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MOOIPLAATS COLLIERY MINE

OVERLOOKED GROUP OPERATIONS

MPUMALANGA

CIVIL ENGINEERING

STORMWATER MANAGEMENT PLAN REPORT

FINAL REPORT

HUMAN ELEMENT REFERENCE NO.

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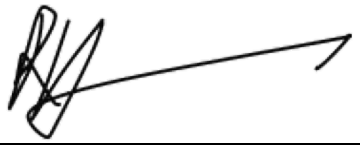
Approved By:	**R.Harricombe, Btech:Civil/Structural Engineering,Pr. Eng Tech** **ECSA Reg. No. 201070025** 	Date: 2024-10-07

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DECLARATION

I, Sihle Mncameleni (Candidate Engineering Technologist) declare that I am an independent specialist working under Human Element (Pty) Ltd under supervision of Raphael Harricombe (Professional Engineering Technologist). I Sihle Mncameleni of Human Element Pty do not benefit in any way from our client Overlooked Group whether directly or indirectly apart from the consultation work we conduct based on their requests. I further declare that I, and Human Element (Pty) Ltd have no interest and have no personal investments and other forms of benefits with regards to the Overlooked Group.

1. EXECUTIVE SUMMARY

Mooiplats Colliery an operation under Overlooked Group of Companies. The mine was under Care and Maintenance since 30 September 2013 with no mining activities took place until January 2018. There are currently no coal mining activities taking place from the existing mining pit, however, the mine is operating it's crushing and screening plant, receiving its coal from external coal mines for processing and washing.

The current Stormwater Management Infrastructure at Mooiplats Colliery does not meet its key design intent, this is mainly due to poor stormwater management maintenance techniques employed on site to manage the s dirty water runoff. The operational maintenance systems being implemented on site are non-compliant to the design operational procedure which has consequently led to the siltation of the pollution control dams (PCDs),excess water in the stormwater channels f, the blockage of stormwater sump areas as well as a high potential of dirty water runoff into the natural environment

After an assessment of the structural integrity condition of the existing stormwater facilities such as, concrete channels around the Co-Disposal facility, PCDs, concrete sumps and concrete silt traps, it was noted that these are in acceptable structural condition. Whilst the design capacity of all stormwater infrastructure is adequate to handle the stormwater volumes experienced on the mine, however poor management and maintenance of this infrastructure leads to its operational inefficiency.

The most significant contributor of dirty water surface runoff are the coal stockpile and plant areas which take up a significant footprint at the operation with the dirty footprint being 14 Ha. Not only has the poor management of the dirty run-off infrastructure negatively impacted the water clean areas at the operation, .It can also be concluded that the clean and dirty water systems are inefficient.

The delayed implementation of recommendations made in a Hydrological Impact Assessment report dated July 2019 by WSP Environmental Pty ltd (Section 14) for Mooiplats Colliery has negatively impacted the efficient operation of the stormwater

infrastructure and compromised its design intent. These recommendations included measures to be put in place to mitigate overflow /spillages from the existing pollution control dams thereby ensuring compliance with GN 704 and BPG. The uncontrolled vegetation on the existing stormwater structures causes clogging on the stormwater channel and stormwater pipelines which consequently causes failure of the site stormwater management.

In support of the stormwater management assessment, detailed stormwater infrastructure have been included and sized to accommodate dirty water run-off volumes from the coal stockpile and plant areas to prevent further contamination of ground and surface water . The overall separation of clean and dirty water areas is also considered as part of the storm water management plans. The proposed stormwater management system will allow the proposed mine operation to adequately transport clean water away from and around infrastructure to prevent possible contamination as well as prevent operational difficulties of the stormwater infrastructure.

2. INTRODUCTION

Mooiplaats Colliery was an underground coal mine that utilised the board and pillar mining method. Access to the underground workings was obtained through a decline box cut, situated near the northern boundary of the Mooiplaats property. The total life of the mine was then estimated to be approximately 15 years.

The Mooiplats Colliery is approximately 126 ha in extent with a mining area of approximately 74 ha. The mining area lies within the Ermelo Coalfield; three coal seams occur in the area of interest. The Upper A, C and Lower B coal seams were poorly developed and not economically viable to mine. The Upper B seam was sufficiently developed and was the target seam for underground mining. Access to the underground workings was obtained through a T-shaped box cut. Mining was taking place at approximately 100m below ground level and was divided into four sections

Overlooked Group, Mooiplats Colliery commissioned Human Element Pty Ltd, to conduct a stormwater management study and report on the improvement of the existing stormwater management infrastructure as part of the sites Integrated Water Use License requirements. Mooiplats Colliery is located approximately 18km South East of the town of Ermelo, between the N2 and N11, and lies to the south of the Eskom Camden Power Station which falls within the municipal boundaries of the Gert Sibande District Municipality, Mpumalanga Province. The mine has an existing WUL, which has expired and Mooiplats Colliery intends to renew its water use license and to apply for all new water uses triggered by the operation

It was reported that the mine was previously under Care and Maintenance from 30 September 2013 to January 2018.

The existing infrastructure includes inter alia the following:

Mining area:

T-shaped box-cut for the underground access for equipment and staff access;

Diversion berms and channels;

Overburden and soil stockpiles;

Conveyors for coal transports;

Co-disposal Facility

Return Water Dam

Three settling dams; and

Two pairs of Erikson dams/tanks.

Office and admin area:

Potable water tank;

Change house;

Sewage treatment plant;

Reverse Osmosis Plant

Sump to collect run-off from office area fitted with a pump;

Office and administrative buildings;

Workshop;

Wash-bay;

Salvage yard;

Plant area:

Workshop;

Laboratory;

Processing plant and control room;

Coal stockpiling area;

Conveyors;

Substation;

Power lines; and

Erikson dams/tanks.

Mine residue:

Co-disposal facility; and

Return water dams;

In terms of the drainage of the site, the Upper Vaal water management area lies in the eastern interior of South Africa. Large quantities of water are transferred into the area from two neighbouring areas, as well as water sourced from the Upper Orange River via Lesotho. Similarly, large quantities of water are transferred out to three other water management areas, which are dependent on water from the Upper Vaal water management area to meet much of their requirements. The following river channels are

found within the proximity and interconnected to the study site: The Vaal River, which is the third largest river in South Africa, runs north-east of the Mooiplaats colliery boundaries; The Vaal River running along the site is fed by an unnamed tributary, and the Witpunt Spruit. The Vaal River is the largest tributary of the Orange River, which runs westward through South Africa before reaching the Atlantic Ocean.

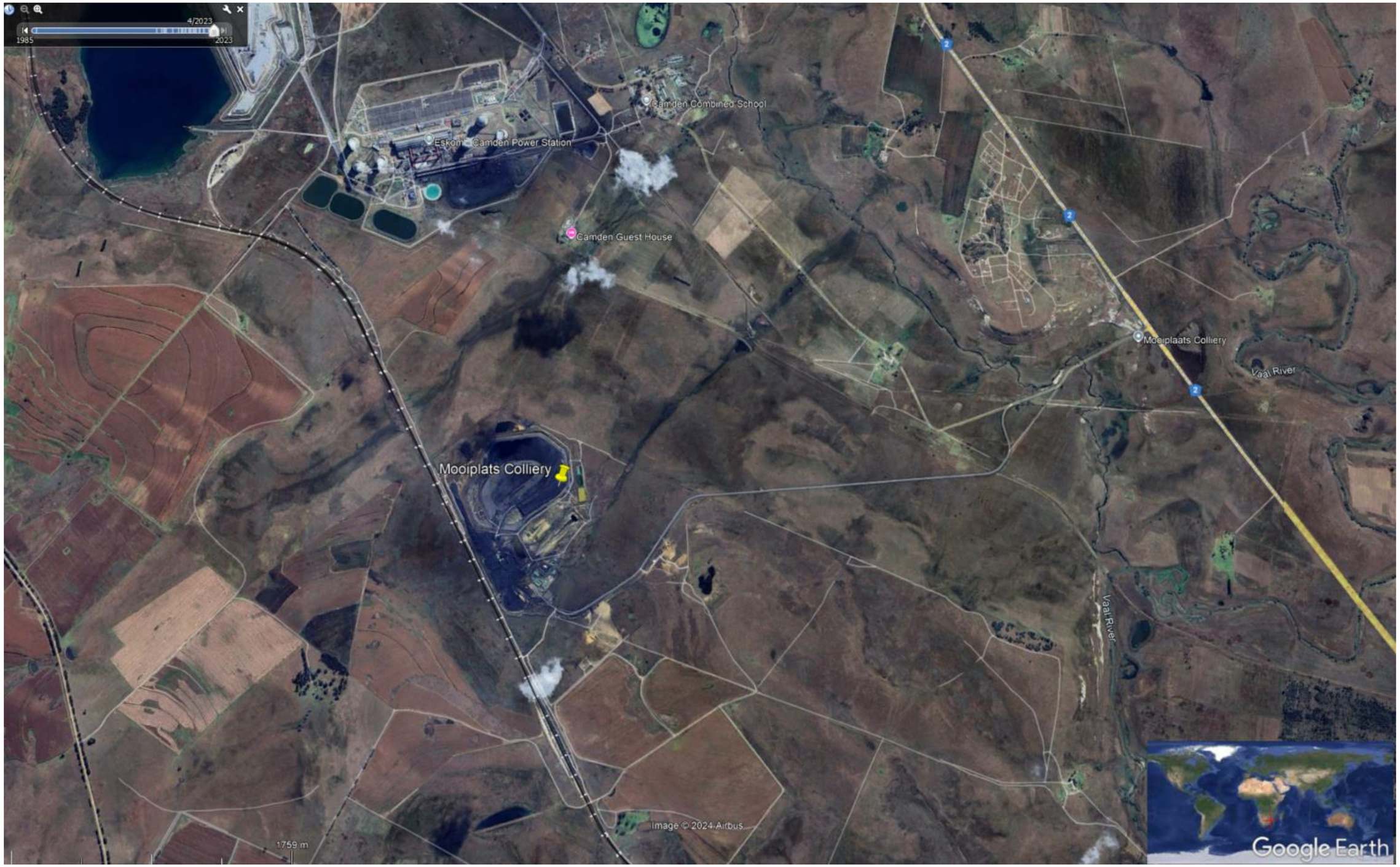


Figure 1:Mooiplats Colliery Arial Photograph [AfriGis 2024]

The study on the stormwater infrastructure commences with a Status Quo assessment to investigate compliance of the existing SWMP at the Mine. A SWMP is then compiled to investigate the impact of future expansion on the existing stormwater infrastructure.

The objective of the study is to provide a storm water management plan in compliance with Government Notice 704 of the South African National Water Act, Act 36 of 1998 and surface infrastructure layout related to civil engineering works for the support of the existing mine operations. A table analysis was done to identify clean and dirty water catchments; the design is intended to incorporate a clean and dirty water separation system approach that will ensure that storm water from outside of the plant and all coal stockpile areas does not flow through the dirty areas, including ensuring that dirty water generated inside the plant, coal stockpiles, mining pits and overburden stockpile does not flow into the clean environment.

Status Quo Condition

The current activities on site include the crushing and screening plant, wash plant, a Co-Disposal facility and the transportation of the product to the markets. Support infrastructure includes maintenance workshops, material storage areas, pollution control dams, storm water channels, Ericson dams and offices.

It was reported that the mine was previously placed under Care and Maintenance since 30 September 2013 to January 2018. The halt in mining operations may be a significant contributary factor to the visible insufficiency of stormwater management infrastructure on site currently

On the 02nd of August 2024, Human Element Civil Engineer conducted a site visit to evaluate the stormwater management infrastructure at Mooiplats Colliery in support of the compilation of the stormwater management report. The findings from this on-site assessment are detailed in Table 1 below.

Facility Name:	**Return Water Dam & Silt Trap**	
Coordinates:	Lat: 25° 29' 23.8" S	Long: 27° 05' 58.4" E
Surface Dimensions:	76.63 m x 153.65 m	
Volume:	12000 m^3	
Type of Water:	Co-Disposal Run off Water	
Liner Specifications:	Lined with HDPE Liner & Concrete (Silt Trap Facility)	
Drawing Reference:	None Provided	
Inlet:	Storm Water Concrete Channel	
Outlet:	Overflow Concrete Channel	
Comments:	Located on the Northern side of the co-disposal facility. The return water dam is currently operated beyond its design capacity. Poor housekeeping of the stormwater channel inlet has caused severe silt build on all concrete silt trap.	

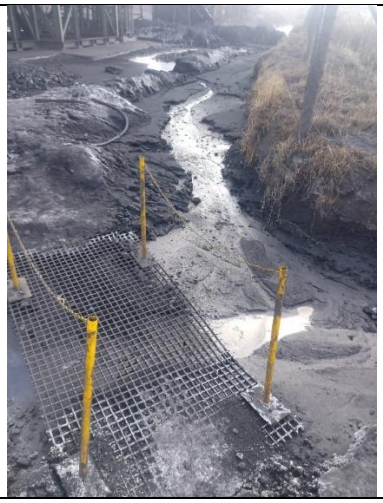
Facility Name:	**Plant & Stockpile Pollution Control Dam**	
Coordinates:	Lat: 26°38'41.59" S	Long: 30° 5'48.01" E
Surface Dimensions:	63.35 m x 155.92 m (4m Deep)	
Volume:	39,510 m^3	
Type of Water:	Process Water	
Liner Specifications:	Lined with HDPE Liner	
Drawing Reference:	None provided	
Inlet:	Storm Water silt trap channel	
Outlet:	Stormwater concrete pipe	
Comments:	Located to the south of the raw material stockpile area. Theoverflow connects to the Genset Dam. Pollution control dam is completely silted up and can be regarded as non-compliant PCD according to the GNR704.The PCD is currently not serving the function of containing dirty water from the dirty areas. A high risk of heavily silted water overflow to clean water areas is of like hood to take occur.	

Facility Name:	**Pollution Control Dam 3**		
Coordinates:	Lat: 26°38'30.63" S	Long: 30° 6'2.72" E	
Surface Dimensions:	42.5 m x 89.6 m		
Volume:	7,565 m^3		
Type of Water:	Process Water		
Liner Specifications:	Lined with HDPE Liner		
Drawing Reference:	None provided.		
Inlet:	Storm Water HDPE pipeline		
Outlet:	No outlet structure		
Comments:	Located on the far North East of the site. Pollution Control Dam is operated at minimal capacity. Poor vegetation control has been noted .HDPE lining appears to be in good condition.		

Facility Name:	**Pollution Control Dam 2**		
Coordinates:	Lat: 26° 38.465' S	Long :30° 6.039' E	
Surface Dimensions:	89.6 m x 71.5 m		
Volume:	9609 m^3		
Type of Water:	Process Water		
Liner Specifications:	Lined with HDPE Liner		
Drawing Reference:	None provided		
Inlet:	Storm Water HDPE Pipeline		
Outlet:	Concrete Overflow Channel		
Comments:	Located on the far North East of the site. Pollution Control Dam is operated at minimal capacity. Poor vegetation control has been noted. HDPE lining appears to be in good condition.		

Facility Name:	**Pollution Control Dam 1**		
Coordinates:	Lat: 26°38'25.71" S	Long: 30° 6'2.02" E	
Surface Dimensions:	35.5 m x 64.75 m		
Volume:	5747 m^3		
Type of Water:	Process Water		
Liner Specifications:	Lined with HDPE Liner		
Drawing Reference:	None provided.		
Inlet:	Storm Water Concrete Silt		
Outlet:	Concrete Overflow Channel		
Comments:	Located on the far North East of the site. Poor vegetation control cause blockages to the inlet and greatly compromising the functionality of the stormwater carrier infrastructure. HDPE lining appears to be in good condition. Pollution Control Dam should be free of any vegetation growth. The PCD is referred to as a non-compliant dam.		

Observation	Picture evidence	Recommendation
Progressive soil erosion		Vertical gabions should be constructed as soil erosion protection measures and allow free flow of clean stormwater.
Contaminated clean water channel		Earth channels to be properly trimmed and refurbished with soil erosion protection measures constructed to prevent collapse of the channel embankment. Diversion of dirty water from the clean water trench is should be implemented as an urgent remedial stormwater management measure.
Blocked stormwater concrete pipeline		Maintain vegetation control and clean all weirs to be free of vegetation growth.

Contaminated clean water earth channel		Earth channels to be properly trimmed and refurbished with soil erosion protection measures constructed to prevent collapse of the channel embankment. Diversion of dirty water from the clean water trench is should be implemented as an urgent remedial stormwater management measure.
Dirty water on the clean water earth channel		Earth channels to be properly trimmed and refurbished with soil erosion protection measures constructed to prevent collapse of the channel embankment. Diversion of dirty water from the clean water trench is should be implemented as an urgent remedial stormwater management measure.
Plant dirty water ponding.		Dirty water shallow channels should be constructed within the plant area to properly discharge water to the sit trap and pollution control dam. New silt trap to be constructed at the new dirty water collection point following the design plant area topography.

Plant &Stockpile dirty water ponding with high silt volumes transported directly to PCD with no silt management facility.		Dirty water shallow channels should be constructed within the plant area to properly discharge water to the sit trap and pollution control dam. New silt trap to be constructed at the new dirty water collection point following the design plant area topography
Plant & Stockpile dirty water ponding with high silt volumes runoff directly to PCD with no silt management facility.		Dirty water shallow channels should be constructed within the plant area to properly discharge water to the sit trap and pollution control dam. New silt trap to be constructed at the new dirty water collection point following the design plant area topography
Plant unchanneled surface run-off		Shallow concrete channels to be constructed in strategic area of the plant to capture maximum amount of plant surface run-off to the Pollution Control Dam.

Plant unchanneled surface run-off		Shallow concrete channels to be constructed in strategic area of the plant to capture maximum amount of plant surface run-off to the Pollution Control Dam.
Blocked stormwater junction and pipe outlet from the co-disposal facility and blocked stormwater outlet.		Stormwater junction to be cleaned from silt build up and any vegetation growth.
Co-Disposal trench ponding		Clean all subsoil drainages within perimeter of the co-disposal facility to allow free flow of dirty water to the PCDs.

Flooded stormwater channel with highly contaminated dirty water.		Stormwater run-off captured in the Southern and Northen Sump to be pumped out to PCD 1,2 and 3 to prevent flooding of channels.PCD to be free of vegetation and silt to allow inflow from the collectiong stormwater channel.
Blocked subsoil drainages		Clean all subsoil drainages within perimeter of the co-disposal facility to allow free flow of dirty water to the PCDs.
Blocked and flooded sump. Broken water pump		Pump to be replaced with new pump to pump water out of the stormwater collection sump to make provision for the relief of

Unauthorized dirty water trench		Trench to be properly backfilled in layer specified by the civil engineer. The dirty water trench currently discharges dirty water to the natural environment.
Silt build up on the Genset Dam.		Genset dam to be cleaned and free of any debris and silt to accommodate inflow from the plant PCD. Allow for sufficient pumping of dirty water to the 3 PCDs to allow enough free at least 800mm free board on the Genset Dam.

Site Location

The Mooiplaats Colliery is located approximately 18 km outside of the town of Ermelo, between the N2 and N11, and lies to the south of the Eskom Camden Power Station. Mooiplaats Colliery falls within the municipal boundaries of the Gert Sibande District Municipality, Mpumalanga Province.

Environmental legislation

To conserve water resources, GN 704 (Government Gazette 20119 of 4 June 1999), was created. It contains regulations for the use of water for mining and other related operations. The four primary GN 704 requirements that apply to this project are:

- Regulation 4 – which defines the area in which, mine workings or associated structures may be located, with reference to a watercourse and associated flooding. Any residue deposit, dam, reservoir together with any associated structure or any other facility should be situated outside the 1:100-year flood line. Any underground or opencast mining, prospecting or any other operation or activity should be situated or undertaken outside of the 1:50 year flood-line. Where the flood-line is less than 100 metres away from the watercourse, then a minimum watercourse buffer distance of 100 metres is required for infrastructure and activities; place or dispose of any residue or substance which causes or is likely to cause pollution of a water resource, in the workings of any underground or opencast mine excavation, prospecting diggings, pit or any other excavation.

- Regulation 5 – which indicates that no residue or substance which causes or is likely to cause pollution of a water resource may be used in the construction of any dams, impoundments or embankments or any other infrastructure which may cause pollution of a water resource.

- Regulation 6 – which describes the capacity requirements of clean and dirty water systems. Clean and dirty water systems must be kept separate and must be designed, constructed, maintained, and operated to ensure conveyance the 1:100-year peak flow. Clean and dirty water systems should not spill into each other more frequently than once in 100 years. Any dirty water dams should have a minimum freeboard of 0.8m above full supply level;

- Regulation 7 – which describes the measures which must be taken to protect water resources. All dirty water or substances which may cause pollution should be prevented from entering a water resource (by spillage, seepage, erosion, etc.) and ensure that water used in any process is recycled as far as practicable; ensure that water used in any process at a mine or activity is recycled as far as practicable, and any facility, sump, pumping installation, catchment dam or other impoundment used for recycling water, is of adequate design and capacity to prevent the spillage, seepage or release of water containing waste at any time

• Regulation 8 – which describes the security measures which must be undertaken. Ensure access control in any area used for the stockpiling or disposal of any residue or substance which causes, is likely to cause pollution of a water resource to protect any measures taken in terms of these regulations; protect any existing pollution control measures or replace any existing pollution control measures deleteriously affected, damaged or destroyed by the removing or reclaiming of materials from any residue deposit or stockpile, and establish additional measures for the prevention of pollution of a water resource which might occur, is occurring or has occurred as a result of such operations.

The above regulations restrict the Mooiplats Colliery mining pits and underground from being located within the 1:100 flood line. Additionally, the mine clean and dirty water regions must be kept apart, and any necessary infrastructure, such as the proposed dirty water channels, sump at the stockpile locations, and pit, must be designed, built, maintained, and operated to assure the conveyance of the 1:100-year peak flow. It is necessary to avoid and minimize water resource pollution in the area surrounding the project. Moreover, mitigation measures to stop instability, erosion, sedimentation, modification, and contamination of the watercourse must be taken should any material be removed from the nearby watercourses during the development and operation of the Mooiplats Colliery Mine

3. SCOPE OF WORK

The objective of the study is to provide a storm water management plan in compliance with Government Notice 704 of the South African National Water Act, Act 36 of 1998. The main tasks of the plan are as follows:

- Identify clean and dirty water catchments.
- Establish a water separation system to ensure that all clean storm water from outside the plant and mining areas does not flow into dirty areas; and that all dirty water from the plant and mining areas does not flow into the clean environment more than once in 50 years on average.
- Assessment of existing dirty water storage capacity
- Design of new stormwater channels to convey dirty water to pollution control dams.
- Provide civil engineering solutions for effective stormwater management at Mooiplats Colliery
- Provide engineering solutions for dirty and clean water flow on site and adequate mine haul roads grading to cater for road drainage.

Clean and Dirty Catchment Identification and Separation

- Independent coal mine pits constituted independent coal processing facility which is considered as dirty catchment.
- Non-coal processing facilities such as offices and other buildings are considered clean catchment areas.
- Berms must be used to redirect external storm water around the site.
- Internal storm water will drain towards the perimeter of the facility. This water will be intercepted by perimeter channels and directed to the PCD, from where water may be re-used for dust suppression in the Mine's dirty water footprint.
- The clean diversion berms discussed above can be built using the material excavated from the channels to reduce construction costs. Provided that topsoil is first stripped and stockpiled separately for use in rehabilitation after construction and mining. No carbonaceous material is to be used to construct clean diversion berms.

Determining the storm water management concept

- Identify the legal framework in which the storm water management plan must adhere to.
- Identify clean and dirty catchments.
- Identify approximate infrastructure locations.

Conceptual design

- Locate storm water management infrastructure.
- Size storm water management infrastructure.

Reporting

- Produce a concise design report detailing the design intent, the storm water management plan, infrastructure sizes and site hydrology.
- Produce a general arrangement layout diagram showing the locations of storm water management infrastructure.

4. SITE SETTING AND DESIGN INPUTS

The Mooiplaats Colliery site falls within the Highveld region, which is typically characterised by warm wet summers and cold dry winters. The mean annual temperature ranges between 16°C in the west to 12° in the east, with an average of about 15°C for the catchment as a whole. Maximum summer temperatures occur in January and minimum winter temperatures are experienced in July. Rainfall is seasonal and most rain occurs in the summer months (October to April). Precipitation occurs as showers and thunderstorms, and is sometimes accompanied by hail. Frost occurs in winter, with occasional light snow on high lying areas. The mean annual rainfall decreases from the east (1000mm) to the west (500mm), with the mean annual precipitation (MAP) of approximately 700mm

The coordinates for the mining operations are stipulated below:

Latitude: 26°38'28.25" S

Longitude: 30° 5'49.57" E

The site generally slopes from South to North and West to North East. Water from the site currently drains via surface runoff stormwater channels within perimeter of the Co-disposal Facility and within perimeter of the designated dirty water area stormwater channels and clean water area channels. The clean water areas drain towards the existing Vaal River that is located on the North-East direction of the site. The storm water plan for the entire site will is calculated, the runoff from the mining activity drains to the existing storm water detention ponds that are designed to retain the volumes required for the 1:50 year rainfall event.

Climate Ermelo: Weather By Month

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Nov	Oct	Dec	Year
Record high °C (°F)	43.1 (109.58)	39.0 (102.2)	39.0 (102.2)	37.97 (100.35)	35.92 (96.66)	35.92 (96.66)	32.84 (91.11)	36.95 (98.51)	41.05 (105.89)	41.05 (105.89)	40.03 (104.05)	41.05 (105.89)	43.1 (109.58)
Average high °C (°F)	28.83 (83.89)	28.97 (84.15)	28.4 (83.12)	26.03 (78.85)	25.35 (77.63)	23.17 (73.71)	22.66 (72.79)	25.32 (77.58)	27.59 (81.66)	27.87 (82.17)	28.65 (83.57)	29.25 (84.65)	26.84 (80.31)
Daily mean °C (°F)	25.09 (77.16)	25.04 (77.07)	24.25 (75.65)	21.7 (71.06)	20.01 (68.02)	17.24 (63.03)	17.29 (63.12)	20.31 (68.56)	23.19 (73.74)	23.89 (75.0)	24.77 (76.59)	25.45 (77.81)	22.35 (72.23)
Average low °C (°F)	17.28 (63.1)	17.17 (62.91)	16.13 (61.03)	13.77 (56.79)	11.65 (52.97)	8.82 (47.88)	8.88 (47.98)	11.17 (52.11)	14.27 (57.69)	15.51 (59.92)	16.54 (61.77)	17.38 (63.28)	14.05 (57.29)
Record low °C (°F)	11.29 (52.32)	12.32 (54.18)	8.21 (46.78)	8.21 (46.78)	5.13 (41.23)	3.08 (37.54)	2.05 (35.69)	3.08 (37.54)	6.16 (43.09)	8.21 (46.78)	9.24 (48.63)	7.18 (44.92)	2.05 (35.69)
Average precipitation mm (inches)	177.4 (6.98)	123.66 (4.87)	112.61 (4.43)	55.85 (2.2)	13.56 (0.53)	5.41 (0.21)	6.65 (0.26)	12.1 (0.48)	27.73 (1.09)	81.85 (3.22)	100.49 (3.96)	143.96 (5.67)	71.77 (2.83)
Average precipitation days (≥ 1.0 mm)	19.13	16.05	15.03	9.33	3.26	1.21	1.59	2.62	5.04	12.32	16.14	18.47	10.02
Average relative humidity (%)	79.7	79.89	79.37	76.33	66.01	59.68	59.86	56.34	57.6	66.22	71.69	76.92	69.13
Mean monthly sunshine hours	12.67	12.57	11.52	8.19	8.74	8.73	8.65	8.61	10.07	12.09	12.54	12.7	10.59

Figure 2: Ermelo Monthly Climate Conditions [https://weatherandclimate.com/south-africa/Mpumalanga]

Rainfall and Evaporation

The Mooiplaats Colliery is situated in the Upper Vaal Water Management Area (WMA 8) specifically the C11B quaternary catchment. Figure 3 presents the WMA and quaternary catchment in relation to the site and catchment information is presented in Table 1. The Vaal River is the main tributary within the area flowing in a north south direction towards the Vaal Dam. Other tributaries include the Witpunspruit, Sterkspruit and Wolwespruit, which drain to the Vaal River (Figure 3).

