Our ref: 23164

26 February 2013

Dear Stakeholder,

Public Review of Draft Basic Assessment and Environmental Management Programme Report: Tar Dams Project located near Rustenburg in the North West Province

Anglo American Platinum Limited: Rustenburg Platinum Mines (RPM) proposes to decommission and remediate four Tar Dams within their mine lease area, near Rustenburg, North West Province. The empty tar dams contained legacy residues that were generated from the gas fired smelter at Klipfontein, which existed more than 60 years ago. The tar residue from the smelter was stored in four separate clay-lined, soil compartments. Each empty tar dam is approximately 1600m^2 in size and contained an estimated 3200m^3 of tar residue.

Tar dams A and B (Bleskop Tar Dams) are located on Portion 170 of the Farm Kroondal 304 JQ which is owned by RPM. Tar dams C and D (Temso Tar Dams) are located on Portion 2 (Remaining Extent) of the farm Klipfontein 300 JQ which is owned by the Royal Bafokeng Nation and leased by RPM.

The tar residues and contaminated undercut have been removed from site and disposed of at a permitted hazardous landfill site. This activity was undertaken as a 'reasonable measure' contemplated in Section 28: Duty of Care under the National Environmental Management Act (No. 107 of 1998) (NEMA). Following removal of the tar residues, the dams need to be decommissioned and surrounding soils remediated to ensure compliance with South African legislation (NEMA) and the National Environmental Management Waste Act (No. 28 of 2009) (NEMWA)).

In order to receive environmental authorisation, RPM are required to undertake a basic assessment (BA) process in accordance with the environmental impact assessment (EIA) regulations of 2010 for the decommissioning and remediation activities. The authorisation to decommission the tar dams will need to be obtained by the North West Department of Economic Development, Environment, Conservation and Tourism (NW DEDECT) for the activity listed in GNR.544 of 2010: Activity 27(iv) "The decommissioning of existing facilities or infrastructure for activities, where the facility or land on which it is located is contaminated".

Similarly, a waste management license will need to be obtained from the Department of Environmental Affairs (DEA) for the remediation activities listed in GNR.718 of 2009 – Category A, Activity 12 "The remediation of contaminated land."

Two separate BA reports are being compiled (following the DEA template as well as the NWDEDECT template) and the environmental management programme (EMP) developed. The draft BA reports (including EMP) have been placed for state and public review for a period of 60 days, from 26 February 2013 – 29 May 2013 at the following locations:

- RPM Recreation and Sports Club;
- Rustenburg Public Library
- WSP's website: www.wspenvironmental.co.za

Comments sheets have been included in the report. All comments are to be addressed to **Jared O'Brien** and submitted by 29 May 2013.

Please note that the draft reports **are not to be removed** from the public review venues.

WSP Environmental (Pty) Ltd
WSP House
Bryanston Place
199 Bryanston Drive
Bryanston, 2021
Tel: +27 (0)11 361 1380
Fax: +27 (0)11 361 1381
http://www.wspenvironmental.co.za
Reg. No: 1995/08790/07

WSP Group plc
Offices worldwide

Following the public review period, the reports will be updated with any comments received and finalised before being submitted to the DEA and NWDEDECT.

Should you require any additional information or have any questions, please do not hesitate to contact the undersigned.

Regards,

Jared O'Brien
Environmental Consultant
Tel: 011 361 1396
Fax: 086 505 3939
Email: jared.o'brien@wspgroup.co.za

Comments and Response Sheet

To ensure that all your comments, issues or queries regarding the draft Tar Dams Project Draft Basic Assessment Report are accurately documented and addressed, please forward your comments and contact details with the attached response sheet to:

Jard O'Brien

WSP Environmental Environnent and Energy
Address: P.O. Box 5384, Rivonia, 2128
Tel: (011) 361 1396
Fax: (086) 505 3939
Email: Jared.O'Brien@wspgroup.co.za

Please list your personal details below:

Name:	
Organisation & Designation:	
Address:	
Tel:	
Fax:	
E-mail:	

Please list your comments below:

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Name:	
Organisation & Designation:	
Address:	
Tel:	
Fax:	
E-mail:	

Please list your comments below:

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

(For official use only)

File Reference Number:	
Application Number:	
Date Received:	

Basic assessment report in terms of the Environmental Impact Assessment Regulations, 2010, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

Kindly note that:

1. This basic assessment report is a standard report that may be required by a competent authority in terms of the EIA Regulations, 2010 and is meant to streamline applications. Please make sure that it is the report used by the particular competent authority for the activity that is being applied for.

2. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.

3. Where applicable tick the boxes that are applicable in the report.

4. An incomplete report may be returned to the applicant for revision.

5. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.

6. This report must be handed in at offices of the relevant competent authority as determined by each authority.

7. No faxed or e-mailed reports will be accepted.

8. The report must be compiled by an independent environmental assessment practitioner.

9. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.

10. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.

SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section?	YES ✓	NO

If YES, please complete the form entitled "Details of specialist and declaration of interest" for appointment of a specialist for each specialist thus appointed:

Specialist studies have been conducted in the past which do not fall within WSP's scope of work.

Specialist studies conducted include: Air Emissions Assessment, Soil Assessment, Groundwater Monitoring, and Surface Water Monitoring.

Any specialist reports must be contained in Appendix D.

1. ACTIVITY DESCRIPTION

Describe the activity, which is being applied for, in detail[1]:

Introduction:

Anglo American Limited: Rustenburg Platinum Mines Limited (RPM) has four existing empty Tar Dams within their mine lease area near Rustenburg, North West Province. The empty Tar Dams contained legacy residues that were generated from the gas fired smelter at Klipfontein, which existed more than 60 years ago. The tar residue from the smelter was stored in four separate clay-lined, soil compartments. Each empty tar dam is approximately 1600m^2 in size and contained an estimated 3200m^3 of tar residue. Tar Dam footprints A and B (referred to as the Bleskop Tar Dams) are located between the Bleskop Stadium and the RPM Hospital, while Tar Dam footprints C and D (referred to as the TEMSO Tar Dams) are located north of the Klipfontein Concentrator, adjacent to the road to TEMSO. Locality maps are included in Appendix A.

History:

Due to the hazardous waste classification of the tar in the dams, a decision was taken in 2003 to recover the material out of Tar Dam D (3,703 tonnes) closest to the road to TEMSO for combustion at a cement kiln in Lichtenburg after all the necessary legal permits were obtained. The tar was transferred in a liquid form to the cement plant to be used as an alternative fuel and resource (AFR). However, as the melted tar was fed into the furnace, it solidified (transfer lines were not heated) and the project was stopped as a result. A decision was then taken in March 2003 to move the rest of the content of the same Tar Dam D to Holfontein H:H hazardous waste landfill site.

Activities Undertaken in 2011 and 2012:

Due to the potential environmental, health and safety risk associated with the Tar Dams, RPM decided to decommission the Tar Dams and remove the remaining tar residues (in dams A, B and C) to a permitted hazardous waste landfill site (Holfontein). The activity was deemed to be a 'reasonable measure' as defined in the National Environmental Management Act (No. 107 of 1998) and environmental authorisation was not required for the removal of the tar residues and underlying contaminated soils. Subsequent remediation of the underlying and surrounding contaminated soil may be required. It is proposed that the potentially contaminated soil be remediated to a predetermined standard prior to being backfilled, shaped and grassed with indigenous self-sustaining grasses. Furthermore, as part of the project, the facilities (Tar Dams) will be decommissioned.

[1] Please note that this description should not be a verbatim repetition of the listed activity as contained in the relevant Government Notice, but should be a brief description of activities to be undertaken as per the project description.

The risks related to the Tar Dams were investigated in detail to ensure that all necessary steps are taken in order to minimise harm to the environment and to ensure legal compliance and best practice. To this effect, numerous specialist studies were undertaken to assess the potential impact on air quality, hydrology and geohydrology and soils (underlying and surrounding). Furthermore, RPM appointed WSP Environment and Energy (WSP) to undertake the environmental authorisation process as well as a geo-environmental risk assessment to evaluate the extent of potential contamination (if any) and provide a remediation strategy for the project.

Geo-environmental Risk Assessment and Remediation Strategy

The full geo-environmental report undertaken by WSP is available in Appendix D.

In summary, an intrusive investigation has identified sites that are underlain by clay resting upon Norite. It appears that the tar dams were formed by excavating into the underlying clay to create pits with the remnant clay material forming the sides of the dams. The upper side material was exposed and subject to the weathering which allowed for small cracks to form which subsequently allowed for some shallow penetration of waste tar into the nearby soils. However, the extent of this penetration is limited therefore the clay is considered an extremely effective medium in containing the tar residues.

The investigation focused upon identifying the possible extent of hydrocarbon contamination in the areas surrounding the tar dams footprint and assessing whether such contamination could be remediated through bio-remediation.

The investigation identified that any spread of hydrocarbon contamination outside of the footprint of the former tar dams is extremely limited and that the sidewalls and base of the tar dams were effective in limiting the potential loss of hydrocarbons into the surrounding soils. In this regard only two hot spots with elevated levels of total oil and grease were identified. The investigation confirmed that hydrocarbons are present in the soil in the most part as a heavy tar fraction but also that elevated levels of hydrocarbons in the C6 to C35 range are also present. With regards to the latter the samples obtained did not exhibit concentrations above industrial acceptable standards but were useful in determining the probable distribution of hydrocarbon chains within any more concentrated soils that are stockpiled onsite.

Bio-remediation

WSP propose to undertake a screening 'soil cleaning' exercise in order to separate the heavily contaminated tar soils from the relatively 'clean' soils located within the contaminated soil stockpiles onsite. The concept behind the soil screening exercise is to separate the heavy tar fraction from the resultant soil. It is anticipated that the heavy tar fraction will not pass through the screen due to the cohesive properties of the tar causing amalgamation of the residual residues that can be disposed of at a licensed facility.

The resultant soil will then be sampled in order to identify level of contamination (if any) and the remediation strategy required to stabilise the soil. Should contamination be identified, the soil stockpiles will be shaped, tilled (soil banking) and/ or a bio-remediation agent added to promote the breakdown of contaminates in the soil.

It is important to note that the success of the trial is dependent on the assumption that the testing will be undertaken during a clear summer day where the tar residue become viscous enabling separation from the soils onsite. The theory behind this assumption is that should the tar residue not be adequately heated, the tar fractions will not become viscous and will be allowed to pass through the screen with the soil. A number of bench tests will be assembled in order to establish the correct screen size, heat required for the tar fraction to become viscous and success of the proposed screening process.

Once contaminates have been adequately removed from the residual soils, the empty tar dam voids will be backfilled, levelled and revegetated.

Summary and Way Forward:

In a public complaint to RPM, it was identified that the existing tar dams that contain legacy tar residues from the decommissioned Klipfontein Smelter may potentially be contaminating the surrounding social and biophysical environment. In order to discontinue any potential environmental and social impacts from occurring, the tar residues and associated undercut were removed and disposed of at Holfontein.

WSP was appointed by RPM to undertake the environmental authorisation required to decommission and remediate the area associated with the tar dams. A comprehensive BA process was undertaken that included a transparent stakeholder engagement process. The potential environmental and social impacts associated with the decommissioning and remediation activities were assessed and mitigation measures developed in order to minimise the risks associated with the project. Please note that as the geo-environmental assessment undertaken by WSP indicated that all tar residues were contained within the clay layer, no contamination assessment to downstream uses was deemed necessary. BA and EMP reports were developed in accordance with the requirements of NEMA. The North West Department of Economic Development, Environment and Tourism will be responsible for authorising the environmental approval for the decommissioning activity whereas the Department of Environmental Affairs will be responsible for authorising the remediation activity.

Following authorisation, RPM will commence the screening 'soil cleaning' exercise where the heavier tar fractions will be separated from the stockpile onsite. The resulting tar will be collected and disposed of as hazardous waste and the soil analysed for contamination. Should it be required, the soil will be tilled and/ or bio-remediation agent added to stabilise the stockpile. Thereafter, the tar dam void will be filled, levelled and revegetated in accordance with the EMP.

2. FEASIBLE AND REASONABLE ALTERNATIVES

"alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

(a) the property on which or location where it is proposed to undertake the activity;
(b) the type of activity to be undertaken;
(c) the design or layout of the activity;
(d) the technology to be used in the activity;
(e) the operational aspects of the activity; and
(f) the option of not implementing the activity.

Describe alternatives that are considered in this application. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The determination of whether site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

Paragraphs 3 – 13 below should be completed for each alternative.

Please note: As this project entails the remediation and decommissioning of existing empty Tar Dams, no site alternatives were assessed. Treatment and Disposal alternatives / options, however, have been included in this document.

3. ACTIVITY POSITION

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.
List alternative sites, if applicable.

Alternative:	Latitude (S):		Longitude (E):	
Alternative S1 (preferred or only site alternative) Dam A	25°	41‘ 50.94”	27°	21’ 30.45”
Alternative S1 (preferred or only site alternative) Dam B	25°	41’ 51.09”	27°	21’ 31.95”
Alternative S1 (preferred or only site alternative) Dam C	25°	41‘ 55.05”	27°	22’ 05.36”
Alternative S1 (preferred or only site alternative) Dam D	25°	41’ 56.35”	27°	22’ 05.22”
Alternative S2 (if any)				
Alternative S3 (if any)				

In the case of linear activities:

Alternative:	Latitude (S):	Longitude (E):

Alternative S1 (preferred or only route alternative)				
• Starting point of the activity	0	‘	0	‘
• Middle/Additional point of the activity	0	‘	0	‘
• End point of the activity	0	‘	0	‘
Alternative S2 (if any)				
• Starting point of the activity	0	‘	0	‘
• Middle/Additional point of the activity	0	‘	0	‘
• End point of the activity	0	‘	0	‘
Alternative S3 (if any)				
• Starting point of the activity	0	‘	0	‘
• Middle/Additional point of the activity	0	‘	0	‘
• End point of the activity	0	‘	0	‘

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

4. PHYSICAL SIZE OF THE ACTIVITY

Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

Alternative:	Size of the activity:
Alternative A1[2] (preferred activity alternative) – Dam A	1600 m^2
Alternative A1 (preferred activity alternative) – Dam B	1600 m^2
Alternative A1 (preferred activity alternative) – Dam C	1600 m^2
Alternative A1 (preferred activity alternative) – Dam D	1600 m^2
Alternative A2 (if any)	m^2
Alternative A3 (if any)	m^2

or, for linear activities:

Alternative:	Length of the activity:
Alternative A1 (preferred activity alternative)	m
Alternative A2 (if any)	m
Alternative A3 (if any)	m

Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):

Alternative:	Size of the site/servitude:
Alternative A1 (preferred activity alternative)	m^2
Alternative A2 (if any)	m^2

Alternative A3 (if any)	m^2

5. SITE ACCESS

Does ready access to the site exist?	YES ✓	NO
If NO, what is the distance over which a new access road will be built	m	

Describe the type of access road planned:

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site.

