PART 7: ENVIRONMENTAL IMPACT ASSESSMENT, MITIGATION MEASURES AND ACTION PLAN

This part of the De Beers Kimberley Mines EMP[1] (incl. EIA[2]) document focuses on the identification, prediction and evaluation of the major potential impacts the mining and related activities, processes and actions may have on the surrounding environment. Furthermore it indicates the major impacts the aspects of these activities have on the environmental components associated with the mine boundary area, as required in terms of Regulations 50 and 52 of the MPRDR [3] (2004) under the MPRDA[4] (2002). The requirements of Regulation 31 (of Regulation 543) of the EIA Regulations (2010), under the NEMA[5] (1998), were also taken into consideration during the compilation of this document.

7.1 EXISTING ACTIVITIES UNDERTAKEN AT THE DE BEERS KIMBERLEY MINES

Environmental management measures pertaining especially to previous opencast and underground mining activities undertaken at Kimberley Mines were described in the report, titled *"De Beers Consolidated Mines Limited: Kimberley Mines, EMPR", dated February 2008 (*hereafter referred to as the approved EMPR[6], dated February 2008). However, due to changes in legislative requirements, some of the commitments in the approved EMPR, dated 2008, are no longer applicable and in some cases contradict current legislative requirements. Also at this point, it should be mentioned that the opencast and underground mining activities at Kimberley Mines have ceased, and that the tailings resources are currently being reclaimed. No new projects are being planned for the near future. The reclaiming of identified tailings resources will extend the Life of Mine to 2016, with the possibility of extending to 2035.

This EMP has thus been updated to comply with the requirements of the MPRDA (2002) and the MPRDR (2004) there under, as well as taking into account the principles of the NEMA (1998) as amended, and considering the requirements of the NWA[7] (1998), and the Government Notice 704, dated June 1999, under the NWA (1998), where appropriate, amongst others.

De Beers Kimberley Mines management has implemented an EMS[8] based on the ISO[9] 14000 series of standards. Different objectives and targets were formulated during workshops as part of the development of the above-mentioned system. The EMS will be revised to reflect the commitments in this updated EMP, amongst others, and thus implementation of the revised EMS will assist in minimising / preventing / addressing impacts of the mining and related activities at De Beers Kimberley Mines on the environment.

[1] EMP: Environmental Management Programme.
[2] EIA: Environmental Impact Assessment
[3] MPRDR: Mineral and Petroleum Resources Development Regulations.
[4] MPRDA: Mineral and Petroleum Resources Development Act.
[5] NEMA: National Environmental Management Act.
[6] EMPR: Environmental Management Programme Report.
[7] NWA: National Water Act, Act 36 of 1998.
[8] EMS: Environmental Management System.
[9] ISO: International Organisation of Standardisation.

The proposed measurements to be implemented at De Beers Kimberley Mines to mitigate the past, current and potential impacts that have occurred / may occur at Kimberley Mines as a result of mining and related activities are described in this part of this EMP (incl. EIA) document This document has been compiled in such a manner that it is an alone-standing document, and correlates to the revised EMP and EIA, dated February 2008.

7.1.1 CONSTRUCTION PHASE

As mentioned previously De Beers Kimberley Mines is currently a fully operational mine and no new expansion projects are being planned for the future. This part of the EMP (incl.EIA) document is therefore not applicable for De Beers Kimberley Mines. The impacts associated with the Construction Phase are not described within this EMP (incl. EIA) document. All relevant aspects, if any, will be addressed under the Operational Phase.

7.1.2 OPERATIONAL PHASE

This phase commenced in 1870 with commencement of the first mining and related activities at Kimberley Mines, which included the removal of ore (opencast and underground mining), and the associated processing thereof. This phase will include the period during which the tailings resources will be reclaimed as well as its related activities are undertaken (i.e. hauling of tailings material, management of clean and dirty water systems and infrastructure, as well as coherent rehabilitation, etc.). The Operational Phase will continue until the last truck load of tailings material has been removed from the identified tailings resources, all other Operational Phase activities have ceased, and the Decommissioning Phase commences (except for the in-pit backfilling, a Decommissioning Phase activity, which commenced in 2011, and is conducted in the Operational Phase).