- Mean Annual Precipitation (MAP): 705 mm
- Mean Annual Evaporation (MAE): 1 400 mm
- Mean Annual Runoff (MAR): (32.37 mm)
- Catchment Area : 536km²

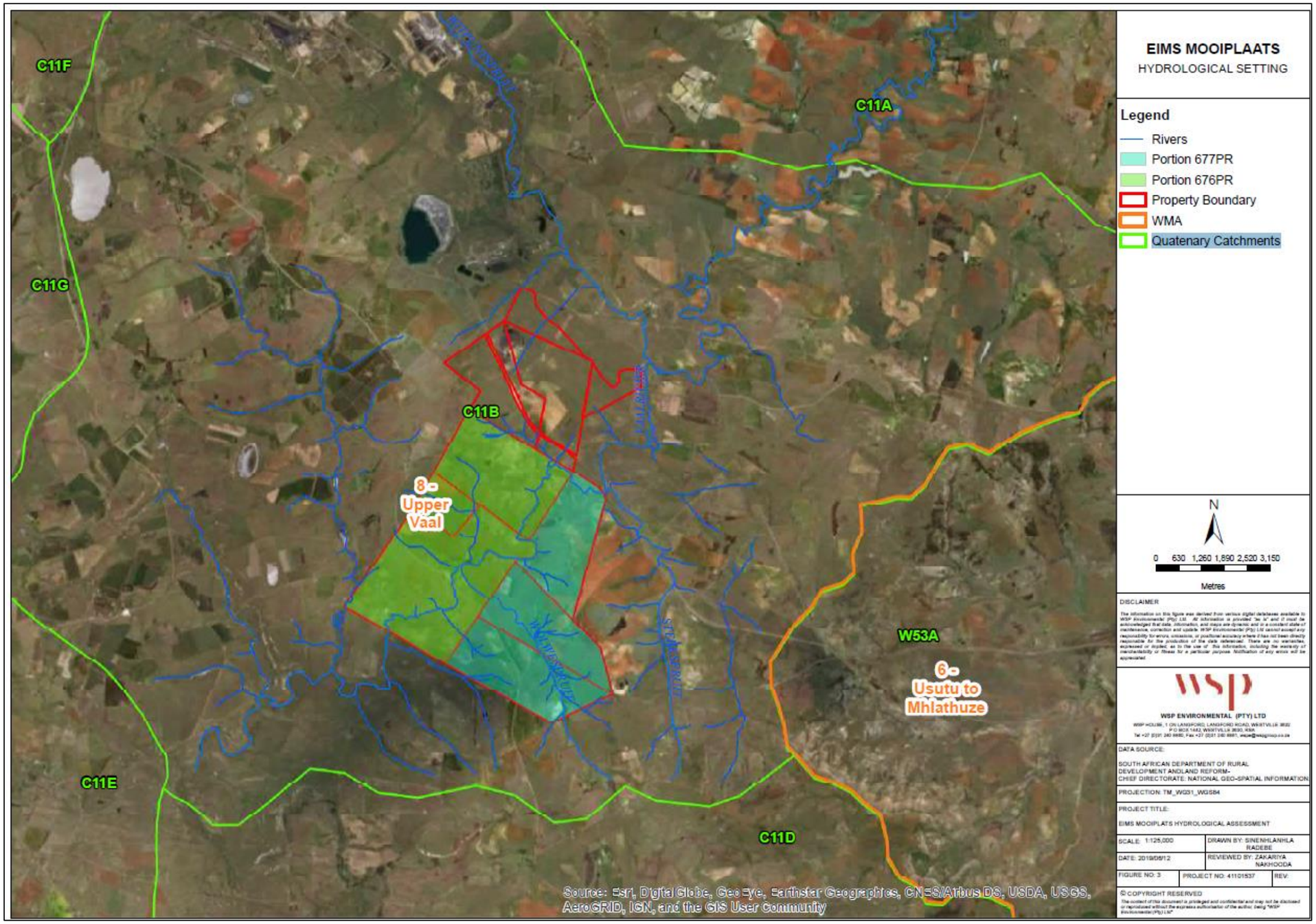


Figure 3: Quaternary Catchment B11B showing the Location of Mooiplats Colliery-[WSP Environmental (Pty)Ltd

5. Topography

The topography of the site is steep with an overall maximum slope of 11.7% and average slope of 3.1%. The site slopes towards from West to East and South to North with the Olifants River running parallel on the Northern-Eastern sphere.

Because infiltration is reduced by steep topography, increased flow velocities and subsequent flood quantities are affected under a variety of related scenarios. The source of the water is usually a rare large amount of rainfall, which may be characterized by water that accumulates in the stream channels that drain the area rather than being absorbed by the ground or dissipated into the air directly or through vegetation.

6. SITE DEVELOPMENT PLAN

The existing mining infrastructure layout for Mooiplats Colliery is presented in Figure 4. The mine infrastructure largely contributing to the mine stormwater infrastructure is as follows:

- A plant area
- Haul Road
- Crushing and screening area
- Coal Washing Plant
- Overburden stockpile area
- Coal Stockpile Area
- Co-Disposal Facilities
- Pollution control dam(s).

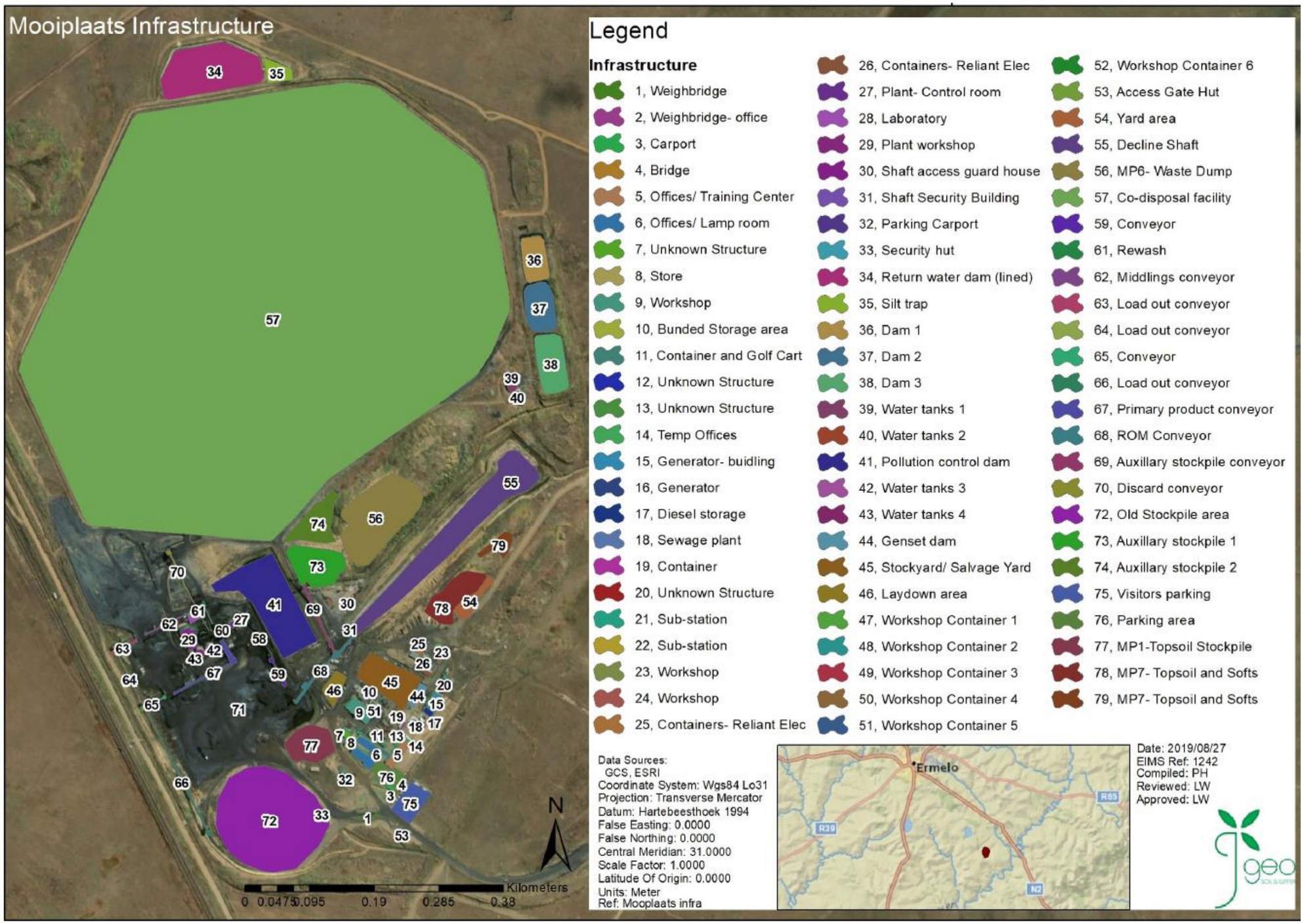


Figure 4:Mooiplats Existing Infrastructure-[Geo Soil & Water,2019]

7. STORM WATER MANAGEMENT DESIGN

7.1 Introduction

Mooiplaats Colliery was an underground coal mine that utilised the board and pillar mining method. Access to the underground workings was obtained through a decline box cut, situated near the northern boundary of the Mooiplaats property. The total life of the mine was then estimated to be approximately 15 years.

The Mooiplats Colliery is approximately 126 ha in extent with a mining area of approximately 74 ha. The mining area lies within the Ermelo Coalfield; three coal seams occur in the area of interest. The Upper A, C and Lower B coal seams were poorly developed and not economically viable to mine. The Upper B seam was sufficiently developed and was the target seam for underground mining. Access to the underground workings was obtained through a T-shaped box cut. Mining was taking place at approximately 100m below ground level and was divided into four sections.

It was reported that the mine was previously under Care and Maintenance since 30 September 2013 until January 2018. With no coal mining taking place from the existing mining pit, the mine is currently operating a crush and screening plant receiving its coal from external coal mines for processing and washing.

A Hydrological Impact Assessment Report was compiled by WSP Group Africa (Pty) Ltd in July 2019 after the commencement of the mines Upper B Seam coal mining operation. On the Hydrological Impact Assessment Report, new concrete stormwater channels were proposed as part of stormwater management and stormwater management channels at the plant and stockpile areas **Refer to Figure 6** below for the proposed stormwater infrastructure. No Civil Engineering detailed designs were compiled at this stage therefore, no construction of the concrete channels was implemented as proposed on the Hydrological Impact Assessment..

The mine has an existing WUL (License Number; 08/C11B/AGJ/2141) subject for renewal. The Colliery has a mining right (MP 30/5/1/2/68MR) in terms of the MPRDA for the Colliery.

Any mining activity has the potential to impact upon the baseline water quality of an area and, if not managed correctly, stormwater may pose a risk of flooding to project infrastructure. The aim of stormwater management measures is to mitigate these impacts by fulfilling the requirements of the National Water Act (Act 36 of 1998) and more particularly GN 704.

The following definitions from GN 704 are appropriate to the classification of catchments and design of stormwater management measures at the Mooiplats Colliery:

- **Clean water system** includes any dam, other forms of impoundment, canal, works, pipeline andany other structure or facility constructed for the retention or conveyance of unpolluted (clean) water.

- **Dam:** includes any settling dam, slurry dam, evaporation dam, catchment or barrier dam and anyother form of impoundment used for the storage of unpolluted water or water containing waste (i.e.,dirty water).

- **Dirty area:** means any area at a mine or **activity** which causes, has caused or is likely to cause pollution of a water resource.

- **Dirty water system:** This includes any dirty water diversion bunds, channels, pipelines, dirty waterdams or other forms of impoundment, and any other structure or facility constructed for the retentionor conveyance of water containing waste (i.e., dirty water); and
- **Activity:** means any mining related process on the mine including the operation of washing plants,mineral processing facilities, mineral refineries, and extraction plants; the operation and the use ofmineral loading and off-loading zones, transport facilities and mineral storage yards, whether situated at the mine or

not; in which any substance is stockpiled, stored, accumulated, dumped, disposed of or transported.

In addition to the above, the Department of Water and Sanitation (then Department of Water and Forestry) developed Best Practice Guidelines for the mining industry, which should inform the design and operation of the Mooiplats Colliery.

Figure 5:Mooiplats Colliery Infrastructure Status Quo in 2018

Figure 6:Mooiplaats Colliery Plant Area Proposed Stormwater Channels[WSP, Hydrological Impact Assessment, July 2019]

Figure 7:Co-Disposal Facility Proposed Stormwater Channel [WSP, Hydrological Impact Assessment, July 2019]

7.2 Design Principles for Stormwater Management

As discussed in the previous section GN 704 requires the following:

- **Capacity:** dirty water systems are to be designed, constructed, maintained, and operated so that they are not likely to spill into a clean water system or the environment more frequently than once in 50 years.
- **Conveyance:** all water systems are to be designed, constructed, maintained, and operated so that they convey a 1:50 year flood event.
- **Freeboard:** as a minimum, any dirty water dams are to be designed, constructed, maintained, and operated to have 0.8m freeboard above full supply level.
- **Collect and Re-Use:** ensure that dirty water is collected and re-used as far as practicable.
- **Diversion:** minimise flow of any surface water or floodwater into coal mine workings.

A series of design principles for stormwater management have been developed to ensure compliance with the requirements of GN 704 and BPGs.

The proposed stormwater management plan for the entire site is presented on, whilst presents more detail around the plant area. The key features include:

- Clean stormwater will be prevented from entering dirty water catchments by creating perimeter berms around dirty water areas and dirty water collection infrastructure (channels and dams).
- Dirty stormwater from the operational areas (crushers, ore stockpiles, load out stations, workshops, stores, contractor's area etc) is collected by lined drainage channels and into dirty water containment facilities, pollution control dam.
- Dirty stormwater and any groundwater collecting within the pit will be collected and pumped to the dirty water dam.
- Runoff from the hard overburden stockpile will be prevented from entering any surface water receptors by creating perimeter stormwater retention berms to collect runoff and allow it to evaporateand/or infiltrate to

ground. Given the waste rock dumps do not pose a `considered compliant with GN 704.

- The topsoil stockpile will be revegetated and any runoff from this will be classified as clean.
- Dirty water within the dirty water containment facilities will be re-used at the site for dust suppression, wash down or other non-potable uses where water quality permits.

To meet the design principles detailed above, detailed Civil Engineering design for the proposed stormwater management measures are presented on this study, along with the specific hydraulic design standards, methodologies, assumptions, and input parameters for each stormwater management correction measures proposed in the study.

7.3 Evaluation of Existing Stormwater Infrastructures

The evaluation of existing stormwater infrastructure includes assessment of existing stormwater water concrete channels capacity to handle stormwater run offs and evaluation of stormwater pollution control dams' capacity to handle additional volumes of dirty water while maintaining 0.8m free board to avoid overflows.

To conclusively evaluate the stormwater infrastructure the following was investigated and is reported on the following sections of this paper:

- The impact of non-maintenance of existing stormwater concrete channels in the receiving bodies such as silt traps, pollution control dams and management of over silted stormwater concrete channels.
- The impact of non-constructed stormwater channel as indicated on the Hydrological Impact Assessment Report, July 2019 around the dirty areas on the entire stormwater management facilities.

7.4 Recommendations from Hydrological Impact Assessment (2019)

The following recommendation were made by WSP Environmental Pty ltd , in terms of Regulation GN704:

- To prevent cross-contamination, it must be ensured that there is no handling and disposal of substances that may give rise to pollution within designated 'clean' areas.
- It is recommended that gabion 'sieves' are placed at the outlet of coal stockpile areas and up-gradient of the pipes/channels. The intention of the gabions will be to prevent large debris from leaving the facilities.
- During storm events and potentially resulting in a backlog of associated infrastructure. These will need to be actively managed to prevent clogging of the gabion baskets.
- The pipes, channels and PCDs need to be constructed to facilitate routine maintenance (i.e., simple, effectual housekeeping).
- It is recommended that stone pitching channels and concrete pipes are used to transfer runoff. Stone pitching is recommended to reduce high runoff velocities in channels and sulphate-resistant concrete to reduce sulphate content generated in 'dirty' areas with sulphate contaminants.
- To prevent clogging of the grated channel covers and maintain channel capacity, best practice and proper housekeeping practices must be ensured.
- To prevent subsurface contamination migration, hardstanding is proposed for the storage areas.
- All pipes and channels must be checked after any major rainfall events to ensure that there are no blockages and that the water flow will not be restricted in any way.
- Sediment that accumulates within pipes, channels and retention facilities needs to be removed directly after the storm events and appropriately disposed of to ensure design capacity is maintained.
- Erosion protection will be required at the outlet of the 'clean' water pipes discharging to the environment. Erosion protection can take the form of gabions or geotextiles.

- It is recommended that the PCDs be operated empty or at a storage level low enough to accommodate storm water inflows, whilst meeting the required spillage frequency and freeboard requirements

7.5 Remedial Measures Implemented (2019)

None of the remedial measures related to the stormwater management facilities was implemented on site to date. Refer to the 2024 latest arial photograph .

7.6 Non-Compliant Stormwater Management Issues (2024)

- The drains were clogged, indicating a lack of implementation of measures to prevent product material from being washed into the drains around the product stockpiles.
- Dirty water collected from the plant area seeped into the clean water trench along the office area.
- No clear diversion of dirty water from clean water areas implemented on site.
- Plant and stockpile areas are the greatest contributors of dirty water ponding areas within the plant area.
- Over silted plant pollution control dam due to poor maintenance of silt trap facility on the upstream side of the plant PCD.
- The plant area topography slopes away from the original silt trap position towards the southern part of the plant PCD, this has resulted in dirty water with silt entering the PCD .
- The PCDs should be operated such that they are empty to ensure that a 1 in 50-year storm event, for which they are sized, can be adequately contained.
- A desktop study was completed to evaluate the capacity of the PCD at the co-disposal area. The runoff from a 1:50 year storm for the catchment area in question was calculated to be approximately 13 940m³. The "as-built" capacity of the dam was calculated to be 23 500m³. The PCD therefore has to be operated at a minimum level to ensure that the dam has capacity available in excess of 23 500m³ available. Currently the dam is operated at higher than maximum capacity and therefore cannot contain a 1:50 storm.

- The PCDs are operating over and above their capacity.
- It was therefore recommended that the 1 in 50-year volume be pumped out from the PCD over a decent interval period in case another storm event occurs.

Figure 9:Surface Infrastructure-Existing Stormwater Status Quo

8. HYDROLOGY

8.1 Hydrological legislation

Various guideline documents and regulatory requirements were studied to ensure that the storm water measures so proposed for the Mine will in fact ensure legal compliance once these remedial actions are implemented by the Mine.

8.2 Regulatory and Guideline Documents

DWS Legislation

- National Water Act, 1998 (Act 36 of 1998)
- GN 704 of 4 June 1999
- GN R991 of 18 May 1984
- GN R1560 of 25 July 1986
- Water Quality Management Policies and Strategies in South Africa
- Minimum Requirements: Handling, Classification, and disposal of Hazardous Waste 2nd Edition 1998
- Other Legislation
- Articles 634, 635 & 636 of Regulation 36784 – of August 2013 – Department of
- Environmental Affairs (Act No. 59 of 2008) – Waste Classification and Management
- Regulations
- Environment Conservation Act, 1989 (Act 73 of 1989)
- Minerals and Petroleum Resources Development Act (Act 28 of 2002)
- GN R992 of 26 June 1970
- National Environmental Management Act, 1998 (Act 107 of 1998)

8.3 Legal Framework

8.3.1 Constitution of RSA, 1996 (Act 108 of 1996)

The Constitution of South Africa specifies the environmental right of the people of South Africa. It then more specifically states that the environment should not be harmful to the health and wellbeing of its citizens and for the environment to be protected for the benefit of present and future generations.

8.3.2 National Environmental Management Act, 1998 (Act No. 107 of 1998)

The National Environmental Management Act (NEMA) provides the guiding legislation and framework for environmental management in South Africa. The act more specifically describes a set of fundamental guiding principles governing the actions of those organs of state that may significantly affect the environment. The Department of Water Affairs & Sanitation (DWS) is thus guided by these principles in the development and implementation of various policies and strategies.

8.3.3 Minerals and Petroleum Resources Development Act, (Act 28 of 2002)

The Minerals and Petroleum Resources Development Act (MPRDA) regulates the overall mining process and provides for safety and health in the mining industry. The Act supports the principles of Integrated Water Resource Management (IWRM) by promoting the goal of sustainable development in the process of developing the mineral and petroleum resources of the country.

8.3.4 National Water Act, 1998 (Act No. 36 of 1998)

The National Water Act (NWA) emphasizes the effective management of South Africa's water resources through the basic principles of Integrated Water Resources Management (IWRM).In terms of the Act, various regulations have been developed to regulate, protect and manage water that is being used from a water resource. Section 26(4) of the Act more specifically has regulations where water users must ensure the following:

- Promoting economic and sustainable use of water
- Conserving and protecting water resources
- Preventing wasteful water use
- Facilitate the management of water use, and
- Facilitate the monitoring of water use and water resources

8.3.5 DWA: Water Use Regulation, GN 704

In terms of the NWA, specific regulations were promulgated in respect of the use of water for mining aimed at protecting water resources, referred to as Government Notice No. 704 of 4 June 1999.The agreement is that DWS will subscribe to the principles of co-operative governance where DMR should co-ordinate environmental management within the mining industry as part of the EMP process.

8.3.6 Overall Water Management Context

It is important that the development of a Storm Water Master Plan (SWMP) cannot be done in isolation where this must be guided by the overall water management context that should include the following:

- National, regional and site-specific water management context
- Integrated Mine Water Management in a regional context
- Mine water management requirements in terms of the life cycle phases of a mine
- Integrated regulatory and procedural guidance

8.3.7 DWS: Best Practice Guideline G1 - Storm Water Management (2008)

The Best Practice Guidelines (BPG) developed by DWS for Storm Water Management targets the waste management hierarchy as follows:

- Pollution Prevention
- Minimization of Impacts (re-use, reclamation & water treatment)
- Discharge or disposal of waste and/or wastewater (risk-based approach)

We have carefully studied the G1 BPG for Storm Water Management and can report the following:

Principle 1: Keep Clean Water Clean

The SWMP model (PCSWMM) developed clearly indicates the clean vs dirty water areas so managed for the Mine.

Principle 2: Collect and Contain Dirty Water

Dirty water areas must be limited to the smallest possible footprint. All dirty water areas must be drained to an in-line silt trap and eventually the PC Dams. The dirty water canals must all be lined, and the PC Dams must be lined with a leakage detection system linked to a sump with level control pumps.

Principle 3: Sustainability over Mine Life Cycle

The dirty water facilities must be planned to ensure full compliance for the Mine life cycle. Special
extended time simulations will be used to evaluate the sizing of the PC Dams for the 1:50 year storm

event (cumulative impacts, i.e., not only the 1-day event but also cumulative over time). Sumps and
return water pumps will be sized based on the Mine's water balance diagrams that were supplied.

Principle 4: Consideration of Regulations & Stakeholders

This principle strongly supports effective liaison with the Department of Water Affairs & Sanitation (DWS) to ensure that ideas and concepts are confirmed beforehand to ensure that the statutory requirements are met.
In this regard it is proposed that, once the SWMP has been approved by Mine Management, a meeting is arranged with DWS where the improvements to the SWMP are openly discussed and agreed upon.

The guideline document has eight (8) specific procedures that are required when a new SWMP is designed and constructed for a Mine:

Procedure 1: Define the objectives of the storm water management plan

The following objectives have been considered in this SWMP:

- A comprehensive clean vs dirty water separation system must be designed for the Mine.
- All dirty water areas must be isolated where the runoff from these areas must be routed to a Pollution Control Dam (PC Dam).
- The infrastructure used to divert the clean and dirty water must be designed according to Regulation GN704 where these facilities must accommodate a 1:50 year peak storm event.

Procedure 2 : Technical Situation Analysis

- A comprehensive SWMP model was developed for the Mine where we have used the well-known CIVIL 3D Autodesk design software.
- All clean –and dirty water areas have been divided into catchments which are routed as part of the Mine's overall SWMP.
- The positions of the PC Dams, silt trap, sumps and pumps, cut-off berms and drains as well as canals have all been indicated.
- The Mine's water balance figures, flow data, as well as the water balance report by WSP was used to simulate the design data and return water strategies in our

model. An updated water balance report is recommended to better inform the current stormwater design.

Procedure 3 : Conceptual Design and Review

- This must be arranged once the Mine has accepted the overall SWMP strategy.

Procedure 4 : Assess the Suitability of the Existing Infrastructure

- This report will investigate the existing infrastructure and facilities already installed by the Mine.

Procedure 5 : Define the Infrastructure Changes that are required

- New recommendations will be made where this is deemed necessary.

Procedure 6 : Undertake Detailed Designs of all required Infrastructure

- The PCSWMM model was used extensively to conduct scenario modelling to optimize the SWMP. The SCS Type 3 design storms have been used in our model.
- Extended time simulations were conducted to test the size of the PC Dams with sump and pumps to accommodate peak wet and dry weather periods that is foreseen at the Mine.
- The proposed mitigation measures will be designed as a separate project and once the mine has signed off on the proposed measures.

Procedure 7: Define Operational, Management & Monitoring Systems Responsibilities

- Where practically possible, limit the impacted dirty water footprint of the Mine to a minimum.

Procedure 8: Document the SWMP

- This SWMP update report will comply with the requirements of this documented approach. We will ensure that our SWMP and model does comply with BPG – G1 Storm Water Management Guideline.

8.4 Design Flood Peaks

8.4.1 Catchment Delineation

The contributing catchment to the river reach was delineated by WSP Environmental Pty Ltd using readily available topographic data. In order to provide a more accurate delineation, aerial imagery was utilised so that current land use and land transformation practices could be incorporated. Catchment delineation was undertaken using 5m contours.**[41101537_Mooiplaats Hydrological Assessment_20190717].**

The delineated catchment is represented in **Figure 9** , together with the associated infrastructure that was considered part of the delineation. Catchment information that was used in generating the design flood estimates for the contributing catchment is summarised in **Table 3.**

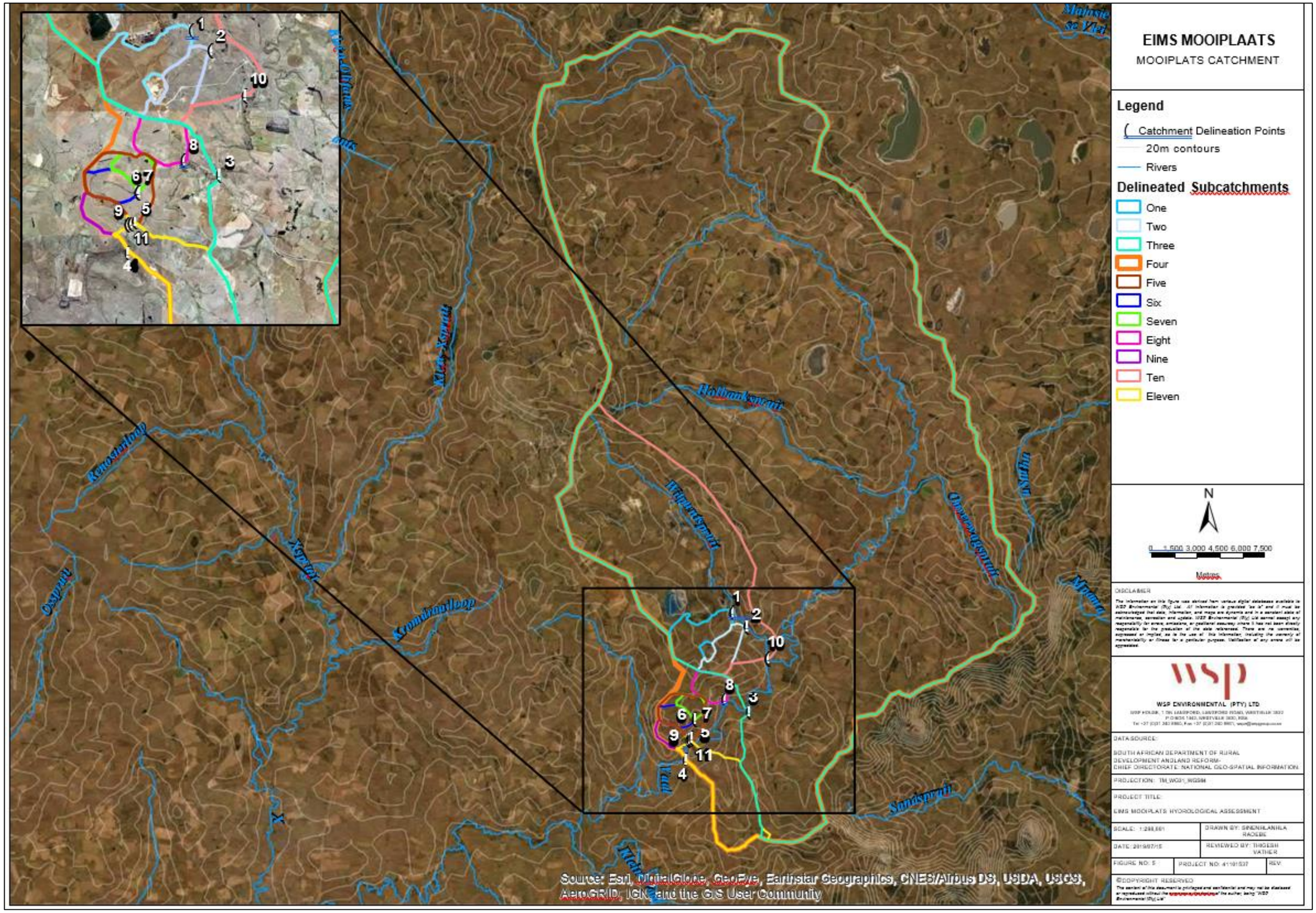


Figure 10:Delineated Catchments –[WSP Environmental Pty Ltd]

8.4.2 Design Flood Peaks Calculation

The estimation of design floods is necessary for the design of hydraulic structures and to quantify the risk of failure of the structures.

