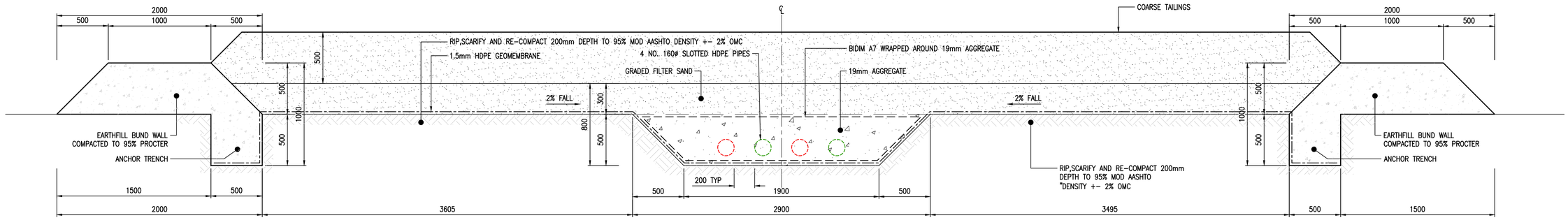
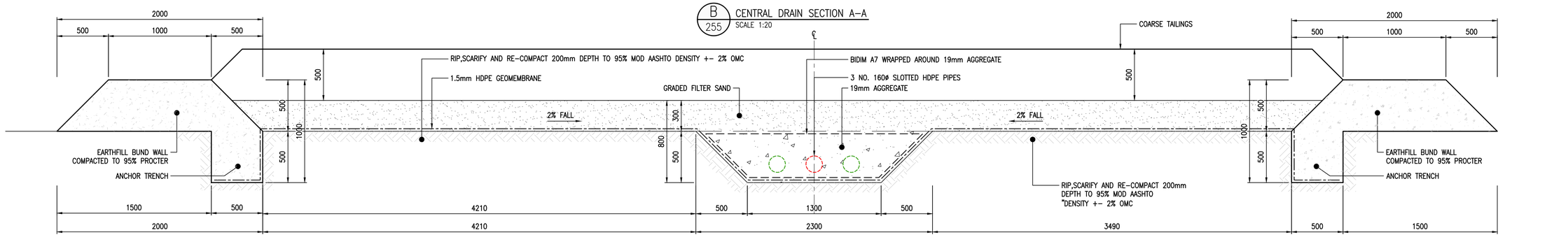
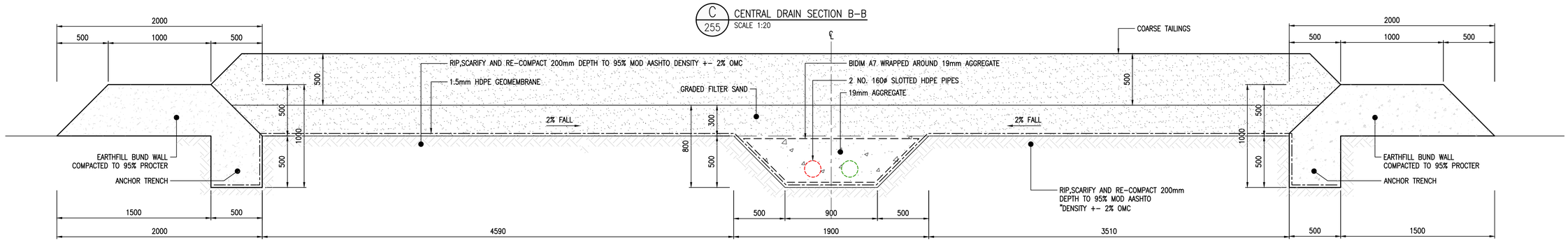


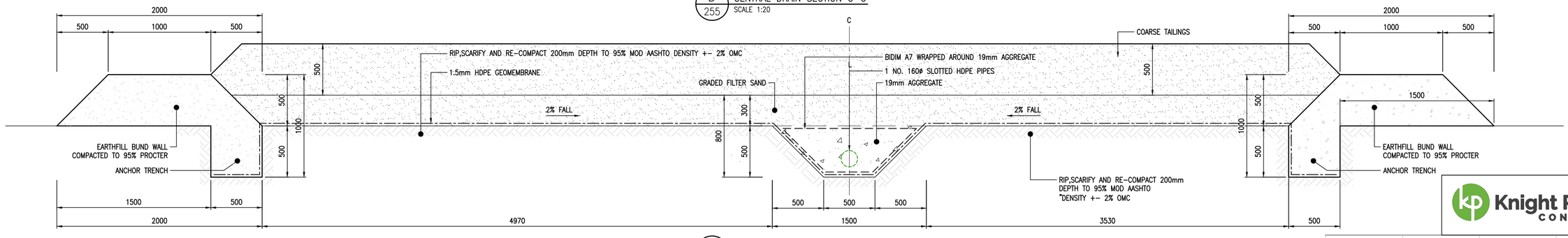
B 255 CENTRAL DRAIN SECTION A-A
SCALE 1:20



C 255 CENTRAL DRAIN SECTION B-B
SCALE 1:20



D 255 CENTRAL DRAIN SECTION C-C
SCALE 1:20



E 255 CENTRAL DRAIN SECTION D-D
SCALE 1:20

500 0 500 1000 1500
MILLIMETRES 1:20

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

TITLE	DRG. No
CENTRAL DRAINS LAYOUT AND SECTIONS	301-00204/13-255

REFERENCE DRAWINGS

DETAIL	MARK	DATE	INIT	APP'D
ISSUED FOR INFORMATION	A	26.11.2018		
ISSUED FOR APPROVAL	B	16.01.2019		
ISSUED FOR TENDER	C	25.01.2019		

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

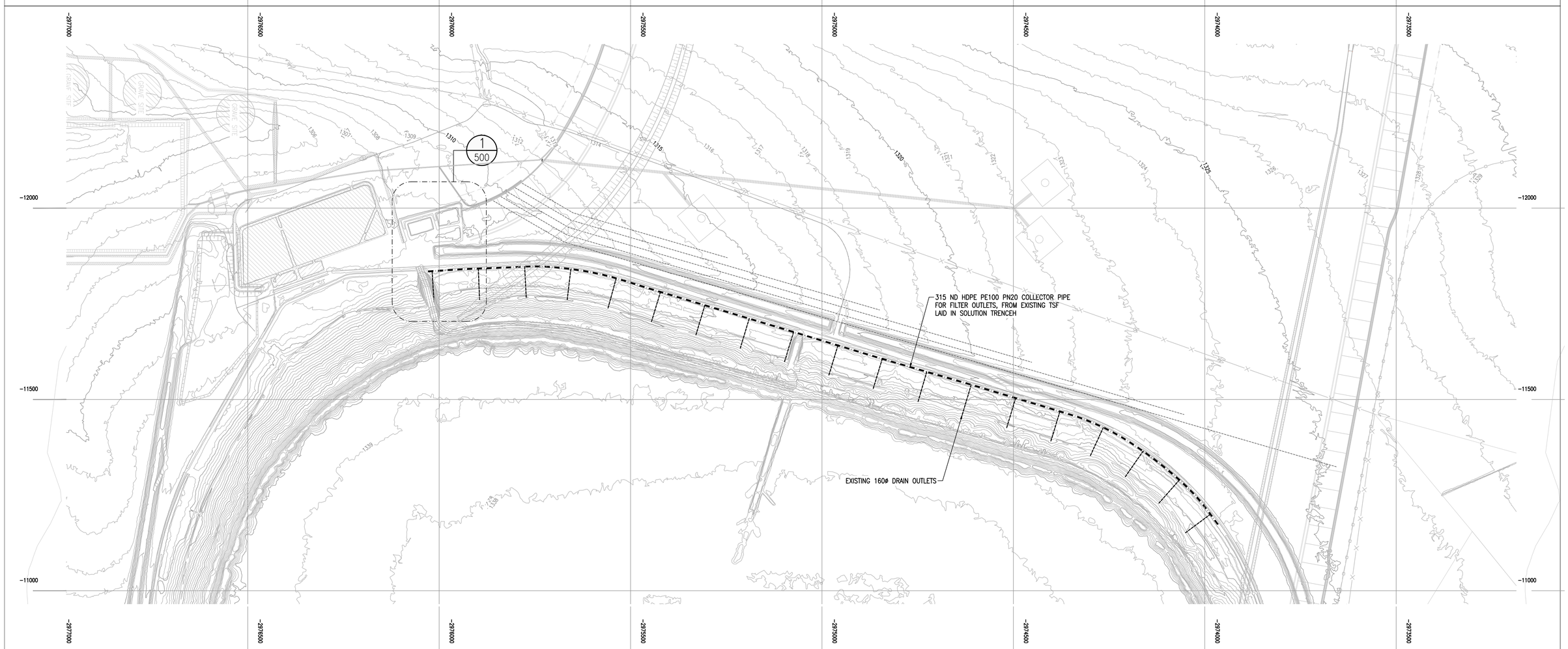
ANGLOGOLD ASHANTI

MET PROJECTS

301-00204/13-256
REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE CENTRAL DRAINS TYPICAL SECTIONS

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE
CWR1806001	MET-MWS-39-C0024			REV C A1

P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-256,255 Rev C.C.dwg



COLLECTOR PIPE LAYOUT
SCALE 1:5000

100 0 100 200 300
METRES 1:5000

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: N.T.S

ISSUED FOR APPROVAL	A	16.01.2019		
ISSUED FOR TENDER	B	25.01.2019		
ISSUED FOR TENDER	C	26.03.2019		

TITLE	DRG. No
REFERENCE DRAWINGS	

DETAIL	MARK	DATE	INIT	APP'D
REVISIONS				

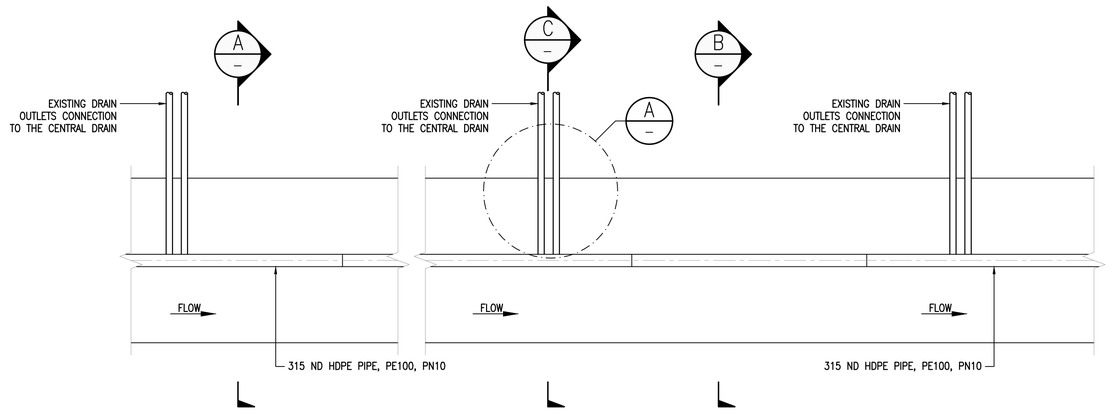
DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	FB/ME			20.11.2018
CHECKED	TM			20.11.2018
SENIOR DESIGNER MET PROJECTS	DGS			20.11.2018
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER	DGS			20.11.2018
MET PROJECTS MANAGER	NAME			20.11.2018

ANGLOGOLD ASHANTI

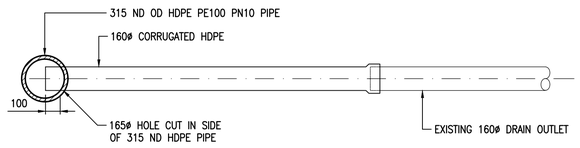
301-00204/13-257
REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE COLLECTOR PIPE FOR EXISTING FILTER DRAINS - LAYOUT

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE - A1
CWR1806001	MET-MWS-39-C0078			REV C

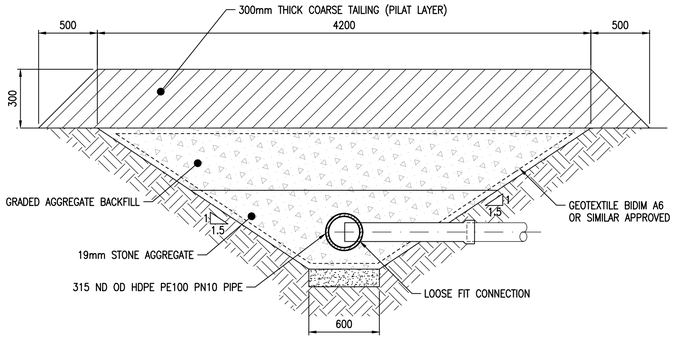
P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-257 RevC.dwg



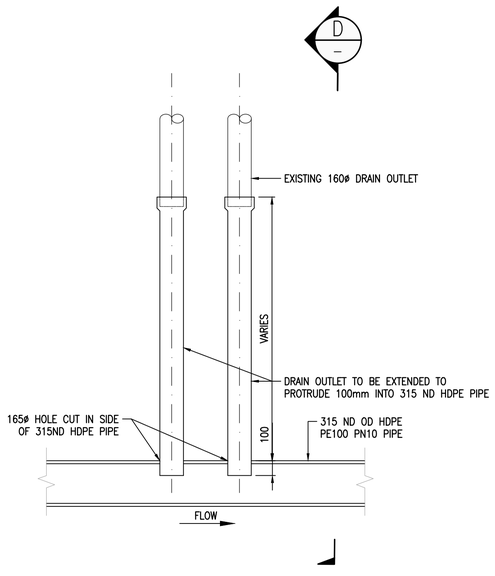
PLAN LAYOUT ON SOLUTION TRENCH REPAIR
SCALE 1:75



D TYPICAL SECTION
SCALE 1:20



C TYPICAL SECTION AT DRAIN OUTLETS
SCALE 1:25



A TYPICAL DETAIL
SCALE 1:20

1000 0 1000 3000 5000
MILLIMETRES 1:75

500 0 500 1000 1500
MILLIMETRES 1:25

500 0 500 1000 1500
MILLIMETRES 1:20

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

TITLE	DRG. No
SEEPAGE INTERCEPTION–UNDERDRAINAGE–GENERAL LAYOUT	301–00204/13–250

REFERENCE DRAWINGS

DETAIL	MARK	DATE	INIT	APP'D
ISSUED FOR APPROVAL	A	16.01.2019		
ISSUED FOR APPROVAL	B	25.01.2019		

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	FB			16.01.2019
CHECKED	TM			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

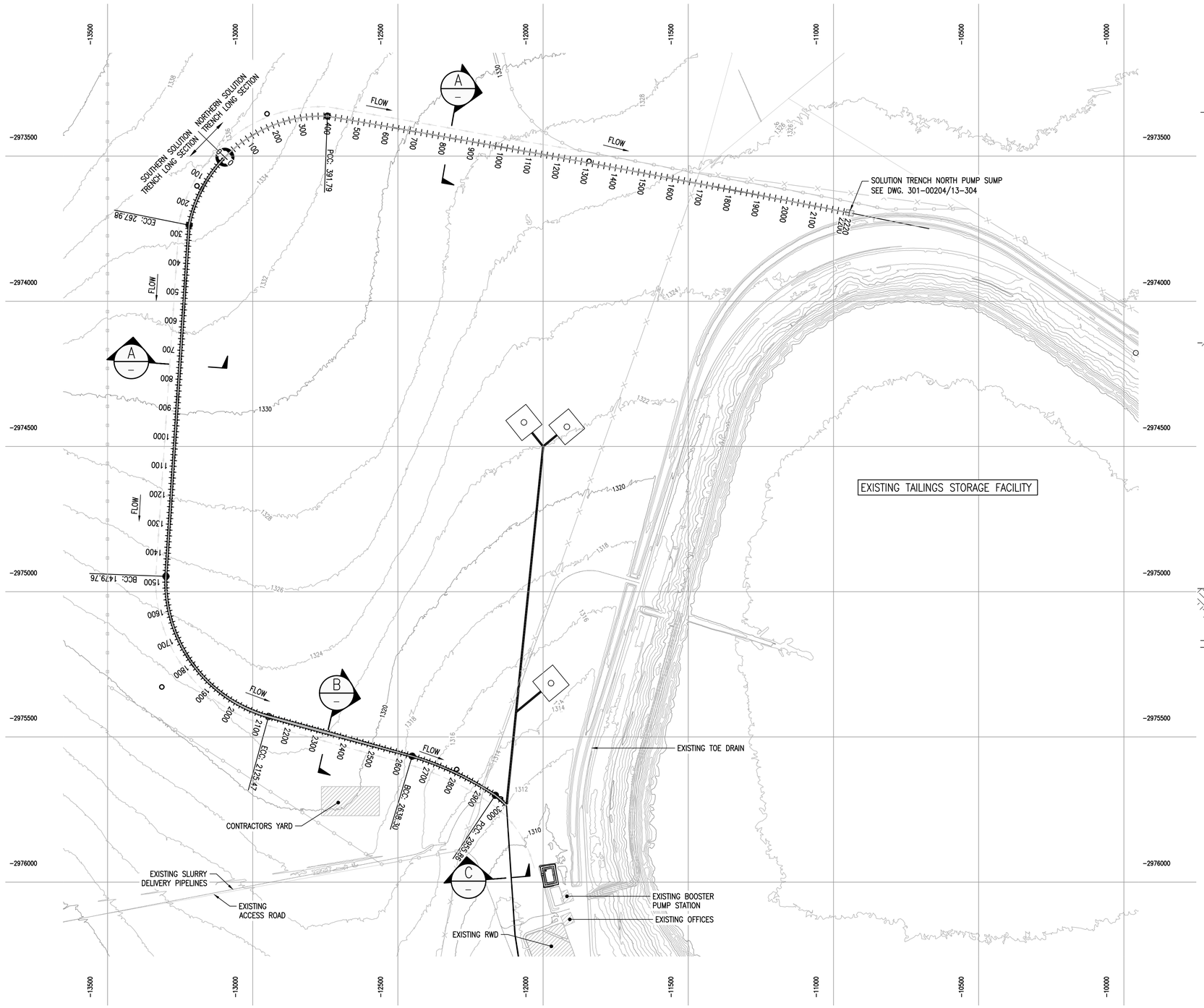
ANGLOGOLD ASHANTI

301–00204/13–258

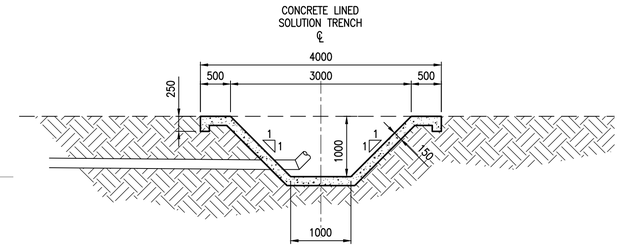
REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE SEEPAGE INTERCEPTION FILTER DRAIN OUTLET DETAILS

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE – A1
CWR1806001	MET–MWS–39–C0079			REV B

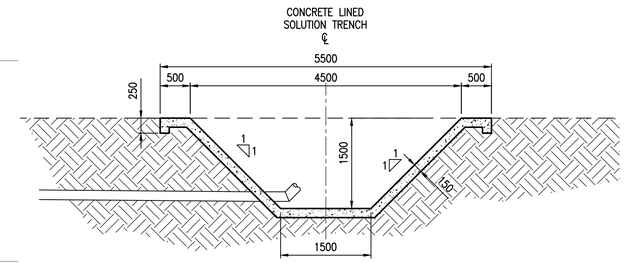
P:\301–00204\13\A\DRAWINGS\KP\For Tender\301–00204–13–258 RevB.dwg



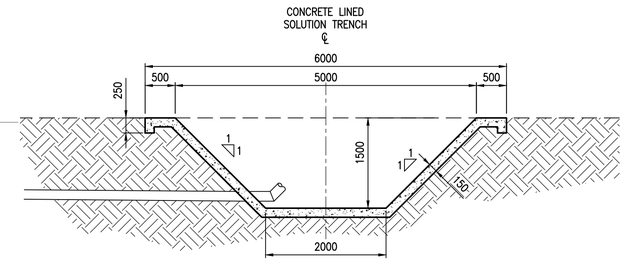
SOLUTION TRENCH – LAYOUT
SCALE: 1:7500



A – TYPICAL SOLUTION TRENCH SECTION
SCALE 1:50



B – TYPICAL SOLUTION TRENCH SECTION
SCALE 1:50



C – TYPICAL SOLUTION TRENCH SECTION
SCALE 1:50

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: 1:7500

REFERENCE DRAWINGS		REVISIONS				
TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D
SOLUTION TRENCH NORTHERN LONG SECTION	301-00204/13-301	ISSUED FOR TENDER	A	01-21-2019		
SOLUTION TRENCH SOUTHERN LONG SECTION	301-00204/13-302	ISSUED FOR TENDER	B	25.01.2019		
SOLUTION TRENCH LONG SECTIONS AND DETAILS	301-00204/13-303	ISSUED FOR TENDER	C	29.03.2019		
NORTH PUMP SUMP CONCRETE DETAILS	301-00204/13-304					

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	FB			31.10.2018
CHECKED	TM			31.10.2018
SENIOR DESIGNER MET PROJECTS				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

MET PROJECTS

301-00204/13-300

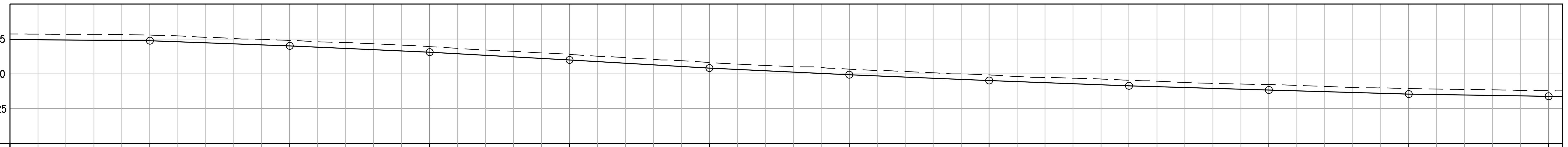
REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE: SOLUTION TRENCH – LAYOUT

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE – A1
CWR1806001	MET-MWS-39-C0025			REV C

P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-300, 301, 302, 304 Rev8.dwg

SCALES:
Horizontal 1:7500
Vertical 1:1500

DATUM 1320.00

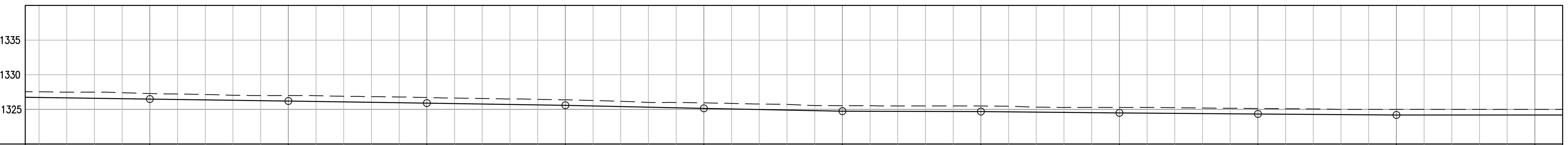


CHAINAGE (m)	EXISTING GROUND LEVELS (m)	DESIGN LEVELS (m)	CUT / FILL
		1334.92	
20.00	1335.70	1334.88	0.82
40.00	1335.66	1334.85	0.81
60.00	1335.66	1334.82	0.84
80.00	1335.62	1334.79	0.84
100.00	1335.55	1334.75	0.80
120.00	1335.44	1334.60	0.84
140.00	1335.24	1334.45	0.79
160.00	1335.07	1334.30	0.77
180.00	1334.95	1334.15	0.81
200.00	1334.80	1334.00	0.80
220.00	1334.60	1333.82	0.78
240.00	1334.50	1333.64	0.86
260.00	1334.31	1333.46	0.85
280.00	1334.13	1333.28	0.84
300.00	1333.91	1333.11	0.80
320.00	1333.66	1332.88	0.78
340.00	1333.42	1332.66	0.77
360.00	1333.23	1332.43	0.80
380.00	1333.00	1332.21	0.79
400.00	1332.79	1331.99	0.80
420.00	1332.53	1331.75	0.78
440.00	1332.33	1331.52	0.80
460.00	1332.07	1331.29	0.77
480.00	1331.88	1331.06	0.82
500.00	1331.63	1330.83	0.80
520.00	1331.41	1330.64	0.77
540.00	1331.21	1330.45	0.76
560.00	1331.04	1330.26	0.78
580.00	1330.90	1330.06	0.84
600.00	1330.67	1329.87	0.80
620.00	1330.51	1329.71	0.80
640.00	1330.34	1329.54	0.80
660.00	1330.16	1329.38	0.78
680.00	1330.00	1329.21	0.79
700.00	1329.85	1329.05	0.80
720.00	1329.63	1328.90	0.73
740.00	1329.49	1328.74	0.75
760.00	1329.38	1328.59	0.79
780.00	1329.27	1328.44	0.83
800.00	1329.09	1328.29	0.80
820.00	1328.96	1328.17	0.79
840.00	1328.77	1328.05	0.72
860.00	1328.64	1327.93	0.71
880.00	1328.55	1327.81	0.73
900.00	1328.49	1327.69	0.80
920.00	1328.35	1327.58	0.77
940.00	1328.21	1327.46	0.75
960.00	1328.06	1327.34	0.72
980.00	1328.00	1327.22	0.77
1000.00	1327.91	1327.11	0.80
1020.00	1327.83	1327.04	0.79
1040.00	1327.78	1326.98	0.80
1060.00	1327.72	1326.91	0.80
1080.00	1327.65	1326.85	0.80
1100.00	1327.59	1326.79	0.80
1110.00	1327.56	1326.76	0.80

LONGSECTION – NORTH
CHAINAGE 0.00m TO 1110.00m

SCALES:
Horizontal 1:7500
Vertical 1:1500

DATUM 1320.00



CHAINAGE (m)	EXISTING GROUND LEVELS (m)	DESIGN LEVELS (m)	CUT / FILL
1110.00	1327.56	1326.76	0.80
1120.00	1327.54	1326.73	0.82
1140.00	1327.50	1326.67	0.83
1160.00	1327.50	1326.61	0.89
1180.00	1327.41	1326.55	0.86
1200.00	1327.29	1326.49	0.80
1220.00	1327.23	1326.43	0.79
1240.00	1327.15	1326.37	0.77
1260.00	1327.05	1326.32	0.73
1280.00	1327.00	1326.26	0.74
1300.00	1327.00	1326.20	0.80
1320.00	1326.98	1326.14	0.84
1340.00	1326.89	1326.08	0.81
1360.00	1326.85	1326.02	0.82
1380.00	1326.80	1325.97	0.83
1400.00	1326.71	1325.91	0.80
1420.00	1326.64	1325.84	0.79
1440.00	1326.57	1325.78	0.80
1460.00	1326.51	1325.71	0.80
1480.00	1326.45	1325.64	0.81
1500.00	1326.38	1325.58	0.80
1520.00	1326.28	1325.49	0.79
1540.00	1326.17	1325.40	0.76
1560.00	1326.01	1325.32	0.69
1580.00	1326.00	1325.23	0.77
1600.00	1325.95	1325.15	0.80
1620.00	1325.86	1325.06	0.80
1640.00	1325.78	1324.98	0.80
1660.00	1325.72	1324.90	0.82
1680.00	1325.55	1324.82	0.73
1700.00	1325.54	1324.74	0.80
1720.00	1325.53	1324.73	0.80
1740.00	1325.50	1324.72	0.78
1760.00	1325.50	1324.71	0.79
1780.00	1325.50	1324.70	0.80
1800.00	1325.49	1324.69	0.80
1820.00	1325.46	1324.65	0.81
1840.00	1325.32	1324.61	0.71
1860.00	1325.29	1324.57	0.72
1880.00	1325.28	1324.53	0.75
1900.00	1325.29	1324.49	0.80
1920.00	1325.28	1324.46	0.82
1940.00	1325.24	1324.43	0.81
1960.00	1325.20	1324.40	0.80
1980.00	1325.17	1324.37	0.80
2000.00	1325.14	1324.34	0.80
2020.00	1325.10	1324.31	0.79
2040.00	1325.06	1324.28	0.78
2060.00	1325.01	1324.25	0.75
2080.00	1325.00	1324.23	0.77
2100.00	1325.00	1324.20	0.80
2120.00	1325.00	1324.20	0.80
2140.00	1325.00	1324.20	0.80
2160.00	1325.00	1324.20	0.80
2180.00	1325.00	1324.20	0.80
2200.00	1325.00	1324.20	0.80
2220.00	1325.00	1324.20	0.80

LONGSECTION – NORTH
CHAINAGE 1110.00m TO 2220.00m

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

TITLE	DRG. No
REFERENCE DRAWINGS	

DETAIL	MARK	DATE	INIT	APP'D
ISSUED FOR TENDER	A	01–21–2019		
ISSUED FOR TENDER	B	25.01.2019		

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	ME			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

MET PROJECTS

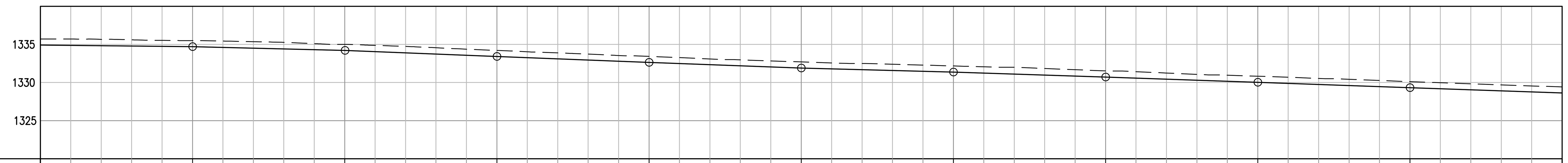
301–00204/13–301
REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE SOLUTION TRENCH – NORTHERN LONG SECTION

PROJECT No: CWR1806001 | B/UNIT AREA SEQ. No: MET–MWS–39–C0026 | REV B | SIZE – A1

P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-300, 301, 302, 304 RevB.dwg

SCALES:
Horizontal 1:7500
Vertical 1:1500

DATUM 1320.00

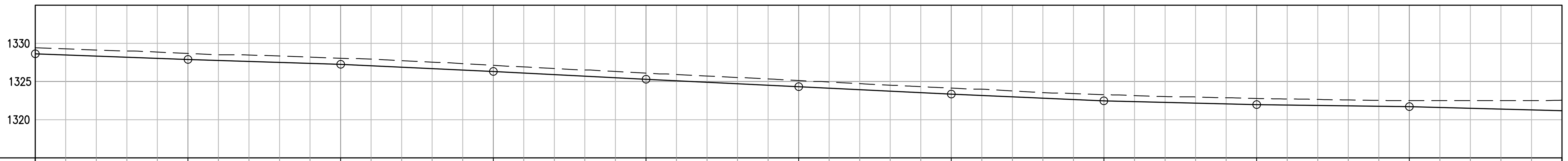


CHAINAGE (m)		20.00	40.00	60.00	80.00	100.00	120.00	140.00	160.00	180.00	200.00	220.00	240.00	260.00	280.00	300.00	320.00	340.00	360.00	380.00	400.00	420.00	440.00	460.00	480.00	500.00	520.00	540.00	560.00	580.00	600.00	620.00	640.00	660.00	680.00	700.00	720.00	740.00	760.00	780.00	800.00	820.00	840.00	860.00	880.00	900.00	920.00	940.00	960.00	980.00	1000.00
EXISTING GROUND LEVELS (m)		1335.71	1335.67	1335.60	1335.53	1335.50	1335.44	1335.35	1335.28	1335.10	1335.00	1334.87	1334.74	1334.56	1334.38	1334.21	1334.03	1333.89	1333.73	1333.54	1333.43	1333.27	1333.09	1332.97	1332.84	1332.70	1332.57	1332.50	1332.40	1332.29	1332.17	1332.06	1332.00	1331.84	1331.68	1331.52	1331.42	1331.24	1331.07	1330.95	1330.83	1330.70	1330.54	1330.43	1330.27	1330.11	1329.97	1329.83	1329.69	1329.55	1329.43
DESIGN LEVELS (m)	1334.92	1334.87	1334.83	1334.79	1334.74	1334.70	1334.60	1334.50	1334.40	1334.30	1334.20	1334.04	1333.89	1333.73	1333.57	1333.41	1333.25	1333.10	1332.94	1332.79	1332.63	1332.49	1332.34	1332.19	1332.05	1331.90	1331.80	1331.69	1331.59	1331.48	1331.37	1331.24	1331.11	1330.98	1330.85	1330.72	1330.58	1330.44	1330.30	1330.17	1330.03	1329.88	1329.74	1329.60	1329.46	1329.31	1329.18	1329.04	1328.90	1328.76	1328.63
CUT / FILL		0.83	0.84	0.82	0.78	0.80	0.84	0.85	0.88	0.80	0.80	0.83	0.85	0.83	0.81	0.80	0.77	0.79	0.79	0.76	0.80	0.78	0.75	0.78	0.79	0.80	0.77	0.81	0.81	0.81	0.80	0.82	0.89	0.86	0.83	0.80	0.84	0.80	0.76	0.79	0.80	0.81	0.80	0.83	0.81	0.80	0.80	0.80	0.79	0.79	0.80

LONGSECTION – SOUTH
CHAINAGE 0.00m TO 1000.00m

SCALES:
Horizontal 1:7500
Vertical 1:1500

DATUM 1315.00

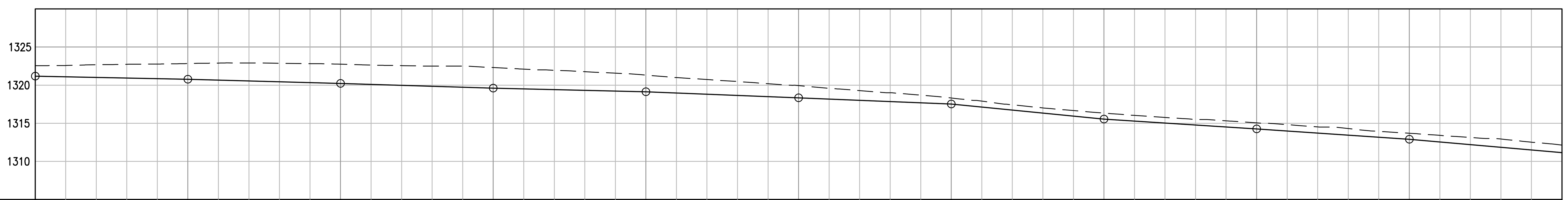


CHAINAGE (m)	1000.00	1020.00	1040.00	1060.00	1080.00	1100.00	1120.00	1140.00	1160.00	1180.00	1200.00	1220.00	1240.00	1260.00	1280.00	1300.00	1320.00	1340.00	1360.00	1380.00	1400.00	1420.00	1440.00	1460.00	1480.00	1500.00	1520.00	1540.00	1560.00	1580.00	1600.00	1620.00	1640.00	1660.00	1680.00	1700.00	1720.00	1740.00	1760.00	1780.00	1800.00	1820.00	1840.00	1860.00	1880.00	1900.00	1920.00	1940.00	1960.00	1980.00	2000.00
EXISTING GROUND LEVELS (m)	1329.43	1329.28	1329.13	1329.00	1328.86	1328.68	1328.50	1328.47	1328.35	1328.20	1328.04	1327.93	1327.74	1327.54	1327.35	1327.12	1326.92	1326.70	1326.50	1326.31	1326.09	1325.92	1325.72	1325.52	1325.35	1325.12	1324.94	1324.72	1324.52	1324.33	1324.14	1324.00	1323.77	1323.55	1323.43	1323.27	1323.16	1323.03	1322.98	1322.87	1322.78	1322.72	1322.66	1322.59	1322.53	1322.50	1322.50	1322.50	1322.50	1322.50	1322.55
DESIGN LEVELS (m)	1328.63	1328.48	1328.33	1328.18	1328.03	1327.88	1327.75	1327.62	1327.50	1327.37	1327.24	1327.06	1326.87	1326.69	1326.50	1326.32	1326.11	1325.91	1325.70	1325.50	1325.29	1325.10	1324.91	1324.71	1324.52	1324.32	1324.13	1323.93	1323.73	1323.54	1323.34	1323.17	1322.99	1322.82	1322.65	1322.47	1322.37	1322.27	1322.17	1322.08	1321.98	1321.92	1321.87	1321.81	1321.76	1321.70	1321.60	1321.49	1321.39	1321.28	1321.18
CUT / FILL	0.80	0.80	0.80	0.82	0.83	0.80	0.75	0.84	0.85	0.83	0.80	0.88	0.86	0.85	0.84	0.80	0.80	0.79	0.80	0.81	0.80	0.82	0.81	0.81	0.83	0.80	0.82	0.79	0.79	0.79	0.80	0.83	0.78	0.73	0.78	0.80	0.78	0.76	0.81	0.80	0.80	0.80	0.80	0.78	0.77	0.80	0.91	1.01	1.11	1.22	1.37