FIGURE 1: Tar Dams A and B (Source: Google Earth 2012)

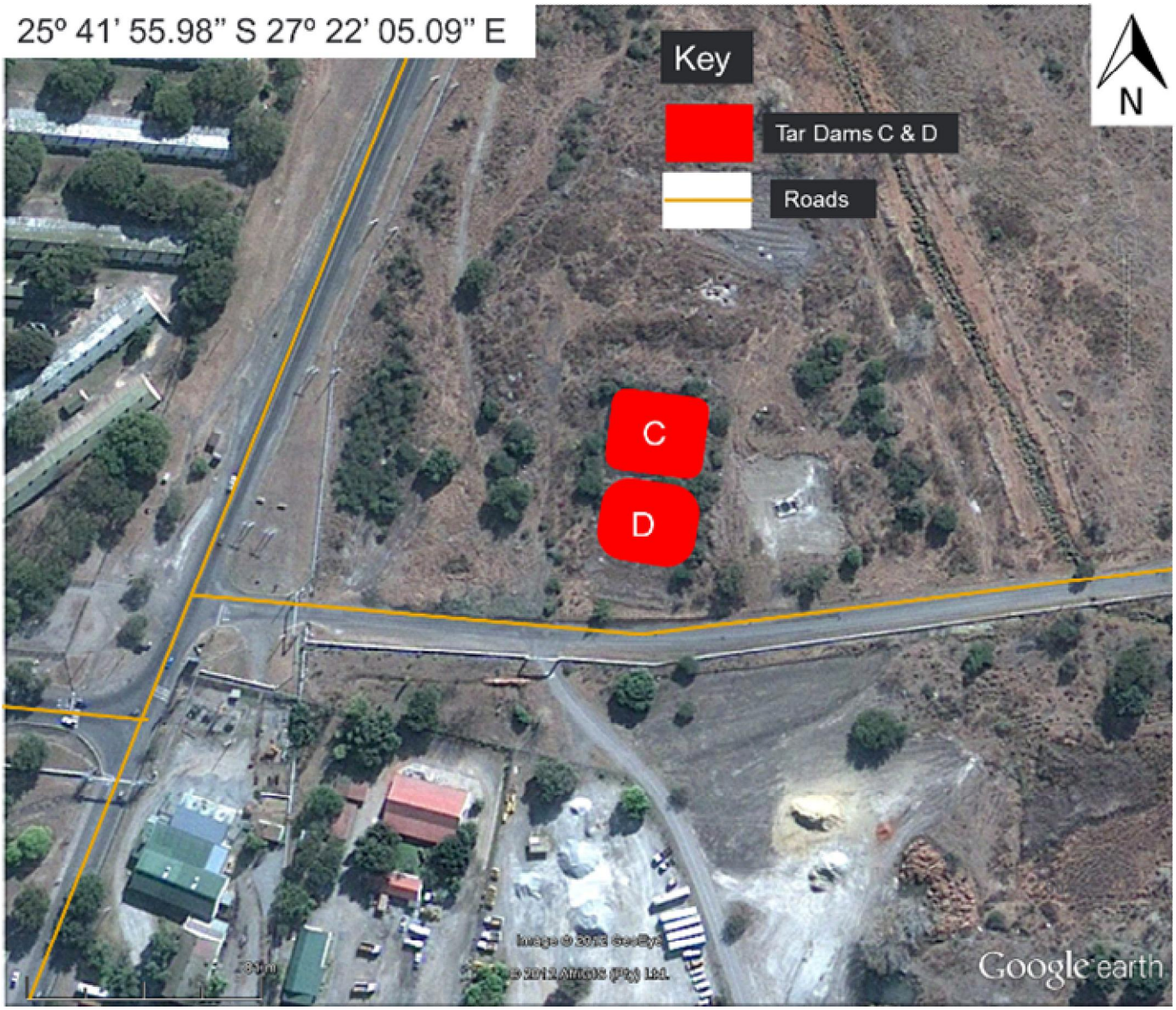


FIGURE 2: Tar Dams C and D (Source: Google Earth 2012)

6. SITE OR ROUTE PLAN

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as Appendix A to this document.

The site or route plans must indicate the following:

6.1 the scale of the plan which must be at least a scale of 1:500;
6.2 the property boundaries and numbers of all the properties within 50 metres of the site;
6.3 the current land use as well as the land use zoning of each of the properties adjoining the site or sites;
6.4 the exact position of each element of the application as well as any other structures on the site;
6.5 the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, street lights, sewage pipelines, storm water infrastructure and telecommunication infrastructure;
6.6 all trees and shrubs taller than 1.8 metres;
6.7 walls and fencing including details of the height and construction material;
6.8 servitudes indicating the purpose of the servitude;
6.9 sensitive environmental elements within 100 metres of the site or sites including (but not limited thereto):

- rivers;

- the 1:100 year flood line (where available or where it is required by DWA);
- ridges;
- cultural and historical features;
- areas with indigenous vegetation (even if it is degraded or invested with alien species);

6.10 for gentle slopes the 1 metre contour intervals must be indicated on the plan and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the plan; and

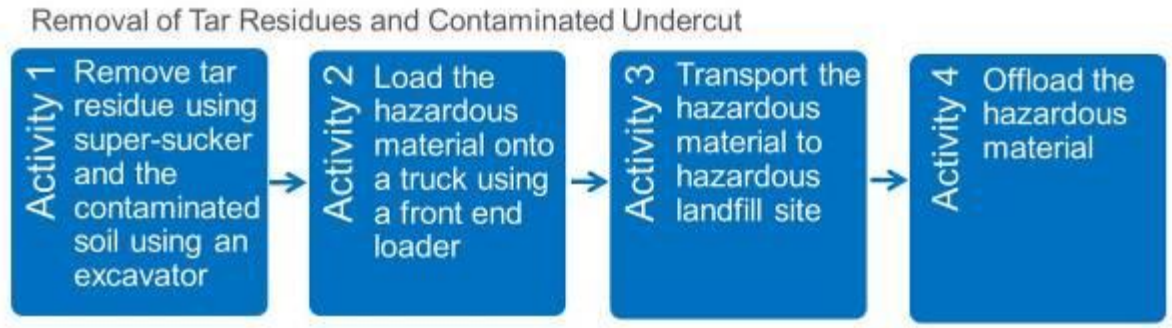
6.11 the positions from where photographs of the site were taken.

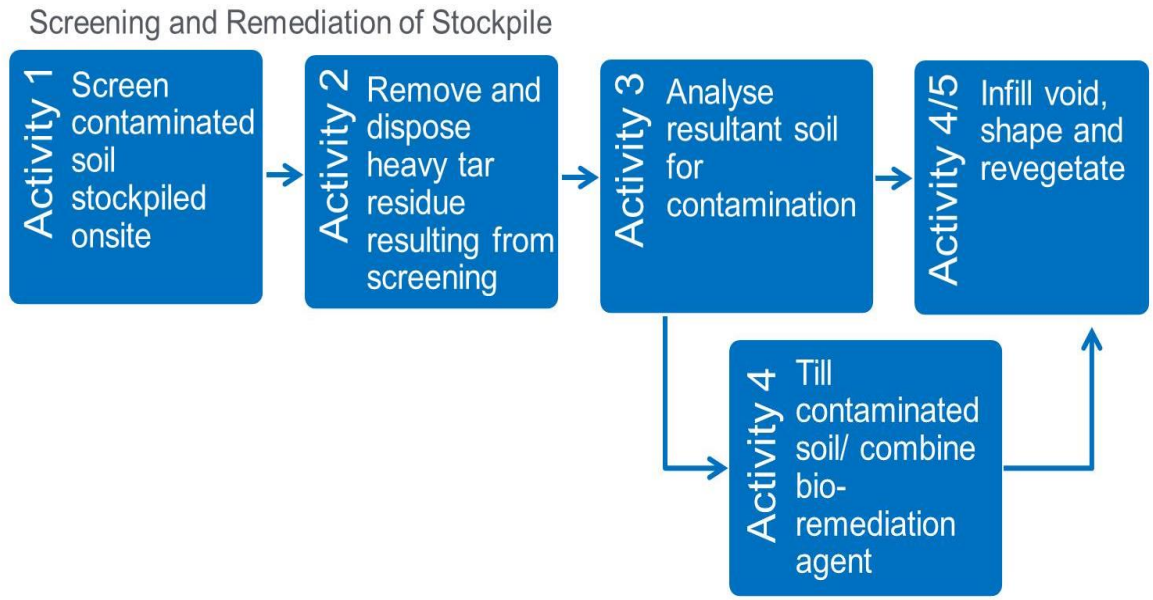
7. SITE PHOTOGRAPHS

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under Appendix B to this form. It must be supplemented with additional photographs of relevant features on the site, if applicable.

8. FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of 1:200 as Appendix C for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity.





9. ACTIVITY MOTIVATION

9(a) Socio-economic value of the activity

Section 9(a) is not applicable as the project is temporary and as a result will create temporary employment on a small scale (through appointing contractors).

What is the expected capital value of the activity on completion?	R	
What is the expected yearly income that will be generated by or as a result of the activity?	R	
Will the activity contribute to service infrastructure?	YES	NO
Is the activity a public amenity?	YES	NO
How many new employment opportunities will be created in the development phase of the activity?		
What is the expected value of the employment opportunities during the development phase?	R	
What percentage of this will accrue to previously disadvantaged individuals?	%	
How many permanent new employment opportunities will be created during the operational phase of the activity?		
What is the expected current value of the employment opportunities during the first 10 years?	R	
What percentage of this will accrue to previously disadvantaged individuals?	%	

9(b) Need and desirability of the activity

Motivate and explain the need and desirability of the activity (including demand for the activity):

NEED:			
1.	Was the relevant provincial planning department involved in the application?	YES	NO ✓
2.	Does the proposed land use fall within the relevant provincial planning framework?	YES	NO ✓
3.	If the answer to questions 1 and / or 2 was NO, please provide further motivation / explanation:		
	The dams fall within RPM's mine lease area. The contaminated stockpiles will be screened, tar residues removed and disposed of and the resulting soil analysed for contamination. Should contamination be present, the soils will be stockpiled, tilled and/ or a bio-remediation agent added until soil stabilisation. Thereafter, the voids will be backfilled, shaped and revegetated.		

DESIRABILITY:			
1.	Does the proposed land use / development fit the surrounding area?	YES ✓	NO
2.	Does the proposed land use conform to the relevant structure plans, SDF and planning visions for the area?	YES ✓	NO
3.	Will the benefits of the proposed land use outweigh the negative impacts of it?	YES ✓	NO
4.	If the answer to any of the questions 1-3 was NO, please provide further motivation / explanation:		
5.	Will the proposed land use impact on the sense of place?	YES	NO ✓
6.	Will the proposed land use set a precedent?	YES ✓	NO
7.	Will any person's rights be affected by the proposed land use?	YES	NO ✓
8.	Will the proposed land use / development compromise the "urban edge"?	YES	NO ✓
9.	If the answer to any of the question 5-8 was YES, please provide further motivation / explanation.		
	The tar residues contained within each of the tar dams have been removed and disposed of at a permitted landfill site. A volume of soil remains which is contaminated with tar residue and has been stockpiled onsite, thus a minor risk remains. In remediating the contaminated stockpiles, a precedent will be set for future environmental remediation activities.		

BENEFITS:			
1.	Will the land use / development have any benefits for society in general?	YES ✓	NO
2.	Explain: The screening (remediation) activity will remove any remaining risks associated with the tar dams. The environmental, health and safety risk that the tar dams previously imposed will be remediated thereby benefitting the immediate surrounding area (and surrounding society).		
3.	Will the land use / development have any benefits for the local communities where it will be located?	YES ✓	NO
4.	Explain: The remediation activity will remove the remaining environmental, health and safety risks associated with the tar dams. This will ensure that no potential surface water, groundwater, air and soil contamination will occur in the future thereby improving the land use potential. Reduced environmental risks and improved land use opportunities will be made as a result of the project.		

10. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations, if applicable:

Title of legislation, policy or guideline:	Administering authority:	Date:
NEMA GNR 544, 27 (iv)	NWDEDECT	2010
NEM: WA GNR 718, 12 & 20	DEA	2010

11. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

11(a) Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?	YES ✓	NO
If yes, what estimated quantity will be produced per month?	3200 m^3	
How will the construction solid waste be disposed of (describe)?		

Removal and Disposal of Tar Residues (complete):

The tar residue in the dams was removed using 'super sucker equipment' by an independent waste contractor. The material from the dams was then placed in a 5 m^3 vacuum tank before being fed into a heating skip system. The heating system comprised of flue (pipe for conveying exhaust gases from a furnace, to the outdoors), which was heated using LPG gas. A strainer system and a positive displacement pump enabled the transfer of filtered material from the heating system to a 30 m^3 heated storage tank. Once the heated storage tank had been filled, the material was transferred to a bitumen tanker and subsequently transported to the Holfontein Hazardous Landfill (H:H) site. The remaining undercut (depth of approximately 300mm) and the semi-solid tar left in the dam was mixed using a grader and loaded into tipper trucks for transportation to the H:H site.

Remediation of Contaminated Stockpile:

During the removal and disposal activity, a small volume of tar residue seeped from the walls of the tar dams. RPM excavated the walls of the tar dams until no visible signs of residue were noted. The contaminated soils have been stockpiled and will be remediated to remove the risk associated with the dams.

WSP will undertake a screening 'soil cleaning' exercise in order to separate the heavily contaminated tar soils from the relatively 'clean' soils located within the contaminated soil stockpiles onsite. The concept behind the soil screening exercise is to separate the heavy tar fraction from the resultant soil. It is anticipated that the heavy tar fraction will not pass through the screen due to the cohesive properties of the tar causing amalgamation of the residual residues that can be disposed of at a licensed facility.

The resultant soil will then be sampled in order to identify level of contamination (if any) and the remediation strategy required to stabilise the soil. Should contamination be identified, the soil stockpiles will be shaped, tilled (soil banking) and/ or a bio-remediation agent added to promote the breakdown of contaminates in the soil.

It is important to note that the success of the trial is dependent on the assumption that the testing will be undertaken during a clear summer day where the tar residue become viscous enabling separation from the soils onsite. The theory behind this assumption is that should the tar residue not be adequately heated, the tar fractions will not become viscous and will be allowed to pass through the screen with the soil. A number of bench tests will be assembled in order to establish the correct screen size, heat required for the tar fraction to become viscous and success of the proposed screening process.

Once contaminates have been adequately removed from the residual soils, the empty tar dam voids will be backfilled, levelled and revegetated.

Where will the construction solid waste be disposed of (describe)?

Holfontein Hazardous Landfill site (H:H)

Will the activity produce solid waste during its operational phase?	YES	NO ✓
If yes, what estimated quantity will be produced per month?	m^3	

How will the solid waste be disposed of (describe)?

N/A

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

N/A

If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the	YES ✓	NO

relevant legislation?		

If yes, inform the competent authority and request a change to an application for scoping and EIA.
The project involves the remediation of contaminated land. The hazardous tar and soil waste material removed from site is transferred to a hazardous waste landfill site. This activity falls under GNR 718 of the NEM:WA in category A and therefore requires a Basic Assessment.

Is the activity that is being applied for a solid waste handling or treatment facility?	YES	NO ✓

If yes, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

11(b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?	YES	NO ✓
If yes, what estimated quantity will be produced per month?	m^3	
Will the activity produce any effluent that will be treated and/or disposed of onsite?	YES	NO ✓

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Will the activity produce effluent that will be treated and/or disposed of at another facility?	YES ✓	NO

If yes, provide the particulars of the facility:

Facility name:	Holfontein, managed by EnvironServ Waste Management (Pty) Ltd		
Contact person:	Lynn van der Linde		
Postal address:	PO Box 1547, Bedfordview		
Postal code:	2008		
Telephone:	011 456 5400	Cell:	
E-mail:	lynnv@enviroserv.co.za	Fax:	011 453 1797

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

N/A

11(c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere?	YES ✓	NO
If yes, is it controlled by any legislation of any sphere of government?	YES	NO ✓

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the emissions in terms of type and concentration:

The results obtained during the Baseline ambient air quality assessment (Appendix D) conducted at the tar dam site (during the tar removal stage of the project) revealed that ambient concentrations of Benzene, Toluene, Ethylbenzene, Xylene, Trimethylbenzenes, Phenol, Ammonia, Cyanide and PAHs at all three of the sampling locations were *well below* the relevant South African Ambient Air Quality Standard and/or the equivalent UK Environmental Assessment Levels (UK EALs). Ambient concentrations of Phenol and Ammonia downwind of the Tar Dams were marginally higher than those recorded at the upwind sampling location, suggesting that tar dam emissions contributed (marginally) to ambient concentrations of these contaminants. Worker exposure to airborne concentrations of Benzene, Toluene, Ethylbenzene, Xylene, Trimethylbenzenes, Phenol, Cresol and Ammonia *was minimal* during the survey period.

11(d) Generation of noise

Will the activity generate noise?

YES ✓	NO

If yes, is it controlled by any legislation of any sphere of government?

YES	NO ✓

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.
If no, describe the noise in terms of type and level:

General machinery in the form of an excavator/s and tipper trucks will be used onsite which create a certain degree of noise pollution although the noise produced onsite is within the Occupational Health and Safety Act (OHSA) limits. PPE will be worn onsite when working with noise producing machinery.

12. WATER USE

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es)

municipal	water board	groundwater	river, stream, dam or lake	other	the activity will not use water

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate
the volume that will be extracted per month:

litres	
YES	NO

Does the activity require a water use permit from the Department of Water Affairs?
If yes, please submit the necessary application to the Department of Water Affairs and attach proof thereof to this application if it has been submitted.

13. ENERGY EFFICIENCY

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

N/A

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

N/A

SECTION B: SITE/AREA/PROPERTY DESCRIPTION

Important notes:

1. For linear activities (pipelines, etc) as well as activities that cover very large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section C and indicate the area, which is covered by each copy No. on the Site Plan.

Section C Copy No. (e.g. A):	

2. Paragraphs 1 - 6 below must be completed for each alternative.

3. Has a specialist been consulted to assist with the completion of this section?

YES	NO ✓

Please note: Specialist studies have been conducted on the Tar Dams in the past. The relevant specialist studies will be included in Appendix D.

If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed:
All specialist reports must be contained in Appendix D.

