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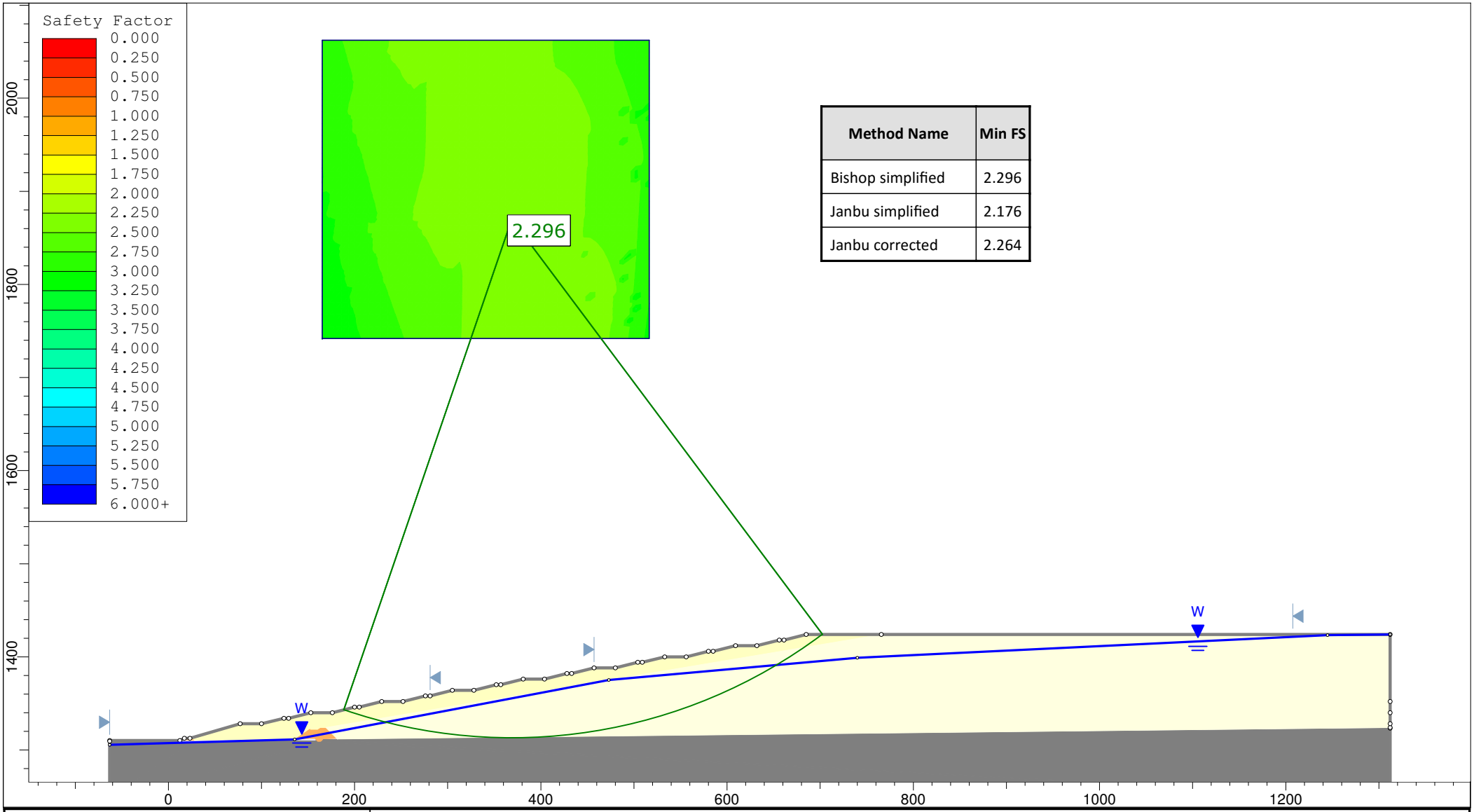
# APPENDIX D

## Seepage & Slope Stability Output

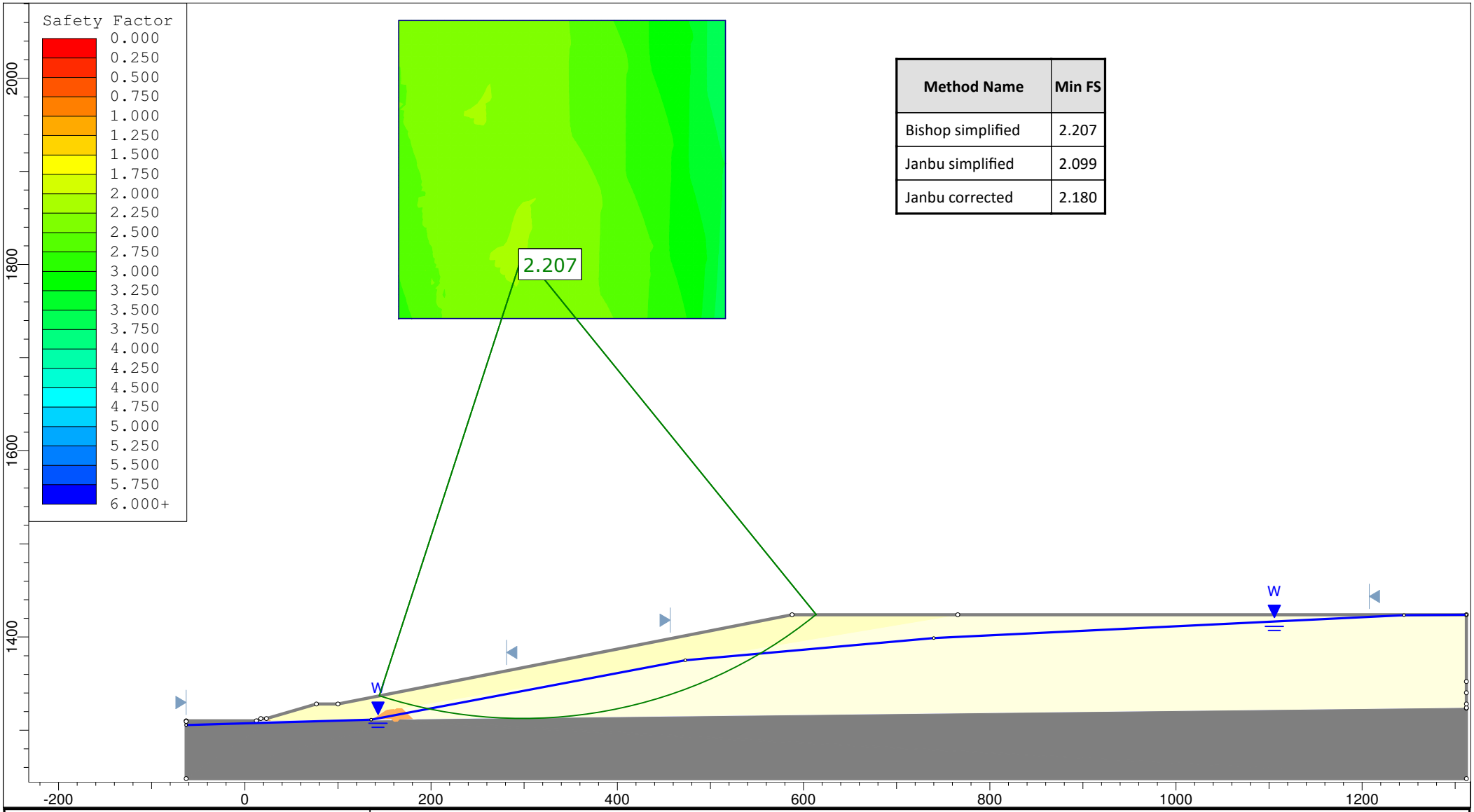



| Method Name | Min FS |
|---|---|
| Bishop simplified | 2.296 |
| Janbu simplified | 2.176 |
| Janbu corrected | 2.264 |

rocscience

SLIDEINTERPRET 8.022

| | | | | | |
|---|---|---|---|---|---|
| *Project* | Kareerand TSF Extension | | | | |
| *Analysis Description* | Normal Slope at 1:6 | | | | |
| *Drawn By* | RG | *Scale* | 1:5689 | *Company* | Knight Piesold |
| *Date* | | | | *File Name* | Normal elv 1424 mamsl.sli |

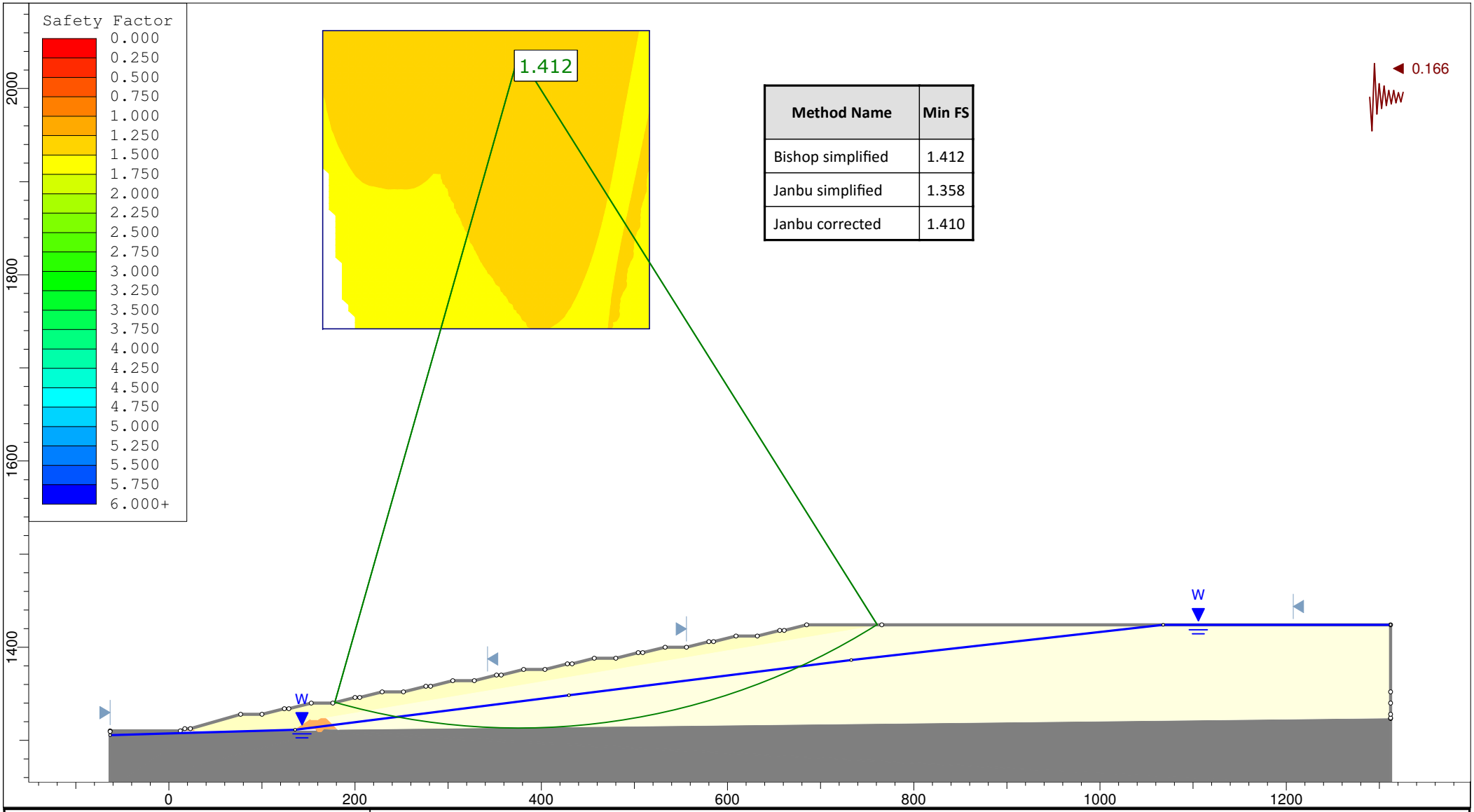



| Method Name | Min FS |
|---|---|
| Bishop simplified | 2.207 |
| Janbu simplified | 2.099 |
| Janbu corrected | 2.180 |

rocscience

SLIDEINTERPRET 8.022

| | | | |
|---|---|---|---|
| *Project* | | | |
| *Analysis Description* | | | |
| *Drawn By* | *Scale* 1:5689 | *Company* | |
| *Date* | | *File Name* | Normal elv 1424 mamsl 1in5 - Copy.sli |

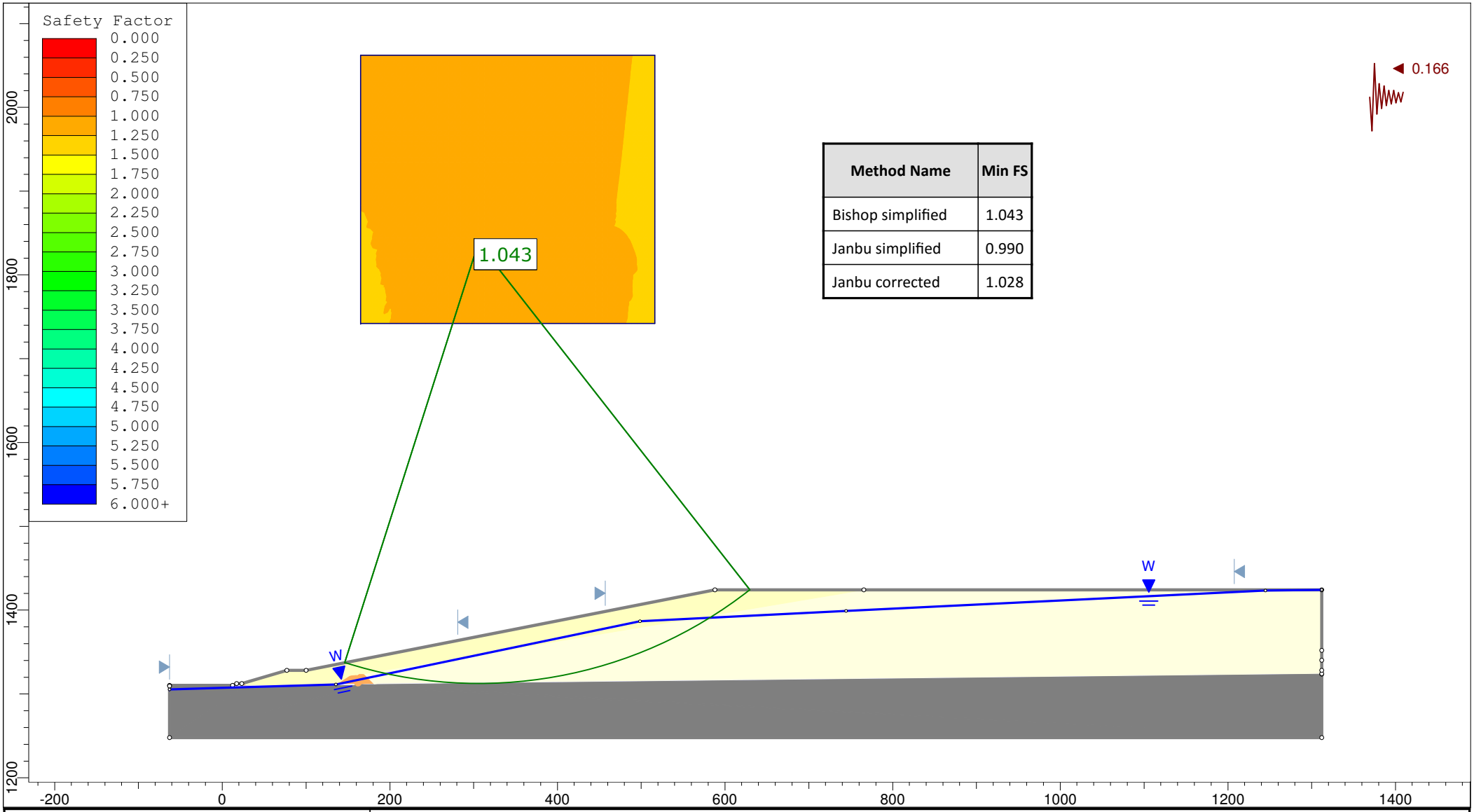



| Method Name | Min FS |
|---|---|
| Bishop simplified | 1.412 |
| Janbu simplified | 1.358 |
| Janbu corrected | 1.410 |

rocscience

SLIDEINTERPRET 8.022

| | | | | | |
|---|---|---|---|---|---|
| *Project* | Kareerand TSF Extension | | | | |
| *Analysis Description* | Seismic Conditions | | | | |
| *Drawn By* | RG | *Scale* | 1:5689 | *Company* | Knight Piesold |
| *Date* | | | | *File Name* | Seismic 0.166 elv 1424 mamsl.sli |




| Method Name | Min FS |
|---|---|
| Bishop simplified | 1.043 |
| Janbu simplified | 0.990 |
| Janbu corrected | 1.028 |

rocscience

SLIDEINTERPRET 8.022

| | | | | | |
|---|---|---|---|---|---|
| *Project* | Kareerand TSF Extension | | | | |
| *Analysis Description* | Seismic 0.166g, slope 1:5 | | | | |
| *Drawn By* | RG | *Scale* | 1:6321 | *Company* | Knight Piesold |
| *Date* | | | | *File Name* | Seismic elv 1424 mamsl 1in5 0.166g.sli |

# APPENDIX E

## Water Balance

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Your reference:
Our reference: 301-00204/13
Contact: A du Plessis

2019/03/11

AnglogoldAshanti Limited
Mine Waste Solutions
Private Bag X5010
Vaal Reef
2621

Dear Sir

**Re: WATER BALANCE CALCULATION FOR THE KAREERAND TSF EXPANSION PROJECT**

The purpose of this letter is to explain the Water Balance Calculations done for the detail design of the Kareerand TSF Expansion Project. This letter cannot expand on the detail of the calculations inside the model, but it will attempt to summarise the results. The letter refers to the Model: "301-00204-13 KR Ext WB 20190311 SmallRWD pumps DWS AdP". This letter differs from the previous versions, in that the pump rates between the RWD's have been reduced to 500 m³/h and RWD 4 has been removed. The capacities of RWD1-3 have also been modified.

The Water Balance is based on the production schedule, stage capacity curves and layout of the TSF Expansion.

The balance model was done in Excel as provided. The layout used is presented in Figure 1.
The TSF's were divided in areas. The stage capacity curve was used to determine when which bench becomes available. The stage capacity curve shows the elevations of the two portions only meet in mid 2037 – see Figure 2.

## 1. Model Information

In reference to the Excel model, the following information can be found on the various sheets in the model.

**Balance Sheet:**

The Balance sheet has the daily calculation of all the in and out flows of all the areas. This sheet is used to:

- Cell C11 - Change the date of the storm
- Cell C13 – change the range of days where the monthly rain will be reduced before and after a storm

- Cell G15 – change the number of days of no power after a storm
- Cell G16 – H20 – Change the number of days and % throttling on decants after power has been restored
    - Area 1 refers to the Existing TSF (Eastern area in Figure 1)
    - Area 2 refers to the TSF Expansion (Western area in Figure 1).

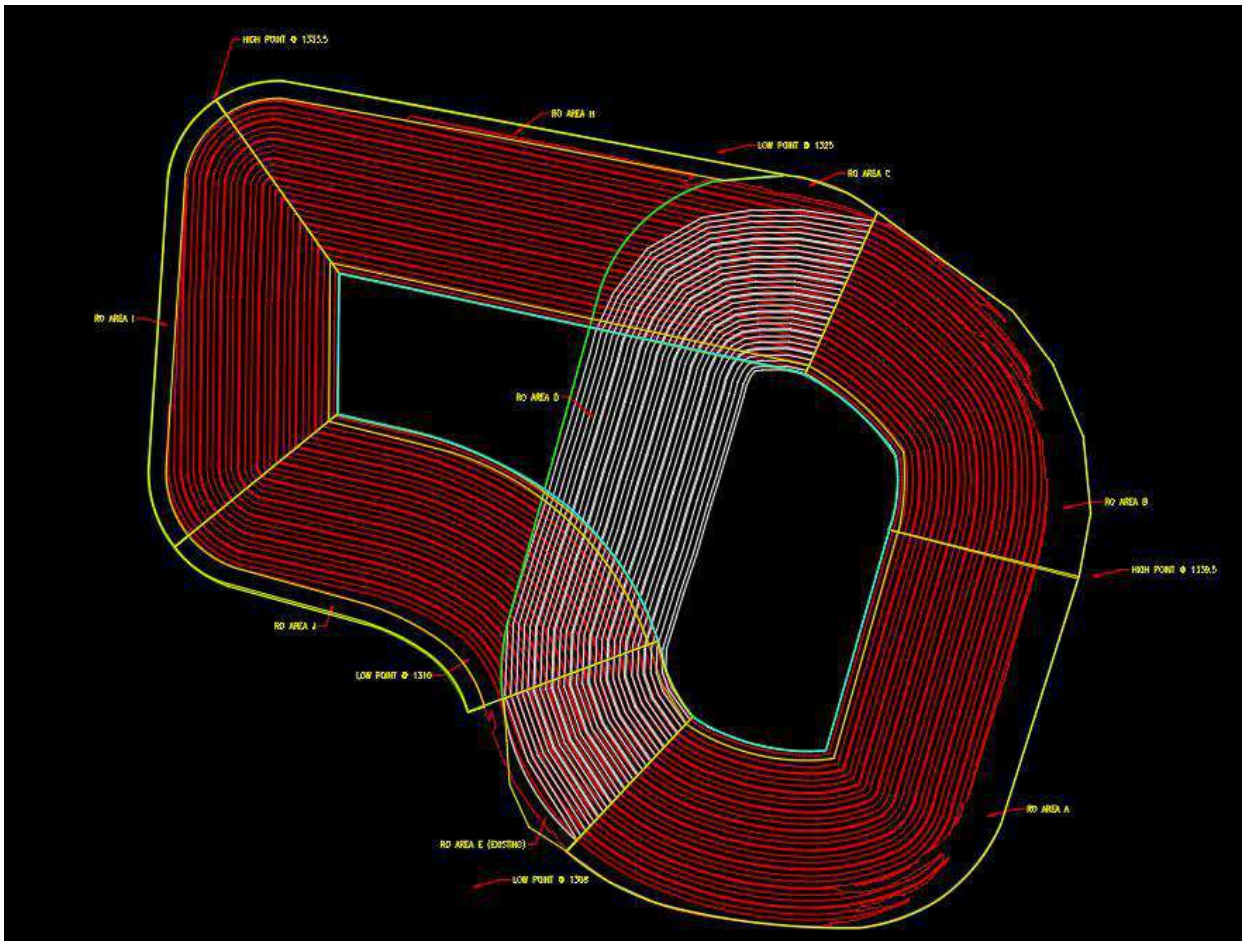



*Figure 1: Layout of TSF*

**Data Input Sheet:**

This sheet presents the areas, and various input parameters to be completed by the user

**Climatic Data**

Provides rainfall and evaporation data

**Picture**

Schematic of model and system

**Areas**

Provides measured areas, lengths and volumes of the various components such as Benches, RWD's etc.