LONGSECTION – SOUTH
CHAINAGE 1000.00m TO 2000.00m

SCALES:
Horizontal 1:7500
Vertical 1:1500

DATUM 1305.00



CHAINAGE (m)	2000.00	2020.00	2040.00	2060.00	2080.00	2100.00	2120.00	2140.00	2160.00	2180.00	2200.00	2220.00	2240.00	2260.00	2280.00	2300.00	2320.00	2340.00	2360.00	2380.00	2400.00	2420.00	2440.00	2460.00	2480.00	2500.00	2520.00	2540.00	2560.00	2580.00	2600.00	2620.00	2640.00	2660.00	2680.00	2700.00	2720.00	2740.00	2760.00	2780.00	2800.00	2820.00	2840.00	2860.00	2880.00	2900.00	2920.00	2940.00	2960.00	2980.00	3000.00
EXISTING GROUND LEVELS (m)	1322.55	1322.58	1322.68	1322.74	1322.77	1322.83	1322.90	1322.91	1322.87	1322.82	1322.75	1322.63	1322.56	1322.50	1322.50	1322.31	1322.10	1321.95	1321.77	1321.57	1321.32	1321.00	1320.74	1320.48	1320.19	1319.94	1319.59	1319.29	1319.00	1318.69	1318.32	1317.91	1317.42	1317.02	1316.67	1316.34	1316.03	1315.77	1315.51	1315.33	1315.05	1314.82	1314.52	1314.30	1313.94	1313.69	1313.41	1313.14	1312.93	1312.52	1312.15
DESIGN LEVELS (m)	1321.18	1321.10	1321.01	1320.93	1320.85	1320.77	1320.66	1320.55	1320.44	1320.34	1320.23	1320.10	1319.98	1319.86	1319.73	1319.61	1319.52	1319.42	1319.33	1319.23	1319.14	1318.98	1318.82	1318.65	1318.49	1318.33	1318.17	1318.01	1317.84	1317.68	1317.52	1317.12	1316.73	1316.33	1315.93	1315.54	1315.28	1315.02	1314.77	1314.51	1314.25	1313.98	1313.71	1313.43	1313.16	1312.89	1312.54	1312.19	1311.84	1311.49	1311.14
CUT / FILL	1.37	1.48	1.67	1.81	1.92	2.07	2.24	2.35	2.43	2.49	2.52	2.53	2.58	2.64	2.77	2.70	2.59	2.53	2.44	2.34	2.18	2.02	1.92	1.83	1.70	1.61	1.42	1.28	1.16	1.01	0.80	0.79	0.69	0.69	0.73	0.80	0.75	0.74	0.74	0.82	0.80	0.84	0.81	0.87	0.77	0.80	0.87	0.95	1.09	1.03	1.00

LONGSECTION – SOUTH
CHAINAGE 2000.00m TO 3000.00m

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

TITLE	DRG. No
REFERENCE DRAWINGS	

DETAIL	MARK	DATE	INIT	APP'D
ISSUED FOR TENDER	A	01–21–2019		
ISSUED FOR TENDER	B	25.01.2019		

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	FB			31.10.2018
CHECKED	DGS			31.10.2018
SENIOR DESIGNER MET PROJECTS				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

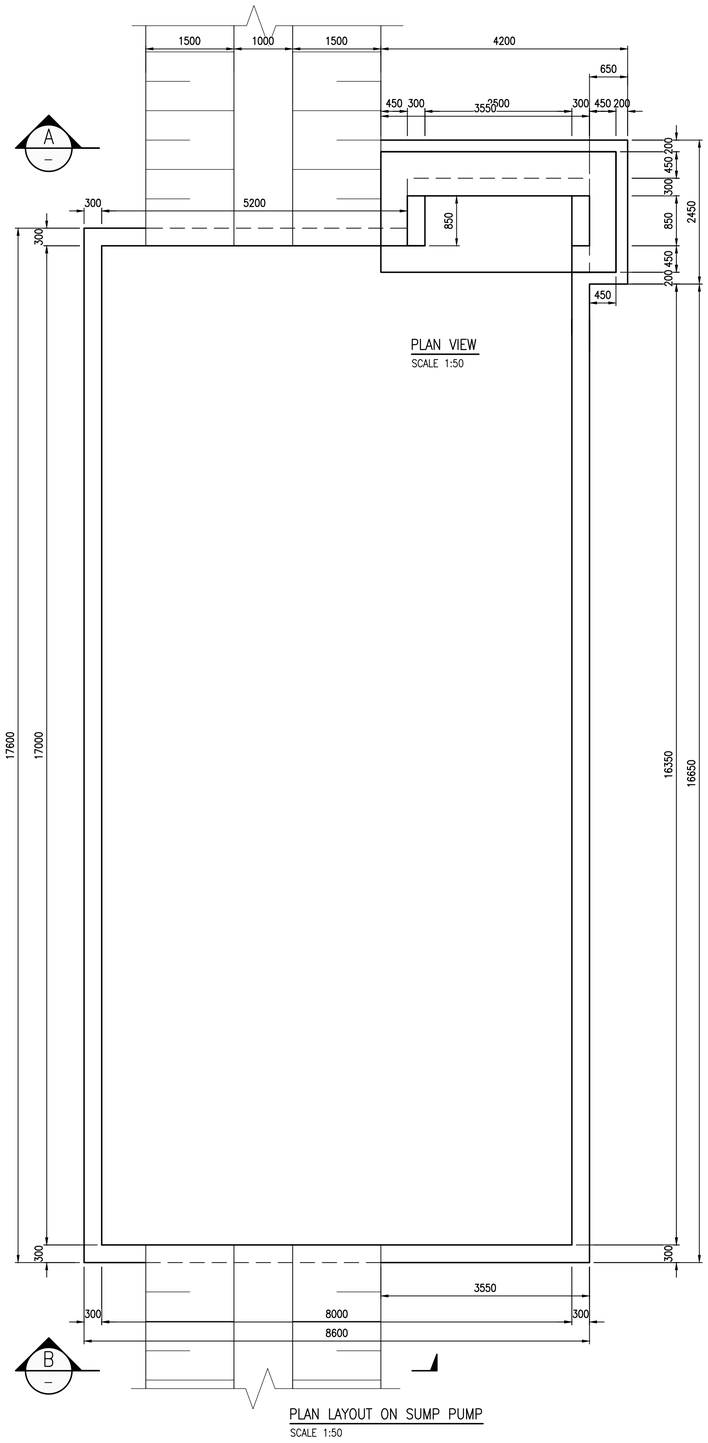
MET PROJECTS

301–00204/13–302
REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE: SOLUTION TRENCH – SOUTHERN LONG SECTION

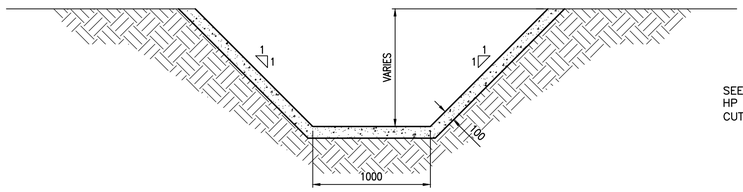
PROJECT No:	B/UNIT AREA SEQ. No:	REV
CWR1806001	MET–MWS–39–C0080	B

SIZE – A1

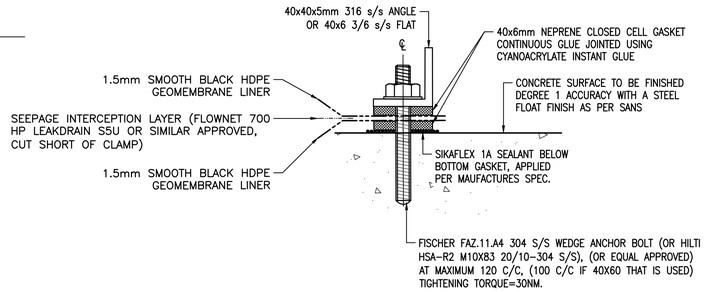
P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-300, 301, 302, 304 RevB.dwg



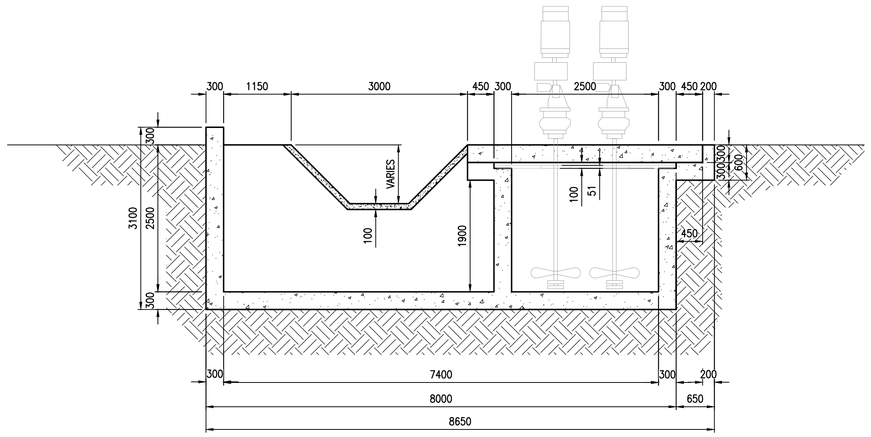
PLAN VIEW
SCALE 1:50



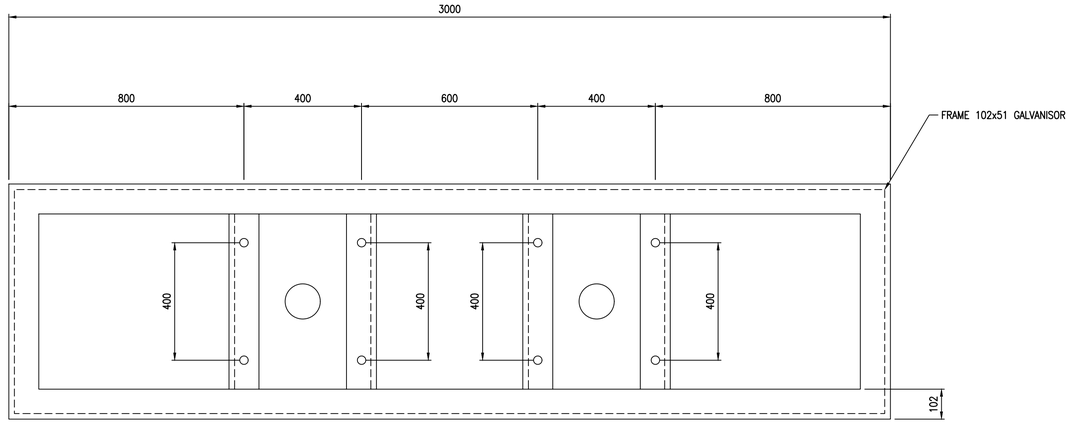
B TYPICAL SECTION
SCALE 1:25



3 TYPICAL HDPE CONCRETE FIXING DETAIL
SCALE 1:2



A TYPICAL SECTION
SCALE 1:50



2NO KSB B12B VN/VI VERTICAL TURBINE PUMPS
TYPICAL DETAIL FOR STEEL FRAME PUMP SUPPORT FOR
SCALE 1:25

PLAN LAYOUT ON SUMP PUMP
SCALE 1:50

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

ISSUED FOR APPROVAL	A	01-21-2019		
ISSUED FOR TENDER	B	01.25.2019		

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
DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE

TITLE | DRG. No
REFERENCE DRAWINGS

DETAIL | MARK | DATE | INIT | APP'D
REVISIONS

ANGLOGOLD ASHANTI

MET PROJECTS

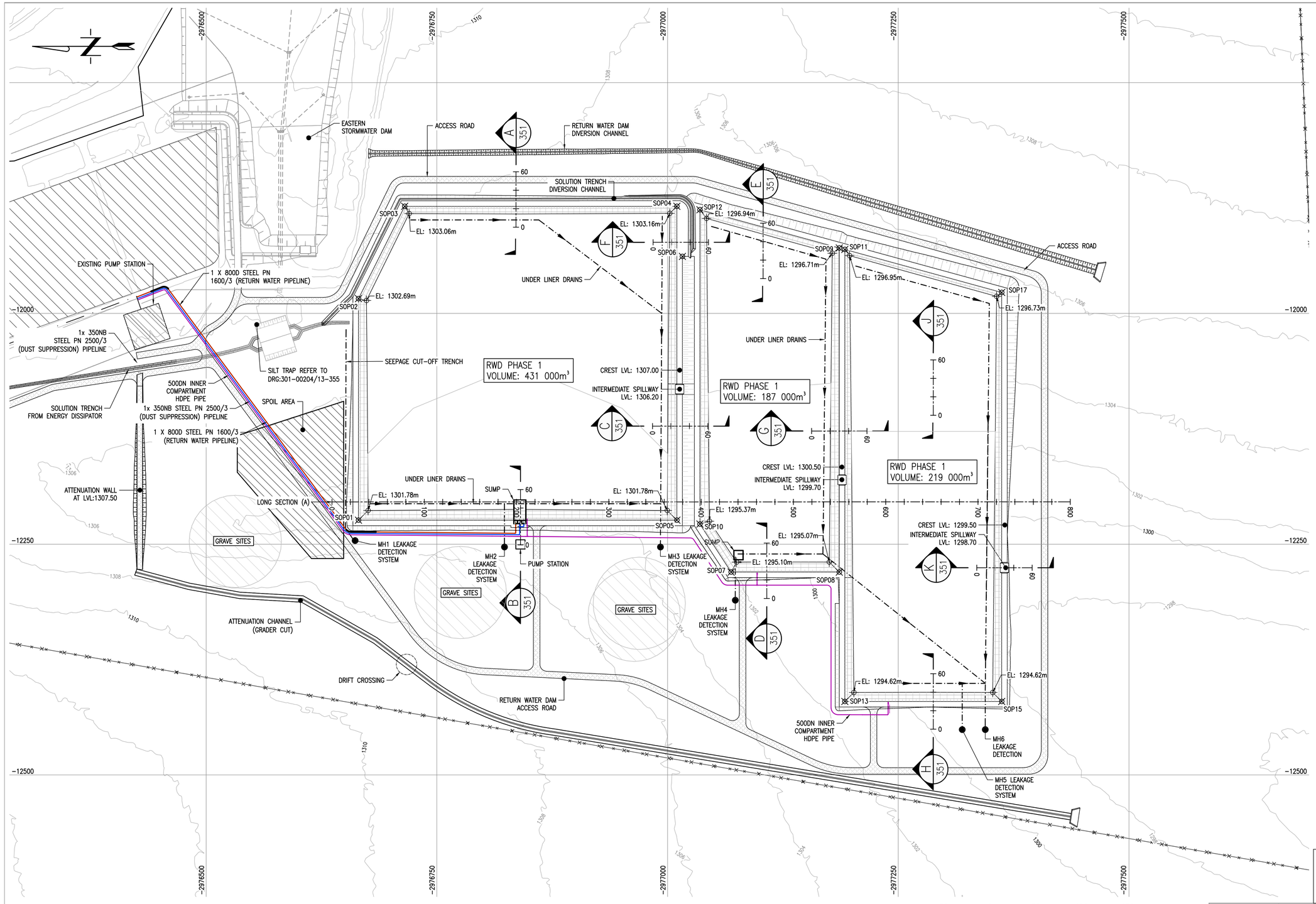
301-00204/13-304

REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE SOLUTION TRENCH - NORTHERN PUMP SUMP CONCRETE DETAILS

CWR1806001 | MET-MWS-39-C0027 | REV B

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

P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-300, 301, 302, 304 Rev0.dwg



RETURN WATER DAM SETTING OUT DATA

POINT	EASTING	NORTHING	ELEVATION
SOP01	12223.96	2976665.09	1307.00
SOP02	11983.97	2976665.09	1307.00
SOP03	11883.97	2976715.09	1307.00
SOP04	11883.97	2977010.09	1307.00
SOP05	12223.96	2977010.09	1307.00
SOP06	11938.26	2977016.09	1307.00
SOP07	12280.26	2977068.89	1300.50
SOP08	12280.26	2977186.09	1300.50
SOP09	11929.09	2977186.09	1300.50
SOP10	12228.19	2977035.09	1300.50
SOP11	11930.73	2977192.09	1299.50
SOP12	11887.75	2977035.09	1300.50
SOP13	12420.40	2977192.09	1299.50
SOP15	12420.40	2977362.09	1299.50
SOP17	11977.28	2977362.09	1299.50

SITE LEGEND

EXISTING AND NEW DRAIN PIPE LEGEND	
	DUST SUPPRESSION PIPELINE
	RETURN WATER PIPELINE
	INNER COMPARTMENT PIPELINE
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

RETURN WATER AND STORM WATER DAMS–LAYOUT

SCALE 1:2000

50 0 50 100 150
METRES 1:2000

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: 1:12000

REFERENCE DRAWINGS		REVISIONS				
TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D
RETURN WATER AND STORM WATER DAMS LONG SECTION AND CROSS SECTIONS	301–00204/13–351	ISSUED FOR APPROVAL	A	20.11.2018		
RETURN WATER AND STORM WATER DAMS–LINERS AND DETAILS	301–00204/13–352	ISSUED FOR TENDER	B	25.01.2019		
SILT TRAPS–LAYOUT AND SECTIONS (CONCRETE DETAILS)	301–00204/13–355	ISSUED FOR TENDER (RETURN WATER DAM AND VOLUMES AMENDED)	C	23.02.2019		
RETURN WATER AND STORM WATER DAMS DETAILED SECTIONS AND EARTHWORKS	301–00204/13–357					

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

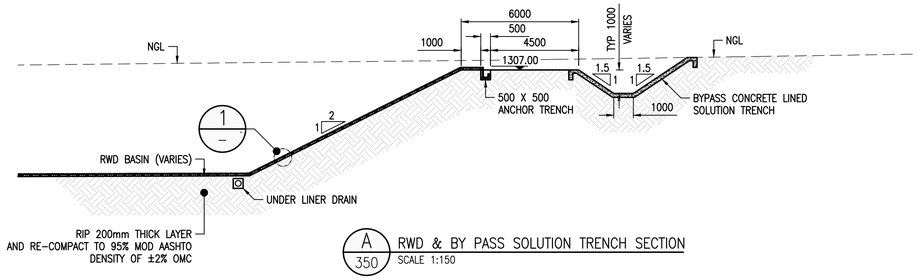
MET PROJECTS

301–00204/13–350

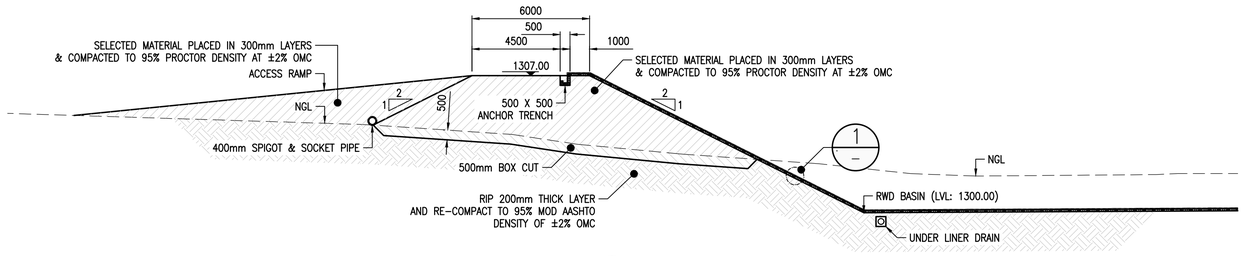
REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE RETURN WATER AND STORM WATER DAMS–LAYOUT

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE – A1
CWR1806001	MET	MWS	39–C0029	REV C

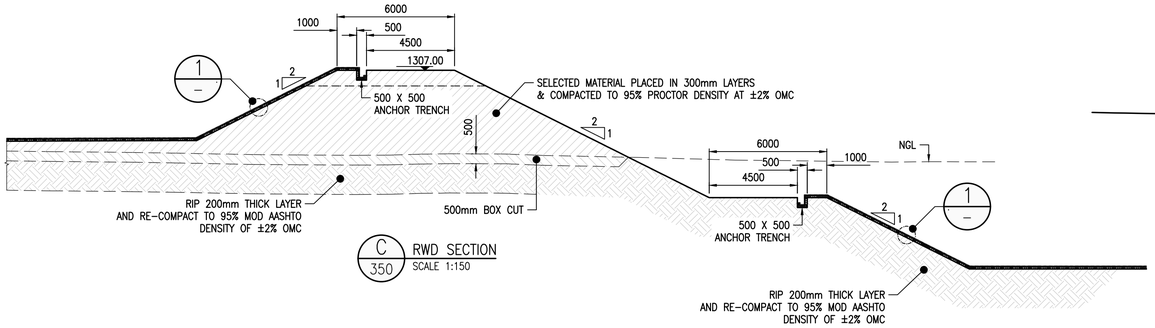
P:\301–00204\13\A\DRAWINGS\KP\For Tender\301–00204–13–350,351,357 Rev0,B,A.dwg



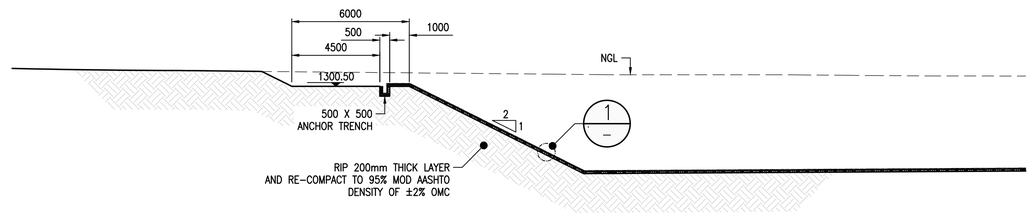
A 350 RWD & BY PASS SOLUTION TRENCH SECTION
SCALE 1:150



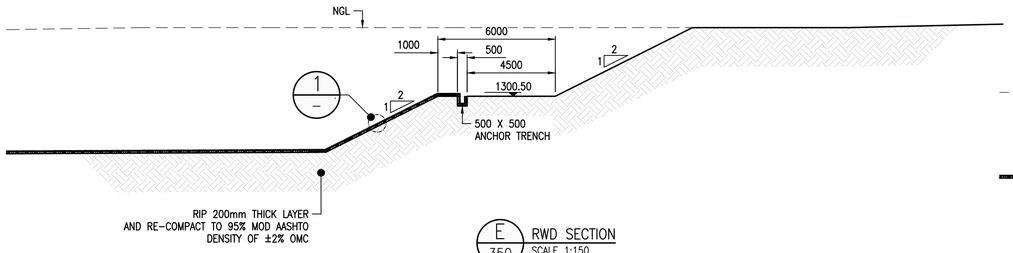
B 350 RWD SECTION
SCALE 1:150



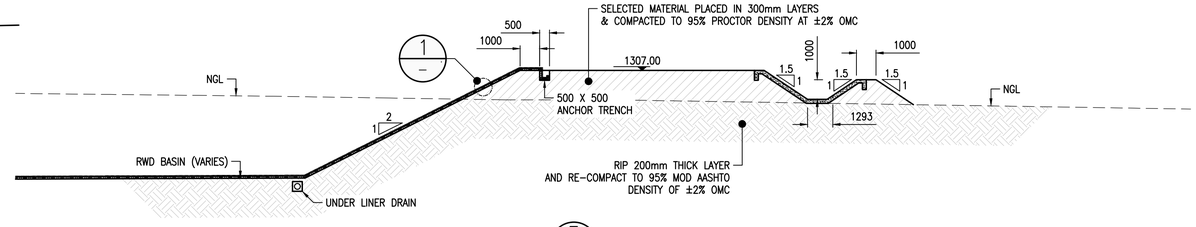
C 350 RWD SECTION
SCALE 1:150



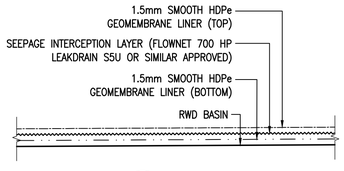
D 350 RWD SECTION
SCALE 1:150



E 350 RWD SECTION
SCALE 1:150



F 350 RWD SECTION
SCALE 1:150



1 TYPICAL LINER DETAIL
SCALE 1:10

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

REFERENCE DRAWINGS								
RETURN WATER AND STORM WATER DAMS-LAYOUT	301-00204/13-350	ISSUED FOR APPROVAL	A	20.11.2018			
RETURN WATER AND STORM WATER DAMS LONG SECTION AND CROSS SECTIONS	301-00204/13-351	ISSUED FOR TENDER	B	25.11.2019			
RETURN WATER AND STORM WATER DAMS-LINER AND DETAILS	301-00204/13-352						
TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D	
		REVISIONS					

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

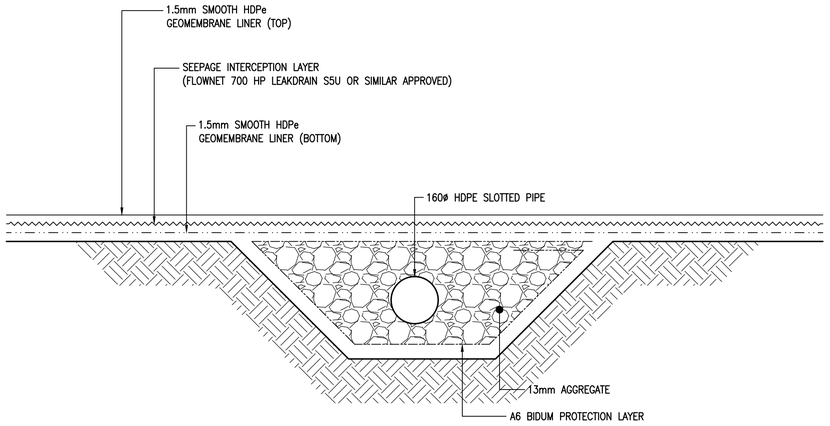
MET PROJECTS

301-00204/13-351

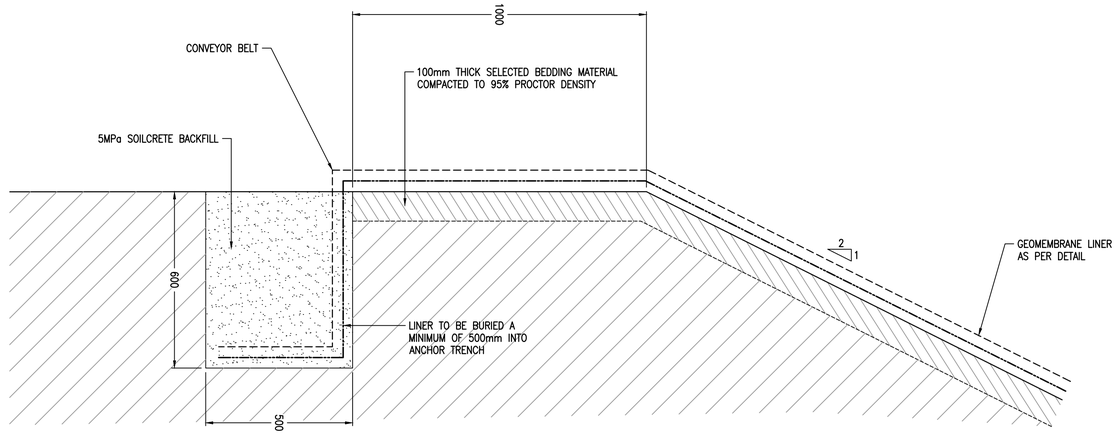
REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE: RETURN WATER AND STORM WATER DAMS DETAILED SECTIONS AND EARTHWORKS

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE – A1
CWR1806001	MET	MWS	39-C0030	REV B

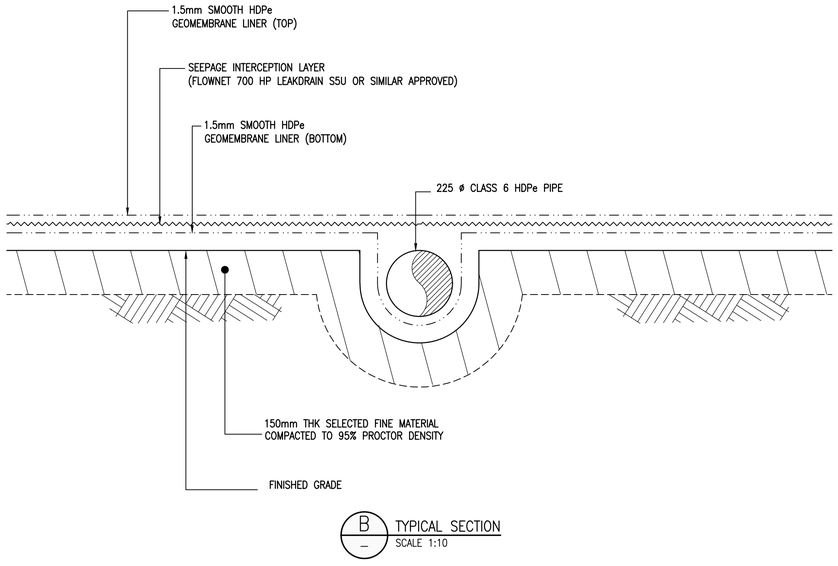
P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-350,351,357 Rev0,B,A.dwg



TYPICAL LINER, SEEPAGE INTERCEPTION AND UNDERDRAINAGE DETAIL
SCALE 1:10



4 RETURN WATER DAM
CONVEYOR BELT ANCHOR TRENCH
SCALE 1:10



B TYPICAL SECTION
SCALE 1:10

250 0 250 500 750
MILLIMETRES 1:10

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

REFERENCE DRAWINGS: TITLE	DRG. No
RETURN WATER AND STORM WATER DAMS LAYOUT	301-00204/13-350
RETURN WATER AND STORM WATER DAMS LONG SECTION AND CROSS SECTIONS	301-00204/13-351
RETURN WATER AND STORM WATER DAMS-LINERS AND DETAILS	301-00204/13-352
RETURN WATER AND STORM WATER DAMS DETAILED SECTIONS AND EARTHWORKS	301-00204/13-357

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

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

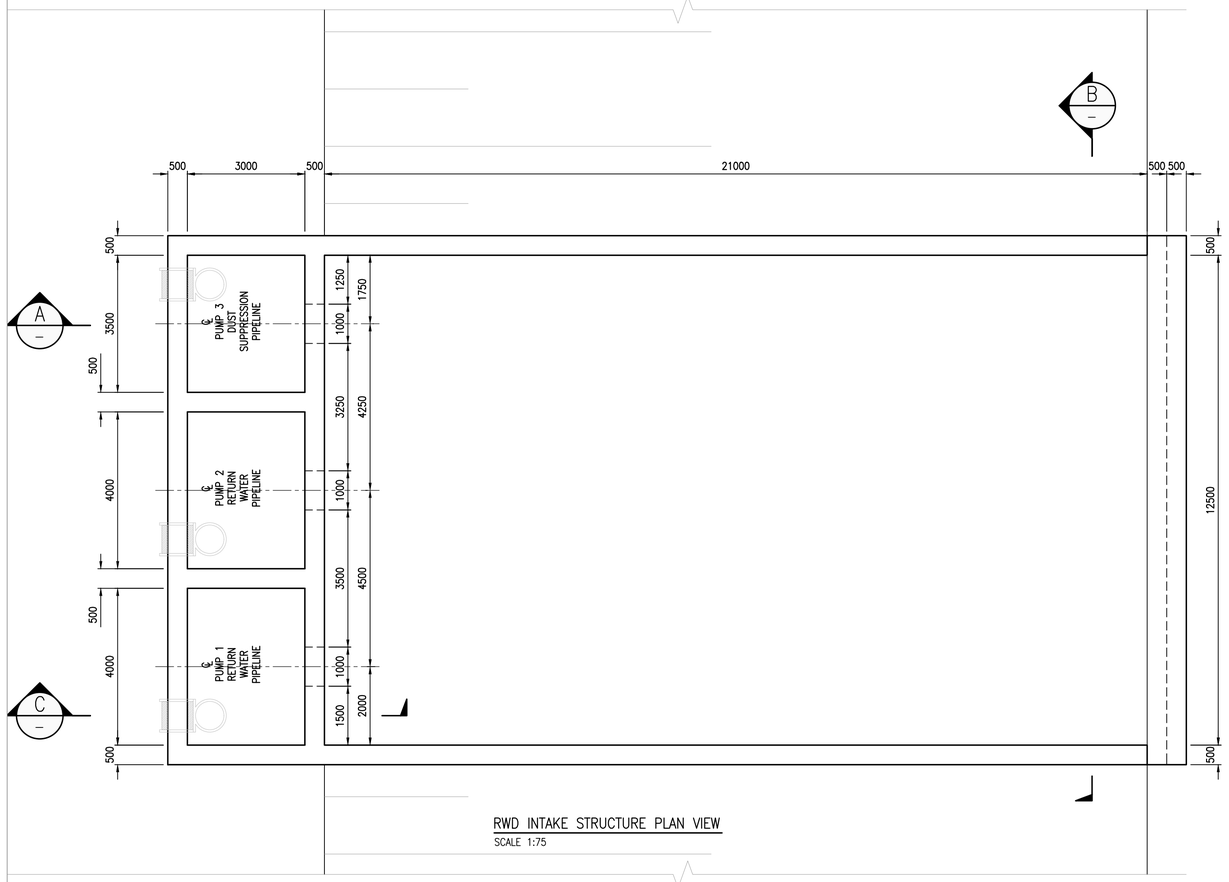
ANGLOGOLD ASHANTI

301-00204/13-352

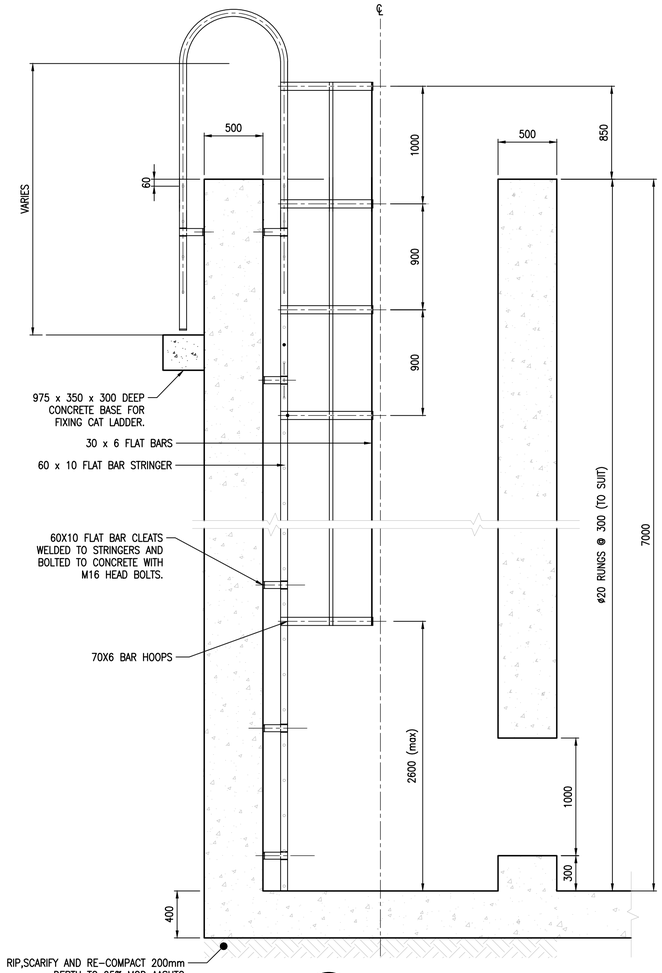
REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE: RETURN WATER AND STORM WATER DAMS-LINERS AND DETAILS

PROJECT No: CWR1806001 | B/UNIT AREA SEQ. No: MET-MWS-39-C0031 | REV B | SIZE – A1

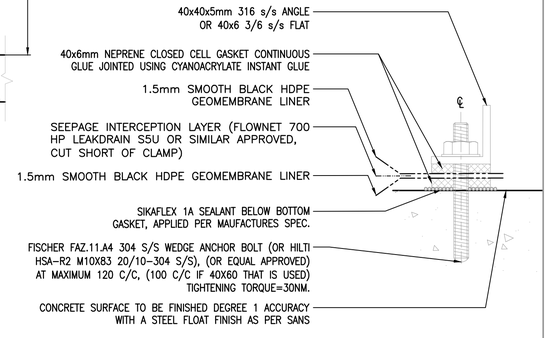
P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-352 RevB.dwg



RWD INTAKE STRUCTURE PLAN VIEW
SCALE 1:75



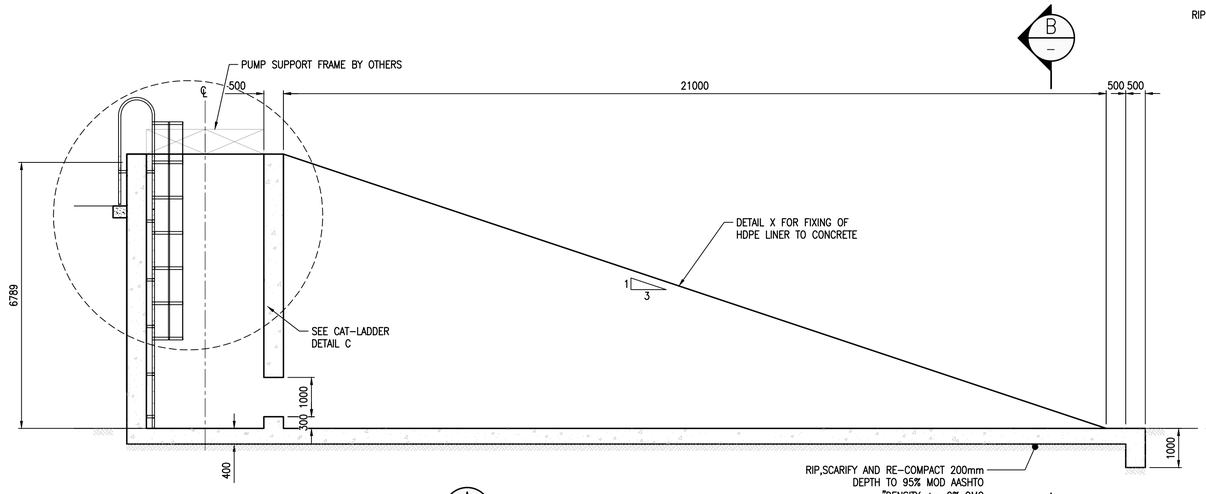
C CAT-LADDER DETAILS
SCALE 1:25



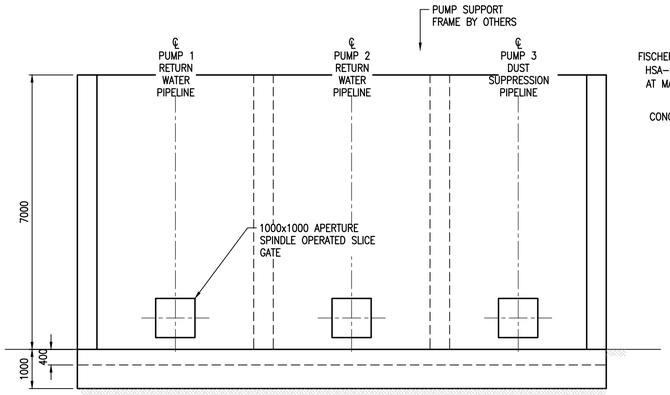
X TYPICAL HDPE CONCRETE FIXING DETAIL
SCALE 1:2

1000 0 1000 3000 5000
MILLIMETRES 1:75

500 0 500 1000 1500
MILLIMETRES 1:20



A TYPICAL SECTION
SCALE 1:75



B TYPICAL SECTION
SCALE 1:75

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

TITLE	DRG. No
RETURN WATER AND STORM WATER DAMS-LAYOUT	301-00204/13-350
RETURN WATER PIPELINE LAYOUT AND MATERIAL LIST - DETAIL 8	301-00204/13-350
DUST SUPPRESSION TRANSFER SYSTEM-PLANS ,SECTIONS AND MATERIAL LIST - DETAIL 4	301-00204/13-212