Property description/physical address: (Tar Dams A & B):	Portion 170 of the farm Kroondal 304 JQ
Property description/physical address: (Tar Dams C & D)	Portion 2 (Remaining Extent) of the farm Klipfontein 300 JQ

(Farm name, portion etc.) Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application.

In instances where there is more than one town or district involved, please attach a list of towns or districts to this application.

Current land-use zoning:	Grazing

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to , to this application.

Is a change of land-use or a consent use application required?	YES	NO ✓
Must a building plan be submitted to the local authority?	YES	NO ✓

Locality map:

An A3 locality map must be attached to the back of this document, as Appendix A. The scale of the locality map must be relevant to the size of the development (at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map.) The map must indicate the following:

- an indication of the project site position as well as the positions of the alternative sites, if any;
- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and
- locality GPS co-ordinates (Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection)

1. GRADIENT OF THE SITE

Indicate the general gradient of the site.
Alternative S1:

Dam A

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Dam B

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Dam C

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Dam D

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Alternative S2 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Alternative S3 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

2. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site:

2.1 Ridgeline
2.2 Plateau
2.3 Side slope of hill/mountain
2.4 Closed valley
2.5 Open valley
2.6 Plain
2.7 Undulating plain / low hills
2.8 Dune
2.9 Seafront

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

DAMS A AND B*

Is the site(s) located on any of the following (tick the appropriate boxes)?

	Alternative S1:		Alternative S2 (if any):		Alternative S3 (if any):	
Shallow water table (less than 1.5m deep)	YES	NO	YES	NO	YES	NO
Dolomite, sinkhole or doline areas	YES	NO	YES	NO	YES	NO
Seasonally wet soils (often close to water bodies)	YES	NO	YES	NO	YES	NO
Unstable rocky slopes or steep slopes with loose soil	YES	NO	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)	YES	NO	YES	NO	YES	NO
Soils with high clay content (clay fraction more than 40%)	YES	NO	YES	NO	YES	NO
Any other unstable soil or geological feature	YES	NO	YES	NO	YES	NO
An area sensitive to erosion	YES	NO	YES	NO	YES	NO

DAMS C AND D*

	Alternative S1:		Alternative S2 (if any):		Alternative S3 (if any):	
Shallow water table (less than 1.5m deep)	YES	NO	YES	NO	YES	NO
Dolomite, sinkhole or doline areas	YES	NO	YES	NO	YES	NO
Seasonally wet soils (often close to water bodies)	YES	NO	YES	NO	YES	NO

Unstable rocky slopes or steep slopes with loose soil	YES	NO	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)	YES	NO	YES	NO	YES	NO
Soils with high clay content (clay fraction more than 40%)	YES	NO	YES	NO	YES	NO
Any other unstable soil or geological feature	YES	NO	YES	NO	YES	NO
An area sensitive to erosion	YES	NO	YES	NO	YES	NO

*Information obtained from a Geological Map of the Rustenburg region and from the maps provided on the DEA website

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. (Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted).

4. GROUNDCOVER

Indicate the types of groundcover present on the site:

The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Natural veld - good condition[E]	Natural veld with scattered aliens[E]	Natural veld with heavy alien infestation[E]	Veld dominated by alien species[E]	Gardens
Sport field	Cultivated land	Paved surface	Building or other structure	Bare soil

The groundcover of the project areas comprise natural veld with scattered aliens, bare soil and tar residue.

If any of the boxes marked with an "[E] "is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn't have the necessary expertise.

5. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that does currently occur within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

Dam A and Dam B

5.1 Natural area

5.2 Low density residential

5.3 Medium density residential

5.4 High density residential

5.5 Informal residential[A]
5.6 Retail commercial & warehousing
5.7 Light industrial
5.8 Medium industrial [AN]
5.9 Heavy industrial AN
5.10 Power station
5.11 Office/consulting room
5.12 Military or police base/station/compound
5.13 Spoil heap or slimes dam[A]
5.14 Quarry, sand or borrow pit
5.15 Dam or reservoir
5.16 Hospital/medical centre
5.17 School
5.18 Tertiary education facility
5.19 Church
5.20 Old age home
5.21 Sewage treatment plant[A]
5.22 Train station or shunting yard [N]
5.23 Railway line [N]
5.24 Major road (4 lanes or more) [N]
5.25 Airport [N]
5.26 Harbour
5.27 Sport facilities
5.28 Golf course
5.29 Polo fields
5.30 Filling station [H]
5.31 Landfill or waste treatment site
5.32 Plantation
5.33 Agriculture
5.34 River, stream or wetland
5.35 Nature conservation area
5.36 Mountain, koppie or ridge
5.37 Museum
5.38 Historical building
5.39 Protected Area
5.40 Graveyard
5.41 Archaeological site
5.42 Other land uses (Mining activities)

Dam C and Dam D
5.1 Natural area
5.2 Low density residential
5.3 Medium density residential
5.4 High density residential
5.5 Informal residential[A]
5.6 Retail commercial & warehousing
5.7 Light industrial
5.8 Medium industrial [AN]
5.9 Heavy industrial AN
5.10 Power station

5.11 Office/consulting room
5.12 Military or police base/station/compound
5.13 Spoil heap or slimes dam[A]
5.14 Quarry, sand or borrow pit
5.15 Dam or reservoir
5.16 Hospital/medical centre
5.17 School
5.18 Tertiary education facility
5.19 Church
5.20 Old age home
5.21 Sewage treatment plant[A]
5.22 Train station or shunting yard [N]
5.23 Railway line [N]
5.24 Major road (4 lanes or more) [N]
5.25 Airport [N]
5.26 Harbour
5.27 Sport facilities
5.28 Golf course
5.29 Polo fields
5.30 Filling station [H]
5.31 Landfill or waste treatment site
5.32 Plantation
5.33 Agriculture
5.34 River, stream or wetland
5.35 Nature conservation area
5.36 Mountain, koppie or ridge
5.37 Museum
5.38 Historical building
5.39 Protected Area
5.40 Graveyard
5.41 Archaeological site
5.42 Other land uses (Mining activities)

If any of the boxes marked with an "[N] "are ticked, how will this impact / be impacted upon by the proposed activity?
If any of the boxes marked with an "An" are ticked, how will this impact / be impacted upon by the proposed activity?
If YES, specify and explain: Heavy Industrial Activities
If YES, specify:
If any of the boxes marked with an "[H]" are ticked, how will this impact / be impacted upon by the proposed activity.
If YES, specify and explain:
If YES, specify:

6. CULTURAL/HISTORICAL FEATURES

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including Archaeological or palaeontological sites, on or close (within 20m) to the site?	YES ✓	NO
	NO	
If YES, explain:	Graveyards are in proximity of the Bleskop Tar Dams site (Dam A and B) but the grave sites are located further than 35 metres from the project activity.	
If uncertain, conduct a specialist investigation by a recognised specialist in the field to establish whether there is such a feature(s) present on or close to the site.		
Briefly explain the findings of the specialist:	N/A	
Will any building or structure older than 60 years be affected in any way?	YES	NO ✓
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	YES	NO ✓
If yes, please submit or, make sure that the applicant or a specialist submits the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application if such application has been made.		

SECTION C: PUBLIC PARTICIPATION

1. ADVERTISEMENT

The person conducting a public participation process must take into account any guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of the application which is subjected to public participation by—

(a) fixing a notice board (of a size at least 60cm by 42cm; and must display the required information in lettering and in a format as may be determined by the competent authority) at a place conspicuous to the public at the boundary or on the fence of—
  (i) the site where the activity to which the application relates is or is to be undertaken; and
  (ii) any alternative site mentioned in the application;

(b) giving written notice to—
  (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
  (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
  (v) the municipality which has jurisdiction in the area;

(vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
(vii) any other party as required by the competent authority;

(c) placing an advertisement in—
(i) one local newspaper; or
(ii) any official *Gazette* that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;

(d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official *Gazette* referred to in subregulation 54(c)(ii); and

(e) using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desiring of but unable to participate in the process due to—
(i) illiteracy;
(ii) disability; or
(iii) any other disadvantage.

2. CONTENT OF ADVERTISEMENTS AND NOTICES

A notice board, advertisement or notices must:

(a) indicate the details of the application which is subjected to public participation; and

(b) state—
(i) that the application has been submitted to the competent authority in terms of these Regulations, as the case may be;
(ii) whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation;
(iii) the nature and location of the activity to which the application relates;
(iv) where further information on the application or activity can be obtained; and
(iv) the manner in which and the person to whom representations in respect of the application may be made.

3. PLACEMENT OF ADVERTISEMENTS AND NOTICES

Where the proposed activity may have impacts that extend beyond the municipal area where it is located, a notice must be placed in at least one provincial newspaper or national newspaper, indicating that an application will be submitted to the competent authority in terms of these regulations, the nature and location of the activity, where further information on the proposed activity can be obtained and the manner in which representations in respect of the application can be made, unless a notice has been placed in any *Gazette* that is published specifically for the purpose of providing notice to the public of applications made in terms of the EIA regulations.

Advertisements and notices must make provision for all alternatives.

4. DETERMINATION OF APPROPRIATE MEASURES

The practitioner must ensure that the public participation is adequate and must determine whether a public meeting or any other additional measure is appropriate or not based on the particular nature of each case. Special attention should be given to the involvement of local community structures such as Ward Committees, ratepayers associations and traditional authorities where appropriate. Please note that public concerns that emerge at a later stage that should have been addressed may cause the competent authority to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was inadequate.

5. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments and respond to each comment of the public before the application is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations and be attached to this application. The comments and response report must be attached under Appendix E.

6. AUTHORITY PARTICIPATION

Please note that a complete list of all organs of state and or any other applicable authority with their contact details must be appended to the basic assessment report or scoping report, whichever is applicable.

Authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input.

List of authorities informed:

- Department of Environmental Affairs (DEA);
- Department of Water Affairs (DWA);
- North West Department of Agriculture, Conservation & Environment (NWDACE);
- Department of Health (DOH);
- Bonjanala Platinum District Municipality;
- Rustenburg Local Municipality; and
- South African Heritage Resource Association (SAHRA).

List of authorities from whom comments have been received:

- NWDACE;
- DWA; and
- SAHRA.

7. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for linear activities, or where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that subregulation to the extent and in the manner as may be agreed to by the competent authority. Proof of any such agreement must be provided, where applicable.

Has any comment been received from stakeholders?

YES ✓	NO

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

Please note that WSP had confirmations from two stakeholders that were to attend the public meeting, however, no stakeholder attended the public meeting despite adequate notification. There were no further comments received with reference to the project.

SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2010, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts.

1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

List the main issues raised by interested and affected parties.

- The Department of Water Affairs (DWA) questioned the proximity of the project to a water course.
- The Rustenburg Local Municipality (RLM) indicated that the Local Municipality would review and comment on the report once it is released for authority review. The RLM representative further emphasised that WSP should include all the identified impacts and appropriate mitigation measures in the Basic Assessment Report (BAR).
- Motshabi Mohlalisi from the NW DEDECT stated that the individual from the waste department at the Department should be contacted with regards to attending a site visit and being involved in the review of the BAR.

*(Please refer to Appendix E for further detail on the issues received thus far in the project and the corresponding responses issued).

Response from the practitioner to the issues raised by the interested and affected parties (A full response must be given in the Comments and Response Report that must be attached to this report as Annexure E):

- WSP responded to the DWA stating that the rivers would not be impacted upon, as WSP will formulate mitigation measures to prevent any foreseen impacts.
- WSP responded to RLM indicating that the report will be submitted to the Department for review once completed.
- Andre Britz indicated that he is willing to make himself available to accompany the relevant NW DEDECT personnel on a site visit.

*(Please refer to Appendix E for further detail on the issues received thus far in the project and the corresponding responses issued).

2. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

List the potential direct, indirect and cumulative property/activity/design/technology/operational alternative related impacts (as appropriate) that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed.

Alternative (preferred alternative)

Direct impacts:

Environmental Aspect	Significance (+ve / -ve)
Topography	+
Surface Water	+
Ground Water	+
Soil	+
Air	+
Land use	+
Fauna	+
Flora	+
Noise	-
Visual Aspect	+
Health & Safety	+ and -

Refer to Appendix G5

Indirect impacts:

Environmental Aspect	Significance (+ve / -ve)
Waste Management	+
Traffic	+
Cultural & Heritage Impacts	-
Employment	+
Climate	+
Visual Aspect	+
Health & Safety	+ and -

Refer to Appendix G5

Cumulative impacts:

RPM's daily activities, in different sections and areas of the mine, and in the greater Rustenburg area, are viewed as factors contributing to the overall environmental impact which the mine imposes on the natural and social environment. These impacts are mitigated through continual implementation of the existing environmental management programme reports that have been developed for the mine. Similarly, the Tar Dams may have minor contributing factors to the cumulative impact of the mine and hence its removal, decommissioning and rehabilitation will decrease the cumulative risks associated with the mining activities.

3. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

The information contained in this basic assessment report provides a detailed description of the activities associated with the tar removal (completed), the remediation strategy (to be undertaken), the motivation to undertake the work, the options considered and the stakeholder consultation process that was followed. The report also provides an environmental impact assessment that identified potential impacts that may arise from the project and an environmental management programme that considers the impacts of the decommissioning and remediation phases associated with the project.

Provided that the measures set out in the environmental management programme are adhered to, no significant negative biophysical or socio-economic impacts should arise during the decommissioning and remediation activities.

It is the view of the Environmental Assessment Practitioner that this project is needed to ensure the long-term health and safety of surrounding communities and the natural environment. Furthermore, pollutants associated with the tar dams will be remediated thereby minimising future impacts and risks associated with the tar dams from occurring.

Alternative A (preferred alternative)

The tar residues and contaminated undercut has been removed by a registered waste contractor and transported to Holfontein for correct disposal. As the tar residues and contaminated undercut contain Benzene, Toluene, Ethylbenzene, Xylene, Trimethylbenzenes, Phenol, Ammonia, Cyanide and PAHs and other harmful constituents which are considered toxic, the material was removed and disposed of at a hazardous landfill site as a 'reasonable measure' contained under Section 28 of the NEMA.

The dig and dump process involved the excavation of the tar contaminated soil from the tar dam footprints into a side tipper truck which then transported the hazardous waste material to Holfontein where it was disposed of. Holfontein is classified as a H:H landfill and can therefore accept Category 1 and 2 hazardous waste.

The contaminated soils obtained from the sidewalls of the dams have been stockpiled onsite. According to WSPs geo-environmental assessment, the clay liner and norite below the ground contain any potential risk from occurring. It is proposed that the contaminated soil undergo a screening exercise in order to separate the heavier tar fractions from the soil. Resultant tar residues will be disposed of as hazardous waste. The soil will undergo analysis in order to identify the level of contamination (if any) prior to being stockpiled, tilled and/ or supplemented with an environmentally friendly bio-remediation agent.

Due to the viscosity and characteristics of the tar residue, it is anticipated that the separated soil will not be contaminated. However, soil analysis will be undertaken in order to confirm effectiveness of the remediation activity. Following analysis, the voids will be backfilled, shaped and revegetated accordingly.

Alternative B (Incineration)

An alternative method for disposing of the tar residue was noted to be controlled incineration due to the presence of cyanide in the tar. An attempt was made to transfer the tar material to a cement kiln in 2003, where it would was to be co-combusted with other materials during the operations at Alpha Cement in Lichtenburg. However, complications were experienced while transferring the tar into the kiln from the transport tanker, as the tar residue could not be heated

during delivery and the resultant tar coagulated thereby making the project unfeasible. The project was therefore aborted due to issues with the process which could not be resolved.

Alternative C (Recycling / Recovery)

It has been noted that the tar and pitch wastes can be blended with waste oils and other waste petroleum products to give a second grade fuel oil. However, this is not acceptable due to the presence of cyanide which poses a health risk to users. The alternative is therefore not considered a responsible/ feasible option and was not considered.

No-go alternative (compulsory)

The no-go alternative means that the tar residue contaminated soil will remain onsite, resulting in potential long-term risk of exposure through the soil, air and water contaminated. As previously stated, the Tar Dams contained harmful substances which had a potential to lead to biophysical and social health risks and impacts. Furthermore, should the area associated with the tar dams not be remediated, there exists a potential contamination of groundwater reserves in the general vicinity of the tar dams, thus contributing to the cumulative impact of the mine on the general socio-economic and biophysical environment. The contamination of natural water reserves could also lead to a greater cost of water treatment activities as an additional impact

Although the tar residues have been removed from site and disposed of as hazardous waste, and WSPs geo-environmental report indicated that contamination associated with the tar dams is contain within the clay layer underlying the dams; should the remaining contaminated soil not be remediated, the potential for environmental and social degradation may contaminate underlying non-contaminated soil. This could result in potential surface and groundwater contamination and resultant impact to downstream uses. Therefore, this is not considered to be a feasible or responsible alternative by the EAP and should not be considered further.