**Production**

This sheet provides

- Production schedule per month
- Elevations from capacity curve
- Side slope Zones
    - Areas un-rehabilitated
    - Areas re-habilitated
    - Bench lengths

**Elevation vs Time**

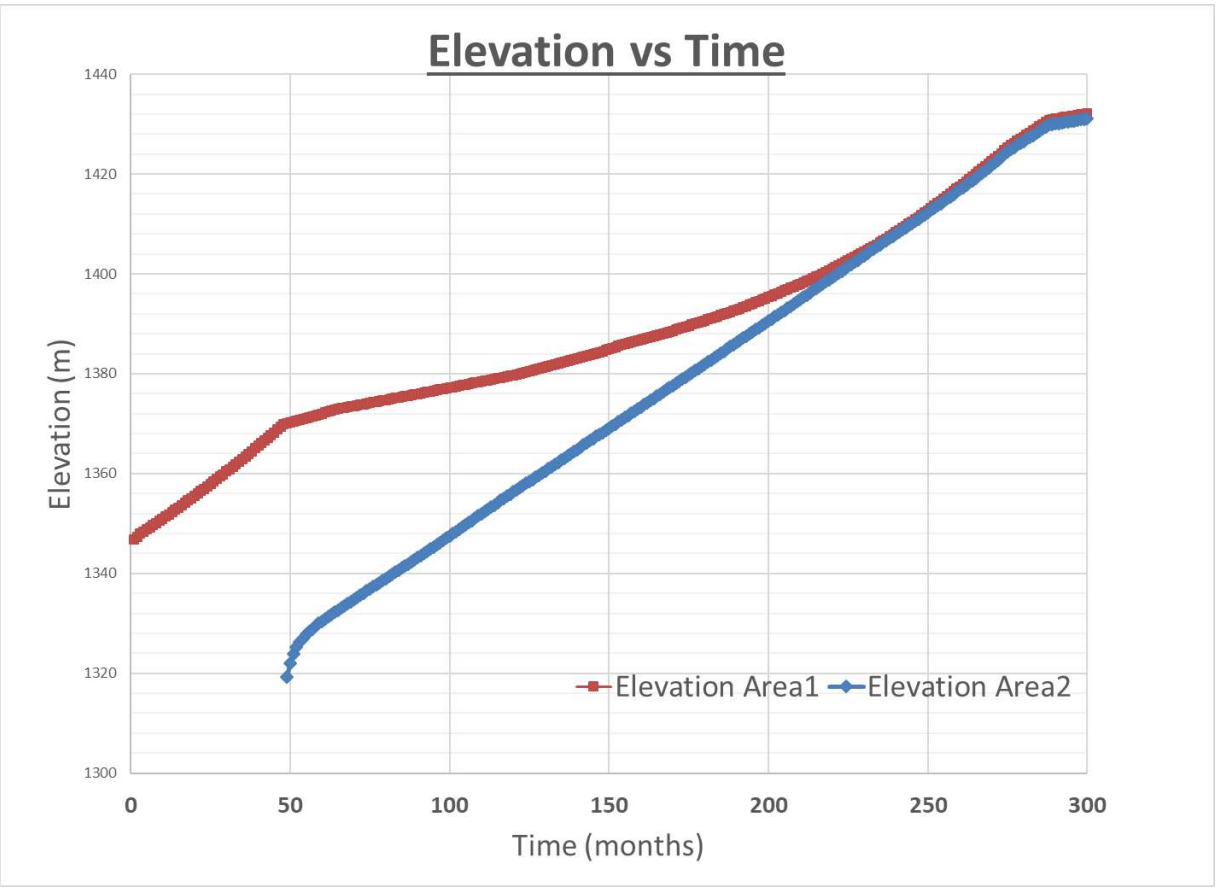



*Figure 2: Elevation curves (Area 1 = Existing TSF, Area 2 = Extension)*

**Volumes of dams**

Graph presenting the required number of dams

**Decant on TSF's**

Decant shortfall = volume stored on dam

**Summaries**

Summary of volumes required

**Runoff Factor calculations**

- Rational - Dry Beach
- Rational - Side wall no vegetation
- Rational - Side wall Rehab

## 2. Assumptions:

For this model, it was assumed that the Existing TSF (A1) Decant flows to the Bufferdam (BD), which will overflow into the East Stormwater dam (ESWD), while the ESWD will overflow into the RWD1 and the full Midway capacity will be pumped from RWD1. In practice this could be varied to pump from either RWD1 or the BD.

When RWD1 has reached its limit and can't pump away enough water, it overflow into RWD2, which overflow into RWD3 when it reaches its capacity etc.

When a month for example January 2018 is considered, the volumes appearing in RWD2 and 3 are from the rain falling on the dam, which can be ignored since the dams have not been constructed – see more detail in Process description below.

The worst month to receive a 1:100 24h storm event is in January. The storm events were applied to 15 January in the years considered.

The production figures show that TSF Expansion only starts in 2022.

Bufferdam starts @ 80% full – cell Data Input'!E88, therefore BD overflow to ESWD in wet months

ESWD start @ 20% full – Cell Data Input'!$E89.

RWD1 start @ 10% full – Cell Data Input'!$E90.

## 3. Process:

Considering the rise in the TSF's over time, specific dates were chosen to calculate the required capacities of the RWD's.

The dates and volumes required are summarized below (from Summaries tab):

| Year | Month | RWD1 Vol required | RWD2 Vol required | RWD3 Vol required |
|---|---|---|---|---|
| 2019 | Jan | 260000 | 0 | 0 |
| 2021 | Jan | 284000 | 0 | 0 |
| 2022 | Jan | 431000 | 187000 | 219000 |
| 2029 | Jan | 431000 | 187000 | 219000 |
| 2029 | March | 431000 | 187000 | 219000 |
| 2030 | Jan | 431000 | 187000 | 219000 |
| 2038 | Jan | 431000 | 187000 | 219000 |
| 2040 | Feb | 431000 | 187000 | 219000 |

Some of the data in the model is discussed in more detail below to provide an explanation of the model.

**2019/01/15**

Considering for example a storm on 15 January 2019, note the following:

- BD receives extra runoff and spills more to ESWD (column IM)
- The power is off for 5 days and then the decant starts

| | Bufferdam | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | + | + | + | + | + | + | | - | - | | | - | - | |
| Date | BD Start of day (m³) | Decant A1 (m³) | Rain BD (m³) | ZoneA Side Runoff (m³) | ZoneE Side Runoff (m³)2 | Seepage to filtersA1 (m³) | Scavenger holes A1 (m³) | Total In BD (m³) | Max evaporation BD (m³) | Dust Suppression (m³) | Sub-Total Out BD (m³) | Interim Vol BD (m³) | Pump to Midway BD (m³) | Overflow to ESW (m³) | BD End of day (m³) |
| 2019/01/14 | 169 830 | 61 188 | 83 | 431 | 95 | 3 167 | 7 742 | 72 706 | 323 | 2 500 | 2 823 | 239 712 | 0 | 69 882 | 169 830 |
| 2019/01/15 | 169 830 | 0 | 8 711 | 76 944 | 19 165 | 3 167 | 0 | 107 987 | 323 | 0 | 323 | 277 493 | 0 | 107 663 | 169 830 |
| 2019/01/16 | 169 830 | 0 | 83 | 431 | 95 | 3 167 | 0 | 3 775 | 323 | 0 | 323 | 173 282 | 0 | 3 452 | 169 830 |
| 2019/01/17 | 169 830 | 0 | 83 | 431 | 95 | 3 167 | 0 | 3 775 | 323 | 0 | 323 | 173 282 | 0 | 3 452 | 169 830 |
| 2019/01/18 | 169 830 | 0 | 83 | 431 | 95 | 3 167 | 0 | 3 775 | 323 | 0 | 323 | 173 282 | 0 | 3 452 | 169 830 |
| 2019/01/19 | 169 830 | 0 | 83 | 431 | 95 | 3 167 | 0 | 3 775 | 323 | 0 | 323 | 173 282 | 0 | 3 452 | 169 830 |
| 2019/01/20 | 169 830 | 0 | 83 | 431 | 95 | 3 167 | 0 | 3 775 | 323 | 0 | 323 | 173 282 | 0 | 3 452 | 169 830 |
| 2019/01/21 | 169 830 | 72 000 | 83 | 431 | 95 | 3 167 | 7 742 | 83 517 | 323 | 2 500 | 2 823 | 250 524 | 0 | 80 694 | 169 830 |
| 2019/01/22 | 169 830 | 72 000 | 83 | 431 | 95 | 3 167 | 7 742 | 83 517 | 323 | 2 500 | 2 823 | 250 524 | 0 | 80 694 | 169 830 |
| 2019/01/23 | 169 830 | 72 000 | 83 | 431 | 95 | 3 167 | 7 742 | 83 517 | 323 | 2 500 | 2 823 | 250 524 | 0 | 80 694 | 169 830 |
| 2019/01/24 | 169 830 | 72 000 | 83 | 431 | 95 | 3 167 | 7 742 | 83 517 | 323 | 2 500 | 2 823 | 250 524 | 0 | 80 694 | 169 830 |
| 2019/01/25 | 169 830 | 72 000 | 83 | 431 | 95 | 3 167 | 7 742 | 83 517 | 323 | 2 500 | 2 823 | 250 524 | 0 | 80 694 | 169 830 |
| 2019/01/26 | 169 830 | 72 000 | 83 | 431 | 95 | 3 167 | 7 742 | 83 517 | 323 | 2 500 | 2 823 | 250 524 | 0 | 80 694 | 169 830 |

- ESWD overflows to RWD1

| | East Storm dam | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | + | + | | - | | | - | |
| Date | ESW Start of day (m³) | Rain ESW (m³) | Overflow from BD (m³) | Total In ESW (m³) | Max evaporation ESW (m³) | Sub-Total Vol ESW (m³) | Interim Vol ESW (m³) | Overflow to RWD1 (m³) | ESW End of day (m³) |
| 2019/01/14 | 162 846 | 90 | 69 882 | 69 972 | 352 | 352 | 232 466 | 69 620 | 162 846 |
| 2019/01/15 | 162 846 | 9 481 | 107 663 | 117 144 | 352 | 352 | 279 638 | 116 792 | 162 846 |
| 2019/01/16 | 162 846 | 90 | 3 452 | 3 542 | 352 | 352 | 166 036 | 3 190 | 162 846 |
| 2019/01/17 | 162 846 | 90 | 3 452 | 3 542 | 352 | 352 | 166 036 | 3 190 | 162 846 |
| 2019/01/18 | 162 846 | 90 | 3 452 | 3 542 | 352 | 352 | 166 036 | 3 190 | 162 846 |
| 2019/01/19 | 162 846 | 90 | 3 452 | 3 542 | 352 | 352 | 166 036 | 3 190 | 162 846 |
| 2019/01/20 | 162 846 | 90 | 3 452 | 3 542 | 352 | 352 | 166 036 | 3 190 | 162 846 |
| 2019/01/21 | 162 846 | 90 | 80 694 | 80 784 | 352 | 352 | 243 278 | 80 432 | 162 846 |
| 2019/01/22 | 162 846 | 90 | 80 694 | 80 784 | 352 | 352 | 243 278 | 80 432 | 162 846 |
| 2019/01/23 | 162 846 | 90 | 80 694 | 80 784 | 352 | 352 | 243 278 | 80 432 | 162 846 |
| 2019/01/24 | 162 846 | 90 | 80 694 | 80 784 | 352 | 352 | 243 278 | 80 432 | 162 846 |
| 2019/01/25 | 162 846 | 90 | 80 694 | 80 784 | 352 | 352 | 243 278 | 80 432 | 162 846 |
| 2019/01/26 | 162 846 | 90 | 80 694 | 80 784 | 352 | 352 | 243 278 | 80 432 | 162 846 |

- RWD1 receives the water, but can't pump for 5 days – no power, therefore it needs to contain all the water = 260 000 m³
- Dust suppression also only start after 5 days

| | RWD1 | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | + | + | + | + | + | + | + | + | + | + | + | + | = | - | - | = | | | - | |
| Date | RWD1 Start of day (m | Rain RWD1 (m³) | Overflow from ESW (n | Decant A2 (m³) | ZoneB Side Runoff (m³) | ZoneC Side Runoff (m³) | ZoneD Side Runoff (m³) | ZoneH Side Runoff (m³) | ZoneI Side Runoff (m³) | ZoneJ Side Runoff (m³) | Seepage from FiltersA2 (m³) | Pump from RWD2 (m³) | Pump from RWD3 (m³) | Total In RWD1 (m³) | Max evaporati on RWD1 (m³) | Dust Supressi on A2 (m³) | Sub Total Out RWD1 (m³) | Interim Vol RWD1 (m³) | Pump to Midway (m³)2 | Overflow to RWD2 (m³) | RWD1 End of day (m |
| 2019/01/14 | 0 | 191 | 69 620 | 0 | 246 | 124 | 214 | 0 | 0 | 0 | 0 | 0 | 0 | 70 395 | 744 | 2 500 | 3 244 | 67 150 | 67 150 | 0 | 0 |
| 2019/01/15 | 0 | 20 051 | 116 792 | 0 | 44 472 | 21 250 | 41 907 | 0 | 0 | 0 | 0 | 0 | 0 | 244 472 | 744 | 0 | 744 | 243 728 | 0 | 0 | 243 728 |
| 2019/01/16 | 243 728 | 191 | 3 190 | 0 | 246 | 124 | 214 | 0 | 0 | 0 | 0 | 0 | 0 | 3 965 | 744 | 0 | 744 | 246 948 | 0 | 0 | 246 948 |
| 2019/01/17 | 246 948 | 191 | 3 190 | 0 | 246 | 124 | 214 | 0 | 0 | 0 | 0 | 0 | 0 | 3 965 | 744 | 0 | 744 | 250 168 | 0 | 0 | 250 168 |
| 2019/01/18 | 250 168 | 191 | 3 190 | 0 | 246 | 124 | 214 | 0 | 0 | 0 | 0 | 0 | 0 | 3 965 | 744 | 0 | 744 | 253 389 | 0 | 0 | 253 389 |
| 2019/01/19 | 253 389 | 191 | 3 190 | 0 | 246 | 124 | 214 | 0 | 0 | 0 | 0 | 0 | 0 | 3 965 | 744 | 0 | 744 | 256 609 | 0 | 0 | 256 609 |
| 2019/01/20 | 256 609 | 191 | 3 190 | 0 | 246 | 124 | 214 | 0 | 0 | 0 | 0 | 0 | 0 | 3 965 | 744 | 0 | 744 | 259 829 | 0 | 0 | 259 829 |
| 2019/01/21 | 259 829 | 191 | 80 432 | 0 | 246 | 124 | 214 | 0 | 0 | 0 | 0 | 0 | 0 | 81 207 | 744 | 2 500 | 3 244 | 337 791 | 86 400 | 0 | 251 391 |
| 2019/01/22 | 251 391 | 191 | 80 432 | 0 | 246 | 124 | 214 | 0 | 0 | 0 | 0 | 0 | 0 | 81 207 | 744 | 2 500 | 3 244 | 329 353 | 86 400 | 0 | 242 953 |
| 2019/01/23 | 242 953 | 191 | 80 432 | 0 | 246 | 124 | 214 | 0 | 0 | 0 | 0 | 0 | 0 | 81 207 | 744 | 2 500 | 3 244 | 320 916 | 86 400 | 0 | 234 516 |
| 2019/01/24 | 234 516 | 191 | 80 432 | 0 | 246 | 124 | 214 | 0 | 0 | 0 | 0 | 0 | 0 | 81 207 | 744 | 2 500 | 3 244 | 312 478 | 86 400 | 0 | 226 078 |
| 2019/01/25 | 226 078 | 191 | 80 432 | 0 | 246 | 124 | 214 | 0 | 0 | 0 | 0 | 0 | 0 | 81 207 | 744 | 2 500 | 3 244 | 304 040 | 86 400 | 0 | 217 640 |
| 2019/01/26 | 217 640 | 191 | 80 432 | 0 | 246 | 124 | 214 | 0 | 0 | 0 | 0 | 0 | 0 | 81 207 | 744 | 2 500 | 3 244 | 295 602 | 86 400 | 0 | 209 202 |

After the storm it can pump the dam empty in 38 days and return to its normal flow to Midway.

It is important to note that throttling the decant rate should be avoided as the ideal is to decant the water from the TSF as quick as possible. The TSF should not be used to store water.

**2022/01/15**

The run-off areas have increased therefore the volumes to the dams increase.

- BD receives extra runoff and spills more to ESWD (column IM)
- The power is off for 5 days and then the decant starts

| | Bufferdam | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | + | + | + | + | + | + | | - | - | | | - | - | |
| Date | BD Start of day (m³) | Decant A1 (m³) | Rain BD (m³) | ZoneA Side Runoff (m³) | ZoneE Side Runoff (m³)2 | Seepage to filtersA1 (m³) | Scavenger holes A1 (m³) | Total In BD (m³) | Max evaporation BD (m³) | Dust Suppression (m³) | Sub-Total Out BD (m³) | Interim Vol BD (m³) | Pump to Midway BD (m³) | Overflow to ESW (m³) | BD End of day (m³) |
| 2022/01/14 | 169 830 | 10 049 | 83 | 399 | 150 | 3 167 | 7 742 | 21 589 | 323 | 2 500 | 2 823 | 188 596 | 0 | 18 766 | 169 830 |
| 2022/01/15 | 169 830 | 0 | 8 711 | 91 848 | 29 527 | 3 167 | 0 | 133 252 | 323 | 0 | 323 | 302 759 | 0 | 132 929 | 169 830 |
| 2022/01/16 | 169 830 | 0 | 83 | 399 | 150 | 3 167 | 0 | 3 798 | 323 | 0 | 323 | 173 305 | 0 | 3 475 | 169 830 |
| 2022/01/17 | 169 830 | 0 | 83 | 399 | 150 | 3 167 | 0 | 3 798 | 323 | 0 | 323 | 173 305 | 0 | 3 475 | 169 830 |
| 2022/01/18 | 169 830 | 0 | 83 | 399 | 150 | 3 167 | 0 | 3 798 | 323 | 0 | 323 | 173 305 | 0 | 3 475 | 169 830 |
| 2022/01/19 | 169 830 | 0 | 83 | 399 | 150 | 3 167 | 0 | 3 798 | 323 | 0 | 323 | 173 305 | 0 | 3 475 | 169 830 |
| 2022/01/20 | 169 830 | 0 | 83 | 399 | 150 | 3 167 | 0 | 3 798 | 323 | 0 | 323 | 173 305 | 0 | 3 475 | 169 830 |
| 2022/01/21 | 169 830 | 72 000 | 83 | 399 | 150 | 3 167 | 7 742 | 83 540 | 323 | 2 500 | 2 823 | 250 547 | 0 | 80 717 | 169 830 |
| 2022/01/22 | 169 830 | 72 000 | 83 | 399 | 150 | 3 167 | 7 742 | 83 540 | 323 | 2 500 | 2 823 | 250 547 | 0 | 80 717 | 169 830 |
| 2022/01/23 | 169 830 | 72 000 | 83 | 399 | 150 | 3 167 | 7 742 | 83 540 | 323 | 2 500 | 2 823 | 250 547 | 0 | 80 717 | 169 830 |
| 2022/01/24 | 169 830 | 72 000 | 83 | 399 | 150 | 3 167 | 7 742 | 83 540 | 323 | 2 500 | 2 823 | 250 547 | 0 | 80 717 | 169 830 |
| 2022/01/25 | 169 830 | 72 000 | 83 | 399 | 150 | 3 167 | 7 742 | 83 540 | 323 | 2 500 | 2 823 | 250 547 | 0 | 80 717 | 169 830 |
| 2022/01/26 | 169 830 | 72 000 | 83 | 399 | 150 | 3 167 | 7 742 | 83 540 | 323 | 2 500 | 2 823 | 250 547 | 0 | 80 717 | 169 830 |

- ESWD overflows to RWD1

| | East Storm dam | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | + | + | | - | | | - | |
| Date | ESW Start of day (m³) | Rain ESW (m³) | Overflow from BD (m³) | Total In ESW (m³) | Max evaporation ESW (m³) | Sub-Total Vol ESW (m³) | Interim Vol ESW (m³) | Overflow to RWD1 (m³) | ESW End of day (m³) |
| 2022/01/14 | 162 846 | 90 | 18 766 | 18 856 | 352 | 352 | 181 350 | 18 504 | 162 846 |
| 2022/01/15 | 162 846 | 9 481 | 132 929 | 142 410 | 352 | 352 | 304 904 | 142 058 | 162 846 |
| 2022/01/16 | 162 846 | 90 | 3 475 | 3 565 | 352 | 352 | 166 059 | 3 213 | 162 846 |
| 2022/01/17 | 162 846 | 90 | 3 475 | 3 565 | 352 | 352 | 166 059 | 3 213 | 162 846 |
| 2022/01/18 | 162 846 | 90 | 3 475 | 3 565 | 352 | 352 | 166 059 | 3 213 | 162 846 |
| 2022/01/19 | 162 846 | 90 | 3 475 | 3 565 | 352 | 352 | 166 059 | 3 213 | 162 846 |
| 2022/01/20 | 162 846 | 90 | 3 475 | 3 565 | 352 | 352 | 166 059 | 3 213 | 162 846 |
| 2022/01/21 | 162 846 | 90 | 80 717 | 80 807 | 352 | 352 | 243 301 | 80 455 | 162 846 |
| 2022/01/22 | 162 846 | 90 | 80 717 | 80 807 | 352 | 352 | 243 301 | 80 455 | 162 846 |
| 2022/01/23 | 162 846 | 90 | 80 717 | 80 807 | 352 | 352 | 243 301 | 80 455 | 162 846 |
| 2022/01/24 | 162 846 | 90 | 80 717 | 80 807 | 352 | 352 | 243 301 | 80 455 | 162 846 |
| 2022/01/25 | 162 846 | 90 | 80 717 | 80 807 | 352 | 352 | 243 301 | 80 455 | 162 846 |
| 2022/01/26 | 162 846 | 90 | 80 717 | 80 807 | 352 | 352 | 243 301 | 80 455 | 162 846 |

- RWD1 receives the water, but can't pump for 5 days, therefore it needs to keep the water = 431 000 m³

| | RWD1 | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | + | + | + | + | + | + | + | + | + | + | + | + | = | - | - | = | | | - | |
| Date | RWD1 Start of day (m³) | Rain RWD1 (m³) | Overflow from ESW (m³) | Decant A2 (m³) | ZoneB Side Runoff (m³) | ZoneC Side Runoff (m³) | ZoneD Side Runoff (m³) | ZoneH Side Runoff (m³) | ZoneI Side Runoff (m³) | ZoneJ Side Runoff (m³) | Seepage from FiltersA2 (m³) | Pump from RWD2 (m³) | Pump from RWD3 (m³) | Total In RWD1 (m³) | Max evaporation RWD1 (m³) | Dust Supression A2 (m³) | Sub Total Out RWD1 (m³) | Interim Vol RWD1 (m³) | Pump to Midway (m³)2 | Overflow to RWD2 (m³) | RWD1 End of day (m³) |
| 2022/01/14 | 0 | 191 | 18 504 | 41 290 | 224 | 168 | 323 | 0 | 0 | 0 | 4 750 | 0 | 0 | 65 450 | 744 | 2 500 | 3 244 | 62 206 | 62 206 | 0 | 0 |
| 2022/01/15 | 0 | 20 051 | 142 058 | 0 | 52 052 | 28 795 | 66 219 | 0 | 0 | 0 | 4 750 | 0 | 0 | 313 925 | 744 | 0 | 744 | 313 181 | 0 | 0 | 313 181 |
| 2022/01/16 | 313 181 | 191 | 3 213 | 0 | 224 | 168 | 323 | 0 | 0 | 0 | 4 750 | 0 | 0 | 8 869 | 744 | 0 | 744 | 321 305 | 0 | 0 | 321 305 |
| 2022/01/17 | 321 305 | 191 | 3 213 | 0 | 224 | 168 | 323 | 0 | 0 | 0 | 4 750 | 0 | 0 | 8 869 | 744 | 0 | 744 | 329 430 | 0 | 0 | 329 430 |
| 2022/01/18 | 329 430 | 191 | 3 213 | 0 | 224 | 168 | 323 | 0 | 0 | 0 | 4 750 | 0 | 0 | 8 869 | 744 | 0 | 744 | 337 555 | 0 | 0 | 337 555 |
| 2022/01/19 | 337 555 | 191 | 3 213 | 0 | 224 | 168 | 323 | 0 | 0 | 0 | 4 750 | 0 | 0 | 8 869 | 744 | 0 | 744 | 345 680 | 0 | 0 | 345 680 |
| 2022/01/20 | 345 680 | 191 | 3 213 | 0 | 224 | 168 | 323 | 0 | 0 | 0 | 4 750 | 0 | 0 | 8 869 | 744 | 0 | 744 | 353 805 | 0 | 0 | 353 805 |
| 2022/01/21 | 353 805 | 191 | 80 455 | 72 000 | 224 | 168 | 323 | 0 | 0 | 0 | 4 750 | 0 | 0 | 158 111 | 744 | 2 500 | 3 244 | 508 672 | 86 400 | 0 | 422 272 |
| 2022/01/22 | 422 272 | 191 | 80 455 | 72 000 | 224 | 168 | 323 | 0 | 0 | 0 | 4 750 | 0 | 0 | 158 111 | 744 | 2 500 | 3 244 | 577 139 | 86 400 | 59 739 | 431 000 |
| 2022/01/23 | 431 000 | 191 | 80 455 | 72 000 | 224 | 168 | 323 | 0 | 0 | 0 | 4 750 | 0 | 0 | 158 111 | 744 | 2 500 | 3 244 | 585 867 | 86 400 | 68 467 | 431 000 |
| 2022/01/24 | 431 000 | 191 | 80 455 | 72 000 | 224 | 168 | 323 | 0 | 0 | 0 | 4 750 | 0 | 0 | 158 111 | 744 | 2 500 | 3 244 | 585 867 | 86 400 | 68 467 | 431 000 |
| 2022/01/25 | 431 000 | 191 | 80 455 | 72 000 | 224 | 168 | 323 | 0 | 0 | 0 | 4 750 | 0 | 0 | 158 111 | 744 | 2 500 | 3 244 | 585 867 | 86 400 | 68 467 | 431 000 |
| 2022/01/26 | 431 000 | 191 | 80 455 | 72 000 | 224 | 168 | 323 | 0 | 0 | 0 | 4 750 | 0 | 0 | 158 111 | 744 | 2 500 | 3 244 | 585 867 | 86 400 | 68 467 | 431 000 |