The following activities take place during the Operational Phase at Kimberley Mines:

- Mining and related activities:
  - Extraction of Kimberlite ore by means of tailings resource recovery techniques by the small initiatives (Dumpco, Superstone, Superkolong and Sedibeng),
  - The pumping out of water accumulating in the pits.
  - Transport of the Kimberlite ore to the CTP[10].
  - Disposal of coarse mining waste and slimes.
  - Operation of the CTP and the KSMP[11].
- Utilisation of infrastructure:
  - Utilisation of pollution control measures, e.g. the pollution control dams, return water dams, as well as storm water management measures, e.g. trenches.
  - Utilisation of ablution facilities, offices and workshops.
- Rehabilitation and restoration of disturbed areas:
  - In-pit backfilling at the De Beers Kimberley Mines.

[10] CTP: Combined Treatment Plant.

[11] KSMP: Kimberley Mines Sampling Plant.

7.1.3 DECOMMISSIONING PHASE

The Decommissioning Phase will commence when the reclaiming of tailings (and thus the production of diamonds) ceases at the De Beers Kimberley Mines. This phase will continue until Closure begins.

The following activities, which are expected to impact on the surrounding environmental aspects, are anticipated to take place during the Decommissioning Phase:

- Removal of infrastructure:
  - Ripping and removal of haul road material, as well as removal of redundant infrastructure such as the Treatment Plants, workshops, conveyors, other buildings (e.g. offices), depending on the post-closure land use.
  - The demolition of redundant concrete structures.
- Rehabilitation and restoration of disturbed areas:
  - Final backfilling of the De Beers Pit.
  - Rehabilitation of waste dump sites (in situ rehabilitation of, as well as the rehabilitation of the remaining footprints of, waste dumps that will be removed).
  - Clearing of stockpile areas.
  - Rehabilitation of footprint areas of the reclaimed tailings resources.
  - Shaping of rehabilitated areas, including the dams and remaining permanent tailings resources that are not reclaimed.
  - Operation and maintenance of remaining pollution management measures, depending on the long-term water management strategy.
  - Placement of topsoil (if required).
  - Planting of vegetation.
  - Monitoring and reporting.
  - Stabilising and remediation of the affected areas.
  - Maintenance of rehabilitated land until Closure is obtained.

It is important to note that activities that will be undertaken during the Decommissioning Phase will focus on rehabilitation. Routine monitoring and maintenance of the rehabilitated areas will be conducted until Closure is obtained under the MPRDA (2002) and the Post-closure commences.

7.1.4 POST CLOSURE PHASE

The Post-closure Phase will commence once the mine has obtained a Closure Certificate from the DMR.

7.2 IMPACT ASSESSMENT METHODOLOGY

It is required by the DMR[12] Guideline, Section 39(3)(b)(i) of the MPRDA (2002), Regulation 50(c) of the MPRDR (2004) and Regulation 31 (l) (of Regulation 543) of the EIA Regulations (2010), under the NEMA (1998)), that an assessment of the status, extent, duration, probability, reversibility, replaceability of resources and mitigatory

[12] DMR: Department of Mineral Resources.

potential of the major potential environmental impacts of the proposed mining operation be undertaken. The identification of the major potential impacts, prediction of the nature of each impact, the evaluation of each impact by rating its significance and the management and mitigation measures adopted to address each impact, were assessed using the criteria presented in Part 7.3.1 to 7.3.5.

7.2.1 IMPACT IDENTIFICATION

The activities associated with the De Beers Kimberley Mines are described in full in Part 3 and the anticipated impacts of the De Beers Kimberley Mines are described in Part 7.3. The impact assessment is in the form of an EIAMAP[13] and describes the impacts caused by the each mining and related activity and environmental aspect; in terms of the environmental component they affect (e.g. geology, soils, vegetation, etc).

The major impacts that occur as a result of the activities that take place at the De Beers Kimberley Mines within the existing mine boundary area, may combine with those resulting from surrounding activities and land uses to form cumulative impacts, or to contribute to cumulative impacts that already exist. Section 39(3)(i) of the MPRDA (2002), Regulation 50(c) of the MPRDR (2004) under the MPRDA (2002), as well as Regulation 31 (l) (of Regulation 543) of the EIA Regulations (2010), under the NEMA (1998)) requires that cumulative impacts are also considered.