SECTION E. RECOMMENDATION OF PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the environmental assessment practitioner)?	YES ✓	NO

If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment):

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:

The conditions are set out in the EMPr.

All the conditions in the EMPr must be implemented by the responsible parties.

Is an EMPr attached?	YES ✓	NO

The EMPr must be attached as Appendix F.

SECTION F: APPENDIXES

The following appendixes must be attached as appropriate:

Appendix A: Site plan(s)

Appendix B: Photographs

Appendix C: Facility illustration(s)

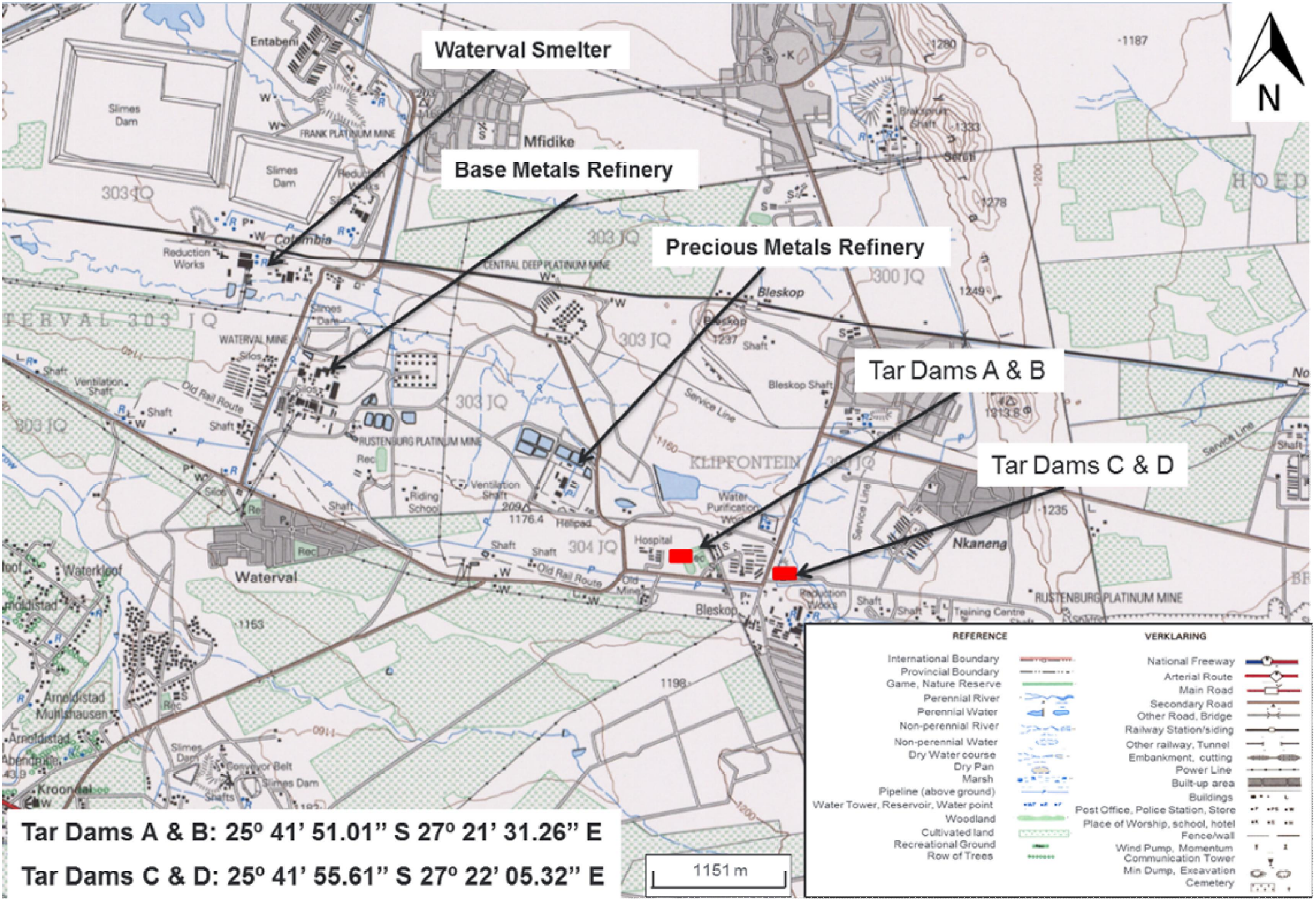
Appendix D: Specialist reports

Appendix E: Comments and responses report

Appendix F: Environmental Management Programme (EMPr)

Appendix G: Other information

Appendix A1: Topographical Locality Map


Waterval Smelter
Base Metals Refinery
Precious Metals Refinery
Tar Dams A & B
Tar Dams C & D
N
Tar Dams A & B: 25º 41' 51.01" S 27º 21' 31.26" E
Tar Dams C & D: 25º 41' 55.61" S 27º 22' 05.32" E
1151 m
REFERENCE
VERKLARING
International Boundary
Provincial Boundary
Game, Nature Reserve
Perennial River
Perennial Water
Non-perennial River
Non-perennial Water
Dry Water course
Dry Pan
Marsh
Pipeline (above ground)
Water Tower, Reservoir, Water point
Woodland
Cultivated land
Recreational Ground
Row of Trees
National Freeway
Arterial Route
Main Road
Secondary Road
Other Road, Bridge
Railway Station/siding
Other railway, Tunnel
Embankment, cutting
Power Line
Built-up area
Buildings
Post Office, Police Station, Store
Place of Worship, school, hotel
Fence/wall
Wind Pump, Momentum
Communication Tower
Min Dump, Excavation
Cemetery

Appendix A2: Google Earth Locality Maps


Temso Tar Dams
N
Bleskop Mine Residence
TEMSO Tar Dams
a
b
c
Klipfontein Concentrator
a = 40 metres
b = 40 metres
Area = 0.16 hectares
c = Tar Dam previously removed in 2003
Google earth

Appendix B: Site Photographs

TAR DAMS A AND B (BLESKOP TAR DAMS)

North East of Tar Dam A

South West of Tar Dam A

Looking North West of Tar Dam A

Looking North of Tar Dam A

Looking West of Tar Dam A

Looking North East of Tar Dam B

Looking North of Tar Dam B

Looking South East of Tar Dam B

Looking North West of Tar Dam B

Looking East of Tar Dam B

Looking East of Tar Dams A and B

Looking North of tar Dams A and B

Looking from West to East of Tar Dams A and B

Looking South of Tar Dams A and B

Looking from the West to the North East of Tar Dams A and B (Tar Dam B in foreground)

TAR DAMS C AND D (TEMSO TAR DAMS)

Looking South West of Tar Dam C

Looking West of Tar Dam C

Looking North West of Tar Dam C

Looking North of Tar Dam C

Looking from the North East to the West of Tar Dam C

Looking South of Tar Dam D

Looking South West of Tar Dam D

Looking West of Tar Dam D

Looking from South to West of Tar Dam D

Appendix C: Facility illustration(s)

Not applicable: as the project tis existing, and the authorisation pertains to the decommissioning of tar dams and the remediation thereof, no site facility illustrations are considered relevant.

Appendix D: Specialist reports - Rustenburg Tar dams Review and Status Report 2011

AngloAmerican

PLATINUM

Rustenburg Tar dams

Review and Status

2011

Compiled by Dr HB Prinsloo

Date: 30 September 2011

CONTENTS

1. INTRODUCTION

The “tar dams” at Rustenburg Section (Rusteburg Platinum Mines) are legacy residues from a gas fired smelter at Klipfontein (where the existing Klipfontein Concentrator is) that existed more than 60 years ago. These residues were deposited in 4 different soil compartments that are situated in what is now the Rustenburg Platinum Mine lease area. Tar dams A and B (approximately 1600m2 per dam) are between Bleskop Soccer Stadium and the Hospital (red circle on map below) while tar dams C and D (approximately 1600m2 per dam) can be found next to the road to TEMSO (right arrow on map below).

2. HISTORY

The history and sequence of events related to the tar dams in Rustenburg section can be summarized as follows:

1960

- 4 tar dams was generated as a result of residue from an old gas fired smelter at Klipfontein that existed more than 60 years ago

2003 (see detailed 2003 Enviroserve Report in Annexure A)

- Due to the hazardous waste classification of the tar in the dams, a decision was taken in 2003 to recover the material out of dam D (3703 tonnes) closest to the road to TEMSO for combustion at Alpha’s cement kiln in Lichtenburg

after all the necessary legal permits were obtained. The tar was transferred in a liquid form to the Alpha Cement Plant to be used as an alternative fuel and resource (AFR). However, as the melted tar was fed into the furnace, it solidified (transfer lines were not heated) and the project was stopped as a result.

- A decision was then taken in March 2003 to move the rest of the content of the same tar dam (dam D) to Holfontein H:H hazardous waste landfill site. The transfer of tar started immediately after the Alpha Cement project was terminated.
- Although safe disposal at Holfontein is a solution, alternative solutions like re-use or treatment, had to be considered for the tar in the dams.

2008

- A tender was therefore issued in 2008 to consider alternative treatment solutions, or as a last resort, to remove as a priority the tar at the two dams (A and B) between Bleskop Soccer Stadium and the Hospital (the intent was to remove the tar in the third dam (C) next to TEMSO at a later stage). Although quotes to remove the tar from the dams A and B have been received in reaction to the tender, no acceptable alternative treatment options could be agreed upon. Therefore no order to proceed with the work was issued.

2011 (see Enviroserve quotation in Annexure B)

- In 2011, a decision was taken to remove the residue in the dams to Holfontein and to rehabilitate the disturbed areas. The removal of the 3 tar dams is in progress and is expected to be finalized before the end of 2011.

3. SPECIALIST STUDIES

After the decision was taken in 2011 to remove all remaining residue in the tar dams to Holfontein and to rehabilitate the disturbed areas, the risk related to the tar dams were investigated in detail to ensure all necessary steps are taken to minimize harm to the environment and to ensure legal compliance.

As a result, the follow studies have been completed:

- Baseline Ambient Air Quality Assessment (6 Sep 2011) – Anglo Platinum Limited: Tar Dam site *by* Margot Saner & Associates (MS&A) (Pty) Ltd **(See Annexure C)**

- Follow-up Air Sampling Survey – Anglo Platinum Limited: Tar Dam site (7 Sep 2011) – Anglo Platinum Limited: Tar Dam site *by* Margot Saner & Associates (MS&A) (Pty) Ltd **(See Annexure D)**
- The Status of Soil, Surface Water and Groundwater at the Tar Dam (August 2011) by Cleanstream **(See Annexure E)**
- Tar dam rehabilitation status report (September 2011) *by* Enviroserve **(See Annexure F)**

A decision has also been take to obtain the independent opinion of a toxicologist the end of 2011 to cover the following scope:

The scope of work is to evaluate the existing processes and approach with regards to environmental and human health impacts associated with the tar dams by:

- *Undertaking an Environmental risk assessment on the Air and Water analysis conducted,*
- *Undertaking an Human Health risk assessment on the Air and Water analysis conducted,*
- *Evaluate the potential exposure pathways and risks between the air and water,*

Based on point 1-3, as well as the understanding of the physical chemistry and the environmental fate, this should result in:

- *Advice on the potential exposure pathways during remediation by removal of the contents of the tars to a hazardous waste management facility,*
- *Advise on the remediation and rehabilitation process.*
- *If the tar comprises material that fall within the dangerous goods classification advice on whether any "dangerous goods" as contemplated in the South African National Standard 10234 are contained in the tar in sufficient quantities in order to determine whether further environmental authorisation is required to proceed with the removal.*

4. FINDINGS FROM SPECIALIST STUDIES

Emissions:

Baseline Ambient Air Quality Assessment (6 Sep 2011) – Anglo Platinum Limited: Tar Dam site by Margot Saner & Associates (MS&A) (Pty) Ltd (See Annexure C)

CONCLUSION / EXECUTIVE SUMMARY

The results obtained during this Baseline ambient air quality assessment conducted at the tar dam site adjacent to the Anglo Plats Medical Centre revealed that ambient concentrations of Benzene, Toluene, Ethylbenzene, Xylene, Trimethylbenzenes, Phenol, Ammonia, Cyanide and PAHs at all three of the sampling locations were well below the relevant South African Ambient Air Quality Standard (Benzene) and/or the equivalent UK Environmental Assessment Levels (UK EALs).

Ambient concentrations of Phenol and Ammonia downwind of the tar dams were marginally higher than those recorded at the upwind sampling location, suggesting that tar dam emissions contributed (marginally) to ambient concentrations of these contaminants.

Based on the results of this baseline study, the health risks associated with acute and/or chronic inhalation exposure to the measured ambient contaminant concentrations at the tar dam site, are minimal.

Follow-up Air Sampling Survey – Anglo Platinum Limited: Tar Dam site (7 Sep 2011) – Anglo Platinum Limited: Tar Dam site by Margot Saner & Associates (MS&A) (Pty) Ltd (See Annexure D)

CONCLUSION / EXECUTIVE SUMMARY

The outcome of the follow-up air sampling surveys conducted at the tar dam site adjacent to the Anglo Plats Medical Centre, revealed the following:

- Ambient concentrations of Benzene, Toluene, Ethylbenzene, Xylene, Trimethylbenzenes, Phenol, Cresol and Ammonia at both of the sampling locations were well below the relevant South African Ambient Air Quality Standard (Benzene) and/or the equivalent UK Environmental Assessment Levels (UK EALs).
- Worker exposure to airborne concentrations of Benzene, Toluene, Ethylbenzene, Xylene, Trimethylbenzenes, Phenol, Cresol and Ammonia was minimal during the survey period – i.e. all results were well below the relevant Occupational Exposure Limits (OELs).

Based on these results it is evident that:

• The health risks associated with acute and/or chronic inhalation exposure to the measured ambient contaminant concentrations at the tar dam site remain minimal.

• The health risks associated with worker inhalation exposure to priority contaminant concentrations at the tar dam site were low.

RECOMMENDATIONS:

Based on the results obtained during both the baseline air sampling survey (MS&A Project No 02626) and this follow-up study, the following recommendations are made:

- Additional follow-up air sampling (ambient and worker) must be conducted during full-scale excavation of the tar dams using excavator equipment (set to replace the 'Super-sucker'). This will allow for informed comment on the risks of worker / off-site receptor exposure to priority airborne contaminants under *worst-case conditions*. *(Note: this additional sampling was conducted on 30 August 2011 and results are awaited).*

- Pending completion of this additional air sampling it is recommended that all workers required to engage in any activities within the demarcated operational area, continue to be issued with the following Personal Protective Equipment (PPE):
  - Cotton overalls
  - Safety boots / Rubber gum boots
  - Tyvek oversuits
  - Safety goggles
  - Rubber gloves (elbow length)
  - Type ABEK1 half mask respirators

- Use of the above PPE must be enforced, with special priority being given to ensuring that workers make diligent use of hand protection (gloves) so as to prevent direct skin contact with the tar mixture as far as practicably possible. Despite the low risk of exposure to excessive airborne concentrations of contaminant compounds, use of respiratory protective equipment (RPE) by workers should be encouraged when engaged within the demarcated operational area and enforced whenever workers are actively engaged in actual tar removal activities. Additional comment in this regard will follow once the recommended follow-up air sampling has been completed and the results are available for interpretation.

- Workers must be fully informed about the health risks associated with exposure to the tar dam contents as well as the likely routes of exposure – particularly direct skin/eye contact.

- All workers must remain subject to appropriate medical surveillance protocols. The structure and frequency of these protocols should be at the discretion of the company Occupational Medical Practitioner (OMP). Both this report and MS&A Project No 02626 must be made available to the OMP.