- Water overflows to RWD 2.
- The following parameters were chosen for pumping back from RWD2 to RWD 1:
  - Start pumping when RWD1 is below 80% full
  - Stop pumping when RWD2 is 20% full
- The following parameters were chosen for pumping back from RWD3 to RWD 1:
  - Start pumping when RWD2 is below 70% full
  - Stop pumping when RWD3 is 20% full

Utilising the full 219 000 m³ of RWD3, the decant rates must be limited to the following:

| | | | |
|---|---|---|---|
| 2022/01/20 | 5 | | No power |
| 2022/01/25 | 5 | 100% | % of Decant rate A1&A2 |
| 2022/01/29 | 4 | 70% | % of Decant rate A1&A2 |
| 2022/02/03 | 5 | 90% | % of Decant rate A2 |
| 2022/03/15 | 40 | 75% | % of Decant rate A2 |

The decant will be brought back to its full capacity after 59 days.

| | RWD2 | | | | | | | | | | | | RWD3 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | + | + | = | - | = | | - | - | | | | | + | + | = | - | = | | - | - |
| Date | RWD2 Start of day (m³) | Rain RWD2 (m³) | Overflow from RWD1 (m³) | Total In RWD2 (m³) | Max evaporation RWD2 (m³) | Sub Total Out RWD2 (m³) | Interim Vol RWD2 (m³) | Pump RWD2 to RWD1 (m³) | Overflow to RWD3 (m³) | RWD2 End of day (m³) | SP30 | RWD3 Start of day (m³) | Rain RWD3 (m³) | Overflow from RWD2 (m³) | Total In RWD3 (m³) | Max evaporation RWD3 (m²) | Sub Total Out RWD3 (m³) | Interim Vol RWD3 (m³) | Pump RWD3 to RWD1 (m³) | Overflow to Env (m³) | RWD3 End of day (m³) |
| 2022/01/21 | 7 960 | 92 | 0 | 92 | 358 | 358 | 7 693 | 0 | 0 | 7 693 | | 11 422 | 132 | 0 | 132 | 514 | 514 | 11 040 | 0 | 0 | 11 040 |
| 2022/01/22 | 7 693 | 92 | 59 739 | 59 830 | 358 | 358 | 67 165 | 0 | 0 | 67 165 | | 11 040 | 132 | 0 | 132 | 514 | 514 | 10 657 | 0 | 0 | 10 657 |
| 2022/01/23 | 67 165 | 92 | 68 467 | 68 559 | 358 | 358 | 135 366 | 0 | 0 | 135 366 | | 10 657 | 132 | 0 | 132 | 514 | 514 | 10 275 | 0 | 0 | 10 275 |
| 2022/01/24 | 135 366 | 92 | 68 467 | 68 559 | 358 | 358 | 203 566 | 0 | 16 566 | 187 000 | | 10 275 | 132 | 16 566 | 16 698 | 514 | 514 | 26 459 | 0 | 0 | 26 459 |
| 2022/01/25 | 187 000 | 92 | 68 467 | 68 559 | 358 | 358 | 255 200 | 0 | 68 200 | 187 000 | | 26 459 | 132 | 68 200 | 68 332 | 514 | 514 | 94 277 | 0 | 0 | 94 277 |
| 2022/01/26 | 187 000 | 92 | 25 267 | 25 359 | 358 | 358 | 212 000 | 0 | 25 000 | 187 000 | | 94 277 | 132 | 25 000 | 25 132 | 514 | 514 | 118 895 | 0 | 0 | 118 895 |
| 2022/01/27 | 187 000 | 92 | 25 267 | 25 359 | 358 | 358 | 212 000 | 0 | 25 000 | 187 000 | | 118 895 | 132 | 25 000 | 25 132 | 514 | 514 | 143 513 | 0 | 0 | 143 513 |
| 2022/01/28 | 187 000 | 92 | 25 267 | 25 359 | 358 | 358 | 212 000 | 0 | 25 000 | 187 000 | | 143 513 | 132 | 25 000 | 25 132 | 514 | 514 | 168 131 | 0 | 0 | 168 131 |
| 2022/01/29 | 187 000 | 92 | 25 267 | 25 359 | 358 | 358 | 212 000 | 0 | 25 000 | 187 000 | | 168 131 | 132 | 25 000 | 25 132 | 514 | 514 | 192 749 | 0 | 0 | 192 749 |
| 2022/01/30 | 187 000 | 92 | 14 077 | 14 169 | 358 | 358 | 200 810 | 0 | 13 810 | 187 000 | | 192 749 | 132 | 13 810 | 13 942 | 514 | 514 | 206 177 | 0 | 0 | 206 177 |
| 2022/01/31 | 187 000 | 92 | 0 | 92 | 358 | 358 | 186 734 | 0 | 0 | 186 734 | | 206 177 | 132 | 0 | 132 | 514 | 514 | 205 794 | 0 | 0 | 205 794 |
| 2022/02/01 | 186 734 | 90 | 3 318 | 3 407 | 310 | 310 | 189 831 | 0 | 2 831 | 187 000 | | 205 794 | 129 | 2 831 | 2 960 | 445 | 445 | 208 309 | 0 | 0 | 208 309 |
| 2022/02/02 | 187 000 | 90 | 4 002 | 4 092 | 310 | 310 | 190 782 | 0 | 3 782 | 187 000 | | 208 309 | 129 | 3 782 | 3 910 | 445 | 445 | 211 774 | 0 | 0 | 211 774 |
| 2022/02/03 | 187 000 | 90 | 4 002 | 4 092 | 310 | 310 | 190 782 | 0 | 3 782 | 187 000 | | 211 774 | 129 | 3 782 | 3 910 | 445 | 445 | 215 240 | 0 | 0 | 215 240 |

This situation occurs from 2022 to 2029.

**2029/03/15**

Although January is the worst month, an additional bench was added in March, which resulted in higher throttling requirement.

- BD – note that the decant rate was 0 (power outage). After the power outage the decant rate was 100% for a few days and then decreased to prevent spillage out of RWD 3

| | Bufferdam | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | + | + | + | + | + | + | | - | - | | | - | - | |
| Date | BD Start of day (m³) | Decant A1 (m³) | Rain BD (m³) | ZoneA Side Runoff (m³) | ZoneE Side Runoff (m³)2 | Seepage to filtersA1 (m³) | Scavenger holes A1 (m³) | Total In BD (m³) | Max evaporation BD (m³) | Dust Suppression (m³) | Sub-Total Out BD (m³) | Interim Vol BD (m³) | Pump to Midway BD (m³) | Overflow to ESW (m³) | BD End of day (m³) |
| 2029/03/14 | 169 830 | 8 235 | 71 | 514 | 182 | 3 167 | 7 742 | 19 910 | 229 | 2 500 | 2 729 | 187 011 | 0 | 17 181 | 169 830 |
| 2029/03/15 | 169 830 | 0 | 8 698 | 119 595 | 37 887 | 3 167 | 0 | 169 347 | 229 | 0 | 229 | 338 948 | 0 | 169 118 | 169 830 |
| 2029/03/16 | 169 830 | 0 | 71 | 514 | 182 | 3 167 | 0 | 3 934 | 229 | 0 | 229 | 173 535 | 0 | 3 705 | 169 830 |
| 2029/03/17 | 169 830 | 0 | 71 | 514 | 182 | 3 167 | 0 | 3 934 | 229 | 0 | 229 | 173 535 | 0 | 3 705 | 169 830 |
| 2029/03/18 | 169 830 | 0 | 71 | 514 | 182 | 3 167 | 0 | 3 934 | 229 | 0 | 229 | 173 535 | 0 | 3 705 | 169 830 |
| 2029/03/19 | 169 830 | 0 | 71 | 514 | 182 | 3 167 | 0 | 3 934 | 229 | 0 | 229 | 173 535 | 0 | 3 705 | 169 830 |
| 2029/03/20 | 169 830 | 0 | 71 | 514 | 182 | 3 167 | 0 | 3 934 | 229 | 0 | 229 | 173 535 | 0 | 3 705 | 169 830 |
| 2029/03/21 | 169 830 | 72 000 | 71 | 514 | 182 | 3 167 | 7 742 | 83 675 | 229 | 2 500 | 2 729 | 250 777 | 0 | 80 947 | 169 830 |
| 2029/03/22 | 169 830 | 72 000 | 71 | 514 | 182 | 3 167 | 7 742 | 83 675 | 229 | 2 500 | 2 729 | 250 777 | 0 | 80 947 | 169 830 |
| 2029/03/23 | 169 830 | 72 000 | 71 | 514 | 182 | 3 167 | 7 742 | 83 675 | 229 | 2 500 | 2 729 | 250 777 | 0 | 80 947 | 169 830 |
| 2029/03/24 | 169 830 | 72 000 | 71 | 514 | 182 | 3 167 | 7 742 | 83 675 | 229 | 2 500 | 2 729 | 250 777 | 0 | 80 947 | 169 830 |
| 2029/03/25 | 169 830 | 72 000 | 71 | 514 | 182 | 3 167 | 7 742 | 83 675 | 229 | 2 500 | 2 729 | 250 777 | 0 | 80 947 | 169 830 |
| 2029/03/26 | 169 830 | 43 200 | 71 | 514 | 182 | 3 167 | 7 742 | 54 875 | 229 | 2 500 | 2 729 | 221 977 | 0 | 52 147 | 169 830 |
| 2029/03/27 | 169 830 | 43 200 | 71 | 514 | 182 | 3 167 | 7 742 | 54 875 | 229 | 2 500 | 2 729 | 221 977 | 0 | 52 147 | 169 830 |

- ESWD overflows to RWD1.

| | East Storm dam | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | + | + | | - | | | - | |
| Date | ESW Start of day (m³) | Rain ESW (m³) | Overflow from BD (m³) | Total In ESW (m³) | Max evaporation ESW (m³) | Sub-Total Vol ESW (m³) | Interim Vol ESW (m³) | Overflow to RWD1 (m³) | ESW End of day (m³) |
| 2029/03/14 | 162 846 | 77 | 17 181 | 17 259 | 249 | 249 | 179 855 | 17 009 | 162 846 |
| 2029/03/15 | 162 846 | 9 468 | 169 118 | 178 585 | 249 | 249 | 341 182 | 178 336 | 162 846 |
| 2029/03/16 | 162 846 | 77 | 3 705 | 3 782 | 249 | 249 | 166 379 | 3 533 | 162 846 |
| 2029/03/17 | 162 846 | 77 | 3 705 | 3 782 | 249 | 249 | 166 379 | 3 533 | 162 846 |
| 2029/03/18 | 162 846 | 77 | 3 705 | 3 782 | 249 | 249 | 166 379 | 3 533 | 162 846 |
| 2029/03/19 | 162 846 | 77 | 3 705 | 3 782 | 249 | 249 | 166 379 | 3 533 | 162 846 |
| 2029/03/20 | 162 846 | 77 | 3 705 | 3 782 | 249 | 249 | 166 379 | 3 533 | 162 846 |
| 2029/03/21 | 162 846 | 77 | 80 947 | 81 024 | 249 | 249 | 243 621 | 80 775 | 162 846 |
| 2029/03/22 | 162 846 | 77 | 80 947 | 81 024 | 249 | 249 | 243 621 | 80 775 | 162 846 |
| 2029/03/23 | 162 846 | 77 | 80 947 | 81 024 | 249 | 249 | 243 621 | 80 775 | 162 846 |
| 2029/03/24 | 162 846 | 77 | 80 947 | 81 024 | 249 | 249 | 243 621 | 80 775 | 162 846 |
| 2029/03/25 | 162 846 | 77 | 80 947 | 81 024 | 249 | 249 | 243 621 | 80 775 | 162 846 |
| 2029/03/26 | 162 846 | 77 | 52 147 | 52 224 | 249 | 249 | 214 821 | 51 975 | 162 846 |
| 2029/03/27 | 162 846 | 77 | 52 147 | 52 224 | 249 | 249 | 214 821 | 51 975 | 162 846 |

- RWD1 receives the water, but can't pump for 5 days, therefore it needs to keep the water = 431 000 m³

| | RWD1 | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | + | + | + | + | + | + | + | + | + | + | + | + | = | - | - | = | | | - | | |
| Date | RWD1 Start of day (m³) | Rain RWD1 (m³) | Overflow from ESW (m³) | Decant A2 (m³) | ZoneB Side Runoff (m³) | ZoneC Side Runoff (m³) | ZoneD Side Runoff (m³) | ZoneH Side Runoff (m³) | ZoneI Side Runoff (m³) | ZoneJ Side Runoff (m³) | Seepage from FiltersA2 (m³) | Pump from RWD2 (m³) | Pump from RWD3 (m³) | Total In RWD1 (m³) | Max evaporation RWD1 (m³) | Dust Supression A2 (m³) | Sub Total Out RWD1 (m³) | Interim Vol RWD1 (m³) | Pump to Midway (m³)2 | Overflow to RWD2 (m³) | RWD1 End of day (m³) | |
| 2029/03/14 | 0 | 163 | 17 009 | 49 575 | 294 | 182 | 418 | 0 | 0 | 0 | 3 167 | 0 | 0 | 70 808 | 527 | 2 500 | 3 027 | 67 781 | 67 781 | 0 | 0 | |
| 2029/03/15 | 0 | 20 023 | 178 336 | 0 | 68 384 | 34 815 | 88 032 | 0 | 0 | 0 | 3 167 | 0 | 0 | 392 757 | 527 | 0 | 527 | 392 230 | 0 | 0 | 392 230 | |
| 2029/03/16 | 392 230 | 163 | 3 533 | 0 | 294 | 182 | 418 | 0 | 0 | 0 | 3 167 | 0 | 0 | 7 756 | 527 | 0 | 527 | 399 460 | 0 | 0 | 399 460 | |
| 2029/03/17 | 399 460 | 163 | 3 533 | 0 | 294 | 182 | 418 | 0 | 0 | 0 | 3 167 | 0 | 0 | 7 756 | 527 | 0 | 527 | 406 689 | 0 | 0 | 406 689 | |
| 2029/03/18 | 406 689 | 163 | 3 533 | 0 | 294 | 182 | 418 | 0 | 0 | 0 | 3 167 | 0 | 0 | 7 756 | 527 | 0 | 527 | 413 918 | 0 | 0 | 413 918 | |
| 2029/03/19 | 413 918 | 163 | 3 533 | 0 | 294 | 182 | 418 | 0 | 0 | 0 | 3 167 | 0 | 0 | 7 756 | 527 | 0 | 527 | 421 147 | 0 | 0 | 421 147 | |
| 2029/03/20 | 421 147 | 163 | 3 533 | 0 | 294 | 182 | 418 | 0 | 0 | 0 | 3 167 | 0 | 0 | 7 756 | 527 | 0 | 527 | 428 376 | 0 | 0 | 428 376 | |
| 2029/03/21 | 428 376 | 163 | 80 775 | 72 000 | 294 | 182 | 418 | 0 | 0 | 0 | 3 167 | 0 | 0 | 156 998 | 527 | 2 500 | 3 027 | 582 348 | 86 400 | 64 948 | 431 000 | |
| 2029/03/22 | 431 000 | 163 | 80 775 | 72 000 | 294 | 182 | 418 | 0 | 0 | 0 | 3 167 | 0 | 0 | 156 998 | 527 | 2 500 | 3 027 | 584 971 | 86 400 | 67 571 | 431 000 | |
| 2029/03/23 | 431 000 | 163 | 80 775 | 72 000 | 294 | 182 | 418 | 0 | 0 | 0 | 3 167 | 0 | 0 | 156 998 | 527 | 2 500 | 3 027 | 584 971 | 86 400 | 67 571 | 431 000 | |
| 2029/03/24 | 431 000 | 163 | 80 775 | 72 000 | 294 | 182 | 418 | 0 | 0 | 0 | 3 167 | 0 | 0 | 156 998 | 527 | 2 500 | 3 027 | 584 971 | 86 400 | 67 571 | 431 000 | |
| 2029/03/25 | 431 000 | 163 | 80 775 | 72 000 | 294 | 182 | 418 | 0 | 0 | 0 | 3 167 | 0 | 0 | 156 998 | 527 | 2 500 | 3 027 | 584 971 | 86 400 | 67 571 | 431 000 | |
| 2029/03/26 | 431 000 | 163 | 51 975 | 43 200 | 294 | 182 | 418 | 0 | 0 | 0 | 3 167 | 0 | 0 | 99 398 | 527 | 2 500 | 3 027 | 527 371 | 86 400 | 9 971 | 431 000 | |
| 2029/03/27 | 431 000 | 163 | 51 975 | 43 200 | 294 | 182 | 418 | 0 | 0 | 0 | 3 167 | 0 | 0 | 99 398 | 527 | 2 500 | 3 027 | 527 371 | 86 400 | 9 971 | 431 000 | |

Utilising the full 219 000 m³ of RWD3, the decant rates must be limited to the following:

| 2029/03/15 | days | | |
|---|---|---|---|
| 2029/03/20 | 5 | | No power |
| 2029/03/25 | 5 | 100% | % of Decant rate A1&A2 |
| 2029/03/30 | 5 | 60% | % of Decant rate A1&A2 |
| 2029/04/05 | 6 | 100% | % of Decant rate A2 |
| 2029/04/28 | 23 | 90% | % of Decant rate A2 |

The decant will be brought back to its full capacity after 44 days.

| | RWD2 | | | | | | | | | | | RWD3 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | + | + | = | - | = | | - | - | | | | + | + | = | - | = | | - | - | |
| Date | RWD2 Start of day (m³) | Rain RWD2 (m³) | Overflow from RWD1 (m³) | Total In RWD2 (m³) | Max evaporation RWD2 (m³) | Sub Total Out RWD2 (m³) | Interim Vol RWD2 (m³) | Pump RWD2 to RWD1 (m³) | Overflow to RWD3 (m³) | RWD2 End of day (m³) | SP30 | RWD3 Start of day (m³) | Rain RWD3 (m³) | Overflow from RWD2 (m³) | Total In RWD3 (m³) | Max evaporation RWD3 (m³) | Sub Total Out RWD3 (m³) | Interim Vol RWD3 (m³) | Pump RWD3 to RWD1 (m³) | Overflow to Env (m³) | RWD3 End of day (m³) |
| 2029/03/14 | 0 | 78 | 0 | 78 | 254 | 254 | 0 | 0 | 0 | 0 | | 0 | 113 | 0 | 113 | 364 | 364 | 0 | 0 | 0 | 0 |
| 2029/03/15 | 0 | 9 637 | 0 | 9 637 | 254 | 254 | 9 383 | 0 | 0 | 9 383 | | 0 | 13 829 | 0 | 13 829 | 364 | 364 | 13 465 | 0 | 0 | 13 465 |
| 2029/03/16 | 9 383 | 78 | 0 | 78 | 254 | 254 | 9 208 | 0 | 0 | 9 208 | | 13 465 | 113 | 0 | 113 | 364 | 364 | 13 214 | 0 | 0 | 13 214 |
| 2029/03/17 | 9 208 | 78 | 0 | 78 | 254 | 254 | 9 033 | 0 | 0 | 9 033 | | 13 214 | 113 | 0 | 113 | 364 | 364 | 12 962 | 0 | 0 | 12 962 |
| 2029/03/18 | 9 033 | 78 | 0 | 78 | 254 | 254 | 8 858 | 0 | 0 | 8 858 | | 12 962 | 113 | 0 | 113 | 364 | 364 | 12 711 | 0 | 0 | 12 711 |
| 2029/03/19 | 8 858 | 78 | 0 | 78 | 254 | 254 | 8 683 | 0 | 0 | 8 683 | | 12 711 | 113 | 0 | 113 | 364 | 364 | 12 460 | 0 | 0 | 12 460 |
| 2029/03/20 | 8 683 | 78 | 0 | 78 | 254 | 254 | 8 508 | 0 | 0 | 8 508 | | 12 460 | 113 | 0 | 113 | 364 | 364 | 12 208 | 0 | 0 | 12 208 |
| 2029/03/21 | 8 508 | 78 | 64 948 | 65 026 | 254 | 254 | 73 280 | 0 | 0 | 73 280 | | 12 208 | 113 | 0 | 113 | 364 | 364 | 11 957 | 0 | 0 | 11 957 |
| 2029/03/22 | 73 280 | 78 | 67 571 | 67 650 | 254 | 254 | 140 676 | 0 | 0 | 140 676 | | 11 957 | 113 | 0 | 113 | 364 | 364 | 11 706 | 0 | 0 | 11 706 |
| 2029/03/23 | 140 676 | 78 | 67 571 | 67 650 | 254 | 254 | 208 072 | 0 | 21 072 | 187 000 | | 11 706 | 113 | 21 072 | 21 184 | 364 | 364 | 32 526 | 0 | 0 | 32 526 |
| 2029/03/24 | 187 000 | 78 | 67 571 | 67 650 | 254 | 254 | 254 396 | 0 | 67 396 | 187 000 | | 32 526 | 113 | 67 396 | 67 508 | 364 | 364 | 99 671 | 0 | 0 | 99 671 |
| 2029/03/25 | 187 000 | 78 | 67 571 | 67 650 | 254 | 254 | 254 396 | 0 | 67 396 | 187 000 | | 99 671 | 113 | 67 396 | 67 508 | 364 | 364 | 166 815 | 0 | 0 | 166 815 |
| 2029/03/26 | 187 000 | 78 | 9 971 | 10 050 | 254 | 254 | 196 796 | 0 | 9 796 | 187 000 | | 166 815 | 113 | 9 796 | 9 908 | 364 | 364 | 176 360 | 0 | 0 | 176 360 |
| 2029/03/27 | 187 000 | 78 | 9 971 | 10 050 | 254 | 254 | 196 796 | 0 | 9 796 | 187 000 | | 176 360 | 113 | 9 796 | 9 908 | 364 | 364 | 185 905 | 0 | 0 | 185 905 |
| 2029/03/28 | 187 000 | 78 | 9 971 | 10 050 | 254 | 254 | 196 796 | 0 | 9 796 | 187 000 | | 185 905 | 113 | 9 796 | 9 908 | 364 | 364 | 195 449 | 0 | 0 | 195 449 |
| 2029/03/29 | 187 000 | 78 | 9 971 | 10 050 | 254 | 254 | 196 796 | 0 | 9 796 | 187 000 | | 195 449 | 113 | 9 796 | 9 908 | 364 | 364 | 204 994 | 0 | 0 | 204 994 |

**From 2030 to 2037:**

- the top surface areas are combined and all rain is accounted for on Area2 (Production sheet)
- the side slope runoff change as follows:
    - the higher benches have smaller areas, so the increase in un-rehabilitated areas slow down
    - the lower benches are assumed to be re-habilitated therefore reducing the run-off

**2038/01/01:**

In mid 2037, the two TSF's reach the same elevation. Both Areas now have 8 benches.