The impact assessment of the De Beers Kimberley Mines has been compiled in terms of the following:

- Impacts during the Operational Phase (refer to Part 7.3.1).
  This Phase comprises the longest period of time associated with the LOM[14]. This phase commenced when the first truck load of tailings material was removed from the Tailings resources and will include the period during which the aspects such as hauling of tailings material, management of clean and dirty water separation systems and infrastructure, progressive rehabilitation, etc. are conducted. The Operational Phase will continue until the last truck load of tailings material has been removed from the tailings resources, all other Operational Phase activities have ceased, and the Decommissioning Phase commences (<2011).
- Impacts during the Decommissioning Phase (refer to Part 7.3.2).
  This phase starts when the last load of tailings material is removed from the ground and ends when the mine receives a Closure certificate from the DMR. During this phase, rehabilitation will continue to take place. Activities during the Decommissioning Phase focus on rehabilitation, until Closure Certificate is obtained. Many of the Decommissioning Phase aspects (e.g. concurrent rehabilitation of mined out areas) will take place during the Operational Phase of the mine to minimise the resultant and long-term environmental impacts (<2011).
- Post Closure Phase impacts (refer to Part 7.3.3)
  The Post-closure Phase will commence once the mine has obtained a Closure Certificate from the DMR (<2035).

[13] EIAMAP: Environmental Impact Assessment and Management Action Plan.

[14] LOM: Life of Mine.

- Cumulative impacts (refer to Part 7.3.4)
  Cumulative impacts can be defined as "*changes to the environment that are caused by an action in combination with other past, present and future human actions*" (DEAT, 2004). Different types of cumulative impacts can occur, depending on the characteristics thereof. The table below presents a summary of these cumulative impacts as per Guideline 5: Assessment of Alternatives and Impacts (DEAT, 2006).

Table 7.1: Types of cumulative impacts

Type		Description
Additive		Where it adds to the impact which is caused by other similar impacts.
Interactive impact		A cumulative impact is caused by different impacts that combine to form a new kind of impact.
	Countervailing	The net adverse cumulative impact is less than the sum of the individual impacts.
	Synergistic	The net adverse cumulative impact is greater than the sum of the individual impacts.

7.2.2 IMPACT PREDICTION

Once the major potential impacts were identified, a further investigation was conducted in order to predict the nature of the impact. The criteria used to describe the nature of the impacts are shown below.

Table 7.2: Impact prediction criteria

Status of impact		
Positive	+	Impact will be beneficial to the environment (a benefit).
Negative	-	Impact will not be beneficial to the environment (a cost).
Neutral	0	Positive and negative impact (neutral).
Magnitude		
Minor	2	Bio-physical and/or social functions and/or processes will remain unaltered.
Low	4	Bio-physical and/or social functions and/or processes might be negligibly altered or enhanced.
Moderate	6	Bio-physical and/or social functions and/or processes might be notably altered or enhanced.
High	8	Bio-physical and/or social functions and/or processes might be considerably altered or enhanced.
Very high	10	Bio-physical and/or social functions and/or processes might be severely/substantially altered or enhanced.
Extent of impact		
Site only	1	Effect limited to the site and its immediate surroundings.
Local	2	Effect limited to within 3-5 km of the site.
Regional	3	Activity will have an impact on a regional scale.

National	4	Activity will have an impact on a national scale.
International	5	Activity will have an impact on an international scale.
Duration of impact		
Immediate	1	Effect occurs periodically throughout the life of the activity.
Short term	2	Effect lasts for a period 0 to 5 years.
Medium term	3	Effect continues for a period between 5 and 15 years.
Long term	4	Effect will cease after the operational life of the activity either because of natural process or by human intervention.
Permanent	5	Where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.
Probability of occurrence		
Improbable	1	Less than 30% chance of occurrence.
Low	2	Between 30 and 50% chance of occurrence.
Medium	3	Between 50 and 70% chance of occurrence.
High	4	Greater than 70% chance of occurrence.
Definite	5	Will occur regardless of any prevention measures.