REFERENCE DRAWINGS

DETAIL	MARK	DATE	INIT	APP'D
ISSUED FOR APPROVAL	A	12/04/2018		
ISSUED FOR TENDER	B	16/01/2019		
ISSUED FOR TENDER	C	28/03/2019		

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	FB			12/04/2018
CHECKED	DGS			12/04/2018
SENIOR DESIGNER: MET PROJECTS	DGS			12/04/2018
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER	DGS			12/04/2018
MET PROJECTS MANAGER				12/04/2018

ANGLOGOLD ASHANTI

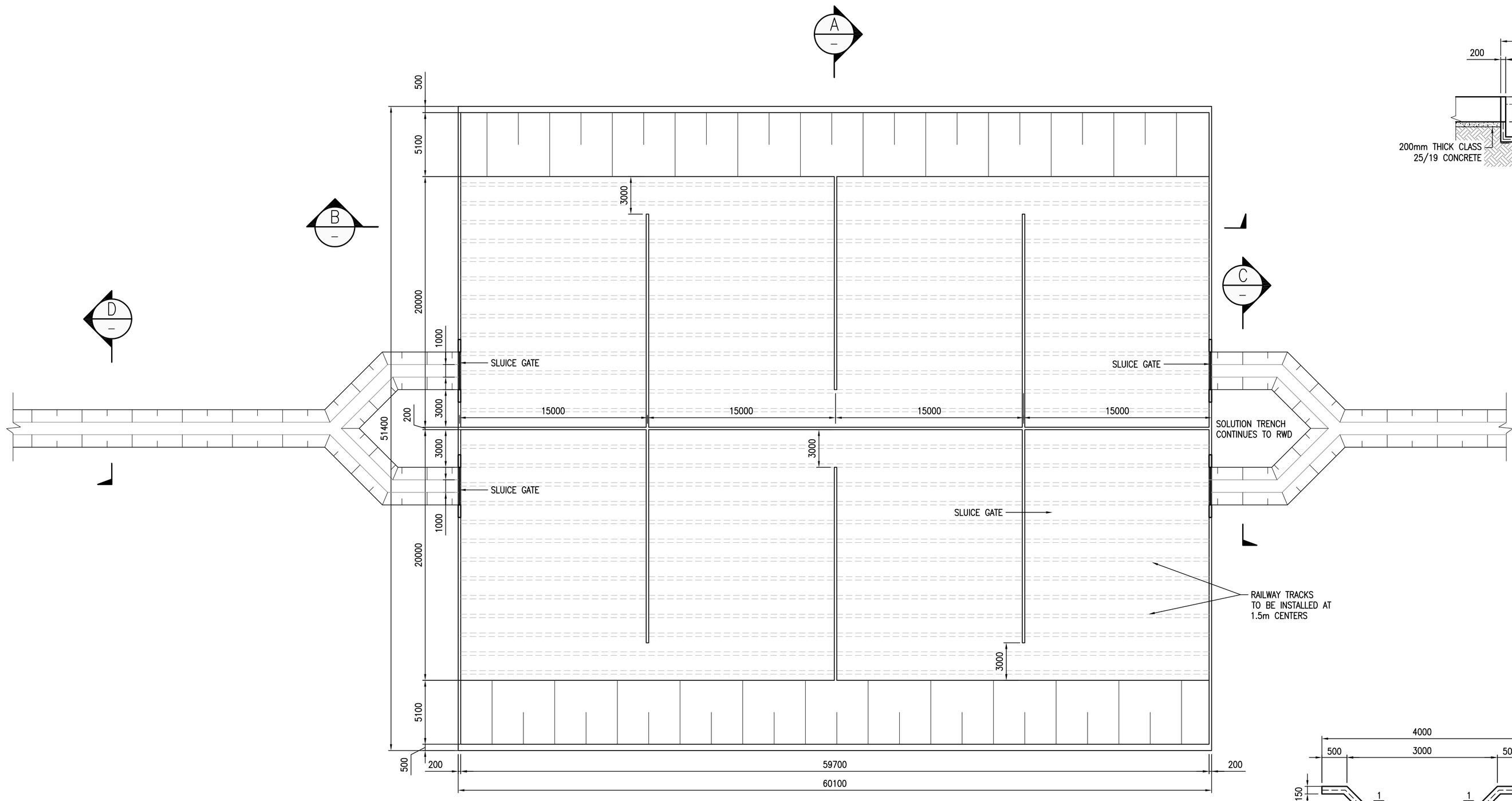
MET PROJECTS

301-00204/13-353

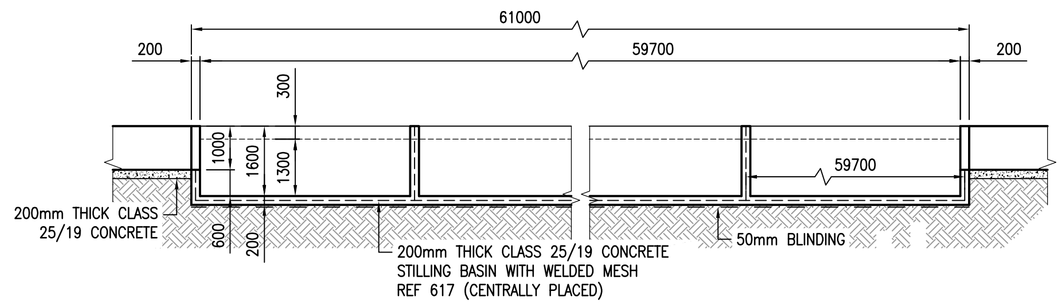
REGION: SOUTH AFRICA REGION - VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE: RETURN WATER DAM PUMP SUMP CONCRETE DETAILS FOR RETURN WATER AND DUST SUPPRESSION

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

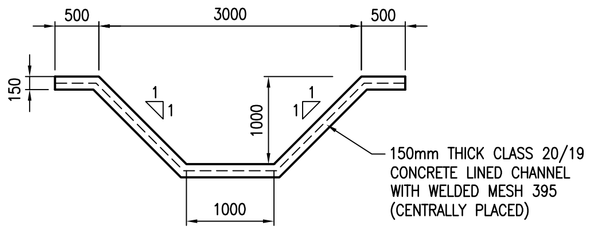
P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-353 RevB.dwg



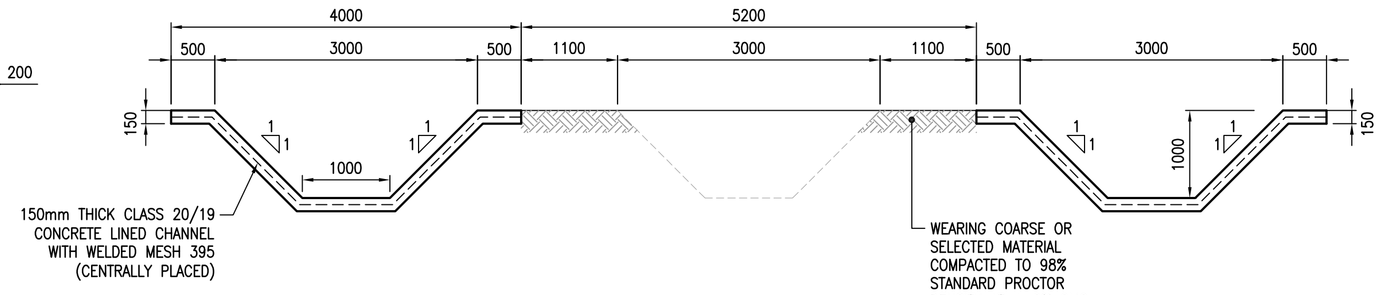
SILT TRAP PLAN LAYOUT
SCALE 1:200



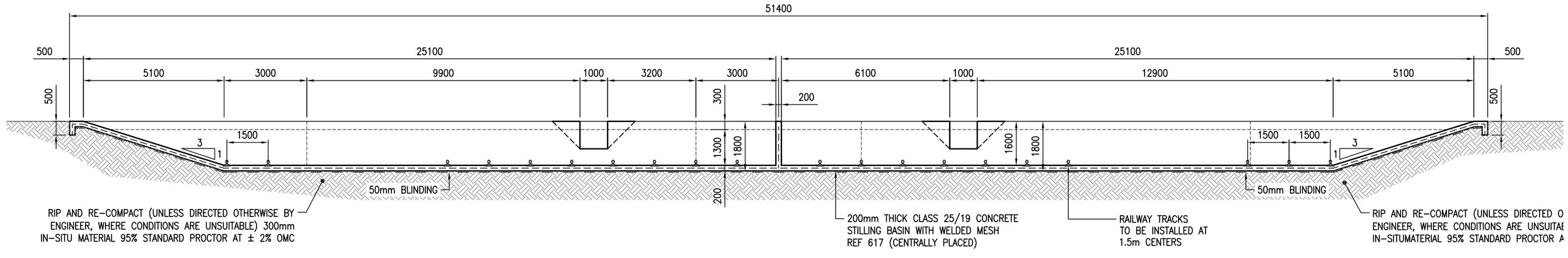
B TYPICAL SECTION
SCALE 1:100



D TYPICAL SECTION THROUGH CONCRETE CHANNEL
SCALE 1:50



C TYPICAL SECTION
SCALE 1:50



A TYPICAL SECTION
SCALE 1:100

1000 0 2000 4000
MILLIMETRES 1:50

2500 0 2500 5000 7500
MILLIMETRES 1:100

5 0 5 10 15
METRES 1:200

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

TITLE	DRG. No
RETURN WATER AND STORM WATER DAMS-LAYOUT	301-00204/13-350

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 - LAYOUT UPDATED	C	29.01.2019		

REVISIONS

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

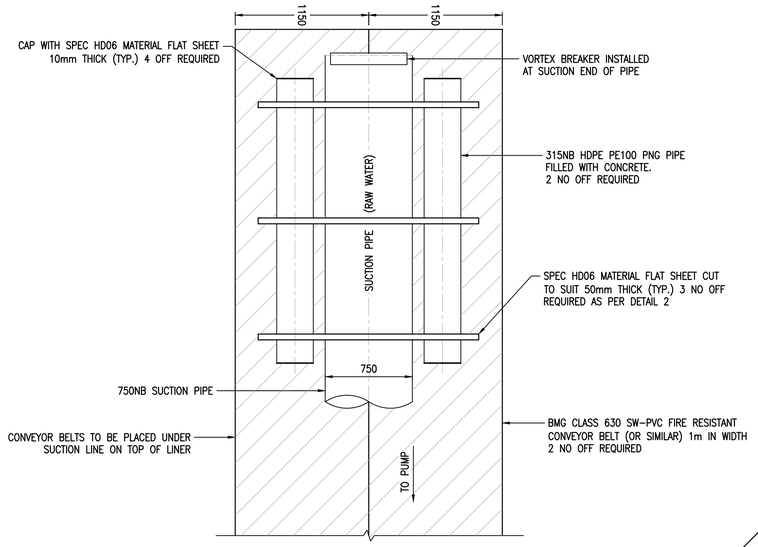
MET PROJECTS

301-00204/13-355

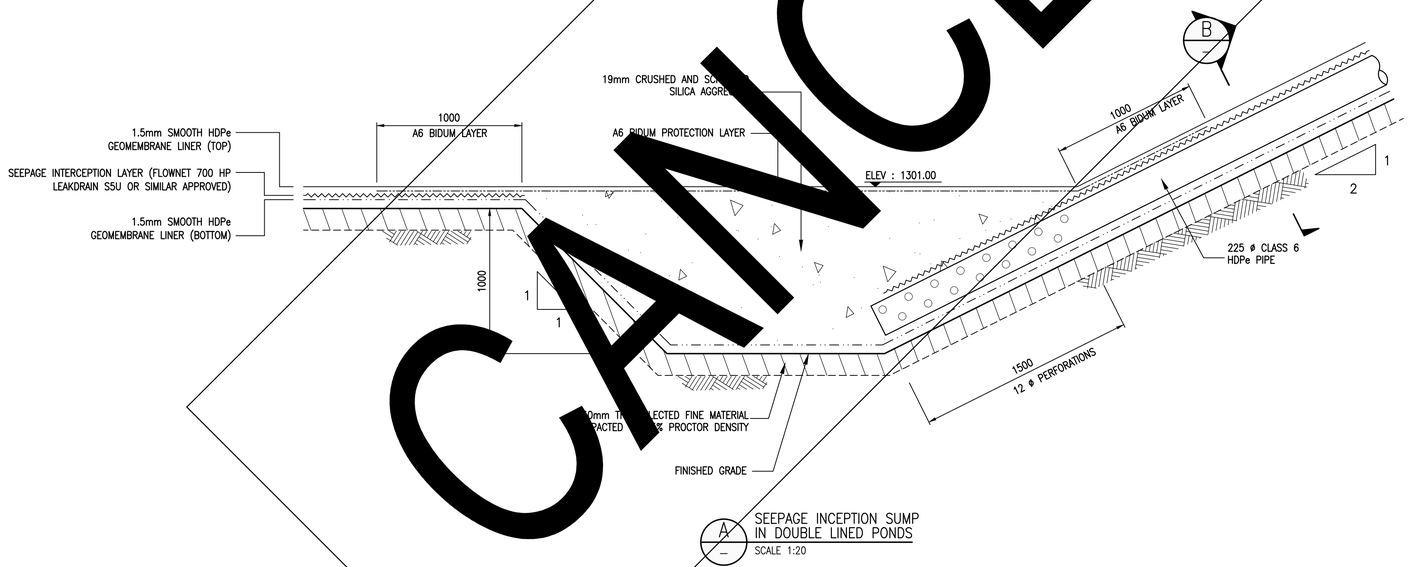
REGION: SOUTH AFRICA REGION - VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE: SILT TRAPS-LAYOUT AND SECTIONS (CONCRETE DETAILS)

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE
CWR1806001	MET-MWS-39-C0034			REV C / A1

P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-355 RevC.dwg



1 — TYPICAL SUCTION PIPES AND STABILIZERS DETAIL
SCALE 1:25



A — SEEPAGE INCEPTION SUMP IN DOUBLE LINED PONDS
SCALE 1:20

CANCELLED

SITE PLAN

50 0 50 100 150
METRES
1:2500

SCALE: 1:1

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

ISSUED FOR APPROVAL	A	20.11.2018		
DRAWING CANCELLED	B	29.03.2019		

TITLE	DRG. No
REFERENCE DRAWINGS	

DETAIL	MARK	DATE	INIT.	APP'D
REVISIONS				

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	NAME			20.11.2018

ANGLOGOLD ASHANTI

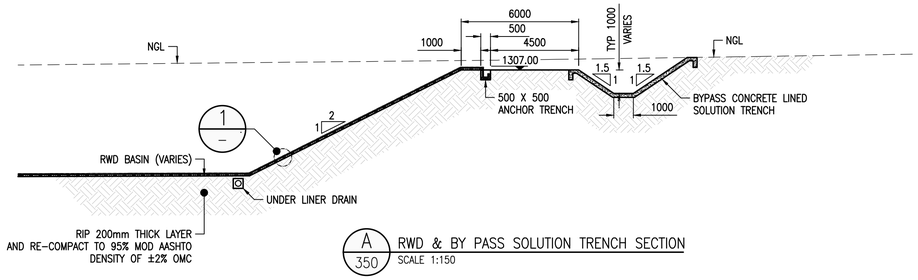
MET PROJECTS

301-00204/13-356

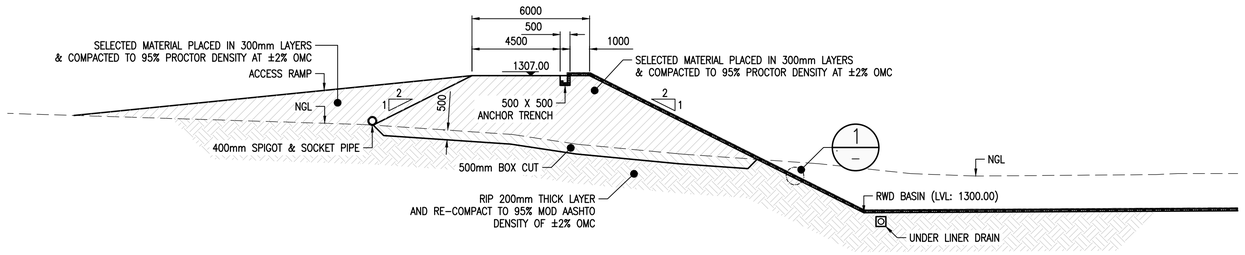
REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE RETURN WATER AND STORM WATER DAMS-LINERS AND DETAILS

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE – A1
CWR1806001	MET-MWS-39-C0031			REV B

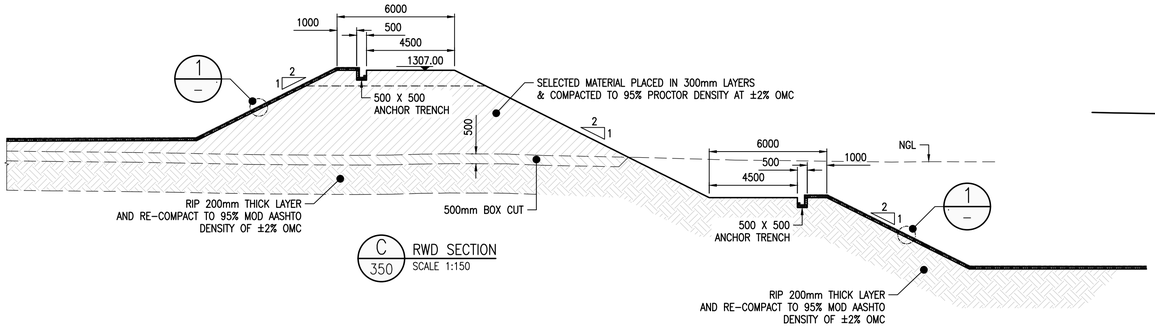
P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-356 Rev4.dwg



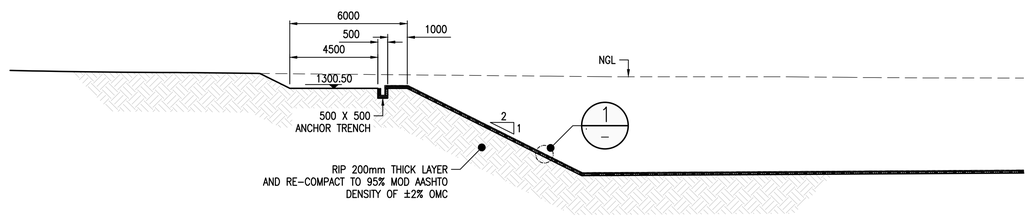
A 350 RWD & BY PASS SOLUTION TRENCH SECTION
SCALE 1:150



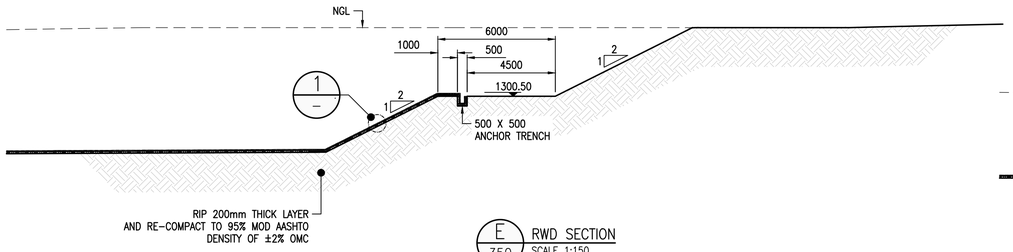
B 350 RWD SECTION
SCALE 1:150



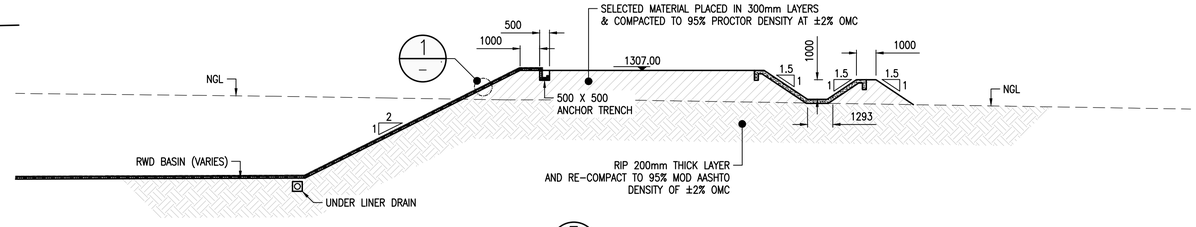
C 350 RWD SECTION
SCALE 1:150



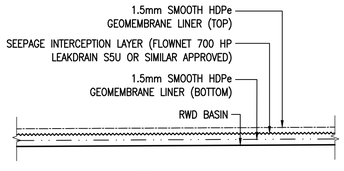
D 350 RWD SECTION
SCALE 1:150



E 350 RWD SECTION
SCALE 1:150



F 350 RWD SECTION
SCALE 1:150



1 — TYPICAL LINER DETAIL
SCALE 1:10

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
RETURN WATER AND STORM WATER DAMS-LAYOUT	301-00204/13-350	ISSUED FOR APPROVAL	A	20.11.2018		
RETURN WATER AND STORM WATER DAMS LONG SECTION AND CROSS SECTIONS	301-00204/13-351	ISSUED FOR TENDER	B	25.11.2019		
RETURN WATER AND STORM WATER DAMS-LINER AND DETAILS	301-00204/13-352					

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

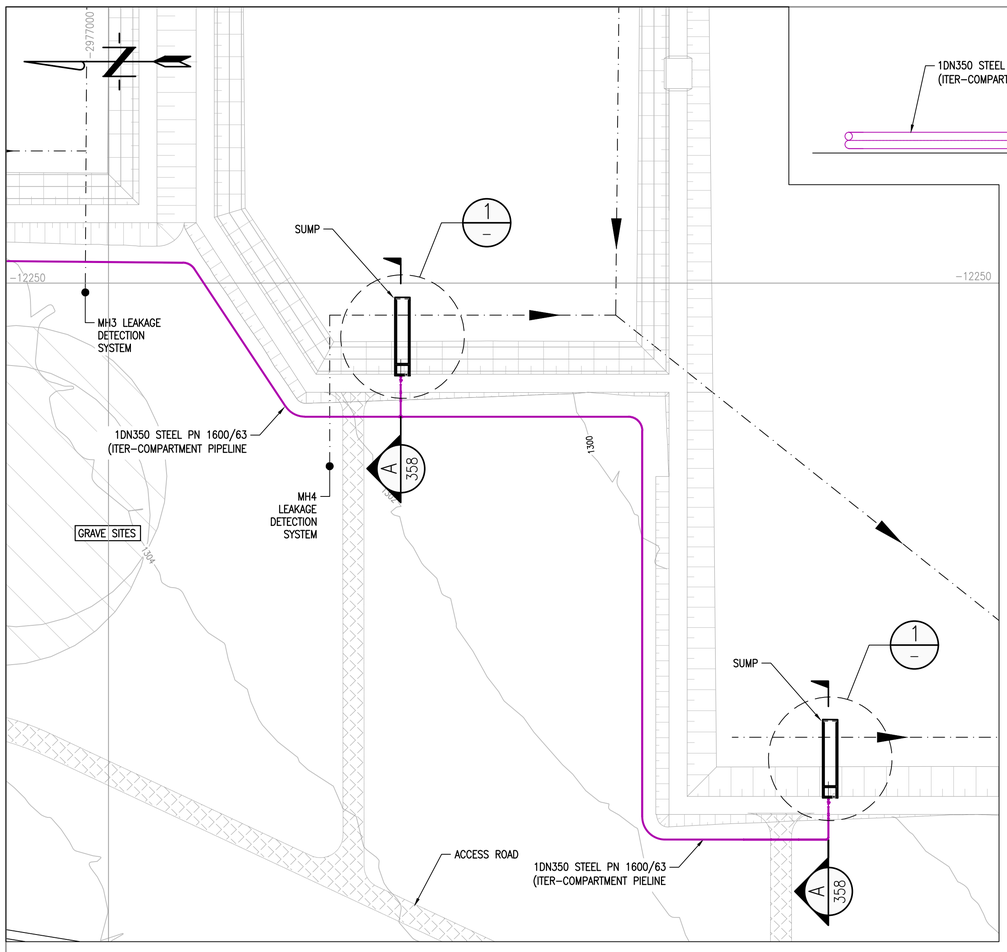
MET PROJECTS

301-00204/13-357

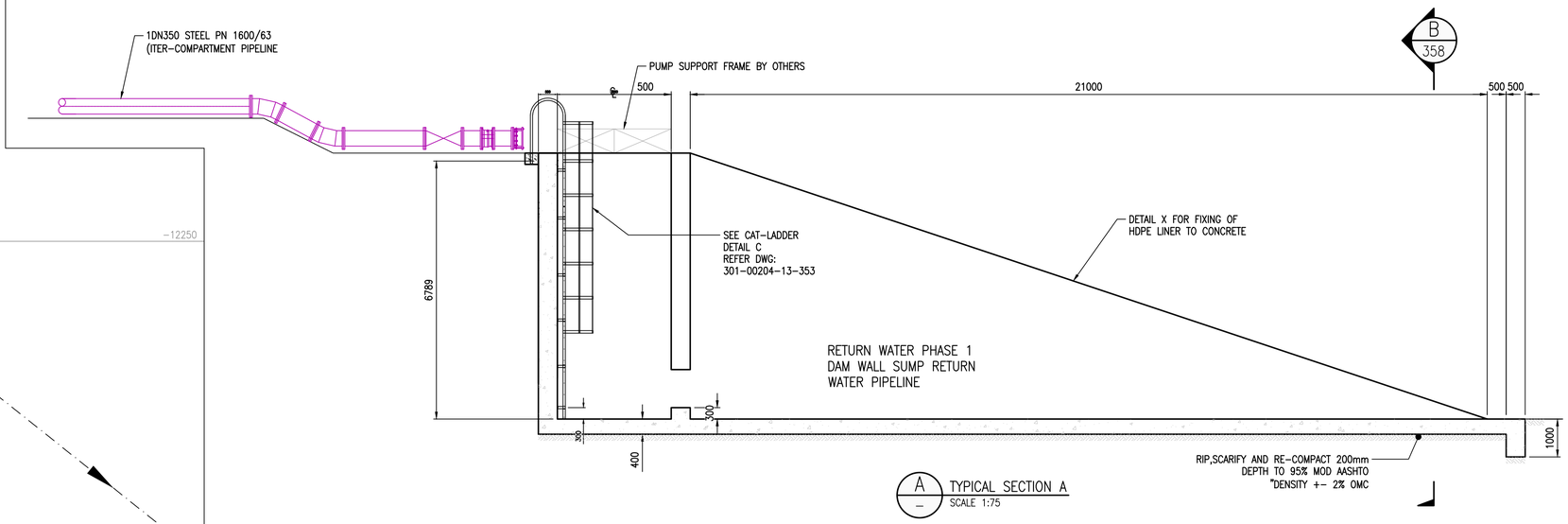
REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE: RETURN WATER AND STORM WATER DAMS DETAILED SECTIONS AND EARTHWORKS

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE – A1
CWR1806001	MET	MWS	39-C0035	REV B

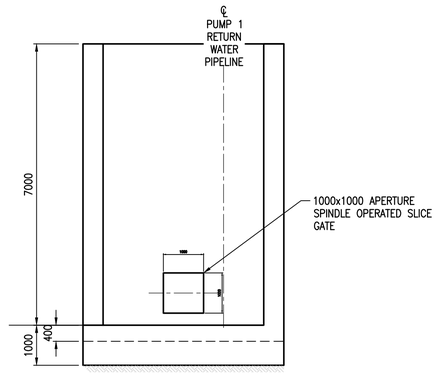
P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-350,351,357 RevD,B,A.dwg



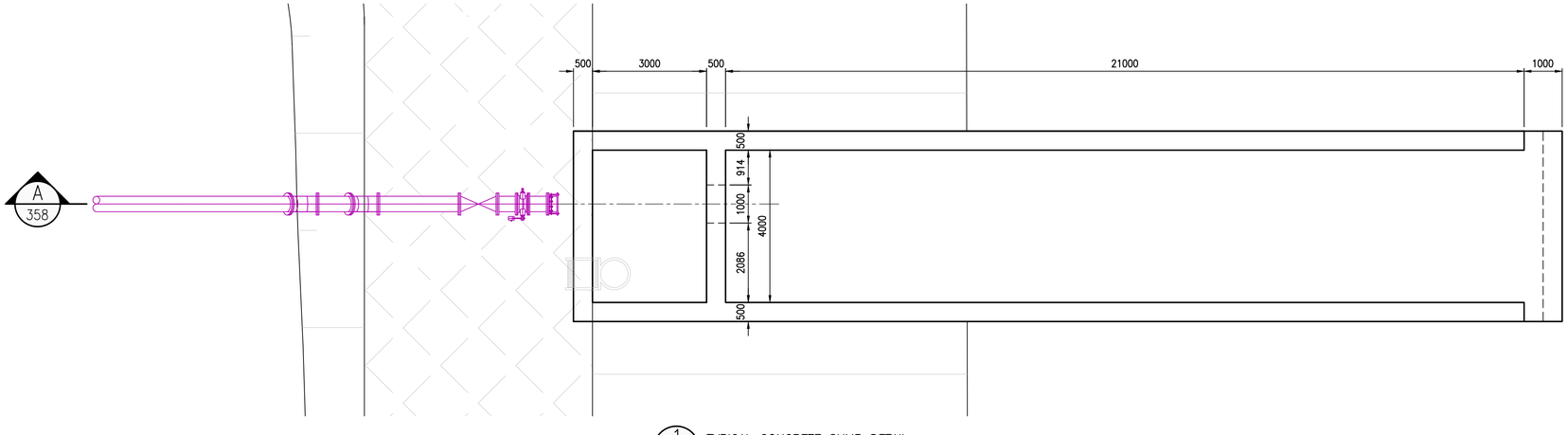
RETURN WATER DAMS INTER-COMPARTMENT PIPLINE DISCHARGE LAYOUT
SCALE 1:1000



A TYPICAL SECTION A
SCALE 1:75



B TYPICAL SECTION
SCALE 1:75



1 TYPICAL CONCRETE SUMP DETAIL
SCALE 1:75

1000 0 1000 3000 5000
MILLIMETRES 1:75

25 0 25 50 75
METRES 1:1000

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: 1:1000

RETURN WATER DAM PUMP SUMP CONCRETE DETAILS FOR RETURN WATER AND DUST SIPPRESSION	301-00204-13-353	ISSUED FOR TENDER	A	04.01.2019			
TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D	
REFERENCE DRAWINGS		REVISIONS					

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
DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE

ANGLOGOLD ASHANTI

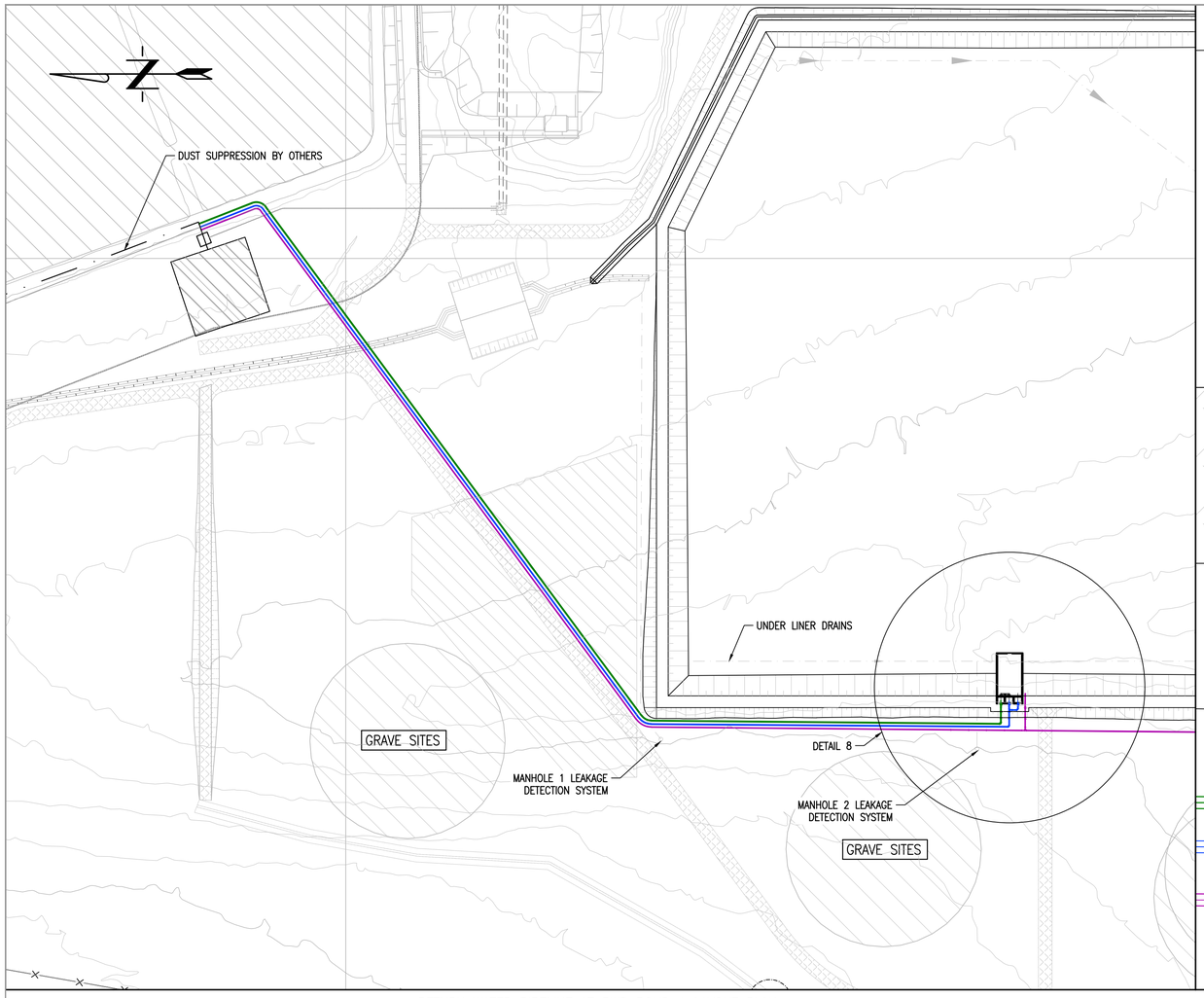
MET PROJECTS

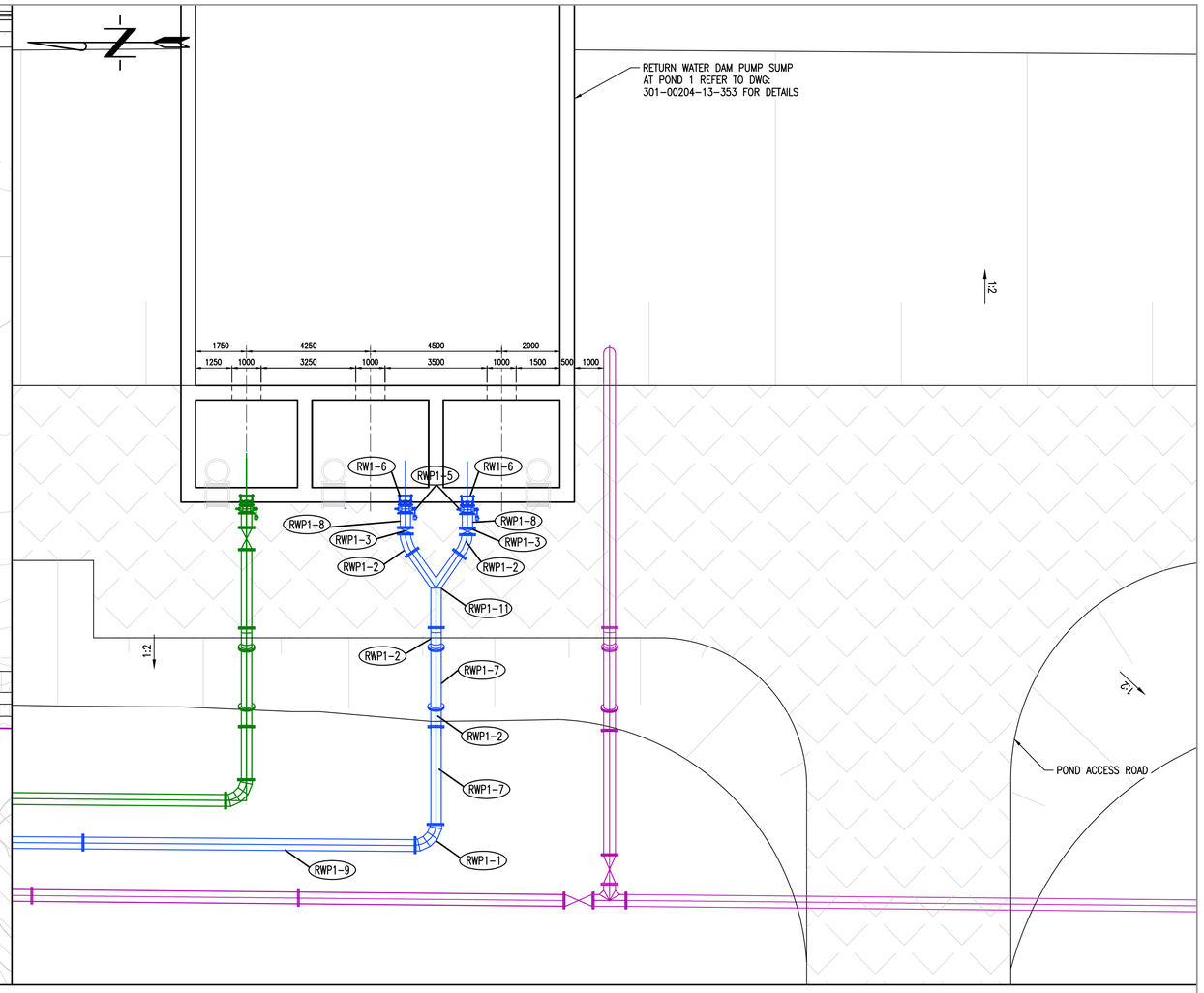
301-00204/13-358

REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE INTER-COMPARTMENT PUMPS SYSTEM: CONCRETE LAYOUT, SECTION AND DETAILS.