- BD – once again gets water from Area1. The water from Area1 decant is due to production water, which builds up as it could not be decanted for 5 days

| | Bufferdam | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | + | + | + | + | + | + | | - | - | | | | - | - | |
| Date | BD Start of day (m³) | Decant A1 (m³) | Rain BD (m³) | ZoneA Side Runoff (m³) | ZoneE Side Runoff (m³)2 | Seepage to filtersA1 (m³) | Scavenger holes A1 (m³) | Total In BD (m³) | Max evaporation BD (m³) | Dust Suppression (m³) | Sub-Total Out BD (m³) | Interim Vol BD (m³) | Pump to Midway BD (m³) | Overflow to ESW (m³) | BD End of day (m³) |
| 2038/01/14 | 169 830 | 24 447 | 83 | 559 | 161 | 3 167 | 7 742 | 36 158 | 323 | 2 500 | 2 823 | 203 165 | 0 | 33 335 | 169 830 |
| 2038/01/15 | 169 830 | 0 | 8 711 | 142 032 | 38 912 | 3 167 | 0 | 192 821 | 323 | 0 | 323 | 362 328 | 0 | 192 498 | 169 830 |
| 2038/01/16 | 169 830 | 0 | 83 | 559 | 161 | 3 167 | 0 | 3 970 | 323 | 0 | 323 | 173 477 | 0 | 3 647 | 169 830 |
| 2038/01/17 | 169 830 | 0 | 83 | 559 | 161 | 3 167 | 0 | 3 970 | 323 | 0 | 323 | 173 477 | 0 | 3 647 | 169 830 |
| 2038/01/18 | 169 830 | 0 | 83 | 559 | 161 | 3 167 | 0 | 3 970 | 323 | 0 | 323 | 173 477 | 0 | 3 647 | 169 830 |
| 2038/01/19 | 169 830 | 0 | 83 | 559 | 161 | 3 167 | 0 | 3 970 | 323 | 0 | 323 | 173 477 | 0 | 3 647 | 169 830 |
| 2038/01/20 | 169 830 | 0 | 83 | 559 | 161 | 3 167 | 0 | 3 970 | 323 | 0 | 323 | 173 477 | 0 | 3 647 | 169 830 |
| 2038/01/21 | 169 830 | 72 000 | 83 | 559 | 161 | 3 167 | 7 742 | 83 712 | 323 | 2 500 | 2 823 | 250 718 | 0 | 80 888 | 169 830 |
| 2038/01/22 | 169 830 | 72 000 | 83 | 559 | 161 | 3 167 | 7 742 | 83 712 | 323 | 2 500 | 2 823 | 250 718 | 0 | 80 888 | 169 830 |
| 2038/01/23 | 169 830 | 72 000 | 83 | 559 | 161 | 3 167 | 7 742 | 83 712 | 323 | 2 500 | 2 823 | 250 718 | 0 | 80 888 | 169 830 |
| 2038/01/24 | 169 830 | 28 466 | 83 | 559 | 161 | 3 167 | 7 742 | 40 178 | 323 | 2 500 | 2 823 | 207 185 | 0 | 37 355 | 169 830 |
| 2038/01/25 | 169 830 | 24 447 | 83 | 559 | 161 | 3 167 | 7 742 | 36 158 | 323 | 2 500 | 2 823 | 203 165 | 0 | 33 335 | 169 830 |
| 2038/01/26 | 169 830 | 24 447 | 83 | 559 | 161 | 3 167 | 7 742 | 36 158 | 323 | 2 500 | 2 823 | 203 165 | 0 | 33 335 | 169 830 |
| 2038/01/27 | 169 830 | 24 447 | 83 | 559 | 161 | 3 167 | 7 742 | 36 158 | 323 | 2 500 | 2 823 | 203 165 | 0 | 33 335 | 169 830 |

- ESWD – overflows to RWD1

| | East Storm dam | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | + | + | | - | | | - | |
| Date | ESW Start of day (m³) | Rain ESW (m³) | Overflow from BD (m³) | Total In ESW (m³) | Max evaporation ESW (m³) | Sub-Total Vol ESW (m³) | Interim Vol ESW (m³) | Overflow to RWD1 (m³) | ESW End of day (m³) |
| 2038/01/14 | 162 846 | 90 | 33 335 | 33 425 | 352 | 352 | 195 919 | 33 073 | 162 846 |
| 2038/01/15 | 162 846 | 9 481 | 192 498 | 201 979 | 352 | 352 | 364 473 | 201 627 | 162 846 |
| 2038/01/16 | 162 846 | 90 | 3 647 | 3 737 | 352 | 352 | 166 231 | 3 385 | 162 846 |
| 2038/01/17 | 162 846 | 90 | 3 647 | 3 737 | 352 | 352 | 166 231 | 3 385 | 162 846 |
| 2038/01/18 | 162 846 | 90 | 3 647 | 3 737 | 352 | 352 | 166 231 | 3 385 | 162 846 |
| 2038/01/19 | 162 846 | 90 | 3 647 | 3 737 | 352 | 352 | 166 231 | 3 385 | 162 846 |
| 2038/01/20 | 162 846 | 90 | 3 647 | 3 737 | 352 | 352 | 166 231 | 3 385 | 162 846 |
| 2038/01/21 | 162 846 | 90 | 80 888 | 80 979 | 352 | 352 | 243 473 | 80 627 | 162 846 |
| 2038/01/22 | 162 846 | 90 | 80 888 | 80 979 | 352 | 352 | 243 473 | 80 627 | 162 846 |
| 2038/01/23 | 162 846 | 90 | 80 888 | 80 979 | 352 | 352 | 243 473 | 80 627 | 162 846 |
| 2038/01/24 | 162 846 | 90 | 37 355 | 37 445 | 352 | 352 | 199 939 | 37 093 | 162 846 |
| 2038/01/25 | 162 846 | 90 | 33 335 | 33 425 | 352 | 352 | 195 919 | 33 073 | 162 846 |
| 2038/01/26 | 162 846 | 90 | 33 335 | 33 425 | 352 | 352 | 195 919 | 33 073 | 162 846 |
| 2038/01/27 | 162 846 | 90 | 33 335 | 33 425 | 352 | 352 | 195 919 | 33 073 | 162 846 |

- RWD1 – overflows to RWD2

| | RWD1 | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | + | + | + | + | + | + | + | + | + | + | + | + | = | - | - | = | | | - | |
| Date | RWD1 Start of day (m³) | Rain RWD1 (m³) | Overflow from ESW (m³) | Decant A2 (m³) | ZoneB Side Runoff (m³) | ZoneC Side Runoff (m³) | ZoneD Side Runoff (m³) | ZoneH Side Runoff (m³) | ZoneI Side Runoff (m³) | ZoneJ Side Runoff (m³) | Seepage from FiltersA2 (m³) | Pump from RWD2 (m³) | Pump from RWD3 (m³) | Total In RWD1 (m³) | Max evaporation RWD1 (m³) | Dust Supression A2 (m³) | Sub Total Out RWD1 (m³) | Interim Vol RWD1 (m³) | Pump to Midway (m³)2 | Overflow to RWD2 (m³) | RWD1 End of day (m³) |
| 2038/01/14 | 0 | 191 | 33 073 | 29 100 | 313 | 0 | 0 | 0 | 0 | 0 | 3 167 | 0 | 0 | 65 844 | 744 | 2 500 | 3 244 | 62 599 | 62 599 | 0 | 0 |
| 2038/01/15 | 0 | 20 051 | 201 627 | 0 | 80 460 | 0 | 0 | 70 942 | 11 974 | 54 399 | 3 167 | 0 | 0 | 442 621 | 744 | 0 | 744 | 441 877 | 0 | 10 877 | 431 000 |
| 2038/01/16 | 431 000 | 191 | 3 385 | 0 | 313 | 0 | 0 | 0 | 0 | 0 | 3 167 | 0 | 0 | 7 055 | 744 | 0 | 744 | 437 311 | 0 | 6 311 | 431 000 |
| 2038/01/17 | 431 000 | 191 | 3 385 | 0 | 313 | 0 | 0 | 0 | 0 | 0 | 3 167 | 0 | 0 | 7 055 | 744 | 0 | 744 | 437 311 | 0 | 6 311 | 431 000 |
| 2038/01/18 | 431 000 | 191 | 3 385 | 0 | 313 | 0 | 0 | 0 | 0 | 0 | 3 167 | 0 | 0 | 7 055 | 744 | 0 | 744 | 437 311 | 0 | 6 311 | 431 000 |
| 2038/01/19 | 431 000 | 191 | 3 385 | 0 | 313 | 0 | 0 | 0 | 0 | 0 | 3 167 | 0 | 0 | 7 055 | 744 | 0 | 744 | 437 311 | 0 | 6 311 | 431 000 |
| 2038/01/20 | 431 000 | 191 | 3 385 | 0 | 313 | 0 | 0 | 0 | 0 | 0 | 3 167 | 0 | 0 | 7 055 | 744 | 0 | 744 | 437 311 | 0 | 6 311 | 431 000 |
| 2038/01/21 | 431 000 | 191 | 80 627 | 72 000 | 313 | 0 | 0 | 0 | 0 | 0 | 3 167 | 0 | 0 | 156 297 | 744 | 2 500 | 3 244 | 584 053 | 86 400 | 66 653 | 431 000 |
| 2038/01/22 | 431 000 | 191 | 80 627 | 72 000 | 313 | 0 | 0 | 0 | 0 | 0 | 3 167 | 0 | 0 | 156 297 | 744 | 2 500 | 3 244 | 584 053 | 86 400 | 66 653 | 431 000 |
| 2038/01/23 | 431 000 | 191 | 80 627 | 72 000 | 313 | 0 | 0 | 0 | 0 | 0 | 3 167 | 0 | 0 | 156 297 | 744 | 2 500 | 3 244 | 584 053 | 86 400 | 66 653 | 431 000 |
| 2038/01/24 | 431 000 | 191 | 37 093 | 72 000 | 313 | 0 | 0 | 0 | 0 | 0 | 3 167 | 0 | 0 | 112 763 | 744 | 2 500 | 3 244 | 540 519 | 86 400 | 23 119 | 431 000 |
| 2038/01/25 | 431 000 | 191 | 33 073 | 72 000 | 313 | 0 | 0 | 0 | 0 | 0 | 3 167 | 0 | 0 | 108 744 | 744 | 2 500 | 3 244 | 536 499 | 86 400 | 19 099 | 431 000 |
| 2038/01/26 | 431 000 | 191 | 33 073 | 72 000 | 313 | 0 | 0 | 0 | 0 | 0 | 3 167 | 0 | 0 | 108 744 | 744 | 2 500 | 3 244 | 536 499 | 86 400 | 19 099 | 431 000 |
| 2038/01/27 | 431 000 | 191 | 33 073 | 72 000 | 313 | 0 | 0 | 0 | 0 | 0 | 3 167 | 0 | 0 | 108 744 | 744 | 2 500 | 3 244 | 536 499 | 86 400 | 19 099 | 431 000 |

- Overflow to RWD 2 and RWD 3

| | RWD2 | | | | | | | | | | | | RWD3 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | + | + | = | - | = | | - | - | | | | | + | + | = | - | = | | - | - | |
| Date | RWD2 Start of day (m³) | Rain RWD2 (m³) | Overflow from RWD1 (m³) | Total In RWD2 (m³) | Max evaporation on RWD2 (m³) | Sub Total Out RWD2 (m³) | Interim Vol RWD2 (m³) | Pump RWD2 to RWD1 (m³) | Overflow to RWD3 (m³) | RWD2 End of day (m³) | SP30 | RWD3 Start of day (m³) | Rain RWD3 (m³) | Overflow from RWD2 (m³) | Total In RWD3 (m³) | Max evaporation on RWD3 (m³) | Sub Total Out RWD3 (m³) | Interim Vol RWD3 (m³) | Pump RWD3 to RWD1 (m³) | Overflow to Env (m³) | RWD3 End of day (m³) |
| 2038/01/15 | 0 | 9 650 | 10 877 | 20 527 | 358 | 358 | 20 169 | 0 | 0 | 20 169 | | 0 | 13 848 | 0 | 13 848 | 514 | 514 | 13 334 | 0 | 0 | 13 334 |
| 2038/01/16 | 20 169 | 92 | 6 311 | 6 403 | 358 | 358 | 26 213 | 0 | 0 | 26 213 | | 13 334 | 132 | 0 | 132 | 514 | 514 | 12 952 | 0 | 0 | 12 952 |
| 2038/01/17 | 26 213 | 92 | 6 311 | 6 403 | 358 | 358 | 32 258 | 0 | 0 | 32 258 | | 12 952 | 132 | 0 | 132 | 514 | 514 | 12 569 | 0 | 0 | 12 569 |
| 2038/01/18 | 32 258 | 92 | 6 311 | 6 403 | 358 | 358 | 38 302 | 0 | 0 | 38 302 | | 12 569 | 132 | 0 | 132 | 514 | 514 | 12 187 | 0 | 0 | 12 187 |
| 2038/01/19 | 38 302 | 92 | 6 311 | 6 403 | 358 | 358 | 44 346 | 0 | 0 | 44 346 | | 12 187 | 132 | 0 | 132 | 514 | 514 | 11 805 | 0 | 0 | 11 805 |
| 2038/01/20 | 44 346 | 92 | 6 311 | 6 403 | 358 | 358 | 50 391 | 0 | 0 | 50 391 | | 11 805 | 132 | 0 | 132 | 514 | 514 | 11 422 | 0 | 0 | 11 422 |
| 2038/01/21 | 50 391 | 92 | 66 653 | 66 745 | 358 | 358 | 116 777 | 0 | 0 | 116 777 | | 11 422 | 132 | 0 | 132 | 514 | 514 | 11 040 | 0 | 0 | 11 040 |
| 2038/01/22 | 116 777 | 92 | 66 653 | 66 745 | 358 | 358 | 183 163 | 0 | 0 | 183 163 | | 11 040 | 132 | 0 | 132 | 514 | 514 | 10 657 | 0 | 0 | 10 657 |
| 2038/01/23 | 183 163 | 92 | 66 653 | 66 745 | 358 | 358 | 249 549 | 0 | 62 549 | 187 000 | | 10 657 | 132 | 62 549 | 62 681 | 514 | 514 | 72 824 | 0 | 0 | 72 824 |
| 2038/01/24 | 187 000 | 92 | 23 119 | 23 211 | 358 | 358 | 209 852 | 0 | 22 852 | 187 000 | | 72 824 | 132 | 22 852 | 22 984 | 514 | 514 | 95 295 | 0 | 0 | 95 295 |
| 2038/01/25 | 187 000 | 92 | 19 099 | 19 191 | 358 | 358 | 205 833 | 0 | 18 833 | 187 000 | | 95 295 | 132 | 18 833 | 18 965 | 514 | 514 | 113 745 | 0 | 0 | 113 745 |
| 2038/01/26 | 187 000 | 92 | 19 099 | 19 191 | 358 | 358 | 205 833 | 0 | 18 833 | 187 000 | | 113 745 | 132 | 18 833 | 18 965 | 514 | 514 | 132 196 | 0 | 0 | 132 196 |
| 2038/01/27 | 187 000 | 92 | 19 099 | 19 191 | 358 | 358 | 205 833 | 0 | 18 833 | 187 000 | | 132 196 | 132 | 18 833 | 18 965 | 514 | 514 | 150 646 | 0 | 0 | 150 646 |
| 2038/01/28 | 187 000 | 92 | 19 099 | 19 191 | 358 | 358 | 205 833 | 0 | 18 833 | 187 000 | | 150 646 | 132 | 18 833 | 18 965 | 514 | 514 | 169 097 | 0 | 0 | 169 097 |
| 2038/01/29 | 187 000 | 92 | 19 099 | 19 191 | 358 | 358 | 205 833 | 0 | 18 833 | 187 000 | | 169 097 | 132 | 18 833 | 18 965 | 514 | 514 | 187 547 | 0 | 0 | 187 547 |
| 2038/01/30 | 187 000 | 92 | 19 099 | 19 191 | 358 | 358 | 205 833 | 0 | 18 833 | 187 000 | | 187 547 | 132 | 18 833 | 18 965 | 514 | 514 | 205 998 | 0 | 0 | 205 998 |

The results after 2038 are similar to the results of 2038.

## 4. Conclusion

The water balance considered the construction of the TSF's, the production schedule, bench geometry, paddocks containment, rehabilitation of benches, a storm rainfall event and various other factors and variables.

It was found that three RWD's are required based on these assumptions and calculations. Factors that could have significant effects on the water balance are:

- Rehabilitation is not done as expected – the run-off factors make a significant difference in the volumes on these large areas
- The model considers one 1:100 year storm event, but if several smaller events occur a few days after each other, additional capacity may be required. The model does apply the daily average rainfall over every day of the month.
- If another storm hits the facility within the storm month, additional storage will be required or throttling of the TSF will have to be extended for a longer period.

Yours sincerely

**Albertus du Plessis**
**Principal Tailings Engineer**
**For Knight Piésold (Pty) Limited**

**Thabang Mokoma**
**Principal Tailings Engineer**
**For Knight Piésold (Pty) Limited**

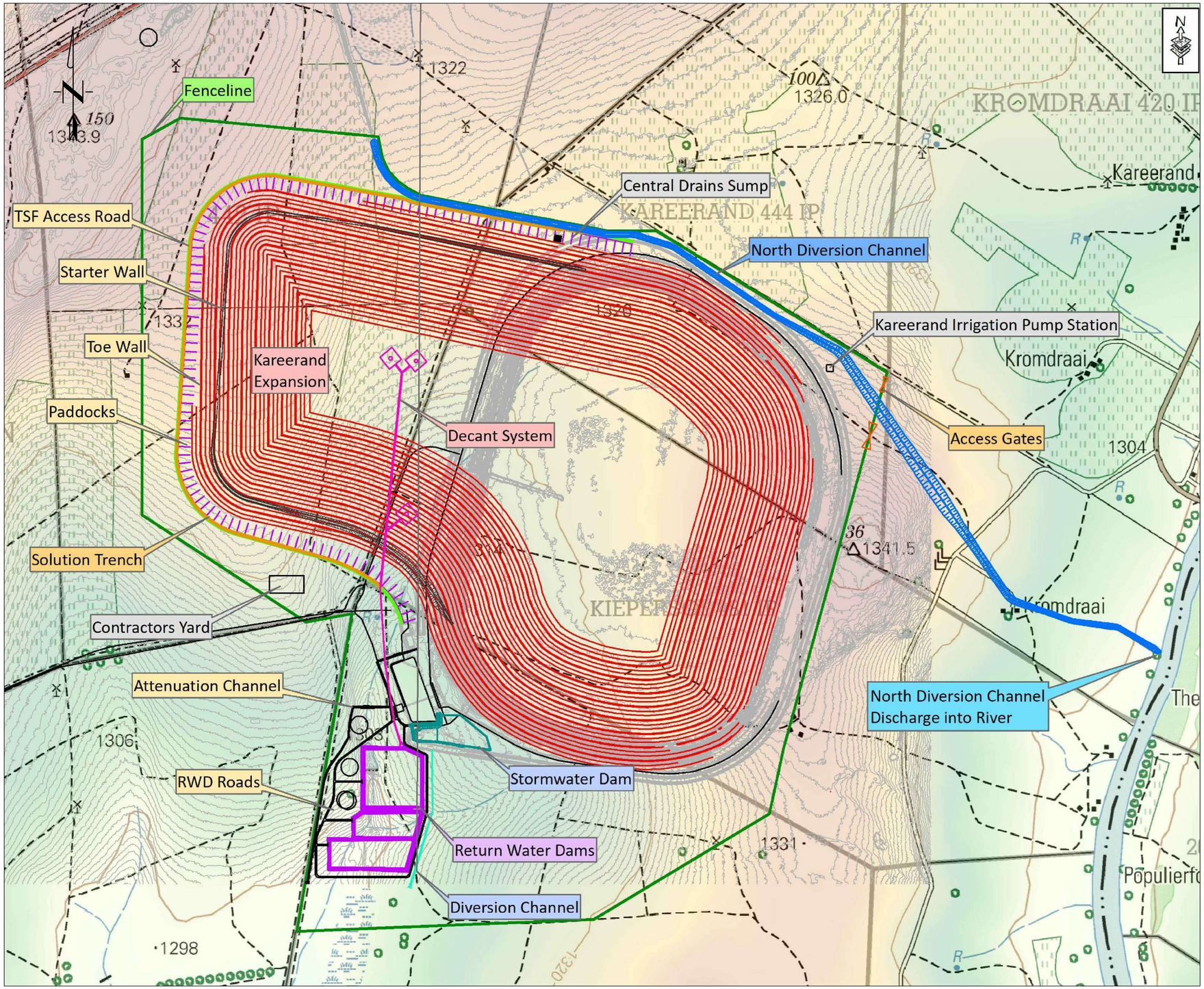
**Duncan Grant-Stuart**
**Technical Consultant**
**For Knight Piésold (Pty) Limited**