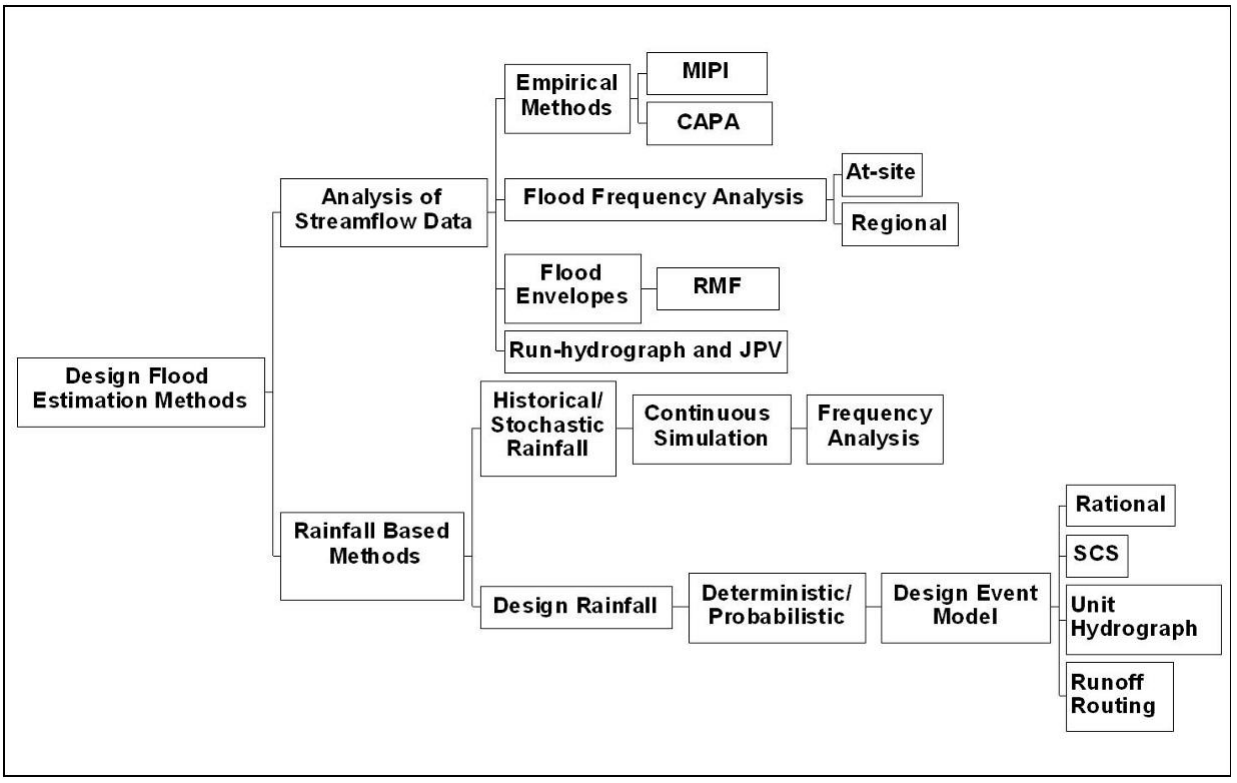


Figure 11:Approach to design flood estimation in South Africa (Smithers and Schulze, 2003)

Design flood peaks were calculated using the RMF, Midgley and Pitman and SDF methods (Table 3). The Midgely and Pitman method used a zone number of 4, the RMF method used a Kovacs region K4 and the SDF method used drainage basin number 28.

The relevant flood peaks for the 1:50- and 1:100-year return intervals for the catchment are shown in **Table 2.** The Midgely Pitman method generally produced lower design flood peaks than the RMF method whilst the SDF method produced the highest flood peaks for each sub catchment. Owing to the differences in the methodology and the resulting design flood peaks, the RMF design flood peaks were used to get the representative flood of the river reach.

Catchment	Return Interval	RMF	Midgley Pitman	SDF
1	1:50	**66.08**	61.14	133.26
	1:100	**83.23**	77.22	172.30
2	1:50	**47.28**	39.54	79.01
	1:100	**59.55**	49.94	102.16
3	1:50	**837.62**	718.03	1073.32
	1:100	**1055.08**	906.98	1388.16
4	1:50	**858.31**	715.61	1075.80
	1:100	**1081.13**	903.93	1391.36
5	1:50	**56.15**	55.48	130.66
	1:100	**70.73**	70.08	168.93
6	1:50	**32.94**	31.14	67.62
	1:100	**41.49**	39.34	87.41
7	1:50	**28.32**	25.85	51.50
	1:100	**35.67**	32.65	66.58
8	1:50	**42.09**	43.12	97.38
	1:100	**53.02**	54.47	125.89
9	1:50	**32.52**	33.33	78.90
	1:100	**40.96**	42.10	102.00
10	1:50	**233.98**	254.69	479.73
	1:100	**308.85**	321.71	620.39
11	1:50	**90.36**	82.95	174.75
	1:100	**116.18**	104.77	225.97

Table 1:Design Flood Volume-WSP Environmental Pty Ltd

The calculated flood extents for the 1:50- and 1:100-year flood events are depicted in **Figures 10 and 11** respectively. The flood extents for the 1:50- and 1:100-year flood events illustrate that the extend of the 1:50- and 1:100-year flood events pose a threat to the existing stormwater infrastructure at Mooiplaats Colliery.

Figure 12:1:50 year Flood line-[WSP Environmental Pty ltd)

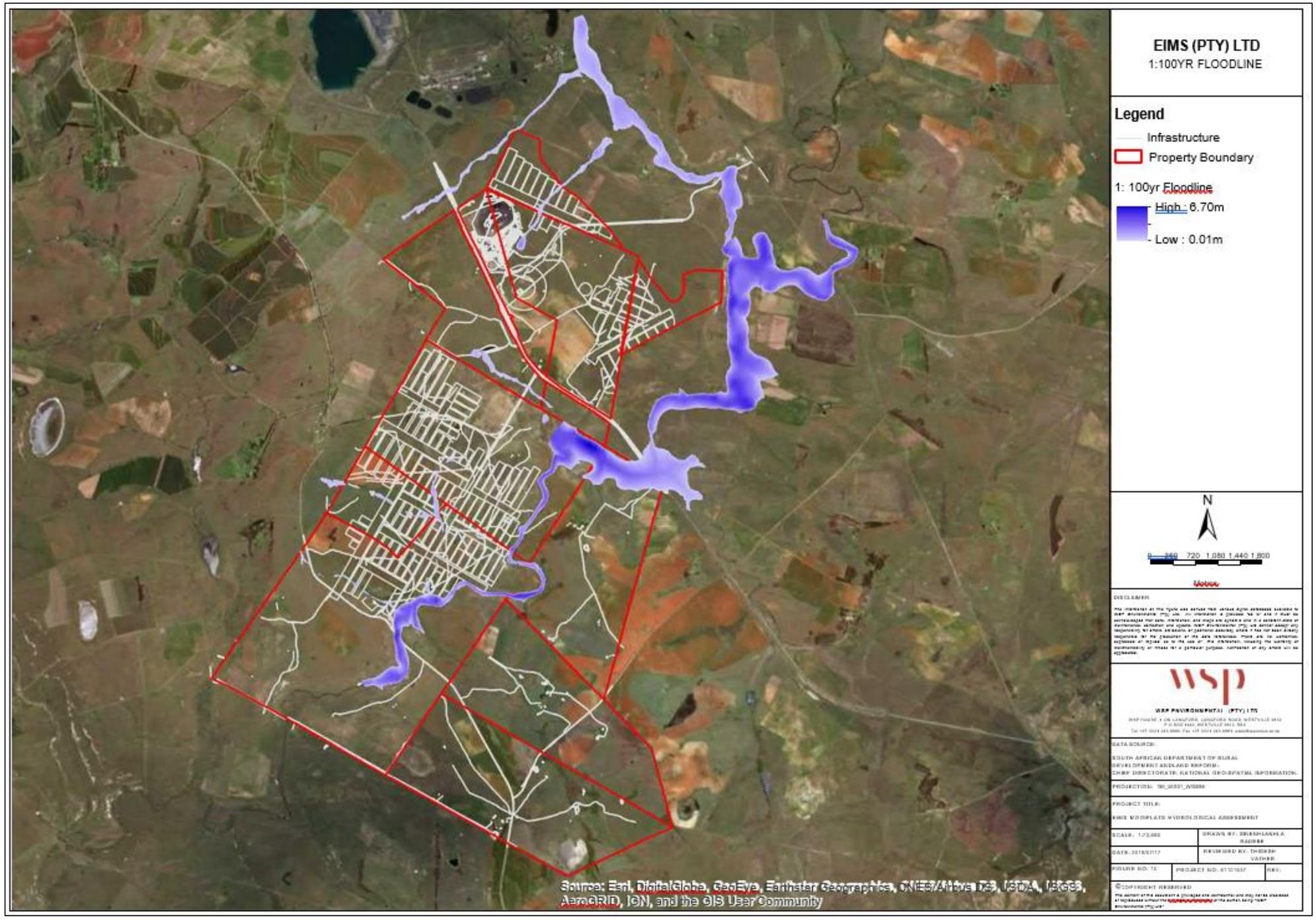


Figure 13:1:100 Year Flood line -[WSP Environmental Pty ltd

8.5 Rational Stormwater Design

Since its inception in 1851, the rational method has become one of the most widely used methods for determining peak flows from small catchments. The basis of the relationship is the conservation of mass and the premise that the flow rate is directly proportional to the size of the contributing area and rainfall intensity. Rainfall intensity is a function of the return period.

Peak flow is obtained by the following relationship:

$$Q = \frac{CIA}{3.6}$$

Where:

- Q = peak flow (m^3/s);
- C = run-off coefficient;
- I = average rainfall intensity over catchment (mm/hour);
- A = effective area of catchment (km^2); and
- 3.6 = Conversion factor.

Despite the Rational method's shortcomings and widespread criticism, it provides realistic results, especially in combination with other run-off estimation models. Disadvantages of the method include those reliable hydrographs cannot be calculated, and the method is of limited use in flood routing calculations.

Due to the disadvantage that the rational method poses of being unable to accurately derive hydrographs and limitation in flood routing. The SARF Detention evaluation was used in the report to further refine the outputs of the rational method.

Three runoff hydrographs have been generated as below:

- A runoff hydrograph using the method of James (Estimation of Urban Flood Hydrographs, Proc 2nd Intl Conf Urban Storm Drainage, Illinois 1981)
- A routed hydrograph using the Modified Puls method
- A routed hydrograph using a Runge Kutta technique (Brooker unpublished Msc Eng)

The SARF Detention Evaluation was done taking into account anticipated pipeline to the nearest existing discharging point.

8.6 Clean and Dirty Catchments

Three main drainage systems were identified within the Mooiplaats Colliery based on land use, and this is shown in **Figure 11:**

- Plant Area – 'Dirty' water catchments draining to the PCD and Genset Dam;
- Slurry Dam – 'Dirty' water generated on the Slurry Dam; and
- Clean catchments – 'Clean' water generated from the surrounding clean catchments

The plant area was discretised into a total of 20 sub-catchments (SC1-SC19 and the shaft) and this is shown in **Figure 7**.

The slurry dam was discretised into a total of 3 sub-catchments (SD1-SD3) and is shown in **Figure 6.**

The clean catchment draining towards the site was discretised into three sub catchments (C1-C3) and is shown in Figure 13. These catchment characteristics are shown in **Table 3**.

System	Sub-catchment	Description	Area (ha)	Width (m)	Flow Length (m)	Imperviousness (%)
Plant Area	SC1	Dirty	2.57	170	151.28	25
	SC2	Dirty	1.04	60	173.73	25
	SC3	Dirty	1.35	130	104.02	70
	SC4	Dirty	2.40	110	218.52	70
	SC5	Dirty	1.45	130	111.63	70
	SC6	Dirty	1.84	100	183.93	70
	SC7	Dirty	1.12	100	112.12	70
	SC8	Clean	0.25	500	5.01	70
	SC9	Clean	0.47	45	103.40	40
	SC10	Clean	1.39	55	253.15	50
	SC11	Dirty	0.61	65	94.37	70
	SC12	Dirty	0.19	35	55.37	70
	SC13	Dirty	0.31	55	56.60	70
	SC14	Dirty	0.37	50	74.96	60
	SC15	Dirty	0.47	60	79.15	40
	SC16	Intermediary	0.91	40	228.45	25
	SC17	Intermediary	0.70	40	175.03	25
	SC18	Intermediary	1.87	60	311.65	25
	SC19	Intermediary	2.01	80	251.75	25
	Shaft	Dirty	2.79	80	348.20	25
Slurry Dam	SD1	Dirty	9.34	310	301.24	35
	SD2	Dirty	11.04	250	441.64	35
	SD3	Dirty	10.69	300	356.30	35
Clean Catchments	C1	Clean	10.11	225	449.25	10
	C2	Clean	11.01	150	733.89	10
	C3	Clean	28.56	330	865.35	10

Table 2: Stormwater Sub catchment

9. STORM WATER DESIGN APPROACH

9.1. Return Period

Any sustainable Storm water Management Plan has to be designed to meet some specific design criteria in order to ensure a high probability of success. The same procedure was used for the design of the Stormwater Management Plan for Mooiplats Colliery Mine. The method used in establishing the design criteria is referred to in statistical terms as the Probability of exceeding the chosen event.

9.2 Statistical Analysis

To determine the possibility of the respective storm events occurring, reference was made to the methods used by Montgomery and Runger (2007) and the Drainage Manual (2007).

An increasing probability of exceeding a 30-year design life was used to calculate different return periods using Equation 1-1. The results obtained showed that at a lower probability of exceeding the design return period needed to be substantially higher, i.e. ensuring that the return period chosen to design for happens very scarcely, it must be ensured that the probability of exceeding is fairly low.

$$P_X = \left(1 - \frac{1}{T}\right)^{-x} \qquad \textbf{Equation 1-1}$$

Where:

- X = Number of exceeding occurrences
- n^Cx = Number of combinations of n events taken x at a time
- $n^Cx = \frac{n!}{x!\,(n-x)!}$ **Equation 1-2**

- P_1 = Probability of at least one exceeding occurrence during the life
- n = Design life in years
- T = Return period in years

To aid in determining the design return period, **Figure 14 and Figure 15** was compiled by grouping together return periods**. Figure 14** illustrates that 85 percent of the exceeding occurrences occur at a design return period of less than 1:50 years. The probability of a storm event exceeding the 1:50 year flood was thus determined to be 13 percent, which indicates a high probability of success. The 1: 50-year return period was thus used to design all Storm water Management Plan components.

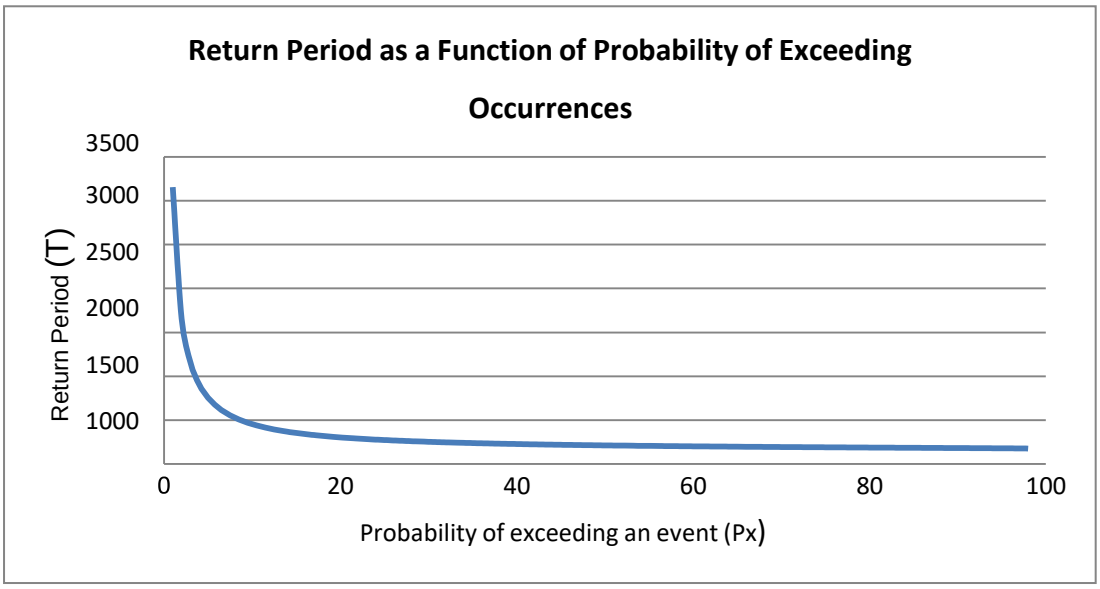


Figure 14:Return period probability.

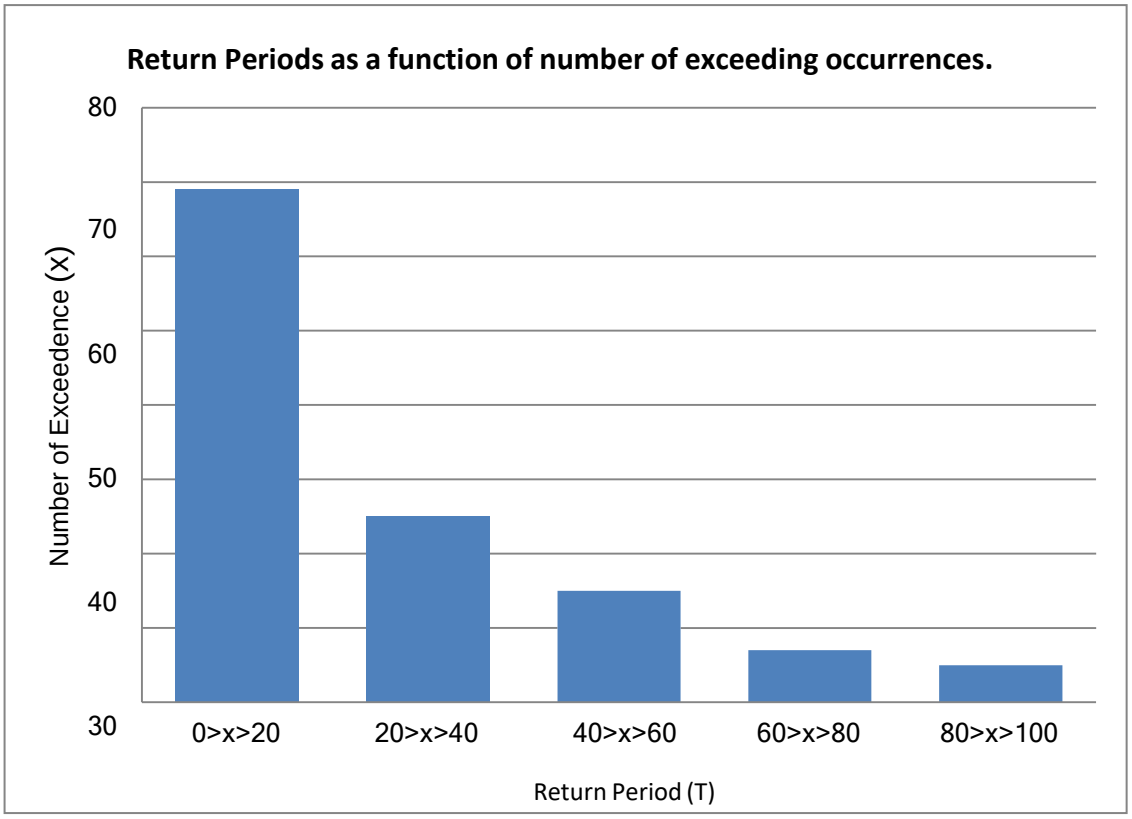


Figure 15:Number of exceeding occurrences

9.3 Run-off calculation methodology

Watson (1981) states that run-off calculation techniques used in South Africa are inadequate and often based on unverified catchment and rainfall data. The use of various models should be used to derive run-off data and to ensure that gross errors in estimation are eliminated. The SCS and Rational methods were selected to derive run-off for purposes of this study. Each one's background and calculation methodology are briefly explained below.

9.4 SCS methodology

The SCS method for designing flood estimation is widely used and has, in the USA, replaced the rational method (Smithers & Schulze, 2003). In South Africa, an independent Water Research Commission funded verification study, revealed the SCS method is the only method of those tested against catchment run-off data, to be statistically acceptable and reliable (Schulze, Schmidt & Smithers, 2004). The SCS method, adapted for South Africa, is now widely used for estimating run-off for small catchments. The SCS model uses the following relationship to derive run- off:

The SCS method uses measured daily rainfall incombination with a soil moisture abstraction model to derive run-off estimations. A major advantage of the method is that entire hydrographs can be calculated for flood routing purposes.

9.5 Rational method

Since its inception in 1851, the rational method has become one of the most widely used methods for determining peak flows from small catchments. The basis of the relationship is the conservation of mass and the premise that the flowrate is directly proportional to the size of the contributing area and rainfall intensity. Rainfall intensity is a function of the return period.

Peak flow is obtained by the following relationship:

$$Q = \frac{CIA}{3.6}$$

Where:

- Q = peak flow (m^3/s);
- C = run-off coefficient;
- I = average rainfall intensity over catchment (mm/hour);
- A = effective area of catchment (km^2); and
- 3.6 = Conversion factor.

Despite the Rational method's shortcomings and widespread criticism, it provides realistic results, especially in combination with other run-off estimation models. Disadvantages of the method include those reliable hydrographs cannot be calculated, and the method is of limited use in flood routing calculations.

10. STORM WATER CHANNELS

10.1 Channel Specifications

All primary stormwater channels/ main collecting channels concrete lined channels alongside the haul road channelling dirty water into the PCD. They are also concrete V-drain channels to allow vehicular access across the channel. The primary concrete lined channels will be main collecting channels from the earth secondary compacted channels.

The channels will have a minimum gradient of 0.5%. No standing water will occur in the channels. This combined with the small channel footprints will result in low seepage volumes from the channels. Less than 1 m³ of seepage will occur from all the channels during a 2-hour storm, assuming a seepage rate of 1x10-7 m/s. The material excavated from the channel is placed in a berm on the outside of the channel. This serves three purposes: · the berm acts as a clean storm water cut-off · the berm will increase the capacity of the channel above its design capacity · the berm allows cost effective construction as load and haul volumes are minimised.

The berms should be compacted and vegetated. Channels should be kept free of long grass, shrubs, and woody vegetation.

10.2 Channel Sizing

All new proposed channels were sized to accommodate the flood peaks presented in Table 2. The Mannings' open channel flow equation was used to calculate flow depths in the channels. It is good practice to allow a further 0.3 m of freeboard in the channel. This is to allow for wave action and flow surges in the channel. To keep channel depths practical to construct, the freeboard allowance within the channel is varied. However, where freeboard within the channel is less than 0.3 m the berms on the outsides of the channels provide the additional freeboard. A minimum of 0.3 m freeboard is therefore available in all channels.

It is not considered necessary to extend the concrete lining to the top of the channel, as water will only contact the unlined upper section of the channel during extreme events, in the region of a 1:100-year event.

The following assumptions were made during the design of the flow diversion channels:

The channels are sized to take the maximum flow calculated for the downstream end of the contributing catchment and the channel sizing will be uniform along their entire length.

The longitudinal gradients are based on 0.5m contours provided by DCME.

Clean water will be kept out of the dirty water channels by constructing and maintaining a linear bund alongside the channel with the material excavated from the channel (as shown on Figure 16).

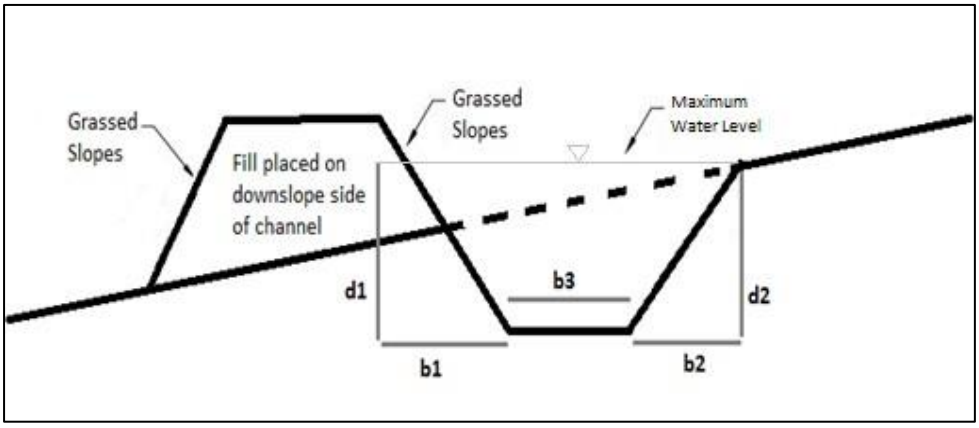


Figure 16:Storm water channel configuration design

10.3 Clean & Dirty Water Delineation Layout

The proposed infrastructure pertinent to this SWMP has been classified as dirty or clean areas as indicated in **Table 4**.

Area Classification	Mine Areas	Storm water Treatment Technique
Clean	The area upstream of the Mine infrastructure (upstream of the pit and upstream of the Main offices areas Haul roads Topsoil	Divert around dirty areas and discharge to natural environment system and the water is not collected.
Dirty	Run of Mine (RoM) and Product Stockpile Pit excavations Overburden material (Hards and Softs)	Perimeter berms and channels Convey dirty water and contain in a Pollution Control Dam (PCD) containment facility and reuse

Table 3:Clean and dirty area classification

10.4 Run Off Parameters

As was alluded to in Section 9.5, both the Rational and SCS methods were used to calculate the peak run-off volumes. The parameters obtained are summarized in this chapter.

10.5 Hydraulic Length

The hydraulic length refers to the length of the point furthest away from the collection point, which contributes to the run-off of the catchment. This value is used to calculate the time of concentration which refers to the time it takes forthe whole catchment area to contribute. This value plays a pivotal role in determining the run-off for the catchment.

11. RETENTION FACILITIES (DAMS)

Pollution control dams (PCDs) form an integral and important part of the water management systems on a mine. Different types of PCDs may exist on a mine site, such as process water dams, storm water dams, evaporation dams and other dams, possibly including excess mine water dams and natural pans.

The purpose of PCDs for the mine and in the water management circuits are to:

- Minimize the impact of polluted water on the water resource
- Minimize the area that is polluted as far as possible, by separating out clean and dirty catchments, and
- Capture and retain the dirty water contribution to the PCDs that cannot be discharged to the water resource, due to water quality constraints, and manage this dirty water through recycling, reuse, evaporation and/or treatment and authorized discharge.

The design, operation, and closure of PCDs are important aspects in the successful operation of a mine, given the inherent safety and environmental risks posed by structural failure, spillage or overtopping of these facilities. It is thus important that within engineering design this field a good understanding of the management of water, both surface and groundwater, when designing and/or operating PCDs.

Best practice for mine water PCDs is developed from a combination of the following Requirements:

- Legislative requirements
- Industry norms and generally accepted good practices.
- Technically and environmentally sound design practices
- Life cycle planning for the PCD
- Management of hazards and risks
- Effective water resources management, both for the mine site and within the regional Catchment Management Plan,

Effective design, operation, management, and closure of PCDs are ensured through adherence to the above requirements. This design therefore covers the full life cycle

of a PCD, including design, construction, operations, and closure.

Best Practice water management for PCDs is based on the following general principles:

- All PCDs must comply with the legal and regulatory conditions within South Africa
- Worst-case conservative assumptions were made in instances where the quality of water to be contained within the PCD could not be established with certainty.
- PCDs are sited, sized, and operated to maximise the opportunities for water reuse and reclamation and to minimise the impacts on the water resource.
- Designs should adhere to the generally accepted principles of sustainable development and,
- Best Practice Environmental Option (BPEO), as defined in Section 2 of NEMA, by integrating social, economic, and environmental factors during the planning and implementation and closure phases.
- The full life cycle of the PCD's were considered in the design, operation, and closure of PCDs.
- Designs should adopt a holistic approach, including:
    - Sustainability
    - Full life cycle of the PCD
    - Water quantity and quality, and
    - Surface water and groundwater

11.1 Design and operational philosophy

The design of PCDs on a mine should meet the following broad requirements:

- PCDs should be appropriately sized to meet the requirement of Government Notice No. 704 in terms of spillage frequency.
- PCDs adhere to the relevant dam safety criteria, based on the safety risk classification of the dam. This includes appropriate design and assessment of:
- Geotechnical conditions at the dam site
- Slope stability
- Seepage analysis, and
- Construction requirement, including the material selection for the dam wall.
- PCDs should safely accommodate the appropriate design floods, based on the safety risk classification of the dam.

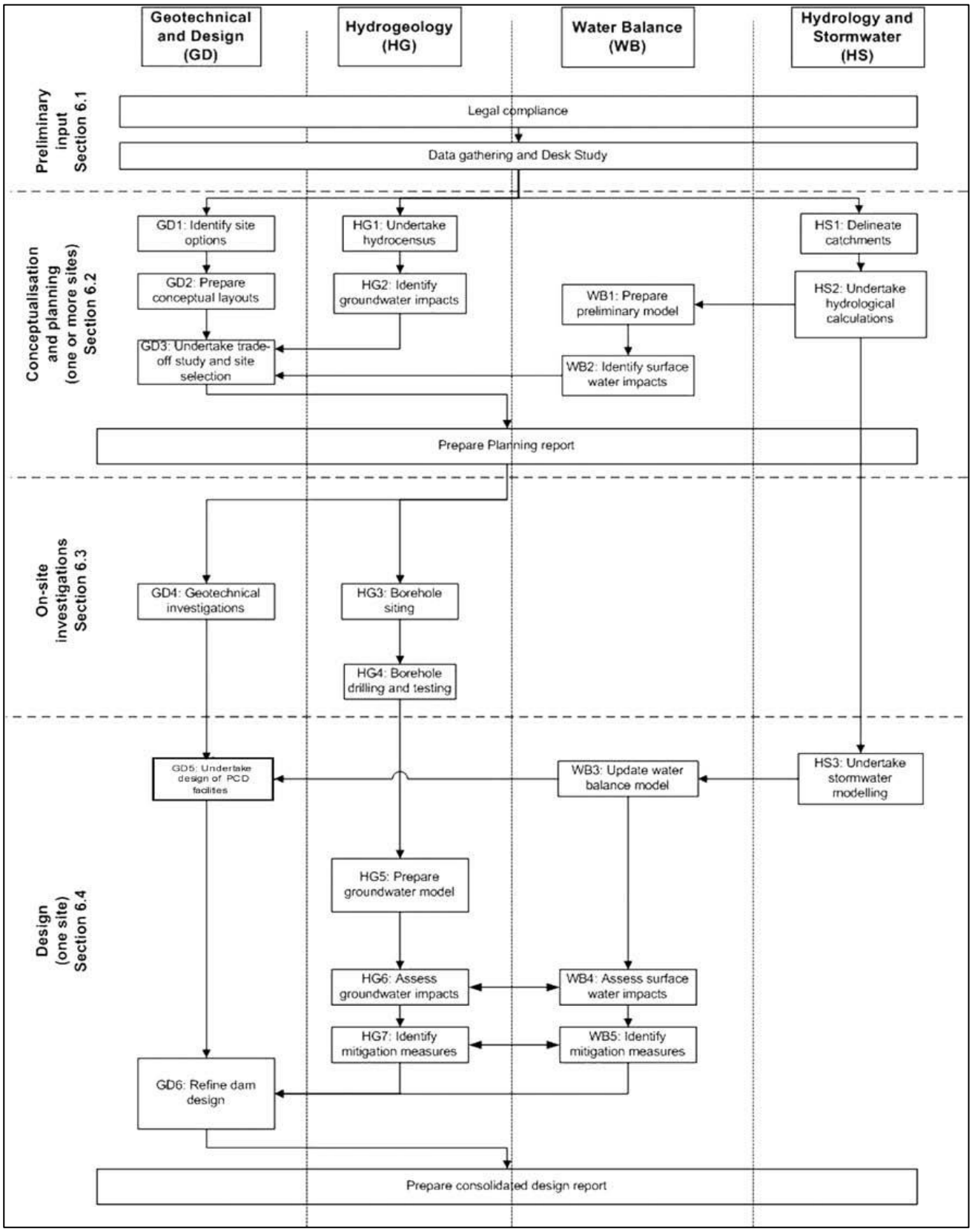


Figure 17:Task/Activity flow for PCD Design

Name	Contributing Area (ha)	Max. Flow (m^3/s)	Total Flow (ML)	Total Flow (m^3)
Plant Area PCD	22	6.81	16.73	16730
Return Water Dam (RWD)	31	6.17	18.41	18410
Genset Dam	1.1	0.65	1.14	1140
Shaft Sump	2.7	0.70	2.15	2150

Table 4:Remodelled flow volumes to containment facilities

11.2 Hydrogeology/Hydrology

Identification of groundwater impacts

For the evaluation of the existing PCD, the design team used the hydro census to identify the potential groundwater impacts for each PCD location.

