS REQUIRING FURTHER ATTENTION

The following aspects requiring further attention were identified during compilation of the closure costs:

- Detailed landform modelling will be required to optimise material handling activities. Aspects requiring specific attention include:
  - Optimisation of material handling,
  - Optimum overburden and topsoil stockpile positioning;
  - Size and position of the final void; and
  - Final landform modelling to ensure a sustainable landform.
- Some off-site mitigation might be required to compensate for the destruction of sensitive ecosystems and/or wetlands. It is assumed that this will be required during the operational phase of this project and is therefore not included as a scheduled closure cost. Preliminary estimates amount to a figure of approximately R25 million that might be required as an off-site offset.

9.0 CONCLUSION

The closure costs as reflected in this report were based on information obtained during consultation with the client and review of available information. In those cases where the required information was not available estimates were made based on experience. Unit rates for the costing were obtained from Golders' existing data base and/or from demolition and rehabilitation practitioners. Where required, these were adapted to reflect site-specific conditions.

Notwithstanding the above, if the closure measures are implemented as envisaged, the reflected costs provide a good indication of the costs for the scheduled situation as at December 2009 and should provide a good basis for making the required financial provision.

R Hattingh
Closure and Reclamation

SAP Brown
Principal

RH/SAPB/rh

Reg. No. 2002/007104/07

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APPENDIX A

Document limitations

DOCUMENT LIMITATIONS

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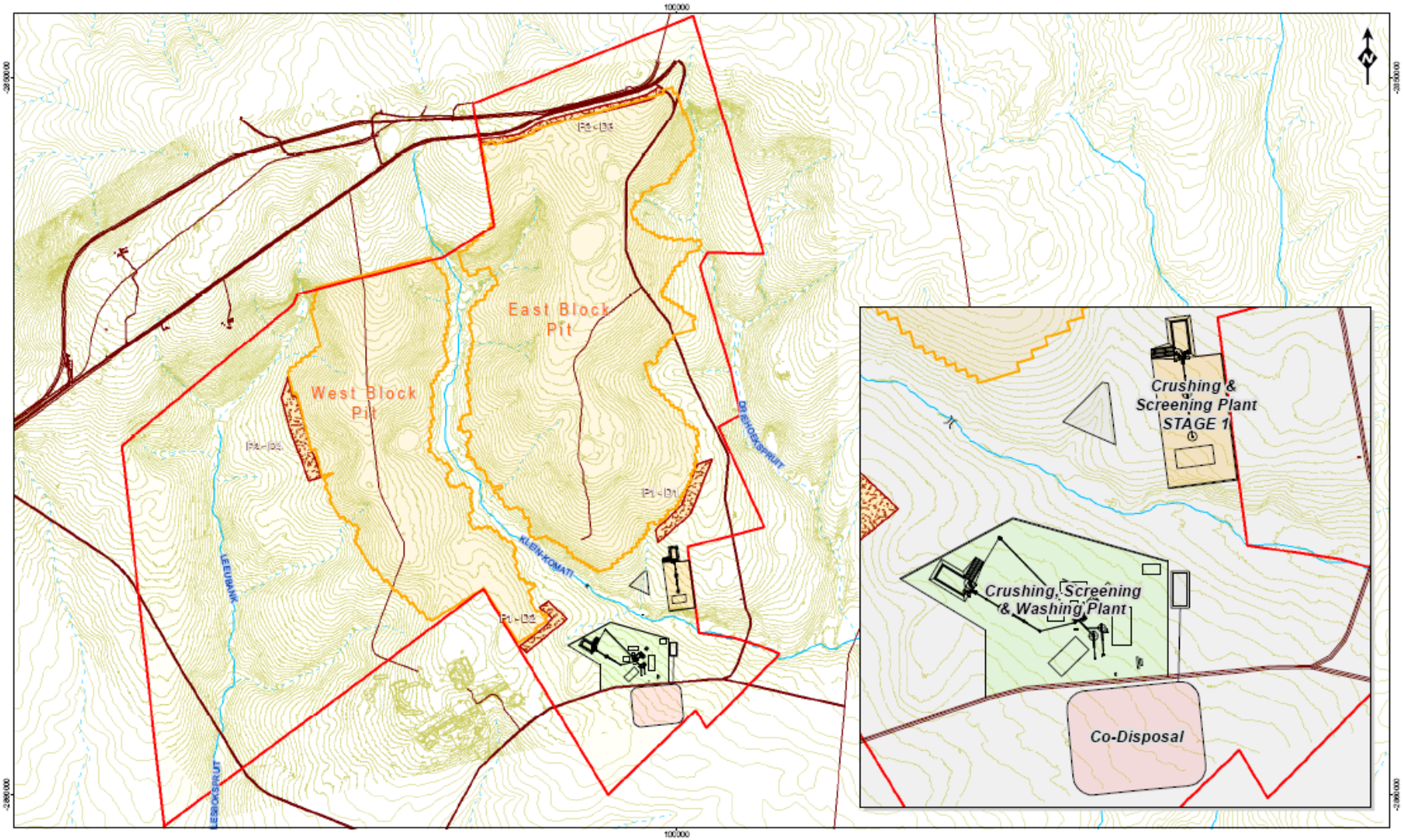
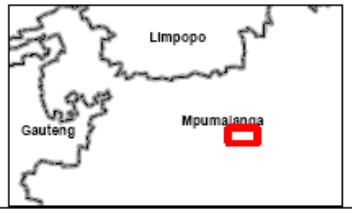
APPENDIX B