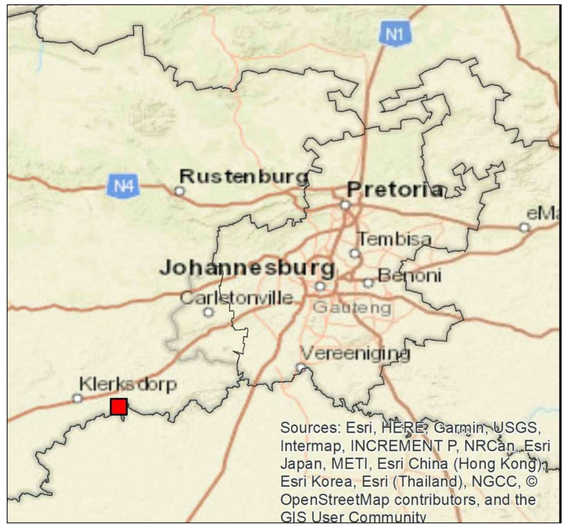
# APPENDIX F

## Feasibility Study Drawings

| | |
|---|---|
| **Project Name:** | *TSF EXSPANSION* |
| **Location:** | *MINE WASTE SOLUTIONS - KAREERAND TAILINGS STORAGE FACILITY* |
| **Work package description:** | |
| **Work package service provider:** | *Knight Piesold* |
| **Work package tangible deliverables:** | *Approved for construction (AFC) drawings for all engineering design disiplines as listed* |

| Engineering Discipline: | Service provider drawing number | AGA matching drawing number | Drawings Descriptions | Drawing revision number and date | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Rev A | Rev B | Rev C | Rev D | Rev E | Rev F | Rev G |
| General | 301-00204/13-000 | MET-MWS-39-C0000 | Kareerand TSF Expansion Project List Of Drawings | 2018/11/20 | 2018/11/27 | 2019/01/30 | | | | |
| General | 301-00204/13-001 | MET-MWS-39-C0001 | Site Location-Plan | 2018/11/20 | 2019/01/25 | 2019/02/28 | 2019/03/29 | | | |
| General | 301-00204/13-002 | MET-MWS-39-C0002 | Existing Tailings Storage Facility -Layout | 2018/11/20 | 2019/01/30 | 2019/03/29 | | | | |
| General | 301-00204/13-003 | MET-MWS-39-C0003 | Tailings Storage Facility Extension-Layout | 2018/11/20 | 2018/11/27 | 2019/01/30 | 2019/02/23 | 2019/03/29 | | |
| General | 301-00204/13-004 | MET-MWS-39-C0004 | Tailings Storage Facility Combined-Layout | 2018/11/20 | 2019/01/28 | | | | | |
| General | 301-00204/13-005 | MET-MWS-39-C0005 | Battery limits layout | 2018/11/20 | Cancelled | | | | | |
| General | 301-00204/13-006 | MET-MWS-39-C0049 | Fencing Layout and Details | 2018/11/20 | 2019/01/30 | 2019/03/29 | | | | |
| General | 301-00204/13-007 | MET-MWS-39-C0070 | Tailings Storage Facility And Byl Property | 2018/11/21 | 2019/01/30 | 2019/03/29 | | | | |
| General | 301-00204/13-008 | MET-MWS-39-C0071 | Contractor's Yard Layout Plan | 2019/01/16 | | | | | | |
| | | | | | | | | | | |
| Geotech | 301-00204/13-050 | MET-MWS-39-C0007 | Geotechnnical Test Pit and Borehole Locations-Layout | 2018/11/21 | 2019/01/25 | 2019/03/29 | | | | |
| Geotech | 301-00204/13-051 | MET-MWS-39-C0008 | Borrow pits areas | 2018/11/21 | Cancelled | | | | | |
| Geotech | 301-00204/13-052 | MET-MWS-39-C0008 | Geotechnical Zones-Layout | 2018/11/21 | 2019/01/28 | | | | | |
| | | | | | | | | | | |
| TSF Earthworks | 301-00204/13-100 | MET-MWS-39-C0009 | TSF-Starter Walls-Layout | 2018/11/21 | 2019/01/25 | 2019/03/29 | | | | |
| TSF Earthworks | 301-00204/13-101 | MET-MWS-39-C0010 | TSF-Starter Walls-Section | 2018/11/20 | 2018/11/27 | 2019/01/30 | 2019/03/29 | | | |
| TSF Earthworks | 301-00204/13-102 | MET-MWS-39-C0011 | TSF-Embankment-Sections | 2018/11/21 | 2019/01/30 | 2019/03/29 | | | | |
| TSF Earthworks | 301-00204/13-103 | MET-MWS-39-C0072 | TSF-Starter Walls-Section | | 2019/01/30 | 2019/03/29 | | | | |
| TSF Earthworks | 301-00204/13-104 | MET-MWS-39-C0073 | TSF-Starter Walls-Section | | 2019/01/30 | 2019/03/29 | | | | |
| | | | | | | | | | | |
| Decant | 301-00204/13-150 | MET-MWS-39-C0012 | TSF-Gravity Decant-Layout | 2019/01/30 | 2019/03/29 | | | | | |
| Decant | 301-00204/13-151 | MET-MWS-39-C0013 | TSF-Intermediate Decant-Sections and details | 2018/11/20 | 2018/11/27 | 2019/01/30 | 2019/03/29 | | | |
| Decant | 301-00204/13-152 | MET-MWS-39-C0022 | TSF-Final Gravity Decant-Sections and Details | 2018/11/21 | 2019/01/30 | | | | | |
| Decant | 301-00204/13-153 | MET-MWS-39-C0023 | TSF-Energy Dissipater-Sections and Details | 2018/11/21 | 2019/01/25 | 2019/03/29 | | | | |
| Decant | 301-00204/13-154 | MET-MWS-39-M0027 | Temporary Catwalk, layout , sections and details | 2019/02/28 | 2019/03/29 | | | | | |
| Decant | 301-00204/13-155 | MET-MWS-39-M0028 | Floating walkway, layout , sections and details | | | | | | | |
| Decant | 301-00204/13-156 | MET-MWS-39-M0029 | Relocated RW Pipeline and Discharge into solution trench | 2019/02/28 | 2019/03/29 | | | | | |
| Decant | 301-00204/13-157 | | Relocated RW Pipeline Layout and pipe schedule | 2019/02/28 | 2019/03/29 | | | | | |
| | | | | | | | | | | |
| Slurry Pipework | 301-00204/13-200 | MET-MWS-39-M0021 | Slurry Delivery Piping-General Arrangement Sheet 1 of 4 | 2019/01/28 | 2019/01/30 | 2019/02/01 | | 2019/03/29 | 2019/04/26 | |
| Slurry Pipework | 301-00204/13-200 | | Slurry Delivery Piping-General Arrangement Sheet 2 of 4 (Line E) | | 2019/03/29 | 2019/04/26 | | | | |
| Slurry Pipework | 301-00204/13-200 | | Slurry Delivery Piping-General Arrangement Sheet 3 of 4 (Line F) | | 2019/03/29 | 2019/04/26 | | | | |
| Slurry Pipework | 301-00204/13-200 | | Slurry Delivery Piping-General Arrangement Sheet 4 of 4 (Line G) | | 2019/03/29 | 2019/04/26 | | | | |
| Slurry Pipework | 301-00204/13-201 | MET-MWS-39-M0020 | Slurry Distribution Pipelines - Station No. 1 Plan, Details and Material List | 2019/01/28 | 2019/01/30 | 2019/02/01 | 2019/03/13 | 2019/03/29 | 2019/04/26 | |
| Slurry Pipework | 301-00204/13-202 | MET-MWS-39-M0019 | Slurry Distribution Pipelines - Station No. 2 to 6 Plan, Details and Material List | 2019/01/28 | 2019/01/30 | 2019/02/01 | 2019/03/13 | 2019/03/29 | 2019/04/26 | |
| Slurry Pipework | 301-00204/13-203 | MET-MWS-39-M0018 | Slurry Delivery Piping System - Pipeline onto Existing TSF (Line G) | 2019/01/28 | 2019/01/30 | 2019/02/01 | 2019/03/13 | 2019/03/29 | 2019/04/26 | |
| Slurry Pipework | 301-00204/13-204 | MET-MWS-39-M0017 | Slurry Delivery Piping System - Valve Station: General Layout sht 1 of 3 | 2019/01/28 | 2019/01/30 | 2019/02/01 | 2019/03/29 | 2019/04/26 | | |
| Slurry Pipework | 301-00204/13-205 | MET-MWS-39-M0016 | Slurry Delivery Piping System - Valve Station: Pipe Schedule sht 2 of 3 | 2019/01/28 | 2019/01/30 | 2019/02/01 | 2019/02/28 | 2019/03/29 | 2019/04/26 | |
| Slurry Pipework | 301-00204/13-206 | MET-MWS-39-M0015 | Slurry Delivery Piping System - Valve Station: Pipe Schedule sht 3 of 3 | 2019/01/28 | 2019/01/30 | 2019/02/01 | | 2019/03/29 | 2019/04/26 | |
| | | | | | | | | | | |
| Dust Suppression | 301-00204/13-207 | MET-MWS-39-M0022 | Dust Suppression Transfer Systems: General Layout sht 1 of 2 | 2019/02/01 | 2019/02/28 | 2019/03/29 | | | | |
| Dust Suppression | 301-00204/13-207 | MET-MWS-39-M0022 | Dust Suppression Transfer Systems: General Layout sht 2 of 2 | 2019/02/28 | | 2019/03/29 | | | | |
| Dust Suppression | 301-00204/13-211 | MET-MWS-39-M0030 | Dust Suppression Transfer Systems-Plans, Sections and Material List - Detail 7 | 2019/02/28 | 2019/03/13 | 2019/03/29 | | | | |
| Dust Suppression | 301-00204/13-212 | MET-MWS-39-M0031 | Dust Suppression Transfer Systems-Plans, Sections and Material List - Detail 4 | 2019/02/28 | 2019/03/13 | 2019/03/26 | | | | |
| Dust Suppression | 301-00204/13-213 | MET-MWS-39-M0032 | Dust Suppression Transfer Systems-Plans, Sections and Material List - Detail 5 | 2019/02/28 | 2019/03/13 | 2019/03/29 | | | | |
| Dust Suppression | 301-00204/13-214 | MET-MWS-39-M0033 | Dust Suppression Transfer Systems-Plans, Sections and Material List - Detail 6 | 2019/02/28 | 2019/03/13 | 2019/03/29 | | | | |
| | | | | | | | | | | |
| Filters and Drains | 301-00204/13-250 | MET-MWS-39-C0019 | Seepage Interception-Underdrainage-General Layout | 2018/11/20 | 2018/11/27 | 2019/01/30 | | | | |
| Filters and Drains | 301-00204/13-251 | MET-MWS-39-C0074 | Seepage Interception-Underdrainage-Layout (Main Drain) | | 2018/11/27 | 2019/01/30 | | | | |
| Filters and Drains | 301-00204/13-252 | MET-MWS-39-C0075 | Seepage Interception-Underdrainage-North Layout | | 2018/11/27 | 2019/01/30 | | | | |
| Filters and Drains | 301-00204/13-253 | MET-MWS-39-C0076 | Seepage Interception-Underdrainage-West Layout | | 2018/11/27 | 2019/01/30 | | | | |
| Filters and Drains | 301-00204/13-254 | MET-MWS-39-C0022 | Seepage Interception-Filter Drain Outlet-Sections and Details | 2018/11/21 | 2019/01/30 | | | | | |
| Filters and Drains | 301-00204/13-255 | MET-MWS-39-C0077 | Seepage Interception-Underdrainage-Sections | 2018/11/21 | 2019/01/21 | 2019/01/30 | | | | |
| Filters and Drains | 301-00204/13-256 | MET-MWS-39-C0024 | Seepage Interception-Underdrainage-Layout and Sections (Existing Drain Outlet) | 2018/11/21 | 2018/11/27 | 2019/01/30 | | | | |
| Filters and Drains | 301-00204/13-257 | MET-MWS-39-C0078 | Collector pipe for Existing Seepage Outlet Drains - Layout | 2019/01/21 | 2019/01/30 | 2019/03/29 | | | | |
| Filters and Drains | 301-00204/13-258 | MET-MWS-39-C0079 | Collector pipe for Existing Seepage Outlet Drains - Section and Details | 2019/01/21 | 2019/01/30 | | | | | |
| | | | | | | | | | | |
| Solution Trench | 301-00204/13-300 | MET-MWS-39-C0025 | Solution Trench Layout, Section & Details | 2019/01/30 | 2019/01/25 | 2019/03/29 | | | | |
| Solution Trench | 301-00204/13-301 | MET-MWS-39-C0026 | Solution Trench Northern Long Section | 2019/01/30 | 2019/01/25 | | | | | |
| Solution Trench | 301-00204/13-302 | MET-MWS-39-C0080 | Solution Trench Southern Long Section | 2019/01/30 | 2019/01/25 | | | | | |
| Solution Trench | 301-00204/13-304 | MET-MWS-39-C0027 | North Pump Sump Concrete Details | 2019/01/30 | 2019/01/25 | | | | | |
| | | | | | | | | | | |
| RWD's | 301-00204/13-350 | MET-MWS-39-C0029 | Return Water and Storm Water Dams -Layout | 2018/11/20 | 2019/01/30 | 2019/02/23 | | | | |
| RWD's | 301-00204/13-351 | MET-MWS-39-C0030 | Return Water and Storm Water Dams-Sections and Earthwork Details | 2018/11/20 | 2019/01/30 | 2019/03/29 | | | | |
| RWD's | 301-00204/13-352 | MET-MWS-39-C0031 | Return Water and Storm Water Dams-Liners And Details | 2018/11/20 | 2019/01/30 | | | | | |
| RWD's | 301-00204/13-353 | MET-MWS-39-C0032 | Return Water Dam Pump Sump Concrete Details | 2018/11/20 | 2019/01/21 | | | | | |
| RWD's | 301-00204/13-355 | MET-MWS-39-C0034 | Silt Traps-Layout and Sections (Concrete Details) | 2018/11/20 | 2019/01/30 | 2019/02/23 | | | | |
| RWD's | 301-00204/13-356 | MET-MWS-39-C0035 | Return water and storm water dams liners and details | 2018/11/20 | 2019/01/30 | 2019/02/23 | | | | |
| RWD's | 301-00204/13-357 | MET-MWS-39-C0035 | Return water & Stormwater dam details, Sections & Earthworks | 2019/01/30 | 2019/01/25 | Cancelled | | | | |
| RWD's | 301-00204/13-358 | MET-MWS-39-C0089 | Intercompartment pumps system: Concrete layout, section and details. | 2019/03/29 | | | | | | |
| | | | | | | | | | | |
| RWD's Pipework | 301-00204/13-360 | | Return water pipeline layout and pipe schedule | 2019/03/29 | | | | | | |
| RWD's Pipework | 301-00204/13-361 | MET-MWS-39-M0023 | INTER-COMPARTMENT LAYOUT, SECTION AND MATERIAL LIST - DETAIL 1 | 2019/02/01 | | 2019/03/29 | | | | |
| RWD's Pipework | 301-00204/13-362 | MET-MWS-39-M0024 | INTER-COMPARTMENT LAYOUT, SECTION AND MATERIAL LIST - DETAIL 2 | 2019/02/01 | | 2019/03/29 | | | | |
| RWD's Pipework | 301-00204/13-363 | MET-MWS-39-M0025 | INTER-COMPARTMENT LAYOUT, SECTION AND MATERIAL LIST - DETAIL 3 | 2019/02/01 | | 2019/03/29 | | | | |
| | | | | | | | | | | |
| Stormwater Management | 301-00204/13-400 | MET-MWS-39-C0053 | Stormwater Management-Berm Drainage Details | 2018/11/20 | 2019/01/30 | | | | | |
| Stormwater Management | 301-00204/13-401 | MET-MWS-39-C0054 | Stormwater Management-Northern Diversion Channel-Layout | 2018/11/20 | 2019/01/30 | | | | | |
| Stormwater Management | 301-00204/13-402 | MET-MWS-39-C0090 | Stormwater Management: River Entry layout, section and details | 2019/02/28 | | | | | | |
| | | | | | | | | | | |
| Access | 301-00204/13-450 | MET-MWS-39-C0059 | Access Roads-Layout | 2018/11/20 | 2019/01/30 | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Spills Dam | 301-00204/13-500 | MET-MWS-39-C0082 | New Emergency Spills Dam - Layout | 2019/01/21 | 2019/03/29 | | | | | |
| Spills Dam | 301-00204/13-501 | MET-MWS-39-C0083 | New Emergency Spills Dam -Sections and Liner Details | 2019/01/21 | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | C00787-39-PR-DWG-0001-01 | MET-MWS-39-P0011 | Kareerand TSF Expansion Project- Legend Sheet 1 Piping & Instrumentation | 2018/10/16 | 2018/10/20 | 2018/10/24 | | | | |
| | C00787-39-PR-DWG-0001-02 | MET-MWS-39-P0012 | Kareerand TSF Expansion Project- Legend Sheet 2 Piping & Instrumentation Diagram | 2018/10/16 | 2018/10/20 | 2018/10/24 | | | | |
| | C00787-39-PR-DWG-0001-03 | MET-MWS-39-P0013 | Kareerand TSF Expansion Project Legend Sheet 3 Piping & Instrumentation Diagram | 2018/10/16 | 2018/10/20 | 2018/10/24 | | | | |
| | C00787-39-PR-PFD-0001-01 | MET-MWS-39-P0001 | Kareerand TSF Capacity Expansion Project- Tailings Disposal Process Flow Diagram | 2018/09/26 | 2018/09/28 | 2018/10/05 | 2018/11/28 | | | |
| | C00787-39-PR-PFD-0002-01 | MET-MWS-39-P0002 | Kareerand Return Water Dam and Pumping | 2018/10/23 | 2018/10/30 | 2018/11/05 | 2018/11/28 | | | |
| | C00787-39-PR-PFD-0004-01 | MET-MWS-39-P0031 | Kareerand Gland Service Water | | | | | | | |
| | C00787-39-PR-PID-0001-01 | MET-MWS-39-P0003 | Kareerand TSF Capacity Expansion Project-Residue Tank Piping & Instrumentation Diagram | 2018/09/26 | 2018/09/28 | 2018/10/05 | 2018/11/28 | | | |
| | C00787-39-PR-PID-0001-02 | MET-MWS-39-P0004 | Kareerand TSF Capacity Expansion Project-Stage 1 Pump -Piping & Instrumentation Diagram | 2018/09/26 | 2018/09/28 | 2018/10/05 | 2018/11/28 | | | |
| | C00787-39-PR-PID-0001-03 | MET-MWS-39-P0005 | Kareerand TSF Capacity Expansion Project-Stage 2 Pump -Piping & Instrumentation Diagram | 2018/09/26 | 2018/09/28 | 2018/10/05 | 2018/11/28 | | | |
| | C00787-39-PR-PID-0001-04 | MET-MWS-39-P0006 | Kareerand TSF Capacity Expansion Project-Stage 3 Pump -Piping & Instrumentation Diagram | 2018/09/26 | 2018/09/28 | 2018/10/05 | 2018/11/28 | | | |
| | C00787-39-PR-PID-0001-05 | MET-MWS-39-P0007 | Kareerand TSF Capacity Expansion Project-Stage 4 Pump -Piping & Instrumentation Diagram | 2018/09/26 | 2018/09/28 | 2018/10/05 | 2018/11/28 | | | |
| | C00787-39-PR-PID-0001-06 | MET-MWS-39-P0010 | Kareerand TSF Capacity Expansion Project-Stage 5 Pump -Piping & Instrumentation Diagram | 2018/09/26 | 2018/09/28 | 2018/10/05 | | | | |
| | C00787-39-PR-PID-0002-01 | MET-MWS-39-P0008 | PID - Kareerand Return Water Dam and Pumping (1) | | | 2018/11/20 | 2018/11/28 | | | |
| | C00787-39-PR-PID-0002-02 | MET-MWS-39-P0009 | PID - Kareerand Return Water Dam and Pumping (2) | | | 2018/11/20 | 2018/11/28 | | | |
| | C00787-39-PR-PID-0003-01 | MET-MWS-39-P0025 | PID - Kareerand Dust Suppression Water and Pumping | | | | 2018/11/28 | | | |
| | C00787-39-PR-PID-0003-01 | MET-MWS-39-P0026 | Kareerand TSF Capacity Expansion Project- Dust Suppression Water & Pumping Process Flow Diagram | | | | 2018/11/28 | | | |
| | C00787-39-PR-PID-0004-01 | MET-MWS-39-P0032 | PID - Kareerand Gland Service Water | | | | | | | |
| | C00787-39-PR-PID-0001-01 | MET-MWS-39-P0027 | Kareerand TSF Expansion Project- Legend Sheet 1 Piping & Instrumentation Diagram | | | | 2018/11/28 | | | |
| | C00787-39-PR-PID-0001-02 | MET-MWS-39-P0028 | Kareerand TSF Expansion Project- Legend Sheet 2 Piping & Instrumentation Diagram | | | | 2018/11/28 | | | |
| | C00787-39-PR-PID-0001-03 | MET-MWS-39-P0029 | Kareerand TSF Expansion Project Legend Sheet 3 Piping & Instrumentation Diagram | | | | 2018/11/28 | | | |
| | C00787-39-PR-PID-0001-06 | MET-MWS-39-P0030 | Kareerand TSF Capacity Expansion Project-Stage 5 Pump -Piping & Instrumentation Diagram | | | | 2018/11/28 | | | |
| | C00787-39-ME-DGA-0001 | MET-MWS-39-M0001 | Tailings Transfer Pump Train General Arrangement | | | | | | | |
| | C00787-39-ME-DGA-0002 | MET-MWS-39-M0002 | Tailings Transfer Pump Train GA Section Details | | | | | | | |
| | C00787-39-ME-DGA-0003 | MET-MWS-39-M0003 | Return Water Pump General Arrangement (1) | | | | | | | |
| | C00787-39-ME-DGA-0004 | MET-MWS-39-M0004 | Return Water/Dust Suppression Pumps Section Details GA | | | | | | | |
| | C00787-39-ME-DGA-0005 | MET-MWS-39-M0013 | Dust Suppresion Pump General Arrangement | | | | | | | |
| | C00787-39-ME-DGA-0006 | MET-MWS-39-M0014 | Return Water Pump General Arrangement (2) | | | | | | | |
| | C00787-39-PE-DAL-0001-01 | MET-MWS-39-M0005 | Tailings Transfer Pump Train Suction Line General Arrangement | 2018/10/30 | 2018/11/01 | | | | | |
| | C00787-39-PE-DAL-0002-01 | MET-MWS-39-M0006 | Tailings Transfer Pump Train Discharge line General Arrangement | 2018/10/30 | 2018/11/01 | 2018/11/01 | | | | |
| | C00787-39-PE-DAL-0003-01 | MET-MWS-39-M0007 | Return Water Pipeline GA/Layout | 2018/10/30 | 2018/11/01 | 2018/11/01 | | | | |
| | C00787-39-PE-DAL-0004-01 | MET-MWS-39-M0008 | Gland Seal Water Pipeline GA - (for new pump train) | 2018/10/30 | 2018/11/01 | 2018/11/01 | | | | |
| | C00787-39-PE-DAL-0004-02 | MET-MWS-39-M0009 | | | | 2018/11/01 | | | | |
| | C00787-39-PE-DAL-0005-01 | MET-MWS-39-M0012 | Dust Suppression - GA/Layout | | | | | | | |
| | C00787-39-CI-DAL-0001-01 | MET-MWS-39-C0050 | Tailings Transfer Pumps Pilinth GA | | | | | | | |
| | C00787-39-CI-DAL-0002-01 | MET-MWS-39-C0051 | Tailings Transfer Pumps Civil Bund Area GA | | | | | | | |
| | C00787-39-CI-DAL-0003-01 | MET-MWS-39-C0052 | Tailings Transfer Pipeline Support Plinth GA | | | | | | | |
| | C00787-39-CI-DAL-0004-01 | MET-MWS-39-C0067 | Return Water Pump Are Plinth & Bunded Area GA | | | | | | | |
| | C00787-39-CI-DAL-0005-01 | MET-MWS-39-C0068 | Dust Suppression Pipeline Support Plinth GA | | | | | | | |




**Legend:**

- Contractors Yard
- Decant System
- Starter Wall
- Stormwater Dam
- Diversion
- Solution Trench
- TSF @ 1432m
- Access Roads
- Return Water Dams
- RWD Diversion
- Paddocks
- Existing Infrastructure
- Fenceline

Projection: WGS27

SITE LOCATION PLAN
SCALE: NTS

Knight Piésold CONSULTING

| DESCRIPTION | DOCUMENT NUMBER | NAME | SIGNATURE | DATE |
|---|---|---|---|---|
| DESIGN CALCULATIONS | | | | |
| RISK ASSESSMENT | | | | |

SCALE: N.T.S

| REFERENCE DRAWINGS | | | REVISIONS | | | | | |
|---|---|---|---|---|---|---|---|---|
| TITLE | DRG. No | | DETAIL | MARK | DATE | INIT | APP'D |
| | | | ISSUED FOR APPROVAL | A | 20.11.2018 | | |
| | | | ISSUED FOR TENDER | B | 25.01.2019 | | |
| | | | ISSUED FOR TENDER ( RETURN WATER DAMS AND P STATION UPDATED ) | C | 27.02.2019 | | |
| | | | ISSUED FOR TENDER (ACCESS GATES UPDATED) | D | 26.03.2019 | | |

| DESIGNATION | NAME | REGISTRATION No: | SIGNATURE | DATE |
|---|---|---|---|---|
| DRAWN | FB/ME | | | 20/11/2018 |
| CHECKED | TM | | | 20/11/2018 |
| SENIOR DESIGNER MET PROJECTS | | | | |
| PR ENGINEER | | | | |
| PR TECH | | | | |
| PROJECT / MET ENGINEER | DGS | | | 20/11/2018 |
| MET PROJECTS MANAGER | | | | 20/11/2018 |