Soil, Surface- and groundwater:

The Status of Soil, Surface Water and Groundwater at the Tar Dam (August 2011) by Cleanstream **(See Annexure E)**

CONCLUSION / EXECUTIVE SUMMARY

6.1 Surface water

Water in the tar dam

The organic and inorganic results from this study clearly indicate that the water in the **Klipfontein Tar Dam** is polluted. Pollutants identified in the water of the tar dam which exceeds guidelines for the protection of human health, and which could pose possible contamination of receiving ground and surface water environment include (drinking water guidelines shown in brackets):

• Aluminium	4.4 mg/l	(0.15 mg/l)
• Arsenic	0.063 mg/l	(0.010 mg/l)
• Chloride	1490 mg/l	(100 mg/l)
• Cyanide	2.24 mg/l	(0.20 mg/l)
• Fluoride	45.22 mg/l	(1.0 mg/l)
• Lead	0.021 mg/l	(0.020 mg/l)
• Manganese	5.07 mg/l	(0.40 mg/l)
• Mercury	0.21 mg/l	(0.006 mg/l)
• Nickel	0.91 mg/l	(0.15 mg/l)
• Selenium	0.031 mg/l	(0.010 mg/l)
• Sulphate	3790 mg/l	(400 mg/l)
• Benzene	0.051 mg/l	(0.010 mg/l)
• Phenol	500 mg/l	(4.0 mg/l)

Other constituents, that recorded above detection limits, but are within health based guidelines, or for which no health based guideline are available include (where available drinking water guidelines are shown in brackets):

• Ethylbenzne	0.0048 mg/l	(0.30 mg/l)
• Toluene	0.057 mg/l	(0.70 mg/l)
• o-xylene	0.013 mg/l	
• m,p, xylene	0.026 mg/l	
• Trimethylbenzene	0.016 mg/l	
• n-Butylbenzene	0.0048 mg/l	
• Cresols	370 mg/l	
• 2,4-Dimethylphenol	13.0 mg/l	
• 2,5-Dimethylphenol	4.3 mg/l	
• o-Ethylphenol	2.3 mg/l	
• m-Ethylphenol	13.0 mg/l	
• TPH (C10 – C40)	65.0 mg/l	

Significant impacts are related to (risks to human health at the concentration recorded are shown in brackets):

- Chloride (Medium)
- Sulphate (Medium)
- Cyanide (High)
- Mercury (High)
- Fluoride (High)
- Phenol (High)
- Cresols (High)
- Total petroleum hydrocarbons (High)

Surface water in adjacent streams

The Central Services Workshop effluent (**K083**) located upstream from the tar dam including NB12 and NB12A was included in this pollution assessment. Although K083 did not record any organic or inorganic constituents above health based guidelines, it did contain volatile oragnic hydrocarbons, mercury, chrysene, trichloromethane, phenol and TPH above detection limits (some of which no health based guidelines are available). Parameters and concentrations include (where available guidelines are shown in brackets):

- Mercury 0.00043 mg/l (0.001 mg/l)
- Benzene 0.0055 mg/l (0.010 mg/l)
- Ethylbenzene 0.0019 mg/l (0.30 mg/l)
- Toluene 0.013 mg/l (700 mg/l)
- o-xylene 0.0057 mg/l
- m,p, xylene 0.0054 mg/l
- Xylenes (sum) 0.011 mg/l (0.50 mg/l)
- Trimethylbenzene 0.0037 mg/l
- p-Isopropyltoluene 0.0008 mg/l
- Phenol 0.015 mg/l
- Chrysene 0.00026 mg/l
- Trichloromethane 0.0013 mg/l (0.30 mg/l)
- TPH (C10-C40) 19.0 mg/l

Significant impacts are related to risks to human health at the concentration recorded are shown in brackets):

- Total Petroleum Hydrocarbons

The organic and inorganic results for the Klipfontein Spruit, K110 and K058, situated downstream from K083 and upstream and downstream from the tar dam respectively, do not show any indication of impact from the the tar dam or the effluent from Central Services Workshop (K083).

Average TDS for the database period, as managed by Clean Stream Scientific Services relating to the routine RPM-RS monthly surface water monitoring programme, at K110 are 3361 mg/l and for K058 3463 mg/l. TDS in this section of the Klipfontein Spruit is a concern with the Resource Quality Objective (RQO) as per the Draft Water Use Licence (162/7/A220/C5) of 2007, set at 515 mg/l. Similarly, average NO_3 for the upstream locality K110 is 4% greater than for the downstream locality at K058. Average NO_3 for K110 is 56.3 mg N/l while for K058 it was calculated at 53.9 mg N/l. NO_3 also remain a concern with the bulk of the NO_3 is most probably introduced from the Klipfontein re-mining activities. The additional contributions at the downstream locality, K058, is most probably from other upstream sources, such as from Siphumelele 3 Mine or could be sewage related (Siyavuya informal settlement) as high *E.coli* is typically recorded for K058.

Significant impacts (non-tar dam related) are related to risks to human health at the concentration recorded are shown in brackets)::

- Salinity (medium)
- Nitrate (high)
- *E.coli* (high)

6.2 Groundwater

In terms of groundwater the Terratest results indicate tracers for both inorganic and organic constituents in the downstream groundwater regime as recorded at **NB12**.

Mercury (Hg) was recorded for NB12 downstream from the tar dam and K083 at a concentration of 0.000092 mg/l. Mercury (Hg) was also recorded for the tar dam and **K083** with concentrations of 0.210 mg/l and 0.00043 mg/l. Although the Hg concentration is well within the health based guideline of 0.006 mg/l, it is nevertheless significant, because no Hg has been recorded above detection limits for the other surface or groundwater localities. This could be indicative of leachate from the tar dam or seepage from K083 into the downstream groundwater regime.

No cyanide was recorded in any of the groundwater localities sampled.

Organic constituents recorded for NB12 above detection limits include (where available human health guidelines are shown in brackets):

- Benzene 0.0004 mg/l (0.010 mg/l)
- Ethylbenzene 0.01 mg/l (0.30 mg/l)
- Phenol 1.8 mg/l (4.0 mg/l)

- Cresols 4.1 mg/l
- TPH (C10 – C40) 0.20 mg/l

In terms of organic parameters, the less dense benzene and ethylbenzene, and equally dense phenols and cresols were identified as tracers in both the tar dam and downstream groundwater as recorded at borehole NB12. The total petroleum hydrocarbons (TPH) in borehole NB12 also recorded mostly in the lighter C10-C31 ranges. All of the above constituents, except for the cresols were also recorded for the Central Services Workshop (K083). These compounds, generally known as light-non-aqueous-phase-liquids (LNAPLs), will generally spread across the surface of the water table and form a layer on top of the water table. Soluble components will follow the direction of groundwater movement creating a typical pollution plume.

The potable water quality guideline for phenol is set at 4.0 mg/l with the concentration in NB12 recording significantly less at 1.8 mg/l. No drinking water quality guidelines exist for cresols or total TPH compounds but are regarded as toxic. Therefore, although the health risks at NB12 in terms of the organic tracers and available guidelines remain low, leachate from the tar dam and / or seepage from K083 are the most probable sources for the organic constituents.

The phenol concentration for NB12, recorded at 1.8 mg/l, is significantly greater than the concentration at K083 – 0.015 mg/l. Because a pollution plume decreases in concentration away from the source, K083 may contribute to the pollution but cannot be solely responsible. Furthermore, it is significant that cresols of 4.1 mg/l and 370 mg/l were recorded for NB12 and the tar dam, respectively, but was not detected for K083. *However, some phenols may be formed as a result of natural processes like the formation of phenol and p-cresol during decomposition of organic matter (Swarts et. al., 1998). Decomposed organic matter was noted to be present at NB12 during time of sampling as a result of the borehole being uncapped.*

A significant impact on the downgradient groundwater regime relative to the tar dam was calculated in terms of salinity, mostly contributed by chloride, bicarbonate, calcium, magnesium, sodium, potassium and saline ammonia (NH_4^+). Other parameters increasing significantly from NB12A (upstream) towards NB12 (downstream) include phosphate, iron and manganese.

Of significance is the increase in salinity, alkalinity and saline ammonia in NB12 (downstream) relative to NB12A (upstream). EC increased more than double to values exceeding acceptable drinking water standards as proposed by the DWA (DWAF, 1998). An EC increase from 63.2 mS/m to 158.8 mS/m was recorded with acceptable maximum ranges set at 70 mS/m. An alkalinity increase of 544.4 mg/l was recorded at NB12 relative to NB12A with concentrations of 742.7 mg/l and 198.3 mg/l recorded respectively. Although no drinking water guideline exist for alkalinity, this should nevertheless be seen as significant since a very high alkalinity concentration of 3483 mg/l was recorded for the tar dam.

A saline ammonia increase of 38.78 mg N/l was recorded at NB12 relative to NB12A with respective concentrations of 44.22 mg N/l and 5.44 mg N/l. No health based guideline exists for saline ammonia. It is significant to note that the tar dam did not record high saline ammonia or nitrate (both as N) which may indicate contamination from other sources. Other sources may include historic sewage pollution and organic matter degradation (borehole is uncapped and could result as a trap for small mammals and reptiles). Frequent theft of borehole caps is a concern at RPM-RS. Current measures of securing the caps are by Allen keys but new more effective measures should be revised.

The significant PO_4-P concentration at NB12 relative to NB12A are cause for concern. An increase of 2.92 mg P/l was recorded downstream from NB12A (0.98 mg P/l) towards NB12 (3.90 mg P/l). High PO_4 of 38.5 mg P/l was recorded for the tar dam with K083 averaging at 8.1 mg P/l for the database period. Leachate from the tar and / or seepage from K083 could be responsible for the increase in PO_4 concentrations although P from organic matter degradation is also highly probable. In addition, seepage from water at K083 into the subsurface may follow a preferential pathway to NB12 which may be why a similar distribution is not noted for NB12A. However, a specialist geohydrological investigation should confirm this.

Significant impacts are related to:

- Phenols (Low)
- Cresols (Low)
- Mercury (Low)

6.3 Soil

Metals recorded for soil-1 which exceeds soil quality guidelines for the protection of human health are Cr (500 mg/kg) and Ni (160 mg/kg). Guidelines set for Cr and Ni are 64 mg/kg and 50 mg/kg, respectively.

A wide range of phenolic compounds were recorded above detection limits in **soil-1** but only phenol and cresols (sum) have established health based guidelines of 0.33 mg/kg and 0.40 mg/kg, respectively. Phenol recorded a concentration of 3.44 mg/kg and the sum of cresols 22.0 mg/kg both of which significantly exceed the health based guidelines.

The health based guideline for the sum of PAH of 9.0 mg/kg is significantly exceeded in **soil-1** with a concentration of 450 mg/kg. Similarly, the health based guideline for the sum of TPH, 250 mg/kg are more than 165 times greater in soil-1 with a concentration of 42 000 mg/kg.

Other constituents which exceed soil quality health based guidelines in **soil-1** are the volatile chlorinated hydrocarbon monochlorophenol which at 1.1 mg/kg exceed the guideline set at 0.06 mg/kg.

Chromium (Cr) and benzene recorded concentrations of 86 mg/kg and 1.0 mg/kg in **soil-2** which are significantly greater compared to their respective guidelines of 64 mg/kg and 0.0095 mg/kg, respectively. A wide range of PAH and TPH constituents were recorded for soil-2 but with only guidelines available for the sum of total constituents recorded. The sum of PAH calculated for soil-1 are 4.5 mg/kg which is well within the health based guideline of 9.0 mg/kg. However, the sum of TPH constituents calculated to 720 mg/kg which is significantly greater than the health based guideline of 250 mg/kg. The organic chlorinated compound a-chlordan recorded a concentration of 0.003 mg/kg which is significantly greater than the health based guideline of 0.0004 mg/kg for the sum of chlordans. Chlordan was mostly used as a pesticide in the United States but due to the human and environmental concerns it was banned by the Environmental Protection Agency (EPA) in 1988.

Significant impacts are related to:

- Chromium
- Nickel
- Phenols
- Cresols
- Polycyclic aromatic hydrocarbons
- Total Petroleum Hydrocarbons

RECOMMENDATIONS

Based only on the results presented in this study it is clear that the Klipfontein Tar Dam are impacting on the downstream groundwater regime in terms of salinity and organic compounds. However other contributing sources, specifically related to nutrient enrichment, such as the effluent from the Central Services Workshop (K083) and / or organic matter decomposition, should not be excluded. Since the tracers identified in NB12 are below available drinking water standards for the protection of human health, no immediate risk remain towards the receiving surface or groundwater environment in terms of human health. However for many of the constituents which recorded above detection limits, no health based guidelines are available and it is therefore difficult to assign a human health risk towards it. The concentrations recorded at the possible sources (Klipfontein Tar Dam and effluent from General Services Workshop – K083) remain medium to high with some variables exceeding human health guidelines. ***It is therefore recommended that these probable sources of contamination, the tar dam and K083, be removed and that specialist soil and hydrogeological investigations follow this pollution status report to evaluate the radius and / or depth of influence of contamination.***

Groundwater pump-and-treat systems are probably the most common remediation option for addressing contaminated aquifers. This technology pumps groundwater out of contaminated zones to remove dissolved contaminants and, if present, to slowly dissolve any trapped NAPLs. The pumped water is then treated on the surface to remove or destroy the dissolved

contaminants. However, the first option in remediation should always be source removal if possible (EPA, 1990). The residual NAPL that remains trapped in the soil matrix acts as a continuing source of dissolved contaminants to ground water, and effectively prevents the restoration of NAPL-affected aquifers for many years. The soil in this instance should therefore also be seen as a source and if possible, all polluted fractions should be removed by excavation.

Ongoing monitoring of the groundwater and soil, preferably stratified sampling in the case of soil, should be performed to assess the extent of and / or depth of pollution which should be extended until after source removal.

It is recommended that the borehole at NB12 be purged to remove all stagnant water and be re-tested for nutrients which could have been contaminated by organic matter. This will define the source of the high nutrients (N, P) recorded for NB12 more clearly, whether it be from organic matter degradation or indeed contamination by upstream sources.

5. REHABILITATION AND DECOMMISIONING

Based on the experience gain by Enviroserve in 2003 when they removed the tar in dan D and the fact that they have access to the H:H Landfill site at Holfontein, they were sub contracted by Anglo American Platinum to removed the tar in the remaining tar dams to Holfontein. A quotation of R21.2m was approved and the removal of the tar from the dams started at the beginning of September 2011. The intent is to have all tar removed before end of 2011.

A quote was also obtained from WSP to undertaking an environmental authorisation in the form of a Basic Assessment (BA) process in order to obtain a waste license for the proposed project in accordance with the National Environmental Management Act (No. 107 of 1998), as amended (NEMA) and the National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA). Due to the fact that the project will handle hazardous waste, the Department of Environmental Affairs (DEA) will be responsible for granting the waste license.

This quote is currently be amended to include decommissioning as a listed activity under the NEMA EIA Regulations 2010 for various decommissioning activities. These include the decommissioning of "*existing facilities or infrastructure, for ... activities where the land on which it is located is contaminated ... [or] storage, or storage and handling of dangerous goods or more than 80 cubic metres*".

Other key legal decisions were:

- The existence of the dams pre-dated the Environment Conservation Act ("ECA"). The tar dams fell within the exclusion of matters regarded as waste for purposes of the ECA and consequently no section 20 permit was required when the ECA commenced. Despite various changes in legislation governing mining activities, the exclusion continued to apply until 1 July 2009 when section 20 of the ECA was repealed and the Waste Act came into force.
- The dams are not registered under the National Water Act and are also not licensed under that Act. However, disposing of waste in a manner which may detrimentally impact on a water resource is the continuation of an existing lawful use for which no water use licence is required.
- Further investigation of the quality of the groundwater and the removal of the source of the pollution and the remediation of the area in which it is stored would fall within the ambit of "reasonable measures" as contemplated in NEMA. A similar duty exists under the NWA. Since the external legal opinion was prepared, the groundwater has been investigated and ambient air quality studies have been conducted. A toxicologist is to be appointed. This again, would represent compliance with the duty of care.

6. WAY FORWARD

The following actions will be implemented:

Immediate – 31 Dec 2011:

- Continue with removal of tar from dams (due end of Dec 2011)
- Continue with emission monitoring (monthly)
- Continue with water monitoring (monthly)
- Amend WSP quote and initiate order to apply for authorization (October)
- Obtain quotations for toxicologist and initiate order (October)
- Once authorization obtained, Initiate decommissioning and rehabilitation (November-December)
- Upgrade ground water monitoring e.g. boreholes, based on outcome of Basic Assessment (November-December)

2012 and beyond:

- Continue with monitoring programme (until closure)

UNITED BY OUR DIFFERENCE

WSP

THE PROPOSED DECOMMISSIONING AND REMEDIATION OF THE TAR DAMS AT RUSTENBURG PLATINUM MINES

Environmental Management Programme

2012/05/17

Revised: 2012/05/17

Confidentiality: Public

Quality Management

Issue/revision	Issue 1	Revision 1	Revision 2	Revision 3
Remarks	Draft			
Date	17/05/2012			
Prepared by	Jared O'Brien			
Signature				
Checked by	Janna Bedford-Owen			
Signature				
Authorised by	Brent Holme			
Signature				
Project number	23164			
Report number	Draft EMP			
File reference	23164/Tar Dams/Reports			

THE PROPOSED DECOMMISSIONING AND REMEDIATION OF THE TAR DAMS AT RUSTENBURG PLATINUM MINES

Environmental Management Programme

2012/05/17

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1 Background

1.1 Introduction and Project Location

Rustenburg Platinum Mines Limited (RPM) has four existing Tar Dam footprints within their mine lease area near Rustenburg, North West Province. The Tar Dam footprints contained legacy residues that were generated from the gas fired smelter at Klipfontein, which existed more than 60 years ago. The tar residue from the smelter was stored in four separate clay-lined, soil compartments. Each Tar Dam footprint is approximately 1600m^2 in size and contained an estimated 3200m^3 of tar residue. Tar Dam footprints A and B (referred to as the Bleskop Tar Dams) are located between the Bleskop Stadium and the RPM Hospital, while Tar Dam footprints C and D are located north of the Klipfontein Concentrator, adjacent to the road to TEMSO (Figure 1, 2 and 3 below). Table 1 outlines the relevant project location for both Tar Dams.