Such impacts included the following:

- The impact on downstream water users
- Impacts on sensitive or protected areas.
- Impacts on any open-cast or underground workings, shafts, or occupied premises.
- Geological structures
- Effects of seepage, and/or Groundwater quality impacts.

The runoff from the "dirty" areas must be captured, retained, and managed within the mine water systems. The use of diversion berms and channels and PCDs are the typical methods used to manage the runoff. The berms and channels are used to isolate the dirty areas to:

- Prevent the runoff from the "clean" areas from entering the dirty areas, and
- Ensure that the dirty runoff enters the PCD. Every effort should be made to maximize the clean area and minimize the dirty area when locating the PCDs and the diversion berms and channels. In the case of a new mine, the maximization of the clean areas should influence the location of the mine infrastructure.

The recycling or reuse of the runoff and seepage water collected in the

PCDs should be prioritized. The size and frequency of the abstraction for reuse will depend on the water use within the site wide water balance.

The 'dirty' water dams were sized according to the recommendations set out in Regulation 704, i.e., the 1:50 year return period was used (as was described in previous chapters).

The 'dirty' water dams were sized to accommodate the total run-off volume attributed to the 1:50 year return period. Regulation 704 indicates that polluted water may not be discharged into the natural environment without being treated, thus all dirty water run-off is conveyed to the Dirty water balancing dam, from where the contaminated water is passed through an oil-water separator to be cleaned. The clean water from the dirty water balancing dam is re-used in the mining plant and for dust suppression around the mine. **The water balance diagram illustrates the process which is followed in Storm Water Management Plan and is attached in Annexure A.**

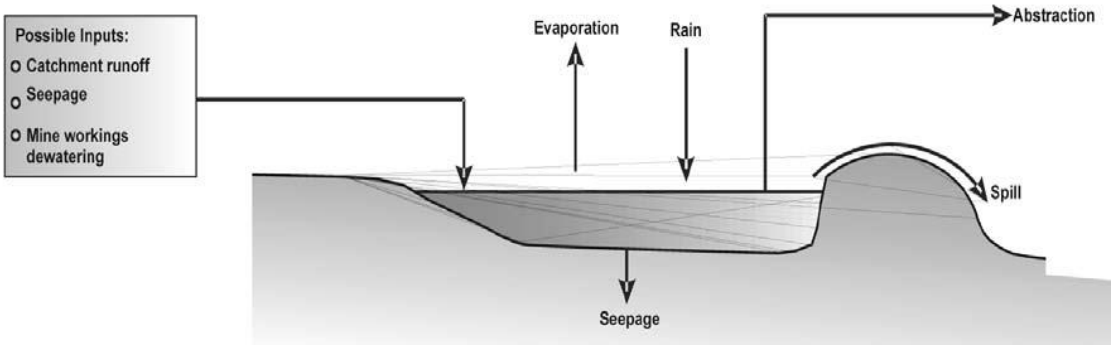


Figure 18:Pathways to consider in a PCD water balance. [Best Practice Guideline - A4: Pollution Control Dams -- August 2007]

11.3 Balancing Dam

The balancing dam provides the Dirty Water Dam with water for re-use in the mine dirty areas. The main purpose of the balancing dam is to retain storm water at a central point where the volume of water can be regulated and to limit the number of oil/water separators required and to enable optimal management of dirty water on site, capacity to store dirty water if the main PCD needs to be repaired / de-silted or something and to provide extra capacity for dirty water storage on site to prevent discharge. The balancing dam is fitted with an overflow away from any facilities to ensure that water can be managed in large flood events. The Pollution Control and Dirty Water Balancing Dam has been designed to comply with

Regulation 704 of the National Water Act.

In compliance with Regulation 704, all dirty water impoundment structures will be operated with 800mm minimum freeboard above full water supply level and designed within 1:50 year storm event.

11.4 Ground Water Management

The fundamental function of the ground water management plan is to provide a guideline and framework for the applicant to identify, mitigate and minimize potential impact of the proposed operation on sensitive environmental and ground water receptors. [JFW Mostert, Pr.Sci.Nat: Gradient Groundwater Consulting]. The proposed groundwater management plan on this study focuses primarily on the construction phase.

Mitigation and management measures associated with the construction phase activities as mentioned on the groundwater impact assessment by [JFW Mostert, Pr.Sci.Nat: Gradient Groundwater Consulting] include the following:

- Areas where vegetation has been cleared shall be rehabilitated as soon as possible to minimise erosion. Erosion control measures should be put in place where necessary. Erosion control measures will be implemented during construction of pollution control dams and construction of storm water channels. These measures include Riprap of large stones that form pollution control dam wall. Riprap will be used to block runoff and prevent water erosion. The second corrosion measure to be put in place is the use of concrete blocks. The concrete blocks fit together and follow the shape of the land and hold soil in place along perimeter of the pollution control dams. They are effective near water. The control of soil erosion will help preserve and protect the construction site and the structure, thus promoting sustainable construction.
- Clean surface water run-off to be diverted by mean of diverting berms around disturbed areas and discharged to the downstream catchment.

12. WATER BALANCE

At the time of the study there was no recent water balance provided from Mooiplats Colliery. Provision was made with the available water balance dated July 2019.

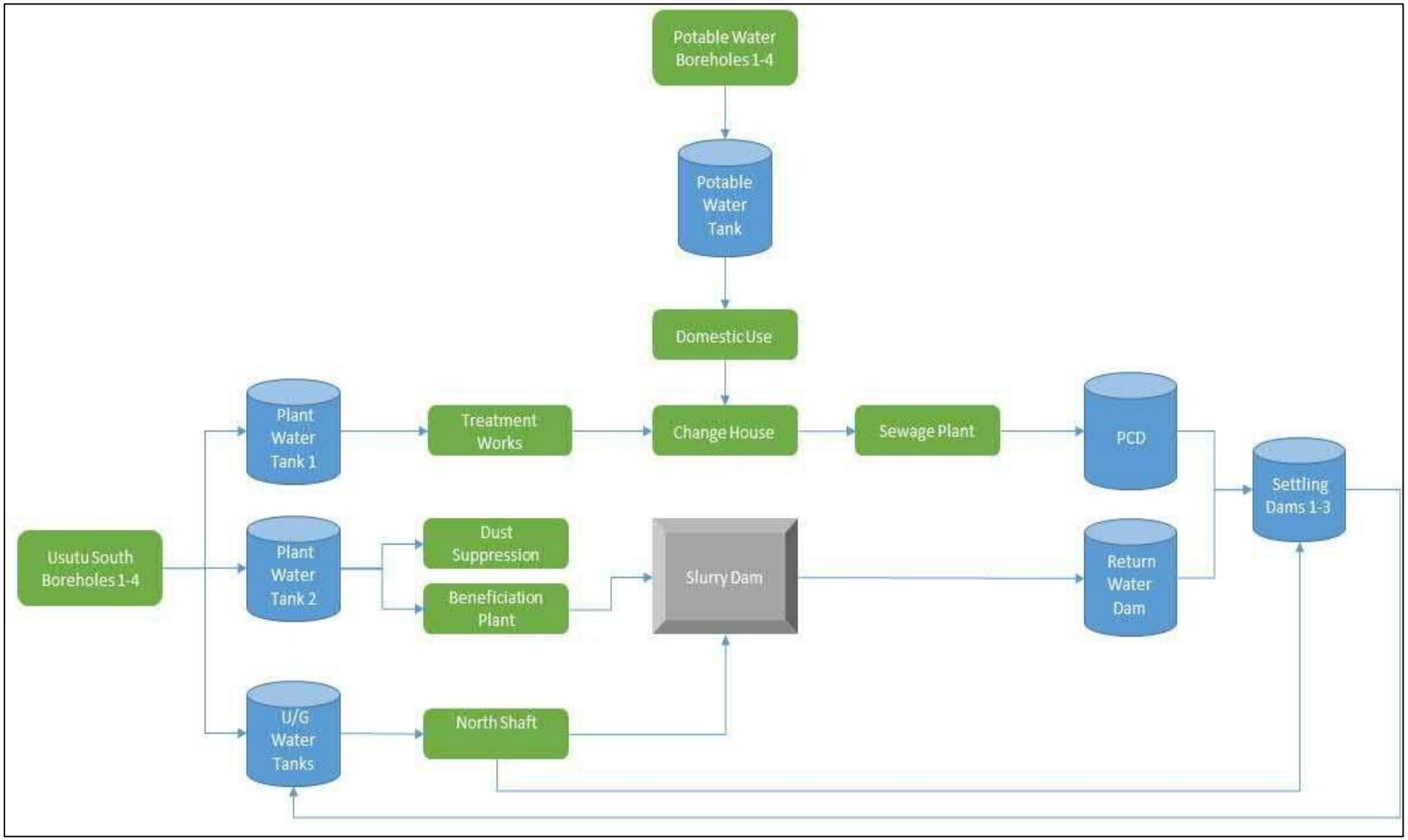
The following assumptions were made during the calculation of the annual average water balance **[WSP, Hydrological Impact Assessment, July 2019]**:

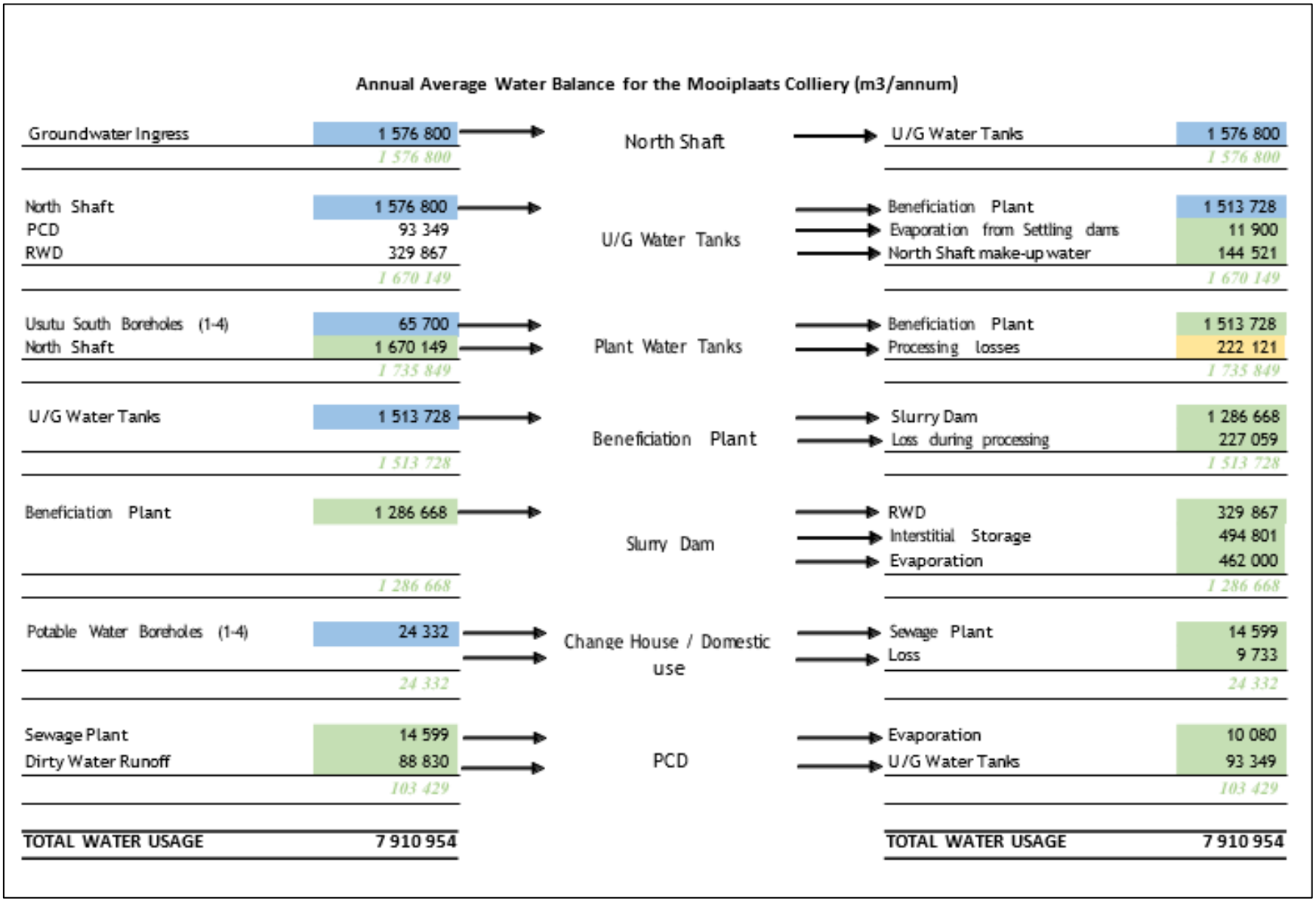
- It was assumed that plant water supply is equal to 48l/s. This was based on the water balance diagram received from the client.
- It was assumed that groundwater ingress to the North Shaft is equal to 50l/s. This was based on the water balance diagram from the client.
- Water usage data was obtained for three months only (August-October 2018). These values were extrapolated were possible for an annual average water balance.
- It was assumed that borehole abstraction would be equal to the maximum limit within the water use licence application.
- It was assumed that 40% of the water loss would occur within the change house. This was based on the water balance calculations from the client.

  A most recent water balance study is recommended to further evaluate the water inflow and outflow on the mine.

ANNEXURE A: WATER BALANCE DIAGRAM

(DESIGNED BY WSP ENVIRONMENTAL PROPRIETARY LIMITED (WSP)


Potable Water Boreholes 1-4
Potable Water Tank
Domestic Use
Plant Water Tank 1
Treatment Works
Change House
Sewage Plant
PCD
Settling Dams 1-3
Usutu South Boreholes 1-4
Plant Water Tank 2
Dust Suppression
Beneficiation Plant
Slurry Dam
Return Water Dam
U/G Water Tanks
North Shaft



Annual Average Water Balance for the Mooiplaats Colliery (m3/annum)

Groundwater Ingress	1 576 800	→	North Shaft	→	U/G Water Tanks 1 576 800
	1 576 800				*1 576 800*
North Shaft	1 576 800	→	U/G Water Tanks	→	Beneficiation Plant 1 513 728
PCD	93 349			→	Evaporation from Settling dams 11 900
RWD	329 867			→	North Shaft make-up water 144 521
	1 670 149				*1 670 149*
Usutu South Boreholes (1-4)	65 700	→	Plant Water Tanks	→	Beneficiation Plant 1 513 728
North Shaft	1 670 149	→		→	Processing losses 222 121
	1 735 849				*1 735 849*
U/G Water Tanks	1 513 728	→	Beneficiation Plant	→	Slurry Dam 1 286 668
				→	Loss during processing 227 059
	1 513 728				*1 513 728*
Beneficiation Plant	1 286 668	→	Slurry Dam	→	RWD 329 867
				→	Interstitial Storage 494 801
				→	Evaporation 462 000
	1 286 668				*1 286 668*
Potable Water Boreholes (1-4)	24 332	→	Change House / Domestic use	→	Sewage Plant 14 599
		→		→	Loss 9 733
	24 332				*24 332*
Sewage Plant	14 599	→	PCD	→	Evaporation 10 080
Dirty Water Runoff	88 830	→		→	U/G Water Tanks 93 349
	103 429				*103 429*
TOTAL WATER USAGE	**7 910 954**				**TOTAL WATER USAGE 7 910 954**

13. EVALUATION OF CO-DISPOSAL FACILITY

The evaluation of co-disposal facility stormwater management system is crucial in evaluating the impact of the co-disposal facility on the return water dam and the silt trap. The stormwater drainage system around the co-disposal directs all dirty water to the concrete silt facility and then overflows to the return water dam. The return water dam is currently operating beyond its design capacity and over the 1:50 year flood design period. After closure of the underground workings, the beneficiation plant at Mooiplaats colliery has continued operation by means of washing coal for external clients. Mooiplaats colliery requested an inspection on the disposal facility in order to plan for future deposition on the facility as well as possible re-mining of the dried-out slurry cell.

12.1 HDPE Geomembrane Lining

From the visual inspection conducted on site the HDPE geomembrane lining in the return water dam is in a fair state, Currently the water in the return water dam does not appear to be leaking through the lining into the environment. From the site inspection, only the silt trap was covered with concrete filled geo-cells. The UV lifespan of the geomembrane is anticipated to be 15 years as it is exposed and susceptible to UV degradation. The geomembrane has therefore reached its design lifespan for UV degradation and need to be tested for competence as a containment barrier.**[Status Quo Report (Co-disposal Facility),August 2024]**

12.2 Penstocks

During the site inspection the original upper-level penstocks appeared in good condition with no signs of blockage or collapse. The lower-level penstocks also appear to be in good condition with no signs of blockage or collapse. Slurry deposition in the lower-level slurry pond have however caused the supernatant pond to shift towards the western embankment. This creates a stagnant dam in the slurry pond that is unable to drain through the penstocks **see figure 19**. This item is critical as it can cause saturation of the western discard embankment that can lower the F.O.S. against failure. The walkways to the penstocks are in serious disrepair and needs to be reconstructed in order to ensure the safety of personnel working in the area. **[Status Quo Report (Co-disposal Facility),August 2024]**

12.3 Slurry Pond

The lower-level slurry pond is currently in operation. The following items need to be addressed as a matter of urgency:

- Slurry line discharge pond on the south end of the slurry pond needs to be extended and moved to points along the western embankment. This needs to be done as there is a deep pool forming close to the western embankment that could lead to a catastrophic failure of the wall. The slurry needs to be deposited in such a way as to drive the supernatant pond back to around the penstocks from where the water can be drained through the penstock in order to minimise the amount of water in the co-disposal. **Status Quo Report (Co-disposal Facility),August 2024]**

Figure 19:Co-Disposal Dirty Slurry Ponding & Over Capacitated RWD

14. CONCLUSIONS

A key objective of stormwater management is the protection of property and infrastructure by the safe conveyance of excessive runoff from extreme 1:50 events.

The current Stormwater Management Infrastructure at Mooiplats does not meet its key design intent, this is mainly due to poor stormwater management and maintenance techniques employed on site to manage the site dirty water. The operational procedure currently being employed on site are non-compliant to the design operational procedure consequently leading to PCDs being silted, stormwater channels flooded, stormwater sump areas being blocked and natural environment being contaminated with dirty water.

The structural integrity condition of the existing stormwater facilities such as, concrete channels around the Co-Disposal facility, PCDs , concrete sumps and concrete silt traps have been noted to be in good structural condition.

The Mooiplats Colliery stormwater has been poorly managed. The design capacity of all stormwater infrastructure is adequate to handle the stormwater volumes experienced on the mine ,however poor management of stormwater infrastructure causes operational inefficiency of the stormwater infrastructure,

The most significant contributor of dirty water surface runoff originates greatly from the coal stockpile and plant area. The dirty footprint of the coal stockpile and the plant area is significantly large making the dirty footprint the most contributor of dirty water runoff with the surface area of 14 Ha. Poor management of the dirty run-off has negatively impacted the clean area and contaminated the clean areas. It can also be concluded that the site cease to have efficient separation system of clean and dirty water area.

The delayed implementation of the recommendation from the Hydrological Impact Assessment dated July 2019 by WSP Environmental Pty ltd by Mooiplats Colliery has negatively impacted the proper operation of the stormwater infrastructure and compromised the stormwater infrastructure design intent.

The PCD designs followed industry standards at the time of their design and construction. Although the PCD does not meet R635 and R636 criteria, it can continue

to operate under the design capacity provided to the department as long as no alteration are made to the, capacity, or secondary systems. The PCD's operation and administration do not meet the original specifications, and it is now operating above the required free capacity. The dam must be operated at a level that allows for a reserve capacity capable of containing a one-in-50-year storm.

The lower-level slurry pond needs to be operated in such a manner that the supernatant pond is shifted back towards the penstocks. The western wall needs to be lifted in order to ensure that a 800mm freeboard is kept and widened to ensure a minimum crest width of 5m.

Dirty catchments include all the areas where coal is handled such as opencast pits, overburden stockpile, sorting, and stockpiling areas. Clean catchments are areas adjacent to the opencast pits. Diversion berms have been proposed around the dirty catchments and provision has been made to construct vegetated trapezoidal channels inside the berms to convey dirty runoff into dirty water containment facilities such as the Pollution Control Dams (PCDs) and in-pit sumps.

The civil engineering stormwater designs entailed in the study which include stormwater channels and have been sized to accommodate dirty water run-off volumes from the plant and stockpile areas and prevent contamination of ground and surface water resources. The overall separation of clean and dirty water areas is also considered as part of the storm water management plans. The proposed stormwater management system will allow the mine operation

The uncontrolled vegetation on the existing stormwater structures causes clogging on the stormwater channel and stormwater pipelines which consequently causes failure of the site stormwater management. Poor regular maintenance of all dirty water carriers/channels causes failure of stormwater management system on the site.

The construction notes and specification discussed in the study covers the construction methodologies, construction materials, and construction quality assurance to be implemented during construction phase of surface infrastructure on the project. These are to be adhered to and a site engineer and site environmentalist are recommended for construction efficiency of the stormwater concrete channels as means to protect the environment during construction, protect groundwater and to build structures within the legal codes designed from.

15. RECOMENDATIONS

- To prevent cross-contamination, it must be ensured that there is no handling and disposal of substances that may give rise to pollution within designated 'clean' areas.
- It is recommended that gabion 'sieves' are placed at the outlet of coal stockpile areas and up-gradient of the pipes/channels. The intention of the gabions will be to prevent large debris from leaving the facilities.
- During storm events and potentially resulting in a backlog of associated infrastructure. These will need to be actively managed to prevent clogging of the gabion baskets.
- The proposed stormwater channels within the coal stockpile area andPCDs need to be constructed to facilitate routine maintenance (i.e., simple, effectual housekeeping).
- It is recommended that stone pitching channels and concrete pipes are used to transfer runoff. Stone pitching is recommended to reduce high runoff velocities in channels and sulphate-resistant concrete to reduce sulphate content generated in 'dirty' areas with sulphate contaminants.
- To prevent clogging of the grated channel covers and maintain channel capacity, best practice and proper housekeeping practices must be ensured.
- To prevent subsurface contamination migration, hardstanding is proposed for the storage areas.
- All pipes and channels must be checked after any major rainfall events to ensure that there are no blockages and that the water flow will not be restricted in any way.
- Sediment that accumulates within pipes, channels and retention facilities needs to be removed directly after the storm events and appropriately disposed of to ensure design capacity is maintained.
- Erosion protection will be required at the outlet of the 'clean' water pipes discharging to the environment. Erosion protection can take the form of gabions or geotextiles.
- It is recommended that the PCDs be operated empty or at a storage level low enough to accommodate storm water inflows, whilst meeting the required spillage frequency and freeboard requirements.
- It is recommended that Dredging be done on the plant Pollution Control Dam. The method of dredging recommended is hydraulic excavating and not mechanical

excavating as often done in most mining operations. Mechanical dredging does not provide desirable results in severely silted up pollution control dams as the case at the Mooiplats Colliery. Hydraulic excavating is done with special water jests in cohesionless soils such as silt, sand and gravel. The dredged material which has been loosened from the sea-bed is sucked up and transported further as a mixture (solid material and water) using centrifugal pumps.

16. REFERENCES

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APPENDIX A:

CONCRETE STORMWATER CHANNELS DESIGNS

PRODUCT STORMWATER CHANNEL_04

PRODUCT STORMWATER CHANNEL_02

PRODUCT STORMWATER CHANNEL_03

PRODUCT STORMWATER CHANNEL_05

PRODUCT STORMWATER CHANNEL_01

PRODUCT STORMWATER CHANNEL_08

PRODUCT STORMWATER CHANNEL_07

PRODUCT STORMWATER CHANNEL_06

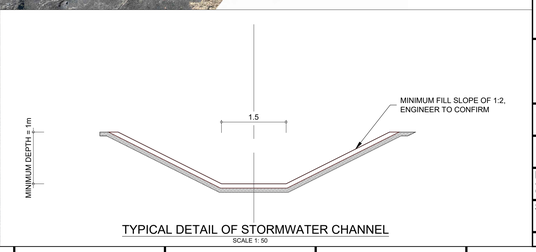
PLAN LAYOUT

SCALE 1: 1200

GENERAL LEGEND

DESCRIPTION

- CLEAN WATER LINE
- FENCE
- CLEAN WATER TRENCH
- 100 YEAR FLOODLINE
- 50 YEAR FLOODLINE
- WATER STORAGE
- DIRTY WATER COLLECTION
- EMERGENCY STOP
- PARKING
- HARD ROCK DUMP
- SOFT OVERBURDEN DUMP
- TOP OVERBURDEN DUMP
- NEW STRUCTURES
- NEW ACCESS ROADS
- DESIGN SURFACE CONTOURS
- EXISTING SURFACE CONTOURS



TYPICAL DETAIL OF STORMWATER CHANNEL

SCALE 1: 50

Rev	Date	Reason For Issue:	Check	Appr.