ANGLOGOLD ASHANTI



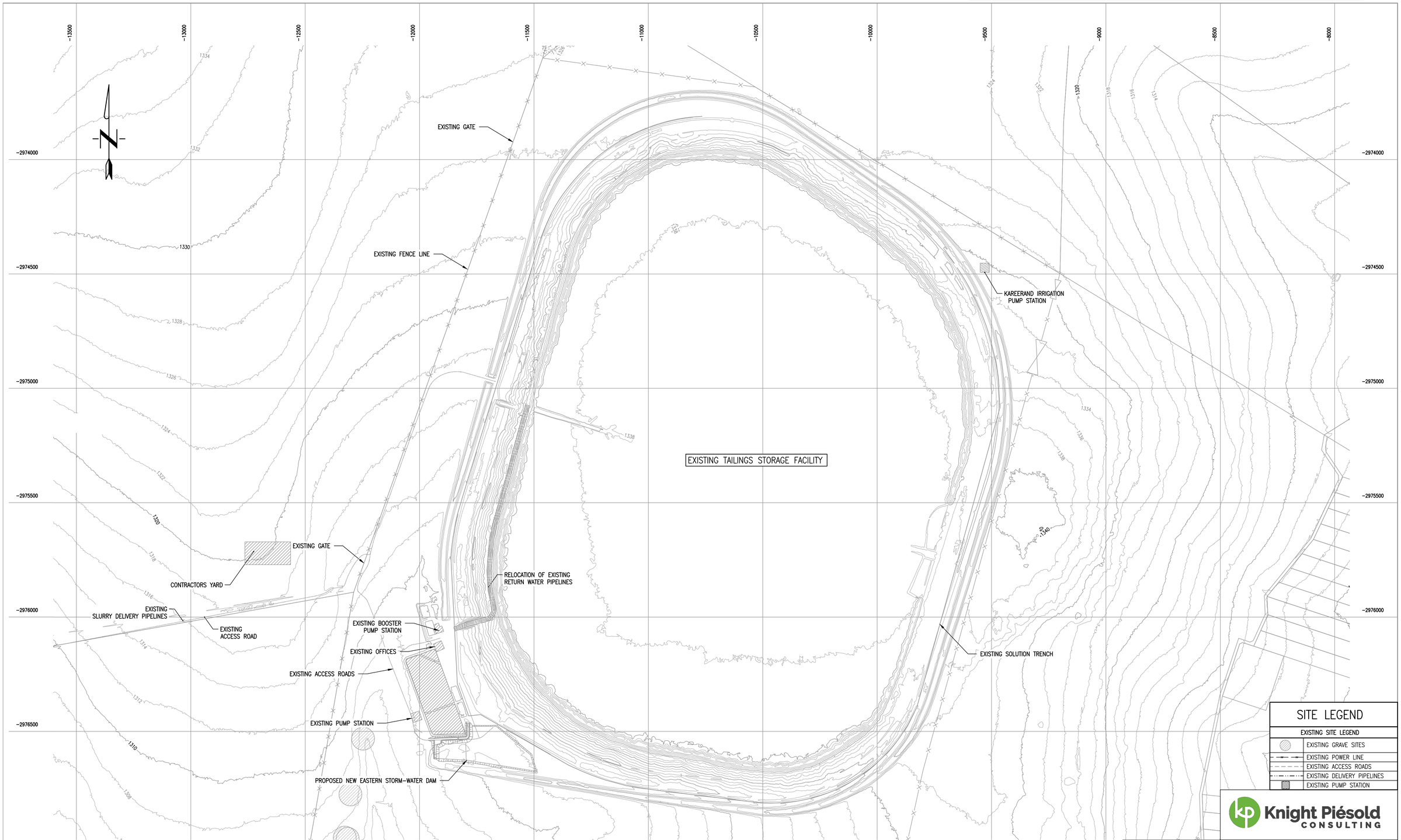
MET PROJECTS

301-00204/13-001

| | |
|---|---|
| REGION | SOUTH AFRICA REGION – VR |
| BUSINESS UNIT | MINE WASTE SOLUTIONS |
| PROJECT | KAREERAND TSF EXPANSION PROJECT |
| DRAWING TITLE | SITE LOCATION PLAN |

| PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE | REV |
|---|---|---|---|---|---|
| CWR1806001 | MET-MWS-39-C0001 | | | A1 | D |

P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-001 Rev0.dwg




## EXISTING TAILINGS STORAGE FACILITY

SCALE 1:7 500

### SITE LEGEND

| EXISTING SITE LEGEND |
|---|
| EXISTING GRAVE SITES |
| EXISTING POWER LINE |
| EXISTING ACCESS ROADS |
| EXISTING DELIVERY PIPELINES |
| EXISTING PUMP STATION |

Knight Piésold CONSULTING

| DESCRIPTION | DOCUMENT NUMBER | NAME | SIGNATURE | DATE |
|---|---|---|---|---|
| DESIGN CALCULATIONS | | | | |
| RISK ASSESSMENT | | | | |

SCALE: 1:7500

| TITLE | DRG. No |
|---|---|
| REFERENCE DRAWINGS | |

| DETAIL | MARK | DATE | INIT | APP'D |
|---|---|---|---|---|
| ISSUED FOR APPROVAL | A | 20.11.2018 | | |
| ISSUED FOR TENDER | B | 25.01.2019 | | |
| ISSUED FOR TENDER | C | 26.03.2019 | | |

REVISIONS

| DESIGNATION | NAME | REGISTRATION No: | SIGNATURE | DATE |
|---|---|---|---|---|
| DRAWN | FB | | | 20.11.2018 |
| CHECKED | TM | | | 20.11.2018 |
| SENIOR DESIGNER MET PROJECTS | | | | |
| PR ENGINEER | | | | |
| PR TECH | | | | |
| PROJECT / MET ENGINEER | DGS | | | 20.11.2018 |
| MET PROJECTS MANAGER | | | | 20.11.2018 |

ANGLOGOLD ASHANTI

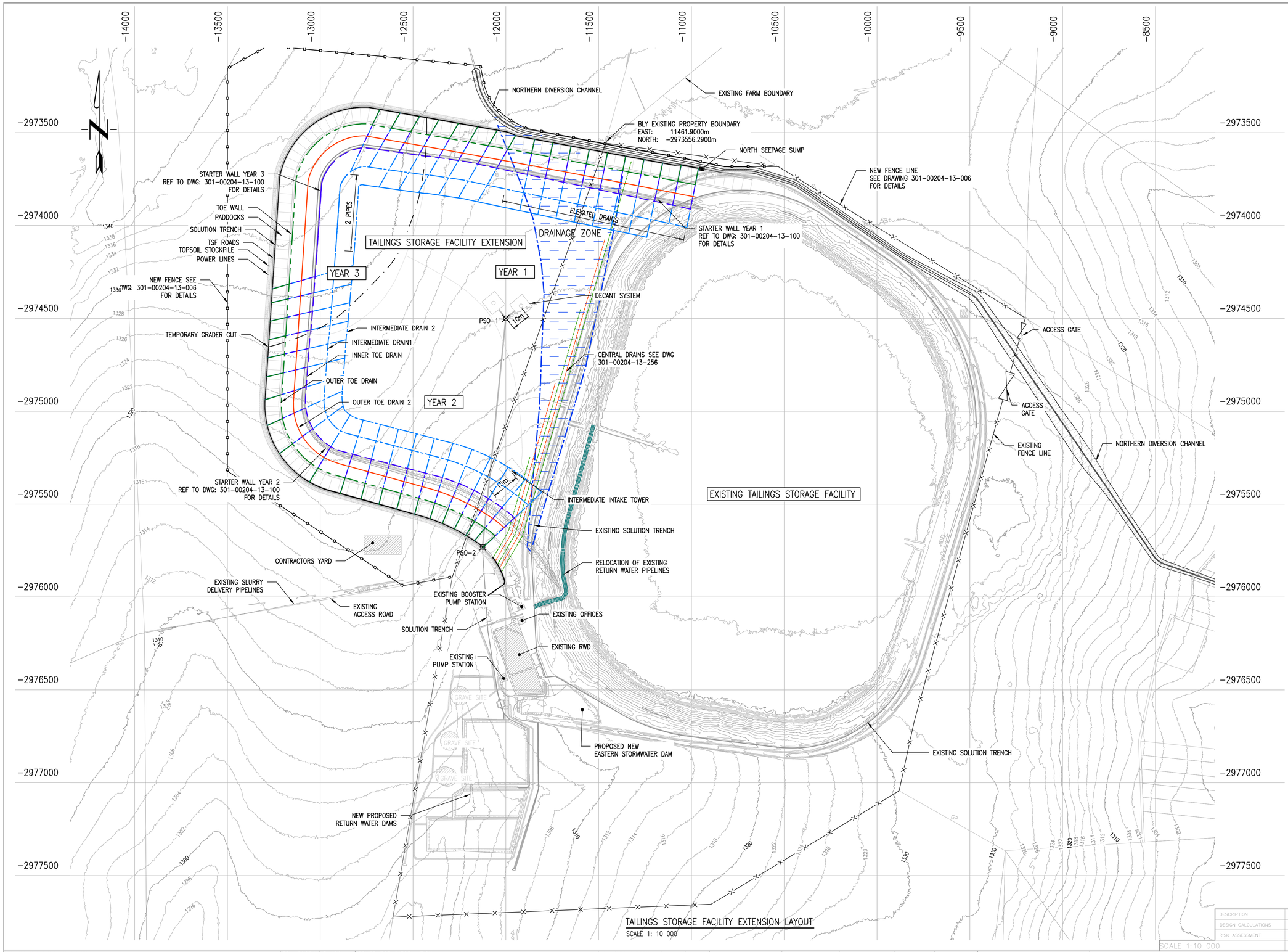


301-00204/13-002

REGION: SOUTH AFRICA REGION - VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE: EXISTING TAILINGS STORAGE FACILITY - LAYOUT

| PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE |
|---|---|---|---|---|
| CWR1806001 | MET-MWS-39-C0002 | | | REV C A1 |

P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-002 RevC.dwg




## TAILINGS STORAGE FACILITY EXTENSION LAYOUT

SCALE 1: 10 000

### TEST PIT SETTING OUT DATA Lo-27-WGS84

| POINT | EASTING | NORTHING | ELEVATION |
|---|---|---|---|
| PSO-1 | 12000.00 | 2974500.00 | 1322.00 |
| PSO-2 | 12125.47 | 2975731.07 | 1311.14 |

### STARTER WALL VOLUMES YEAR 1, 2 AND 3

| YEAR | AREA | LENGHT | VOLUME |
|---|---|---|---|
| YEAR 1 | 29599.2m² | 1517m | 74259.1m³ |
| YEAR 2 | 76677.5m² | 2180m | 510036.2m³ |
| YEAR 3 | 23999.1m² | 1520m | 37875.2m³ |
| YEAR1,2,3 | 129857.7m² | | 622170.5m³ |

### STORAGE FACILITY YEARLY EXPANSION AREAS

| YEAR | AREA |
|---|---|
| YEAR 1 | 452665.8m² |
| YEAR 2 | 1148949.3m² |
| YEAR 3 | 452665.8m² |
| | |

### SITE LEGEND

| EXISTING AND NEW DRAIN PIPE LEGEND |
|---|
| INTERMEDIATE DRAIN 1 |
| INTERMEDIATE DRAIN 2 |
| INNER TOE DRAIN |
| OUTER TOE DRAIN |
| CENTRAL TOE DRAIN |
| EXISTING TOE DRAIN |
| EXISTING SEEPAGE DRAINS |
| EXISTING SEEPAGE DRAINS |
| **YEARLY CONSTRUCTION LEGEND** |
| TEMPORARY GRADER CUT |
| YEAR 1 CONSTRUCTION |
| YEAR 2 CONSTRUCTION |
| YEAR 3 CONSTRUCTION |
| NEW CONTRACTORS YARD |
| NEW TSF ACCESS ROAD |
| NEW TSF SECURITY FENCE LINE |
| **EXISTING SITE LEGEND** |
| EXISTING GRAVE SITES |
| EXISTING POWER LINE |
| EXISTING ACCESS ROADS |
| EXISTING DELIVERY PIPELINES |
| EXISTING PUMP STATION |

250 0 250 500 750
METRES 1:10000

SCALE 1:10 000

Knight Piésold CONSULTING

| DESCRIPTION | DOCUMENT NUMBER | NAME | SIGNATURE | DATE |
|---|---|---|---|---|
| DESIGN CALCULATIONS | | | | |
| RISK ASSESSMENT | | | | |

| REFERENCE DRAWINGS | | | REVISIONS | | | | | DESIGNATION | NAME | REGISTRATION No: | SIGNATURE | DATE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TSF-STARTER WALLS-LAYOUT | 301-00204/13-100 | ISSUED FOR INFORMATION | A | 21.11.2018 | | | DRAWN | FB | | | 20.11.2018 |
| FENCING LAYOUT AND DETAILS | 301-00204/13-006 | ISSUED FOR APPROVAL | B | 27.11.2018 | | | CHECKED | TM | | | 20.11.2018 |
| SEEPAGE INTERCEPTION-UNDERDRAINAGE-SECTION | 301-00204/13-255 | ISSUED FOR TENDER | C | 25.01.2019 | | | SENIOR DESIGNER MET PROJECTS | | | | |
| SEEPAGE INTERCEPTION-UNDERDRAINAGE-GENERAL LAYOUT | 301-00204/13-250 | ISSUED FOR TENDER (RETURN WATER DAM AND AMENDED) | D | 23.02.2019 | | | PR ENGINEER | | | | |
| RETURN WATER AND STORM WATER DAMS-LAYOUT | 301-00204/13-350 | ISSUED FOR TENDER | E | 26.03.2019 | | | PR TECH | | | | |
| | | | | | | | PROJECT / MET ENGINEER | DGS | | | 20.11.2018 |
| | | | | | | | MET PROJECTS MANAGER | | | | 20.11.2018 |

AngloGold Ashanti



MET PROJECTS

301-00204/13-003

REGION SOUTH AFRICA REGION - VR

BUSINESS UNIT MINE WASTE SOLUTIONS

PROJECT KAREERAND TSF EXPANSION PROJECT

DRAWING TITLE TAILINGS STORAGE FACILITY EXTENSION-LAYOUT

| PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE = A1 |
|---|---|---|---|---|
| CWR1806001 | MET-MWS-39-C0003 | | | REV E |

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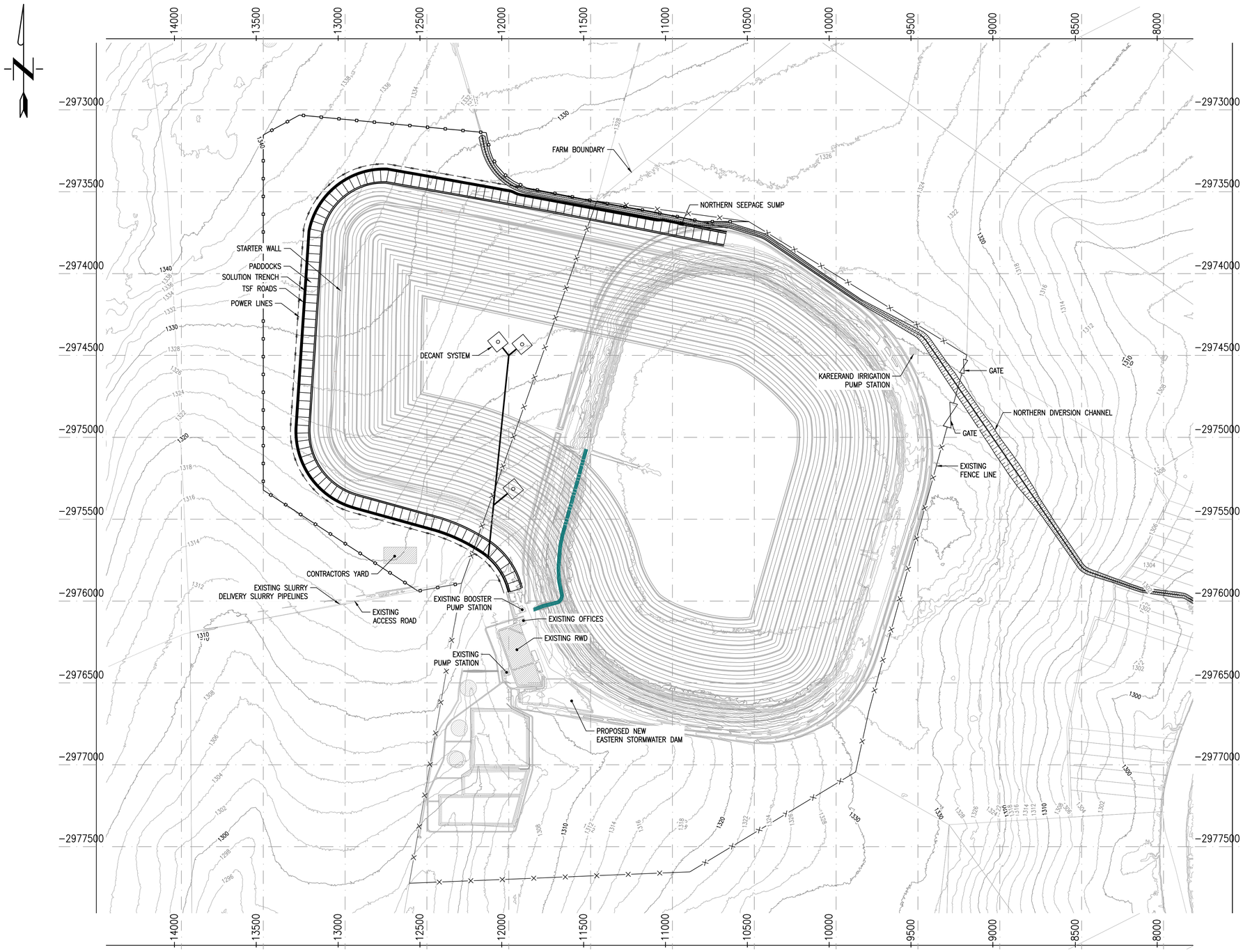


TAILINGS STORAGE FACILITY LAYOUT
SCALE 1:12.500

## SITE LEGEND

| YEARLY CONSTRUCTION LEGEND | |
|---|---|
| | TEMPORARY GRADER CUT |
| | NEW CONTRACTORS YARD |
| | NEW TSF ACCESS ROAD |
| | NEW TSF SECURITY FENCE LINE |

| EXISTING SITE LEGEND | |
|---|---|
| | EXISTING GRAVE SITES |
| | EXISTING POWER LINE |
| | EXISTING ACCESS ROADS |
| | EXISTING DELIVERY PIPELINES |
| | EXISTING PUMP STATION |

5 0 5 10
METRES 1:125

Knight Piésold CONSULTING

| DESCRIPTION | DOCUMENT NUMBER | NAME | SIGNATURE | DATE |
|---|---|---|---|---|
| DESIGN CALCULATIONS | | | | |
| RISK ASSESSMENT | | | | |

SCALE: 1:12500

| REFERENCE DRAWINGS | | REVISIONS | | | | |
|---|---|---|---|---|---|---|
| TITLE | DRG. No | DETAIL | MARK | DATE | INIT | APP'D |
| ACCESS ROAD–LAYOUT | 301–00204/13–450 | ISSUED FOR APPROVAL | A | 20.11.2018 | | |
| SOLUTION TRENCH LAYOUT | 301–00204/13–300 | ISSUED FOR TENDER | B | 25.01.2019 | | |
| TSF–GRAVITY DECANT LAYOUT | 301–00204/13–150 | RETURN WATER DAM LAYOUT CHANGED | C | 25.03.2019 | | |
| STORMWATER MANAGEMENT NORTHERN DIVERSION CHANNEL–LAYOUT SECTIONS | 301–00204/13–400 | | | | | |
| | 301–00204/13–400 | | | | | |

| DESIGNATION | NAME | REGISTRATION No: | SIGNATURE | DATE |
|---|---|---|---|---|
| DRAWN | FB/ME | | | 20.11.2018 |
| CHECKED | TM | | | 20.11.2018 |
| SENIOR DESIGNER MET PROJECTS | | | | |
| PR ENGINEER | | | | |
| PR TECH | | | | |
| PROJECT / MET ENGINEER | DGS | | | 20.11.2018 |
| MET PROJECTS MANAGER | | | | 20.11.2018 |

ANGLOGOLD ASHANTI



MET PROJECTS

301–00204/13–004

REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: MINE WASTE SOLUTION–KAREERAND EXTENSION PROJECT
DRAWING TITLE: TAILINGS STORAGE FACILITY COMBINED LAYOUT AT CLOSURE

| PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE – A1 |
|---|---|---|---|---|
| CWR1806001 | MET–MWS–39–C0004 | | | REV C |

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250 0 250 500 750
METRES 1:10000

| DESCRIPTION | DOCUMENT NUMBER | NAME | SIGNATURE | DATE |
|---|---|---|---|---|
| DESIGN CALCULATIONS | | | | |
| RISK ASSESSMENT | | | | |

SCALE: 1:12500

REFERENCE DRAWINGS

| TITLE | DRG. No |
|---|---|

REVISIONS

| DETAIL | MARK | DATE | INIT | APP'D |
|---|---|---|---|---|
| DRAWING CANCELLED | A | 29/03/2019 | | |

| DESIGNATION | NAME | REGISTRATION No: | SIGNATURE | DATE |
|---|---|---|---|---|
| DRAWN | FB | | | 31/10/2018 |
| CHECKED | DGS | | | 31/10/2018 |
| SENIOR DESIGNER MET PROJECTS | DGS | | | 31/10/2018 |
| PR ENGINEER | DGS | | | 31/10/2018 |
| PR TECH | | | | |
| PROJECT / MET ENGINEER | DGS | | | 31/10/2018 |
| MET PROJECTS MANAGER | NAME | | | 31/10/2018 |

ANGLOGOLD ASHANTI



301–00204/13–005

REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: MINE WASTE SOLUTION–KAREERAND EXTENSION PROJECT
DRAWING TITLE: BATTERY LIMITS–LAYOUT

| PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE – A1 |
|---|---|---|---|---|
| CWR1806001 | MET–MWS–39–C0005 | | | REV A |

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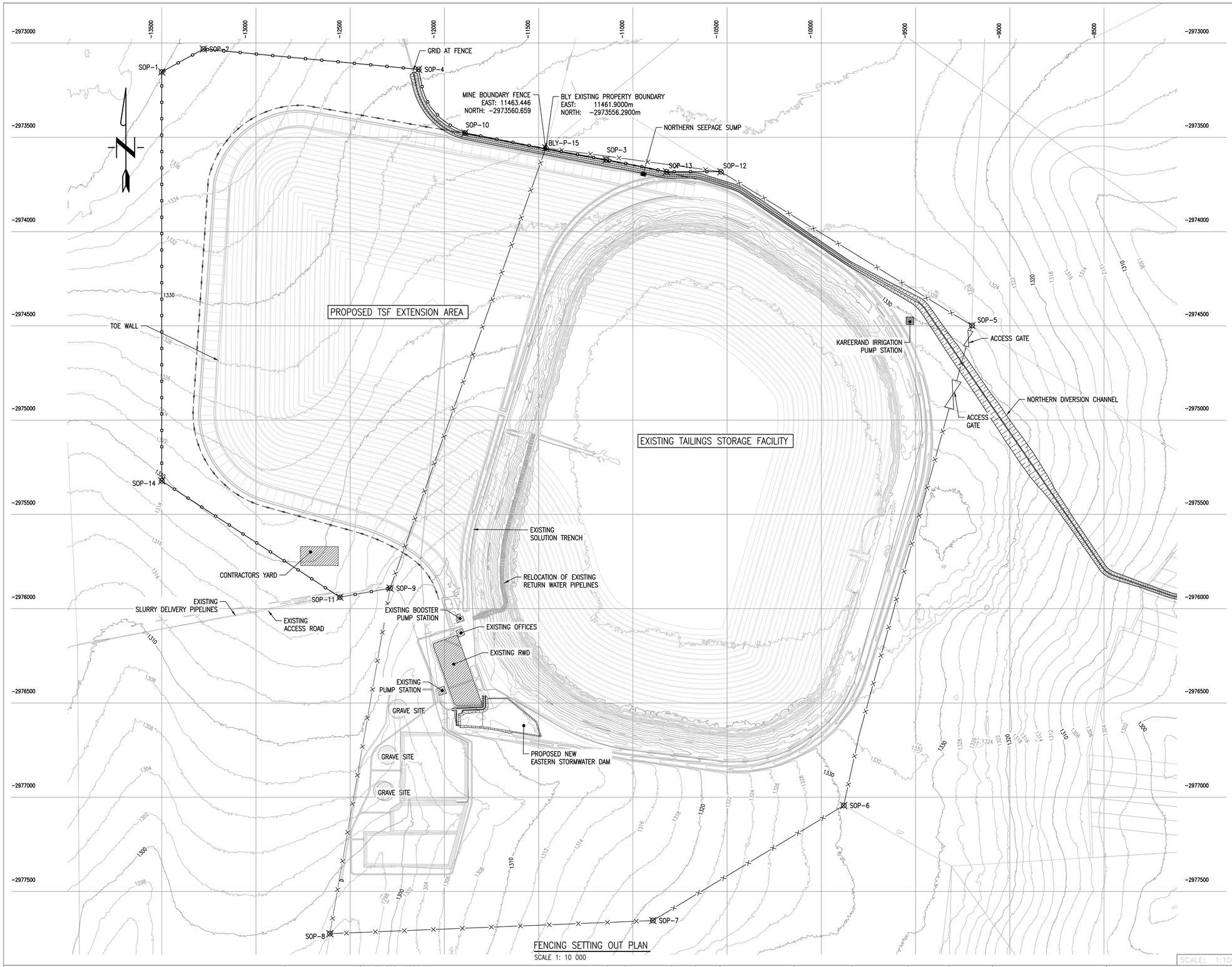