Table 1: Locations of the Tar Dams

Tar Dam footprint	Located	Province	Co-ordinates
Tar Dam footprints A and B	Located between the Bleskop Stadium and the RPM Hospital.	North West	25°41'51.01"S; 27°21'31.26"E
Tar Dam footprints C and D	Located north of the Klipfontein Concentrator, adjacent to the road to TEMSO.	North West	25°41'55.61"S; 27°22'05.32"E

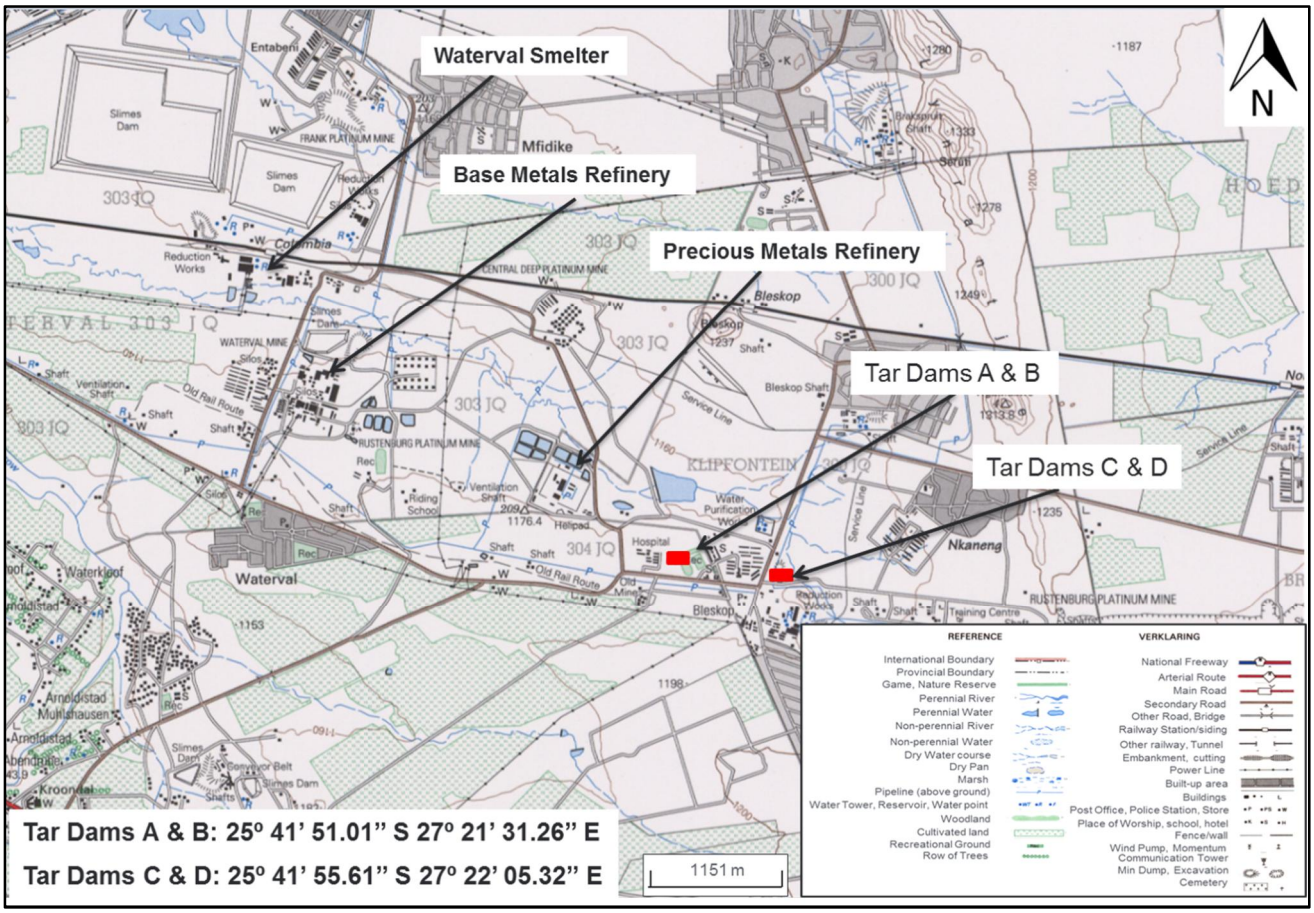

Figure 1: Topographical Map indicating Tar Dam Locations

Figure 2: Aerial Image illustrating Tar Dams A and B (Source: Google Earth, 2012)

Figure 3: Aerial Image illustrating Tar Dams C and C (Source: Google Earth, 2012)

It was noted that the Tar Dams posed an environmental, health and safety risk and as a result, the tar residues were removed by an independent waste contractor to a permitted hazardous waste landfill site (Holfontein). Subsequent remediation of the underlying and surrounding contaminated soil is required. It is proposed that the contaminated soil be screened in order to separate the soil from the heavy fractioned tar residues. Following successful remediation, the voids being backfilled, levelled and shaped with topsoil and grassed with indigenous self-sustaining grasses. Furthermore, as part of the project, the facilities (Tar Dams) will also be decommissioned.

1.2 Project Motivation

It has been noted that the Tar Dams created a visual disturbance, as well as a potential health, safety and biophysical hazard on the surrounding environment, and have been removed. In order to ensure best practice and legal compliance, RPM has appointed WSP to undertake the necessary environmental authorisation required for the remediation and decommissioning project in accordance with the National Environmental Management Act (No. 107 of 1998) (NEMA) and the National Environmental Management Waste Act (No. 59 of 2008) (NEMWA). Please note that the tar residues and contaminated undercut (soil) have already been removed from the sites as this was deemed a 'reasonable measure' under Section 28 of the NEMA (Duty of Care).

WSP undertook an environmental authorisation process in order to assess the potential environmental and socio-economic impacts originating from the tar dams project. The environmental management programme (EMP) document contains the management and mitigation measures that are to be followed in remediating and rehabilitating the site to ensure associated impacts are minimised.

The project will alleviate the potential environmental, health and safety risks associated with the Tar Dams. The remediation of the contaminated stockpile onsite will ensure that potential surface water, groundwater, air, and soil contamination will not occur in the future, thus improving the land use potential. Reduced environmental risks and improved land use opportunities will be made as a result of the project. It is anticipated that the remediation activity will also set the precedent for similar environmental remediation activities in the area.

1.3 Terms of Reference

The NEMA is South Africa's overarching environmental legislation and refers to Environmental Impact Assessment (EIA) Regulations of 2010, which contain listed activities that require environmental authorisation. Government Notice Regulation (GNR) 544 of 2010 list specific activities that require an environmental authorisation in the form of a basic assessment (BA) process (outlined in GNR.543 of 2010). The project triggers the following activity contain in NEMA:

- GNR.544 of 2010, Activity 27:
  - The decommissioning of existing activities or infrastructure for (iv) activities where the facility is located or the land on which it is located is contaminated.

Furthermore, the NEMWA also contains a number of waste management activities that require environmental authorisation prior to being granted a waste management license. The following activity is noted as relevant for the project:

- GNR.718 of 2010, Category B Activity 12:
  - The remediation of contaminated land.

Although it has been identified that the remediation activities associated with the Tar Dams can be defined as 'reasonable measures' under Section 28 of the NEMA, the authorisation process is being undertaken to ensure compliance with best practice and South African legislation. It has been noted that authorisation to decommission the facility will need to be obtained from the North West Department of Economic Development, Environment, Conservation and Tourism (NWDEDECT) and authorisation to undertake the remediation of the contaminated soil stockpiles from the Department of Environmental Affairs (DEA). The following was undertaken as part of the BA process:

- Compilation and submission of a waste management license form to DEA;
- Compilation and submission of an application to undertake environmental authorisation to the NWDEDECT;
- Transparent and comprehensive stakeholder engagement process, including the distribution of stakeholder notification material, public meeting and an authorities meeting;
- Geo-environmental assessment of the tar dam area;
- Compilation of a BA report and accompanying documentation;
- Compilation of a draft EMP;
- Public and state department review of the relevant documentation associated with the project; and
- Soil screening exercise, where the tar residues will be separated from the contaminated soil and disposed of. The soil will undergo analysis to identify the effectiveness of the remediation activity.

A BA process has been undertaken and environmental and socio-economic impacts have been identified and assessed in order to identify significant impacts associated with the project.

It is expected that the contractor be conversant with all legislation pertaining to the environment, including provisional and local government ordinances, which may be applicable to the contract. Some of the environmental legislation application to the project include, but are not limited to, the following:

- The South African Constitution (No. 108 of 1996);
- NEMA;
- NEM:WA
- National Water Act (No. 36 of 1998);
- The National Heritage Resources Act (No. 25 of 1999);
- National Environmental Management: Biodiversity Act (No. 10 of 2004);
- National Environmental Management: Air Quality Management Act (No. 39 of 2004); and
- Hazardous Substances Act (No. 15 of 1973).

1.4 Project Proponent/ Applicant

RPM appointed WSP to undertake the BA process in accordance with the NEMA. The relevant details of the proponent (RPM) and applicant are as follows:

Table 2: Project Applicant

Project Applicant	Rustenburg Platinum Mine
Contact Person	Andre Britz
Postal Address	Anglo Platinum Limited, Central Services, Klipfontein Main Offices, Bleskop Road, Rustenburg, 0300.
Telephone Number	+27 014 598 1109
Fax Number	+27 014 598 1153
Email	andre.britz@angloamerican.com

1.5 Independent Environmental Assessment Practitioner

WSP were appointed by RPM to undertake the function of an independent environmental assessment practitioner (EAP) to facilitate the BA process. WSP is a leading international environmental consultancy with a broad range of expertise in the environmental industry. WSP is a subsidiary of WSP Group plc, a global consultancy which is listed on the London Stock Exchange. WSP has successfully project managed a number of high profile environmental projects in South Africa over the past 20 years.

Table 3: Independent Environmental Assessment Practitioner

Environmental Assessment Practitioner	WSP Environment and Energy
Contact Person	Brent Holme/ Jared O'Brien
Postal Address	P O Box 5384,

Environmental Assessment Practitioner	WSP Environment and Energy
	Rivonia, 2128, South Africa.
Telephone Number	+27 011 361 1389/ +27 011 361 1396
Fax Number	+27 086 532 8685/ +27 086 505 3939
Email	brent.holme@wspgroup.co.za/ jared.obrien@wspgroup.co.za

1.6 Methodology Applied to the draft EMP Process

The draft EMP provides the actions for the management of potential environmental impacts associated with the Tar Dams project, as identified and recorded in the BA report. The EMP will provide a detailed outline of the implementation programme to minimise and/or eliminate the anticipated negative environmental impacts and enhance the positive impacts associated with the project. The draft EMP will provide strategies to be used to address the roles and responsibilities of environmental management personnel onsite, as well as a framework for environmental compliance and monitoring.

This draft EMP, which forms an integral part of the contract documents, informs the contractor as to his/ her duties in the fulfilment of the project objectives with particular reference to the prevention and mitigation of environmental impacts caused by activities associated with the project. The contractor should note that obligations imposed by the EMP are binding in terms of the conditions of the contract that pertain to the project.

This draft EMP has been compiled for the decommissioning, remediation and rehabilitation phases of the Tar Dams project. The draft EMP includes the following:

- Details and expertise of the person who prepared the draft EMP;
- Information on proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in the BA report, including environmental impacts or objectives in respect of all project phases;
- A description of the aspects of the activity that are covered by the draft EMP;
- An identification of the persons who will be responsible for the implementation of the mitigation measures;
- Proposed mechanisms for monitoring compliance with the draft EMP and reporting thereto;
- Measures to rehabilitate the environment affected by the proposed project (as far as possible);
- Timeframes for which the proposed mitigation measures should be implemented;
- The process for managing any environmental damage associated with the proposed project; and
- An environmental awareness plan.

The draft EMP has been compiled in conjunction with the BA report and will be submitted to DEA as an appendix to the BAR. The draft EMP has been developed in accordance with minimum legal requirements of Section 33 of the NEMA.

2 Environmental Management Programme

2.1 Objectives of the draft EMP

The draft EMP has been developed under the requirements of the NEMA EIA Regulations to ensure that RPM adopts a sound environmental management approach during the remediation and rehabilitation of the Tar Dam project, and also provides a framework for environmental monitoring throughout the project activities. The EMP includes management and mitigation measures to be implemented during the remediation, rehabilitation and decommissioning phases and defines the roles and responsibilities of personnel involved in the EMP implementation.

The objectives of the EMP are to:

- Encourage good management practices through planning and commitment to environmental issues;
- Reduce or mitigate environmental impacts and risk associated with the decommissioning anf remediation activities;
- Define how the management of the environment is reported and performance evaluated;
- Provide rational and practical environmental guidelines to:
  - Minimise disturbance of the natural environment;
  - Minimise disturbance on the local social and economic environs;
  - Ensure water and water resource protection;
  - Prevent or minimise all forms of pollution;
  - Protect indigenous flora and fauna; and
  - Prevent soil erosion and facilitate revegetation of affected areas;
- Comply with all applicable laws, regulations, standards and guidelines for the protection of the environment;
- Develop waste management practices based on prevention, minimisation, recycling, treatment or disposal of waste;
- Provide a monitoring and auditing framework from which to identify impacts on the environment and measure the effectiveness of management and mitigation measures; and
- Train employees and contractor/s with regards to their environmental obligations.

2.2 Definition of Roles and Responsibilities

The draft EMP is to be implemented by RPM to ensure compliance for the day-to-day activities associated with the project. The provisions of this draft EMP are binding on RPM during the life of the project. The draft EMP is to be read in conjunction with all the documentation that comprises the suite of documents for this project and the project's environmental authorisation process. Relevant personnel referred to in the draft EMP are defined in Table 4 below.

Table 4: Roles and Responsibilities

Designation	Contact Person	Role
RPM	The RPM land manager or an individual appointed by RPM.	RPM is ultimately responsible for the remediation, rehabilitation and decommissioning operations onsite.

Designation	Contact Person	Role
Designated Environmental Officer	Preferably a member of the site personnel or contractor's staff.	Daily implementation of the EMP and record keeping. The DEO will be responsible for weekly reporting to the contractor, Safety Officer and the ECO during site audits.
Environmental Control Officer	Preferably a member of RPM that will ensure ongoing compliance to the commitments contained in the EMP.	Daily implementation of the EMP and record keeping. The DEO will be responsible for weekly reporting to the contractor, safety officer and relevant personnel at RPM.
Contractor	As appointed by RPM.	The contractor will be responsible for liaising with DEO during audits, as well as ensuring the EMP is being adhered to. The contractor will report to RPM directly.
Employee	As appointed by the Contractor.	The employees will need to be made aware of the commitments contained in this draft EMP and ensure compliance thereof.

2.3 Structure of the draft EMP

The draft EMP contains recommended mitigation measures in order to ensure that the Tar Dams project is undertaken in a sustainable manner, minimising the potential impacts on the socio-economic and biophysical environment. Aspects that comprise the structure of the draft EMP have been address in Table 5 below.

Table 5: Structure of the draft EMP

Section	Description
Impact	Indicates what the potential impact associated with the activity is on the environment.
Mitigation Measure	The recommended management actions required to either prevent and/ or minimise the potential impact on the environment.
Environment	Indicates what aspect of the environment the impact/ mitigation measures are referring to.
Project Phase	Refers to the project phase in which the management measure should be implemented.
Responsibility	Recommends the relevant personnel responsible for either ensuring the management measure is implemented, or ensuring the compliance to the recommended management measure contained in the draft EMP.