CWR1806001	MET-MWS-39-C0089	REV A
PROJECT No:	B/UNIT AREA SEQ. No:	SIZE - A1

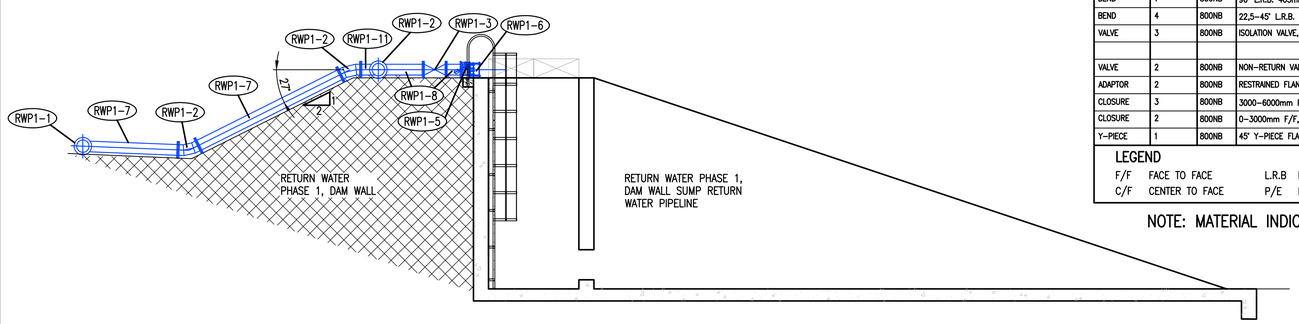
P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-358 RevA.dwg





RETURN WATER PIPELINE AT RWD POND 1 LAYOUT PLAN
SCALE 1:500

DETAIL 8 LAYOUT FOR (RETURN WATER PIPELINE AT POND 1)
SCALE 1:100



SECTION THROUGH DETAIL 8
SCALE 1:100

MATERIAL LIST (RETURN WATER PIPELINE)

ITEM	Qty.	SIZE	DESCRIPTION	MK	WALL (mm)	Flg. (PN)	LINER (mm)
BEND	1	800NB	90° L.R.B. 405mm C/F, FLANGED BOTH ENDS ,HDPE LINED	RWP1-1	6	2500/3	.
BEND	4	800NB	22,5-45° L.R.B. 405mm C/F, FLANGED BOTH ENDS ,HDPE LINED	RWP1-2	6	2500/3	.
VALVE	3	800NB	ISOLATION VALVE, FLANGED, BUTTERFLY	RWP1-3	.	2500/3	.
						2500/3	
VALVE	2	800NB	NON-RETURN VALVE, TILTING DISC, FLANGED	RWP1-5	.	2500/3	.
ADAPTOR	2	800NB	RESTRAINED FLANGE ADAPTOR, DRILLED TO SUIT NON-RETURN VALVE	RWP1-6	.	2500/3	.
CLOSURE	3	800NB	3000-6000mm F/F, FLANGED BOTH END, SUPPLY WITH LOOSE FLANGE *	RWP1-7	6	2500/3	.
CLOSURE	2	800NB	0-3000mm F/F, FLANGED BOTH END, SUPPLY WITH LOOSE FLANGE *	RWP1-8	6	2500/3	.
Y-PIECE	1	800NB	45° Y-PIECE FLANGED BOTH ENDS HDPE LINED	RWP1-11	6	2500/3	.

LEGEND
F/F FACE TO FACE L.R.B LONG RADIUS BEND * TO BE CONFIRMED ON SITE
C/F CENTER TO FACE P/E PLAIN ENDED

NOTE: MATERIAL INDICATED IS FOR RETURN WATER PIPELINE DETAIL 8

MATERIAL LIST (RETURN WATER PIPELINE FROM DETAIL 8-END)

ITEM	Qty.	SIZE	DESCRIPTION	MK	WALL (mm)	Flg. (PN)	LINER (mm)
SPOOL	58	800ND	9144mm F/F, FLANGED BOTH ENDS ,HDPE LINED	RWP1-9	6	2500/3	.
BEND	1	800ND	45°-90° L.R.B. 405mm C/F, FLANGED BOTH ENDS ,HDPE LINED	RWP1-10	6	2500/3	.
CLOSURE	7	800ND	0-3000mm F/F, FLANGED BOTH END, SUPPLY WITH LOOSE FLANGE *	RWP1-8	6	2500/3	.
BEND	1	800NB	22,5-45° L.R.B. 405mm C/F, FLANGED BOTH ENDS ,HDPE LINED	RWP1-2	8	2500/3	.
VALVE	3	800ND	ISOLATION VALVE, FLANGED, BUTTERFLY	RWP1-3	.	2500/3	.

LEGEND
F/F FACE TO FACE L.R.B LONG RADIUS BEND * TO BE CONFIRMED ON SITE
C/F CENTER TO FACE P/E PLAIN ENDED

NOTE: MATERIAL INDICATED IS FOR ENTIRE RETURN WATER PIPELINE

2500 0 2500 5000 7500
MILLIMETRES 1:100
50 0 50 100
METRES 1:1500

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: 1:1500

MARK	DATE	DESCRIPTION	INIT	APP'D
A	03.13.2019	ISSUED FOR TENDER		
B	03.29.2019	ISSUED FOR TENDER (MATERIAL LIST UPDATED)		

REVISIONS

REFERENCE DRAWINGS

TITLE	DRG. No
DUST SUPPRESSION & RETURN WATER TRANSFER SYSTEMS GENERAL ARRANGEMENT SHEET 2OF2	301-00204/13-207
DUST SUPPRESSION & RETURN WATER TRANSFER SYSTEMS GENERAL ARRANGEMENT SHEET 1OF2	301-00204/13-207

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	EN/FB			03.13.2019
CHECKED	TM			03.13.2019
SENIOR DESIGNER MET PROJECTS	DGS			03.13.2019
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER	DGS			03.13.2019
MET PROJECTS MANAGER				03.13.2019

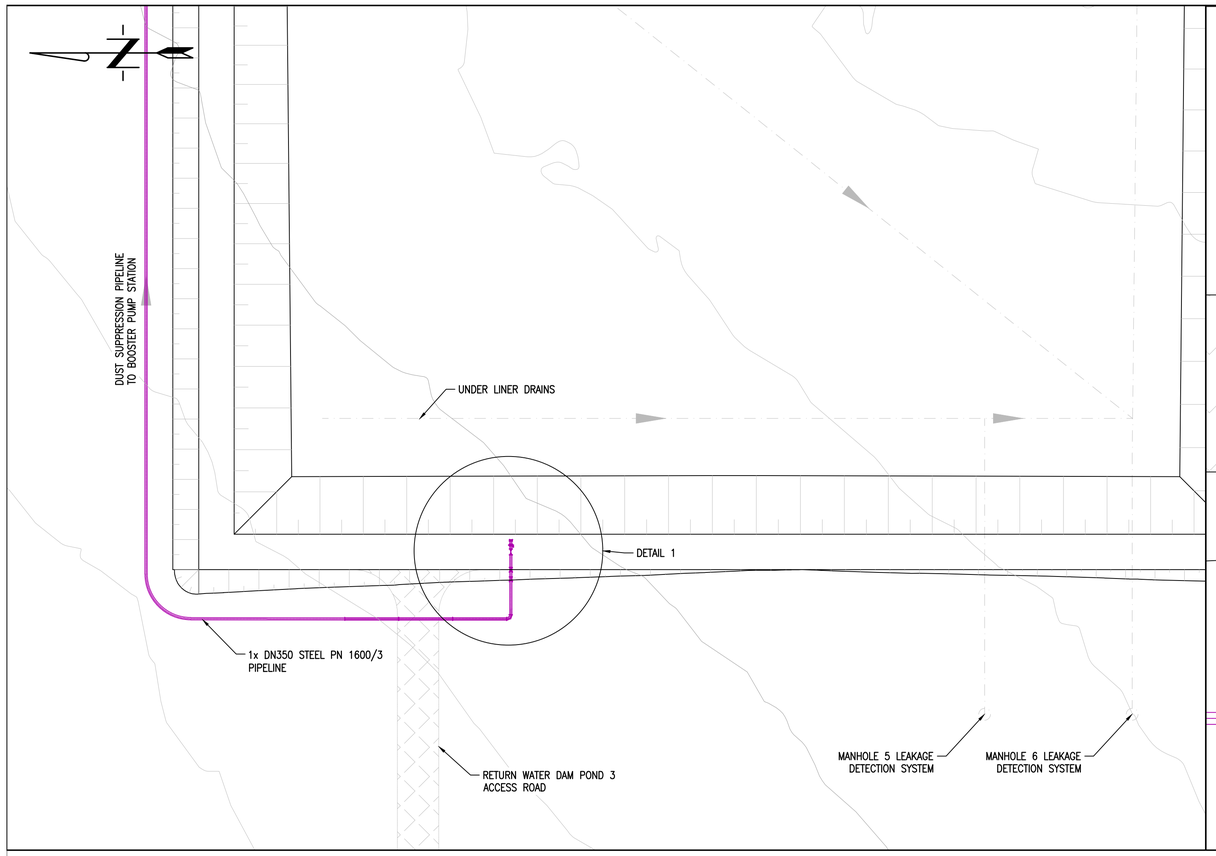
ANGLOGOLD ASHANTI

301-00204/13-360
REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE RETURN WATER PIPELINE-LAYOUT AND MATERIAL LIST - DETAIL 8

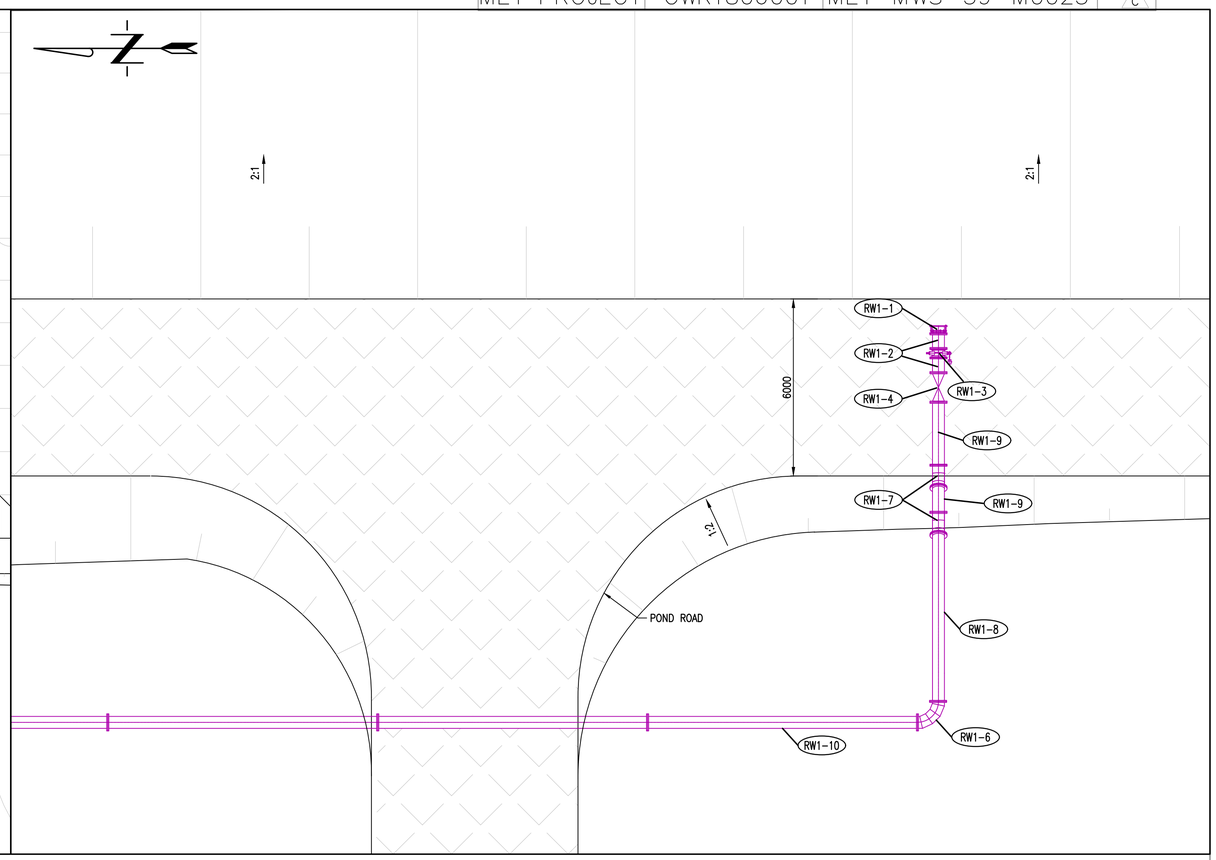
CWR1806001 | REV B

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

P:\301-00204\13\A\DRAWINGS\VP\For Tender\301-00204-13-361,362,363,359 RevC.dwg



INTER-COMPARTMENT TRANSFER SYSTEM AT RWD POND 3 LAYOUT PLAN
SCALE 1:500



DETAIL 1 LAYOUT FOR (INTER-COMPARTMENT TRANSFER SYSTEM AT POND 3)
SCALE 1:100

MATERIAL LIST (INTER-COMPARTMENT)

ITEM	Qty.	SIZE	DESCRIPTION	MK	WALL (mm)	Flg. (PN)	LINER (mm)
ADAPTOR	1	DN350	RESTRAINED FLANGE ADAPTOR, DRILLED TO SUIT NON-RETURN VALVE	RW1-1	.	1600/3	.
SPOOL	2	DN350	500mm F/F, FLANGED BOTH ENDS ,HDPE LINED	RW1-2	6	1600/3	12
VALVE	1	DN350	NON-RETURN VALVE, TILTING DISC, FLANGED	RW1-3	.	1600/3	.
VALVE	1	DN350	ISOLATION VALVE, FLANGED, BUTTERFLY	RW1-4	.	1600/3	.
BEND	1	DN350	90° L.R.B. 405mm C/F, FLANGED BOTH ENDS ,HDPE LINED	RW1-6	6	1600/3	12
BEND	2	DN350	22,5-45° L.R.B. 405mm C/F, FLANGED BOTH ENDS ,HDPE LINED	RW1-7	6	1600/3	12
CLOSURE	1	DN350	3000-6000mm F/F, FLANGED BOTH END, SUPPLY WITH LOOSE FLANGE *	RW1-8	6	1600/3	12
CLOSURE	2	DN350	0-3000mm F/F, FLANGED BOTH END, SUPPLY WITH LOOSE FLANGE *	RW1-9	6	1600/3	12

LEGEND
F/F FACE TO FACE L.R.B LONG RADIUS BEND * TO BE CONFIRMED ON SITE
C/F CENTER TO FACE P/E PLAIN ENDED

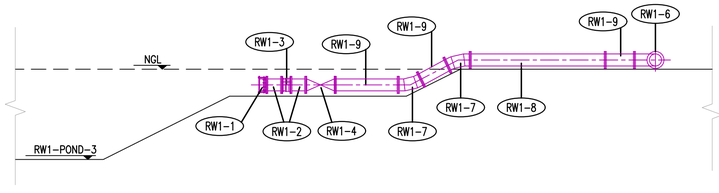
NOTE: MATERIAL INDICATED IS FOR INTER-COMPARTMENT TRANSFER SYSTEM AT POND 3

MATERIAL LIST (INTER-COMPARTMENT FROM DETAIL 1-2)

ITEM	Qty.	SIZE	DESCRIPTION	MK	WALL (mm)	Flg. (PN)	LINER (mm)
SPOOL	26	DN350	9144mm F/F, FLANGED BOTH ENDS ,HDPE LINED	RW1-10	6	1600/3	12
CLOSURE	2	DN350	6000-9000mm F/F, FLANGED BOTH END, SUPPLY WITH LOOSE FLANGE *	RW1-15	6	1600/3	12
CLOSURE	2	DN350	0-3000mm F/F, FLANGED BOTH END, SUPPLY WITH LOOSE FLANGE *	RW1-9	6	1600/3	12
BEND	2	DN350	90° L.R.B. 405mm C/F, FLANGED BOTH ENDS ,HDPE LINED	RW1-6	6	1600/3	12
TEE	1	DN350	EQUAL GUSSET TEE PIERCE, 560mm C/F, FLANGED BOTH END ,HDPE LINED	RW1-12	8	1600/3	.
VALVE	1	DN350	ISOLATION VALVE, FLANGED, BUTTERFLY	RW1-3	.	1600/3	.

LEGEND
F/F FACE TO FACE L.R.B LONG RADIUS BEND * TO BE CONFIRMED ON SITE
C/F CENTER TO FACE P/E PLAIN ENDED

NOTE: MATERIAL INDICATED IS FOR INTER-COMPARTMENT TRANSFER SYSTEM AT POND 3 DETAIL 1 TO DETAIL 2



TYPICAL SECTION OF DETAIL 1
SCALE 1:100

10 0 20 40
METRES 1:500
2500 0 2500 5000 7500
MILLIMETRES 1:100

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

ISSUED FOR TENDER	A	2019.02.01		
ISSUED FOR TENDER	B	2019.03.13		
ISSUED FOR TENDER (MATERIAL LIST UPDATED)	C	2019.03.28		

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	TG			25/01/2018
CHECKED	TM			25/01/2019
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER	DGS			
PR TECH				
PROJECT / MET ENGINEER	DGS			25/01/2019
MET PROJECTS MANAGER				25/01/2019

TITLE	DRG. No
DUST SUPPRESSION & RETURN WATER TRANSFER SYSTEMS GENERAL ARRANGEMENT SHEET 2OF2	301-00204/13-207
DUST SUPPRESSION & RETURN WATER TRANSFER SYSTEMS GENERAL ARRANGEMENT SHEET 1OF2	301-00204/13-207

REFFERENCE DRAWINGS

DETAIL	MARK	DATE	INIT.	APP'D

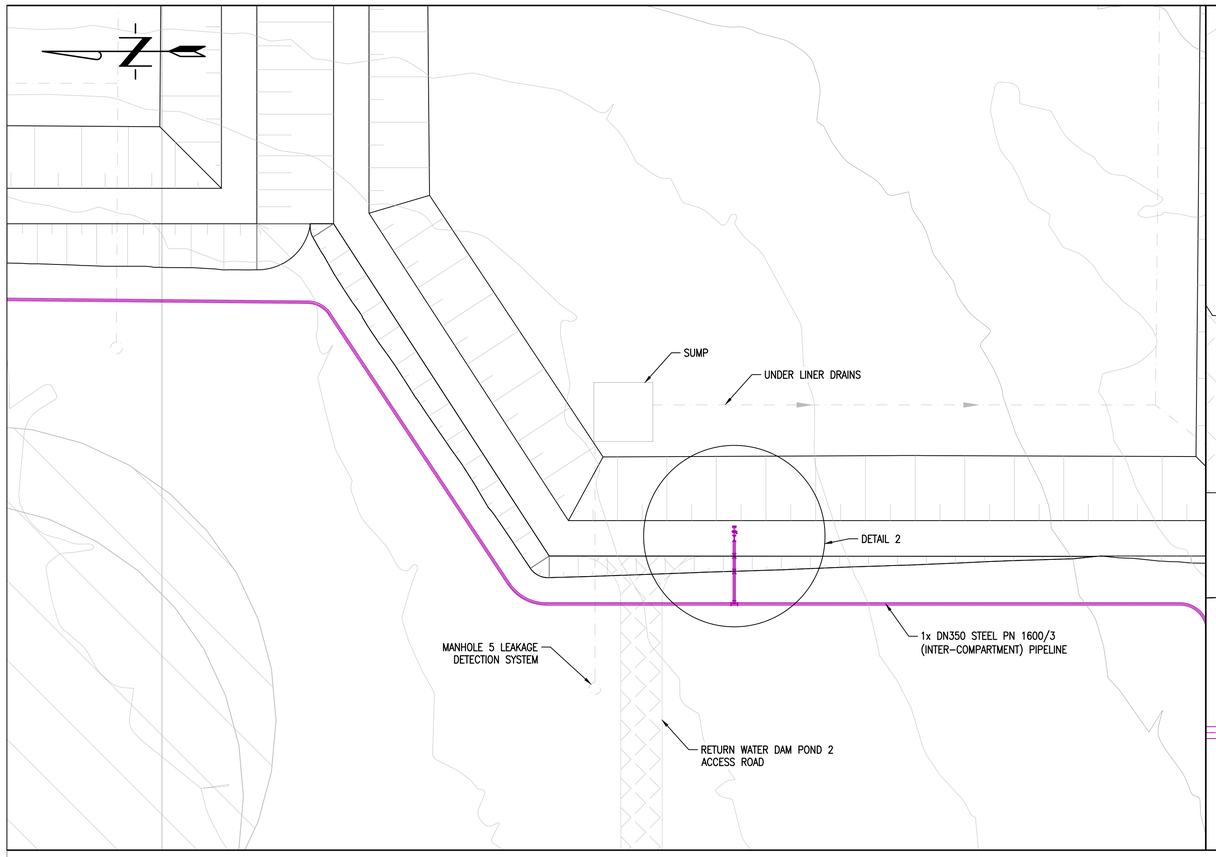
REVISIONS

ANGLOGOLD ASHANTI
COPYRIGHT
MET PROJECTS

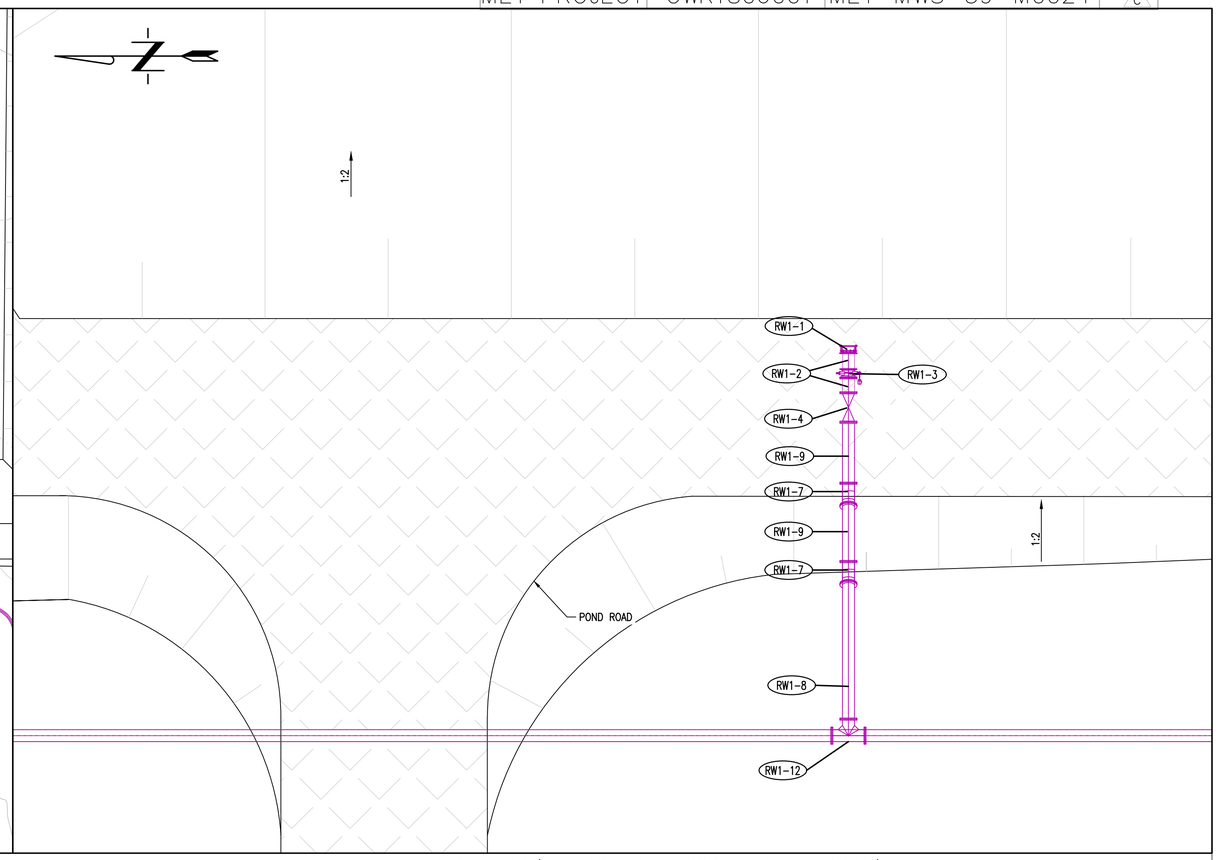
301-00204/13-361
REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE INTER-COMPARTMENT LAYOUT, SECTION AND MATERIAL LIST - DETAIL 1

PROJECT No: CWR1806001 | B/UNIT AREA SEQ. No: MET-MWS-39-M0023 | REV C | SIZE - A1

P:\301-00204\13\A\DRAWINGS\VSP\For Tender\301-00204-13-361,362,363,359 RevC.dwg



INTER-COMPARTMENT TRANSFER SYSTEM AT RWD POND 2 LAYOUT PLAN
SCALE 1:500



DETAIL 2 LAYOUT FOR (INTER-COMPARTMENT TRANSFER SYSTEM AT POND 2)
SCALE 1:100

MATERIAL LIST (INTER-COMPARTMENT)

ITEM	Qty.	SIZE	DESCRIPTION	MK	WALL (mm)	Flg. (PN)	LINER (mm)
ADAPTOR	1	DN350	RESTRAINED FLANGE ADAPTOR, DRILLED TO SUIT NON-RETURN VALVE	RW1-1	.	1600/3	.
SPOOL	2	DN350	500mm F/F, FLANGED BOTH ENDS ,HDPE LINED	RW1-2	6	1600/3	12
VALVE	1	DN350	NON-RETURN VALVE, TILTING DISC, FLANGED	RW1-3	.	1600/3	.
VALVE	1	DN350	ISOLATION VALVE, FLANGED, BUTTERFLY	RW1-4	.	1600/3	.
BEND	2	DN350	22,5-45° L.R.B. 405mm C/F, FLANGED BOTH ENDS ,HDPE LINED	RW1-7	6	1600/3	12
CLOSURE	1	DN350	3000-6000mm F/F, FLANGED ONE END, SUPPLY WITH LOOSE FLANGE *	RW1-8	6	1600/3	12
CLOSURE	2	DN350	0-3000mm F/F, FLANGED ONE END, SUPPLY WITH LOOSE FLANGE *	RW1-9	6	1600/3	12
TEE	1	DN350	EQUAL GUSSET TEE PIERCE, 560mm C/F, FLANGED BOTH END ,HDPE LINED	RW1-12	6	1600/3	.

LEGEND
F/F FACE TO FACE L.R.B LONG RADIUS BEND * TO BE CONFIRMED ON SITE
C/F CENTER TO FACE P/E PLAIN ENDED

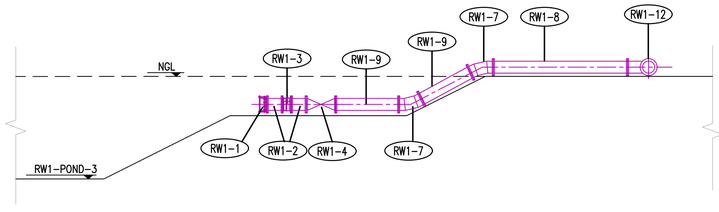
NOTE: MATERIAL INDICATED IS FOR INTER-COMPARTMENT TRANSFER SYSTEM AT POND 2

MATERIAL LIST (INTER-COMPARTMENT FROM DETAIL 2-3)

ITEM	Qty.	SIZE	DESCRIPTION	MK	WALL (mm)	Flg. (PN)	LINER (mm)
SPOOL	28	DN350	9144mm F/F, FLANGED BOTH ENDS ,HDPE LINED	RW1-5	6	1600/3	12
CLOSURE	2	DN350	6000-9000mm F/F, FLANGED BOTH END, SUPPLY WITH LOOSE FLANGE *	RW1-15	6	1600/3	12
BEND	2	DN350	45°-90° L.R.B. 405mm C/F, FLANGED BOTH ENDS ,HDPE LINED	RW1-14	6	1600/3	12

LEGEND
F/F FACE TO FACE L.R.B LONG RADIUS BEND * TO BE CONFIRMED ON SITE
C/F CENTER TO FACE P/E PLAIN ENDED

NOTE: MATERIAL INDICATED IS FOR INTER-COMPARTMENT TRANSFER SYSTEM AT POND 2 DETAIL 2 TO DETAIL 3



TYPICAL SECTION OF DETAIL 2
SCALE 1:100

10 0 20 40
METRES 1:500

2500 0 2500 5000 7500
MILLIMETRES 1:100

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

ISSUED FOR TENDER	A	2019.02.01		
ISSUED FOR TENDER	B	2019.03.13		
ISSUED FOR TENDER (MATERIAL LIST UPDATED)	C	2019.03.26		

TITLE	DRG. No
DUST SUPPRESSION & RETURN WATER TRANSFER SYSTEMS GENERAL ARRANGEMENT SHEET 2OF2	301-00204/13-207
DUST SUPPRESSION & RETURN WATER TRANSFER SYSTEMS GENERAL ARRANGEMENT SHEET 1OF2	301-00204/13-207

REFFERENCE DRAWINGS

DETAIL | MARK | DATE | INIT. | APP'D

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	TG			25/01/2018
CHECKED	TM			25/01/2019
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER	DGS			
PR TECH				
PROJECT / MET ENGINEER	DGS			25/01/2019
MET PROJECTS MANAGER				25/01/2019

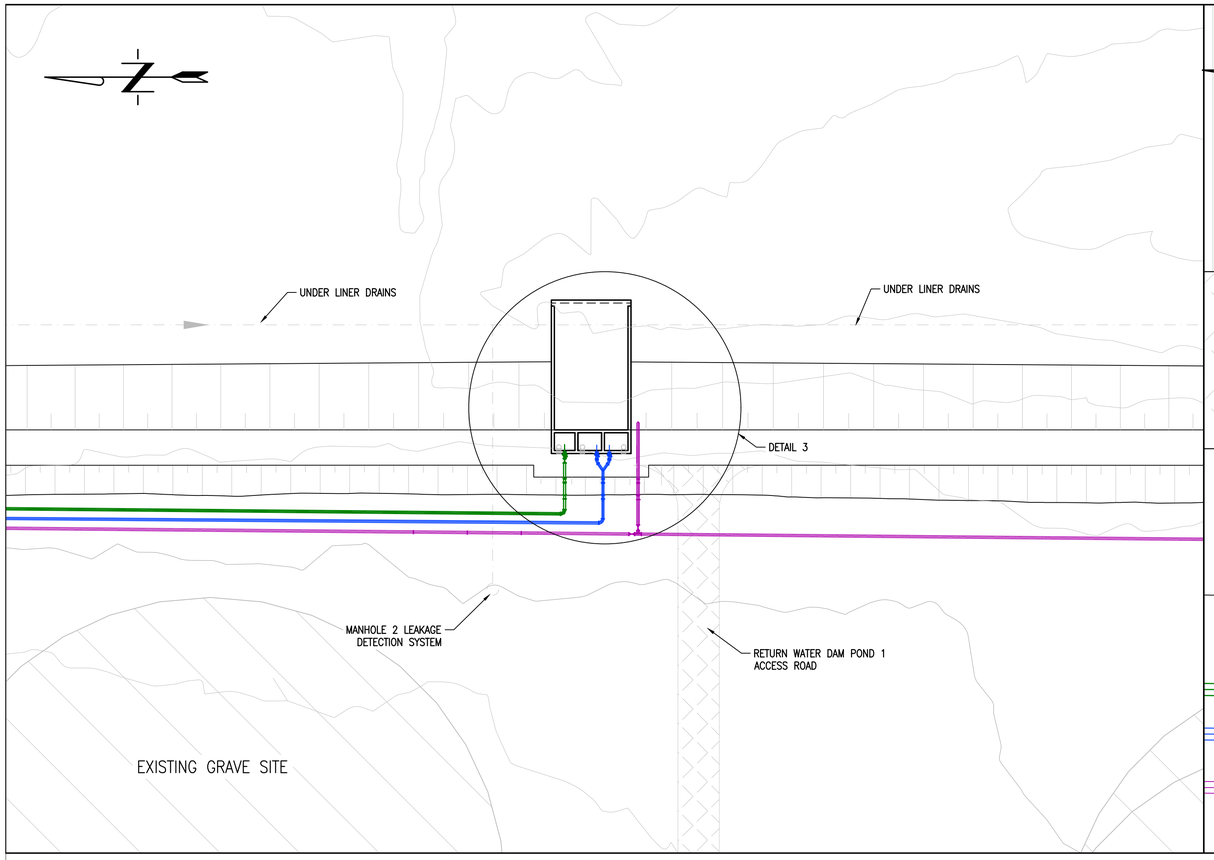
ANGLOGOLD ASHANTI

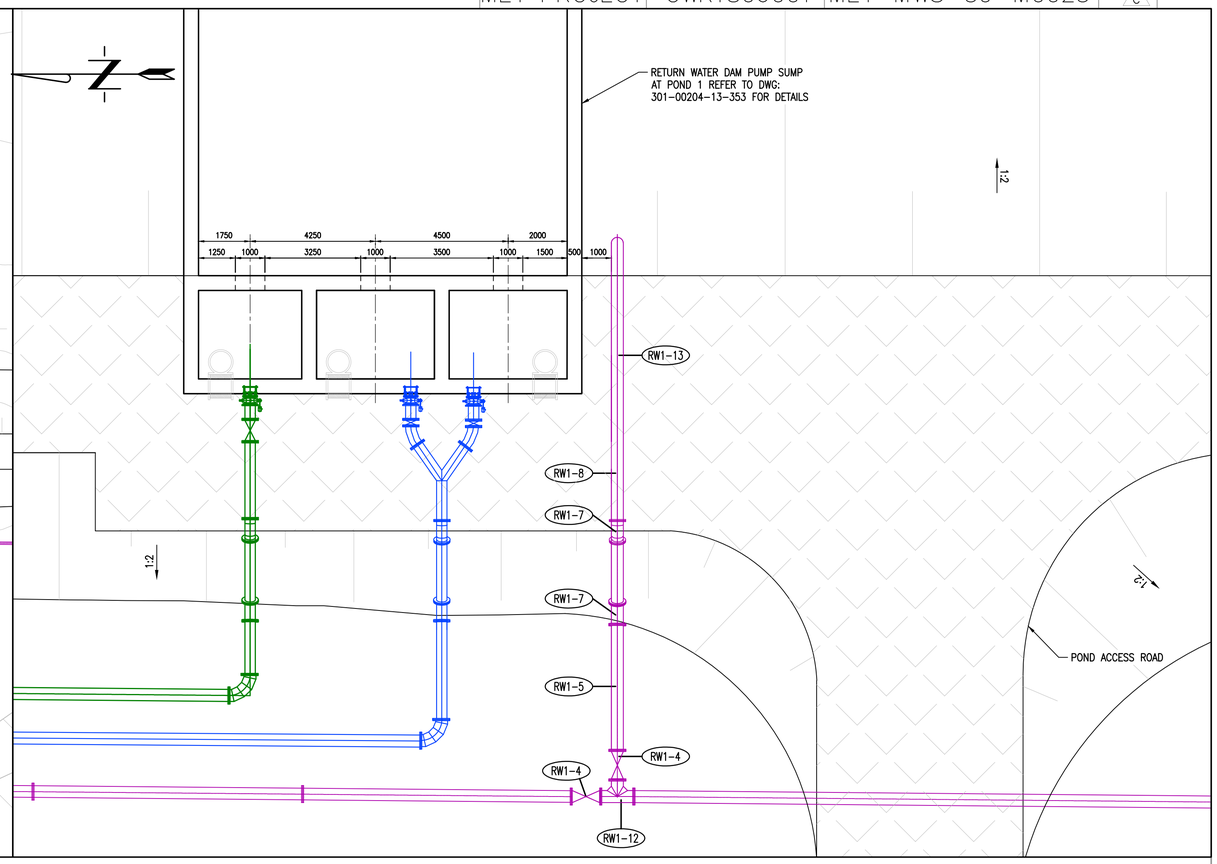
MET PROJECTS

301-00204/13-362
REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE INTER-COMPARTMENT LAYOUT, SECTION AND MATERIAL LIST - DETAIL 2