FENCING SETTING OUT PLAN
SCALE 1: 10 000

## FENCE SETTING OUT DATA Lo-27-WGS84

| POINT | EASTING | NORTHING |
|---|---|---|
| BLY-P-15 | 11461.90 | 2973556.29 |
| SOP-1 | 13500.00 | 2973153.29 |
| SOP-2 | 13279.06 | 2973031.79 |
| SOP-3 | 11142.16 | 2973618.33 |
| SOP-4 | 12137.52 | 2973139.54 |
| SOP-5 | 9201.07 | 2974498.10 |
| SOP-6 | 9881.08 | 2977043.74 |
| SOP-7 | 10893.93 | 2977654.08 |
| SOP-8 | 12607.93 | 2977723.67 |
| SOP-9 | 12288.07 | 2975891.23 |
| SOP-10 | 11890.98 | 2973476.49 |
| SOP-11 | 12554.74 | 2975938.98 |
| SOP-12 | 10532.75 | 2973682.55 |
| SOP-13 | 10821.40 | 2973682.46 |
| SOP-14 | 13500.00 | 2975322.36 |
| SOP-16 | 25109.47 | 5951877.96 |

250 0 250 500 750
METRES 1:10000

Knight Piésold CONSULTING

| DESCRIPTION | DOCUMENT NUMBER | NAME | SIGNATURE | DATE |
|---|---|---|---|---|
| DESIGN CALCULATIONS | | | | |
| RISK ASSESSMENT | | | | |

SCALE: 1:10000

| TITLE | DRG. No |
|---|---|
| REFERENCE DRAWINGS | |

| DETAIL | MARK | DATE | INIT | APP'D |
|---|---|---|---|---|
| ISSUED FOR APPROVAL | A | 20.11.2018 | | |
| ISSUED FOR TENDER | B | 16.01.2019 | | |
| RETURN WATER DAM LAYOUT CHANGED | C | 25.03.2019 | | |
| REVISIONS | | | | |

| DESIGNATION | NAME | REGISTRATION No: | SIGNATURE | DATE |
|---|---|---|---|---|
| DRAWN | FB | | | 16.01.2018 |
| CHECKED | TM | | | 20.11.2018 |
| SENIOR DESIGNER MET PROJECTS | DGS | | | |
| PR ENGINEER | | | | |
| PR TECH | | | | |
| PROJECT / MET ENGINEER | DGS | | | 20.11.2018 |
| MET PROJECTS MANAGER | | | | 20.11.2018 |

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COPYRIGHT
MET PROJECTS

301-00204/13-006
REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE FENCING SETTING OUT PLAN

| PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE: - A1 |
|---|---|---|---|---|
| CWR1806001 | MET-MWS-39-C0049 | | | REV C |

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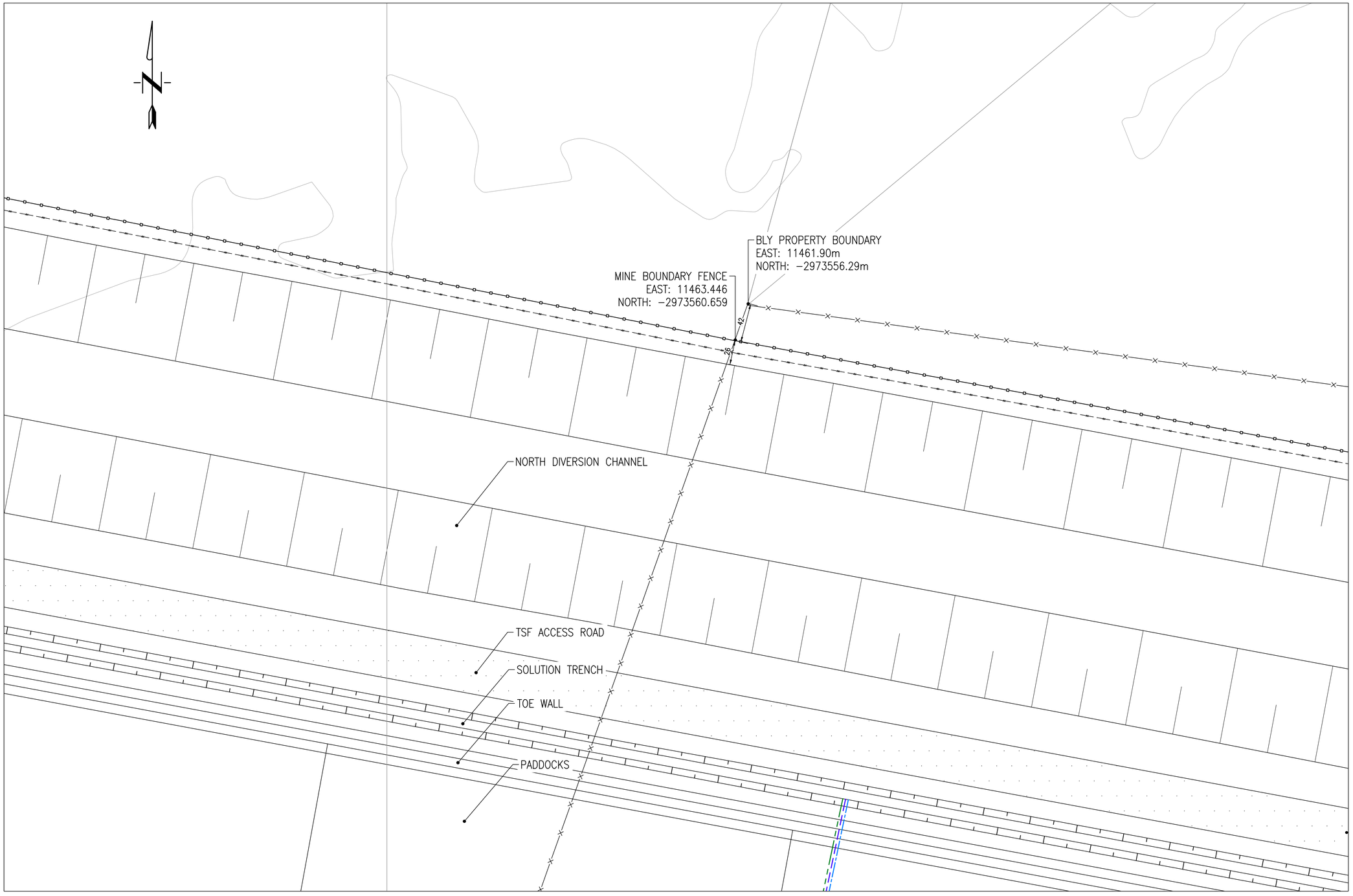


TAILINGS STORAGE FACILITY AND BYL PROPERTY FENCE LAYOUT
SCALE N.T.S

Knight Piésold CONSULTING

| DESCRIPTION | DOCUMENT NUMBER | NAME | SIGNATURE | DATE |
|---|---|---|---|---|
| DESIGN CALCULATIONS | | | | |
| RISK ASSESSMENT | | | | |

SCALE NTS

| TITLE | DRG. No |
|---|---|
| SOLUTION TRENCH LAYOUT | 301-00204/13-300 |
| STORMWATER MANAGEMENT NORTHERN DIVERSION CHANNEL-LAYOUT SECTIONS | 301-00204/13-401 |
| ACCESS ROAD-LAYOUT | 301-00204/13-450 |
| TSF-STARTER WALLS-LAYOUT | 301-00204/13-100 |

REFERENCE DRAWINGS

| DETAIL | MARK | DATE | INIT | APP'D |
|---|---|---|---|---|
| ISSUED FOR APPROVAL | A | 20.11.2018 | | |
| ISSUED FOR TENDER | B | 25.01.2019 | | |
| ISSUED FOR TENDER | C | 26.03.2019 | | |

REVISIONS

| DESIGNATION | NAME | REGISTRATION No: | SIGNATURE | DATE |
|---|---|---|---|---|
| DRAWN | FB | | | 31.10.2018 |
| CHECKED | TM | | | 31.10.2018 |
| SENIOR DESIGNER MET PROJECTS | | | | |
| PR ENGINEER | | | | |
| PR TECH | | | | |
| PROJECT / MET ENGINEER | DGS | | | 31.10.2018 |
| MET PROJECTS MANAGER | NAME | | | 31.10.2018 |

ANGLOGOLD ASHANTI



MET PROJECTS

301-00204/13-007

REGION: SOUTH AFRICA REGION - VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE: TAILINGS STORAGE FACILITY AND BLY PROPERTY FENCE LAYOUT

| PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE - A1 | REV |
|---|---|---|---|---|---|
| CWR1806001 | MET-MWS-39-C0070 | | | | C |

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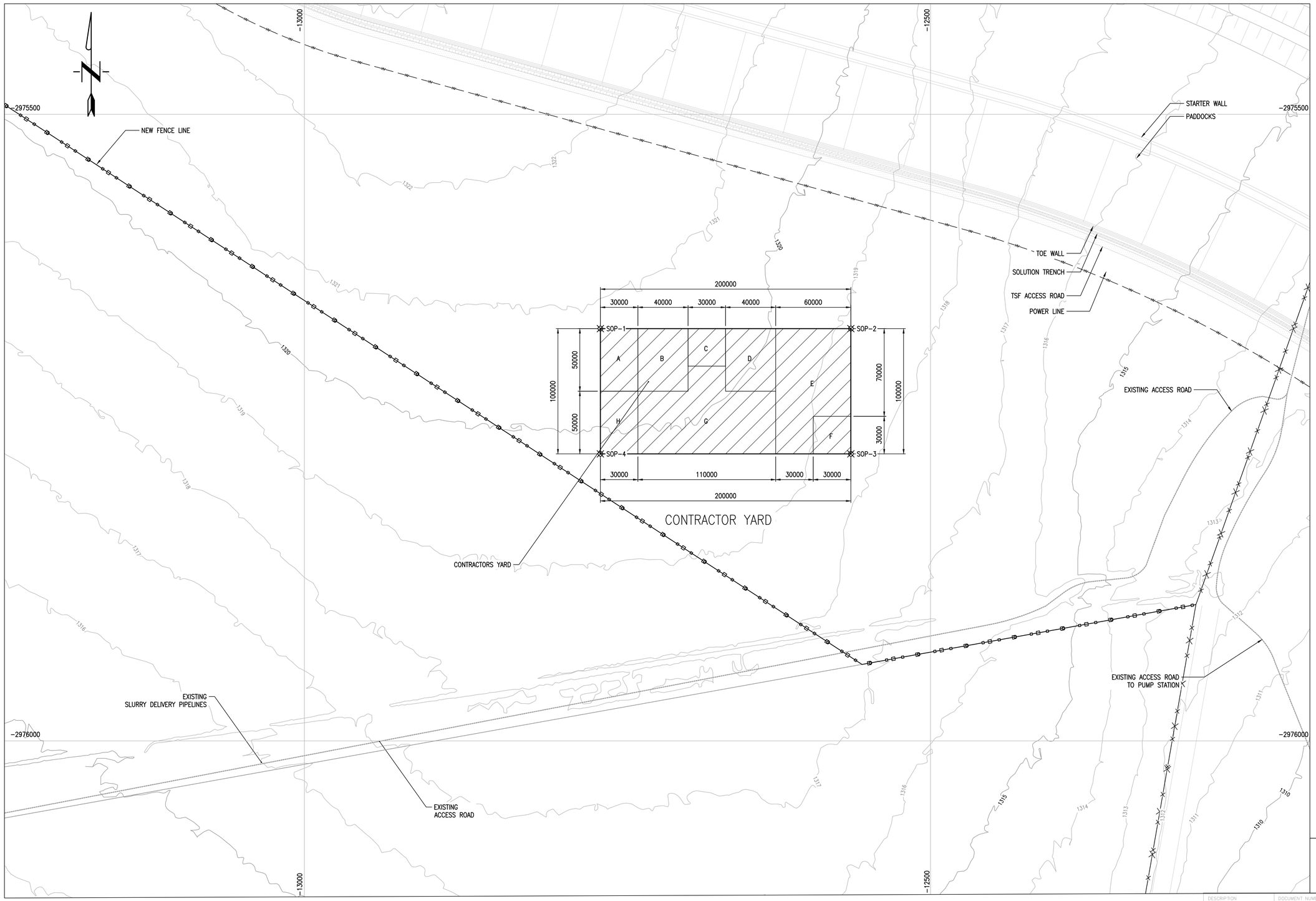


| CONTRACTOR YARD LEGEND | | |
|---|---|---|
| A: | OFFICES | 1500m² |
| B: | STORES | 2000m² |
| C: | ABLUTIONS | 900m² |
| D: | WORKSHOPS | 2000m² |
| E: | PLANT YARD | 5100m² |
| F: | DIESEL STORE | 900m² |
| G: | LAY DOWN AREA | 6100m² |
| H: | PARKING | 1500m² |

## CONTRACTOR YARD SETTINGG OUT DATA LO-27-WGS84

| POINT | EASTING | NORTHING |
|---|---|---|
| SOP-1 | 12763.64 | 2975670.98 |
| SOP-2 | 12563.64 | 2975670.98 |
| SOP-3 | 12563.64 | 2975770.98 |
| SOP-4 | 12763.64 | 2975770.98 |

Knight Piésold CONSULTING

CONTRACTOR YARD LAYOUT PLAN
SCALE 1: 1500

50 0 50 100
METRES 1:1500

| DESCRIPTION | DOCUMENT NUMBER | NAME | SIGNATURE | DATE |
|---|---|---|---|---|
| DESIGN CALCULATIONS | | | | |
| RISK ASSESSMENT | | | | |

SCALE: 1:1500

| ACCESS ROAD-LAYOUT | 301-00204/13-450 |
|---|---|

| TITLE | DRG. No |
|---|---|

REFERENCE DRAWINGS

| | DETAIL | MARK | DATE | INIT | APP'D |
|---|---|---|---|---|---|
| A | ISSUED FOR TENDER | A | 16.01.2019 | | |

REVISIONS

| DESIGNATION | NAME | REGISTRATION No: | SIGNATURE | DATE |
|---|---|---|---|---|
| DRAWN | FB | | | 16.01.2019 |
| CHECKED | TM | | | 20.11.2018 |
| SENIOR DESIGNER MET PROJECTS | | | | |
| PR ENGINEER | DGS | | | 20.11.2018 |
| PR TECH | | | | |
| PROJECT / MET ENGINEER | DGS | | | 20.11.2018 |
| MET PROJECTS MANAGER | NAME | | | 20.11.2018 |

ANGLOGOLD ASHANTI



MET PROJECTS

301-00204/13-008

REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE CONTRACTORS YARD LAYOUT PLAN

| PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE - A1 |
|---|---|---|---|---|
| CWR1806001 | .... | | | REV A |

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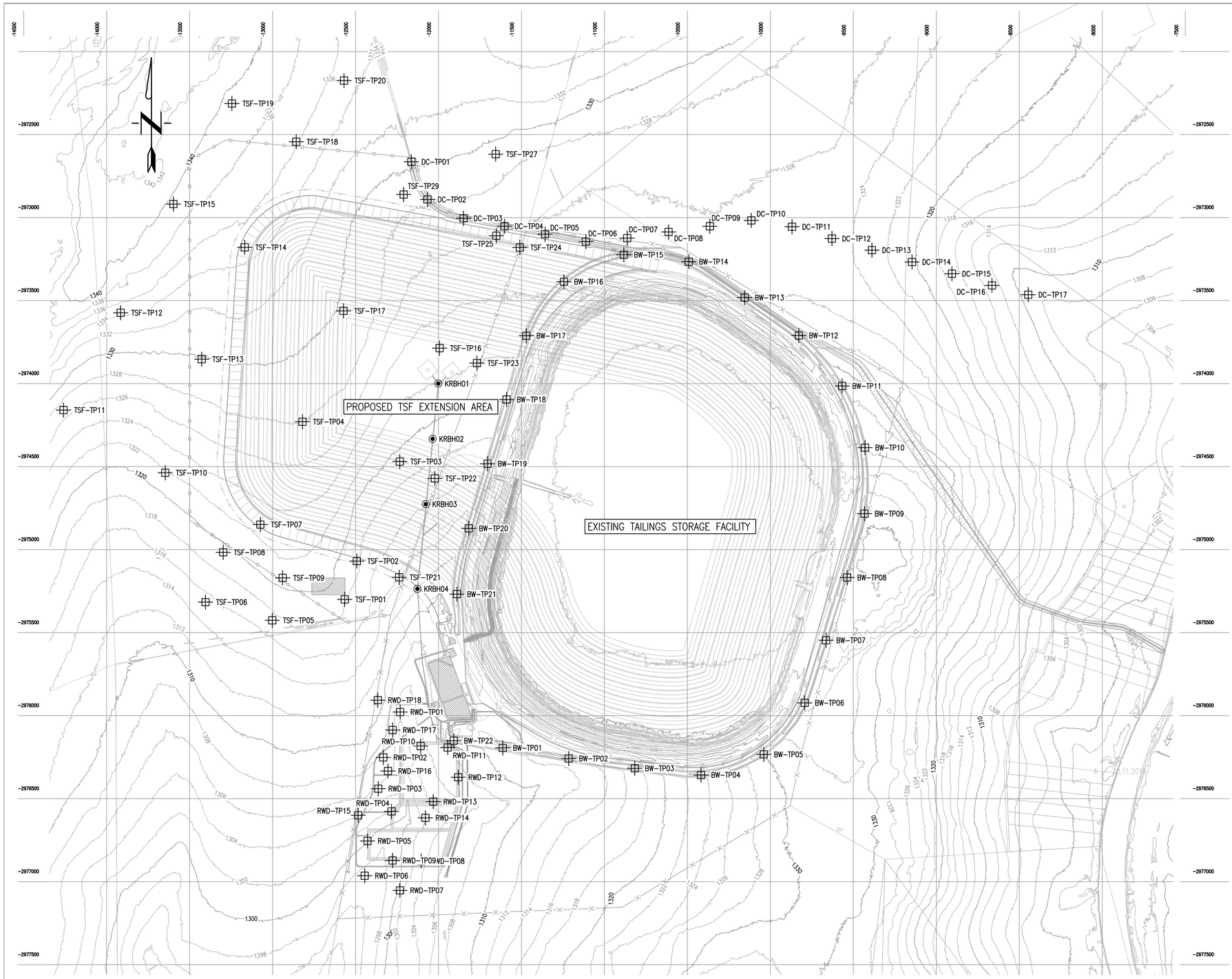


GEOTECHNICAL TEST PIT AND BOREHOLE LOCATIONS LAYOUT
SCALE: 1:10000

## TEST PIT SETTING OUT DATA Lo-27-WGS84

| POINT | EASTING | NORTHING |
|---|---|---|
| BW-TP01 | 11612.71 | 2976693.97 |
| BW-TP02 | 11215.58 | 2976758.09 |
| BW-TP03 | 10817.04 | 2976816.94 |
| BW-TP04 | 10417.84 | 2976856.79 |
| BW-TP05 | 10039.68 | 2976733.25 |
| BW-TP06 | 9792.80 | 2976422.60 |
| BW-TP07 | 9664.03 | 2976045.81 |
| BW-TP08 | 9537.39 | 2975667.68 |
| BW-TP09 | 9432.34 | 2975283.13 |
| BW-TP10 | 9429.24 | 2974885.52 |
| BW-TP11 | 9567.39 | 2974513.91 |
| BW-TP12 | 9828.50 | 2974210.06 |
| BW-TP13 | 10154.62 | 2973981.62 |
| BW-TP14 | 10491.61 | 2973765.38 |
| BW-TP15 | 10883.44 | 2973723.60 |
| BW-TP16 | 11244.22 | 2973886.04 |
| BW-TP17 | 11471.03 | 2974211.64 |
| BW-TP18 | 11589.87 | 2974595.57 |
| BW-TP19 | 11704.24 | 2974982.71 |
| BW-TP20 | 11817.59 | 2975371.92 |
| BW-TP21 | 11889.04 | 2975767.67 |
| BW-TP22 | 11908.05 | 2976650.59 |
| DC-TP01 | 12163.51 | 2973163.79 |
| DC-TP02 | 12066.72 | 2973390.48 |
| DC-TP03 | 11849.02 | 2973504.16 |
| DC-TP04 | 11602.24 | 2973551.85 |
| DC-TP05 | 11357.53 | 2973599.74 |
| DC-TP06 | 11111.46 | 2973644.12 |
| DC-TP07 | 10862.44 | 2973623.34 |
| DC-TP08 | 10613.27 | 2973586.47 |
| DC-TP09 | 10364.64 | 2973552.17 |
| DC-TP10 | 10114.78 | 2973516.72 |
| DC-TP11 | 9869.45 | 2973555.12 |
| DC-TP12 | 9628.99 | 2973626.19 |
| DC-TP13 | 9387.63 | 2973695.93 |
| DC-TP14 | 9146.27 | 2973767.07 |
| DC-TP15 | 8905.47 | 2973837.93 |
| DC-TP16 | 8664.38 | 2973908.22 |
| DC-TP17 | 8445.81 | 2973964.27 |
| RWD-TP01 | 12230.94 | 2976477.96 |
| RWD-TP02 | 12332.49 | 2976751.52 |
| RWD-TP03 | 12363.01 | 2976939.69 |

## TEST PIT SETTING OUT DATA Lo-27-WGS84

| POINT | EASTING | NORTHING |
|---|---|---|
| RWD-TP04 | 12283.00 | 2977076.57 |
| RWD-TP05 | 12427.57 | 2977254.65 |
| RWD-TP06 | 12444.64 | 2977463.98 |
| RWD-TP07 | 12232.47 | 2977552.30 |
| RWD-TP08 | 12104.31 | 2977375.56 |
| RWD-TP09 | 12276.85 | 2977371.96 |
| RWD-TP10 | 12107.55 | 2976682.71 |
| RWD-TP11 | 11944.62 | 2976691.75 |
| RWD-TP12 | 11881.27 | 2976870.98 |
| RWD-TP13 | 12031.53 | 2977017.38 |
| RWD-TP14 | 12078.83 | 2977115.15 |
| RWD-TP15 | 12484.44 | 2977100.03 |
| RWD-TP16 | 12304.40 | 2976833.49 |
| RWD-TP17 | 12276.13 | 2976586.26 |
| RWD-TP18 | 12365.62 | 2976406.52 |
| TSF-TP01 | 12565.32 | 2975799.65 |
| TSF-TP02 | 12492.21 | 2975568.53 |
| TSF-TP03 | 12233.26 | 2974969.15 |
| TSF-TP04 | 12819.72 | 2974729.29 |
| TSF-TP05 | 13001.34 | 2975925.55 |
| TSF-TP06 | 13404.40 | 2975815.95 |
| TSF-TP07 | 13073.77 | 2975348.75 |
| TSF-TP08 | 13297.23 | 2975515.81 |
| TSF-TP09 | 12939.27 | 2975669.92 |
| TSF-TP10 | 13646.70 | 2975036.70 |
| TSF-TP11 | 14259.83 | 2974659.26 |
| TSF-TP12 | 13915.57 | 2974073.06 |
| TSF-TP13 | 13427.04 | 2974352.51 |
| TSF-TP14 | 13167.65 | 2973679.23 |
| TSF-TP15 | 13597.48 | 2973418.56 |
| TSF-TP16 | 11993.35 | 2974286.33 |
| TSF-TP17 | 12572.31 | 2974061.70 |
| TSF-TP18 | 12857.20 | 2973042.99 |
| TSF-TP19 | 13244.98 | 2972812.53 |
| TSF-TP20 | 12569.25 | 2972674.37 |
| TSF-TP21 | 12236.79 | 2975666.50 |
| TSF-TP22 | 12022.18 | 2975070.82 |
| TSF-TP23 | 11768.36 | 2974375.91 |
| TSF-TP24 | 11509.95 | 2973679.70 |
| TSF-TP25 | 11651.43 | 2973609.10 |
| TSF-TP27 | 11655.29 | 2973117.72 |
| TSF-TP29 | 12210.17 | 2973360.74 |