Company Logo:

human element
VAT NO: 4890286877
CSD NO: MAAA1054667

Client Logo:

Overlooked Group
Invest, Empower, Sustain

Project:

MOOIPLAATS COLLIERY

Title:

PLAN VIEW LAYOUT OF STORMWATER CHANNELS

Originator Drawing no:

Drawing no:		Sheet no.
	2406003-00-CIV-DPR-001-001	1 OF 1

Drawn By:	Checker:	Approver:	Issue Date:
S VADEBE CANDIDATE PR ENG TECH: (2022404193)	S MNCAMELEN CANDIDATE PR ENG TECH: (2022404183)	K HARRICHAND CANDIDATE PR ENG TECH: (201070925)	29-09-2024

Size:	Reason for issue:	Scale:	Project No:	Revision:
A0	FOR APPROVAL	AS SHOWN	2406003	A

Copyright: Human Element

LONGSECTION STRM CHNL_1
FROM 0.000 TO 771.272

LONGITUDINAL SECTION
HOR SCALE 1:500
VER SCALE 1:50

| | | |

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
1	-90379.27	-2948239.26	1672.71
2	-90379.27	-2948229.26	1672.78
3	-90369.27	-2948259.26	1672.49
4	-90369.27	-2948249.26	1672.56
5	-90369.27	-2948239.26	1672.62
6	-90369.27	-2948229.26	1672.69
7	-90369.27	-2948219.26	1672.75
8	-90359.27	-2948279.26	1672.27
9	-90359.27	-2948269.26	1672.33
10	-90359.27	-2948259.26	1672.40
11	-90359.27	-2948249.26	1672.47
12	-90359.27	-2948239.26	1672.53
13	-90359.27	-2948229.26	1672.60
14	-90359.27	-2948219.26	1672.66
15	-90359.27	-2948209.26	1672.73
16	-90349.27	-2948299.26	1672.04
17	-90349.27	-2948289.26	1672.11
18	-90349.27	-2948279.26	1672.18
19	-90349.27	-2948269.26	1672.24
20	-90349.27	-2948259.26	1672.31

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
21	-90349.27	-2948249.26	1672.38
22	-90349.27	-2948239.26	1672.44
23	-90349.27	-2948229.26	1672.51
24	-90349.27	-2948219.26	1672.57
25	-90349.27	-2948209.26	1672.64
26	-90339.27	-2948319.26	1671.82
27	-90339.27	-2948309.26	1671.89
28	-90339.27	-2948299.26	1671.95
29	-90339.27	-2948289.26	1672.02
30	-90339.27	-2948279.26	1672.09
31	-90339.27	-2948269.26	1672.15
32	-90339.27	-2948259.26	1672.22
33	-90339.27	-2948249.26	1672.29
34	-90339.27	-2948239.26	1672.35
35	-90329.27	-2948339.26	1671.60
36	-90329.27	-2948329.26	1671.66
37	-90329.27	-2948319.26	1671.73
38	-90329.27	-2948309.26	1671.80
39	-90329.27	-2948299.26	1671.86
40	-90329.27	-2948289.26	1671.93

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
41	-90319.27	-2948359.26	1671.38
42	-90319.27	-2948349.26	1671.44
43	-90319.27	-2948339.26	1671.51
44	-90319.27	-2948329.26	1671.57
45	-90319.27	-2948319.26	1671.64
46	-90319.27	-2948309.26	1671.71
47	-90309.27	-2948389.26	1671.09
48	-90309.27	-2948379.26	1671.15
49	-90309.27	-2948369.26	1671.22
50	-90309.27	-2948359.26	1671.29
51	-90309.27	-2948349.26	1671.35
52	-90309.27	-2948339.26	1671.42
53	-90309.27	-2948329.26	1671.48
54	-90299.27	-2948409.26	1670.86
55	-90299.27	-2948399.26	1670.93
56	-90299.27	-2948389.26	1671.00
57	-90299.27	-2948379.26	1671.06
58	-90299.27	-2948369.26	1671.13
59	-90299.27	-2948359.26	1671.20
60	-90299.27	-2948349.26	1671.26

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
61	-90289.27	-2948429.26	1670.64
62	-90289.27	-2948419.26	1670.71
63	-90289.27	-2948409.26	1670.77
64	-90289.27	-2948399.26	1670.84
65	-90289.27	-2948389.26	1670.91
66	-90289.27	-2948379.26	1670.97
67	-90289.27	-2948369.26	1671.04
68	-90279.27	-2948449.26	1670.42
69	-90279.27	-2948439.26	1670.49
70	-90279.27	-2948429.26	1670.55
71	-90279.27	-2948419.26	1670.62
72	-90279.27	-2948409.26	1670.68
73	-90279.27	-2948399.26	1670.75
74	-90279.27	-2948389.26	1670.82
75	-90269.27	-2948469.26	1670.20
76	-90269.27	-2948459.26	1670.26
77	-90269.27	-2948449.26	1670.33
78	-90269.27	-2948439.26	1670.40
79	-90269.27	-2948429.26	1670.46
80	-90269.27	-2948419.26	1670.53

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
81	-90269.27	-2948409.26	1670.59
82	-90259.27	-2948499.26	1669.91
83	-90259.27	-2948489.26	1669.97
84	-90259.27	-2948479.26	1670.04
85	-90259.27	-2948469.26	1670.11
86	-90259.27	-2948459.26	1670.17
87	-90259.27	-2948449.26	1670.24
88	-90259.27	-2948439.26	1670.31
89	-90259.27	-2948429.26	1670.37
90	-90249.27	-2948509.26	1669.75
91	-90249.27	-2948499.26	1669.82
92	-90249.27	-2948489.26	1669.88
93	-90249.27	-2948479.26	1669.95
94	-90249.27	-2948469.26	1670.02
95	-90249.27	-2948459.26	1670.08
96	-90249.27	-2948449.26	1670.15
97	-90239.27	-2948529.26	1669.53
98	-90239.27	-2948519.26	1669.59
99	-90239.27	-2948509.26	1669.66
100	-90239.27	-2948499.26	1669.73

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
101	-90239.27	-2948489.26	1669.79
102	-90239.27	-2948479.26	1669.86
103	-90239.27	-2948469.26	1669.93
104	-90229.27	-2948549.26	1669.31
105	-90229.27	-2948539.26	1669.37
106	-90229.27	-2948529.26	1669.44
107	-90229.27	-2948519.26	1669.50
108	-90229.27	-2948509.26	1669.57
109	-90229.27	-2948499.26	1669.64
110	-90219.27	-2948579.26	1669.02
111	-90219.27	-2948569.26	1669.08
112	-90219.27	-2948559.26	1669.15
113	-90219.27	-2948549.26	1669.22
114	-90219.27	-2948539.26	1669.28
115	-90219.27	-2948529.26	1669.35
116	-90219.27	-2948519.26	1669.41
117	-90219.27	-2948509.26	1669.48
118	-90209.27	-2948609.26	1668.73
119	-90209.27	-2948599.26	1668.79
120	-90209.27	-2948589.26	1668.86

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
121	-90209.27	-2948579.26	1668.93
122	-90209.27	-2948569.26	1668.99
123	-90209.27	-2948559.26	1669.06
124	-90209.27	-2948549.26	1669.13
125	-90209.27	-2948539.26	1669.19
126	-90209.27	-2948529.26	1669.26
127	-90209.27	-2948519.26	1669.32
128	-90209.27	-2948509.26	1669.39
129	-90199.27	-2948619.26	1668.57
130	-90199.27	-2948609.26	1668.64
131	-90199.27	-2948599.26	1668.70
132	-90199.27	-2948589.26	1668.77
133	-90199.27	-2948579.26	1668.84
134	-90199.27	-2948569.26	1668.90
135	-90199.27	-2948559.26	1668.97
136	-90199.27	-2948549.26	1669.04
137	-90199.27	-2948539.26	1669.10
138	-90199.27	-2948529.26	1669.17
139	-90199.27	-2948519.26	1669.23
140	-90189.27	-2948629.26	1668.42

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
141	-90189.27	-2948619.26	1668.48
142	-90189.27	-2948609.26	1668.55
143	-90189.27	-2948599.26	1668.61
144	-90189.27	-2948589.26	1668.68
145	-90189.27	-2948579.26	1668.75
146	-90189.27	-2948569.26	1668.81
147	-90189.27	-2948559.26	1668.88
148	-90189.27	-2948549.26	1668.95
149	-90189.27	-2948539.26	1669.01
150	-90189.27	-2948529.26	1669.08
151	-90189.27	-2948519.26	1669.14
152	-90179.27	-2948639.26	1668.26
153	-90179.27	-2948629.26	1668.33
154	-90179.27	-2948619.26	1668.39
155	-90179.27	-2948609.26	1668.46
156	-90179.27	-2948599.26	1668.52
157	-90179.27	-2948589.26	1668.59
158	-90179.27	-2948579.26	1668.66
159	-90179.27	-2948569.26	1668.72
160	-90179.27	-2948559.26	1668.79

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
161	-90179.27	-2948549.26	1668.86
162	-90179.27	-2948539.26	1668.92
163	-90179.27	-2948529.26	1668.99
164	-90179.27	-2948519.26	1669.05
165	-90169.27	-2948639.26	1668.17
166	-90169.27	-2948629.26	1668.23
167	-90169.27	-2948619.26	1668.30
168	-90169.27	-2948609.26	1668.37
169	-90169.27	-2948599.26	1668.43
170	-90169.27	-2948589.26	1668.50
171	-90169.27	-2948579.26	1668.57
172	-90169.27	-2948569.26	1668.63
173	-90169.27	-2948559.26	1668.70
174	-90169.27	-2948549.26	1668.77
175	-90169.27	-2948539.26	1668.83
176	-90169.27	-2948529.26	1668.90
177	-90169.27	-2948519.26	1668.96
178	-90159.27	-2948639.26	1668.08
179	-90159.27	-2948629.26	1668.14
180	-90159.27	-2948619.26	1668.21

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
181	-90159.27	-2948609.26	1668.28
182	-90159.27	-2948599.26	1668.34
183	-90159.27	-2948589.26	1668.41
184	-90159.27	-2948579.26	1668.48
185	-90159.27	-2948569.26	1668.54
186	-90159.27	-2948559.26	1668.61
187	-90159.27	-2948549.26	1668.68
188	-90159.27	-2948539.26	1668.74
189	-90159.27	-2948529.26	1668.81
190	-90159.27	-2948519.26	1668.87
191	-90149.27	-2948649.26	1667.96
192	-90149.27	-2948639.26	1668.00
193	-90149.27	-2948629.26	1668.06
194	-90149.27	-2948619.26	1668.12
195	-90149.27	-2948609.26	1668.19
196	-90149.27	-2948599.26	1668.25
197	-90149.27	-2948589.26	1668.32
198	-90149.27	-2948579.26	1668.39
199	-90149.27	-2948569.26	1668.45
200	-90149.27	-2948559.26	1668.52

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
201	-90149.27	-2948549.26	1668.59
202	-90149.27	-2948539.26	1668.65
203	-90149.27	-2948529.26	1668.72
204	-90149.27	-2948519.26	1668.78
205	-90139.27	-2948699.26	1667.95
206	-90139.27	-2948689.26	1667.92
207	-90139.27	-2948659.26	1667.88
208	-90139.27	-2948649.26	1667.89
209	-90139.27	-2948639.26	1667.92
210	-90139.27	-2948629.26	1667.97
211	-90139.27	-2948619.26	1668.03
212	-90139.27	-2948609.26	1668.10
213	-90139.27	-2948599.26	1668.16
214	-90139.27	-2948589.26	1668.23
215	-90139.27	-2948579.26	1668.30
216	-90139.27	-2948569.26	1668.36
217	-90139.27	-2948559.26	1668.43
218	-90139.27	-2948549.26	1668.50
219	-90139.27	-2948539.26	1668.56
220	-90139.27	-2948529.26	1668.63

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
221	-90139.27	-2948519.26	1668.69
222	-90129.27	-2948729.26	1667.99
223	-90129.27	-2948719.26	1667.96
224	-90129.27	-2948709.26	1667.93
225	-90129.27	-2948699.26	1667.91
226	-90129.27	-2948689.26	1667.88
227	-90129.27	-2948679.26	1667.85
228	-90129.27	-2948669.26	1667.83
229	-90129.27	-2948659.26	1667.82
230	-90129.27	-2948649.26	1667.83
231	-90129.27	-2948639.26	1667.85
232	-90129.27	-2948629.26	1667.89
233	-90129.27	-2948619.26	1667.94
234	-90129.27	-2948609.26	1668.01
235	-90129.27	-2948599.26	1668.07
236	-90129.27	-2948589.26	1668.14
237	-90129.27	-2948579.26	1668.21
238	-90129.27	-2948569.26	1668.27
239	-90129.27	-2948559.26	1668.34
240	-90129.27	-2948549.26	1668.41

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
241	-90129.27	-2948539.26	1668.47
242	-90129.27	-2948529.26	1668.54
243	-90129.27	-2948519.26	1668.60
244	-90119.27	-2948729.26	1667.94
245	-90119.27	-2948719.26	1667.92
246	-90119.27	-2948709.26	1667.89
247	-90119.27	-2948699.26	1667.86
248	-90119.27	-2948689.26	1667.84
249	-90119.27	-2948679.26	1667.81
250	-90119.27	-2948669.26	1667.78
251	-90119.27	-2948659.26	1667.77
252	-90119.27	-2948649.26	1667.76
253	-90119.27	-2948639.26	1667.78
254	-90119.27	-2948629.26	1667.81
255	-90119.27	-2948619.26	1667.86
256	-90119.27	-2948609.26	1667.92
257	-90119.27	-2948599.26	1667.98
258	-90119.27	-2948589.26	1668.05
259	-90119.27	-2948579.26	1668.12
260	-90119.27	-2948569.26	1668.18

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
261	-90119.27	-2948559.26	1668.25
262	-90119.27	-2948549.26	1668.32
263	-90119.27	-2948539.26	1668.38
264	-90119.27	-2948529.26	1668.45
265	-90119.27	-2948519.26	1668.51
266	-90109.27	-2948729.26	1667.90
267	-90109.27	-2948719.26	1667.87
268	-90109.27	-2948709.26	1667.85
269	-90109.27	-2948699.26	1667.82
270	-90109.27	-2948689.26	1667.79
271	-90109.27	-2948679.26	1667.77
272	-90109.27	-2948669.26	1667.74
273	-90109.27	-2948659.26	1667.72
274	-90109.27	-2948649.26	1667.71
275	-90109.27	-2948639.26	1667.71
276	-90109.27	-2948629.26	1667.74
277	-90109.27	-2948619.26	1667.77
278	-90109.27	-2948609.26	1667.83
279	-90109.27	-2948599.26	1667.89
280	-90109.27	-2948589.26	1667.96

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
281	-90109.27	-2948579.26	1668.03
282	-90109.27	-2948569.26	1668.09
283	-90109.27	-2948559.26	1668.16
284	-90109.27	-2948549.26	1668.23
285	-90109.27	-2948539.26	1668.29
286	-90109.27	-2948529.26	1668.36
287	-90099.27	-2948769.26	1667.96
288	-90099.27	-2948739.26	1667.88
289	-90099.27	-2948729.26	1667.86
290	-90099.27	-2948719.26	1667.83
291	-90099.27	-2948709.26	1667.80
292	-90099.27	-2948699.26	1667.78
293	-90099.27	-2948689.26	1667.75
294	-90099.27	-2948679.26	1667.73
295	-90099.27	-2948669.26	1667.70
296	-90099.27	-2948659.26	1667.67
297	-90099.27	-2948649.26	1667.65
298	-90099.27	-2948639.26	1667.65
299	-90099.27	-2948629.26	1667.67
300	-90099.27	-2948619.26	1667.70

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
301	-90099.27	-2948609.26	1667.74
302	-90099.27	-2948599.26	1667.80
303	-90099.27	-2948589.26	1667.87
304	-90099.27	-2948579.26	1667.94
305	-90099.27	-2948569.26	1668.00
306	-90099.27	-2948559.26	1668.07
307	-90099.27	-2948549.26	1668.14
308	-90099.27	-2948539.26	1668.20
309	-90099.27	-2948529.26	1668.27
310	-90089.27	-2948769.26	1667.92
311	-90089.27	-2948759.26	1667.89
312	-90089.27	-2948749.26	1667.87
313	-90089.27	-2948739.26	1667.84
314	-90089.27	-2948729.26	1667.81
315	-90089.27	-2948719.26	1667.79
316	-90089.27	-2948709.26	1667.76
317	-90089.27	-2948699.26	1667.74
318	-90089.27	-2948689.26	1667.71
319	-90089.27	-2948679.26	1667.68
320	-90089.27	-2948669.26	1667.66

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
321	-90089.27	-2948659.26	1667.63
322	-90089.27	-2948649.26	1667.61
323	-90089.27	-2948639.26	1667.60
324	-90089.27	-2948629.26	1667.60
325	-90089.27	-2948619.26	1667.62
326	-90089.27	-2948609.26	1667.66
327	-90089.27	-2948599.26	1667.71
328	-90089.27	-2948589.26	1667.78
329	-90089.27	-2948579.26	1667.85
330	-90089.27	-2948569.26	1667.91
331	-90089.27	-2948559.26	1667.98
332	-90089.27	-2948549.26	1668.05
333	-90089.27	-2948539.26	1668.11
334	-90089.27	-2948529.26	1668.18
335	-90079.27	-2948769.26	1667.88
336	-90079.27	-2948759.26	1667.85
337	-90079.27	-2948749.26	1667.82
338	-90079.27	-2948739.26	1667.80
339	-90079.27	-2948729.26	1667.77
340	-90079.27	-2948719.26	1667.75

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
341	-90079.27	-2948709.26	1667.72
342	-90079.27	-2948699.26	1667.69
343	-90079.27	-2948689.26	1667.67
344	-90079.27	-2948679.26	1667.64
345	-90079.27	-2948669.26	1667.61
346	-90079.27	-2948659.26	1667.59
347	-90079.27	-2948649.26	1667.56
348	-90079.27	-2948639.26	1667.54
349	-90079.27	-2948629.26	1667.54
350	-90079.27	-2948619.26	1667.55
351	-90079.27	-2948609.26	1667.58
352	-90079.27	-2948599.26	1667.63
353	-90079.27	-2948589.26	1667.69
354	-90079.27	-2948579.26	1667.76
355	-90079.27	-2948569.26	1667.82
356	-90079.27	-2948559.26	1667.89
357	-90079.27	-2948549.26	1667.96
358	-90079.27	-2948539.26	1668.02
359	-90079.27	-2948529.26	1668.09
360	-90069.27	-2948769.26	1667.83

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
361	-90069.27	-2948759.26	1667.81
362	-90069.27	-2948749.26	1667.78
363	-90069.27	-2948739.26	1667.76
364	-90069.27	-2948729.26	1667.73
365	-90069.27	-2948719.26	1667.70
366	-90069.27	-2948709.26	1667.68
367	-90069.27	-2948699.26	1667.65
368	-90069.27	-2948689.26	1667.62
369	-90069.27	-2948679.26	1667.60
370	-90069.27	-2948669.26	1667.57
371	-90069.27	-2948659.26	1667.54
372	-90069.27	-2948649.26	1667.52
373	-90069.27	-2948639.26	1667.49
374	-90069.27	-2948629.26	1667.48
375	-90069.27	-2948619.26	1667.49
376	-90069.27	-2948609.26	1667.51
377	-90069.27	-2948599.26	1667.55
378	-90069.27	-2948589.26	1667.60
379	-90069.27	-2948579.26	1667.67
380	-90069.27	-2948569.26	1667.73

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
381	-90059.27	-2948559.26	1667.80
382	-90059.27	-2948549.26	1667.87
383	-90059.27	-2948539.26	1667.93
384	-90059.27	-2948529.26	1668.00
385	-90059.27	-2948769.26	1667.79
386	-90059.27	-2948759.26	1667.77
387	-90059.27	-2948749.26	1667.74
388	-90059.27	-2948739.26	1667.71
389	-90059.27	-2948729.26	1667.69
390	-90059.27	-2948719.26	1667.66
391	-90059.27	-2948709.26	1667.63
392	-90059.27	-2948699.26	1667.61
393	-90059.27	-2948689.26	1667.58
394	-90059.27	-2948679.26	1667.55
395	-90059.27	-2948669.26	1667.53
396	-90059.27	-2948659.26	1667.50
397	-90059.27	-2948649.26	1667.48
398	-90059.27	-2948639.26	1667.45
399	-90059.27	-2948629.26	1667.43
400	-90059.27	-2948619.26	1667.43

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
401	-90059.27	-2948609.26	1667.44
402	-90059.27	-2948599.26	1667.47
403	-90059.27	-2948589.26	1667.52
404	-90059.27	-2948579.26	1667.58
405	-90059.27	-2948569.26	1667.64
406	-90059.27	-2948559.26	1667.71
407	-90059.27	-2948549.26	1667.78
408	-90059.27	-2948539.26	1667.84
409	-90059.27	-2948529.26	1667.91
410	-90049.27	-2948769.26	1667.75
411	-90049.27	-2948759.26	1667.72
412	-90049.27	-2948749.26	1667.70
413	-90049.27	-2948739.26	1667.67
414	-90049.27	-2948729.26	1667.64
415	-90049.27	-2948719.26	1667.62
416	-90049.27	-2948709.26	1667.59
417	-90049.27	-2948699.26	1667.56
418	-90049.27	-2948689.26	1667.54
419	-90049.27	-2948679.26	1667.51
420	-90049.27	-2948669.26	1667.49

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
421	-90049.27	-2948659.26	1667.46
422	-90049.27	-2948649.26	1667.43
423	-90049.27	-2948639.26	1667.41
424	-90049.27	-2948629.26	1667.38
425	-90049.27	-2948619.26	1667.37
426	-90049.27	-2948609.26	1667.38
427	-90049.27	-2948599.26	1667.40
428	-90049.27	-2948589.26	1667.43
429	-90049.27	-2948579.26	1667.49
430	-90049.27	-2948569.26	1667.55
431	-90049.27	-2948559.26	1667.62
432	-90049.27	-2948549.26	1667.69
433	-90049.27	-2948539.26	1667.75
434	-90049.27	-2948529.26	1667.82
435	-90039.27	-2948769.26	1667.71
436	-90039.27	-2948759.26	1667.68
437	-90039.27	-2948749.26	1667.65
438	-90039.27	-2948739.26	1667.63
439	-90039.27	-2948729.26	1667.60
440	-90039.27	-2948719.26	1667.57

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
441	-90039.27	-2948709.26	1667.55
442	-90039.27	-2948699.26	1667.52
443	-90039.27	-2948689.26	1667.50
444	-90039.27	-2948679.26	1667.47
445	-90039.27	-2948669.26	1667.44
446	-90039.27	-2948659.26	1667.42
447	-90039.27	-2948649.26	1667.39
448	-90039.27	-2948639.26	1667.36
449	-90039.27	-2948629.26	1667.34
450	-90039.27	-2948619.26	1667.32
451	-90039.27	-2948609.26	1667.32
452	-90039.27	-2948599.26	1667.33
453	-90039.27	-2948589.26	1667.36
454	-90039.27	-2948579.26	1667.40
455	-90039.27	-2948569.26	1667.46
456	-90039.27	-2948559.26	1667.53
457	-90039.27	-2948549.26	1667.60
458	-90039.27	-2948539.26	1667.66
459	-90039.27	-2948529.26	1667.73
460	-90029.27	-2948769.26	1667.66

PLATFORM LEVELS SETOUT TABLE

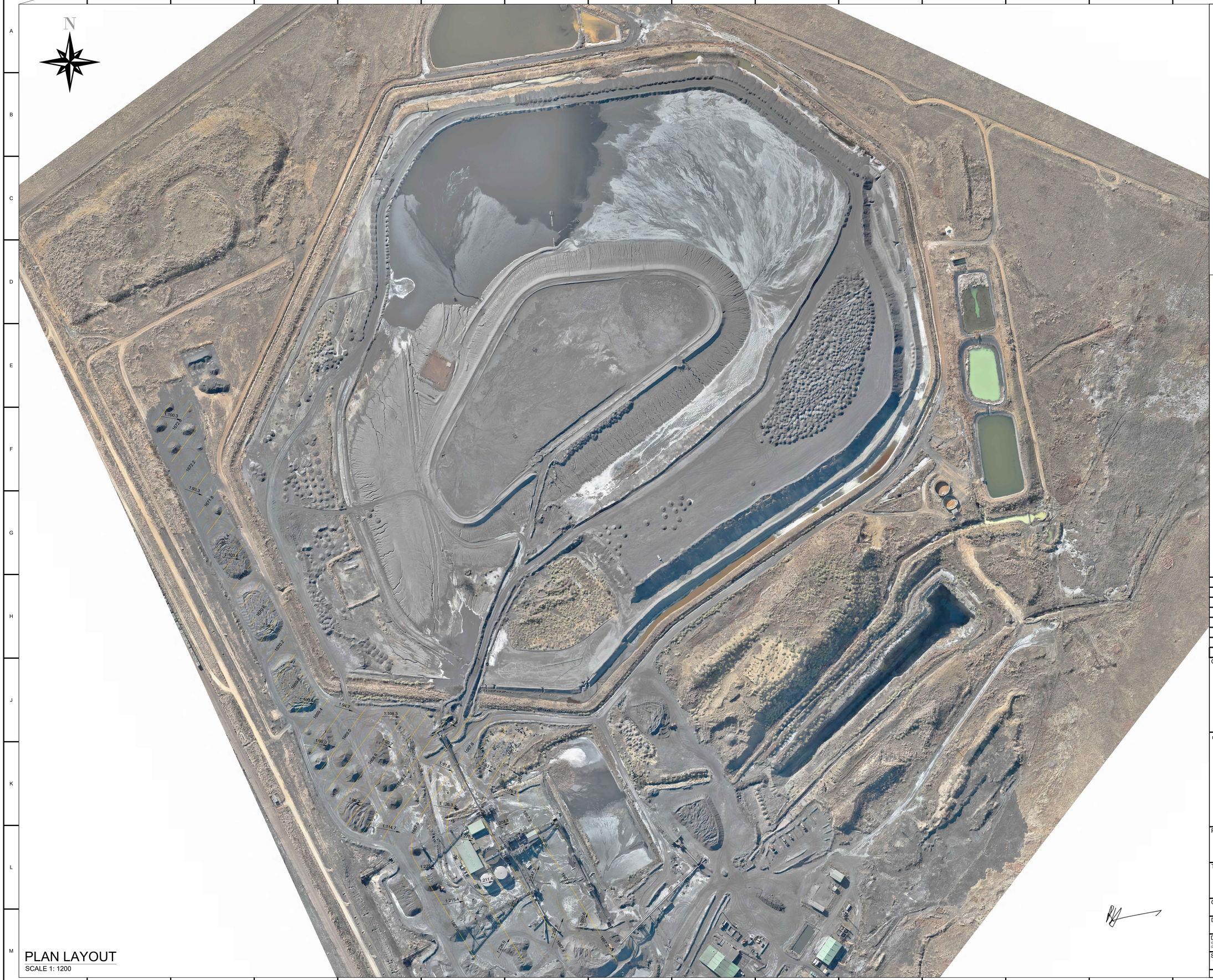
POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
461	-90029.27	-2948759.26	1667.64
462	-90029.27	-2948749.26	1667.61
463	-90029.27	-2948739.26	1667.58
464	-90029.27	-2948729.26	1667.56
465	-90029.27	-2948719.26	1667.53
466	-90029.27	-2948709.26	1667.51
467	-90029.27	-2948699.26	1667.48
468	-90029.27	-2948689.26	1667.45
469	-90029.27	-2948679.26	1667.43
470	-90029.27	-2948669.26	1667.40
471	-90029.27	-2948659.26	1667.37
472	-90029.27	-2948649.26	1667.35
473	-90029.27	-2948639.26	1667.32
474	-90029.27	-2948629.26	1667.30
475	-90029.27	-2948619.26	1667.27
476	-90029.27	-2948609.26	1667.26
477	-90029.27	-2948599.26	1667.26
478	-90029.27	-2948589.26	1667.28
479	-90029.27	-2948579.26	1667.32
480	-90029.27	-2948569.26	1667.37

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
481	-90029.27	-2948559.26	1667.44
482	-90029.27	-2948549.26	1667.51
483	-90029.27	-2948539.26	1667.57
484	-90019.27	-2948769.26	1667.62
485	-90019.27	-2948759.26	1667.59
486	-90019.27	-2948749.26	1667.57
487	-90019.27	-2948739.26	1667.54
488	-90019.27	-2948729.26	1667.52
489	-90019.27	-2948719.26	1667.49
490	-90019.27	-2948709.26	1667.46
491	-90019.27	-2948699.26	1667.44
492	-90019.27	-2948689.26	1667.41
493	-90019.27	-2948679.26	1667.38
494	-90019.27	-2948669.26	1667.36
495	-90019.27	-2948659.26	1667.33
496	-90019.27	-2948649.26	1667.31
497	-90019.27	-2948639.26	1667.28
498	-90019.27	-2948629.26	1667.25
499	-90019.27	-2948619.26	1667.23
500	-90019.27	-2948609.26	1667.21

PLATFORM LEVELS SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
501	-90019.27	-2948599.26	1667.20
502	-90019.27	-2948589.26	1667.22
503	-90019.27	-2948579.26	1667.24
504	-90019.27	-2948569.26	1667.29
505	-90019.27	-2948559.26	1667.35
506	-90009.27	-2948769.26	1667.58
507	-90009.27	-2948759.26	1667.55
508	-90009.27	-2948749.26	1667.53
509	-90009.27	-2948739.26	1667.50
510	-



PLAN LAYOUT

SCALE 1: 1200

GENERAL LEGEND

DESCRIPTION

- CLEAN WATER LINE
- FENCE
- CLEAN WATER TRENCH
- 100 YEAR FLOODLINE
- 50 YEAR FLOODLINE
- WATER STORAGE
- DIRTY WATER COLLECTION
- EMERGENCY STOP
- PARKING
- HARD ROCK DUMP
- SOFT OVERBURDEN DUMP
- TOP OVERBURDEN DUMP
- NEW STRUCTURES
- NEW ACCESS ROADS
- DESIGN SURFACE CONTOURS
- EXISTING SURFACE CONTOURS

Rev	Date	Reason For Issue:	Check	Appr.