7.2.3 IMPACT EVALUATION

Once the prediction components have been ranked for each impact, the significance of the potential impacts are evaluated (or calculated) using the following formula:

Significance = (Magnitude + Duration + Extent) x Probability

For each impact the extent (spatial scale), magnitude, duration (time scale) and the probability of occurrence were predicted and was used to determine the significance of each impact, with and without the implementation of the proposed mitigation measure.

A Significance Rating is calculated by multiplying the Severity Rating with the Probability Rating. Significance is therefore a product of the probability and the severity of the impact. Probability describes the likelihood of the impact occurring and severity is calculated from the sum of the factors given to magnitude, duration and extent.

The maximum value is 100 SP[15]. The unmitigated and mitigated scenarios for each environmental impact were rated as High (SP≥60), Moderate (SP 31-60) and Low (SP<30) significance as shown in **Table 7.3**.

The “no-go” option for this project implies the Immediate closure of the Kimberley Mines Note that the “no-go” option was not assessed separately, rather it was considered implicitly during the assessment of the various potential impacts identified. The “no-go” option will therefore provide a baseline against which all potential impacts are measured.

[15] SP: Significant Points.

Table 7.3: Definition of significance rating (positive and negative)

Significance of predicted impact (i.e. before mitigation)		
Low	0-30	Where the impact will have a relatively small effect on the environment and will require minimum or no mitigation.
Medium	31-60	Where the impact can have an influence on the environment and should be mitigated.
High	61-100	Where the impact will definitely influence the environment and must be mitigated, where possible.
Significance of residual impact (i.e. after mitigation)		
Low	0-30	Where the impact will have a relatively small residual effect on the environment after mitigation.
Medium	31-60	Where the impact would still occur on the environment, but to a lesser extent after mitigation.
High	61-100	Where the impact will definitely influence the environment, even after mitigation.

7.2.4 MANAGEMENT AND MITIGATION MEASURES

Once the significance rating of an impact before mitigation has been determined, the reversibility of the impact, replaceability of the affected resources and the mitigatory potential of the impact can also be determined. These factors have been included in the EIAMAPs below. These factors play an important role in the determination of the level and type of mitigation to be performed. The **Table 7.4** provides the criteria used to assess the above mentioned factors.

Table 7.4: Mitigation prediction criteria

Reversibility of impact		
Reversible	1	The impact on natural, cultural and / or social structures, functions and processes is totally reversible.
Partially	2	The impact on natural, cultural and / or social structures, functions and processes is partially reversible.
Irreversible	3	Where natural, cultural and / or social structures, functions or processes are altered to the extent that it will permanently cease, i.e. impact is irreversible.
Irreplaceable loss of resources		
Replaceable	1	The impact will not result in the irreplaceable loss of resources.
Partially	2	The Impact will result in a partially irreplaceable loss of resources.
Irreplaceable	3	The impact will result in the irreplaceable loss of resources.
Mitigatory potential of impacts		
High	1	High potential to mitigate negative impacts to the level of insignificant effects.
Medium	2	Potential to mitigate negative impacts. However, the implementation of mitigation measures may still not prevent some negative effects.
Low	3	Little or no mechanism exists to mitigate negative impacts.

Once the mitigation prediction has been conducted the management and mitigation measures can be developed. The criteria used for prescribing and designing management measures for mitigation has been adopted from the Council on Environmental Quality Regulations (1998) and includes the following:

Table 7.5: Management Measures criteria

Management Measures	
Avoidance	Mitigation by not carrying out the proposed aspect or the unacceptable parts of the proposed aspect*.
Minimisation	Mitigation by scaling down the magnitude of a project, reorienting the layout of the project or employing technology that reduces the factors generating the undesirable environmental impact.
Rectification	Mitigation through the restoration of environments affected by the aspect.
Reduction	Mitigation by taking maintenance steps during the course of the aspect.
Compensation	Mitigation through the creation, enhancement or acquisition of environments similar to those affected by an aspect. This step should only be considered after all steps above have been completed. As a last resort, donation of land or money for a regional programme of habitat creation or enhancement could be considered.