General layout drawings





LEGEND

- Plant layout
- Roads
- Rivers
- Rivers - Non-perennial
- 2m & 5m Contours
- Mineral rights
- Coal reserve
- Dumps

NOTES

REFERENCE

Projection: LO 29 Cape

PROJECT: SURFACE WATER ASSESSMENT - BELFAST PROJECT

TITLE: **PROPOSED MINE INFRASTRUCTURE**

Golder Associates, Johannesburg, South Africa

PROJECT No. 12433		SCALE 1:50,125	A3	REV. 0
PHASE 1	TASK: 0			
GIS	KS	30/11/2009		
CHECK	BC	30/11/2009		
REVIEW	TJC	30/11/2009		

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APPENDIX C

Unit rates used

UNIT RATES FOR DEMOLITION, RECLAMATION AND RELATED WORK - December 2009						
Ref nr	**Cost Item**		**Currency**	**Unit Rate**	**Unit**	**Notes**
1	**Concrete**					
1.1	Heavy concrete thickness greater than 750 mm	:	Rands	R 1,100.00	/m^3	
1.2	Medium concrete thickness between 750 and 250 mm	:	Rands	R 550.00	/m^3	
1.3	Light concrete thickness less than 250 mm	:	Rands	R 350.00	/m^3	
1.4	Strip footing	:	Rands	R 125.00	/m	
1.5	Column footing	:	Rands	R 850.00	no	
1.6	Bases and floors after removal of super structures	:	Rands	R 150.00	/m^2	
1.7	Heavy duty floors and bases after removal of super structure	:	Rands	R 550.00	/m^2	(500 mm thickness)
2	**Steel structures**					
2.1	Super structures, steel buildings and related infrastructure					
2.1.1	Cable/pipe racks	:	Rands	R 48.00	/m²	
2.1.2	Light plant buildings	:	Rands	R 96.00	/m²	
2.1.3	Medium plant buildings	:	Rands	R 360.00	/m²	Buildings with dynamic equipment
2.1.4	Medium/heavy plant buildings	:	Rands	R 1,200.00	/m²	
2.1.5	Heavy plant buildings	:	Rands	R 1,800.00	/m²	
2.2	Steelstructures (permanent shed type)					
2.2.1	0m – 5m high	:	Rands	R 50.00	/m²	
2.2.2	5m – 10m high	:	Rands	R 80.00	/m²	
2.2.3	10m – 15m high	:	Rands	R 100.00	/m²	
2.2.4	15m – 20m high	:	Rands	R 120.00	/m²	
2.4	Sorting and screening	:	Rands	R 2.50	%	
2.5	Disposal of demolition waste					
2.5.1	Disposal of demolition for benign, general waste	:	Rands	R 300.00	/m³	Benign - 100 km away
2.5.2	Disposal of inert demolition waste	:	Rands	R 158.00	/m³	Inert - 20 km away
2.5.3	Disposal of demolition hazardous waste	:	Rands	R 1,000.00	/m³	Hazardous waste (such as tar)
2.6	Cladding / sheeting	:	Rands	R 18.00	/m²	
2.7	Crane hire and use	:	Rands	R 22,000.00	/d	120 t crane
2.8	Steel tanks with rubber lining					
2.8.1	0-5m	:	Rands	R 10,000.00	/no	Diameter
2.8.2	5-10m	:	Rands	R 25,000.00	/no	Diameter
2.8.3	10-15m	:	Rands	R 35,000.00	/no	Diameter
2.8.4	15-20m	:	Rands	R 50,000.00	/no	Diameter