## BOREHOLE SETTING OUT DATA Lo-27-WGS84

| POINT | EASTING | NORTHING |
|---|---|---|
| KRBH01 | 12001.35 | 2974500.04 |
| KRBH02 | 12035.51 | 2974832.81 |
| KRBH03 | 12076.67 | 2975226.19 |
| KRBH04 | 12127.24 | 2975736.26 |

## SITE LEGEND

| EXISTING SITE LEGEND | |
|---|---|
| | EXISTING GRAVE SITES |
| | EXISTING POWER LINE |
| | EXISTING ACCESS ROADS |
| | EXISTING DELIVERY PIPELINES |
| | EXISTING PUMP STATION |

Knight Piésold CONSULTING

| DESCRIPTION | DOCUMENT NUMBER | NAME | SIGNATURE | DATE |
|---|---|---|---|---|
| DESIGN CALCULATIONS | | | | |
| RISK ASSESSMENT | | | | |

SCALE: 1:10000

STORMWATER MANAGEMENT NORTHERN DIVERSION CHANNEL-LAYOUT SECTIONS | 301-00204/13-401

| MARK | DATE | INIT | APP'D | REVISIONS |
|---|---|---|---|---|
| C | 29.03.2019 | | | ISSUED FOR TENDER GEOTECHNICAL TEST PITS UPDATED |
| B | 25.01.2019 | | | ISSUED FOR TENDER |
| A | 20.11.2018 | | | ISSUED FOR APPROVAL |

REFERENCE DRAWINGS

| DESIGNATION | NAME | REGISTRATION No: | SIGNATURE | DATE |
|---|---|---|---|---|
| DRAWN | FB | | | 20.11.2018 |
| CHECKED | TM | | | 20.11.2018 |
| SENIOR DESIGNER MET PROJECTS | | | | |
| PR ENGINEER | | | | |
| PR TECH | | | | |
| PROJECT / MET ENGINEER | DGS | | | 20.11.2018 |
| MET PROJECTS MANAGER | NAME | | | 20.11.2018 |

ANGLOGOLD ASHANTI



MET PROJECTS

301-00204/13-050
REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE: GEOTECHNICAL TEST PIT AND BOREHOLE LOCATIONS LAYOUT

| PROJECT No: | B/UNIT | AREA | SEQ. No: | REV | SIZE |
|---|---|---|---|---|---|
| CWR1806001 | MET-MWS-39-C0007 | | | C | A1 |

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LEGEND

- BORROW AREA : FINE GRAINED (LOWER HORIZONS)
- BORROW PIT AREAS : COARSE GRAINED (UPPER HORIZONS)

-14500 -14000 -13500 -13000 -12500 -12000 -11500 -11000 -10500 -10000 -9500 -9000 -8500

-2972500 -2973000 -2973500 -2974000 -2974500 -2975000 -2975500 -2976000 -2976500 -2977000

POWER LINE
EXISTING TAILINGS STORAGE FACILITY
KAREERAND IRRIGATION PUMP STATION
EXISTING SOLUTION TRENCH
RELOCATION OF EXISTING RETURN WATER PIPELINES
CONTRACTORS YARD
EXISTING SLURRY DELIVERY PIPELINES
EXISTING ACCESS ROAD
EXISTING RWD LINE
EXISTING RWD
EXISTING PUMP STATION
PROPOSED NEW EASTERN STORMWATER DAM

BORROW PIT AREAS LAYOUT
SCALE: 1:10 000

SITE LEGEND

| EXISTING SITE LEGEND | |
|---|---|
| | EXISTING GRAVE SITES |
| | EXISTING POWER LINE |
| | EXISTING ACCESS ROADS |
| | EXISTING DELIVERY PIPELINES |
| | EXISTING PUMP STATION |

Knight Piésold CONSULTING

| DESCRIPTION | DOCUMENT NUMBER | NAME | SIGNATURE | DATE |
|---|---|---|---|---|
| DESIGN CALCULATIONS | | | | |
| RISK ASSESSMENT | | | | |

SCALE: 1:10 000

| REFERENCE DRAWINGS | | TITLE |
|---|---|---|
| ACCESS ROAD-LAYOUT | 301-00204/13-450 | |

| REVISIONS | | | | |
|---|---|---|---|---|
| DETAIL | MARK | DATE | INIT. | APP'D |
| DRAWING CANCELLED | B | 29.03.2019 | | |
| ISSUED FOR APPROVAL | A | 20.11.2018 | | |

| DESIGNATION | NAME | REGISTRATION No: | SIGNATURE | DATE |
|---|---|---|---|---|
| DRAWN | FB | | | 20.11.2018 |
| CHECKED | DGS | | | 20.11.2018 |
| SENIOR DESIGNER MET PROJECTS | | | | |
| PR ENGINEER | | | | |
| PR TECH | | | | |
| PROJECT / MET ENGINEER | DGS | | | 20.11.2018 |
| MET PROJECTS MANAGER | NAME | | | 20.11.2018 |

ANGLOGOLD ASHANTI



MET PROJECTS

301-00204/13-051

REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE BORROW PIT AREAS LAYOUT

| PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE – A1 |
|---|---|---|---|---|
| CWR1806001 | MET-MWS-39-C0006 | | | REV B |

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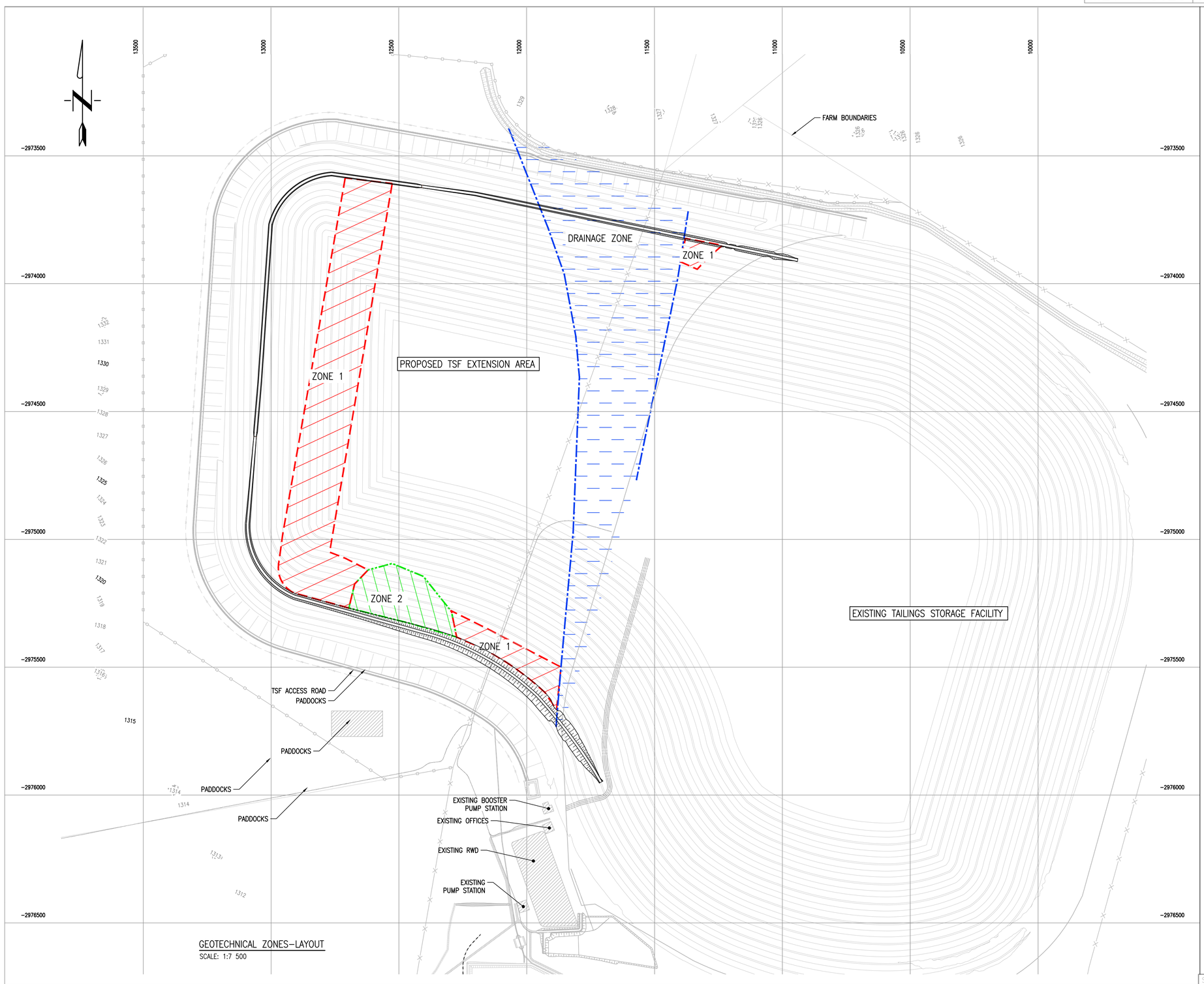


GEOTECHNICAL ZONES-LAYOUT
SCALE: 1:7 500

NOTES

ZONE 1:
REMOVE TOPSOIL COLLUVIUM AND FERRICRETE TO BE USED IN STARTER WALL FILL.
STARTER WALL FOUNDATION PREPARATION TO BE COMPACTED TO 95% PROCTER

ZONE 2:
STARTER WALL FILL TO BE PLACED DIRECTLY ON HARDPAN

DRAINAGE ZONE:
REMOVE TOPSOIL, RIP AND COMPACT TO 95% PROCTER.
THICK ALLUVIUM LAYER. SILTY CLAY.

FUTURE TSF EXTENSION:
REMOVE AND STOCKPILE TOPSOIL. COMPACT IN-SITU COLLUVIUM TO 95% PROCTOR

LEGEND

- GEOTECHNICAL ZONE 1
- GEOTECHNICAL ZONE 2
- DRAINAGE ZONES

SITE LEGEND

| EXISTING SITE LEGEND | |
|---|---|
| | EXISTING GRAVE SITES |
| | EXISTING POWER LINE |
| | EXISTING ACCESS ROADS |
| | EXISTING DELIVERY PIPELINES |
| | EXISTING PUMP STATION |

Knight Piésold CONSULTING

| DESCRIPTION | DOCUMENT NUMBER | NAME | SIGNATURE | DATE |
|---|---|---|---|---|
| DESIGN CALCULATIONS | | | | |
| RISK ASSESSMENT | | | | |

SCALE: 1:7500

| TITLE | DRG. No |
|---|---|
| REFERENCE DRAWINGS | |

| DETAIL | MARK | DATE | INIT | APP'D |
|---|---|---|---|---|
| ISSUED FOR APPROVAL | A | 20.11.2018 | | |
| ISSUED FOR TENDER | B | 25.01.2019 | | |
| REVISIONS | | | | |

| DESIGNATION | NAME | REGISTRATION No: | SIGNATURE | DATE |
|---|---|---|---|---|
| DRAWN | FB | | | 20.11.2018 |
| CHECKED | TM | | | 20.11.2018 |
| SENIOR DESIGNER MET PROJECTS | | | | |
| PR ENGINEER | | | | |
| PR TECH | | | | |
| PROJECT / MET ENGINEER | DGS | | | 20.11.2018 |
| MET PROJECTS MANAGER | | | | 20.11.2018 |

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301-00204/13-052
REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE GEOTECHNICAL ZONES-LAYOUT

| PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE | REV |
|---|---|---|---|---|---|
| CWR1806001 | MET-MWS-39-C0008 | | | A1 | B |

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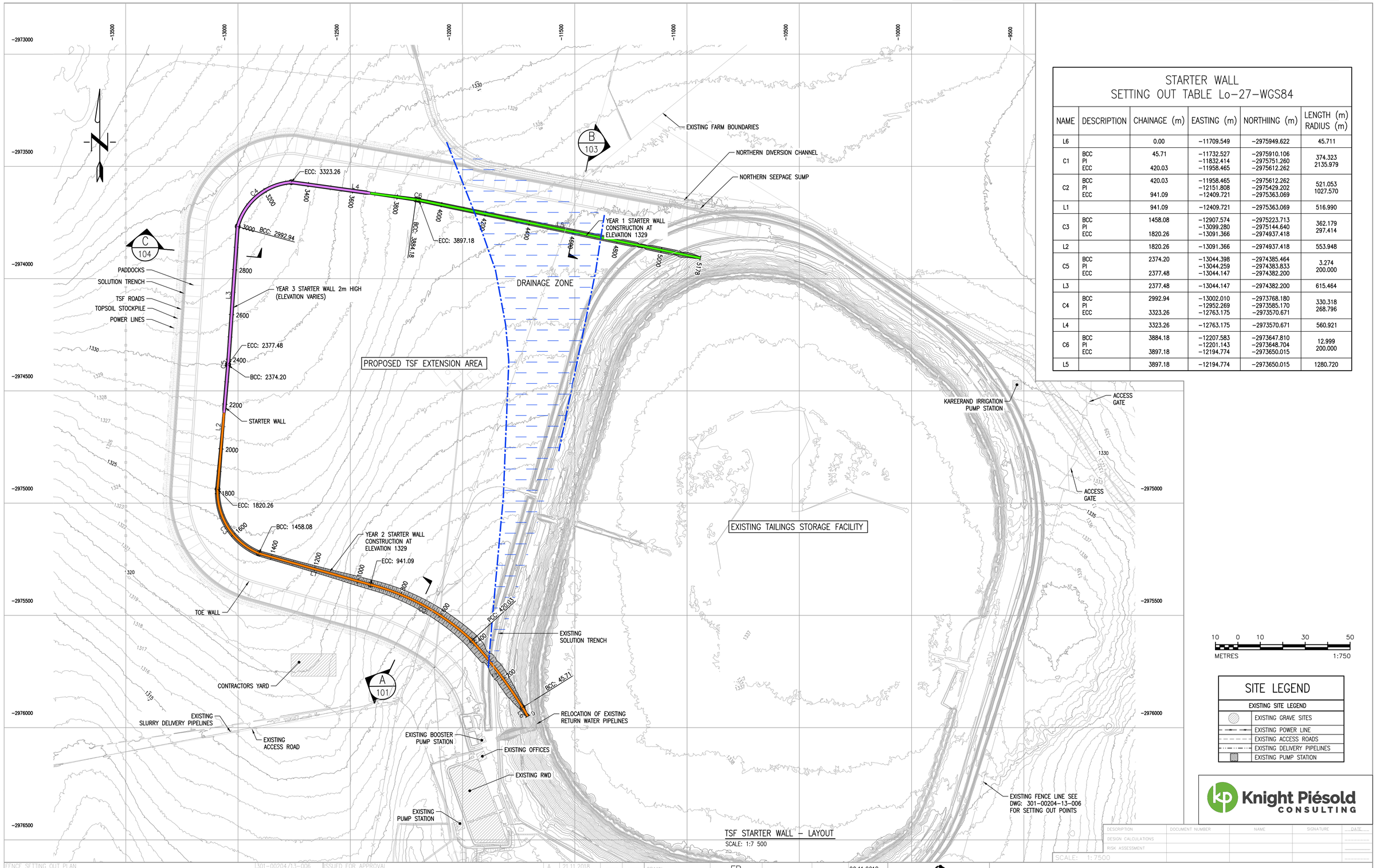


## STARTER WALL SETTING OUT TABLE Lo–27–WGS84

| NAME | DESCRIPTION | CHAINAGE (m) | EASTING (m) | NORTHIING (m) | LENGTH (m) RADIUS (m) |
|---|---|---|---|---|---|
| L6 | | 0.00 | –11709.549 | –2975949.622 | 45.711 |
| C1 | BCC | 45.71 | –11732.527 | –2975910.106 | 374.323 |
| | PI | | –11832.414 | –2975751.260 | 2135.979 |
| | ECC | 420.03 | –11958.465 | –2975612.262 | |
| C2 | BCC | 420.03 | –11958.465 | –2975612.262 | 521.053 |
| | PI | | –12151.808 | –2975429.202 | 1027.570 |
| | ECC | 941.09 | –12409.721 | –2975363.069 | |
| L1 | | 941.09 | –12409.721 | –2975363.069 | 516.990 |
| C3 | BCC | 1458.08 | –12907.574 | –2975223.713 | 362.179 |
| | PI | | –13099.280 | –2975144.640 | 297.414 |
| | ECC | 1820.26 | –13091.366 | –2974937.418 | |
| L2 | | 1820.26 | –13091.366 | –2974937.418 | 553.948 |
| C5 | BCC | 2374.20 | –13044.398 | –2974385.464 | 3.274 |
| | PI | | –13044.259 | –2974383.833 | 200.000 |
| | ECC | 2377.48 | –13044.147 | –2974382.200 | |
| L3 | | 2377.48 | –13044.147 | –2974382.200 | 615.464 |
| C4 | BCC | 2992.94 | –13002.010 | –2973768.180 | 330.318 |
| | PI | | –12952.269 | –2973585.170 | 268.796 |
| | ECC | 3323.26 | –12763.175 | –2973570.671 | |
| L4 | | 3323.26 | –12763.175 | –2973570.671 | 560.921 |
| C6 | BCC | 3884.18 | –12207.583 | –2973647.810 | 12.999 |
| | PI | | –12201.143 | –2973648.704 | 200.000 |
| | ECC | 3897.18 | –12194.774 | –2973650.015 | |
| L5 | | 3897.18 | –12194.774 | –2973650.015 | 1280.720 |

TSF STARTER WALL – LAYOUT
SCALE: 1:7 500

10 0 10 30 50
METRES 1:750

### SITE LEGEND

| EXISTING SITE LEGEND | |
|---|---|
| | EXISTING GRAVE SITES |
| | EXISTING POWER LINE |
| | EXISTING ACCESS ROADS |
| | EXISTING DELIVERY PIPELINES |
| | EXISTING PUMP STATION |

Knight Piésold CONSULTING

| DESCRIPTION | DOCUMENT NUMBER | NAME | SIGNATURE | DATE |
|---|---|---|---|---|
| DESIGN CALCULATIONS | | | | |
| RISK ASSESSMENT | | | | |
| SCALE: 1:7500 | | | | |

| TITLE | DRG. No |
|---|---|
| FENCE SETTING OUT PLAN | 301–00204/13–006 |
| TSF STARTER WALL – SECTIONS SHEET 1/3 | 301–00204/13–101 |
| TSF STARTER WALL – SECTIONS SHEET 2/3 | 301–00204/13–103 |
| TSF STARTER WALL – SECTIONS SHEET 3/3 | 301–00204/13–104 |

REFERENCE DRAWINGS

| DETAIL | MARK | DATE | INIT | APP'D |
|---|---|---|---|---|
| ISSUED FOR APPROVAL | A | 21.11.2018 | | |
| ISSUED FOR TENDER | B | 28.01.2019 | | |
| DIVERSION CHANNEL UPDATED | C | 25.03.2019 | | |

REVISIONS

| DESIGNATION | NAME | REGISTRATION No: | SIGNATURE | DATE |
|---|---|---|---|---|
| DRAWN | FB | | | 20.11.2018 |
| CHECKED | TM | | | 20.11.2018 |
| SENIOR DESIGNER MET PROJECTS | | | | |
| PR ENGINEER | | | | |
| PR TECH | | | | |
| PROJECT / MET ENGINEER | DGS | | | 20.11.2018 |
| MET PROJECTS MANAGER | | | | 20.11.2018 |

ANGLOGOLD ASHANTI



MET PROJECTS

301–00204/13–100

REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE TSF STARTER WALL – LAYOUT AND DETAILS

| PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE |
|---|---|---|---|---|
| CWR1806001 | MET–MWS–39–C0009 | | | REV C – A1 |

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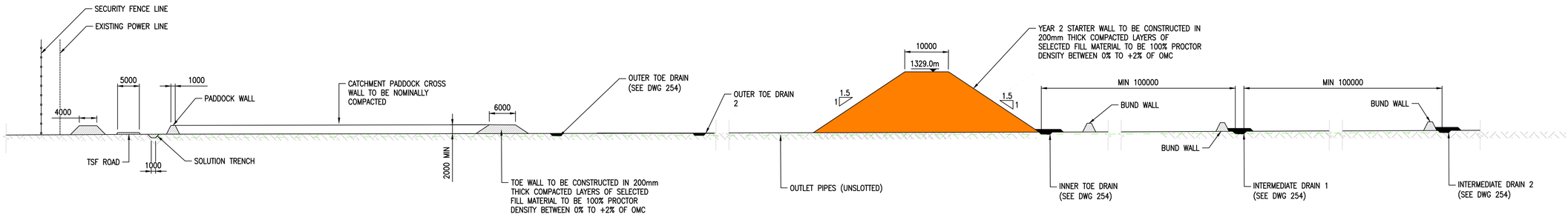


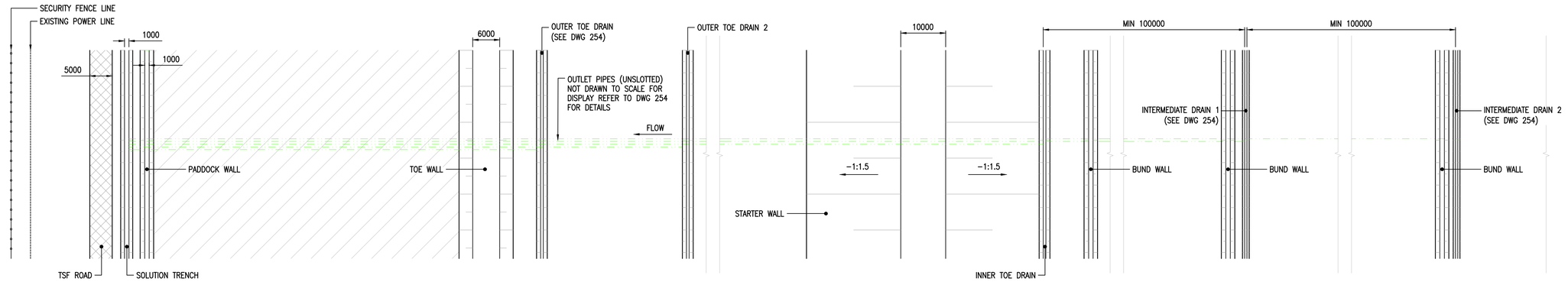


A/100 SECTION
SCALE: N.T.S.

Knight Piésold CONSULTING

| DESCRIPTION | DOCUMENT NUMBER | NAME | SIGNATURE | DATE |
|---|---|---|---|---|
| DESIGN CALCULATIONS | | | | |
| RISK ASSESSMENT | | | | |

SCALE: AS SHOWN

| REFERENCE DRAWINGS | | REVISIONS | | | | | |
|---|---|---|---|---|---|---|---|
| TITLE | DRG. No | DETAIL | MARK | DATE | INIT. | APP'D |
| TSF STARTER WALL - LAYOUT AND DETAILS | 301-00204/13-100 | ISSUED FOR INFORMATION | A | 20.11.2018 | | |
| TSF-STARTER WALLS-SECTION-SHEET 1/3 | 301-00204/13-101 | ISSUED FOR APPROVAL | B | 28.11.2018 | | |
| TSF-STARTER WALLS-SECTION-SHEET 2/3 | 301-00204/13-103 | ISSUED FOR TENDER | C | 25.01.2019 | | |
| TSF-STARTER WALLS-SECTION-SHEET 3/3 | 301-00204/13-104 | ISSUED FOR TENDER (DRAINS NAMING UPDATED) | D | 26.03.2019 | | |
| SEEPAGE INTERCEPTION-FILTER DRAIN OUTLET-SECTIONS AND DETAILS | 301-00204/13-254 | | | | | |

| DESIGNATION | NAME | REGISTRATION No: | SIGNATURE | DATE |
|---|---|---|---|---|
| DRAWN | FB | | | 20.11.2018 |
| CHECKED | TM | | | 20.11.2018 |
| SENIOR DESIGNER MET PROJECTS | | | | |
| PR ENGINEER | | | | |
| PR TECH | | | | |
| PROJECT / MET ENGINEER | TM | | | 20.11.2018 |
| MET PROJECTS MANAGER | NAME | | | 20.11.2018 |

ANGLOGOLD ASHANTI



MET PROJECTS

301-00204/13-101

REGION: SOUTH AFRICA REGION - VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE: TSF STARTER WALL - SECTIONS

| PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE |
|---|---|---|---|---|
| CWR1806001 | MET-MWS-39-C0010 | | | REV D A1 |

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