* Note: For the purpose of this document aspect refers to actions and processes on site that may potentially have an environmental impact.

7.3 ENVIRONMENTAL IMPACT ASSESSMENT

The impact assessment is in the form of an EIAMAP and describes the potential impacts caused by each mining and related activity and aspect in terms of the environmental component they affect (e.g. geology, soils, vegetation, etc), for each phase of the LOM, as well as the cumulative impacts caused by the De Beers Kimberley Mines. The EIAMAP also describe the management measures for each impact, in order for the mitigation measures to be achieved, as required in terms of Regulation 51(b) of the MPRDR (2004), under the MPRDA (2002).

Table 7.6 provides a list of the EIAMAPs that have been prepared for the De Beers Kimberley Mines

Table 7.6: List of EIAMAPs for the De Beers Kimberley Mines.

No.	EIAMAP
7.3.1	**Operational Phase**
7.3.1.1	Mining and related activities
7.3.1.2	Utilisation of infrastructure
7.3.1.3	Rehabilitation and restoration of disturbed areas
7.3.2	**Decommissioning Phase**
7.3.2.1	Removal of infrastructure
7.3.2.2	Rehabilitation and restoration of disturbed areas
7.3.3	**Post Closure Phase**
7.3.4	**Cumulative Impacts**

Also included in Part 7.4 is an impact statement summarising the key findings of the EIA and a comparative assessment of the positive and negative implications of the proposed activity. It should also be noted that Part 7.3 has been developed in a tabular format as directed by the DMR by means of the DME Guideline (2008) that specifically

stated: *"In terms of the provisions of Section 29 of the Act, you are herewith directed to-provide a tabulation in the EMP of the activities with their impacts, management measures and associated costs."*

The following tables contain the impact assessment and mitigation measures for each of the mining and related activities and aspects for all phases of the LOM.

7.3.1: EIAMAP FOR THE OPERATIONAL PHASE OF THE DE BEERS KIMBERLEY MINES

7.3.2: EIAMAP FOR THE DECOMMISSIONING PHASE OF THE DE BEERS KIMBERLEY MINES

7.3.3: EIAMAP FOR THE POST CLOSURE PHASE OF THE DE BEERS KIMBERLEY MINES

7.3.4: EIAMAP OF CUMULATIVE IMPACTS ASSOCIATED WITH THE DE BEERS KIMBERLEY MINES

7.4 ENVIRONMENTAL IMPACT STATEMENT

The environmental impact statement summarises the key findings of the environmental impact assessment and compares the positive and negative implications of the existing mining and related activities at the De Beers Kimberley Mine.

It is evident from the EIAMAPs that the major concerns with regards to the existing activities are the impacts on water quality and quantity and surrounding communities. The major benefit of the De Beers Kimberley Mine is the employment opportunities and the contribution to local, regional and national economy.

The main impact towards groundwater related aspects is the change in groundwater flow since the physical properties of the overlying strata are also a function of groundwater movement and this would have been changed during previous mining activities undertaken at De Beers Kimberley Mines. This will especially pertain to the Kimberley Pit since it is not anticipated to be rehabilitated due to its historic cultural nature. Decanting of groundwater will thus continue to take place at this open pit.

Since not all the tailings resources will be reclaimed during the Operational Phase, the *in situ* rehabilitated tailings resources might have a permanent impact on the groundwater quality due to seepage of storm water runoff from these resources to the groundwater. The significance of the impact towards the groundwater related aspects associated with the remaining rehabilitated tailings resources will be reduced if the described surface water management measures are applied and proper mitigation measures implemented. In addition, the affected groundwater quality will improve over the long-term due to the dilution effect that will occur with recharge of rainwater.

The current tailings and slimes dams will have a residual impact on the groundwater related aspects. The nature of the mentioned tailings and slimes holding facilities reduce the feasibility of implementing mitigation measures at these facilities. Due to the clay-like characteristics of the tailings and slimes generated during activities undertaken at the Treatment Plant, these materials retain large amounts of contaminated water. Seepage of contaminated water from the above-mentioned holding facilities is therefore anticipated to have long-term impacts on the groundwater. Mitigating measures that are to be implemented in terms of the current tailings and slimes dams will however reduce the significance of the mentioned groundwater impact.