2.9	Decontamination of equipment					
2.9.1	Decontamination of equipment	:	Rands	R 2.50	%	Of overall dismantling of steel structure
2.9.2	Decontamination of equipment	:	Rands	R 5.00	%	
3	**Brick buildings and structures**					
3.1	Normal one storey brick buildings	:	Rands	R 275.00	/m^2	(2 - 3 m high)
3.2	Normal double storey brick buildings	:	Rands	R 475.00	/m^2	(>3 m in height)
3.4	Single brick wall (110mm)	:	Rands	R 10.00	/m^2	
3.5	Double brick wall (220mm)	:	Rands	R 15.00	/m^2	
3.6	Temporary Buildings	:	Rands	R 130.00	/m^3	
3.7	Permanent Shed type (large)	:	Rands	R 128.00	/m^3	
3.8	Substations	:	Rands	R 450.00	/m²	
3.9	Car ports (excluding paving)	:	Rands	R 85.00	/m^2	
	Note: *The above relates to floor/surface area*					
3.10	Ceilings	:	Rands	R 20.00	/m^2	
3.11	Timber structures	:	Rands	R 5.00	/m^2	
4	**Plant and related equipment**					
4.1	Overland conveyors	:	Rands	R 150.00	/m	
4.2	Suspended conveyors	:	Rands	R 300.00	/m	Includes footings, etc
4.3	Overland power lines	:	Rands	R 25.00	/m	
4.4	Sub-stations	:	Rands	R 450.00	/m^2	
4.5.1	Plant/steel superstructures: light	:	Rands	R 850.00	/t	
4.5.2	Plant/steel superstructures: light	:	Rands	R 900.00	/t	
4.6.1	Plant/steel superstructures: heavy	:	Rands	R 1,000.00	/t	
4.6.2	Plant/steel superstructures: heavy	:	Rands	R 1,200.00	/t	
4.7	Pipework	:	Rands	R 15.00	/m	
4.8	Cabling	:	Rands	R 1.50	/m	
5	**Roads, paving and walkways**					
5.1	Remove tar roads with 500mm layerworks	:	Rands	R 45.00	/m^2	Excluding disposal of tar
5.2	Gravel road with engineered surface	:	Rands	R 28.00	/m^2	
5.3	Removal and disposal of hard stand and paving	:	Rands	R 35.00	/m^2	
5.4	Allowance for rehabilitation of small unmeasured WRD's	:	Rands	R 500,000.00	sum	Allowance per shaft
5.5	Concrete slabs	:	Rands	R 125.00	/m^2	
5.6	Removal of gunited embankments	:	Rands	R 75.00	/m^2	
6	**Railway lines**					
6.1	Electrified	:	Rands	R 275.00	/m	
6.2	Non-electrified	:	Rands	R 200.00	/m	
6.3	Plug outlet & seal penstock	:	Rands	R 20,000.00	sum	
6.4	Sealing of shaft	:	Rands	R 950,000.00	sum	3.5m diameter
6.5	Sealing of shaft	:	Rands	R 1,390,000.00	sum	5.5m diameter
6.6	Sealing of shaft	:	Rands	R 3,050,000.00	sum	12.5m diameter
6.7	Seal incline and fill portal	:	Rands	R 422,500.00	sum	
6.8	Reshape WRD	:	Rands	R 100,000.00	ha	
6.9	Breach dam wall & reshape to 1:5	:	Rands	R 200.00	m	approx 5m high @ 1:2
6.10	Profiling of footprint areas	:	Rands	R 3,200.00	ha	Minimal dozing, no backfilling of excavations
6.11	Seal incline and fill portal	:	Rands	R 422,500.00	sum	