Company Logo:

human element
VAT NO: 4890286877
CSD NO: MAAA1054667

Client Logo:

Overlooked Group
Invest, Empower, Sustain

Project:

MOOIPLAATS COLLIERY

Title:

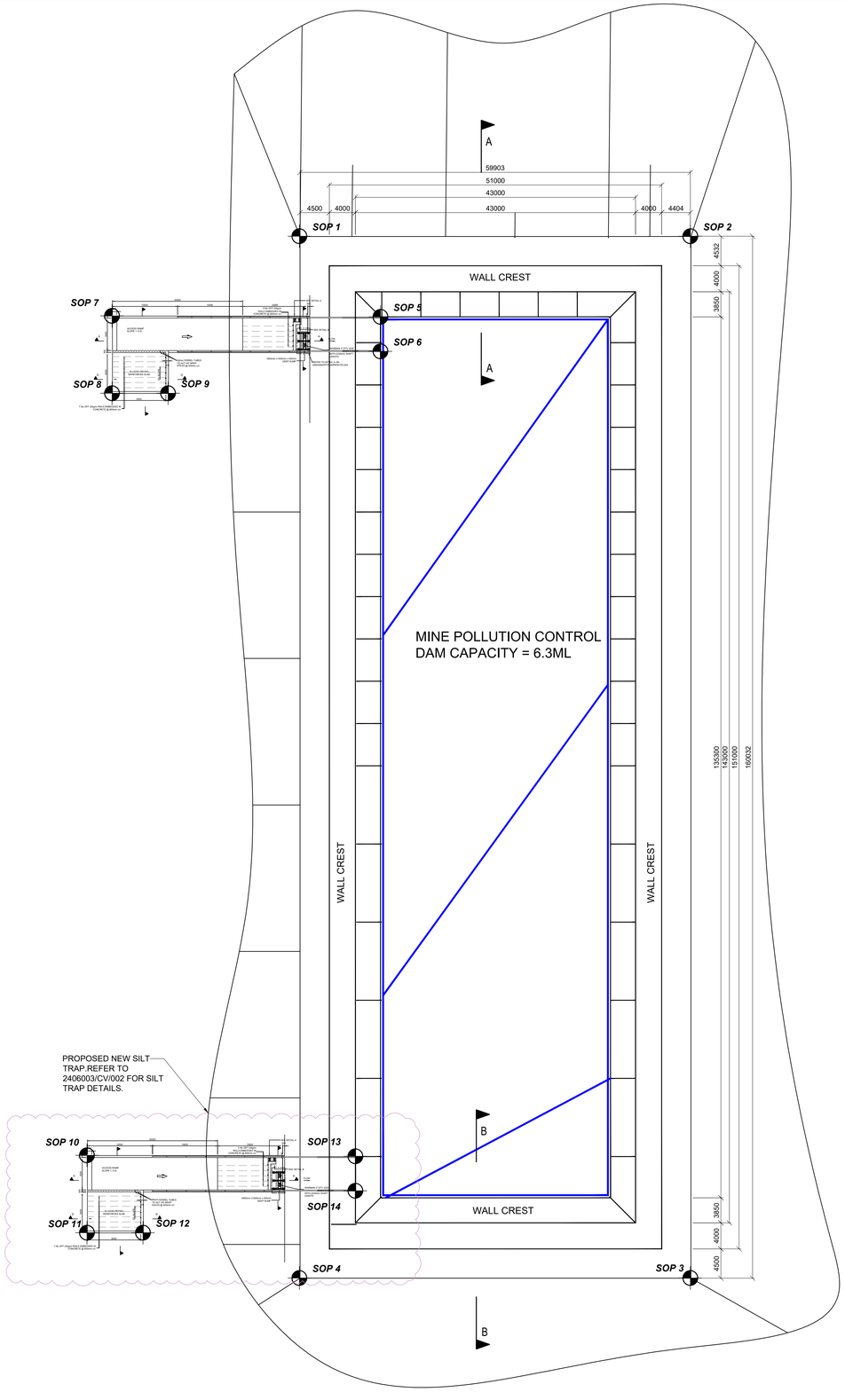
GENERAL ARRANGEMENT - STORMWATER MANAGEMENT

Originator Drawing no:

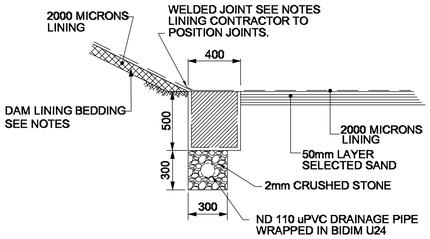
Drawing no:		Sheet no.
	2406003-00-CIV-GAL-0004-001	1 OF 1

Drawn By: S HADEBE CANDIDATE PR ENG TECH: (0922404193)	Checker: S MNCAMELENI CANDIDATE PR ENG TECH: (0202404183)	Approver: K HARRICOMB CANDIDATE PR ENG TECH: (0010700025)	Issue Date: 29-09-2024
Size: A0	Reason for issue: FOR APPROVAL	Scale: AS SHOWN	Project No: 2406003	Revision: A

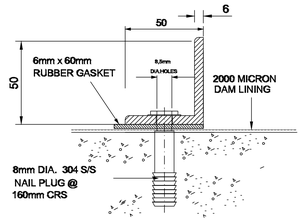
Copyright: Human Element



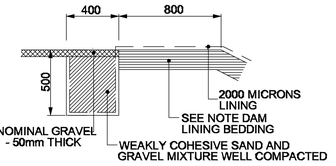
POLLUTION CONTROL DAM LAYOUT
SCALE 1:300



DETAIL "1" - LINING ANCHORAGE AT BASE AND DRAINAGE BELOW DAM FLOOR

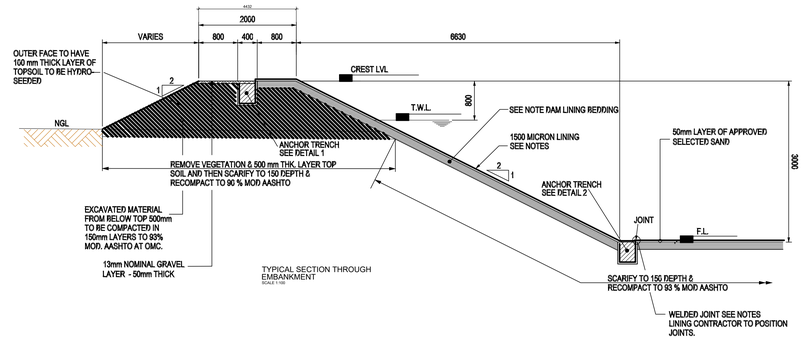


LINING FIXING DETAIL TO CONCRETE AT SILT TRAP AND OVERFLOWS
N.T.S.

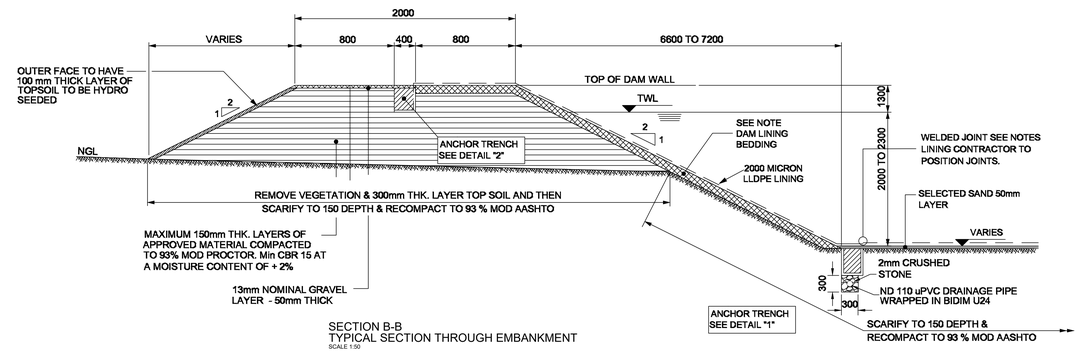


DETAIL "2" - LINING ANCHORAGE AT TOP OF DAM
N T S

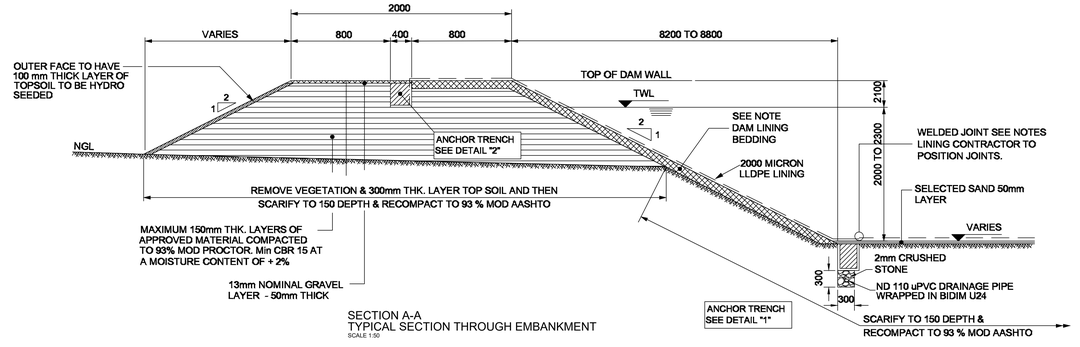
N.T.S.



TYPICAL SECTION THROUGH EMBANKMENT
SCALE 1:100



SECTION B-B
TYPICAL SECTION THROUGH EMBANKMENT
SCALE 1:50



SECTION A-A
TYPICAL SECTION THROUGH EMBANKMENT
SCALE 1:50

1. GENERAL NOTES

1.0 THESE NOTES SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS OF THE ENGINEERS AND ALL APPLICABLE PROJECT AND STANDARDIZED SPECIFICATIONS MENTIONED IN THE TENDER. IN THE EVENT OF CONFLICT BETWEEN THESE NOTES AND THE SPECIFICATIONS THESE NOTES SHALL TAKE PRECEDENCE AND SHALL GOVERN. THE ENGINEER'S DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONSULTANTS AND SPECIALISTS DRAWINGS. DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER PRIOR TO CONSTRUCTION.

1.1 ALL DIMENSIONS TO BE CHECKED ON SITE PRIOR TO INSTALLATION. DISCREPANCIES TO BE REFERRED TO ENGINEER.

1.2 CONCRETE TO BE CLASS 35MPa/15mm WATERTIGHT CONCRETE WITH A MINIMUM W:B RATIO OF 0.55, MINIMUM OF 325kg/m³ AND A MAXIMUM OF 400kg/m³ CEMENT CONTENT.

1.3 CONTRACTOR SHALL VERIFY ALL LENGTHS IN ACCORDANCE WITH VALVES & ACCESSORIES SUBMITTED.

1.4 ALTHOUGH THIS DRAWING IS FOR CONSTRUCTION PURPOSES, DIMENSIONS ARE NOT NECESSARY IN ACCORDANCE WITH COMPONENTS AS SUBMITTED BY CONTRACTOR AND MUST BE VERIFIED BY THE CONTRACTOR BY MEANS OF WORKING DRAWINGS.

1.5 ALL DIMENSIONS IN mm.

1.6 CHAMFER OF 25 x 25mm ON ALL EXPOSED EDGES UNLESS OTHERWISE INDICATED.

1.7 WATERTIGHTNESS TEST TO BE DONE ACCORDING TO BS 8007

2. CONCRETE (STRUCTURAL)

ALL CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF SANS 2001-CC1.

2.1 THE TYPE AND ORIGIN OF AGGREGATE AND CEMENT SHALL BE SUBMITTED TO THE ENGINEER FOR COMMENT PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL SUBMIT A MIX DESIGN AND REPORT BY A RECOGNIZED CONCRETE LABORATORY, TO INDICATE THAT SUITABLE MATERIALS AND MIX PROPORTIONS WILL BE USED TO MAINTAIN WORKABILITY, AND TO AVOID ALKALI AGGREGATE REACTION AND EXCESSIVE BLEEDING.

THE USE OF CORREX SLAB OR GOBS IS NOT PREFERRED FOR ANY WATER RETAINING STRUCTURE. 15 TO 30% FLY ASH IS RECOMMENDED.

2.2 CONCRETE SPECIFICATIONS

CEMENT TO SANS 50197-1 POSITIONS	MPa 28 DAYS	STONE mm
FOUNDATIONS	35	19
SLABS	35	19
COLUMNS	35	19
SURFACE BED	35	19
BEAMS	35	19
WALLS &	35	19
RETAINING WALLS		
BLINDING +MASS	15	19

BACK PROPPING MAY ONLY BE REMOVED AFTER THE CONCRETE HAS REACHED ITS REQUIRED 28-DAY STRENGTH

2.3 NO PUMPING OF CONCRETE SHALL BE ALLOWED WITHOUT PRIOR APPROVAL FROM THE ENGINEER

2.4 ALL CONCRETE SHALL BE CONTINUOUSLY CURED FOR 7 DAYS BY AN APPROVED METHOD - TO BE SUBMITTED TO ENGINEER

2.5 THE POSITION AND METHOD OF FORMING OF ALL CONSTRUCTION JOINTS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.

2.6 CONCRETE COVER TO REINFORCEMENT:
FLOOR TOP.....40mm
FLOOR BOT.....50mm
WALLS EXTERNAL & INTERNAL FACE.....50mm
ROOF.....40mm
COLUMNS.....40mm

2.7 THE DEGREE OF ACCURACY SHALL BE GRADE III FOR FOUNDATIONS AND GRADE II FOR ALL OTHER CONCRETE WORK, AS PER SANS 2001-CC1.

2.8 CONCRETE FINISH SHALL BE "ROUGH" FOR THE FOUNDATIONS AND "SMOOTH" FOR ALL OTHER CONCRETE AS PER SANS 2001-CC1.

2.9 GENERALLY THREE CONCRETE TEST CUBE SHALL BE TESTED AT 7 DAYS AND THREE CUBES AT 28 DAYS. THE RESULTS SHALL IMMEDIATELY BE FORWARDED TO THE ENGINEERS. ONE SET OF TEST CUBES HAS TO BE MADE PER 50 m3 OF CONCRETE OR PART THEREOF DAILY OF EVERY TYPE CAST IN ACCORDANCE WITH SANS 2001-CC1.

2.10 REMOVAL OF FORMWORK IN NORMAL TO HOT CONDITIONS:
BEAM SIDES, WALLS, UNLOADED COLUMNS.....1 DAY
SLABS WITH PROPS LEFT UNDER.....4 DAYS
BEAM SOFFITS WITH PROPS LEFT.....7 DAYS
SLAB PROPS.....10 DAYS
BEAM PROPS, CANTILEVER PROPS.....14 DAYS

2.11 NO CASTS MAY BE DONE WHICH IS MORE THAN 3m HIGH WITHOUT CONSENT FROM THE DESIGN ENGINEER. IF CONSENT IS GRANTED, CONCRETE MAY NOT FREE FALL FOR MORE THAN 3m.

3. FOUNDATIONS

3.1 ALL FOUNDING DEPTHS SHALL BE CONFIRMED BY THE ENGINEER ON SITE.

3.2 ALL FOUNDATION EXCAVATIONS SHALL BE APPROVED BY THE ENGINEER.

3.3 CAST 15 MPa 75mm THICK BLINDING UNDER ALL REINFORCED ELEMENTS.

3.4 DESIGN BEARING PRESSURE = 100 kPa - TO BE VERIFIED ON SITE BY SANAS ACCREDITED LABORATORY DCP TESTING AND WRITTEN APPROVAL OF THE ENGINEER.

4. REINFORCEMENT

4.1 ALL REINFORCEMENT SHALL COMPLY WITH THE REQUIREMENTS OF SANS 2001-CC1 & SANS 282.

4.2 THE CONTRACTOR SHALL GIVE AT LEAST 48-HOURS NOTICE TO THE ENGINEER FOR STEEL INSPECTIONS THAT ARE REQUIRED.

4.3 THE CONTRACTOR SHALL ENSURE ALL STEEL IS PROPERLY FIXED, SPACER BLOCKS POSITIONED, SHUTTERING CLEANED OUT AND REINFORCEMENT INSPECTED BEFORE THE ENGINEER IS NOTIFIED. ALL REINFORCEMENT SHALL BE INSPECTED AND APPROVED BY THE ENGINEER BEFORE THE CASTING OF CONCRETE.

4.4 NO HEATING, CUTTING OR WELDING OF REINFORCEMENT SHALL BE ALLOWED WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.

5. DESIGN INFORMATION

5.1 WATER RETAINING STRUCTURES DESIGNED ACCORDING TO BS 8007, SANS 10100 AND SANS 10160

5.2 ROOF SLAB DESIGNED FOR 2kPa LIVE LOAD.

5.3 DESIGN CRACK WIDTH = 0.1mm.

5.4 MINIMUM LOAD BEARING CAPACITY OF SOIL = 100kPa

Scale: AS SHOWN

ORIGINAL SIZE A0

Rev	Date	Description	Rev. by
0	26/09/2024	ASBUILT DRAWING	SM

Client/Employer

overlooked Group
INVEST. EMPOWER. SUSTAIN

human element
VAT NO: 4890286877
CSD NO: MAAA1054667

Project

MOOIPLAATS COLLIERY MINING PROJECT

Plan Description

MOOIPLAATS COLLIERY POLLUTION CONTROL DAM LAYOUT,SECTION & DETAILS

	Name	Signature
Designed	SM	
Drawn	SM	
Checked	RH	
Approved	RH	
Pr. No.		

Contract No.: 2406003

Drawing No.: 2406003/CV/001

Revision: 0

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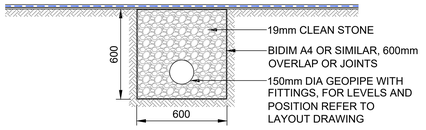
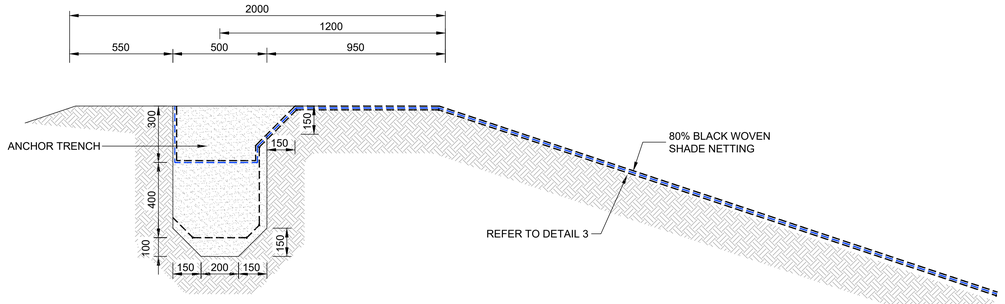
C:\Users\admin\OneDrive\Documents\Infrastructure Working Folder\2024 Projects\Mooiplats Colliery Stormwater Management Report\Drawings\2406003.PDO LAYOUT-SITOctober2024.dwg



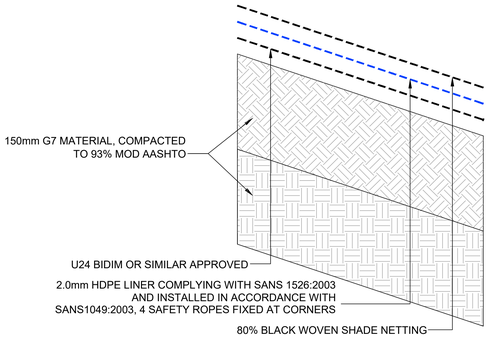
DETAIL 1: SUB-SOIL DRAIN

SCALE 1:20



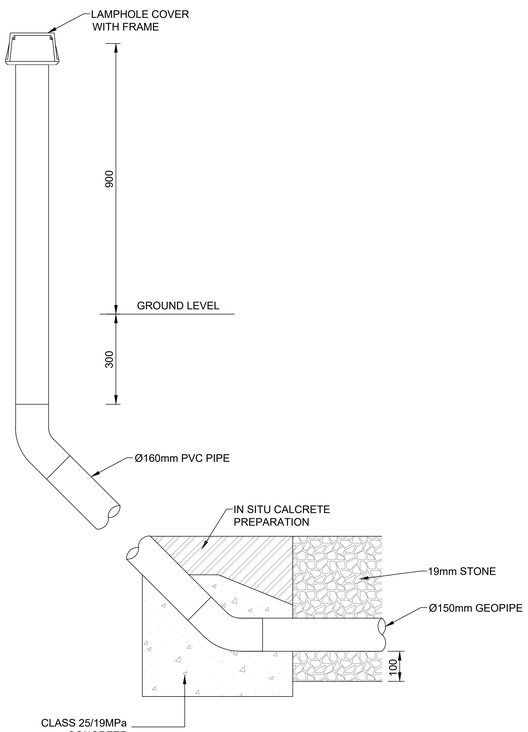
ANCHOR TRENCH DETAIL

SCALE 1:16



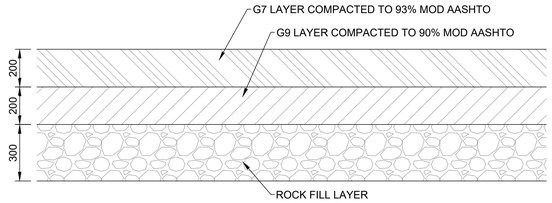
DETAIL 3

SCALE N.T.S



TYPICAL DETAIL OF RODDING EYE:BEGINNING OF SUB-SOIL

SCALE 1:10



SILT TRAP AND LAYERWORKS

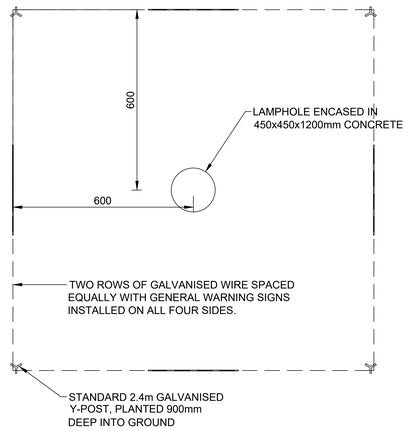
SCALE N.T.S

CONSTRUCTION NOTES:

1. EXCAVATE DAMS AS PER DIMENSIONS PROVIDED
2. PREPARE 2 x 150mm G7 LAYERS AND COMPACT TO 93% MOD ASSHTO
3. EXCAVATE OVERFLOW, INFLOW FROM SILT TRAP AND ANCHOR TRENCHES
4. APPLY U24 BIDIM AND PLACE IN TRENCH
5. INSERT 2mm HDPE LINER AND PLACE IN TRENCH
6. LAY DOWN SHADE NETTING AND PLACE IN TRENCH
7. FILL TRENCHES AND FINISH OFF SITE WORKS

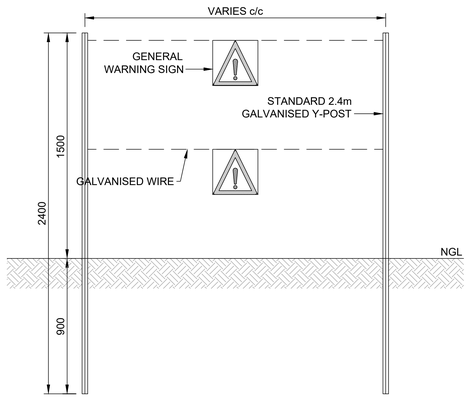
CONSTRUCTION NOTES

1. REMOVE AND STOCKPILE A MINIMUM OF 300mm TOPSOIL
2. EXCAVATE POLLUTION CONTROL DAM ACCORDING TO SANS 1200D, SOFT EXCAVATION IS EXPECTED
3. INSTALL SUB-SOIL DRAINS WITH APPROVED AGGREGATE AND BIDIM
4. RIP AND RE-COMPACT 150mm IN-SITU LAYER
5. FILL AND COMPACT TO LAYERS OF 150mm G7 MATERIAL AND COMPACT TO 93% MOD AASHTO
6. INSTALL V24 BIDIM AND ANCHOR ACCORDING TO TRENCH DETAIL
7. INSTALL 2.0mm HDPE LINER AS PER SANS 1409:2003
8. INSTALL SHADE NETTING AND ANCHOR IN TRENCH AS PER DETAIL



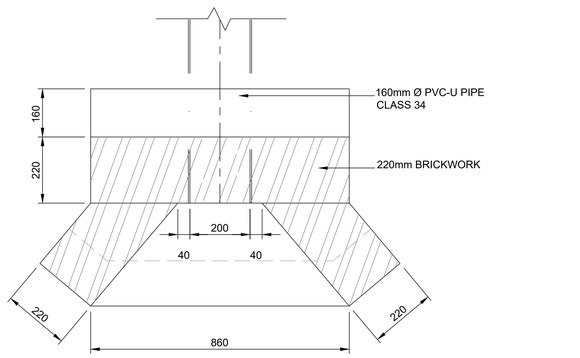
PLAN VIEW OF WARNING SIGN INSTALLATION

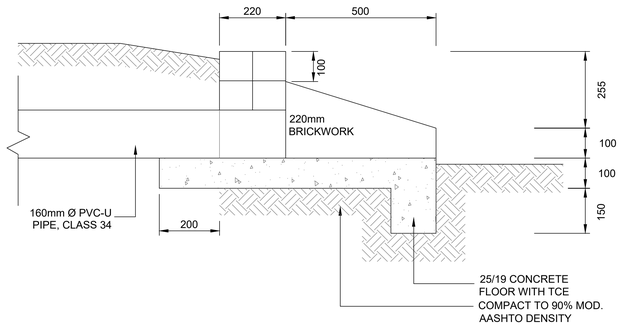
SCALE 1:10



TYPICAL DETAIL OF GENERAL WARNING SIGN INSTALLATION

SCALE 1:20





SIDE ELEVATION

SCALE 1:10

OUTLET STRUCTURE FOR SUB-SOIL DRAINS

1. GENERAL NOTES

1.0 THESE NOTES SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS OF THE ENGINEER AND ALL APPLICABLE PROJECT AND STANDARDIZED SPECIFICATIONS MENTIONED BELOW. IN THE EVENT OF ANY DISCREPANCY BETWEEN THESE NOTES AND THE SPECIFICATIONS THESE NOTES SHALL TAKE PRECEDENCE. THE CONTRACTOR'S AND SUB-CONTRACTOR'S DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONSULTANTS AND SPECIALISTS DRAWINGS. DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER PRIOR TO CONSTRUCTION.

1.1 ALL DIMENSIONS TO BE CHECKED ON SITE PRIOR TO INSTALLATION. DISCREPANCIES TO BE REFERRED TO ENGINEER.

1.2 CONCRETE TO BE 35/19 WATERTIGHT CONCRETE.

1.3 CONTRACTOR SHALL VERIFY ALL LENGTHS IN ACCORDANCE WITH VALVES & ACCESSORIES SUBMITTED.

1.4 CONTRACTOR SHALL VERIFY PROPOSED PLINTH SIZES AS SHOWN ON DRAWINGS. DISCREPANCIES TO BE REFERRED TO ENGINEER.

1.5 ALTHOUGH THIS DRAWING IS FOR CONSTRUCTION PURPOSES, DIMENSIONS ARE NOT NECESSARY IN ACCORDANCE WITH COMPONENTS AS SUBMITTED BY CONTRACTOR AND MUST BE VERIFIED BY THE CONTRACTOR BY MEANS OF WORKING DRAWINGS.

1.6 ALL DIMENSIONS IN mm.

1.7 MINIMUM CONCRETE COVER TO REINFORCEMENT = 40mm.

1.8 CHAMFER OF 20 x 20mm ON ALL EXPOSED EDGES UNLESS OTHERWISE INDICATED.

2. CONCRETE (STRUCTURAL)

ALL CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF SABS 1200 G.

2.1 THE TYPE AND ORIGIN OF AGGREGATE AND CEMENT SHALL BE SUBMITTED TO THE ENGINEER FOR COMMENT PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL SUBMIT A MIX DESIGN AND REPORT BY A RECOGNIZED CONCRETE LABORATORY, TO INDICATE THAT SUITABLE MATERIALS AND MIX PROPORTIONS WILL BE USED TO MAINTAIN WORKABILITY, AND TO AVOID ALKALI AGGREGATE REACTION AND EXCESSIVE BLEEDING.

2.2 CONCRETE SPECIFICATIONS

POSITIONS	Mpa 28 DAYS	STONE mm	CEMENT TO SABS EN 197-1 AND SLAG TO SABS 1491
FOUNDATIONS	35	19	CEM I A-S (65% OPC - 35% SLAG)
SLABS	35	19	CEM I A-S (65% OPC - 35% SLAG)
COLUMNS	35	19	CEM I A-S (65% OPC - 35% SLAG)
SURFACE BED	35	19	CEM I A-S (65% OPC - 35% SLAG)
BEAMS	35	19	CEM I A-S (65% OPC - 35% SLAG)
WALLS & RETAINING WALLS	35	19	CEM I A-S (65% OPC - 35% SLAG)

2.3 NO PUMPING OF CONCRETE SHALL BE ALLOWED WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

2.4 ALL CONCRETE SHALL BE CONTINUOUSLY CURED FOR 7 DAYS BY AN APPROVED METHOD - TO BE SUBMITTED TO ENGINEER.

2.5 THE POSITION AND METHOD OF FORMING OF ALL CONSTRUCTION JOINTS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.

2.6 CONCRETE COVER TO REINFORCEMENT:
FOUNDATION.....50mm WITH SHUTTERING, 60mm WITHOUT SHUTTERING.
ALL CONCRETE IN CONTACT WITH SOIL:.....50mm
INTERNAL COLUMNS & BEAMS:.....40mm TO STIRRUPS
WALLS EXTERNAL:.....40mm
WALLS INTERNAL:.....40mm
EXTERNAL SLAB EDGES:.....40mm
ALL ROOF SLABS:.....40mm

2.7 THE DEGREE OF ACCURACY SHALL BE GRADE III FOR FOUNDATIONS AND GRADE II FOR ALL OTHER CONCRETE WORK, AS PER SABS 1200 G.

2.8 CONCRETE FINISH SHALL BE "ROUGH" FOR THE FOUNDATIONS AND "SMOOTH" FOR ALL OTHER CONCRETE AS PER SABS 1200 G.

2.9 GENERALLY ONE CONCRETE TEST CUBE SHALL BE TESTED AT 7 DAYS AND THREE CUBES AT 28 DAYS. FOR POST TENSIONED SLAB 3 CUBES SHALL BE TESTED AT 3 DAYS AND 3 CUBES AT 28 DAYS. THE RESULTS SHALL IMMEDIATELY BE FORWARDED TO THE ENGINEERS. ONE SET OF TEST CUBES HAS TO BE MADE PER 50 m3 OF CONCRETE OR PART THEREOF DAILY OF EVERY TYPE CAST.

2.10 REMOVAL OF FORMWORK IN NORMAL TO HOT CONDITIONS:
BEAM SIDES, WALLS, UNLOADED COLUMNS.....1 DAY
SLABS WITH PROPS LEFT UNDER.....4 DAYS
BEAM SOFFITS WITH PROPS LEFT.....7 DAYS
SLAB PROPS.....10 DAYS
BEAM PROPS, CANTILEVER PROPS.....14 DAYS

2.11 ALL REINFORCEMENT MUST BE INSPECTED BY ENGINEER BEFORE CONCRETE IS CAST.
THE ENGINEER SHALL BE GIVEN 48 HOURS ADVANCE NOTICE OF INSPECTION.
INSPECTION WILL ONLY BE DONE IF ALL STEEL IS PROPERLY POSITIONED, BLOCKS POSITIONED, SHUTTERING CLEANED OUT AND REINFORCEMENT CHECKED BY CONTRACTOR.
CONCRETE MAY BE ONLY POURED AFTER THE ENGINEER HAS ISSUED A POURING CERTIFICATE.

2.12 SAW JOINTS IN SURFACE BEDS AND SLABS SHALL BE CUT WITHIN 48 HOURS AFTER CASTING OF CONCRETE.

3. FOUNDATIONS

3.1 ALL FOUNDING DEPTHS SHALL BE CONFIRMED BY THE ENGINEER ON SITE.

3.2 ALL FOUNDATION EXCAVATIONS SHALL BE APPROVED BY THE ENGINEER.

3.3 CAST 15 Mpa 75mm THICK BLINDING UNDER ALL REINFORCED FOUNDATIONS.

3.4 ALL FOUNDATIONS ARE LOCATED CENTRALLY UNDER COLUMNS OR WALLS UNLESS SHOWN OTHERWISE.

3.5 DESIGN BEARING PRESSURE = 250 kPa - TO BE VERIFIED ON SITE BY ENGINEER.

4. REINFORCEMENT

4.1 ALL REINFORCEMENT SHALL COMPLY WITH THE REQUIREMENTS OF SABS 1200G.

4.2 THE CONTRACTOR SHALL GIVE AT LEAST 48 HOURS NOTICE TO THE ENGINEER FOR STEEL INSPECTIONS THAT ARE REQUIRED

4.3 THE CONTRACTOR SHALL INSPECT AND APPROVE THE FIXED REINFORCEMENT BEFORE THE ENGINEER IS NOTIFIED. ALL REINFORCEMENT SHALL BE INSPECTED

Scale: AS SHOWN
ORIGINAL SIZE A0

Rev.	Date	Description	Rev. by
0	26/09/2024	PCD ASBUILT DETAILS	SM

Client/Employer

overlooked Group

human element
VAT NO: 4890286877
CSD NO: MAAA1054667

Project
MOOIPLAATS COLLIERY MINING PROJECT

Plan Description
ASBUILT
POLLUTION CONTROL DAM LINING DETAILS 1 OF 2

	Name	Signature
Designed	SM	
Drawn	SM	
Checked	RH	
Approved	RH	
Pr. No.		