The long-term groundwater management strategy must be developed before the onset of the Decommissioning Phase to ensure that sufficient measures can be implemented to mitigate the residual groundwater impacts to acceptable levels.

According to the approved EMPR, dated October 1999 Vol. I, the groundwater levels will gradually return to their pre-mining levels after Closure. The rate at which the water levels are re-established will depend on the prevailing rainfall and re-charge conditions.

Retainer walls are to be maintained at some of the redundant slimes dams, e.g. water retainer walls at Kenilworth and Colville tailings resources, as well as adjacent to the Bloemfontein road, to prevent water erosion and pollution.

Due to the mining and related activities associated with diamond mining, no acid mine drainage is anticipated to occur after Closure of Kimberley Mines.

The surface water management measures implemented at De Beers Kimberley Mines will strive to maintain surface water quality standards and ensure that the minimal impact on catchment yield results. In general, the extent of all surface water impacts will be mitigated during the Operational and Decommissioning Phases. The impacts discussed under the Decommissioning Phase will diminish even further.

The main residual surface water related impact that is expected to occur after mine Closure (determined through modelling) is the probable eventual decanting of pit water (groundwater-related) at the remaining open pits (especially Kimberley Pit) which may negatively impact on surface water resources if not sufficiently mitigated. This will likely occur approximately 40 to 50 years after mine Closure.

In addition to decanting, it is expected that the change in surface water flow patterns will be residual after mine Closure. The remaining tailings resources (e.g. Waste Dump No. 8) that were not reclaimed will be rehabilitated *in situ*, and it is therefore anticipated that the surface water flow patterns within the mine boundary of De Beers Kimberley Mines will be permanently altered due to the rehabilitated tailings resources. The possible occurrence of surface subsidence in future due to underground mining activities, as well as the instability of the side-walls of the open pits and extent of the break-back zone might result in the residual impact on surface water related aspects. This will include the change in surface water flow patterns

No other long-term impacts arising from river diversions, stability of rehabilitated land and residue deposits are applicable or foreseen, except for the permanent alteration of the Dutoitspan.

It is anticipated that the natural processes of the soil that will have been disturbed during the LOM of De Beers Kimberley Mines will begin to re-establish over a relatively long-term period. Monitoring and repair of the soil where necessary, e.g. where erosion has occurred, should be undertaken throughout the Operational and Decommissioning Phases, to ensure that the recovery of the soil to pre-mining conditions will be possible, and to ensure that the soil will be self-sustaining during the Post-closure Phase. Soil on various mining areas will however have been sterilised due to mining and related activities such as depositing of tailings material, including the longstanding nature of several of the tailings resources.

As mentioned previously, most of the tailings resources will be reclaimed, while the unworked tailings resources (e.g. Waste Dump No. 8) will be landscaped and vegetated. According to the approved EMPR, dated October 1999 Vol. I, rock dumps are fully overgrown and is therefore already regarded as stabilised.

The sidewalls of the current slimes dam is stabilised with calcrete, while vegetation is being established on top of the calcrete layer. The floors of the disposal facilities are mainly underplayed with red soil and stabilised with natural vegetation.

The rehabilitated slimes areas will be managed as wilderness zones. In addition, the red soil areas will be regarded as grazing land and Dutoitspan as a wetland.

The land capability of areas such as the current tailings dam, open pits (especially Kimberley Pit) and unworked tailings resources may have been altered permanently due to mining, depending on the long-term groundwater management strategy. Although the open pits, except the Kimberley Pit, will be filled with tailings material, the surface stability may not be sufficient for certain land uses (e.g. the erection of high buildings). The instability of the surface will therefore limit the future land capability and therefore also restrict the future land uses in these areas.
As mentioned previously, the Dutoitspan will remain a dirty water system during the Decommissioning Phase, since this pan receives contaminated water from various areas which includes the Beaconsfield industrial area amongst other. The anticipated impact on Dutoitspan will therefore be permanent of nature. In addition, the permanent nature of the impacts on the Dutoitspan will result in the permanent alteration of the pre-mining ecology and hydrology.