7	**Reclamation of disturbed areas**					
7.1	Shaping/leveling of areas from which infrastructure has been removed (general) to 500 mm	:	Rands	R 50,000.00	/ha	Includes stockpiling of material, backfilling of excavations and final profiling @ ave 500mm over footprint area
7.2	Shaping/leveling of areas from which infrastructure has been removed (general) to 750 mm	:	Rands	R 75,000.00	/ha	Includes stockpiling of material, backfilling of excavations and final profiling @ ave 750mm over footprint area
7.3	Establishment of vegetation (general)	:	Rands	R 12,500.00	/ha	
7.4	Establishment of vegetation directly into platinum tailings	:	Rands	R 26,300.00	/ha	
7.5	Establishment of vegetation in topsoil layer on dumps	:	Rands	R 17,100.00	/ha	
7.6	Clean-up of contaminated areas/soils to 250 mm average depth	:	Rands	R 80,000.00	/ha	(1-2km)
7.7	Ripping of footprint areas (general - dozer with 3 ripper tines to 500mm)	:	Rands	R 6,000.00	/ha	
7.8	Importation of cover material (300mm)	:	Rands	R 147,000.00	/ha	3000m^3 over 4km average @ R49/m^3
7.9	Remove concrete liner from dam	:	Rands	R 50.00	/m^2	
8	**Earthworks**					
8.1	Dozing to profile dumps	:	Rands	R 12.00	/m^3	
8.2	Excavation	:	Rands	R 18.00	/m^3	
8.3	Load and haul (1km)	:	Rands	R 25.00	/m^3	For smaller volumes
8.4	Load and haul (1 - 2 km free haul)	:	Rands	R 32.00	/m^3	For smaller volumes
8.5	Load and haul (3-4 km free haul)	:	Rands	R 46.00	/m^3	For smaller volumes
8.6	Extra over rates for overhaul outside free haul distance	:	Rands	R 7.00	/m^3/km	
8.7	Stormwater routing along outer slopes/upper surface	:	Rands	R 2,000.00	/ha	
8.8	Backfilling of final void	:	Rands	R 32.00	/m^3	5km haul distance for bulk material
8.9	Deep ripping (1 ripper tine to depth of 1m)	:	Rands	R 12,500.00	/ha	
8.10	Shaping and leveling of cover	:	Rands	R 3.00	/m^3	
8.11	Removal and disposal of liner	:	Rands	R 5.00	/m^2	
9	**Fencing**					
9.1	Erection of security fencing	:	Rands	R 125.00	/m	
9.2	Erection of stock fencing	:	Rands	R 45.00	/m	
9.3	Dismantling of security fencing	:	Rands	R 20.00	/m	
9.4	Dismantling of stock fencing	:	Rands	R 7.50	/m	
9.5	Dismantling of concrete palisade	:	Rands	R 110.00	/m	
10	**Post-closure aspects**					
10.1	Surface water	:	Rands	R 240,000.00	/yr	
10.2	Groundwater	:	Rands	R 80,000.00	/yr	
10.3	Reclamation monitoring	:	Rands	R 2,250.00	/ha	5 years
10.4	Care and maintenance	:	Rands	R 14,000.00	/ha	5 years
11	**Other**					
11.1	Not applicable	:	Rands	R 0.00	0	
11.2	Sum	:	Rands	R 1.00	sum	