Contract No. 2406003

Drawing No. 2406003/CV/002
Revision 0

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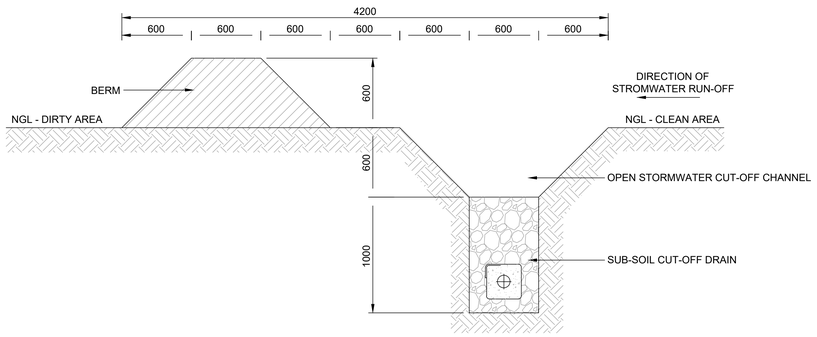
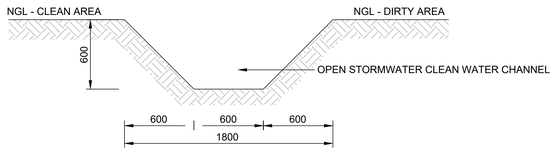


STORMWATER PROFILE 1 A

SCALE 1:25



STORMWATER PROFILE 1 B

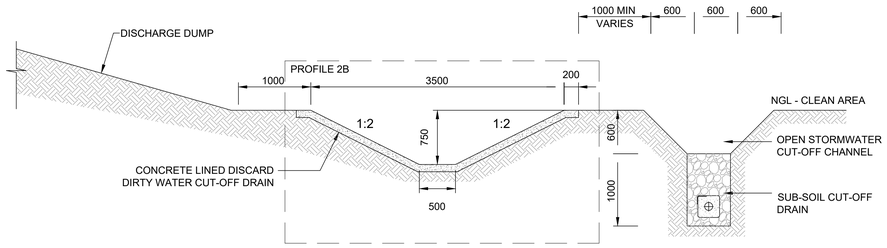
SCALE 1:25

NOTES

1. ALL CONCRETE WORK TO BE 25/19 MPa CONCRETE
2. REINFORCEMENT COVERAGE TO BE A MINIMUM 40mm

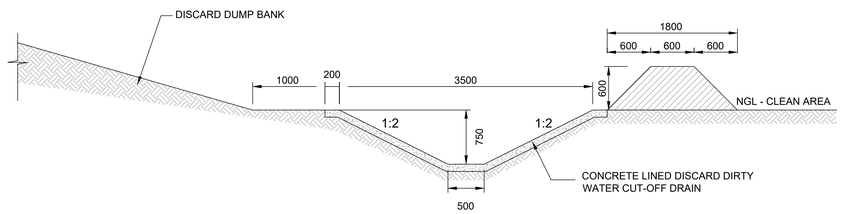
CONSTRUCTION NOTES

1. REMOVE 300mm TOPESOIL AND STOCKPILE
2. ALL COMPACTION TO BE DONE AS PER SANS 1200D AND TO A MINIMUM OF 93% MOD AASHTO
3. WORKS TO COMPLY WITH THE RELEVANT SANS 1200 SPECIFICATIONS
4. MINIMUM DRAINING SLOPE OF 067%



STORMWATER PROFILE 2 A

SCALE: N.T.S



STORMWATER PROFILE 2 B

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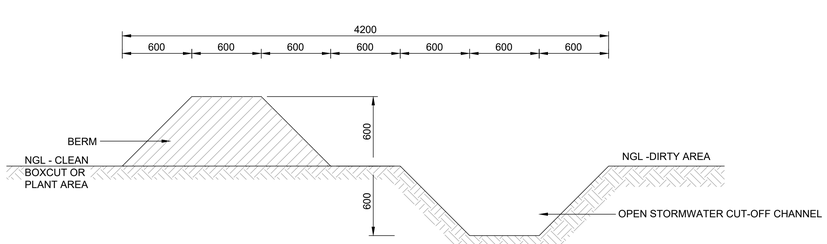

STORMWATER PROFILE 3 A

SCALE 1:25

STORMWATER PROFILE 3 B

SCALE 1:25

1. GENERAL NOTES

1.0 THESE NOTES SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS OF THE ENGINEER AND ALL APPLICABLE PROJECT AND STANDARDIZED SPECIFICATIONS MENTIONED BELOW. IN THE EVENT OF ANY DISCREPANCY BETWEEN THESE NOTES AND THE SPECIFICATIONS THESE NOTES SHALL TAKE PRECEDENCE AND SHALL GOVERN. THE ENGINEER'S DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONSULTANTS AND SPECIALISTS DRAWINGS.
DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER PRIOR TO CONSTRUCTION.

1.1 ALL DIMENSIONS TO BE CHECKED ON SITE PRIOR TO INSTALLATION. DISCREPANCIES TO BE REFERRED TO ENGINEER.

1.2 CONCRETE TO BE 35/19 WATERTIGHT CONCRETE.

1.3 CONTRACTOR SHALL VERIFY ALL LENGTHS IN ACCORDANCE WITH VALVES & ACCESSORIES SUBMITTED.

1.4 CONTRACTOR SHALL VERIFY PROPOSED PLINTH SIZES AS SHOWN ON DRAWINGS. DISCREPANCIES TO BE REFERRED TO ENGINEER.

1.5 ALTHOUGH THIS DRAWING IS FOR CONSTRUCTION PURPOSES, DIMENSIONS ARE NOT NECESSARY IN ACCORDANCE WITH COMPONENTS AS SUBMITTED BY CONTRACTOR AND MUST BE VERIFIED BY THE CONTRACTOR BY MEANS OF WORKING DRAWINGS.

1.6 ALL DIMENSIONS IN mm.

1.7 MINIMUM CONCRETE COVER TO REINFORCEMENT = 40mm.

1.8 CHAMFER OF 20 x 20mm ON ALL EXPOSED EDGES UNLESS OTHERWISE INDICATED.

2. CONCRETE (STRUCTURAL)

ALL CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF SABS 1200 G.

2.1 THE TYPE AND ORIGIN OF AGGREGATE AND CEMENT SHALL BE SUBMITTED TO THE ENGINEER FOR COMMENT PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL SUBMIT A MIX DESIGN AND REPORT BY A RECOGNIZED CONCRETE LABORATORY, TO INDICATE THAT SUITABLE MATERIALS AND MIX PROPORTIONS WILL BE USED TO MAINTAIN WORKABILITY, AND TO AVOID ALKALI AGGREGATE REACTION AND EXCESSIVE BLEEDING.

2.2 CONCRETE SPECIFICATIONS

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SLABS	35	19	CEM II A-S (65% OPC - 35% SLAG)
COLUMNS	35	19	CEM II A-S (65% OPC - 35% SLAG)
SURFACE BED	35	19	CEM II A-S (65% OPC - 35% SLAG)
BEAMS	35	19	CEM II A-S (65% OPC - 35% SLAG)
WALLS & RETAINING WALLS	35	19	CEM II A-S (65% OPC - 35% SLAG)

2.3 NO PUMPING OF CONCRETE SHALL BE ALLOWED WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

2.4 ALL CONCRETE SHALL BE CONTINUOUSLY CURED FOR 7 DAYS BY AN APPROVED METHOD - TO BE SUBMITTED TO ENGINEER.

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FOUNDATION:..50mm WITH SHUTTERING,
60mm WITHOUT SHUTTERING.
ALL CONCRETE IN CONTACT WITH SOIL:....50mm
INTERNAL COLUMNS & BEAMS:.....40mm TO STIRRUPS
WALLS EXTERNAL:.....40mm
WALLS INTERNAL:.....40mm
EXTERNAL SLAB EDGES:.....40mm
ALL ROOF SLABS:.....40mm

2.7 THE DEGREE OF ACCURACY SHALL BE GRADE III FOR FOUNDATIONS AND GRADE II FOR ALL OTHER CONCRETE WORK, AS PER SABS 1200 G.

2.8 CONCRETE FINISH SHALL BE "ROUGH" FOR THE FOUNDATIONS AND "SMOOTH" FOR ALL OTHER CONCRETE AS PER SABS 1200 G.

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BEAM SOFFITS WITH PROPS LEFT.....7 DAYS
SLAB PROPS.....10 DAYS
BEAM PROPS, CANTILEVER PROPS.....14 DAYS

2.11 ALL REINFORCEMENT MUST BE INSPECTED BY ENGINEER BEFORE CONCRETE IS CAST.
THE ENGINEER SHALL BE GIVEN 48 HOURS ADVANCE NOTICE OF INSPECTION.
INSPECTION WILL ONLY BE DONE IF ALL STEEL IS PROPERLY FIXED, SPACER BLOCKS POSITIONED, SHUTTERING CLEANED OUT AND REINFORCEMENT CHECKED BY CONTRACTOR.
CONCRETE MAY BE ONLY POURED AFTER THE ENGINEER HAS GIVEN WRITTEN APPROVAL.

2.12 SAW JOINTS IN SURFACE BEDS AND SLABS SHALL BE CUT WITHIN 48 HOURS AFTER CASTING OF CONCRETE.

3. FOUNDATIONS

3.1 ALL FOUNDING DEPTHS SHALL BE CONFIRMED BY THE ENGINEER ON SITE.

3.2 ALL FOUNDATION EXCAVATIONS SHALL BE APPROVED BY THE ENGINEER.

3.3 CAST 15 Mpa 75mm THICK BLINDING UNDER ALL REINFORCED FOUNDATIONS.

3.4 ALL FOUNDATIONS ARE LOCATED CENTRALLY UNDER COLUMNS OR WALLS UNLESS SHOWN OTHERWISE.

3.5 DESIGN BEARING PRESSURE = 250 kPa - TO BE VERIFIED ON SITE BY ENGINEER.

4. REINFORCEMENT

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Scale: AS SHOWN
ORIGINAL SIZE A0

Rev.	Date	Description	Rev by
A	26/09/2024	ISSUED FOR INFORMATION	SM

Client/Employer

overlooked Group

human element
VAT NO: 4890286877
CSD NO: MAAA1054667

Project

MOOIPLAATS COLLIERY
MINING PROJECT

Plan Description

STANDARD DETAILS
FOR PROPOSED STORMWATER
DETAILS

	Name	Signature
Designed	SM	
Drawn	SM	
Checked	RH	
Approved	RH	

Pr. No.

Contract No.
2406003

Drawing No.
2406003/CV/003

Revision
A

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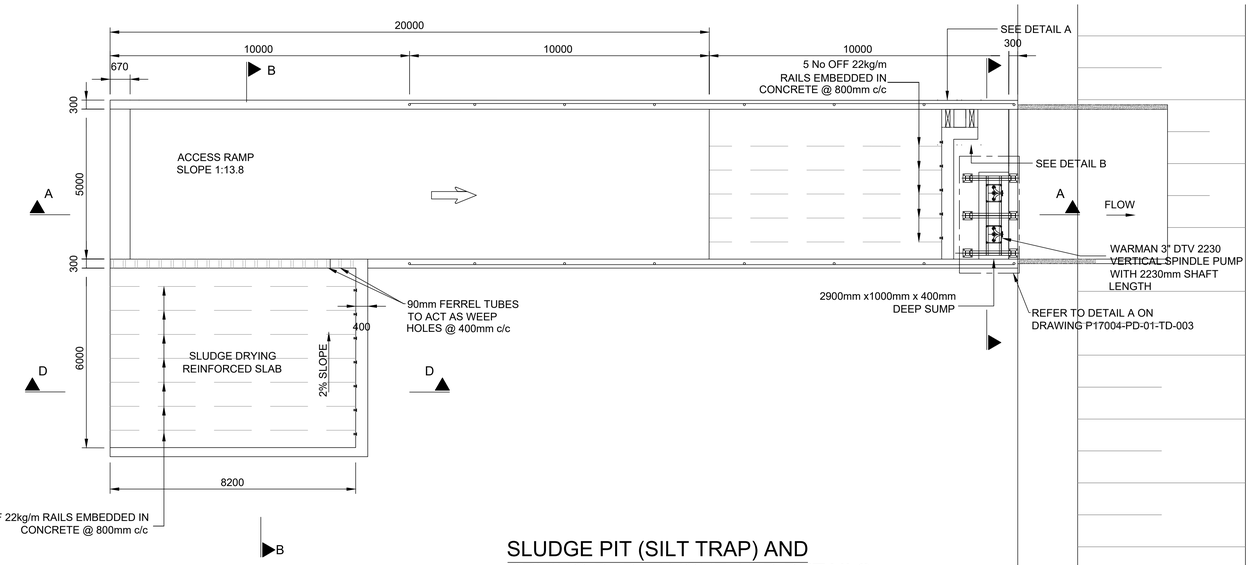
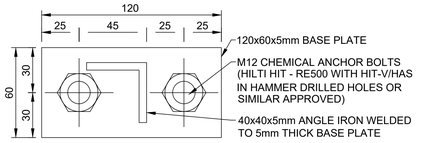


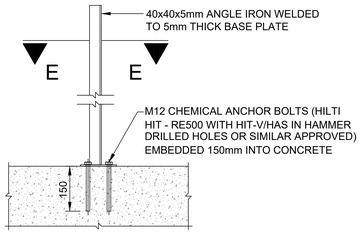
SLUDGE PIT (SILT TRAP) AND DRYING BED LAYOUT AND DETAILS

SCALE 1:100



SECTION E-E

SCALE 1:2

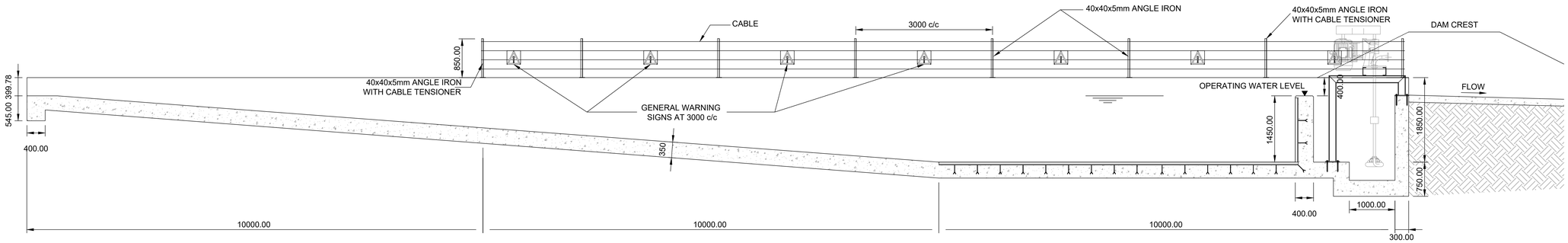


DETAIL C

SCALE 1:10

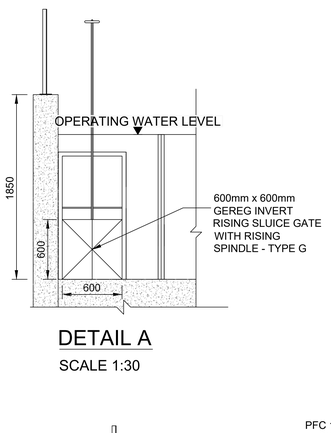
GENERAL WARNING

SCALE 1:25



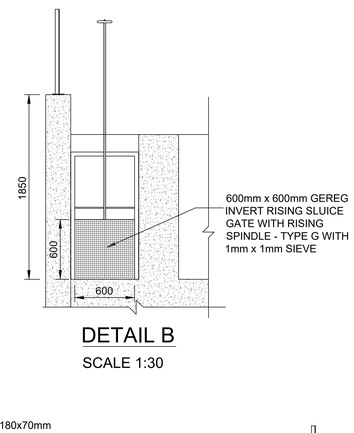
SECTION A-A

SCALE 1:50



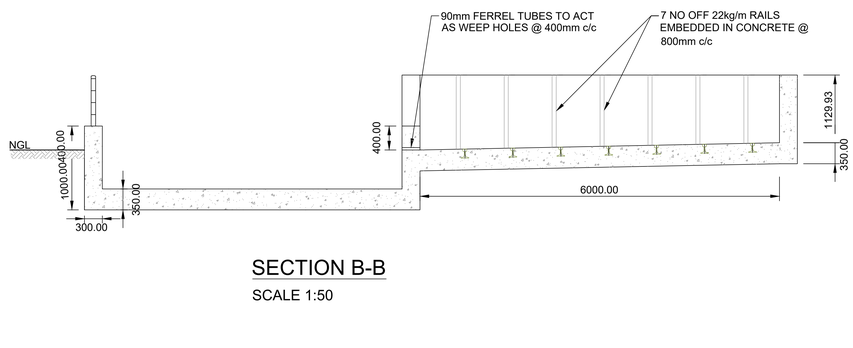
DETAIL A

SCALE 1:30



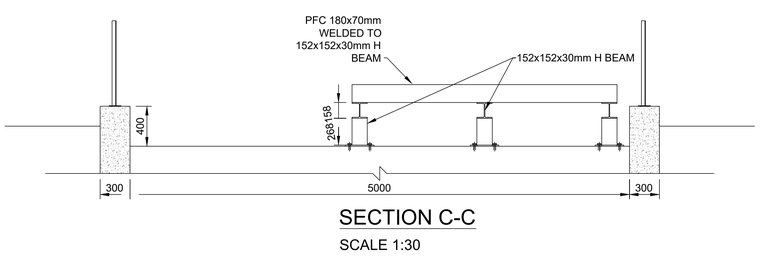
DETAIL B

SCALE 1:30



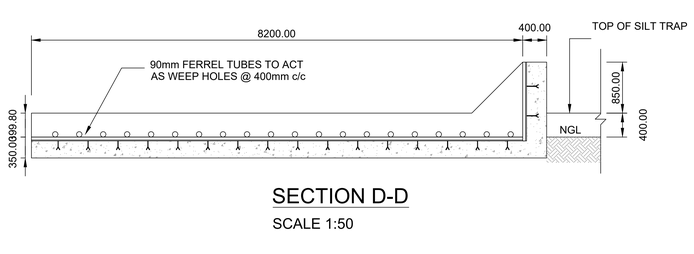
SECTION B-B

SCALE 1:50



SECTION C-C

SCALE 1:30



SECTION D-D

SCALE 1:50

NOTE:

1. CONCRETE CLASS 25MPa/ 19 mm
2. ALL STEEL FITTINGS ABOVE THE OPERATING WATER LEVEL SHALL BE HOT DIPPED GALVANISED AFTER MANUFACTURING.
3. ALL STEEL FITTINGS BELOW THE OPERATING WATER LEVEL SHALL BE DOUBLE HOT DIPPED GALVANISED AFTER MANUFACTURING.
4. ALL ANGLE IRON SHALL BE HOT DIPPED GALVANISED.

LEGEND:

Ø4mm STRAINING WIRE

1. GENERAL NOTES

1.0 THESE NOTES SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS OF THE ENGINEER AND ALL APPLICABLE PROJECT AND STANDARDIZED SPECIFICATIONS MENTIONED BELOW. IN THE EVENT OF ANY DISCREPANCY BETWEEN THESE NOTES AND THE SPECIFICATIONS THESE NOTES SHALL TAKE PRECEDENCE AND SHALL GOVERN. THE ENGINEER'S DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONSULTANTS AND SPECIALISTS DRAWINGS. DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER PRIOR TO CONSTRUCTION.

1.1 ALL DIMENSIONS TO BE CHECKED ON SITE PRIOR TO INSTALLATION. DISCREPANCIES TO BE REFERRED TO ENGINEER.

1.2 CONCRETE TO BE 35/19 WATERTIGHT CONCRETE.

1.3 CONTRACTOR SHALL VERIFY ALL LENGTHS IN ACCORDANCE WITH VALVES & ACCESSORIES SUBMITTED.

1.4 CONTRACTOR SHALL VERIFY PROPOSED PLINTH SIZES AS SHOWN ON DRAWINGS. DISCREPANCIES TO BE REFERRED TO ENGINEER.

1.5 ALTHOUGH THIS DRAWING IS FOR CONSTRUCTION PURPOSES, DIMENSIONS ARE NOT NECESSARY IN ACCORDANCE WITH COMPONENTS AS SUBMITTED BY CONTRACTOR AND MUST BE VERIFIED BY THE CONTRACTOR BY MEANS OF WORKING DRAWINGS.

1.6 ALL DIMENSIONS IN mm.

1.7 MINIMUM CONCRETE COVER TO REINFORCEMENT = 40mm.

1.8 CHAMFER OF 20 x 20mm ON ALL EXPOSED EDGES UNLESS OTHERWISE INDICATED.

2. CONCRETE (STRUCTURAL)

ALL CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF SABS 1200 G.

2.1 THE TYPE AND ORIGIN OF AGGREGATE AND CEMENT SHALL BE SUBMITTED TO THE ENGINEER FOR COMMENT PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL SUBMIT A MIX DESIGN CERTIFICATE FOR ALL CONCRETE CONFORMING TO LABORATORY INDICATIONS THAT SATISFACTORY MATERIALS AND MIX PROPORTIONS WILL BE USED TO MAINTAIN WORKABILITY, AND TO AVOID ADALI AGGREGATE REACTION AND EXCESSIVE BLEEDING.

2.2 CONCRETE SPECIFICATIONS:

POSITIONS	Mpa 28 DAYS	STONE mm	CEMENT TO SABS EN 197-1 AND SLAG TO SABS 1491
FOUNDATIONS	35	19	CEM II A-S (65% OPC - 35% SLAG)
SLABS	35	19	CEM II A-S (65% OPC - 35% SLAG)
COLUMNS	35	19	CEM II A-S (65% OPC - 35% SLAG)
SURFACE BED	35	19	CEM II A-S (65% OPC - 35% SLAG)
BEAMS	35	19	CEM II A-S (65% OPC - 35% SLAG)
WALLS & RETAINING WALLS	35	19	CEM II A-S (65% OPC - 35% SLAG)

2.3 NO PUMPING OF CONCRETE SHALL BE ALLOWED WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

2.4 ALL CONCRETE SHALL BE CONTINUOUSLY CURED FOR 7 DAYS BY AN APPROVED METHOD - TO BE SUBMITTED TO ENGINEER.

2.5 THE POSITION AND METHOD OF FORMING OF ALL CONSTRUCTION JOINTS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.

2.6 CONCRETE COVER TO REINFORCEMENT:
FOUNDATION.....50mm WITH SHUTTERING, 60mm WITHOUT SHUTTERING.
ALL CONCRETE IN CONTACT WITH SOIL.....50mm
INTERNAL COLUMNS & BEAMS:.....40mm TO STIRRUPS
WALLS EXTERNAL:.....40mm
WALLS INTERNAL:.....40mm
EXTERNAL SLAB EDGES:.....40mm
ALL ROOF SLABS:.....40mm

2.7 THE DEGREE OF ACCURACY SHALL BE GRADE III FOR FOUNDATIONS AND GRADE II FOR ALL OTHER CONCRETE WORK, AS PER SABS 1200 G.

2.8 CONCRETE FINISH SHALL BE "ROUGH" FOR THE FOUNDATIONS AND "SMOOTH" FOR ALL OTHER CONCRETE AS PER SABS 1200 G.

2.9 GENERALLY ONE CONCRETE TEST CUBE SHALL BE TESTED AT 7 DAYS AND THREE CUBES AT 28 DAYS. FOR POST TENSIONED SLAB 3 CUBES SHALL BE TESTED AT 3 DAYS AND 3 CUBES AT 28 DAYS. THE RESULTS SHALL IMMEDIATELY BE FORWARDED TO THE ENGINEERS. ONE SET OF TEST CUBES HAS TO BE MADE PER 50 m3 OF CONCRETE OR PART THEREOF DAILY OF EVERY TYPE CAST.

2.10 REMOVAL OF FORMWORK IN NORMAL TO HOT CONDITIONS
BEAM SIDES, WALLS, UNLOADED COLUMNS:.....1 DAY
SLABS WITH PROPS LEFT UNDER:.....4 DAYS
BEAM SOFFITS WITH PROPS LEFT:.....7 DAYS
SLAB PROPS:.....10 DAYS
BEAM PROPS, CANTILEVER PROPS:.....14 DAYS

2.11 ALL REINFORCEMENT MUST BE INSPECTED BY ENGINEER BEFORE CONCRETE IS CAST.
THE ENGINEER SHALL BE GIVEN 48 HOURS ADVANCE NOTICE OF INSPECTION
INSPECTION WILL ONLY BE DONE IF ALL STEEL IS PROPERLY FIXED, SPACER BLOCKS POSITIONED, WALTTERING CLEANED OUT AND REINFORCEMENT CHECKED BY CONTRACTOR.
CONCRETE MAY BE ONLY POURED AFTER THE ENGINEER HAS ISSUED A POURING CERTIFICATE.