There are already existing cumulative impacts on the larger Kimberley area due to previous mining and related activities undertaken at De Beers Kimberley Mines, amongst other. Although opencast and underground mining activities at De Beers Kimberley Mines have ceased, the above-mentioned sensitive landscapes could potentially be impacted upon negatively due to current tailings resource recovery operations undertaken at De Beers Kimberley Mines.

A recent study was done by the Institute for Water Quality Studies (Resource Quality Services), the results of which were recorded within the report, titled *"Sol Plaatje Municipality, Kamfers Dam: Water Quality and Quantity Impact Study, Northern Cape"*, dated January 2006, compiled by Kwezi V3 Engineers. The physico-chemical condition in the water of Kamfers Dam was changed significantly due to water pollution, mainly originating from the Homevale WWTW effluent. This in return resulted in a gradual shift in biological composition in the mentioned dam. In addition, storm water inflow and a high evaporation rate, contribute to a continually increasing dissolved solid content.

According to the De Beers Kimberley Mines IWULA, dated October 2006, there is concern that the above-mentioned water pollution and increase in dissolved solid content may affect the sustainability of the site for flamingos and other water birds. A higher dam level, through increased inflow of water from the Homevale WWTW, has resulted in Spoornet expressing severe concern about the potential flood and structural stability of their railway lines which surround three sides of the dam. In addition, the dam experiences occasional algal blooms and die-offs with the decomposing algae producing sulphide emissions, which result in unpleasant smells for surrounding communities.

De Beers Kimberley Mines is also faced with social and political pressure from local communities who also wish to recycle the tailings dumps for their own gain.

Four small business initiatives were started to address this concern. Superstone, Dumpco, Superkolong and Sedibeng currently process recovered tailings dump material through small plants located on the perimeter of the abandoned De Beers Mine pit, which they are back-filling with their tailings.

As noted above, the mining and related activities associated with the De Beers Kimberley Mines will impact on all components of the environment. The positive impacts of the project as well as the benefits of the project must be weighed up against the losses and negative impacts. It is evident that although the appropriate management principles and mitigation measures for the impacts are implemented at the De Beers Kimberley Mines, the benefits created from employment and contribution to the national economy may compensate for the negative impacts of the diamond mining.

7.5 FINANCIAL PROVISION

According to Section 51 of the Mineral and Petroleum Resources Development Regulations, GN. R.527, dated April 2004, under the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act 28 of 2002) "*an environmental management programme contemplated in Section 39(1) of the Act must include: (b)(v) financial provision in relation to the execution of the environmental management programme which must include –*

(aa) the determination of the quantum of the financial provision contemplated in Regulation 54, and

(bb) details of the method providing for financial provision contemplated in Regulation 53."

The description of financial provision needs to include details of the method(s) of provision, as well as the quantum of financial provision as contemplated in Sections 53 and 54 of Regulations R. 527, dated April 2004, under the MPRDA (2002).

7.5.1 METHOD OF FINANCIAL PROVISION

The financial provision, required in terms of Section 41 of the MPRDA, 2002 (Act 28 of 2002), to achieve the total quantum for rehabilitation and remediation of environmental impacts, damage as well as final Closure needs to be provided for by one or more of the following methods (refer to the Guideline Document for the Evaluation of Financial Provisions made by the Mining Industry, by Golder Associates Africa (Pty) Ltd, 3 March 2004):

- Approved contribution(s) to a dedicated trust fund as provided for in terms of Section 10(1)(cH) of the Income Tax Act, 1962,
- A financial guarantee from a South African registered bank or any other bank or financial institution approved by the Minister guaranteeing the financial provision relating to the environmental management programme,
- A cash deposit to be deposited at the office of the Regional Manager in whose region the application was lodged, and / or
- Any other manner the Minister may determine.

According to the Kimberley Mines EMPR, dated October 1999, rehabilitation activities and the costs associated therewith are incorporated into the ongoing mining programme of Kimberley Mines.