APPENDIX D

Closure costing spreadsheets

Belfast Project Closure Costs as at December 2009								
Closure component		Scheduled closure (2049)						
		Quantity	Unit	Unit rate code	Unit rate	Unit	Total cost	Notes
1	**INFRASTRUCTURAL AREAS**							
1.1	**Dismantling of processing plant and related structures**							
1.1.1	Dismantling and demolition of beneficiation plant complex	1	sum	11.2	R 13,467,158.43	sum	R 13,467,158.43	Demolition of all concrete and steel structures
	Sub-total for dismantling of processing plant and related structures						**R 13,467,158.43**	
1.2	**Demolition of steel buildings and structures**							
1.2.1	Included at processing plant and related structures	0	0.00	11.1	R 0.00	0.00	R 0.00	Not applicable
	Sub-total for demolition of steel buildings and structures						**R 0.00**	
1.3	**Demolition of re-inforced concrete buildings and structures**							
1.3.1	Included at processing plant and related structures	0	0.00	11.1	R 0.00	0.00	R 0.00	Not applicable
	Sub-total for demolition of re-inforced concrete buildings and structures						**R 0.00**	
1.4	**Rehabilitation of access and haul roads**							
1.4.1	Deep rip haul roads to alleaviate compaction	20	/ha	8.9	R 12,500.00	/ha	R 250,000.00	8km x 25m
1.4.2	Shaping and levelling	20	/ha	7.1	R 50,000.00	/ha	R 1,000,000.00	500mm
1.4.3	Establish vegetation	20	/ha	7.3	R 12,500.00	/ha	R 250,000.00	
1.4.4	Remove culvert crossings	2	sum	11.2	R 50,000.00	sum	R 100,000.00	2 stream crossings
	Sub-total for rehabilitation of access and haul roads						**R 1,600,000.00**	
1.5	**Demolition and rehabilitation of electrified railway lines**							
	Not applicable	0	0.00	11.1	R 0.00	0.00	R 0.00	Not applicable
	Sub-total for rehabilitation of electrified railway lines						**R 0.00**	
1.6	**Demolition and rehabilitation of non-electrified railway lines**							
	Not applicable	0	0.00	11.1	R 0.00	0.00	R 0.00	Not applicable
	Sub-total for demolition and rehabilitation on non-electrified railway lines						**R 0.00**	
1.7	**Demolition of offices, workshops and residential buildings**							
	Included at processing plant and related structures	0	0.00	11.1	R 0.00	0.00	R 0.00	Not applicable
	Sub total for demolition of offices, workshops and residential buildings						**R 0.00**	
1.8	**River diversions**							
	Not applicable	0	0.00	11.1	R 0.00	0.00	R 0.00	Not applicable
	Sub-total for river diversions						**R 0.00**	
1.9	**Fencing**							
1.9.1	Dismantling of fencing	7000	/m	9.3	R 20.00	/m	R 140,000.00	Assume 7km
	Sub-total for fencing						**R 140,000.00**	
	Sub-total for INFRASTRUCTURAL AREAS						**R 15,207,158.43**	
2	**MINING AREAS**							
2.1	**Open pit reclamation including final voids and ramps**							
2.1.1	In-fill of eastern final void	1417500	/m3	8.8	R 32.00	/m3	R 45,360,000.00	Only eastern pit final void @ closure. 1.5 cuts remaining, 75m deep on 10% (280m) of the face. 5km haul distance (bulk haul)
2.1.2	Import topsoil on in-filled final void and other remaining disturbed areas	320000	/m3	8.4	R 32.00	/m3	R 10,240,000.00	Assume 400mm on 80ha (5% of eastern pit area). Assume 1-2km haul distance.
2.1.3	Shaping and levelling	80.00	/ha	7.2	R 75,000.00	/ha	R 6,000,000.00	Assume 5% of eastern pit area (750mm)