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE
CWR1806001	MET-MWS-39-M0024			REV C / A1

P:\301-00204\13\A\DRAWINGS\ST\For Tender\301-00204-13-361,362,363,359 RevC.dwg





INTER-COMPARTMENT TRANSFER SYSTEM AT RWD POND 1 LAYOUT PLAN
SCALE 1:500

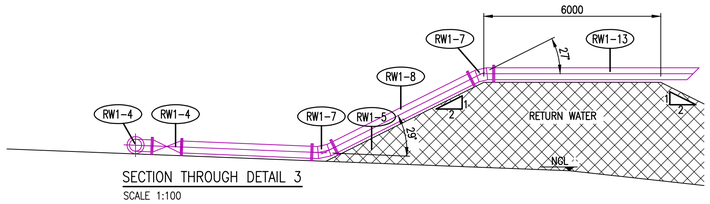
DETAIL 3 LAYOUT FOR (INTER-COMPARTMENT TRANSFER SYSTEM AT POND 1)
SCALE 1:100

MATERIAL LIST (INTER-COMPARTMENT)

ITEM	Qty.	SIZE	DESCRIPTION	MK	WALL (mm)	Flg. (PN)	LINER (mm)
VALVE	2	DN350	ISOLATION VALVE, FLANGED, BUTTERFLY	RW1-4	.	1600/3	.
BEND	2	DN350	22,5-45° L.R.B. 405mm C/F, FLANGED BOTH ENDS ,HDPE LINED	RW1-7	6	1600/3	12
CLOSURE	1	DN350	3000-6000mm F/F, FLANGED ONE END, SUPPLY WITH LOOSE FLANGE *	RW1-8	6	1600/3	12
TEE	1	DN350	EQUAL GUSSET TEE PIERCE, 560mm C/F, FLANGED BOTH END ,HDPE LINED	RW1-12	8	1600/3	.
SPECIAL	1	DN350	SPOOL PIPE, 6750mm F/F, FLANGED ONE END, BEVELED AT 45° IN VERTICAL	RW1-13	8	1600/3	12
SPOOL	1	DN350	9144mm F/F, FLANGED BOTH ENDS ,HDPE LINED	RW1-5	6	1600/3	12

LEGEND
F/F FACE TO FACE
C/F CENTER TO FACE
L.R.B LONG RADIUS BEND
P/E PLAIN ENDED
* TO BE CONFIRMED ON SITE

NOTE: MATERIAL INDICATED IS FOR INTER-COMPARTMENT TRANSFER SYSTEM AT POND 1



SECTION THROUGH DETAIL 3
SCALE 1:100

MATERIAL LIST (INTER-COMPARTMENT FROM DETAIL 3 TO END)

ITEM	Qty.	SIZE	DESCRIPTION	MK	WALL (mm)	Flg. (PN)	LINER (mm)
SPOOL	60	DN350	9144mm F/F, FLANGED BOTH ENDS ,HDPE LINED	RW1-5	6	1600/3	12
CLOSURE	3	DN350	6000-9000mm F/F, FLANGED BOTH END, SUPPLY WITH LOOSE FLANGE *	RW1-15	6	1600/3	12
CLOSURE	1	DN350	0-3000mm F/F, FLANGED ONE END, SUPPLY WITH LOOSE FLANGE *	RW1-9	6	1600/3	12
BEND	2	DN350	45°-90° L.R.B. 405mm C/F, FLANGED BOTH ENDS ,HDPE LINED	RW1-14	6	1600/3	12
BEND	1	DN350	90° L.R.B. 405mm C/F, FLANGED BOTH ENDS ,HDPE LINED	RW1-6	6	1600/3	12

LEGEND
F/F FACE TO FACE
C/F CENTER TO FACE
L.R.B LONG RADIUS BEND
P/E PLAIN ENDED
* TO BE CONFIRMED ON SITE

NOTE: MATERIAL INDICATED IS FOR INTER-COMPARTMENT TRANSFER SYSTEM AT POND 1 DETAIL 3 TO END

2500 0 2500 5000 7500
MILLIMETRES 1:100

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

REFERENCE DRAWINGS

TITLE	DRG. No
RETURN WATER DAM PUMP SUMP CONCRETE DETAILS	301-00204-13-353
DUST SUPPRESSION & RETURN WATER TRANSFER SYSTEMS GENERAL ARRANGEMENT SHEET 20F2	301-00204/13-207
DUST SUPPRESSION & RETURN WATER TRANSFER SYSTEMS GENERAL ARRANGEMENT SHEET 10F2	301-00204/13-207

REVISIONS

DETAIL	MARK	DATE	INIT	APP'D
ISSUED FOR TENDER	A	2019.02.01		
ISSUED FOR TENDER	B	2019.03.13		
ISSUED FOR TENDER (MATERIAL LIST UPDATED)	C	2019.03.28		

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	TG			25/01/2018
CHECKED	TM			25/01/2019
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER	DGS			
PR TECH				
PROJECT / MET ENGINEER	DGS			25/01/2019
MET PROJECTS MANAGER				25/01/2019

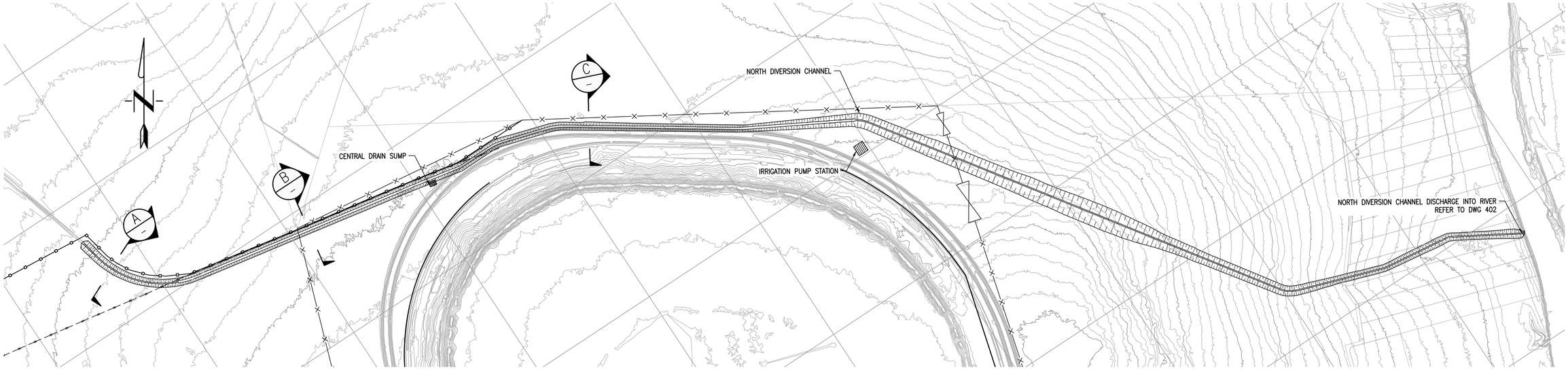
ANGLOGOLD ASHANTI

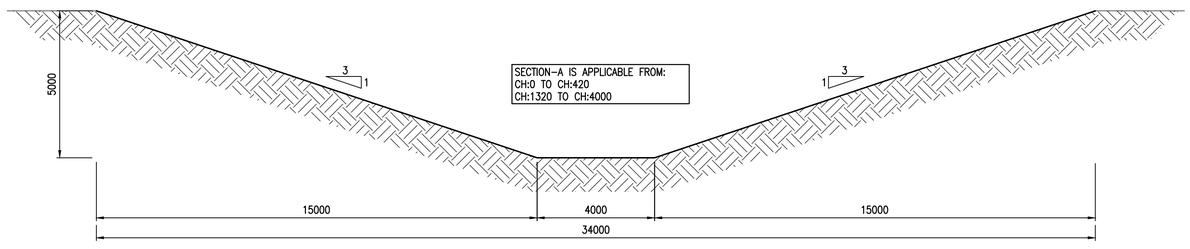
MET PROJECTS

301-00204/13-363
REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE INTER-COMPARTMENT LAYOUT, SECTION AND MATERIAL LIST - DETAIL 3

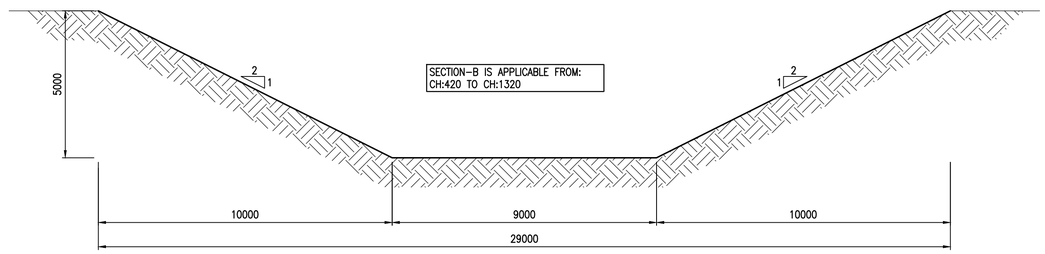
PROJECT No:	B/UNIT	AREA	SEQ. No:	REV	SIZE
CWR1806001	MET	MWS	39-M0025	C	A1

P:\301-00204\13\A\DRAWINGS\R3\For Tender\301-00204-13-361,362,363,360 RevC-KEEP.dwg

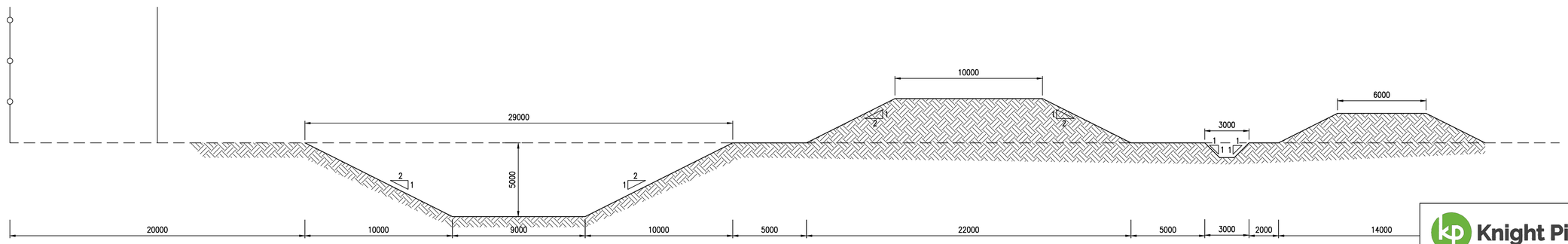




A TYPICAL SECTION
SCALE 1:100



B TYPICAL SECTION
SCALE 1:100



C NORTH SIDE TYPICAL SECTION
SCALE 1:150

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

TITLE	DRG. No	DETAIL	MARK	DATE	INIT.	APP'D
REFERENCE DRAWINGS		ISSUED FOR APPROVAL	A	20.11.2018		
		ISSUED FOR TENDER	B	25.01.2019		
		REVISIONS				

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				

ANGLOGOLD ASHANTI

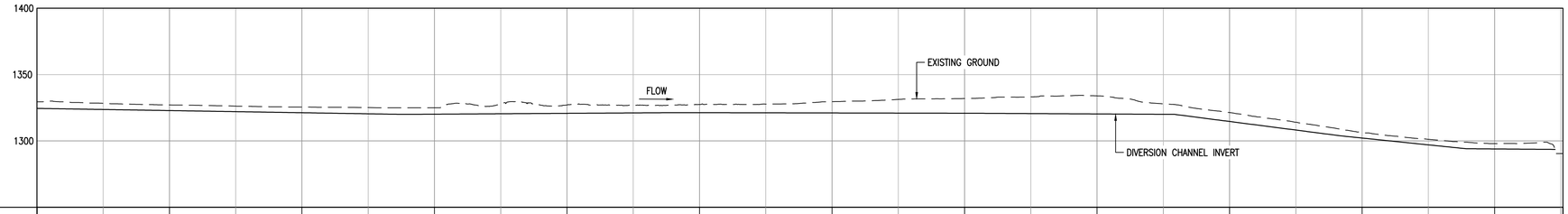
MET PROJECTS

301-00204/13-400

REGION: SOUTH AFRICA REGION - VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXTENSION
DRAWING TITLE: STORM WATER MANAGEMENT NORTHERN DIVERSION CHANNEL - LAYOUT & SECTION

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE
CWR1806001	MET-MWS-39-C0036			REV B A1

P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-400, 401 Rev0.dwg



SCALES:
Horizontal 1:10000
Vertical 1:2000

DATUM 1250.00

CHAINAGE (m)	0.00	250.00	500.00	750.00	1000.00	1250.00	1500.00	1750.00	2000.00	2250.00	2500.00	2750.00	3000.00	3250.00	3500.00	3750.00	4000.00	4250.00	4500.00	4750.00	5000.00	5250.00	5500.00	5750.00	5757.63
EXISTING GROUND LEVELS (m)	1329.50	1328.32	1327.08	1326.20	1325.50	1325.12	1325.00	1327.96	1327.07	1326.82	1327.43	1327.75	1329.55	1331.27	1331.96	1333.16	1333.93	1328.00	1321.37	1314.00	1306.51	1301.20	1298.00	1290.50	1290.50
DESIGN LEVELS (m)	1324.95	1323.69	1322.87	1322.06	1321.25	1320.43	1320.15	1320.47	1320.78	1321.10	1321.29	1321.18	1321.07	1320.96	1320.85	1320.60	1320.32	1320.05	1314.85	1308.19	1302.15	1297.02	1293.95	1293.59	
CUT / FILL	–4.55	–4.63	–4.21	–4.14	–4.25	–4.68	–4.85	–7.50	–6.28	–5.72	–6.14	–6.57	–8.48	–10.31	–11.10	–12.56	–13.61	–7.95	–6.72	–5.81	–4.36	–4.18	–4.05	1.17	

DIVERSION CHANNEL LONGITUDINAL SECTIN CH: 0.00m – 5757.00m
SCALE 1: 10 000

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: 1: 10 000

		ISSUED FOR APPROVAL	A	20.11.2018	
		ISSUED FOR TENDER	B	25.01.2019	

TITLE	DRG. No
REFERENCE DRAWINGS	

DETAIL	MARK	DATE	INIT	APP'D
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	TM			20.11.2018
MET PROJECTS MANAGER	NAME			20.11.2018

ANGLOGOLD ASHANTI

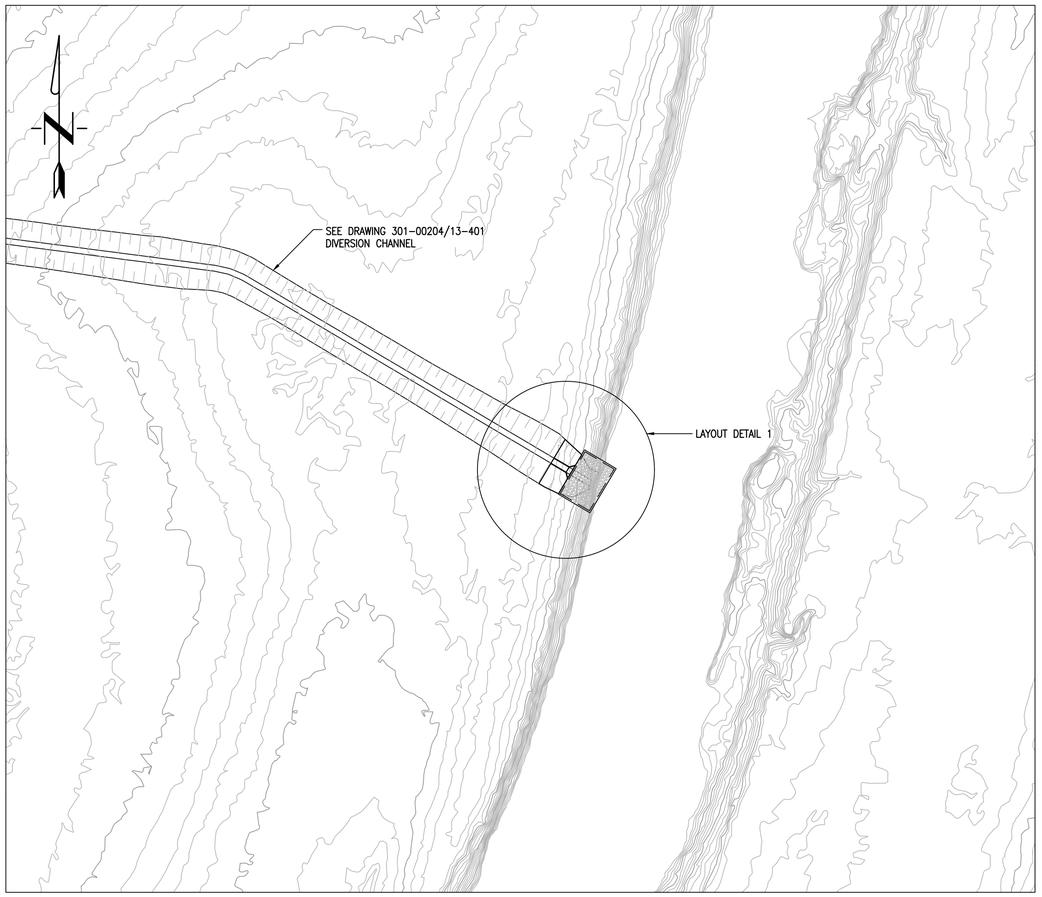
MET PROJECTS

301–00204/13–401

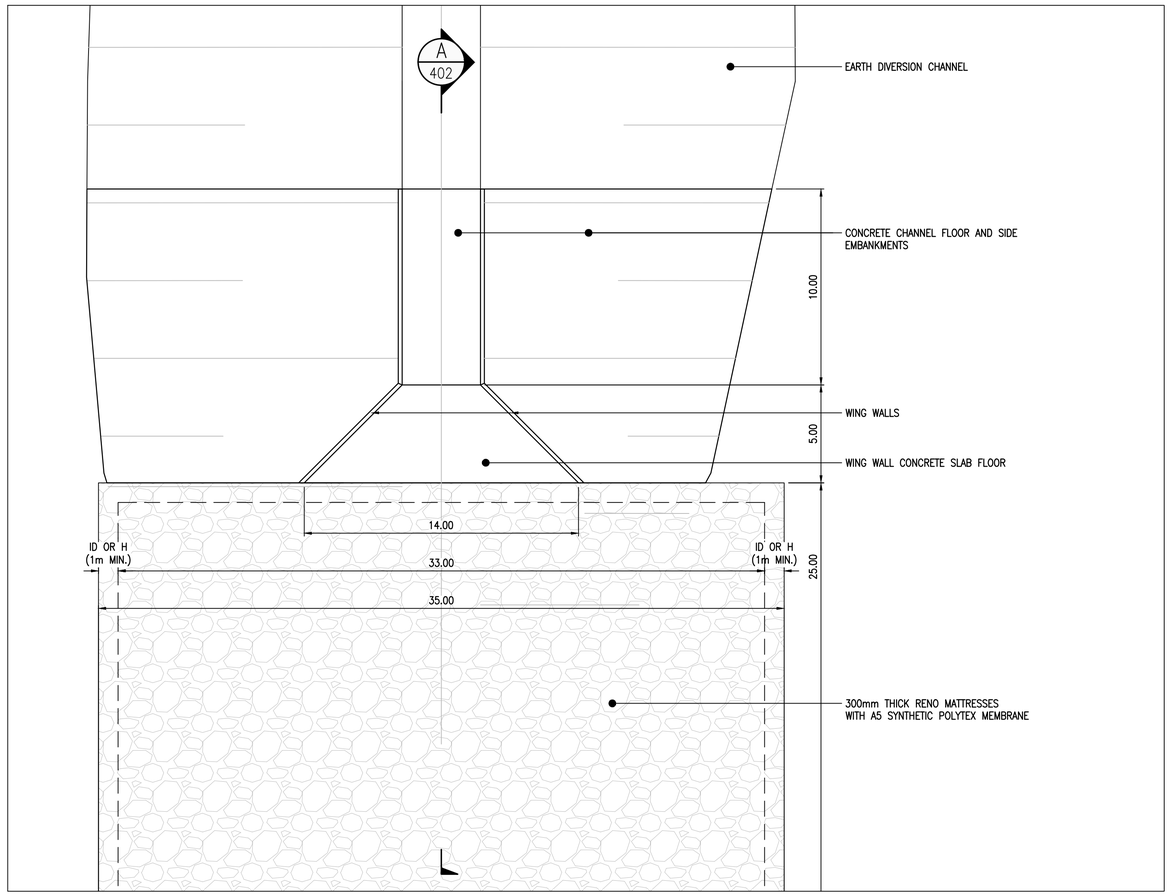
REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXTENSION
DRAWING TITLE STORM WATER MANAGEMENT NORTHERN DIVERSION CHANNEL – LONG SECTION

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE – A1
CWR1806001	MET–MWS–39–C0036			REV B

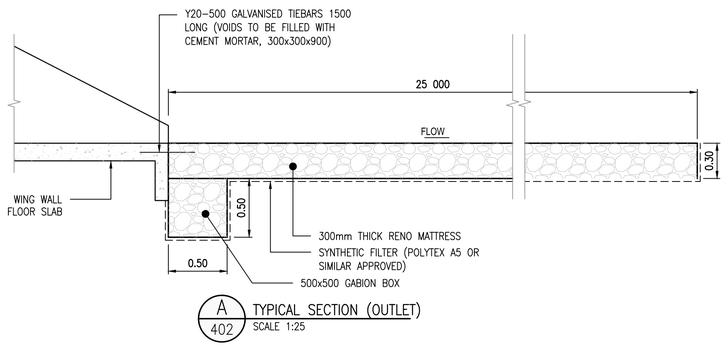
P:\301–00204\13\A\DRAWINGS\KP\For Tender\301–00204–13–400, 401 RevB.dwg



NOTHERN STORM-WATER DIVIRSION CHANNEL LAYOUT PLAN
SCALE 1:2000



STORM-WATER DIVIRSION CHANNEL DISCHARGE DETAIL 1
SCALE 1:100



A 402 TYPICAL SECTION (OUTLET)
SCALE 1:25

NOTE
1. GABION BOXES AND RENO MATTRESSES (MACCAFERRI SA OR SIMILAR APPROVED) DIMENSIONS, SPECIFICATIONS AND ASSEMBLY DETAILS AS PER MANUFACTURERS REQUIREMENTS.
2. FOR GRASS, STONE PITCHING, CONCRETE AND STILLING BASIN EROSION PROTECTIVE MEASURES REFER TO CHAPTER 7 OF THE ROAD DRAINAGE MANUAL, 5th EDITION, 2006.

FOR LATEST VERSION CHECK www.nra.co.za

GUIDELINE FLOW VELOCITY (m/s)	PROTECTION MEASURE*
V < 1.5	FIELD GRASS
1.5 < V < 3.5	GRASS SODS
3.5 < V < 6.5	GABION MATTRESS (300mm)
6.58 < V < 8	GABIONS (500mm MIN)

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

REVISIONS					
ISSUED FOR TENDER	A	13.03.2019			

REFERENCE DRAWINGS		
TITLE	DRG. No	DETAIL
STORM WATER MANAGEMENT NORTH DIVERSION CHANNEL LAYOUT	301-000204/13-402	
STORM WATER MANAGEMENT NORTH DIVERSION CHANNEL LAYOUT	301-000204/13-401	

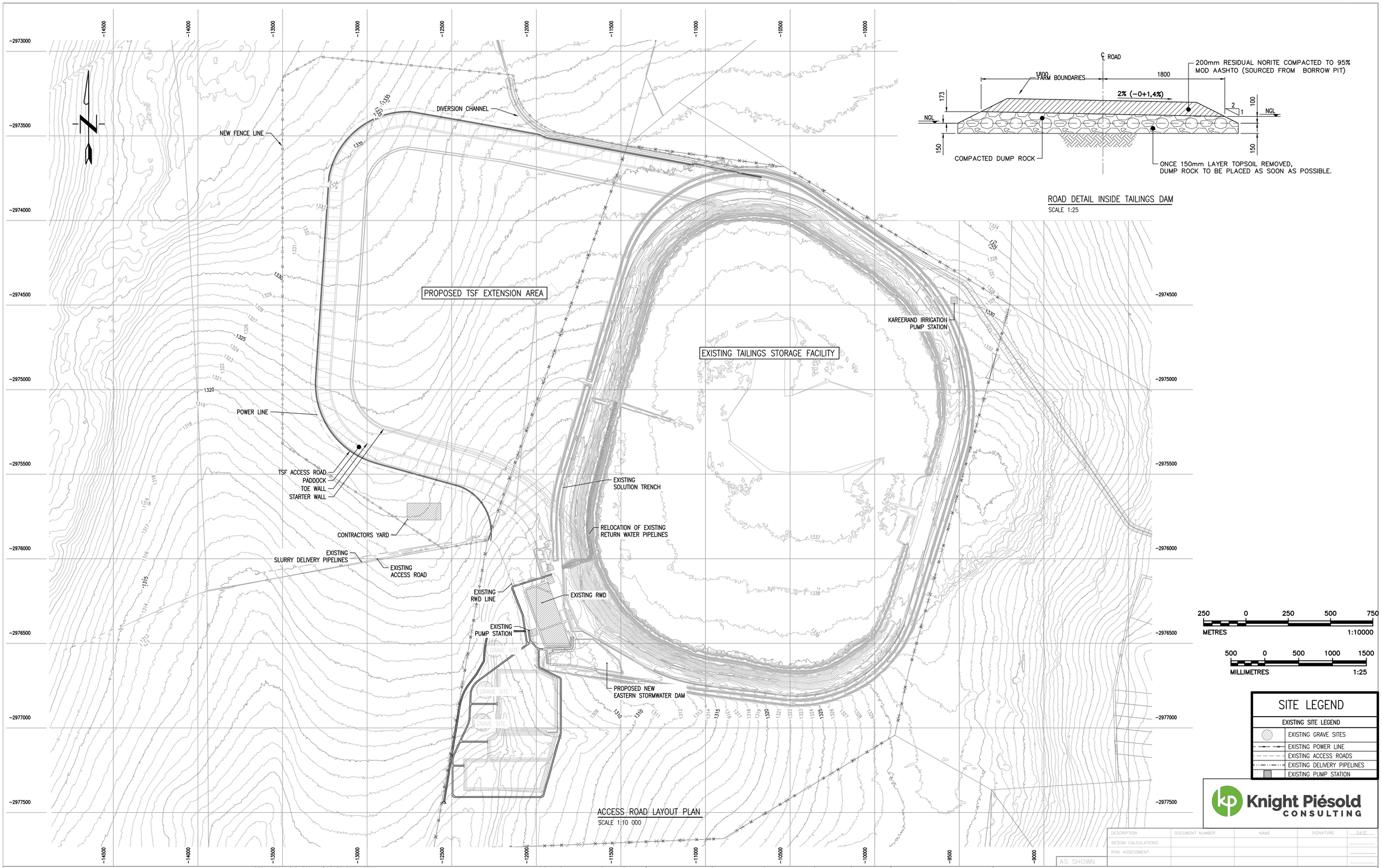
DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	FB			27.02.2019
CHECKED	TM			27.02.2019
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER	DGS			27.02.2019
MET PROJECTS MANAGER				27.02.2019

ANGLOGOLD ASHANTI

301-00204/13-402
REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE: STORMWATER MANAGEMENT – RIVER ENTRY – LAYOUT, SECTIONS AND DETAILS

PROJECT No:	B/UNIT	AREA	SEQ. No:	REV	SIZE
CWR1806001	MET-MWS-39-C0090			A	A1

P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-402 RevA.dwg



ACCESS ROAD LAYOUT PLAN
SCALE 1:10 000

ROAD DETAIL INSIDE TAILINGS DAM
SCALE 1:25

250 0 250 500 750
METRES 1:10000

500 0 500 1000 1500
MILLIMETRES 1:25

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				

AS SHOWN

REFERENCE DRAWINGS		REVISIONS				
TITLE	DRG. No	DETAIL	MARK	DATE	INIT.	APP'D
FENCING LAYOUT AND DETAILS	301-00204/13-006	ISSUED FOR APPROVAL	A	20.11.2018		
TAILINGS STORAGE FACILITY-LAYOUT	301-00204/13-003	ISSUED FOR TENDER	B	25.01.2019		
ACCESS ROADS-SECTIONS AND LAYERWORKS	301-00204/13-451					
ACCESS ROADS-CULVERT DETAILS	301-00204/13-452					

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				

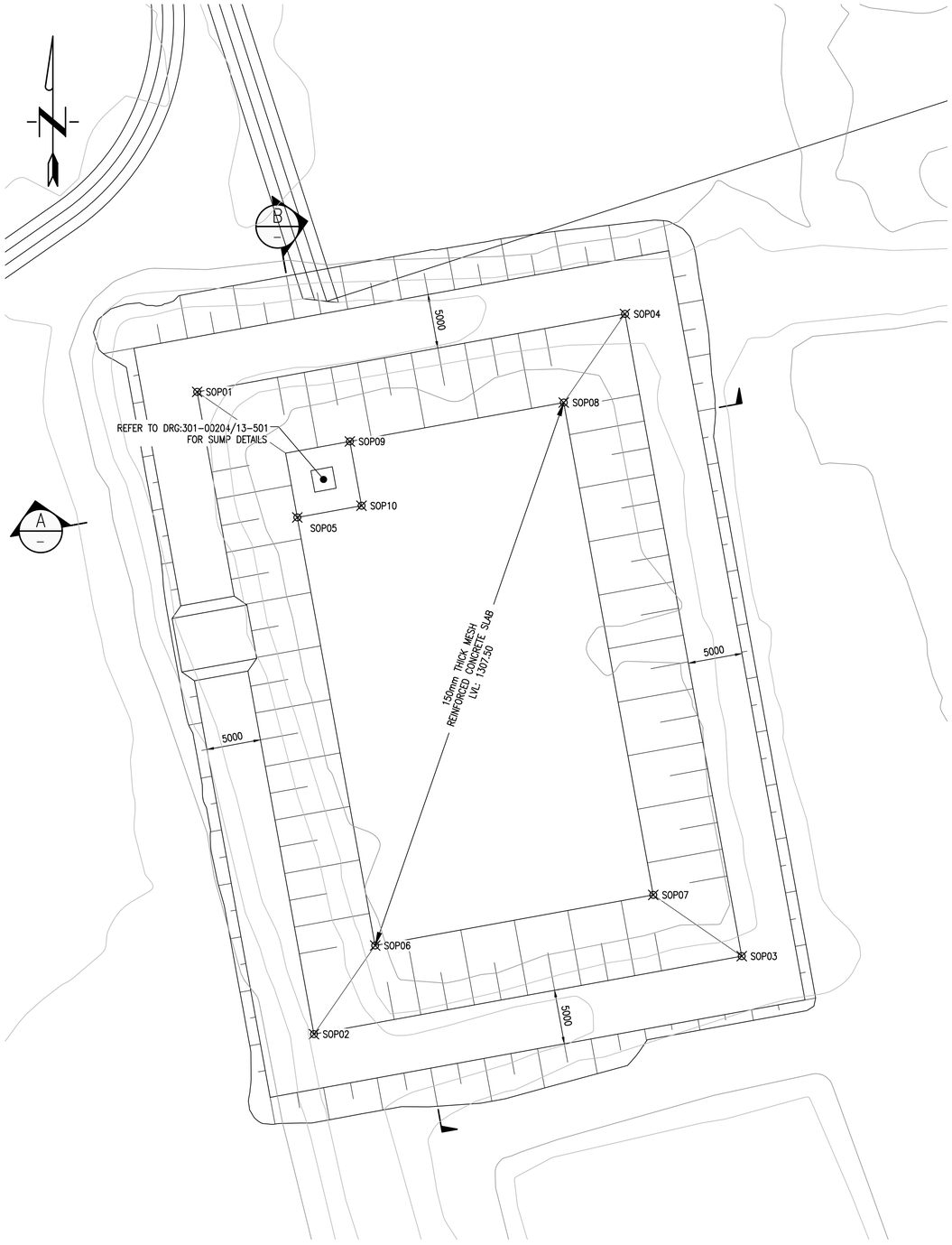
AngloGold Ashanti

MET PROJECTS

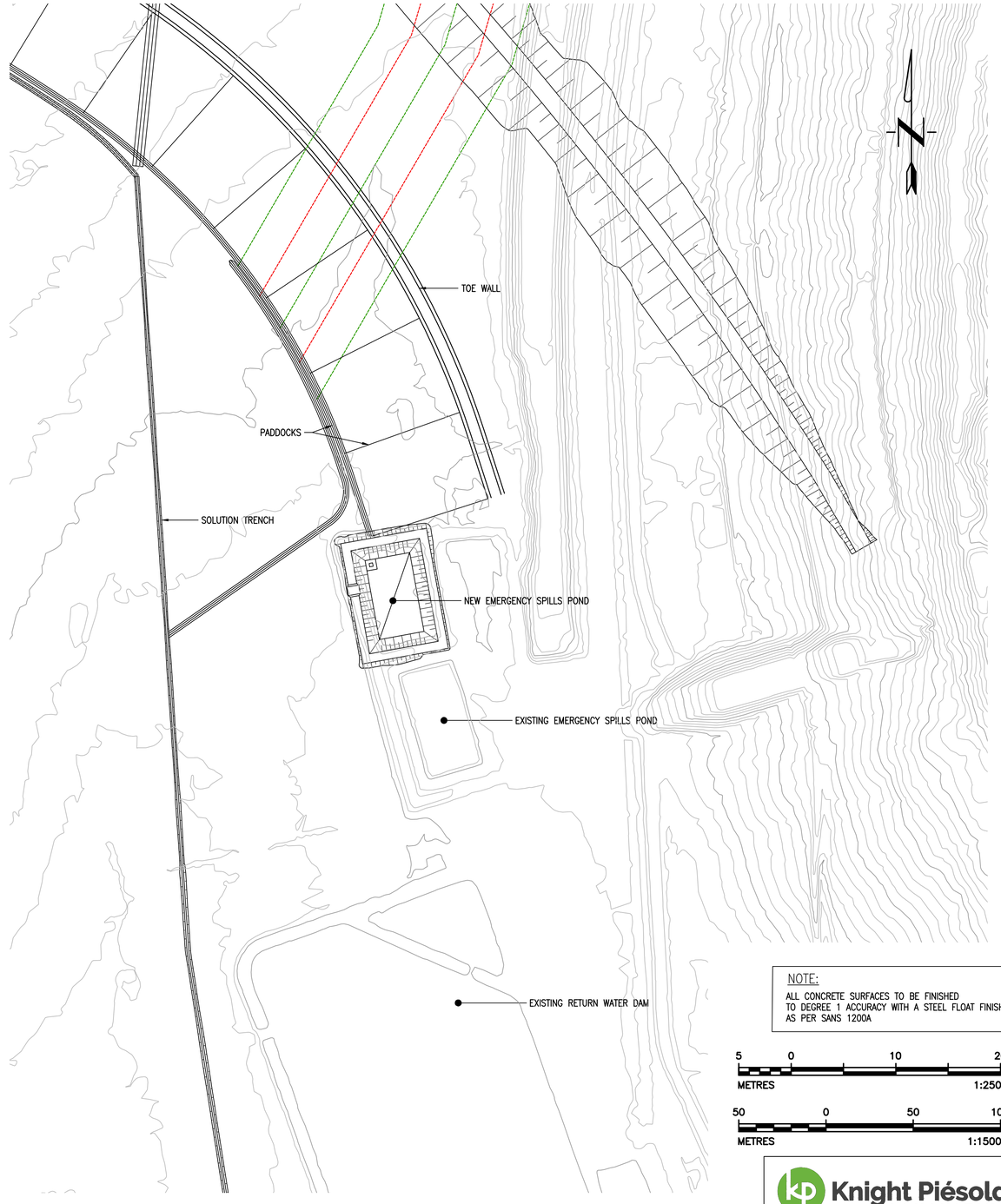
301-00204/13-450
REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXTENSION
DRAWING TITLE ACCESS ROADS - LAYOUT

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE - A1
CWR1806001	MET	MWS	39-C0059	REV B

P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-450 Rev5.dwg



EMERGENCY SPILLWAY POND PLAN LAYOUT
SCALE 1:250



EMERGENCY SPILLWAY POND PLAN LAYOUT
SCALE 1:1500

NOTE:
ALL CONCRETE SURFACES TO BE FINISHED TO DEGREE 1 ACCURACY WITH A STEEL FLOAT FINISH AS PER SANS 1200A

5 0 10 20
METRES 1:250

50 0 50 100
METRES 1:1500

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

TITLE	DRG. No
NEW EMERGENCY SPILLS DAM-SECTIONS, LINER AND DETAILS	A301-00204/13-501

REFERENCE DRAWINGS

DETAIL	MARK	DATE	INIT	APP'D
ISSUED FOR TENDER	A	16.01.2019		
ISSUED FOR TENDER (POSITION MOVED)	B	29.03.2019		

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	ME			16.01.2019
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