7.5.2 QUANTUM PROVISION

7.5.2.1 Risk based Closure Costing (2004)

During 2004, a Risk Based Closure Costing was conducted for Kimberley Mines by ERA[16], the results of which are documented in the report, titled "*De Beers Consolidated Mines, Risk Based Closure Costing for Kimberley Mines*", dated November 2004, with Project number P285, which is available from the mine upon request. The Closure cost has been provided both for Immediate Closure and for planned LOM Closure.

As described in the above-mentioned report, the ERA process that has been followed at Kimberley Mines is consistent with that described in the MPRDR (2004), Regulation 54, dated April 2004, under the MPRDA (2002).

The afore-mentioned Risk Based Closure Costing report, dated November 2004, includes the following:

- The methodology used in the financial provision quanta,
- Closure costs estimates (as at 2004), and
- Recommendations for further work required to reduce the level of uncertainty and to refine the cost estimates.

7.5.2.2 Environmental Liability and Closure costs calculation (2011)

Kimberley Mines have recently reviewed their environmental liability in line with the relevant DMR and De Beers Group guidelines and submitted to the DMR in September 2001. It terms of this submission, the aspects associated with sale of assets for both Phase I and Phase 2 amounting to R127,042,809. (Excluding post closure and financial considerations) has been removed from the Kimberley Mines quantum.

7.5.2.2.2 Immediate- and Life of Mine Closure costs

According to the information provided in the Environmental Liability and Closure costs Calculation (**Appendix R**), the total amount calculated for Immediate Closure is **167,748,565**, and the total amount calculated for Life of Mine (LOM) Closure is **R 105,588,923**.

[16] ERA: Enviro Risk Assessment

A summary of the calculated Closure costs are given in **Table 7.7** below. Refer also to **Appendix R** for more detailed information in this regard.

Table 7.7: Immediate and LOM Closure costs (2011)

Description	Immediate Closure (R)	LOM Closure (R)
Slimes dams	21,340,306	21,040,306
Mining Aspects	101,040,965	64,878,528
Plant infrastructure demolition and removal	13,046,845	10,398,725
Mine infrastructure demolition and removal	5,488,207	5,488,207
Water management	3,016,894	2,987,601
Sub total	**122,592,911**	**83,713,005**
Post Closure Aspects	21,155,852	7,311,928
Preliminary and general (6 %)	8,642,925	5,461,496
Contingencies (10 %)	14,374,876	9,102,493
Sub total	**44,155,654**	**21,875,917**
Total	**166,748,566**	**105,588,923**

7.5.2.3 Decommissioning and Restoration liabilities

Table 7.8 below indicates the Decommissioning and Restoration liabilities for Kimberley Mines. Refer also to Appendix 3 to 7 of **Appendix R** for more detailed information regarding the Decommissioning and Restoration liabilities.

Table 7.8: Decommissioning and Restoration liabilities

Liability portion	Amount (R)
Decommissioning portion of the liability	13,046,845
Restoration portion of the liability	109,546,066
Total liability	**122,592,911**

7.5.3 REVIEW OF QUANTUM PROVISION

The review and updating of the quantum of the financial provision will to be undertaken annually in consultation with a competent person, or as requested by the Minister (DMR).

The Closure Cost Assessment will continue to be reviewed in such a manner so that the quantum of the financial provision includes the requirements of Section 54 (1) of the MPRDR, GN. R.527, dated April 2004, under the MPRDA (2002), which stipulates that "*the quantum of the financial provision should include a detailed itemization of all actual costs required for –*

(a) premature closure regarding –

(i) the rehabilitation of the surface of the area,

(ii) the prevention and management of pollution of the atmosphere,

(iii) the prevention and management of pollution of water and the soil,

(iv) the prevention of leakage of water and minerals between subsurface formations and the surface.

(b) decommissioning and final Closure of the operation, and

(c) *post-closure management of residual and latent environmental impacts*."

7.5.4 RECTIFICATIONS

Section 54 (3) of the MPRDR, GN. R.527, dated April 2004, under the MPRDA (2002), stipulates that "*Any inadequacies with regard to the financial provision must be rectified by the holder of the Mining Right –*

a) in an amendment to the environmental management programme,

b) within a timeframe provided for, or

c) as determined by the Minister.