2.1.4	Establish vegetation on in-filled final voids	80.00	/ha	7.3	R 12,500.00	/ha	R 1,000,000.00	Assume 5% of eastern pit area
	Sub-total for opencast rehabilitation including final voids and ramps						**R 62,600,000.00**	
2.2	**Sealing of shafts, adits and inclines**							
	Not applicable	0	0.00	11.1	R 0.00	0.00	R 0.00	Not applicable
	Sub-total for sealing shafts, adits and inclines						**R 0.00**	
2.3	**Reclamation of overburden and spoils**							
2.3.1	Ripping of overburden stockpile footprint areas	10	/ha	7.7	R 6,000.00	/ha	R 60,000.00	Assume 10ha
2.3.2	Establish vegetation on ripped areas	10	/ha	7.3	R 12,500.00	/ha	R 125,000.00	Assume 10ha
	Sub-total for rehabilitation of overburden and spoils						**R 185,000.00**	
2.4	**Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)**							
2.4.1	**Rehabilitate Rurface Water Dam (RWD) - lined**							Assume 2ha with HDPE liner
2.4.1.1	Remove silt in dam and dispose	7500	/m3	8.3	R 25.00	/m3	R 187,500.00	Assume 500mm in 1.5ha basin
2.4.1.2	Remove liner and dispose	20000	/m2	8.11	R 5.00	/m2	R 100,000.00	Assume 2ha
2.4.1.3	Remove contaminated material from underneath liner and dispose	1500	/m3	8.3	R 25.00	/m3	R 37,500.00	Assume 200mm on 50% of 1.5ha
2.4.1.4	Breach wall and reshape to at least 1:5 (V:H)	600	m	6.9	R 200.00	m	R 120,000.00	Assume 600m
2.4.1.5	Rip disturbed footprint area	2	/ha	7.7	R 6,000.00	/ha	R 12,000.00	2ha
2.4.1.6	Establish vegetation on ripped areas	2	/ha	7.3	R 12,500.00	/ha	R 25,000.00	2ha
2.4.2	**Rehabilitate plant raw water dam - lined**							Assume 1ha with HDPE liner
2.4.2.1	Remove liner and dispose	10000	/m2	8.11	R 5.00	/m2	R 50,000.00	1ha
2.4.2.2	Breach wall and reshape to at least 1:5 (V:H)	400	m	6.9	R 200.00	m	R 80,000.00	Assume 400m
2.4.2.3	Rip disturbed footprint area	1	/ha	7.7	R 6,000.00	/ha	R 6,000.00	1ha
2.4.2.4	Establish vegetation on ripped areas	1	/ha	7.3	R 12,500.00	/ha	R 12,500.00	1ha
2.4.3	**Rehabilitate bio-filter dam - lined**							Assume 1ha with HDPE liner
2.4.3.1	Remove liner and dispose	10000	/m2	8.11	R 5.00	/m2	R 50,000.00	1ha
2.4.3.2	Breach wall and reshape to at least 1:5 (V:H)	400	m	6.9	R 200.00	m	R 80,000.00	Assume 400m
2.4.3.3	Rip disturbed footprint area	1	/ha	7.7	R 6,000.00	/ha	R 6,000.00	1ha
2.4.3.4	Establish vegetation on ripped areas	1	/ha	7.3	R 12,500.00	/ha	R 12,500.00	1ha
	Sub-total for rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)						**R 779,000.00**	
2.5	**Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)**							
2.5.1	**Rehabilitate top surface of Co-disposal site**							Assume 25ha (500x500), and only top surface to rehabilitate at closure
2.5.1.1	Plug outlet and seal penstock	1	sum	6.3	R 20,000.00	sum	R 20,000.00	Nominal allowance
2.5.1.2	Construct 2m parapet wall to around top perimeter	28000	/m3	8.2	R 18.00	/m3	R 504,000.00	2m parapet wall @ 14m^3/m x 2000m
2.5.1.3	Import material and construct breaker layer (300mm)	87500	/m3	8.4	R 32.00	/m3	R 2,800,000.00	25ha x 350mm (allowed 50mm extra in quantities)
2.5.1.4	Import material and construct store and release cover on top surface (600mm)	237500	/m3	8.4	R 32.00	/m3	R 7,600,000.00	25ha x 950mm (allowed 50mm extra in quantities)
2.5.1.5	Construct chutes to discharge water from the top	8	sum	11.2	R 330,000.00	sum	R 2,640,000.00	Assume 8 concrete lined chutes