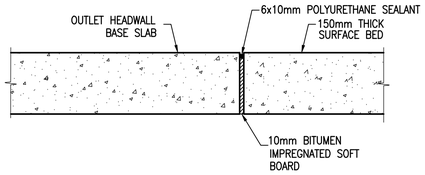
MET PROJECTS

301-00204/13-500

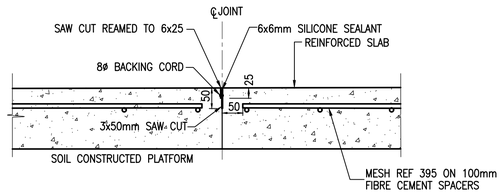
REGION	SOUTH AFRICA REGION - VR
BUSINESS UNIT	MINE WASTE SOLUTIONS
PROJECT	KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE	EMERGENCY SPILLS POND - LAYOUT, SECTIONS & DETAILS

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE - A1
CWR1806001	MET-MWS-39-C0082			REV B

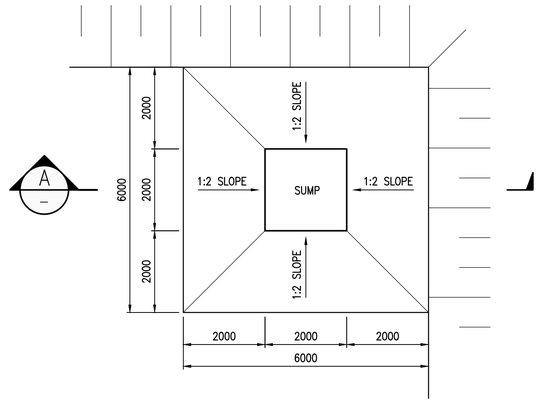
P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-500, 501 Rev8.dwg



ISOLATION JOINT DETAIL
SCALE 1:7.5



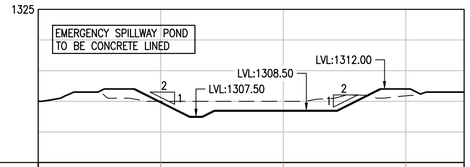
SAW-CUT JOINT DETAIL IN SURFACE BED
SCALE 1:7.5



SUMP LAYOUT
SCALE 1:75

SCALES:
Horizontal 1:75
Vertical 1:75

DATUM 1300.00

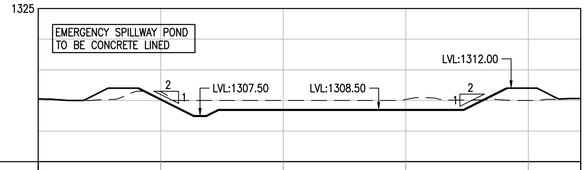


CHAINAGE (m)	0.00	20.00	40.00	60.00	69.52
EXISTING GROUND LEVELS (m)	1310.00	1310.00	1310.00	1310.89	1311.50
DESIGN LEVELS (m)	1310.00	1309.88	1308.50	1312.00	1311.50
CUT / FILL	0.00	0.12	1.50	-1.11	0.00

LONGSECTION – A
CHAINAGE 0.00m TO 69.52m

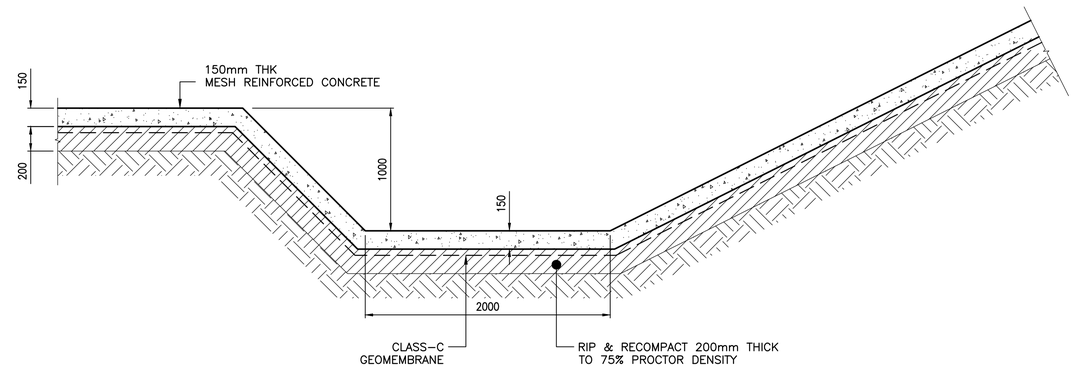
SCALES:
Horizontal 1:75
Vertical 1:75

DATUM 1300.00

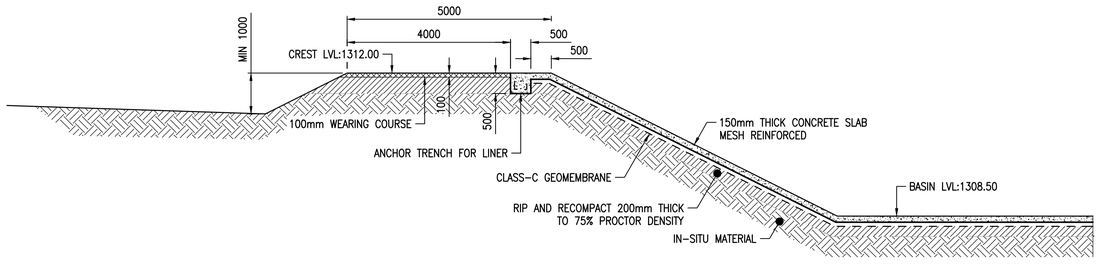


CHAINAGE (m)	0.00	20.00	40.00	60.00	80.00	88.56
EXISTING GROUND LEVELS (m)	1310.24	1311.45	1310.00	1310.16	1310.00	1310.32
DESIGN LEVELS (m)	1310.24	1310.21	1308.50	1308.50	1312.00	1310.32
CUT / FILL	0.00	1.24	1.50	1.66	-2.00	0.00

LONGSECTION – B
CHAINAGE 0.00m TO 88.56m



A – EMERGENCY SPILLWAY SUMP
1:25



TYPICAL SECTION THROUGH SPILLWAY POND WALL
SCALE 1:75

NOTE:
ALL CONCRETE SURFACES TO BE FINISHED TO DEGREE 1 ACCURACY WITH A STEEL FLOAT FINISH AS PER SANS 1200A

500 0 500 1000 1500
MILLIMETRES 1:25

1000 0 1000 3000 5000
MILLIMETRES 1:75

Knight Piésold CONSULTING

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS				
RISK ASSESSMENT				

SCALE: AS SHOWN

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

REFERENCE DRAWINGS — TITLE / DRG. No
REVISIONS — DETAIL

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	ME			16.01.2019
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

MET PROJECTS

301-00204/13-501

REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE: EMERGENCY SPILLS POND – SECTIONS & DETAILS

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

P:\301-00204\13\A\DRAWINGS\KP\For Tender\301-00204-13-500, 501 Rev8.dwg

APPENDIX G

Worley Parsons Reports & Drawings

ANGLOGOLDASHANTI

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 d						
				Rev A	Rev B	Rev C	Rev D	Rev E	Rev F	Rev G
Mechanical	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				
Mechanical	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				
Mechanical	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				
Mechanical	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			
Mechanical	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			
Mechanical	C00787-39-PR-PFD-0004-01	MET-MWS-39-P0031	Kareerand Gland Service Water							
Mechanical	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			
Mechanical	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			
Mechanical	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			
Mechanical	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			
Mechanical	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			
Mechanical	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				
Mechanical	C00787-39-PR-PID-0002-01	MET-MWS-39-P0008	PID - Kareerand Return Water Dam and Pumping (1)			2018-11-20	2018-11-28			
Mechanical	C00787-39-PR-PID-0002-02	MET-MWS-39-P0009	PID - Kareerand Return Water Dam and Pumping (2)			2018-11-20	2018-11-28			
Mechanical	C00787-39-PR-PID-0003-01	MET-MWS-39-P0025	PID - Kareerand Dust Suppression Water and Pumping				2018-11-28			
Mechanical	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			
Mechanical	C00787-39-PR-PID-0004-01	MET-MWS-39-P0032	PID - Kareerand Gland Service Water				2018-12-04			
Mechanical	C00787-39-PR-PID-0001-01	MET-MWS-39-P0027	Kareerand TSF Expansion Project- Legend Sheet 1 Piping & Instrumentation Diagram				2018-11-28			
Mechanical	C00787-39-PR-PID-0001-02	MET-MWS-39-P0028	Kareerand TSF Expansion Project- Legend Sheet 2 Piping & Instrumentation Diagram				2018-11-28			
Mechanical	C00787-39-PR-PID-0001-03	MET-MWS-39-P0029	Kareerand TSF Expansion Project Legend Sheet 3 Piping & Instrumentation Diagram				2018-11-28			
Mechanical	C00787-39-PR-PID-0001-06	MET-MWS-39-P0030	Kareerand TSF Capacity Expansion Project-Stage 5 Pump -Piping & Instrumentation Diagram				2018-11-28			
Mechanical	C00787-39-ME-DGA-0001	MET-MWS-39-M0001	Tailings Transfer Pump Train General Arrangement				2018-11-29			
Mechanical	C00787-39-ME-DGA-0002	MET-MWS-39-M0002	Tailings Transfer Pump Train GA Section Details				2018-11-29			
Mechanical	C00787-39-ME-DGA-0003	MET-MWS-39-M0003	Return Water Pump General Arrangement (1)				2018-11-29			
Mechanical	C00787-39-ME-DGA-0004	MET-MWS-39-M0004	Return Water/Dust Suppression Pumps Section Details GA				2018-11-29			
Mechanical	C00787-39-ME-DGA-0005	MET-MWS-39-M0013	Dust Suppresion Pump General Arrangement				2018-11-29			
Mechanical	C00787-39-ME-DGA-0006	MET-MWS-39-M0014	Return Water Pump General Arrangement (2)				2018-11-29			
Mechanical	C00787-39-PE-DAL-0001-01	MET-MWS-39-M0005	Tailings Transfer Pump Train Suction Line General Arrangement	2018-10-30	2018-11-01					
Mechanical	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				
Mechanical	C00787-39-PE-DAL-0003-01	MET-MWS-39-M0007	Return Water Pipeline GA/Layout	2018-10-30	2018-11-01	2018-11-01				
Mechanical	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				
Mechanical	C00787-39-PE-DAL-0004-02	MET-MWS-39-M0009				2018-11-01				
Mechanical	C00787-39-PE-DAL-0005-01	MET-MWS-39-M0012	Dust Suppression - GA/Layout			2018-11-27				
Mechanical	C00787-39-CI-DAL-0001-01	MET-MWS-39-C0050	Tailings Transfer Pumps Pilinth GA			2018-11-14				
Mechanical	C00787-39-CI-DAL-0002-01	MET-MWS-39-C0051	Tailings Transfer Pumps Civil Bund Area GA			2018-11-14				
Mechanical	C00787-39-CI-DAL-0003-01	MET-MWS-39-C0052	Tailings Transfer Pipeline Support Plinth GA			2018-11-14				
Mechanical	C00787-39-CI-DAL-0004-01	MET-MWS-39-C0067	Return Water Pump Are Plinth & Bunded Area GA			2018-11-14				
Mechanical	C00787-39-CI-DAL-0005-01	MET-MWS-39-C0068	Dust Suppression Pipeline Support Plinth GA			2018-11-14				

39-PMP-005

SET 1 PUMP 5
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH
RATING : 500kW

39-PMP-010

SET 2 PUMP 5
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH
RATING : 500kW

39-PMP-017

SET 3 PUMP 5
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH
RATING : 500kW

39-PMP-022

SET 4 PUMP 5
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH
RATING : 500kW

39-PMP-027

SET 5 PUMP 5
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH
RATING : 500kW

SET 5 PUMP 4
39-PMP-026
C00787-039-PR-PID-0001-05
PSL-039-030-350-CSRL1

SET 4 PUMP 4
39-PMP-021
C00787-039-PR-PID-0001-05
PSL-039-031-350-CSRL1
ALPHA

SET 3 PUMP 4
39-PMP-016
C00787-039-PR-PID-0001-05
PSL-039-032-350-CSRL1
BRAVO

SET 3 PUMP 4
39-PMP-009
C00787-039-PR-PID-0001-05
PSL-039-038-350-CSRL1
CHARLIE

SET 1 PUMP 4
39-PMP-004
C00787-039-PR-PID-0001-05
PSL-039-034-350-CSRL1
DELTA

INSTRUMENT AIR
UIA-039-001-025-CS1

GLAND SERVICE WATER
UGW-039-024-080-CS3

USW-039-025-025-CS3
USW-039-026-025-CS3
USW-039-027-025-CS3
USW-039-028-025-CS3
USW-039-029-025-CS3

PSL-039-001-500-CSRL2 — TO CYCLONES AT TSF
PSL-039-002-500-CSRL2 — TO CYCLONES AT TSF
PSL-039-003-500-CSRL2 — TO CYCLONES AT TSF
PSL-039-004-500-CSRL2 — TO CYCLONES AT TSF
PSL-039-005-500-CSRL2 — TO CYCLONES AT TSF

NOTES:

1. FIFTH PUMP TO BE ADDED ONTO EXISTING TRAIN BY OTHERS.

DRAWING NOT TO BE USED FOR CONSTRUCTION UNLESS SIGNED BY PROFESSIONAL ENGINEER / TECH.

DESIGNED, DRAWN AND ISSUED BY WORLEYPARSONS RSA (Pty)Ltd
Professional Eng. / Tech. :-.....
ECSA Reg. No. :-..... Rev. :-.....

LEGEND
1. PROCESS FLOW MAJOR
2. PROCESS FLOW MINOR
3. INTERMITTENT FLOW
4. VENDOR PACKAGE
5. NEW

OneWay to zero harm

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel : +27 11 218 3000 | Intl Fax: +27 11 218 3100

DRAWING No.	REFERENCE DRAWINGS	DRAWING No.	REFERENCE DRAWINGS
C00787-0000-PR-PFD-0001-01	KAREERAND TAILINGS DISPOSAL		

REV No.	DATE	REVISIONS	BY	CHK	LEAD ENG
A	26/09/18	DRAWING STARTED	ES	VP	
B	28/09/2018	ISSUED FOR INTERNAL REVIEW	ES	VP	
C	05/10/2018	ISSUED FOR CLIENT REVIEW	ES	VP	

CLIENT	NAME	DATE	WP	NAME	DATE	WP	NAME	DATE
Process Engineer			Mechanical Engineer			Drawn By	ES	26/09/2018
Electrical Engineer			Mining Engineer			Checked By		
Instrument Engineer			Piping Engineer			Section Leader		
Mechanical Engineer			Process Engineer			Project S/Leader		
Mining Engineer			Structural Engineer			Civil Engineer		
Structural Engineer			Engineering Manager			Electrical Engineer		
Project Manager			Project Manager			Instrument Engineer		

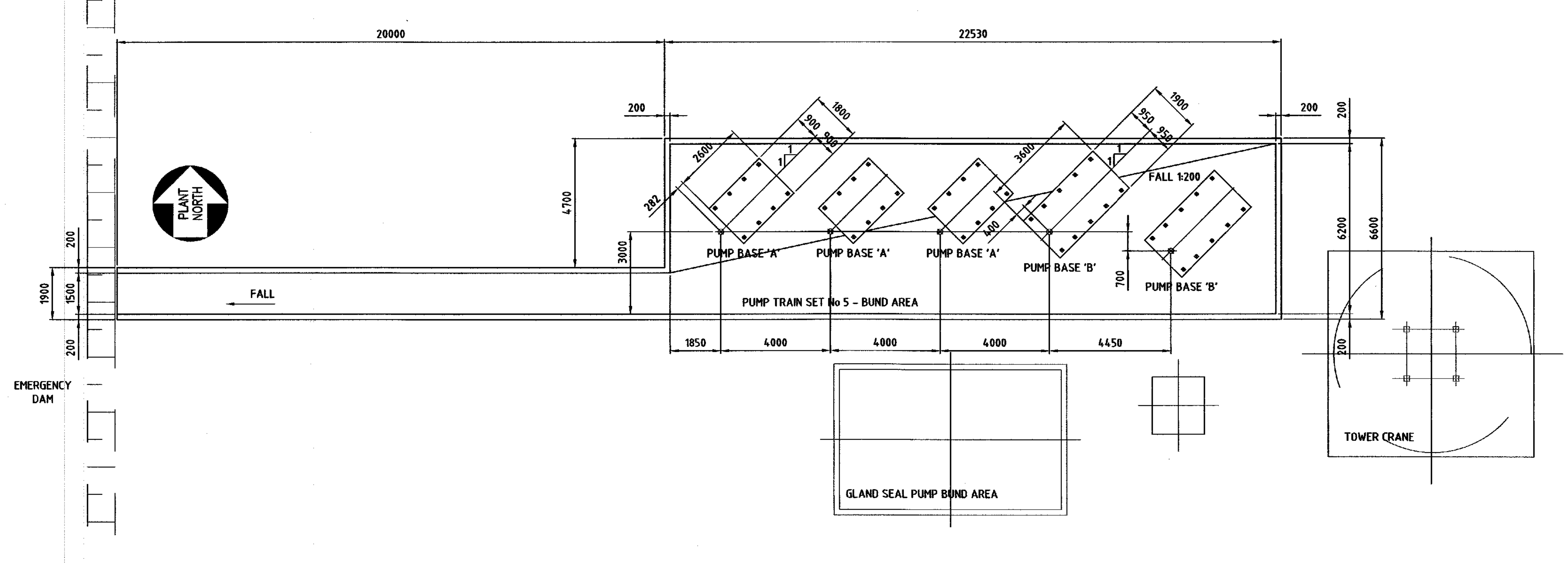
ANGLOGOLD ASHANTI

KAREERAND TSF EXPANSION PROJECT
STAGE 5 PUMPS

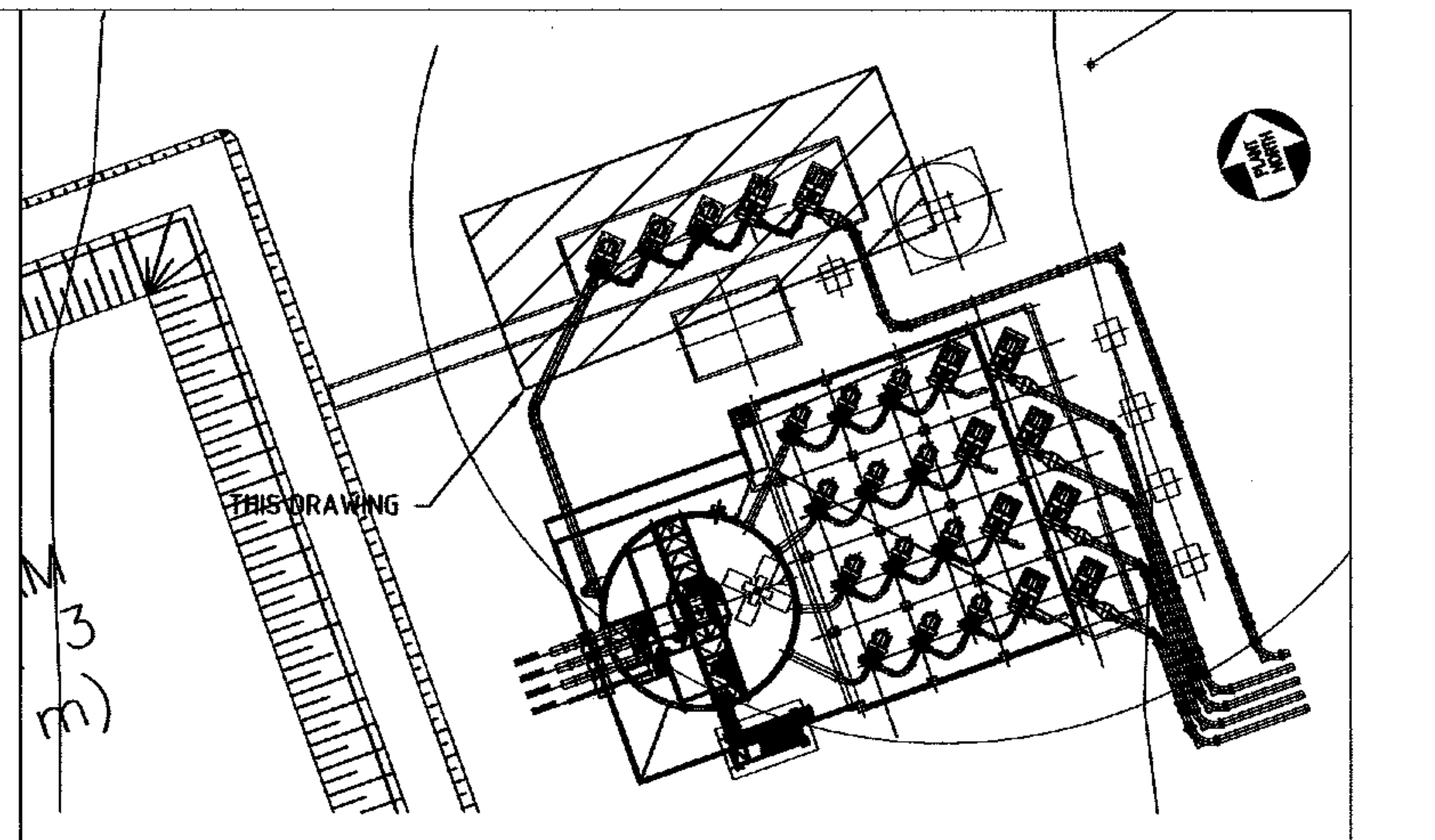
PIPING & INSTRUMENTATION DIAGRAM

CLIENT DRAWING NUMBER				SHEET SIZE	SCALE	
				A1	NTS	
PROJECT No	WBS	DISC	DWG ID	DOC ID.	SHEET	REV
C00787	039	PR	PID	0001	06	C

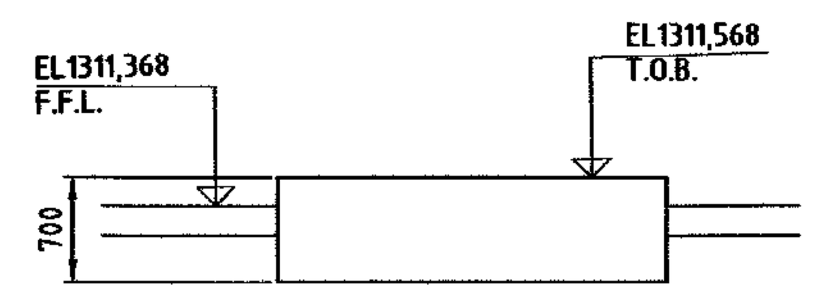
LOCATION: H:\CAD DRAWINGS\C00787 - KAREERAND TSF CAPACITY EXPANSION\P & IDS\C00787-0000-PR-PID-0001-06 REV A.DWG
USER NAME: vhutshilo.phamphe
DATE: 2018/10/05



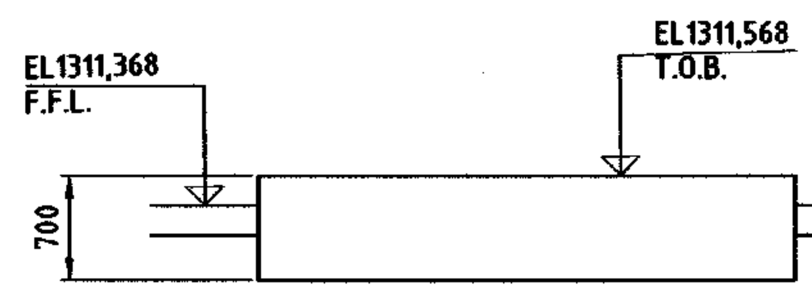
PLAN ON PUMPTRAIN SET No 5 - BUND AREA
SCALE 1:100



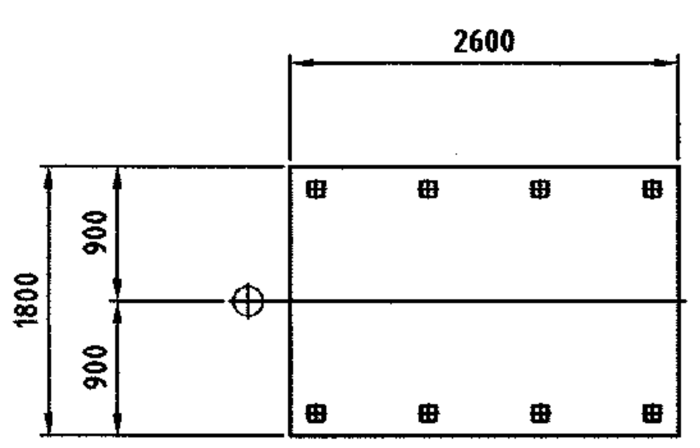
SITE PLAN



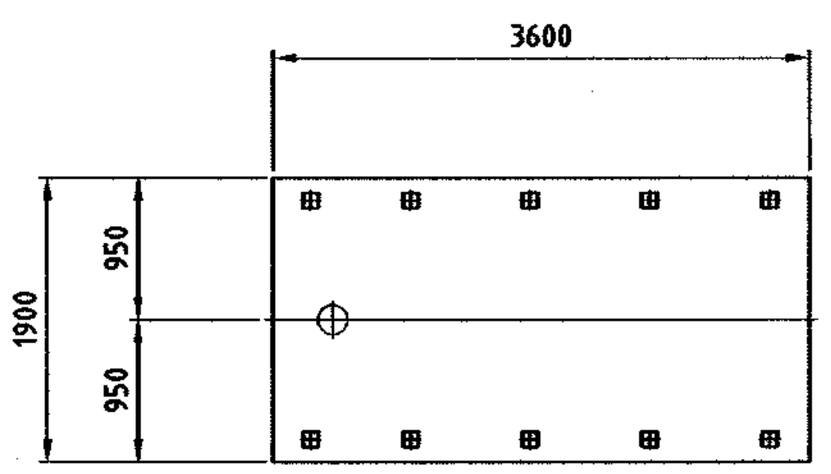
ELEVATION ON PUMP BASE 'A'



ELEVATION ON PUMP BASE 'B'



PLAN ON PUMP BASE 'A'
SCALE 1:50



PLAN ON PUMP BASE 'B'
SCALE 1:50

GENERAL NOTES – SURFACE CIVIL STRUCTURES

1. GENERAL
1.1 ALL DESIGN WORK SHALL BE IN ACCORDANCE WITH AGA SPECIFICATION 114010 LATEST ISSUE
1.2 ALL CONSTRUCTION WORK SHALL BE IN ACCORDANCE WITH AGA SPECIFICATION 114011 LATEST ISSUE
1.3 THESE WORKS SHOULD BE READ IN CONJUNCTION WITH QSP115 CIVIL CONSTRUCTION GENERAL NOTES
2. CONCRETE
2.1 CONCRETE SHALL BE 'STRENGTH CONCRETE' AS SPECIFIED BELOW UNLESS OTHERWISE NOTED
   BLINDING CONCRETE — GRADE 10/19
   ALL STRUCTURAL CONCRETE — GRADE 30/19
   CONCRETE COVER — 50mm ALL ROUND
   FOUNDATION COVER — 75mm ALL ROUND
3. FORMED AND UNFORMED SURFACES
3.1 FORMWORK SHALL BE CLASSIFIED AS SPECIFIED BELOW (U.O.N.)
   "ROUGH" — WHERE FACE IS NOT EXPOSED
   "SMOOTH" — WHERE FACE IS EXPOSED
   SMOOTH FORMWORK TO EXPOSED FACES TO BE CARRIED DOWN TO 150mm BELOW ADJOINING FINAL GROUND OR PAVING LEVEL
3.2 ARRISSES SHALL BE CHAMFERED 20x20mm
3.3 EXPOSED UNFORMED SURFACES AND SURFACES TO RECEIVE GROUT TO "WOOD FLOAT FINISH" (U.O.N.)
4. FOUNDING MATERIAL
4.1 THE MAXIMUM DESIGN BEARING PRESSURE FOR FOUNDATIONS SHALL BE 150KPa UNLESS OTHERWISED NOTED
5. CAST IN ITEMS AND GROUTING
5.1 CAST IN ITEMS TO BE SUPPLIED BY CIVIL CONTRACTOR UNLESS OTHERWISE NOTED
5.2 GROUTING UNDER BASE PLATES SHALL BE DONE BY CIVIL CONTRACTOR UNLESS OTHERWISE NOTED
6. ALL REBAR SHAPE CODES ACCORDING TO SANS 282 STEEL TO COMPLY WITH SANS 920
   BARS PREFIX "Y" = HIGH YIELD DEFORMED STEEL BARS OF STRENGTH 450 MPa
   BARS PREFIX "R" = PLAIN ROUND MILD STEEL BARS OF STRENGHT 250 MPa
7. SETTING OUT TO BE APPROVED BY THE ENGINEER OR HIS APPOINTED REPRESENTATIVE PRIOR TO THE START OF CONSTRUCTION
8. NO STRUCTURAL CONCRETE MAY BE POURED BEFORE THE REBAR, FORMWORK AND CAST-IN ITEMS HAVE BEEN INSPECTED AND APPROVED IN WRITING BY THE ENGINEER OR HIS APPOINTED REPRESENTATIVE
9. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF ALL FORMWORK REQUIRED ON A PROJECT.
   A LAYOUT DRAWING SHOWING POSITION AND TYPE OF SUPPORT MUST BE ISSUED TO THE ENGINEER OR HIS APPOINTD REPRESENTATIVE FOR REVIEW.
   ONLY AFTER THE REVIEW WILL THE CONTRACTOR BE ALLOWED TO PROCEED.
   IRRESPECTIVE OF THE OUTCOME OF THE REVIEW IT REMAINS THE RESPONSIBILITY OF THE CONTRACTOR TO MAKE SURE THE DESIGN AND INSTALLATION ARE CORRECT AND ADHERED TO.

WP	NAME	DATE
Drawn By	APH	01/11/2018
Checked By	GB	06/11/2018
Project Manager		08/11/2018
Process Engineer	AM	08/11/2018
Civil Engineer	GB	08/11/2018
Mechanical Engineer	AM	08/11/2018
Piping Engineer	LS	08/11/2018

SCALE: AS NOTED

WorleyParsons resources & energy

WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3180

C00787-39-CI-DAL-0001-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO	.	28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA	.	.

TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D
TAILINGS TRANSFER PUMPS-CIVIL BUND AREA-GA	MET-MWS-39-M0050	ISSUE FOR USE	C	14-11-2018	.	.

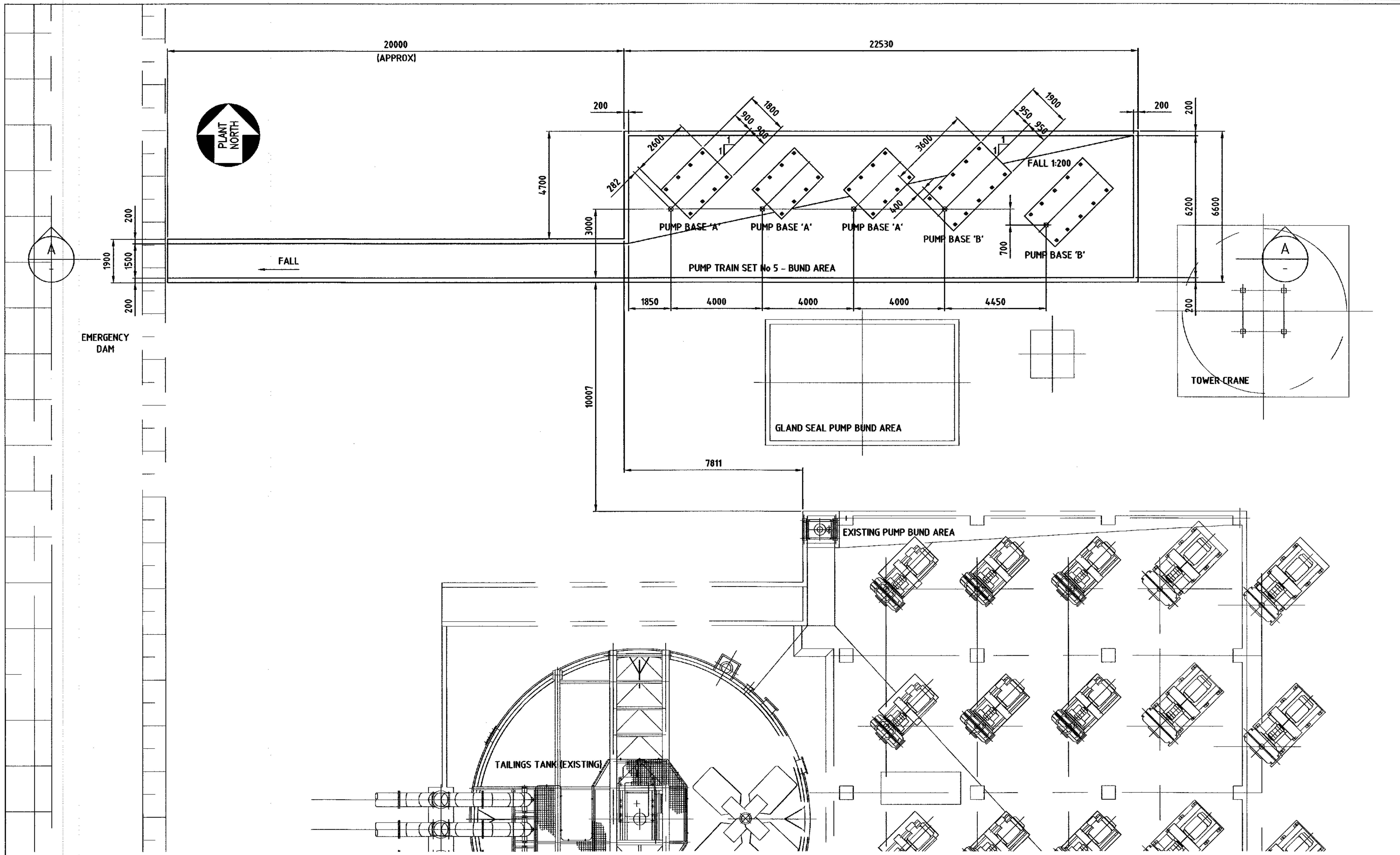
REFERENCE DRAWINGS — REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	APH	—		01.11.2018
CHECKED	GB	—		06.11.2018
SENIOR DESIGNER MET PROJECTS	.			.
PR ENGINEER	.	.		.
PR TECH	.	.		.
PROJECT / MET ENGINEER	.	.		.
MET PROJECTS MANAGER	.	.		.