2.12 FORMWORK TO WALLS, BEAMS AND SLABS SHALL BE CUT WITHIN 48 HOURS AFTER CASTING OF CONCRETE.

3. FOUNDATIONS

3.1 ALL FOUNDING DEPTHS SHALL BE CONFIRMED BY THE ENGINEER ON SITE.

3.2 ALL FOUNDATION EXCAVATIONS SHALL BE APPROVED BY THE ENGINEER.

3.3 CAST 15 Mpa 75mm THICK BLINDING UNDER ALL REINFORCED FOUNDATIONS.

3.4 ALL FOUNDATIONS ARE LOCATED CENTRALLY UNDER COLUMNS OR WALLS UNLESS SHOWN OTHERWISE.

3.5 DESIGN BEARING PRESSURE = 250 kPa - TO BE VERIFIED ON SITE BY ENGINEER.

4. REINFORCEMENT

4.1 ALL REINFORCEMENT SHALL COMPLY WITH THE REQUIREMENTS OF SABS 1200G.

4.2 THE CONTRACTOR SHALL GIVE AT LEAST 48 HOURS NOTICE TO THE ENGINEER FOR STEEL INSPECTIONS THAT ARE REQUIRED.

4.3 THE CONTRACTOR SHALL INSPECT AND APPROVE THE FIXED REINFORCEMENT BEFORE THE ENGINEER IS NOTIFIED. ALL REINFORCEMENT SHALL BE INSPECTED

Scale: AS SHOWN

ORIGINAL SIZE A0

Rev.	Date	Description	Rev. by
A	26/09/2024	ISSUED FOR INFORMATION	SM

Client/Employer

overlooked Group

human element
VAT NO: 4890286877
CSD NO: MAAA1054667

Project

MOOIPLAATS COLLIERY
MINING PROJECT

Plan Description

NEWLY PROPOSED SILT TRAP LAYOUT,SECTIONS & DETAILS
1of 2

	Name	Signature
Designed	SM	
Drawn	SM	
Checked	RH	
Approved	RH	
Pr. No.	201070025	

Contract No.: 2406003

Drawing No.: 2406003/CV/004

Revision: A

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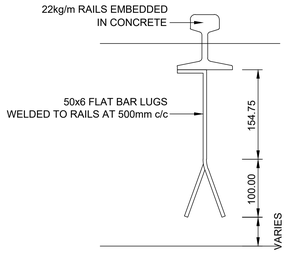
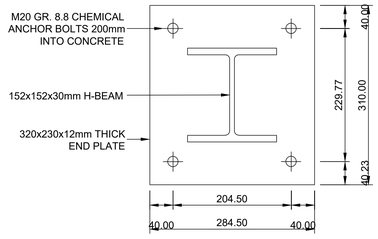


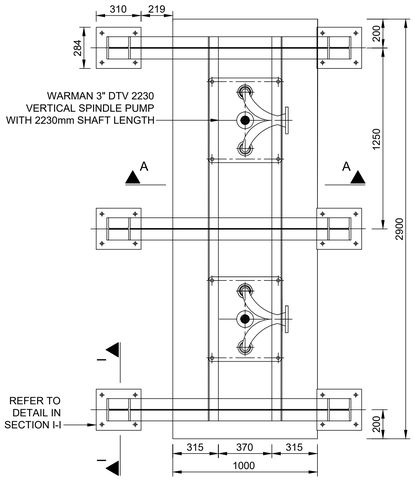
DETAIL OF LUGS

SCALE 1:5



SECTION I-I

SCALE 1:5



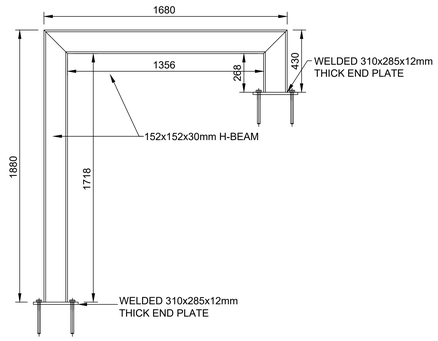
DETAIL A: LAYOUT

SCALE 1:20

NOTES:

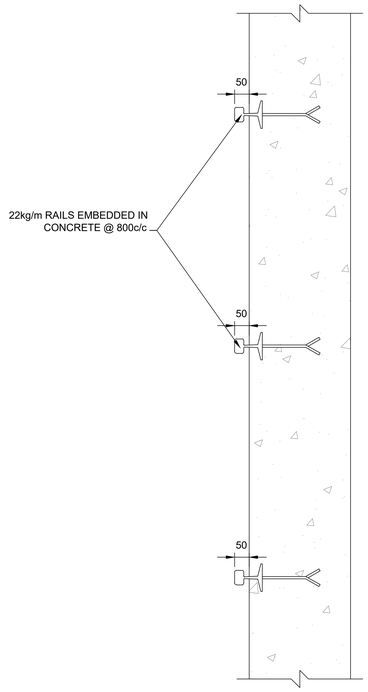
1. FOUNDING MATERIAL: HARDPAN CALCRETE.
2. LAYERWORKS: COMPACT IN SITU MATERIAL TO 95% MOD AASHTO 150mm THICK LAYERS SELECTED TO 98% MOD AASHTO.
3. ALL PROPRIETARY ITEMS MUST BE INSTALLED STRICTLY TO MANUFACTURER'S SPECIFICATION.
4. CONCRETE DESIGNED AND APPROVED IN ACCORDANCE WITH AA SPECIFICATION 114010.
5. STRUCTURAL STEEL DESIGNED AND APPROVED IN ACCORDANCE WITH AA SPECIFICATION 114001.
6. CONTRACTOR TO REFER TO THE FOLLOWING PROJECT SPECIFICATIONS:
   - 6.1. CONCRETE CONSTRUCTION SPECIFICATION: AA SPECIFICATION 114011
   - 6.2. STEEL CONSTRUCTION SPECIFICATION: AA SPECIFICATION 114002
7. MICRO FLOAT SWITCH MODEL B-01/10 CONNECTED TO CONTROL BOX AS PER ACDC DYNAMICS SPECS OR SIMILAR APPROVED
8. CABLE-PIPE STRAPS TO BE STAINLESS STEEL GRADE 316 OR SIMILAR APPROVED AND USED TO STRAP FLOAT SWITCH CABLE TO I-BEAM
9. LAP LENGTHS AND CONCRETE COVER AS PER STRUCTURAL SPECIFICATIONS

10.CONCRETE CLASS 25MPa/ 19mm



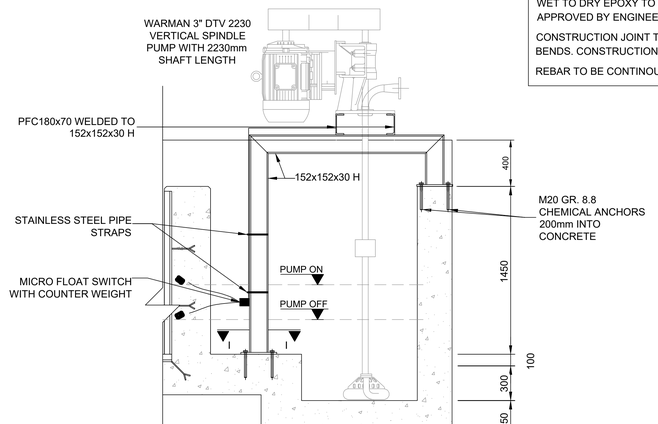
H-BEAM PROFILE

SCALE 1:20



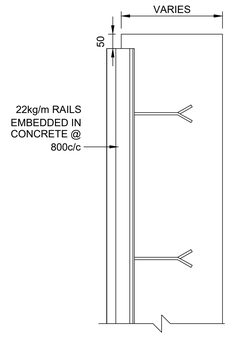
TYPICAL PLAN VIEW OF RAILS IN WALL

SCALE 1:10



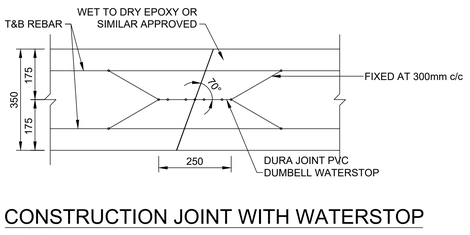
SECTION A-A

SCALE 1:25



TYPICAL SECTION OF VERTICAL RAILS IN WALL

SCALE 1:10



CONSTRUCTION JOINT WITH WATERSTOP

SCALE 1:10

NOTES:

INSTALLATION TECHNIQUES (WATERSTOP)

CENTRALLY PLACE WATERSTOP, FULLY TIDE TO RE-BAR TO ELIMINATE POSSIBLE DISPLACEMENT DURING CONCRETE CASTING & VIBRATING PROCESS. FULLY COMPACT CONCRETE AROUND WATERSTOP TO ELIMINATE ANY VOIDS OR HONEYCOMBING. DURA JOINT PVC DUMBELL - 250mm WATERSTOP OR SIMILAR APPROVED.

CONCRETE CASTING & CONSTRUCTION JOINT

SCABBLE AWAY CONCRETE AND APPLY WET TO DRY EPOXY BEFORE CASTING CONCRETE. WHEN SCABBLING DAMAGE TO WATERSTOP MUST BE PREVENTED.

WET TO DRY EPOXY TO BE APPLIED ACCORDING TO PRODUCT SPECIFICATION. WET TO DRY EPOXY TO BE APPROVED BY ENGINEER.

CONSTRUCTION JOINT TO BE SLOPED 70° FROM HORIZONTAL. JOINT MUST BE STRAIGHT AND CANNOT FORM BENDS. CONSTRUCTION JOINT TO BE APPLIED ACROSS FULL SECTION OF SLAB.

REBAR TO BE CONTINOUS THROUGH JOINT.

1. GENERAL NOTES

1.0 THESE NOTES SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS OF THE ENGINEER AND ALL APPLICABLE PROJECT AND STANDARDIZED SPECIFICATIONS MENTIONED BELOW. IN THE EVENT OF ANY DISCREPANCY BETWEEN THESE NOTES AND THE SPECIFICATIONS THESE NOTES SHALL TAKE PRECEDENCE AND SHALL GOVERN. THE ENGINEER'S DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONSULTANTS AND SPECIALISTS DRAWINGS. DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER PRIOR TO CONSTRUCTION.

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1.2 CONCRETE TO BE 35/19 WATERTIGHT CONCRETE.

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1.4 CONTRACTOR SHALL VERIFY PROPOSED PLINTH SIZES AS SHOWN ON DRAWINGS. DISCREPANCIES TO BE REFERRED TO ENGINEER.

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1.6 ALL DIMENSIONS IN mm.

1.7 MINIMUM CONCRETE COVER TO REINFORCEMENT = 40mm.

1.8 CHAMFER OF 20 x 20mm ON ALL EXPOSED EDGES UNLESS OTHERWISE INDICATED.

2. CONCRETE (STRUCTURAL)

ALL CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF SABS 1200 G.

2.1 THE TYPE AND ORIGIN OF AGGREGATE AND CEMENT SHALL BE SUBMITTED TO THE ENGINEER FOR COMMENT PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL SUBMIT A MIX DESIGN FOR THE CONCRETE TO BE USED IN THE VARIOUS ELEMENTS TO INDICATE THAT SUITABLE MATERIALS AND MIX PROPORTIONS WILL BE USED TO MAINTAIN WORKABILITY, AND TO AVOID ADALI AGGREGATE REACTION AND EXCESSIVE BLEEDING.

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2.6 CONCRETE COVER TO REINFORCEMENT:
FOUNDATION.....50mm WITH SHUTTERING, 60mm WITHOUT SHUTTERING.
ALL CONCRETE IN CONTACT WITH SOIL.....50mm
INTERNAL COLUMNS & BEAMS:.....40mm TO STIRRUPS
WALLS EXTERNAL:.....40mm
WALLS INTERNAL:.....40mm
EXTERNAL SLAB EDGES:.....40mm
ALL ROOF SLABS:.....40mm

2.7 THE DEGREE OF ACCURACY SHALL BE GRADE III FOR FOUNDATIONS AND GRADE II FOR ALL OTHER CONCRETE WORK, AS PER SABS 1200 G.

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BEAM SIDES, WALLS, UNLOADED COLUMNS.....1 DAY
SLABS WITH PROPS LEFT UNDER.....4 DAYS
BEAM SOFFITS WITH PROPS LEFT.....7 DAYS
SLAB PROPS.....10 DAYS
BEAM PROPS, CANTILEVER PROPS.....14 DAYS

2.11 ALL REINFORCEMENT MUST BE INSPECTED BY ENGINEER BEFORE CONCRETE IS CAST.
THE ENGINEER SHALL BE GIVEN 48 HOURS ADVANCE NOTICE OF INSPECTION
INSPECTION WILL ONLY BE DONE IF ALL STEEL IS PROPERLY FIXED, SPACER BLOCKS POSITIONED, BKU SHUTTERING CLEANED OUT AND REINFORCEMENT CHECKED BY CONTRACTOR.
CONCRETE MAY BE ONLY POURED AFTER THE ENGINEER HAS ISSUED A POURING CERTIFICATE.

2.12 ALL CONSTRUCTION JOINTS AND SLABS SHALL BE CUT WITHIN 48 HOURS AFTER CASTING OF CONCRETE.

3. FOUNDATIONS

3.1 ALL FOUNDING DEPTHS SHALL BE CONFIRMED BY THE ENGINEER ON SITE.

3.2 ALL FOUNDATION EXCAVATIONS SHALL BE APPROVED BY THE ENGINEER.

3.3 CAST 15 Mpa 75mm THICK BLINDING UNDER ALL REINFORCED FOUNDATIONS.

3.4 ALL FOUNDATIONS ARE LOCATED CENTRALLY UNDER COLUMNS OR WALLS UNLESS SHOWN OTHERWISE.

3.5 DESIGN BEARING PRESSURE = 250 kPa - TO BE VERIFIED ON SITE BY ENGINEER.

4. REINFORCEMENT

4.1 ALL REINFORCEMENT SHALL COMPLY WITH THE REQUIREMENTS OF SABS 1200G.

4.2 THE CONTRACTOR SHALL GIVE AT LEAST 48 HOURS NOTICE TO THE ENGINEER FOR STEEL INSPECTIONS THAT ARE REQUIRED

4.3 THE CONTRACTOR SHALL INSPECT AND APPROVE THE FIXED REINFORCEMENT BEFORE THE ENGINEER IS NOTIFIED. ALL REINFORCEMENT SHALL BE INSPECTED

Scale: AS SHOWN

ORIGINAL SIZE A0

Rev.	Date	Description	Rev. by
A	26/09/2024	ISSUED FOR INFORMATION	SM

Client/Employer

overlooked Group

human element
VAT NO: 4890286877
CSD NO: MAAA1054667

Project

MOOIPLAATS COLLIERY
MINING PROJECT

Plan Description

SILT TRAP
LAYOUT,SECTIONS & DETAILS

	Name	Signature
Designed	SM	
Drawn	SM	
Checked	RH	
Approved	RH	

Pr. No.

Contract No.: 2406003

Drawing No.: 2406003/CV/005

Revision: A

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APPENDIX B:

STATUS QUO REPORT-CO-DISPOSAL FACILITY

OVERLOOKED GROUP
MOOIPLAATS COLLIERY
MPUMALANGA

Status Quo report
(Codisposal Facility)

DOCUMENT NO: 0313-10-01

REVISION 00
FINAL

PROJECT NUMBER: 0313
August 2024

CONSULTING ENGINEERS

JB Umwelttechnik (Pty) Ltd.
32 Hammerfest Street
Valhalla
0185
Cell: 084 775 5887
jaco@jbumwelt.com

DEVELOPER

Overlooked Group
Mooiplaats Colliery

DOCUMENT CONTROL

TITLE:	Overlooked group. Mooiplaats Colliery, Mpumalanga
SUB-TITLE:	Status Quo Report (Codisposal Facility)
REPORT STATUS:	Final
DOCUMENT NUMBER:	0313-10-01
REPORT NUMBER:	10
REVISION NUMBER:	00
CLIENT:	Overlooked Group
PREPARED BY:	JB Umwelttechnik (Pty) Ltd. 32 Hammerfest Street Valhalla 0185
DATE:	August 2024
PROJECT TEAM:	Author: Jaco Badenhorst, Pr. Tech Eng Reviewer:
COPIES ISSUED TO:	Internal Copy; Client Copy

INITIAL AND SURNAME	DATE	SIGNATURE
Author (s) JA Badenhorst	August 2024	
Reviewer		

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8.1.2 Clear water ..... **Error! Bookmark not defined.**
8.1.3 Dirty water ..... **Error! Bookmark not defined.**
8.1.4 Discharge water ..... **Error! Bookmark not defined.**
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8.2.1 Potable Water ..... **Error! Bookmark not defined.**
8.2.2 Clear water ..... **Error! Bookmark not defined.**
8.2.3 Run-off Mining Areas ..... **Error! Bookmark not defined.**
8.2.4 Run-off surface operations ..... **Error! Bookmark not defined.**
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9.3. RAINFALL DATA ..... **ERROR! BOOKMARK NOT DEFINED.**
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10. CONCLUSION ..... ERROR! BOOKMARK NOT DEFINED.

LIST OF ABBREVIATION TERMS

JBU	**:**	JB Umwelttechnik (Pty) Ltd.
MAP	**:**	Mean Annual Rainfall
DTM	**:**	Digital Terrain Modelling
NGL	**:**	Natural Ground Level
DWS	**:**	Department of Water and Sanitation
SWMP	**:**	Storm Water Management Plan
PCD	**:**	Pollution Control Dam

1. QUALITY MANAGEMENT AND APPROVALS

STATUS OF REPORT : Final

FIRST DRAFT : August 2024

Approved by JB Umwelttechnik (PTY) LTD.

…… 2024-08-10

J A Badenhorst (Pr. Tech. Eng.) Date:

ECSA # 201270355

Approved by Client:

…… ……

Signature Date:

2. EXECUTIVE SUMMARY

JB Umwelttechnik Pty) Ltd. was appointed by Overlooked Group to compile a Status Quo report for the Codisposal at the Mooiplaats Colliery near Ermelo in the Mpumalanga Province.

This report deals with the current status of the codisposal facility and addresses critical maintenance requirements required.

3. INTRODUCTION

As part of the operations on the site, the codisposal needs to be inspected and remedial works actioned in order to ensure the safety and stability of the site. A site investigation was conducted in order to assess the serviceability of the facility and associated infrastructure.

4. BACKGROUND

After closure of the underground workings, the beneficiation plant at Mooiplaats colliery have continued operations by means of toll washing coal for external clients. Mooiplaats colliery requested a inspection on the codisposal facility in order to plan for future deposition on the facility as well as possible re-mining of the dried out slurry cell.

5. SCOPE OF WORK

Overlooked group appointed JB Umwelttechnik (Pty) Ltd. to compile a Status quo report for the codisposal at the Mooiplaats Colliery near Ermelo in the Mpumalanga Province. A site assessment along with a desktop study was conducted in order to assess the current condition of the infrastructure in the functional area of the codisposal.

6. LOCALITY AND SITE DESCRIPTION

The Mooiplaats colliery lies approximately 18.5km –South-east of the town of Ermelo in the Mpumalanga Province. The site is situated in a coal field known as the Ermelo coal field

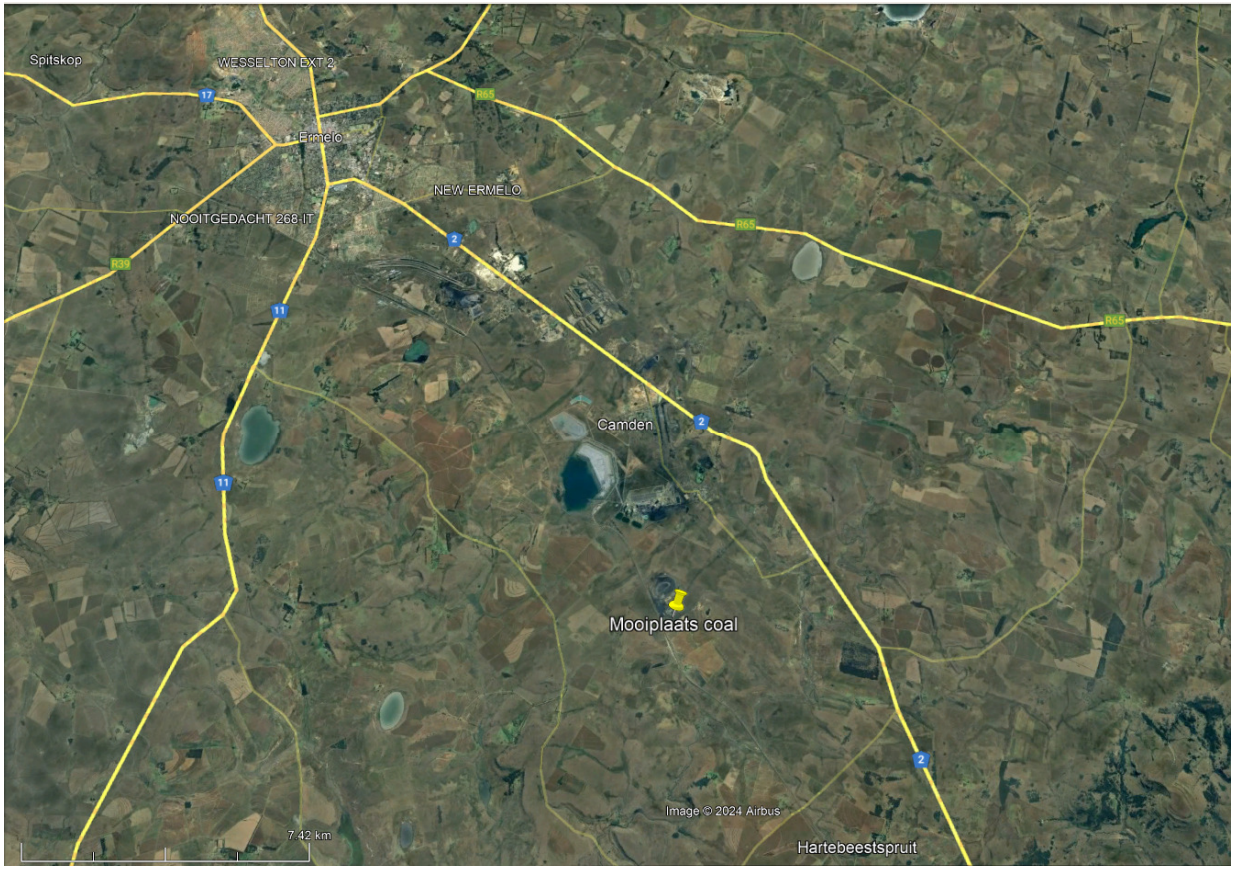

Figure 1: Site Location

Co-ordinates for the site is as follow:

26°38'54.94"S

30° 5'57.74"E

7. TOPOGRAPHY AND DRAINAGE

The mining area lies in the undulating countryside at approximately 1684m AMSL, with the ground sloping at 2% and drainage to the north of the codisposal area.

8. VEGETATION

The main activities in the area are mining and agriculture. The site is bound by agricultural land.

9. LEGAL FRAMEWORK

9.1. CONSTITUTION OF RSA, 1996 (ACT 108 OF 1996)

The Constitution of South Africa specifies the environmental right of the people of South Africa. It then more specifically states that the environment should not be harmful to the health and well-being of its citizens and for the environment to be protected for the benefit of present and future generations.

9.2. NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998)

The National Environmental Management Act (NEMA) provides the guiding legislation and framework for environmental management in South Africa. The act more specifically describes a set of fundamental guiding principles governing the actions of those organs of state that may significantly affect the environment.

9.3. MINERALS AND PETROLEUM RESOURCES DEVELOPMENT ACT, (ACT NO 28 OF 2002)

The Minerals and Petroleum Resources Development Act (MPRDA) regulates the overall mining process and provides for safety and health in the mining industry. The Act supports the principles of Integrated Water Resource Management (IWRM) by promoting the goal of sustainable development in the process of developing the mineral and petroleum resources of the country.

9.4. NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998)

The National Water Act (NWA) emphasises the effective management of South Africa's water resources through the basic principles of Integrated Water Resources Management (IWRM). Section 19 of the Act deals specifically with the prevention and remedying effects of pollution. In terms of the Act, various regulations have been developed to regulate, protect and manage water that is being used from a water resource.

9.5. APPLICABLE REGULATIONS AND GUIDELINES

9.5.1 NWA: Regulations on the Use of Water for Mining, GN 704

In terms of the NWA, specific regulations were promulgated in respect of the use of water for mining aimed at protecting water resources, referred to as Government Notice No. 704 of 4 June 1999. The agreement is that DWS will subscribe to the principles of co-operative governance where DMR should coordinate environmental management within the mining industry as part of the EMP process.

9.5.2 NEMWA: Regulation 632: Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits from a Prospecting, Mining, Exploration or Production Operation

From the waste classification the material was classified as a type 3 waste for the waste rock as well as the product stockpiles, due to the carbonaceous nature of the material. A typical type C barrier was therefore specified for the lining of the waste rock stockpiles as well as the product stockpiles on the mine.

9.5.3 NEMWA: Regulation 636: National Norms and standards for disposal of waste to landfill

In order to compile the design of the PCD, GN R636 has to be complied with. The following sections of the regulation are applicable to the project:

10. DESIGN SIZING AND LINING

10.1. PCD SIZING

A desktop study was completed to check the capacity of the PCD. The runoff from a 1:50 year storm for the catchment area in question was calculated to be approximately 13 940m³. The “as-built” capacity of the dam was calculated to be 23 500m³. The PCD therefore has to be operated at a minimum level to ensure that the dam has spare capacity in excess of 23 500m³ available. **Currently the dam is operated at higher than maximum capacity and therefore cannot contain a 1:50 storm.**

Figure 2: PCD current water level

10.2. LINING

The infrastructure on the mine was constructed in 2009 and amended in 2011 and therefore has to conform to GN 704 National water act, 1998 (Act 36 of 1998) Regulations for the use of water for mining and related activities aimed at the protection of water resources. The infrastructure does fall under the national environmental management waste act of 2008 as the construction of the infrastructure was completed after the act was promulgated. It also predates regulation R 635 (2013) National Environmental Management: Waste Act of 2008 (Act 59 of 2008) National Norms and standards for the assessment of waste for disposal by landfill and R636 (2013) National Environmental Management: Waste Act of 2008 (Act 59 of 2008) National Norms and standards for the assessment of waste for disposal by landfill. The PCD was thus designed under the Minimum Requirements for Waste Disposal by Landfill (2nd Edition, 1998; Department of Water Affairs and Forestry)

The lining the codisposal consist of only a clay layer and the lining of the return water dam consists of a 1500micron HDPE layer, with no clay below the geomembrane to act as composite lining. The geomembrane was designed to be covered with concrete filled geocells.

11. CURENT CONDITION OF FACILITIES

11.1. HDPE GEOMEMBRANE LINING

From the visual inspection conducted on site the HDPE geomembrane lining in the return water dam is in a fair state, Currently the water in the return water dam does not appear to be leaking through the lining into the environment. From the site inspection, only the silt trap was covered with concrete filled geo-cells. The UV lifespan of the geomembrane is anticipated to be 15 years as it is exposed and susceptible to UV degradation. The geomembrane has therefore reached its design lifespan for UV degradation and need to be tested for competence as a containment barrier.

Figure 3: existing return water dam

Figure 5: Return water dam silt trap.

11.2. EMBANKMENT STABILITY

During the inspection the return water dam embankments appeared to be stable, with no signs of movement, slip or subsidence. No wet spots were observed along the toe line of the western embankment.

The embankments of the codisposal appears to be stable and within the final design slope of 1(v) : 2(h). The 5m wide bench have however not been introduced in all areas as indicated on the original design drawings and can therefore cause the overall slope of the codisposal embankment to be steeper than the original design. Excessively steeps slopes can not only lead to possible slip failures, but can create issues during rehabilitation where excess material needs to be moved at additional closing cost in order to attain the final land form profile. A slope stability assessment will be conducted and final landform design submitted.

Figure 4: codisposal embankment slope

11.3. SPILLWAY

The return water dam spillway appears to be in good condition with no signs of erosion or movement.

Figure 5: Blocked Spillway

11.4. PENSTOCKS

During the site inspection the original upper-level penstocks appeared in good condition with no signs of blockage or collapse. The lower-level penstocks also appear to be in good condition with no signs of blockage or collapse. Slurry deposition in the lower-level slurry pond have however caused the supernatant pond to shift towards the western embankment. This creates a stagnant dam in the slurry pond that is unable to drain through the penstocks. This item is critical as it can cause saturation of the western discard embankment that can lower the F.O.S. against failure.

Figure 6: Supernatant Pond

The walkways to the penstocks is in serious disrepair and needs to be re-constructed in order to ensure the safety of personnel working in the area.

Figure 7: Lower slurry cell walkway

11.5. SILT TRAP

During the site inspection the silt trap was in fair condition and fully operational. The silt trap does however need to be cleaned and maintained on a regular basis.

Figure 8: Silt trap

11.6. FENCING

Fencing around the PCD is in a fair state. Periodic inspection and maintenance is required in order to mitigate the liability in terms of drowning potential as well as the GN704 requirement that all dams must be access controlled. Over all the mine site is also fenced off controlling access to the mine.

Figure 9: return water dam fencing.

11.7. DISCARD WALL

The discard wall of the codisposal appears sound with no visible signs of movement, cracks or sloughing. The western wall of the lower slurry cell does however need to be raised to allow for the required 800mm freeboard. The width of the discard wall needs to be widened to allow for a minimum crest width of 5m plus a safety berm. It should be noted that the safety berm does not form part of the required 800mm freeboard and is measured from the water level to the no overspill crest.

Figure 10: Discard wall

Discard placement on the eastern embankment have not been compacted and subsequently shows signs of spontaneous combustion. The burning discard needs to be removed and placed in an open area where it can be extinguished before filling and compacting the area.

Figure 11: Spontaneous combustion on eastern wall

11.8. SLURRY POND

The upper-level slurry pond has been left un-used for an extended period and have subsequently dried up to the point where it is accessible by foot. There is a possibility that the dried-out slurry can be sold as product. This remining operation will be handled as a separate report.

The lower-level slurry pond is currently in operation. The following items need to be addressed as a matter of urgency:

- Slurry line discharge pond on the south end of the slurry pond needs to be extended and moved to points along the western embankment. This needs to be done as there is a deep pool forming close to the western embankment that could lead to a catastrophic failure of the wall. The slurry needs to be deposited in such a way as to drive the supernatant pond back to around the penstocks from where the water can be drained

through the penstock in order to minimise the amount of water in the codisposal.

- The walkways need to be re-constructed around the penstocks in order to ensure the safety of personnel and servicing of the penstocks.

Figure 12: lover-level slurry pond

6 CONCLUSION

In terms of the design the PCD was sized and designed according to industry standards used at the time. The PDC does however not conform to R635 and R636 standards but can be operated as previously approved by the department as long as it is not changed in terms of use or capacity or a secondary system added. The operation and management of the PCD is not according to the original specification and is currently being operated above the required free capacity. The dam must be operated at a level that allows for a spare capacity that will be able to contain a 1;50 year storm.

The lower-level slurry pond needs to be operated in such a manner that the supernatant pond is shifted back towards the penstocks. The western wall needs to be lifted in order to ensure that a 800mm freeboard is kept and widened to ensure a minimum crest width of 5m.

The walkways need to be re-constructed.

The spontaneous combustion on the eastern embankment needs to be loaded out and replaced with compacted competent discard.

Methodology of the re-mining of the upper-level dried out slurry will be addressed in a separate report.

APPENDIX C:

MOOIPLATS COLLIERY STORMWATER FINANCIAL ESTIMATE

Mooiplats Colliery Stormwater Infrastructre Capital Cost Estimate									
Item No.	**Item**	**No.**	**Length (m)**	**Area m^2**	**Depth/Heght**	**Volume m^3**	**Ton (t)**	**Rate**	**Amount**
1	**Plant Area Surface Infrastructre Grading/Clearance**								
1,1	Plant Area Surface Infrastructure footprint area			25 000				R 5,50	R 137 500,00
	Sub-total for Site Clearance								R 137 500,00
2,0	Excavation for Dirty water channels		1 750	1	0,60	1 050		R 67,50	R 70 875,00
2,1	Trimming of existing Clean water channels			225	0,60	135		R 67,50	R 9 112,50
	Sub-total for Earth and Concrete Channels								R 79 987,50
3	**Stormwater Management on Facility**								
3,1	Stomwater Concrete Channels (Plant & Stockpile Area)		1 750	1	0,60	630		R 1 780,00	R 1 121 400,00
3,2	Concrete Channels Mesh			1 695				R 225,00	R 381 375,00
3,3	*Sub-total Reinforced Concrete Channel*								R 1 502 775,00
5	**Structural Concrete Silt Trap**								
5,1	PCD Silt Trap Concrete					450		R 2 250,00	R 1 012 500,00
5,2	PCD Silt Trap Reinforcement						5,00	R 16 500,00	R 82 500,00
	Sub-total Concrete Silt Trap								R 1 095 000,00
6	**Plant Area Pollution Control Dam Dredging**								
6,1	Hydrualic Dredging Technique	1						R 800 000,00	R 800 000,00
	Sub-total								R 800 000,00
9	**Summary**								
9,1	Phase 1 Site Clearance and Grading								R 137 500,00
9,3	Concrete and Earth Channel Excavation								R 79 987,50
9,4	Structural Reinforced Concrete Channel								R 1 502 775,00
9,5	Structural Concrete Silt Trap								R 1 095 000,00
9,6	Reverse Osmosis Plant (Option 3)								R 800 000,00
	Total Cost of Construction Estimate								**R 3 615 262,50**
10,0	Preliminary & General (5%)								R 180 763,13
11,00	Contingencies (5%)								R 180 763,13
12,00	Proffesional Fees accordance with ECSA & Government Gazzete (8%) Discounted Proffesional Fees By Consultant to 5%								R 180 763,13
						Total Capital Cost			**R 4 157 551,88**