2.5.1.6	Routing of possible seepage to planned water treatment facility	1	sum	11.2	R 500,000.00	sum	R 500,000.00	Nominal allowance
2.5.1.7	Establish vegetation	25	/ha	7.5	R 17,100.00	/ha	R 427,500.00	25ha top area
	Sub-total for rehabilitation of processing waste deposits and evaporation ponds (polluting potential)						**R 14,491,500.00**	
2.6	**Reclamation of subsided areas**							
	Not applicable	0	0.00	11.1	R 0.00	0.00	R 0.00	Not applicable
	Sub-total for rehabilitation of subsided areas						**R 0.00**	
	Sub-total for MINING AREAS						**R 78,055,500.00**	
3	**GENERAL SURFACE RECLAMATION**							
3.1	Removal and disposal of fugitive material	6	/ha	7.6	R 80,000.00	/ha	R 480,000.00	Assume 250mm on 6ha
3.2	Deep rip of engineered bases of stockyard	4	/ha	8.9	R 12,500.00	/ha	R 50,000.00	
3.3	Shaping and levelling where infrastructure had been removed	45	/ha	7.1	R 50,000.00	/ha	R 2,250,000.00	500mm
3.4	Off site disposal of demolition waste	10000	/m³	2.5.2	R 158.00	/m³	R 1,580,000.00	
3.5	Rip disturbed footprint areas to alleviate compaction	45	/ha	7.7	R 6,000.00	/ha	R 270,000.00	
3.6	Establish vegetation	45	/ha	7.3	R 12,500.00	/ha	R 562,500.00	
	Sub-total for GENERAL SURFACE RECLAMATION						**R 5,192,500.00**	
4	**WATER MANAGEMENT**							
4.1	Rehabilitate disturbed stream area	5.5	sum	11.2	R 1,000,000.00	sum	R 5,500,000.00	R1 million per km for approx 5.5km
4.2	Off-site offsets for damaged sensitive areas	0	0.00	11.1	R 0.00	0.00	R 0.00	Assumed to be conducted during opertational period
4.3	Install boreholes to abstract seepage water for treatment	4	no	6.3	R 20,000.00	sum	R 80,000.00	Assume 2 boreholes per pit
	Sub-total for WATER MANAGEMENT						**R 5,580,000.00**	
	SUB-TOTAL 1 (for infrastructure and related aspects)						**R 104,035,158.43**	
5	**POST-CLOSURE ASPECTS**							
5.1	Surface water quality monitoring	5.00	/yr	10.1	R 240,000.00	/yr	R 1,200,000.00	Assumed 5 year monitoring period
5.2	Groundwater quality monitoring	5.00	/yr	10.2	R 80,000.00	/yr	R 400,000.00	Assumed 5 year monitoring period
5.3	Reclamation monitoring of reclaimed areas	188.50	/ha	10.3	R 2,250.00	/ha	R 424,125.00	Assumed over a 5 year period, over the entire disturbed footprint area
5.4	Care and maintenance of reclaimed areas	188.50	/ha	10.4	R 14,000.00	/ha	R 2,639,000.00	Assumed over a 5 year period, over the entire disturbed footprint area
	Sub-total for post-closure aspects						**R 4,663,125.00**	
5.5	Contingencies for post-closure aspects	1.00	sum	11.2	R 466,312.50	sum	R 466,312.50	Assumed 10 percent of above post-closure aspects
5.6	Ongoing water treatment	1	sum	6.4	R 156,602,215.00	sum	R 156,602,215.00	Water treatment facility and ongoing treatment of water (contingency already included)
	Sub-total for contingencies for post-closure aspects						**R 157,068,527.50**	
	SUB-TOTAL 2 (for post closure aspects)						**R 161,731,652.50**	
6	**ADDITIONAL ALLOWANCES**							
6.1	Preliminary and general	1.00	sum	11.2	R 12,484,219.01	sum	R 12,484,219.01	Assumed 12 percent of sub-total 1
6.2	Contingencies	1.00	sum	11.2	R 10,403,515.84	sum	R 10,403,515.84	Assumed 10 percent of sub-total 1
	SUB-TOTAL 3 (for additional allowances)						**R 22,887,734.85**	
	GRAND TOTAL (for sub-total 1 + 2 + 3)						**R 288,654,545.78**	

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