ANGLOGOLD ASHANTI
COPYRIGHT

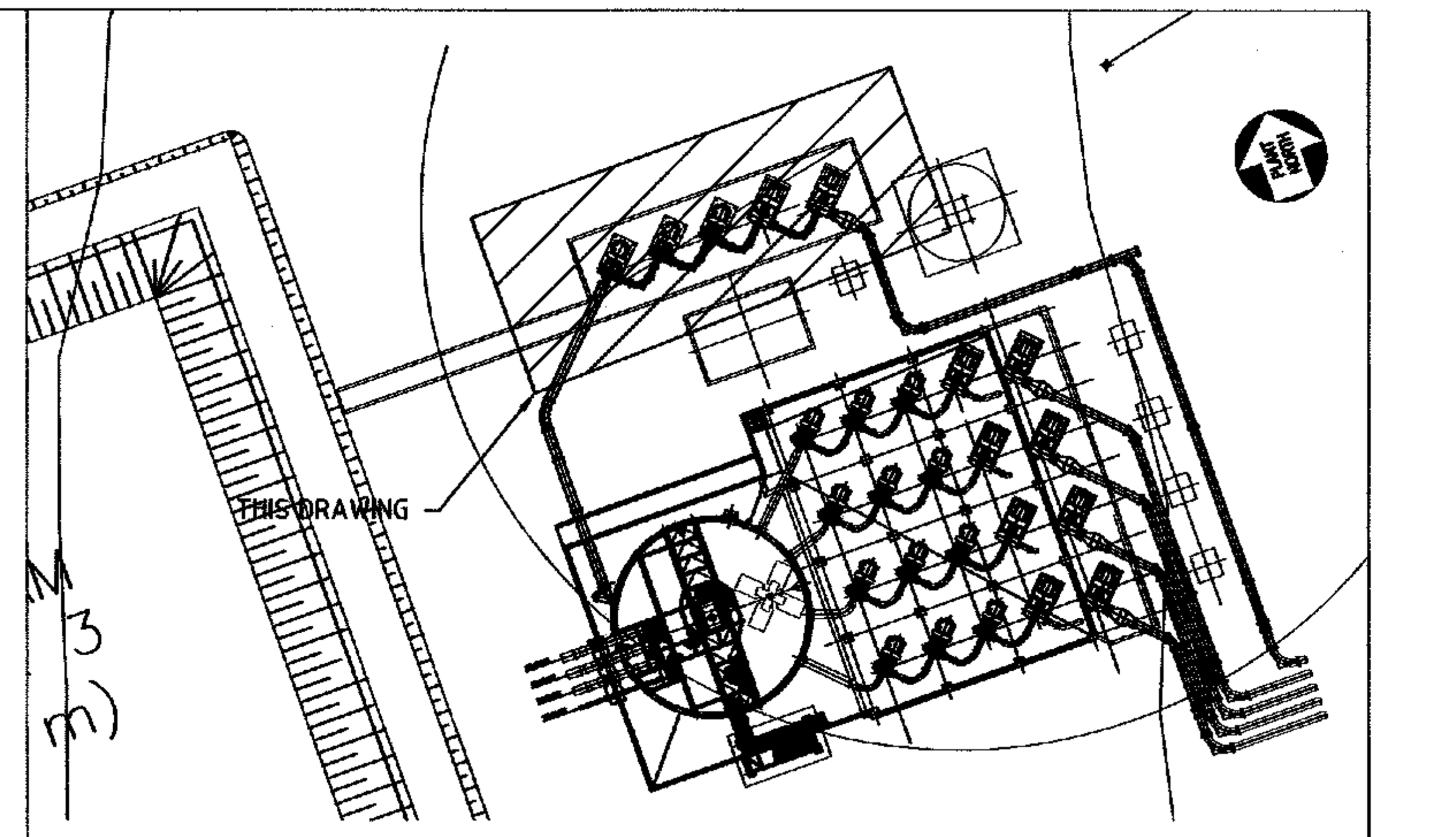
REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE: TAILINGS TRANSFER PUMPS – PLINTH – GENERAL ARRANGEMENT

MET PROJECTS	CWR1806001	MET-MWS-39-C0050	REV C
	PROJECT No:	B/UNIT AREA SEQ. No:	SIZE – A1

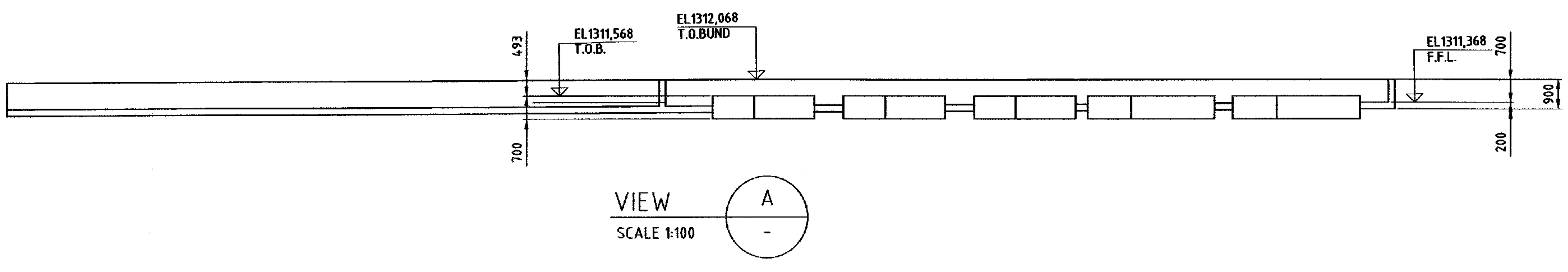


PLAN ON PUMPTRAIN SET No 5 - BUND AREA

SCALE 1:100



SITE PLAN



VIEW A

SCALE 1:100

GENERAL NOTES – SURFACE CIVIL STRUCTURES

1. GENERAL
1.1 ALL DESIGN WORK SHALL BE IN ACCORDANCE WITH AGA SPECIFICATION 114010 LATEST ISSUE
1.2 ALL CONSTRUCTION WORK SHALL BE IN ACCORDANCE WITH AGA SPECIFICATION 114011 LATEST ISSUE
1.3 THESE WORKS SHOULD BE READ IN CONJUNCTION WITH QSP115 CIVIL CONSTRUCTION GENERAL NOTES
2. CONCRETE
2.1 CONCRETE SHALL BE 'STRENGTH CONCRETE' AS SPECIFIED BELOW UNLESS OTHERWISE NOTED
BLINDING CONCRETE GRADE 10/19
ALL STRUCTURAL CONCRETE GRADE 30/19
CONCRETE COVER 50mm ALL ROUND
FOUNDATION COVER 75mm ALL ROUND
3. FORMED AND UNFORMED SURFACES
3.1 FORMWORK SHALL BE CLASSIFIED AS SPECIFIED BELOW (U.O.N.)
"ROUGH" WHERE FACE IS NOT EXPOSED
"SMOOTH" WHERE FACE IS EXPOSED
SMOOTH FORMWORK TO EXPOSED FACES TO BE CARRIED DOWN TO 150mm BELOW ADJOINING FINAL GROUND OR PAVING LEVEL
3.2 ARRISSES SHALL BE CHAMFERED 20x20mm
3.3 EXPOSED UNFORMED SURFACES AND SURFACES TO RECEIVE GROUT TO "WOOD FLOAT FINISH" (U.O.N.)
4. FOUNDING MATERIAL
4.1 THE MAXIMUM DESIGN BEARING PRESSURE FOR FOUNDATIONS SHALL BE 150KPa UNLESS OTHERWISED NOTED
5. CAST IN ITEMS AND GROUTING
5.1 CAST IN ITEMS TO BE SUPPLIED BY CIVIL CONTRACTOR UNLESS OTHERWISE NOTED
5.2 GROUTING UNDER BASE PLATES SHALL BE DONE BY CIVIL CONTRACTOR UNLESS OTHERWISE NOTED
6. ALL REBAR SHAPE CODES ACCORDING TO SANS 282 STEEL TO COMPLY WITH SANS 920
BARS PREFIX "Y" = HIGH YIELD DEFORMED STEEL BARS OF STRENGTH 450 MPa
BARS PREFIX "R" = PLAIN ROUND MILD STEEL BARS OF STRENGHT 250 MPa
7. SETTING OUT TO BE APPROVED BY THE ENGINEER OR HIS APPOINTED REPRESENTATIVE PRIOR TO THE START OF CONSTRUCTION
8. NO STRUCTURAL CONCRETE MAY BE POURED BEFORE THE REBAR, FORMWORK AND CAST-IN ITEMS HAVE BEEN INSPECTED AND APPROVED IN WRITING BY THE ENGINEER OR HIS APPOINTED REPRESENTATIVE
9. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF ALL FORMWORK REQUIRED ON A PROJECT.
A LAYOUT DRAWING SHOWING POSITION AND TYPE OF SUPPORT MUST BE ISSUED TO THE ENGINEER OR HIS APPOINTD REPRESENTATIVE FOR REVIEW.
ONLY AFTER THE REVIEW WILL THE CONTRACTOR BE ALLOWED TO PROCEED.
IRRESPECTIVE OF THE OUTCOME OF THE REVIEW IT REMAINS THE RESPONSIBILITY OF THE CONTRACTOR TO MAKE SURE THE DESIGN AND INSTALLATION ARE CORRECT AND ADHERED TO.

WP	NAME	DATE
Drawn By	APH	05/11/2018
Checked By	GB	06/11/2018
Project Manager	LP	08/11/2018
Process Engineer	MM	08/11/2018
Civil Engineer	GB	08/11/2018
Mechanical Engineer	MM	08/11/2018
Piping Engineer	LS	08/11/2018

SCALE: 1:100

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-CI-DAL-0002-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO	.	28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA	.	.

TITLE	DRG. No
.	.
.	.
.	.
.	.
PID – STAGE 5 PUMPS	MET-MWS-39-P010
TAILINGS TRANSFER PUMP TRAIN – GENERAL ARRANGEMENT	MET-MWS-39-M001
TAILINGS TRANSFER PUMP TRAIN – GA SECTION DETAIL	MET-MWS-39-M002
TAILINGS TRANSFER PUMPS-PLINTH-GA	MET-MWS-39-M0050

REFERENCE DRAWINGS

DETAIL	MARK	DATE	INIT	APP'D
ISSUE FOR USE	C	14-11-2018	.	.

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	APH	–	[signature]	01.11.2018
CHECKED	GB	–	[signature]	06.11.2018
SENIOR DESIGNER MET PROJECTS	.	.		.
PR ENGINEER	.	.		.
PR TECH	.	.		.
PROJECT / MET ENGINEER	.	.		.
MET PROJECTS MANAGER	.	.		.

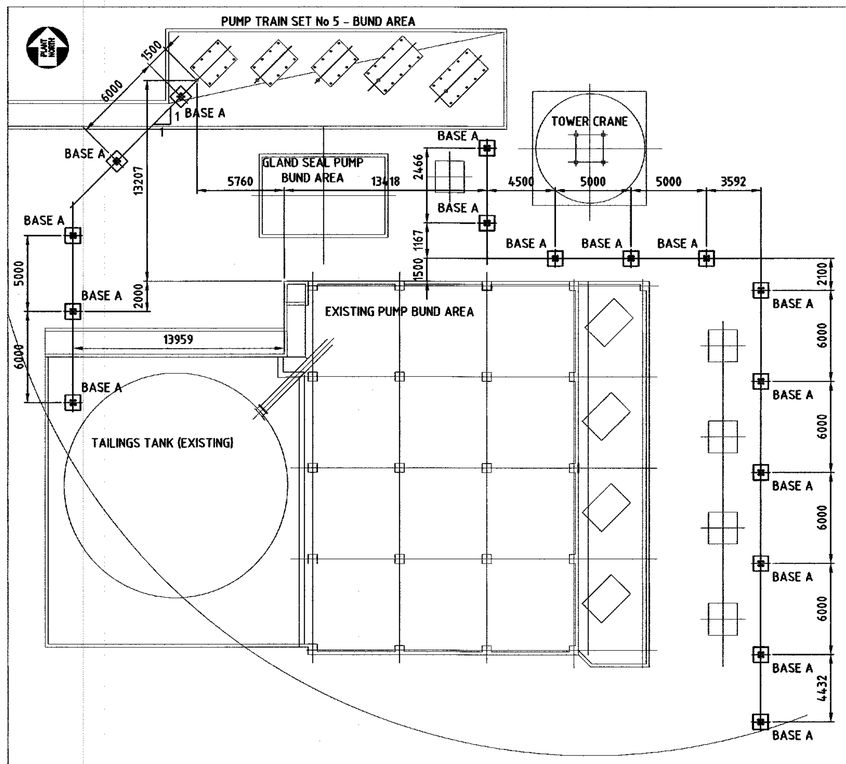
ANGLOGOLD ASHANTI

COPYRIGHT

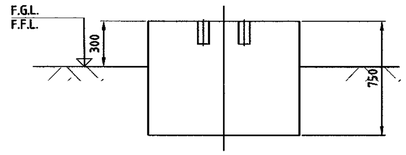
REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE: TAILINGS TRANSFER PUMPS – CIVIL BUND AREA – GENERAL ARRANGEMENT

MET PROJECTS | CWR1806001 | MET-MWS-39-C0051 | REV C

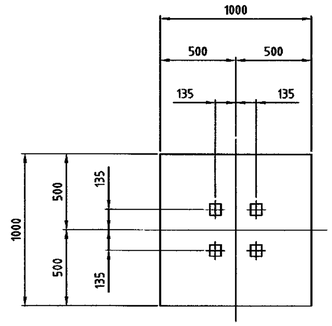
PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE – A1



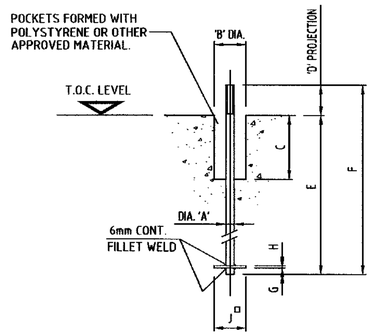
PLAN ON PIPE SUPPORT BASE A
BASE A FOR PIPE SUPPORT PS-1
SCALE 1:200



ELEVATION



PLAN ON PIPE SUPPORT BASE A (16 REQ'D)
SCALE 1:20

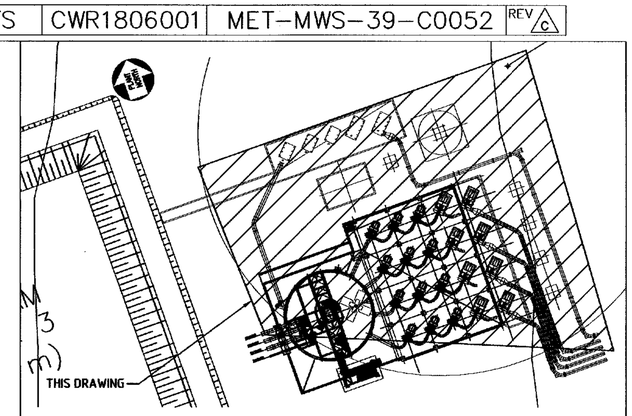


CONTRACTOR TO TAPE AND GREASE TOP OF BOLTS.
ALL BOLTS TO BE SUPPLIED COMPLETE WITH NUTS & WASHERS.

MK	No OFF	ø A	B	C	D	E	F	G	H	J
B1	64	M16	75	150	110	450	560	15	12	60

H.D. BOLT SCHEDULE.

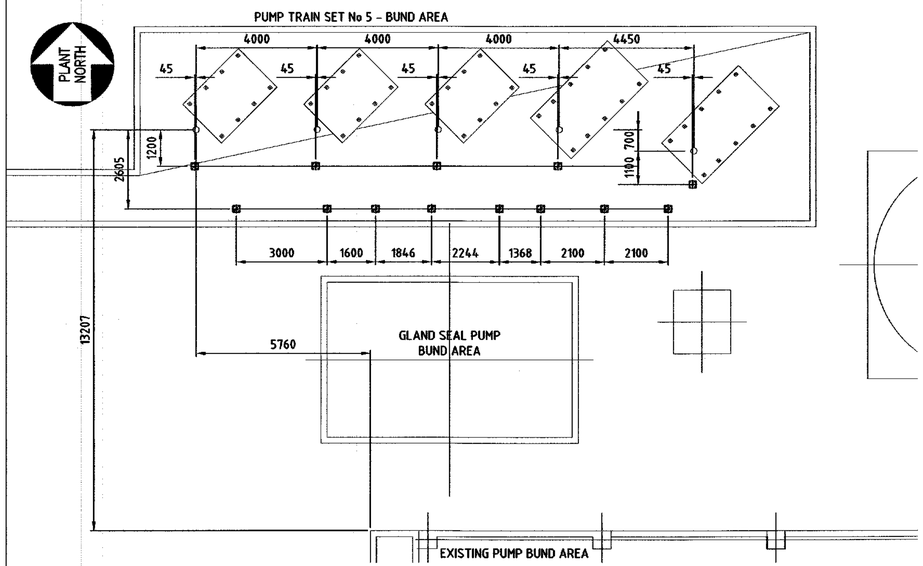
ALL H.D. BOLTS TO BE GRADE 4.6



SITE PLAN

GENERAL NOTES – SURFACE CIVIL STRUCTURES

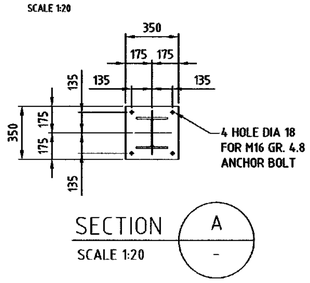
1. GENERAL
1.1 ALL DESIGN WORK SHALL BE IN ACCORDANCE WITH AGA SPECIFICATION 114010 LATEST ISSUE
1.2 ALL CONSTRUCTION WORK SHALL BE IN ACCORDANCE WITH AGA SPECIFICATION 114011 LATEST ISSUE
1.3 THESE WORKS SHOULD BE READ IN CONJUNCTION WITH QSP115 CIVIL CONSTRUCTION GENERAL NOTES
2. CONCRETE
2.1 CONCRETE SHALL BE 'STRENGTH CONCRETE' AS SPECIFIED BELOW UNLESS OTHERWISE NOTED
BLINDING CONCRETE GRADE 10/19
ALL STRUCTURAL CONCRETE GRADE 30/19
CONCRETE COVER 50mm ALL ROUND
FOUNDATION COVER 75mm ALL ROUND
3. FORMED AND UNFORMED SURFACES
3.1 FORMWORK SHALL BE CLASSIFIED AS SPECIFIED BELOW (U.O.N.)
"ROUGH" WHERE FACE IS NOT EXPOSED
"SMOOTH" WHERE FACE IS EXPOSED
SMOOTH FORMWORK TO EXPOSED FACES TO BE CARRIED DOWN TO 150mm BELOW ADJOINING FINAL GROUND OR PAVING LEVEL
3.2 ARRISSES SHALL BE CHAMFERED 20x20mm
3.3 EXPOSED UNFORMED SURFACES AND SURFACES TO RECEIVE GROUT TO "WOOD FLOAT FINISH" (U.O.N.)
4. FOUNDING MATERIAL
4.1 THE MAXIMUM DESIGN BEARING PRESSURE FOR FOUNDATIONS SHALL BE 150KPa UNLESS OTHERWISED NOTED
5. CAST IN ITEMS AND GROUTING
5.1 CAST IN ITEMS TO BE SUPPLIED BY CIVIL CONTRACTOR UNLESS OTHERWISE NOTED
5.2 GROUTING UNDER BASE PLATES SHALL BE DONE BY CIVIL CONTRACTOR UNLESS OTHERWISE NOTED
6. ALL REBAR SHAPE CODES ACCORDING TO SANS 282 STEEL TO COMPLY WITH SANS 920
BARS PREFIX "Y" = HIGH YIELD DEFORMED STEEL BARS OF STRENGTH 450 MPa
BARS PREFIX "R" = PLAIN ROUND MILD STEEL BARS OF STRENGHT 250 MPa
7. SETTING OUT TO BE APPROVED BY THE ENGINEER OR HIS APPOINTED REPRESENTATIVE PRIOR TO THE START OF CONSTRUCTION
8. NO STRUCTURAL CONCRETE MAY BE POURED BEFORE THE REBAR, FORMWORK AND CAST-IN ITEMS HAVE BEEN INSPECTED AND APPROVED IN WRITING BY THE ENGINEER OR HIS APPOINTED REPRESENTATIVE
9. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF ALL FORMWORK REQUIRED ON A PROJECT.
A LAYOUT DRAWING SHOWING POSITION AND TYPE OF SUPPORT MUST BE ISSUED TO THE ENGINEER OR HIS APPOINTD REPRESENTATIVE FOR REVIEW.
ONLY AFTER THE REVIEW WILL THE CONTRACTOR BE ALLOWED TO PROCEED.
IRRESPECTIVE OF THE OUTCOME OF THE REVIEW IT REMAINS THE RESPONSIBILITY OF THE CONTRACTOR TO MAKE SURE THE DESIGN AND INSTALLATION ARE CORRECT AND ADHERED TO.



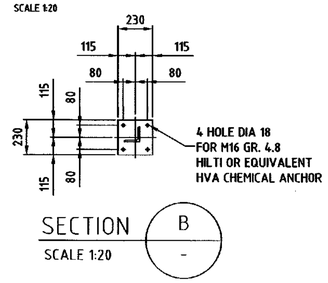
PLAN ON PIPE SUPPORTS (FOR PS-2)
SCALE 1:100

PIPE SUPPORT PS-1 (16 REQUIRED)
SCALE 1:20

PIPE SUPPORT PS-2 (13 REQUIRED)
SCALE 1:20



SECTION A
SCALE 1:20



SECTION B
SCALE 1:20

NOTE:
RETURN WATER SUMP LOCATION/ORINTATION TO BE CONFIRMED DURING EXECUTION

MEMBER SIZE LEGEND	
ITEM No.	DESCRIPTION
A20	100x100x10 ANGLE
H4	203x203x46 UC

WP	NAME	DATE
Drawn By	APH	14/11/2018
Checked By	GB	14/11/2018
Project Manager		14/11/2018
Process Engineer		14/11/2018
Civil Engineer		14/11/2018
Mechanical Engineer		14/11/2018
Piping Engineer		14/11/2018

SCALE: AS NOTED

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 69 292, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 339
Int'l Tel: +27 11 218 3000 | Int'l Fax: +27 11 218 3339

C00787-39-CI-DAL-0003-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO	.	28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA	.	.

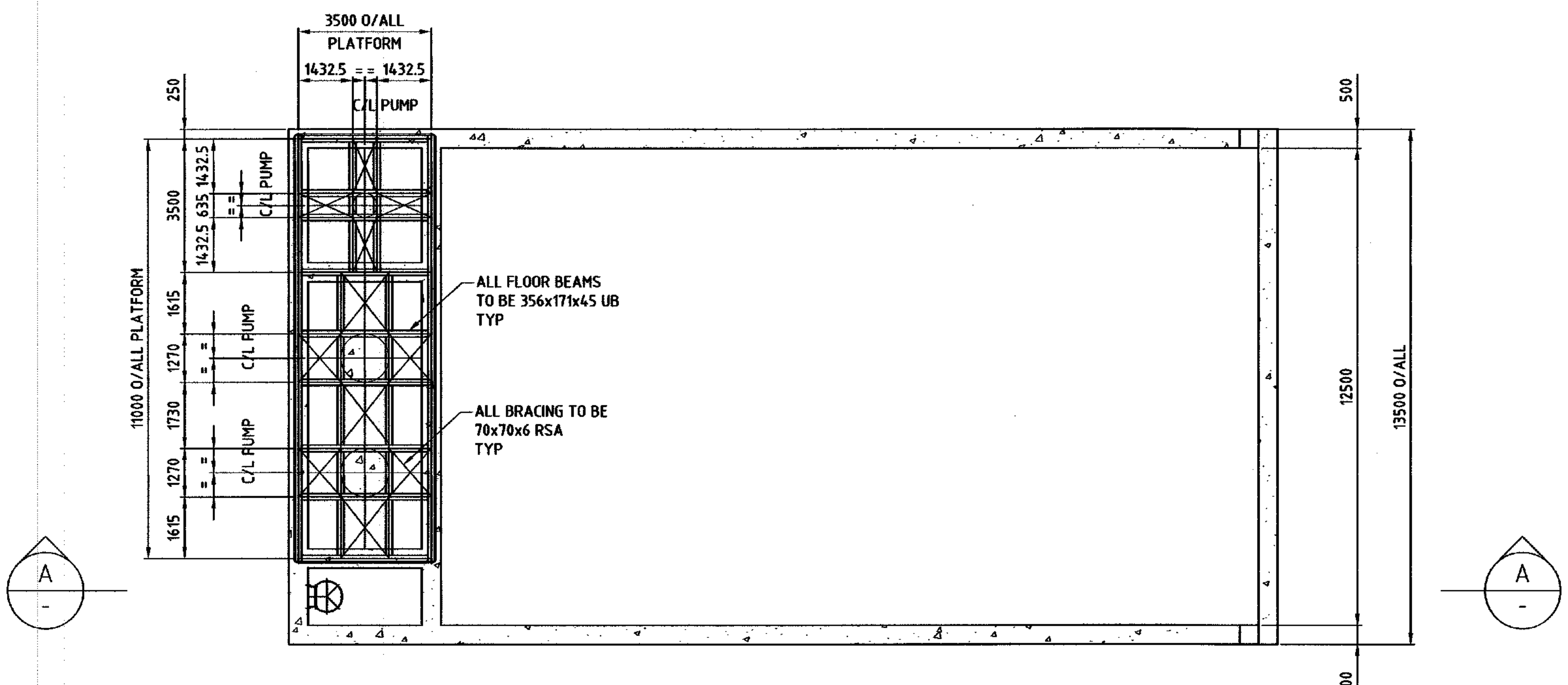
REFERENCE DRAWINGS		REVISIONS					
TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D	
TAILINGS TRANSFER PUMPS-PLINTH-GA	MET-MWS-39-P050						
PID – STAGE 5 PUMPS	MET-MWS-39-P010						
TAILINGS TRANSFER PUMP TRAIN – GENERAL ARRANGEMENT	MET-MWS-39-M001						
TAILINGS TRANSFER PUMP TRAIN – GA SECTION DETAIL	MET-MWS-39-M002	ISSUE FOR USE	C	21-11-2018			

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	APH			14.11.2018
CHECKED	GB			14.11.2018
SENIOR DESIGNER MET PROJECTS	.	.		.
PR ENGINEER	.	.		.
PR TECH	.	.		.
PROJECT / MET ENGINEER	.	.		.
MET PROJECTS MANAGER	.	.		.

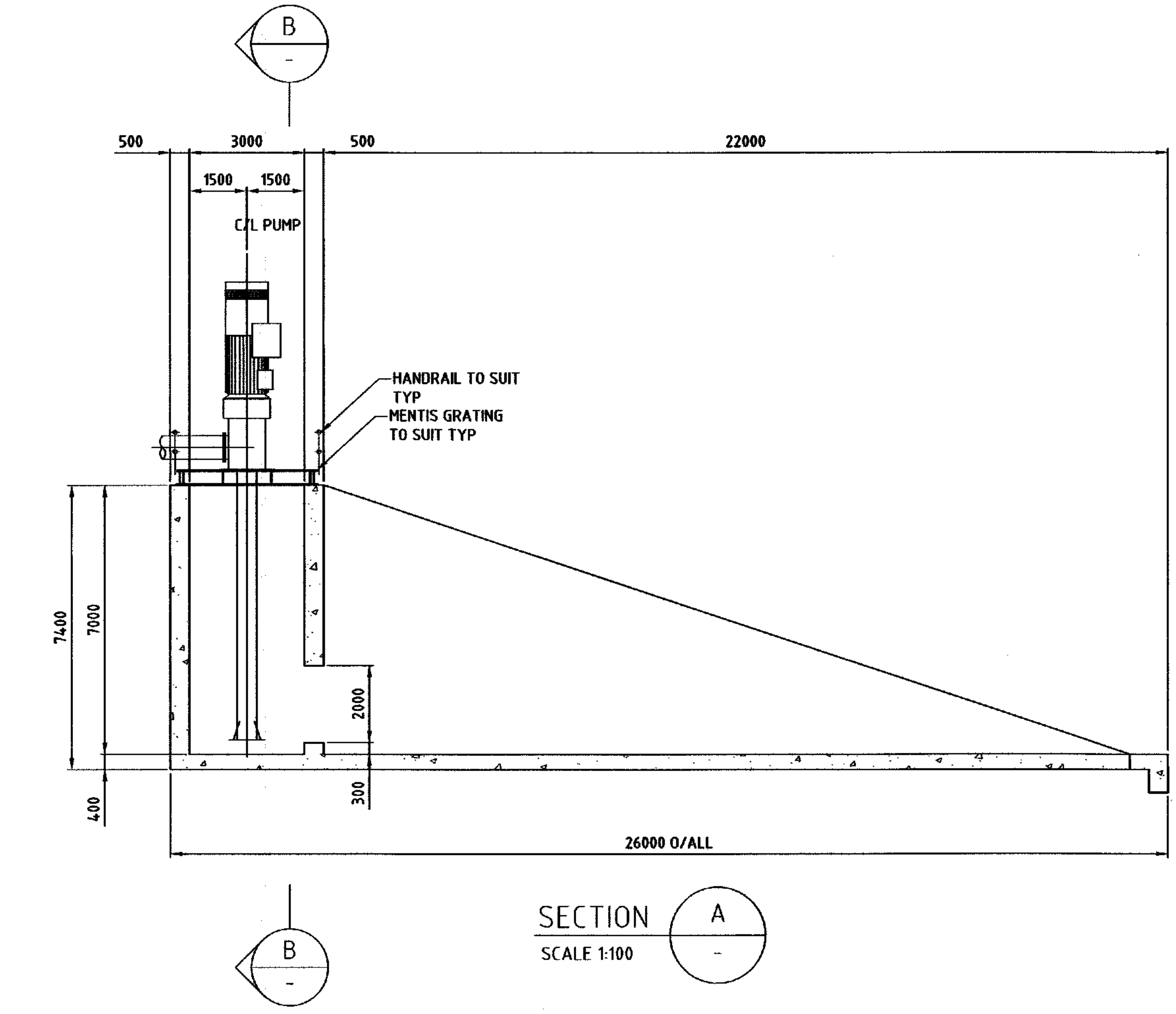
ANGLOGOLD ASHANTI
COPYRIGHT
MET PROJECTS

REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE TAILINGS TRANSFER PUMP – PIPE SUPPORTS – GENERAL ARRANGEMENT

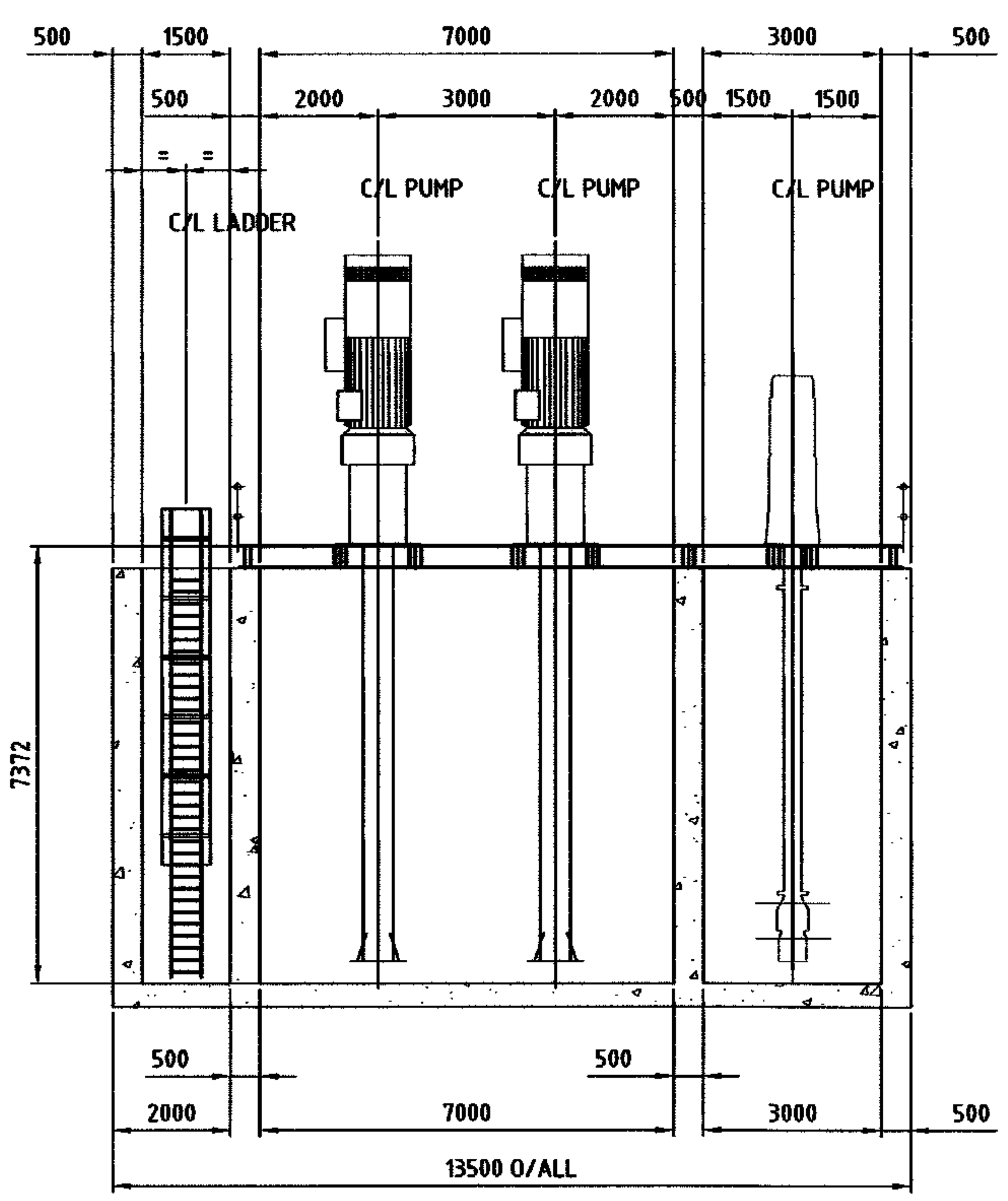
PROJECT No:	B/UNIT	AREA	SEQ. No:	REV	SIZE
CWR1806001	MET	MWS	C0052	C	A1



PLAN VIEW ON PUMP STATION

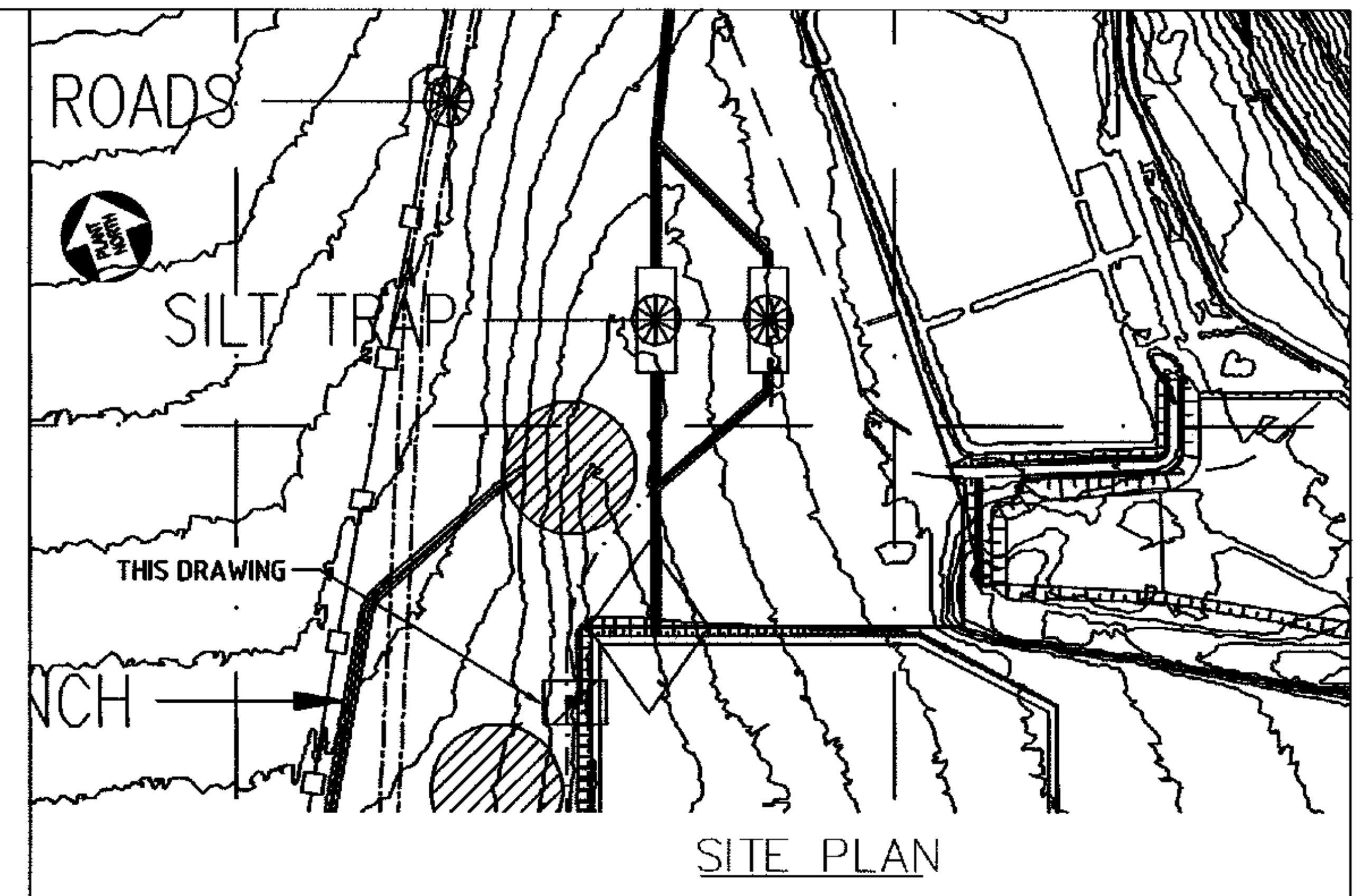


SECTION A
SCALE 1:100



SECTION B
SCALE 1:100

NOTE:
RETURN WATER SUMP LOCATION/ORINTATION TO BE CONFIRMED DURING EXECUTION



SITE PLAN

SITE PLAN

GENERAL NOTES – SURFACE CIVIL STRUCTURES

1. GENERAL
1.1 ALL DESIGN WORK SHALL BE IN ACCORDANCE WITH AGA SPECIFICATION 114010 LATEST ISSUE
1.2 ALL CONSTRUCTION WORK SHALL BE IN ACCORDANCE WITH AGA SPECIFICATION 114011 LATEST ISSUE
1.3 THESE WORKS SHOULD BE READ IN CONJUNCTION WITH QSP115 CIVIL CONSTRUCTION GENERAL NOTES
2. CONCRETE
2.1 CONCRETE SHALL BE 'STRENGTH CONCRETE' AS SPECIFIED BELOW UNLESS OTHERWISE NOTED
BLINDING CONCRETE — GRADE 10/19
ALL STRUCTURAL CONCRETE — GRADE 30/19
CONCRETE COVER — 50mm ALL ROUND
FOUNDATION COVER — 75mm ALL ROUND
3. FORMED AND UNFORMED SURFACES
3.1 FORMWORK SHALL BE CLASSIFIED AS SPECIFIED BELOW (U.O.N.)
"ROUGH" — WHERE FACE IS NOT EXPOSED
"SMOOTH" — WHERE FACE IS EXPOSED
SMOOTH FORMWORK TO EXPOSED FACES TO BE CARRIED DOWN TO 150mm BELOW ADJOINING FINAL GROUND OR PAVING LEVEL
3.2 ARRISSES SHALL BE CHAMFERED 20x20mm
3.3 EXPOSED UNFORMED SURFACES AND SURFACES TO RECEIVE GROUT TO "WOOD FLOAT FINISH" (U.O.N.)
4. FOUNDING MATERIAL
4.1 THE MAXIMUM DESIGN BEARING PRESSURE FOR FOUNDATIONS SHALL BE 150KPa UNLESS OTHERWISED NOTED
5. CAST IN ITEMS AND GROUTING
5.1 CAST IN ITEMS TO BE SUPPLIED BY CIVIL CONTRACTOR UNLESS OTHERWISE NOTED
5.2 GROUTING UNDER BASE PLATES SHALL BE DONE BY CIVIL CONTRACTOR UNLESS OTHERWISE NOTED
6. ALL REBAR SHAPE CODES ACCORDING TO SANS 282 STEEL TO COMPLY WITH SANS 920
BARS PREFIX "Y" = HIGH YIELD DEFORMED STEEL BARS OF STRENGTH 450 MPa
BARS PREFIX "R" = PLAIN ROUND MILD STEEL BARS OF STRENGHT 250 MPa
7. SETTING OUT TO BE APPROVED BY THE ENGINEER OR HIS APPOINTED REPRESENTATIVE PRIOR TO THE START OF CONSTRUCTION
8. NO STRUCTURAL CONCRETE MAY BE POURED BEFORE THE REBAR, FORMWORK AND CAST-IN ITEMS HAVE BEEN INSPECTED AND APPROVED IN WRITING BY THE ENGINEER OR HIS APPOINTED REPRESENTATIVE
9. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF ALL FORMWORK REQUIRED ON A PROJECT.
A LAYOUT DRAWING SHOWING POSITION AND TYPE OF SUPPORT MUST BE ISSUED TO THE ENGINEER OR HIS APPOINTD REPRESENTATIVE FOR REVIEW.
ONLY AFTER THE REVIEW WILL THE CONTRACTOR BE ALLOWED TO PROCEED.
IRRESPECTIVE OF THE OUTCOME OF THE REVIEW IT REMAINS THE RESPONSIBILITY OF THE CONTRACTOR TO MAKE SURE THE DESIGN AND INSTALLATION ARE CORRECT AND ADHERED TO.