3 Environmental Management Programme for the Tar Dams Project

Ref	Impact	Mitigation Measure	Environment																		Project Phase			Responsibility			
			Topography	Geology	Soil	Land use	Land capability	Air	Surface water	Groundwater	Fauna	Flora	Noise	Visual aspect	Waste Management	Traffic	Cultural & Heritage	Health & Safety	Employment	Climate	Decommissioning	Remediation	Rehabilitation	DEO	Contractor	RPM	Employees
1	The disturbance of the contaminated soil and pathway exposure to the underlying soil layer, thereby causing potential impacts to soils, surface water, groundwater, flora and fauna, etc.	Following the geo-environmental assessment, it was noted that the dams are lined with a clay liner and underlain with norite. No anticipated exposure is expected.			X	X	X		X	X	X	X										X	X	X	X	X	X	
2	The removal of vegetation may lead to the erosion of the soil directly adjacent to the Tar Dams.	As little vegetation as possible should be removed from the site in order to reduce erosion and reduce the impact on vegetation.			X	X	X		X	X	X	X										X	X	X	X	X	X	
3	Potential contamination to soil, surface water, groundwater, and the surrounding environment due to potential leakages and spillages, of the tar residue and hydrocarbons, during remediation activities.	When undergoing the soil screening exercise, impermeable plastic sheeting should be placed under the screen in order to ensure no additional soil becomes contaminated with tar residues. Tar residues separated from the screening process should be stored in an impermeable receptacle. The receptacle is to be collected and disposed of as hazardous waste.			X	X	X		X	X	X	X			X							X		X	X			
		Develop an emergency response plan detailing actions to be undertaken for potential contaminated soil spills onsite or in the case of a truck accident en-route to the registered landfill site.			X	X	X		X	X	X	X			X			X				X		X	X	X		
		Contractors and employees should be informed (via site induction training) that dumping of the hazardous waste material may not take place onsite or along the route used to transport the material to the hazardous waste disposal site.			X	X	X		X	X	X	X			X			X				X		X	X			
4	Potential hydrocarbon spillages from equipment, machinery and vehicle storage may lead to contamination of the soil in and around the site.	Equipment, machinery and vehicles should be serviced regularly at an offsite location, and daily inspections should be conducted to ensure that the equipment, vehicles and machinery are performing at optimum performance standards and to ensure that there are no leakages of vehicle fuel/ oil tanks.			X	X	X		X	X	X	X										X	X		X	X		
5	The remediation of contaminated soil and backfilling with clean soil.	Prior to infilling, ensure soil in the surrounding area is uncontaminated (included in WSPs remediation assessment).			x	x	x		X	X	X	X						X	X			X		X	X	X		

Ref	Impact	Mitigation Measure	Environment																		Project Phase			Responsibility			
			Topography	Geology	Soil	Land use	Land capability	Air	Surface water	Groundwater	Fauna	Flora	Noise	Visual aspect	Waste Management	Traffic	Cultural & Heritage	Health & Safety	Employment	Climate	Decommissioning	Remediation	Rehabilitation	DEO	Contractor	RPM	Employees
6	The remediation of contaminated soil.	Contaminated soil is to be screened during clear, hot days. It is understood that when the tar residues are tepid, the residue will become viscous and will not pass through the soil screen. Tar residues are to be stored in an impermeable receptacle and disposed of as hazardous waste. The resulting soil is to be analysed for contamination before being stockpiled, tilled and/ or supplemented with an environmentally friendly bio-remediation agent.			X	X	X		X	X	X	X										X		X			
7	Generation of fumes from equipment, machinery and vehicle emissions and the burning of waste onsite.	All vehicles and machinery onsite should be maintained to ensure that emissions being created are not in excess of the manufacturer's specifications of exhaust CO_2 output.						X			X			X				X		X	X	X	X		X	X	X
		No burning of waste should be permitted onsite.						X						X	X			X		X	X	X	X	X	X		
8	Generation of dust by vehicles, equipment and machinery operating onsite.	Tarpaulins should be used to cover material being removed from site to prevent the production of airborne contaminated dust material.						X	X					X				X		X	X	X	X		X		X
		If the access roads are dry, then the roads should be sprayed with clean water (or a dust suppressant chemical) to prevent dust production.			X			X						X				X		X	X	X		X	X		X
9	The contaminated soil may be disturbed during the excavation and screening of polluted undercut and may lead to the potential release of contaminants (PAHs, volatile substances, Phenol, etc.) into the air as a result.	All employees undertaking the remediation activities are to be supplied with personal protective equipment (dust masks, eye protection, etc.). Screening should not be undertaken during windy conditions.			X			X			X				X			X		X	X			X	X	X	
10	The fauna in and around the site may be disturbed as a result of noise levels created during remediation activities.	The vehicles and machinery utilised onsite should be fitted with silencer devices.									X		X									X	X	X	X	X	
11	Fauna naturally occurring in the area may be harmed should they fall into the empty Tar Dam pit during remediation and decommissioning works.	A temporary fence should be erected around the perimeter of the site and it should be ensured that no fauna species remain within the site boundary.									X							X				X		X	X	X	
12	Fauna occurring naturally in the area may be harmed by hunting or poaching.	A site induction presentation should be given to site remediation workers, which states that the hunting or poaching of animals is strictly forbidden.									X							X				X	X	X	X	X	
13	The risks associated with the Tar Dams being remediated and removed.	Remediation and decommissioning activities should only be conducted during daylight hours.									X						X	X			X	X	X	X	X		

Ref	Impact	Mitigation Measure	Environment																		Project Phase			Responsibility			
			Topography	Geology	Soil	Land use	Land capability	Air	Surface water	Groundwater	Fauna	Flora	Noise	Visual aspect	Waste Management	Traffic	Cultural & Heritage	Health & Safety	Employment	Climate	Decommissioning	Remediation	Rehabilitation	DEO	Contractor	RPM	Employees
14	Flora around the Tar Dams may be removed in order to assess the underlying contaminated soil.	Only remove vegetation if considered absolutely necessary.			X	X	X		X			X		X								X		X	X		X
15	The movement of vehicles may lead to the destruction of vegetation around the Tar Dams.	Vehicles should only drive in permitted areas (the site plan should indicate the access route/ plan).				X					X	X				X		X				X	X	X	X		X
		The land area used for road access should be kept to a minimum.			X	X	X						X	X								X	X	X	X		
16	Impacts on flora will be eradicated with the removal of the contaminated soil.	If any alien plant species are discovered onsite they are to be removed and disposed of offsite.			X	X	X					X										X	X	X	X		X
17	Exotic Plant species may be introduced by contractors during the rehabilitation of the site.	No exotic species may be used for rehabilitation purposes.			X							X											X	X		X		
18	The contaminated soil waste, if stored inadequately, may lead to the contamination of the surrounding environment.	According to the geo-environmental assessment, the contaminants associated with the tar dams have been contained within the clay liner and due to the characteristics of the underlying norite, no contamination of the surrounding environment is anticipated.			X	X	X		X	X	X	X			X			X					X	X	X		
		A spill kit should be available at all times during the remediation activities. Spills/ leakages of hydrocarbons from vehicles, equipment and machinery, as well as spillages of tar residues are to be cleaned up and disposed of as hazardous waste.			X	X	X		X	X					X			X				X		X	X		X
19	The general waste created by onsite workers may cause pollution in the form of litter.	There should be an adequate number of general waste receptacles onsite at any given time during remediation and rehabilitation.			X	X	X								X			X						X			X
		Central services should organise the collection and removal of waste receptacles when full.													X	X		X				X	X	X		X	
		Signage prohibiting littering and burning of waste onsite should be erected at strategic points around the site.													X			X				X	X	X	X		
20	The disposable materials used onsite, which come into contact with any hazardous substance, may cause pollution to the surrounding environment.	Ensure that only general waste is disposed of in general waste receptacles. No hazardous waste may be disposed of as general waste. If the general waste comes into contact with hazardous waste, all the waste should be disposed of as hazardous waste.													X			X				X		X	X		X
		Personal Protective Equipment (PPE) used onsite should be disposed of as hazardous waste.													X			X				X		X	X		X

Ref	Impact	Mitigation Measure	Environment																	Project Phase			Responsibility			
			Topography	Geology	Soil	Land use	Land capability	Air	Surface water	Groundwater	Fauna	Flora	Noise	Visual aspect	Waste Management	Traffic	Cultural & Heritage	Health & Safety	Employment	Climate	Decommissioning	Remediation	Rehabilitation	DEO	Contractor	RPM	Employees
		An adequate number of hazardous waste wheelie bins should be placed onsite.												X	X							X	X	X	X		
21	Potential hydrocarbon leakages from machinery, equipment and vehicles operating onsite.	Vehicles should be inspected on a daily basis.			X	X	X	X	X	X	X	X	X							X		X	X		X		X
		A spill response plan should be kept onsite at all times.			X	X	X	X	X	X	X	X		X	X			X				X		X	X		
		No fuel storage should be permitted onsite.			X	X	X	X	X	X	X	X			X			X			X	X	X		X		
22	The disposal trucks leaving the site at regular intervals may have an impact on traffic flow.	Trucks leaving the site should be scheduled at intervals and not more than two trucks should be allowed to leave the site at any given time.														X		X				X	X	X	X		X
23	The leakage of if hydrocarbon materials from the vehicles may result in the contamination of land en-route to the landfill site.	The vehicle to be used for transportation of tar residue should be fitted with a spill kit.			X	X	X	X	X	X	X	X			X							X		X	X		
		A spill response plan should be kept onsite at all times			X	X	X	X	X	X	X	X		X	X			X				X		X	X		
		Ensure that all vehicles transporting the hazardous material conform to SANS 10228. Vehicles are to have appropriate signage providing accurate information about the nature and properties of the load.														X		X			X	X			X	X	
24	The nearby graves (+/- 37m north of the Blesbok Tar Dams) may be disturbed by the movement of remediation workers, equipment, machinery, and vehicles.	The site should be demarcated to prevent employees from entering the graveyard site.															X				X	X	X	X	X	X	
		Signs prohibiting access onto the graveyard should be erected between the excavation site and the graveyard.															X				X	X	X	X		X	
		Awareness training should be provided to employees indicating that the graveyard adjacent to the contaminated site may not be entered unless authorised by management.															X				X	X	X	X	X	X	
25	Illnesses may be introduced to the surrounding areas by the contractors.	Due to the short timeframe and limited number of contractors required for the remediation activity, existing RPM standards and procedures should be complied with regarding employment and contractor safety.																X			X	X	X			X	
26	Contractors may be injured onsite, if the appropriate safety measures are not in place.	PPE should be worn onsite at all times (hard hat, dust mask, steel tip boots, gloves, eye protection, ear plugs when required, high visibility vests and an overall).																X				X		X	X		X
		A safety induction presentation should be undertaken by the employees before entering the site.																X				X	X	X	X	X	X
		Halt remediation work during heavy rain and strong windy conditions.			X													X				X	X	X	X		

Ref	Impact	Mitigation Measure	Environment																	Project Phase			Responsibility			
			Topography	Geology	Soil	Land use	Land capability	Air	Surface water	Groundwater	Fauna	Flora	Noise	Visual aspect	Waste Management	Traffic	Cultural & Heritage	Health & Safety	Employment	Climate	Decommissioning	Remediation	Rehabilitation	DEO	Contractor	RPM	Employees
		Toolbox talks should be held prior to each working day.													X			X				X		X	X		
		Ensure a person qualified in first aid is available throughout the remediation activities and retain a first aid kit onsite.																X				X		X	X		
27	The remediation workers will be exposed to the contaminated soil which may have health implications, such as respiratory difficulties.	Ensure that employees are wearing appropriate respiratory protection.																X				X		X	X		X
28	A fire event onsite may lead to serious injury.	Ensure a person qualified in fire fighting is available throughout the remediation activities.																X				X	X	X	X	X	
		Ensure that fire extinguishers are available at all times at strategic locations on the site during remedial works.																X				X	X	X		X	
	The release of airborne chemicals into the atmosphere during remediation works may result in a minor cumulative negative impact on Climate Change.	The contaminated soil should be remediated in a timeous manner.			X	X	X	X	X	X	X	X			X			X		X		X			X	X	X

4 Environmental Emergency and Response Procedure

Requested from Andre

5 Monitoring Programme

It is considered key to ensure that an efficient monitoring programme is implemented to ensure compliance to the draft EMP. The recommended frequency of inspections, monitoring activities and reporting for the decommissioning and remediation of the Tar Dams project are contained in Table 6.

To aid the monitoring programme, a checklist for inspections is included in Table 7. In order to report on findings, annual and quarterly inspections shall be facilitated through formal meetings. Representatives in such meetings should include a representative from RPM, DEO and (where applicable) contactor.

Table 6: Monitoring Programme

Responsible Personnel	Frequency	Guideline Comments
RPM	Once-off	Appoint DEO (appointment letter must be maintained)
	Once-off	Induction/ training register to be maintained
	Monthly	Compliance monitoring
	Monthly	Review, assess and close-out on incidents identified
	Ongoing	Comply to RPM awareness programme
	Ongoing	Comply to Environmental Emergency and Response Procedure
DEO	Monthly	Compliance monitoring
	Monthly	Compile monthly monitoring reports
	Ongoing	Comply to RPM awareness programme
Contractor	Once-off	Induction/ training register to be maintained
	Monthly	Compliance monitoring
	Ongoing	Comply to RPM awareness programme (Environmental Emergency and Response Procedure)

Table 7: Environmental Impacts Register/ Non-compliance Records

Nature of Incident	Date and Time	Contact Details	Response and Investigation Undertaken	Actions Taken (and by whom)	Formal Response Date

6 Environmental Awareness Plan

WSP Environment & Energy
Tel: 011 361 1380
Fax: 086 505 3939
www.wspenvironmental.co.za

Appendix G: Other information

Appendix G1: Environmental Impact Assessment

Methodology Applied to the Impact Assessment

The significance of impacts are determined for each activity / facility by evaluating and ranking the severity and / or intensity of the potential environmental impacts of the proposed decommissioning and remediation of the Tar Dams and will be evaluated according to the severity, duration, extent and significance of the impact. The WSP Environment and Energy (Pty) Ltd Risk Assessment Methodology will be used for the ranking of the impacts.

This system derives environmental significance on the basis of the consequence of the impact on the environment and the likelihood of the impact occurring. Consequence is calculated as the average of the sum of the ratings of severity, duration and extent of the environmental impact. Likelihood considers the frequency of the activity together with the probability of an environmental impact occurring. The following tables describe the process in detail:

Consequence

Table 1: Assessment and Rating of Severity

Rating	Description
1	Negligible / non-harmful / minimal deterioration (0 – 20%)
2	Minor / potentially harmful / measurable deterioration (20 – 40%)
3	Moderate / harmful / moderate deterioration (40 – 60%)
4	Significant / very harmful / substantial deterioration (60 – 80%)
5	Irreversible / permanent / death (80 – 100%)

Table 2: Assessment and Rating of Duration

Rating	Description
1	Less than 1 month / quickly reversible
2	Less than 1 year / quickly reversible
3	More than 1 year / reversible over time
4	More than 10 years / reversible over time / life of project or facility
5	Beyond life of project of facility / permanent

Table 3: Assessment and Rating of Extent

Rating	Description
1	Within immediate area of activity
2	Surrounding area within project boundary
3	Beyond project boundary
4	Regional / provincial
5	National / international

Consequence is calculated as the average of the sum of the ratings of severity, duration and extent of the environmental impact.

Table 4: Determination of Consequence

Determination of Consequence (C)	(Severity + Duration + Extent) / 3
C =	$\frac{severity + duration + extent}{3}$

Likelihood

Table 5: Assessment and Rating of Frequency

Rating	Description
1	Less than once a year
2	Once in a year
3	Quarterly
4	Weekly
5	Daily

Table 6: Assessment and Rating of Probability

Rating	Description
1	Almost impossible
2	Unlikely
3	Probable
4	Highly likely
5	Definite

Likelihood considers the frequency of the activity together with the probability of the environmental impact associated with that activity occurring.

Table 7: Determination of Likelihood

Determination of Likelihood (L) =	(Frequency + Probability) / 2
L =	$\frac{\text{frequency + probability}}{2}$

Environmental Significance

Environmental significance is the product of the consequence and likelihood values.

Table 8: Determination of Environmental Significance

Environmental Significance (Impact) = C × L	Description
L (1 – 4.9)	Low environmental significance
LM (5 – 9.9)	Low to medium environmental significance
M (10 – 14.99)	Medium environmental significance
MH (15 – 19.9)	Medium to high environmental significance
H (20 – 25)	High environmental significance. Likely to be a fatal flaw.

The impact assessment considers excavation of the contaminated soil, removal of the contaminated soil and the rehabilitation phase. The impact assessment methodology is described below.

BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT											
		A	B	C	D	E	F	G	(DxG)	(DxG)	H
Ref No.	Impact Description	Severity	Duration	Extent	Consequence (A+B+C)/3	Frequency	Probability	Likelihood (E+F)/2	Environmental Significance (Without Mitigation)	Environmental Significance (With Mitigation)	Positive (P) or negative (N)
Topography											
TO1	The land will be levelled, shaped to existing contour and re-vegetated (rehabilitated)	5.0	5.0	2.0	4.0	1.0	5.0	3.0	**12.0**		**N**
		5.0	5.0	2.0	4.0	1.0	5.0	3.0		**12.0**	**P**
Soil, land use and land capability											
S1	The disturbance of the contaminated soil and pathway exposure to the underlying soil layer.	4.0	2.0	1.0	2.3	2.0	2.0	2.0	**4.7**		**N**
		2.0	2.0	1.0	1.7	2.0	2.0	2.0		**3.3**	
S2	The removal of vegetation may lead to the erosion of the soil directly adjacent to the Tar Dams.	3.0	3.0	2.0	2.7	2.0	3.0	2.5	**6.7**		**N**
		1.0	2.0	1.0	1.3	2.0	2.0	2.0		**2.7**	
S3	In the case of a tar residue spillage, uncontaminated soil may become contaminated.	4.0	4.0	1.0	3.0	5.0	3.0	4.0	**12.0**		**N**

BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT											
		A	B	C	D	E	F	G	(DxG)	(DxG)	H
Ref No.	Impact Description	Severity	Duration	Extent	Consequence (A+B+C)/3	Frequency	Probability	Likelihood (E+F)/2	Environmental Significance (Without Mitigation)	Environmental Significance (With Mitigation)	Positive (P) or negative (N)
		1.0	1.0	1.0	1.0	4.0	3.0	3.5		**3.5**	
S4	Potential hydrocarbon spillages from equipment, machinery and vehicles may lead to contamination of the soil in and around the site.	3.0	4.0	1.0	2.7	5.0	2.0	3.5	**9.3**		**N**
		2.0	1.0	1.0	1.3	4.0	2.0	3.0		**4.0**	
S5	The bio-remediation through tilling (soil banking) or Engineered Bio-pilling could result in potential contamination of underlying soil.	4.0	4.0	2.0	3.3	2.0	5.0	3.5	**12.0**		**N**
		5.0	5.0	2.0	4.0	2.0	5.0	3.5		**14.0**	**P**
S6	The decommissioning and remediation of the area associated with the tar dams may succeed in transforming the land use back to grazing.	4.0	4.0	2.0	3.3	2.0	5.0	3.5	**12.0**		**N**
		5.0	5.0	2.0	4.0	2.0	5.0	3.5		**14.0**	**P**

BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT											
		A	B	C	D	E	F	G	(DxG)	(DxG)	H
Ref No.	Impact Description	Severity	Duration	Extent	Consequence (A+B+C)/3	Frequency	Probability	Likelihood (E+F)/2	Environmental Significance (Without Mitigation)	Environmental Significance (With Mitigation)	Positive (P) or negative (N)
Air											
A1	Generation of fumes from equipment, machinery and vehicle emissions onsite and during transportation of the contaminated material to a hazardous landfill site.	3.0	1.0	4.0	2.7	5.0	5.0	5.0	**13.5**		N
		2.0	1.0	4.0	2.3	5.0	2.0	3.5		**8.0**	
A2	Generation of dust from decommissioning and remediation activities (including activities such as the burning of waste onsite).	2.0	1.0	2.0	1.7	5.0	5.0	5.0	**8.3**		N
		1.0	1.0	1.0	1.0	1.0	2.0	1.5		**1.5**	
A3	The contaminated soil may be disturbed during the excavation of polluted undercut, leading to the potential release of contaminants (PAHs, volatile substances, Phenol, etc.).	3.0	1.0	3.0	2.3	5.0	5.0	5.0	**11.5**		N
		2.0	1.0	3.0	2.0	4.0	4.0	4.0		**8.0**	

BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT											
		A	B	C	D	E	F	G	(DxG)	(DxG)	H
Ref No.	Impact Description	Severity	Duration	Extent	Consequence (A+B+C)/3	Frequency	Probability	Likelihood (E+F)/2	Environmental Significance (Without Mitigation)	Environmental Significance (With Mitigation)	Positive (P) or negative (N)
A4	The release of contaminants (PAHs, volatile substances, Phenol, etc.) during the remediation activities (tilling/ Engineered Bio-pilling) of the soil.	3.0	1.0	3.0	2.3	5.0	5.0	5.0	**11.5**		N
		3.0	5.0	1.0	3.0	4.0	4.0	4.0		**12.0**	
Surface water											
SW1	Contamination of the soil and surface runoff from potential spillages and leakages of tar residues and hydrocarbons during decommissioning activities resulting in the degradation of surface water in the area.	2.0	3.0	2.0	2.3	4.0	3.0	3.5	**8.2**		N
		1.0	1.0	2.0	1.3	4.0	1.0	2.5		**3.3**	
SW2	Incorrect management of contaminated soil stockpiles could cause contaminated surface water leaving the site boundary.	3.0	4.0	3.0	3.3	3.0	4.0	3.5	**11.5**		N
		2.0	2.0	2.0	2.0	2.0	3.0	2.5		**5.0**	

BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT											
		A	B	C	D	E	F	G	(DxG)	(DxG)	H
Ref No.	Impact Description	Severity	Duration	Extent	Consequence (A+B+C)/3	Frequency	Probability	Likelihood (E+F)/2	Environmental Significance (Without Mitigation)	Environmental Significance (With Mitigation)	Positive (P) or negative (N)
SW3	Incorrect disposal of contaminated tar residue and undercut could have an impact on the surrounding environment should the surface water become contaminated.	4.0	4.0	2.0	2.0	3.0	1.0	2.0	**4.0**		N
		2.0	1.0	1.0	1.3	1.0	1.0	1.0		**1.3**	
SW4	Potential contamination of surrounding surface water as a result of contaminated runoff during remediation activities (tilling/ Engineered Bio-pilling).	2.0	3.0	2.0	2.3	4.0	3.0	3.5	**8.2**		N
		1.0	1.0	2.0	1.3	4.0	1.0	2.5		**3.3**	
Groundwater											
GW1	Although tar residue has been removed, potential contamination may occur from disruption of clay liner during decommissioning and remediation activities.	3.0	2.0	3.0	2.7	4.0	3.0	3.5	**9.3**		N
		1.0	1.0	2.0	1.3	4.0	1.0	2.5		**3.3**	
GW2	Pollution plume associated with groundwater contamination may be extended with ingress of contaminated rainwater.	3.0	3.0	3.0	3.0	4.0	3.0	3.5	**10.5**		N
		1.0	1.0	2.0	1.3	4.0	1.0	2.5		**3.3**	

BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT											
		A	B	C	D	E	F	G	(DxG)	(DxG)	H
Ref No.	Impact Description	Severity	Duration	Extent	Consequence (A+B+C)/3	Frequency	Probability	Likelihood (E+F)/2	Environmental Significance (Without Mitigation)	Environmental Significance (With Mitigation)	Positive (P) or negative (N)
GW3	Potential contamination of groundwater from contaminated surface runoff infiltration.	3.0	3.0	3.0	3.0	4.0	3.0	3.5	10.5		N
		1.0	1.0	2.0	1.3	4.0	1.0	2.5		3.3	
Fauna											
FA1	The fauna in and around the site may be disturbed as a result of noise levels created during decommissioning and remediation activities.	2.0	2.0	2.0	2.0	5.0	3.0	4.0	8.0		N
		1.0	2.0	2.0	1.7	5.0	2.0	3.5		5.8	
FA2	Fauna naturally occurring in the area may be harmed should they fall into the empty tar dam pit during remediation and decommissioning works.	4.0	2.0	2.0	2.7	4.0	2.0	3.0	8.0		N
		1.0	2.0	2.0	1.7	2.0	1.0	1.5		2.5	

BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT											
		A	B	C	D	E	F	G	(DxG)	(DxG)	H
Ref No.	Impact Description	Severity	Duration	Extent	Consequence (A+B+C)/3	Frequency	Probability	Likelihood (E+F)/2	Environmental Significance (Without Mitigation)	Environmental Significance (With Mitigation)	Positive (P) or negative (N)
FA3	Fauna occurring naturally in the area may be harmed by hunting or poaching from onsite employees.	2.0	2.0	3.0	2.3	4.0	2.0	3.0	**7.0**		**N**
		1.0	2.0	1.0	1.3	1.0	2.0	1.5		**2.0**	
FA4	Potential risks on fauna originating from the tar dams will be removed.	5.0	5.0	2.0	4.0	2.0	5.0	3.5	**14.0**		**N**
		5.0	5.0	2.0	4.0	2.0	5.0	3.5		**14.0**	**P**
Flora											
FL1	Flora around the Tar Dams may be removed during the decommissioning and remediation activities.	2.0	2.0	1.0	1.7	5.0	3.0	4.0	**6.7**		**N**
		2.0	2.0	1.0	1.7	5.0	2.0	3.5		**5.8**	

BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT											
		A	B	C	D	E	F	G	(DxG)	(DxG)	H
Ref No.	Impact Description	Severity	Duration	Extent	Consequence (A+B+C)/3	Frequency	Probability	Likelihood (E+F)/2	Environmental Significance (Without Mitigation)	Environmental Significance (With Mitigation)	Positive (P) or negative (N)
FL2	The movement of vehicles may lead to the destruction of vegetation around the Tar Dams.	2.0	2.0	2.0	2.0	5.0	3.0	4.0	**8.0**		**N**
		2.0	2.0	2.0	2.0	5.0	2.0	3.5		**7.0**	
FL3	Potential risks on flora originating from the tar dams will be removed.	2.0	2.0	2.0	2.0	5.0	3.0	4.0	**8.0**		**N**
		5.0	2.0	2.0	3.0	5.0	2.0	3.5		**10.5**	**P**
FL4	Alien and invasive plant species may be introduced during the decommissioning and remediation activities.	5.0	5.0	3.0	4.3	5.0	2.0	3.5	**15.2**		**N**
		2.0	2.0	1.0	1.7	1.0	1.0	1.0		**1.7**	**N**

BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT											
		A	B	C	D	E	F	G	(DxG)	(DxG)	H
Ref No.	Impact Description	Severity	Duration	Extent	Consequence (A+B+C)/3	Frequency	Probability	Likelihood (E+F)/2	Environmental Significance (Without Mitigation)	Environmental Significance (With Mitigation)	Positive (P) or negative (N)
Noise											
N1	Noise nuisance may result from noise generated by equipment, machinery and vehicles during decommissioning and remediation.	3.0	2.0	2.0	2.3	5.0	3.0	4.0	**9.3**		**N**
		2.0	2.0	2.0	2.0	5.0	2.0	3.5		**7.0**	
Visual Aspects											
VA1	The removal of the Tar Dams and levelling of the void may improve the aesthetic impact on the immediate vicinity of the area.	3.0	2.0	2.0	2.3	5.0	5.0	5.0	**11.7**		**N**
		4.0	5.0	2.0	3.6	5.0	3.0	4.0		**14.4**	**P**
Waste Management											
WM1	Incorrect storage of contaminated material may pollute surrounding uncontaminated soil, resulting in additional volumes of waste to landfill.	3.0	3.0	1.0	2.3	4.0	3.0	3.5	**8.2**		**N**
		2.0	2.0	1.0	1.7	2.0	2.0	2.0		**3.3**	

BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT											
		A	B	C	D	E	F	G	(DxG)	(DxG)	H
Ref No.	Impact Description	Severity	Duration	Extent	Consequence (A+B+C)/3	Frequency	Probability	Likelihood (E+F)/2	Environmental Significance (Without Mitigation)	Environmental Significance (With Mitigation)	Positive (P) or negative (N)
WM2	General waste in the form of litter may be generated from onsite employees during the decommissioning and remediation activities.	2.0	2.0	1.0	1.7	5.0	4.0	4.5	**7.5**		**N**
		1.0	1.0	1.0	1.0	3.0	2.0	2.5		**2.5**	
WM3	Should Engineered Bio-piling tubes be utilised during remediation, resulting tubes will need to be disposed of as hazardous waste.	3.0	3.0	1.0	2.3	4.0	3.0	3.5	**8.2**		**N**
		2.0	2.0	1.0	1.7	2.0	2.0	2.0		**3.3**	
Traffic											
T1	Waste contractor vehicles transporting contaminated material to permitted hazardous landfill sites may impact on the traffic flow of the area.	3.0	2.0	2.0	2.3	5.0	3.0	4.0	**9.3**		**N**
		2.0	2.0	2.0	2.0	5.0	2.0	3.5		**7.0**	

BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT											
		A	B	C	D	E	F	G	(DxG)	(DxG)	H
Ref No.	Impact Description	Severity	Duration	Extent	Consequence (A+B+C)/3	Frequency	Probability	Likelihood (E+F)/2	Environmental Significance (Without Mitigation)	Environmental Significance (With Mitigation)	Positive (P) or negative (N)
T2	The leakage/ spillage of hazardous materials from the transport vehicles may result in the contamination of land en-route to the landfill site.	4.0	3.0	4.0	3.7	4.0	2.0	3.0	**11.0**		**N**
		2.0	1.0	4.0	2.3	4.0	2.0	3.0		**7.0**	
T4	Potential accidents resulting from transport vehicles could have an adverse impact on both the social and biophysical environment.	5.0	5.0	4.0	9.4	1.0	2.0	1.0	**9.4**		**N**
		3.0	3.0	4.0	3.3	1.0	1.0	1.0		**3.3**	
Cultural and Heritage Impacts											
CH1	The nearby graves (+/- 37m north of the Blesbok Tar Dams) may be disturbed by the movement of remediation workers, equipment, machinery, and vehicles.	3.0	5.0	2.0	3.3	5.0	2.0	3.0	**9.9**		**N**
		1.0	1.0	2.0	1.3	2.0	2.0	2.0		**2.7**	

BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT											
		A	B	C	D	E	F	G	(DxG)	(DxG)	H
Ref No.	Impact Description	Severity	Duration	Extent	Consequence (A+B+C)/3	Frequency	Probability	Likelihood (E+F)/2	Environmental Significance (Without Mitigation)	Environmental Significance (With Mitigation)	Positive (P) or negative (N)
Health and Safety											
HS1	Social ills associated with the temporary influx of contractors and employees into the area.	3.0	4.0	3.0	3.3	5.0	3.0	4.0	**13.2**		N
		1.0	1.0	2.0	1.3	5.0	2.0	3.5		**4.7**	
HS2	Potential injury from onsite accidents from machinery, equipment or vehicles during decommissioning and remediation activities.	5.0	2.0	2.0	3.0	5.0	4.0	4.5	**13.5**		N
		2.0	2.0	2.0	2.0	1.0	2.0	1.5		**3.0**	
HS3	Exposure of PAHs, volatile substances, Phenol, etc. during decommissioning and remediation activities.	4.0	4.0	4.0	4.0	5.0	3.0	2.6	**10.4**		N
		2.0	2.0	2.0	1.3	3.0	2.0	2.5		**3.3**	

BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT											
		A	B	C	D	E	F	G	(DxG)	(DxG)	H
Ref No.	Impact Description	Severity	Duration	Extent	Consequence (A+B+C)/3	Frequency	Probability	Likelihood (E+F)/2	Environmental Significance (Without Mitigation)	Environmental Significance (With Mitigation)	Positive (P) or negative (N)
HS5	Potential fires onsite may impact on onsite employee safety.	5.0	5.0	1.0	3.7	4.0	2.0	3.0	**11.1**		**N**
		2.0	2.0	1.0	1.7	2.0	2.0	2.0		**3.4**	
HS6	The remediation activity will remove the risk associated with the inhalation of hazardous airborne chemicals by the surrounding community members.	5.0	4.0	1.0	3.3	4.0	2.0	3.0	**10.0**		**N**
		5.0	4.0	1.0	3.3	2.0	2.0	2.0		**6.7**	**P**
Employment											
E1	The remediation activity may result in temporary employment.	3.0	5.0	4.0	4.0	2.0	4.0	3.0	**12.0**		**P**
		3.0	5.0	4.0	4.0	2.0	4.0	3.0		**12.0**	

BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT											
		A	B	C	D	E	F	G	(DxG)	(DxG)	H
Ref No.	**Impact Description**	**Severity**	**Duration**	**Extent**	**Consequence (A+B+C)/3**	**Frequency**	**Probability**	**Likelihood (E+F)/2**	**Environmental Significance (Without Mitigation)**	**Environmental Significance (With Mitigation)**	**Positive (P) or negative (N)**
E2	The remediation activity may result in temporary skills development.	3.0	5.0	4.0	4.0	2.0	4.0	3.0	**12.0**		**P**
		3.0	5.0	4.0	4.0	2.0	4.0	3.0		**12.0**	