WP	NAME	DATE
Drawn By		30/11/2018
Checked By		04/12/2018
Project Manager		04/12/2018
Process Engineer		04/12/2018
Civil Engineer		04/12/2018
Mechanical Engineer		04/12/2018
Piping Engineer		04/12/2018

SCALE: AS NOTED

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-CI-DAL-0004-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO		28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA	.	.

REFERENCE DRAWINGS

TITLE	DRG. No
DUST SUPPRESSION – GA/LAYOUT	MET-MWS-39-M0012
DUST SUPPRESSION PUMP – GA	MET-MWS-39-M0013
RETURN WATER PIPING GA/LAYOUT	MET-MWS-39-M0007
RETURN WATER PUMP – GA (EXISTING)	MET-MWS-39-M0004

REVISIONS

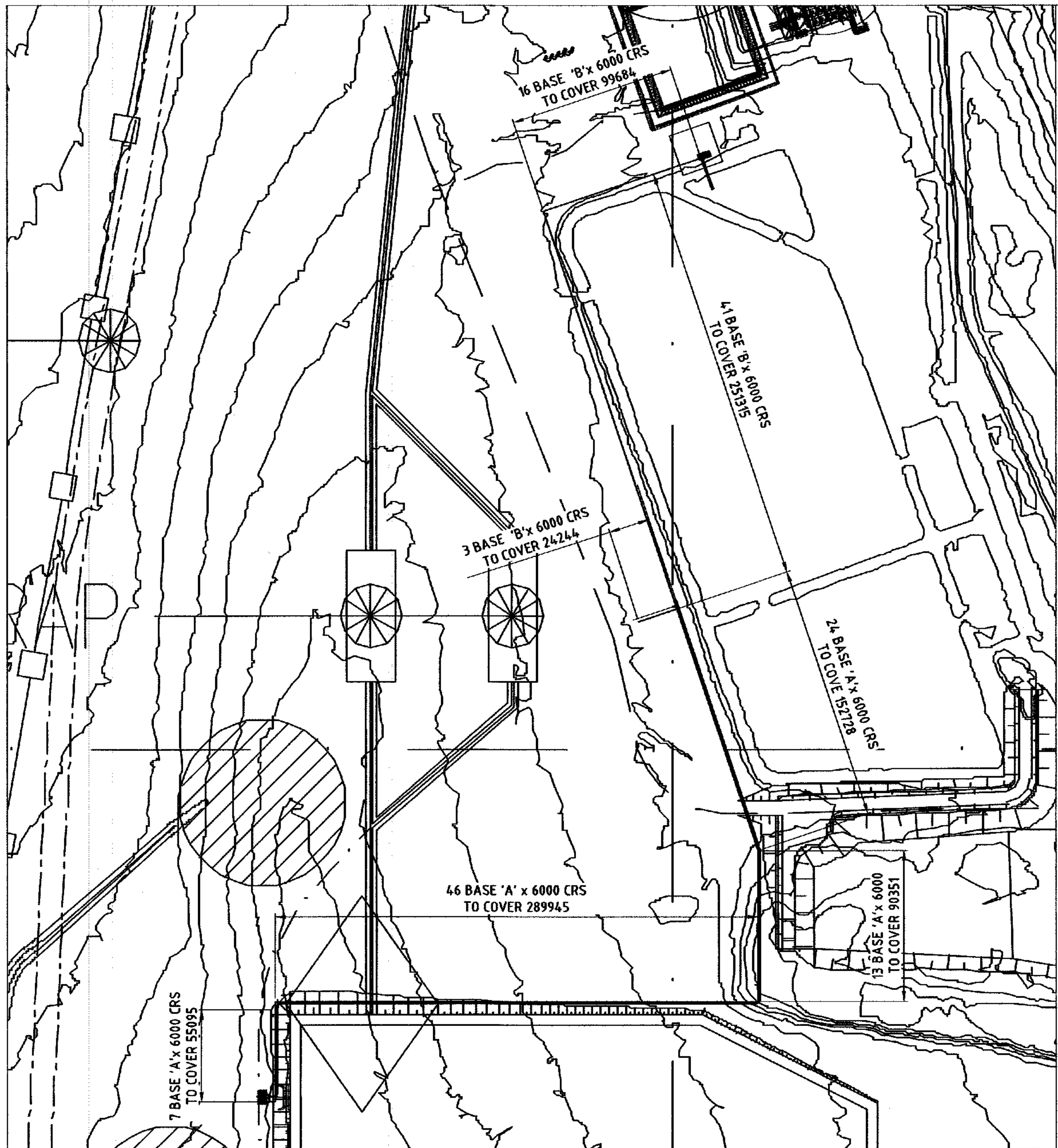
DETAIL	MARK	DATE	INIT	APP'D
ISSUE FOR USE	C	04-12-2018	.	

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	APH	—		30.11.2018
CHECKED	GB	—		04.12.2018
SENIOR DESIGNER MET PROJECTS	.			
PR ENGINEER	.	.		
PR TECH	.	.		
PROJECT / MET ENGINEER	.	.		
MET PROJECTS MANAGER	.	.		

ANGLOGOLD ASHANTI
COPYRIGHT

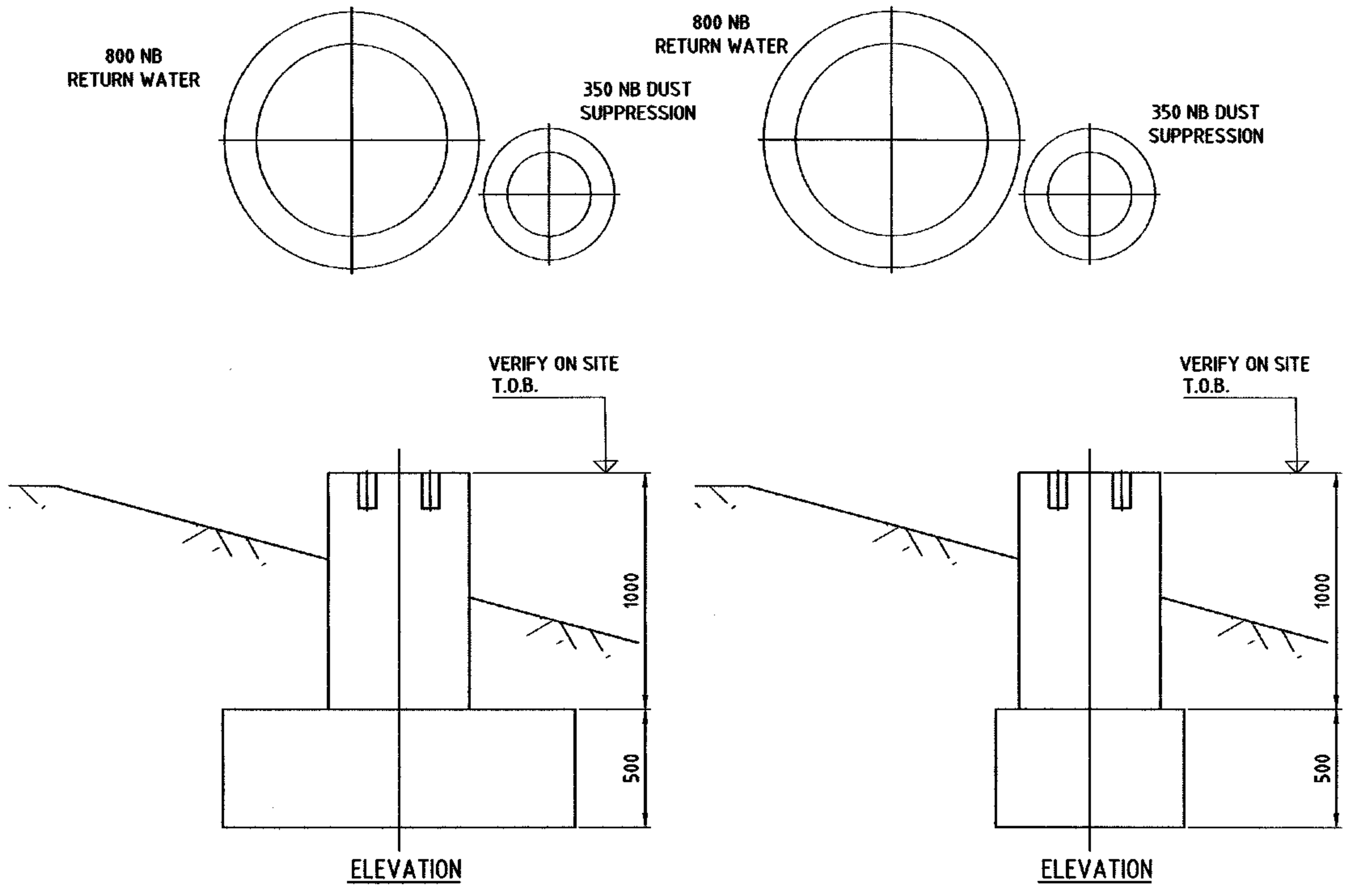
REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE: RETURN WATER PUMP PLINTH – GA

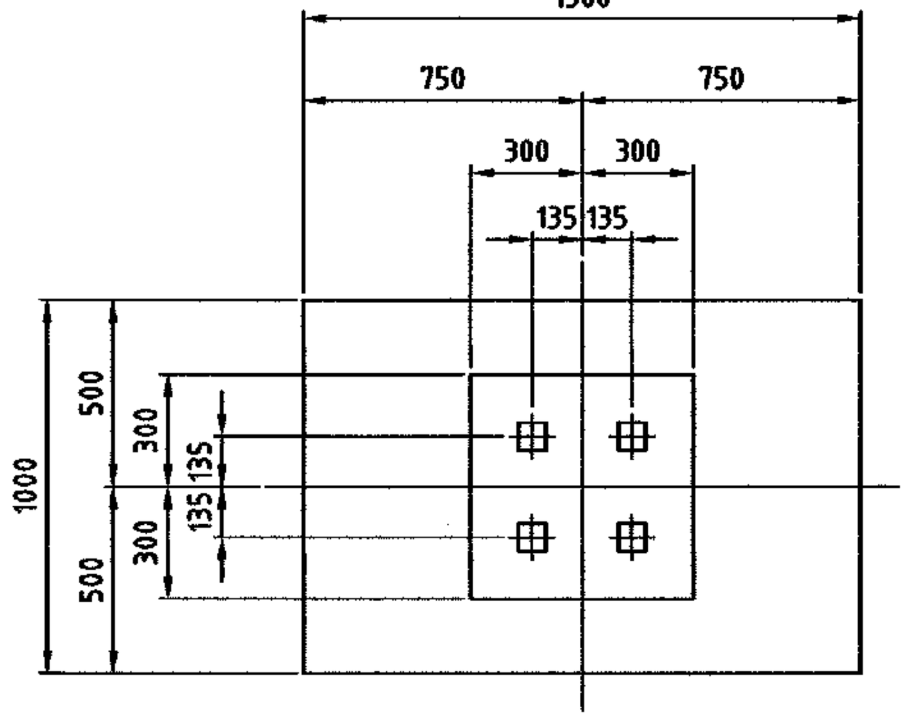
MET PROJECTS	CWR1806001	MET-MWS-39-C0067	REV C
	PROJECT No:	B/UNIT AREA SEQ. No:	SIZE – A1



PLAN RETURN WATER & DUST SUPPRESSION PIPE ROUTE

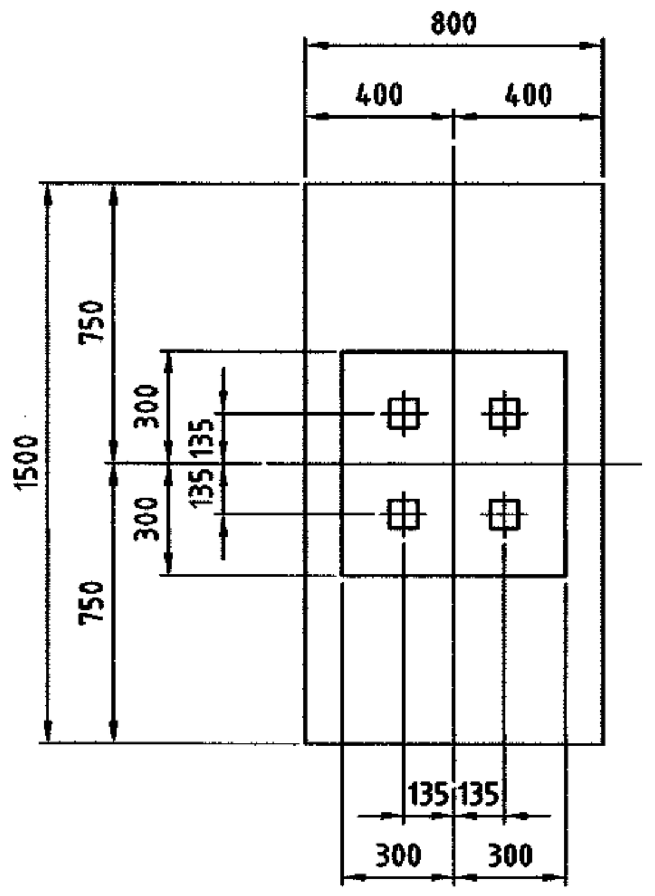
SCALE 1:2000





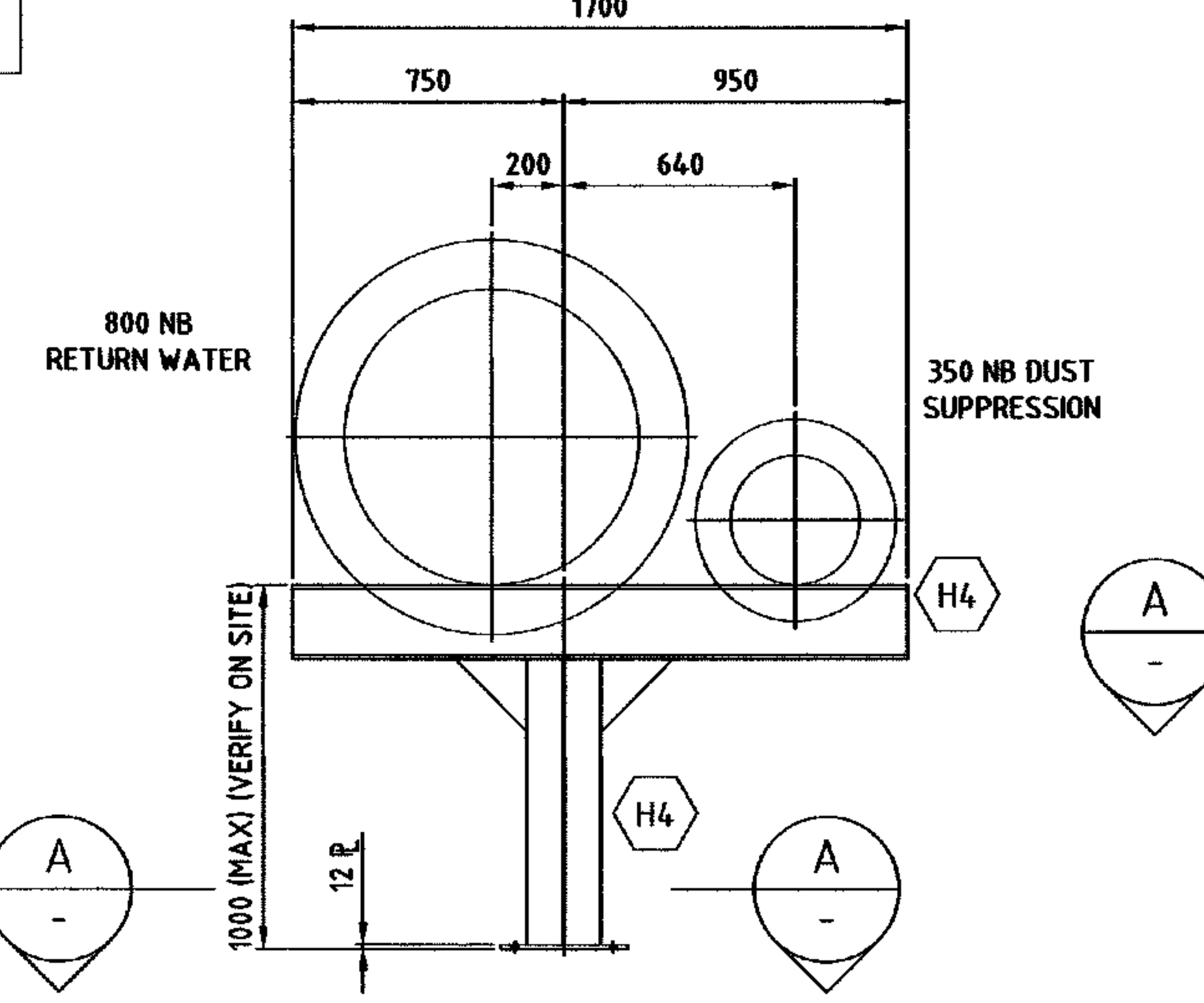
PLAN ON PIPE SUPPORT BASE A (90 REQ'D)

SCALE 1:20



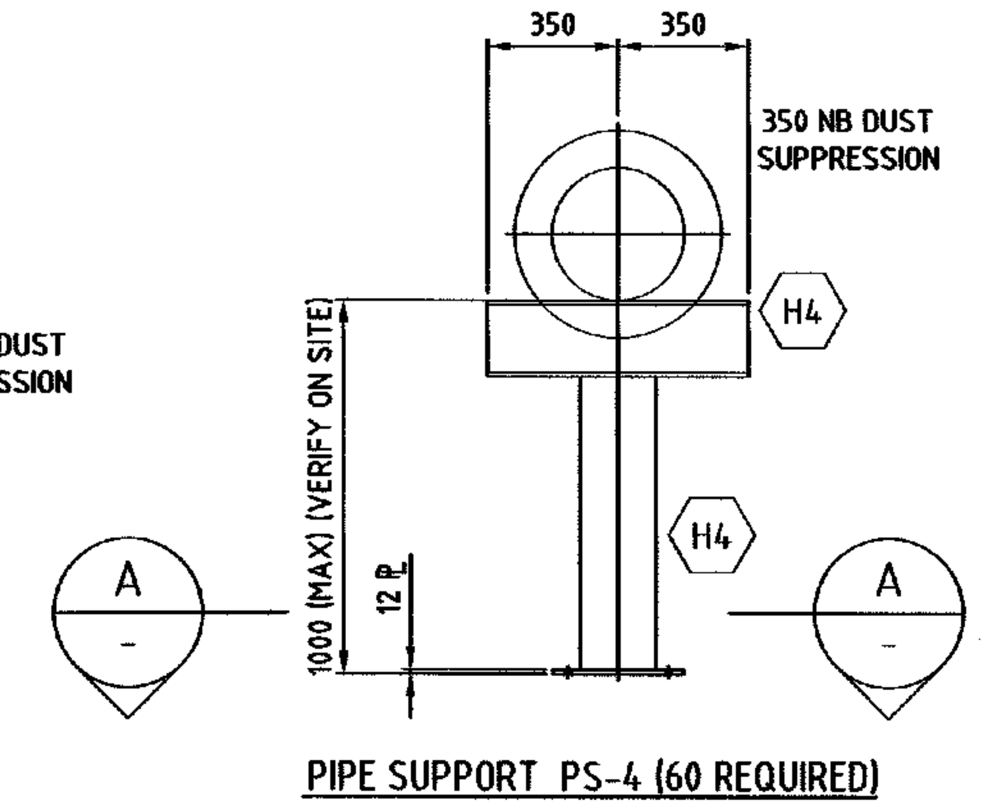
PLAN ON PIPE SUPPORT BASE A (94 REQ'D)

SCALE 1:20



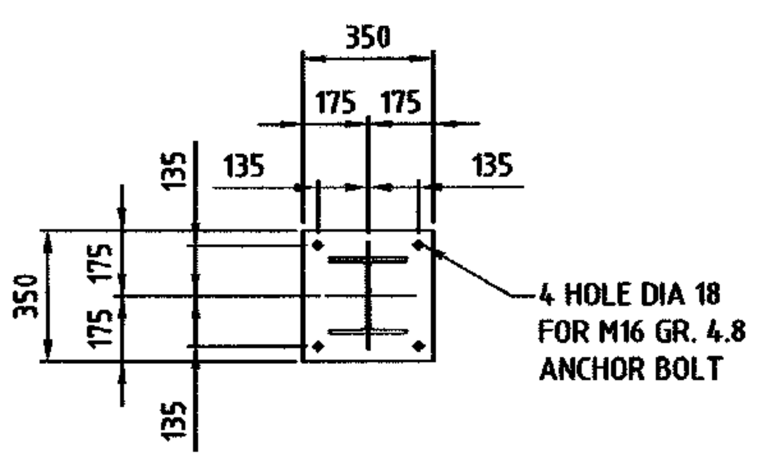
PIPE SUPPORT PS-3 (90 REQUIRED)

SCALE 1:20



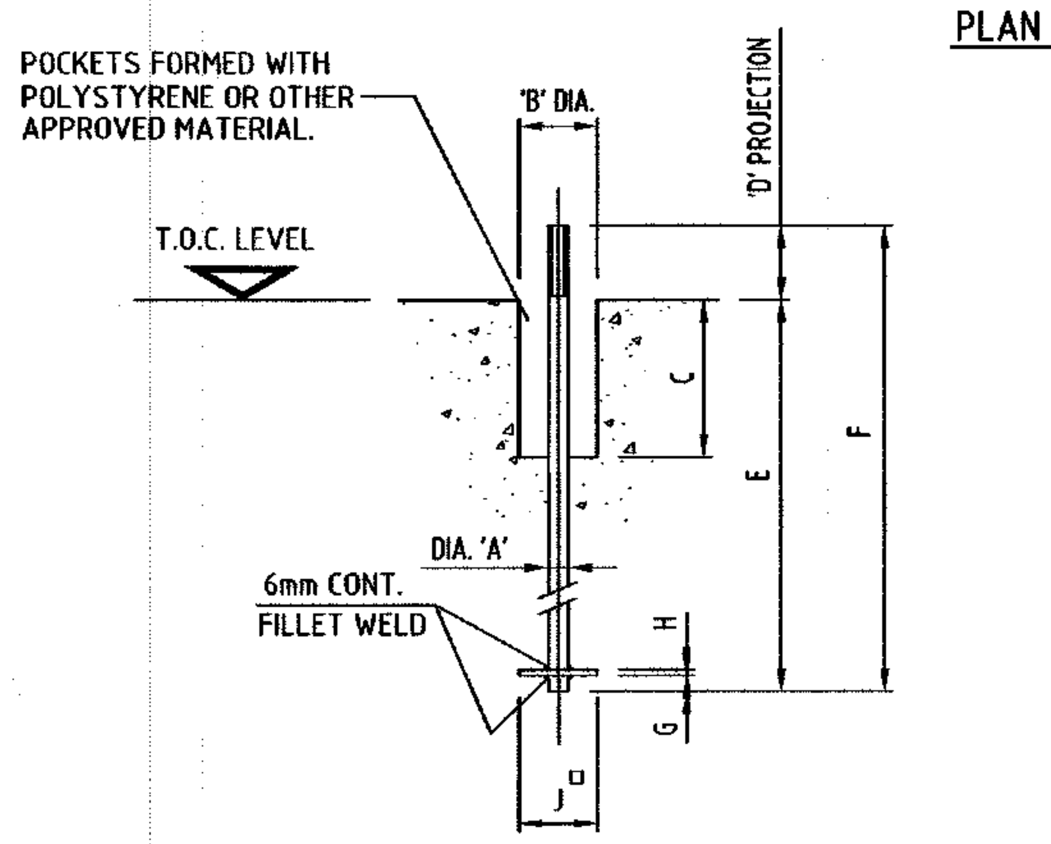
PIPE SUPPORT PS-4 (60 REQUIRED)

SCALE 1:20



SECTION A

SCALE 1:20

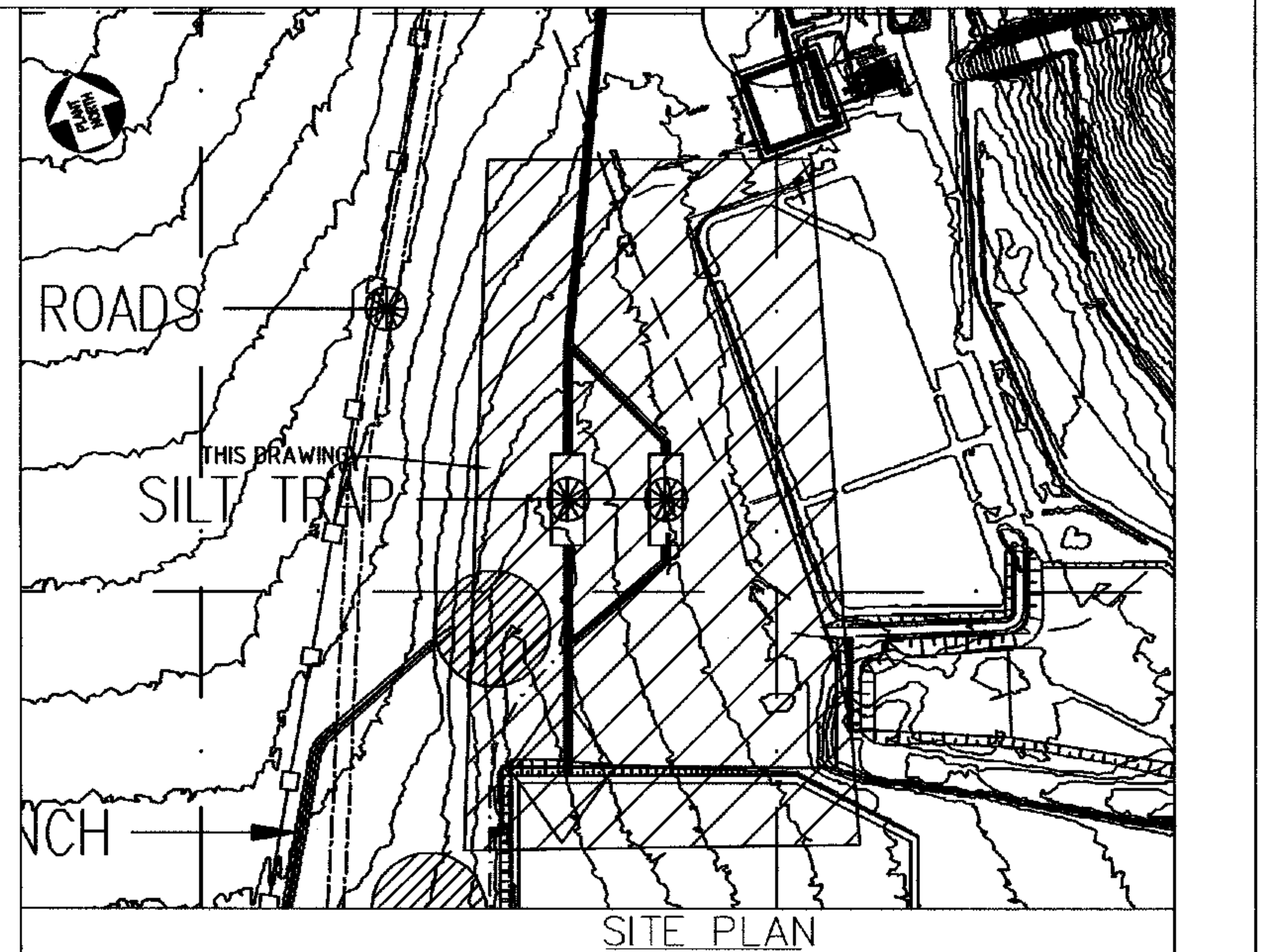


CONTRACTOR TO TAPE AND GREASE TOP OF BOLTS.
ALL BOLTS TO BE SUPPLIED COMPLETE WITH NUTS & WASHERS.

MK	No OFF	ØA	B	C	D	E	F	G	H	J
B1	64	M16	75	150	110	450	560	15	12	60

H.D. BOLT SCHEDULE.

ALL H.D. BOLTS TO BE GRADE 4,6



SITE PLAN

GENERAL NOTES – SURFACE CIVIL STRUCTURES

1. GENERAL
1.1 ALL DESIGN WORK SHALL BE IN ACCORDANCE WITH AGA SPECIFICATION 114010 LATEST ISSUE
1.2 ALL CONSTRUCTION WORK SHALL BE IN ACCORDANCE WITH AGA SPECIFICATION 114011 LATEST ISSUE
1.3 THESE WORKS SHOULD BE READ IN CONJUNCTION WITH QSP115 CIVIL CONSTRUCTION GENERAL NOTES
2. CONCRETE
2.1 CONCRETE SHALL BE 'STRENGTH CONCRETE' AS SPECIFIED BELOW UNLESS OTHERWISE NOTED
BLINDING CONCRETE GRADE 10/19
ALL STRUCTURAL CONCRETE GRADE 30/19
CONCRETE COVER 50mm ALL ROUND
FOUNDATION COVER 75mm ALL ROUND
3. FORMED AND UNFORMED SURFACES
3.1 FORMWORK SHALL BE CLASSIFIED AS SPECIFIED BELOW (U.O.N.)
"ROUGH" WHERE FACE IS NOT EXPOSED
"SMOOTH" WHERE FACE IS EXPOSED
SMOOTH FORMWORK TO EXPOSED FACES TO BE CARRIED DOWN TO 150mm BELOW ADJOINING FINAL GROUND OR PAVING LEVEL
3.2 ARRISSES SHALL BE CHAMFERED 20x20mm
3.3 EXPOSED UNFORMED SURFACES AND SURFACES TO RECEIVE GROUT TO "WOOD FLOAT FINISH" (U.O.N.)
4. FOUNDING MATERIAL
4.1 THE MAXIMUM DESIGN BEARING PRESSURE FOR FOUNDATIONS SHALL BE 150KPa UNLESS OTHERWISED NOTED
5. CAST IN ITEMS AND GROUTING
5.1 CAST IN ITEMS TO BE SUPPLIED BY CIVIL CONTRACTOR UNLESS OTHERWISE NOTED
5.2 GROUTING UNDER BASE PLATES SHALL BE DONE BY CIVIL CONTRACTOR UNLESS OTHERWISE NOTED
6. ALL REBAR SHAPE CODES ACCORDING TO SANS 282 STEEL TO COMPLY WITH SANS 920
BARS PREFIX "Y" = HIGH YIELD DEFORMED STEEL BARS OF STRENGTH 450 MPa
BARS PREFIX "R" = PLAIN ROUND MILD STEEL BARS OF STRENGHT 250 MPa
7. SETTING OUT TO BE APPROVED BY THE ENGINEER OR HIS APPOINTED REPRESENTATIVE PRIOR TO THE START OF CONSTRUCTION
8. NO STRUCTURAL CONCRETE MAY BE POURED BEFORE THE REBAR, FORMWORK AND CAST-IN ITEMS HAVE BEEN INSPECTED AND APPROVED IN WRITING BY THE ENGINEER OR HIS APPOINTED REPRESENTATIVE
9. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF ALL FORMWORK REQUIRED ON A PROJECT.
A LAYOUT DRAWING SHOWING POSITION AND TYPE OF SUPPORT MUST BE ISSUED TO THE ENGINEER OR HIS APPOINTD REPRESENTATIVE FOR REVIEW.
ONLY AFTER THE REVIEW WILL THE CONTRACTOR BE ALLOWED TO PROCEED.
IRRESPECTIVE OF THE OUTCOME OF THE REVIEW IT REMAINS THE RESPONSIBILITY OF THE CONTRACTOR TO MAKE SURE THE DESIGN AND INSTALLATION ARE CORRECT AND ADHERED TO.

MEMBER SIZE LEGEND

ITEM No.	DESCRIPTION
H4	203x203x46 UC

NOTE:
RETURN WATER SUMP LOCATION/ORINTATION TO BE CONFIRMED DURING EXECUTION

WP	NAME	DATE
Drawn By		29/11/2018
Checked By		30/11/2018
Project Manager		30/11/2018
Process Engineer		30/11/2018
Civil Engineer		30/11/2018
Mechanical Engineer		30/11/2018
Piping Engineer		30/11/2018

SCALE: AS NOTED

WorleyParsons resources & energy

C00787-39-CI-DAL-0005-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO		28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA		

TITLE	DRG. No	MARK	DETAIL	DATE	INIT	APP'D
DUST SUPPRESSION – GA/LAYOUT	MET-MWS-39-M0012					
DUST SUPPRESSION PUMP – GA	MET-MWS-39-M0013					
RETURN WATER PIPING GA/LAYOUT	MET-MWS-39-M0007					
RETURN WATER PUMP – GA (EXISTING)	MET-MWS-39-M0004	C	ISSUE FOR USE	30/11/2018		

REFERENCE DRAWINGS | REVISIONS

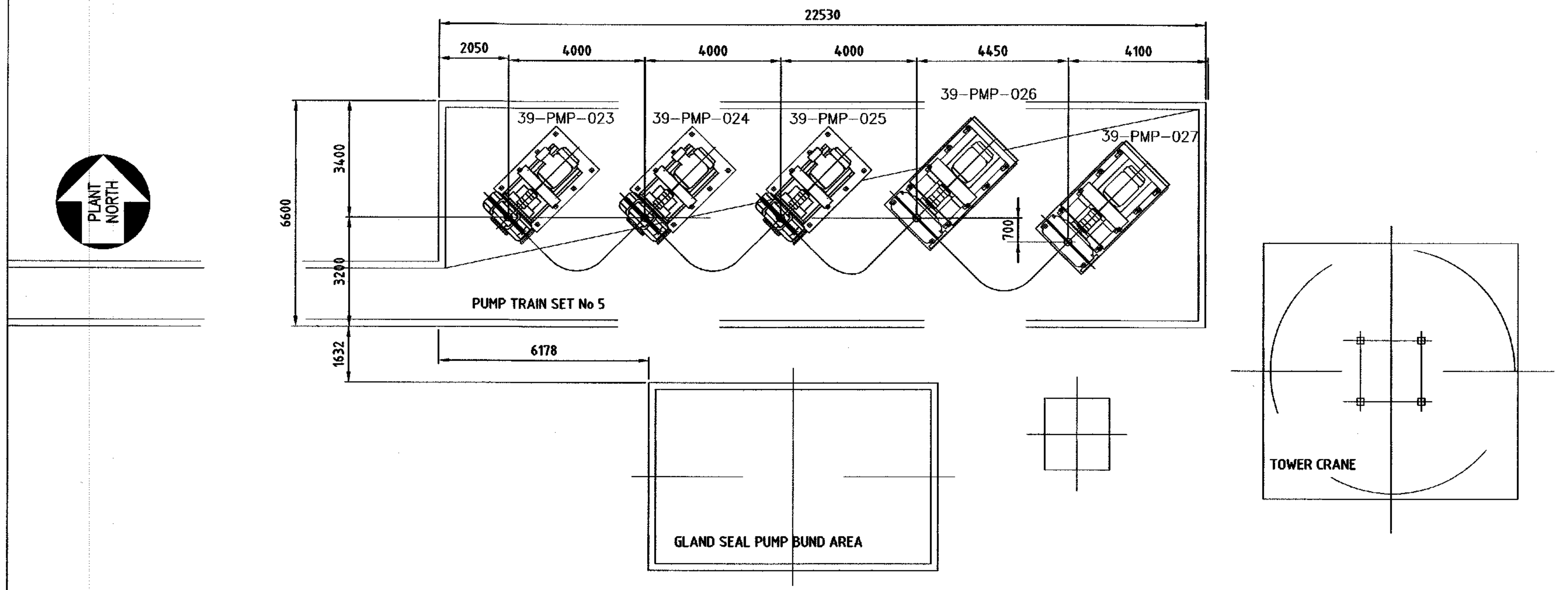
DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	APH			29.11.2018
CHECKED	GB	–		30.11.2018
SENIOR DESIGNER MET PROJECTS	.			
PR ENGINEER	.			
PR TECH	.			
PROJECT / MET ENGINEER	.			
MET PROJECTS MANAGER	.			

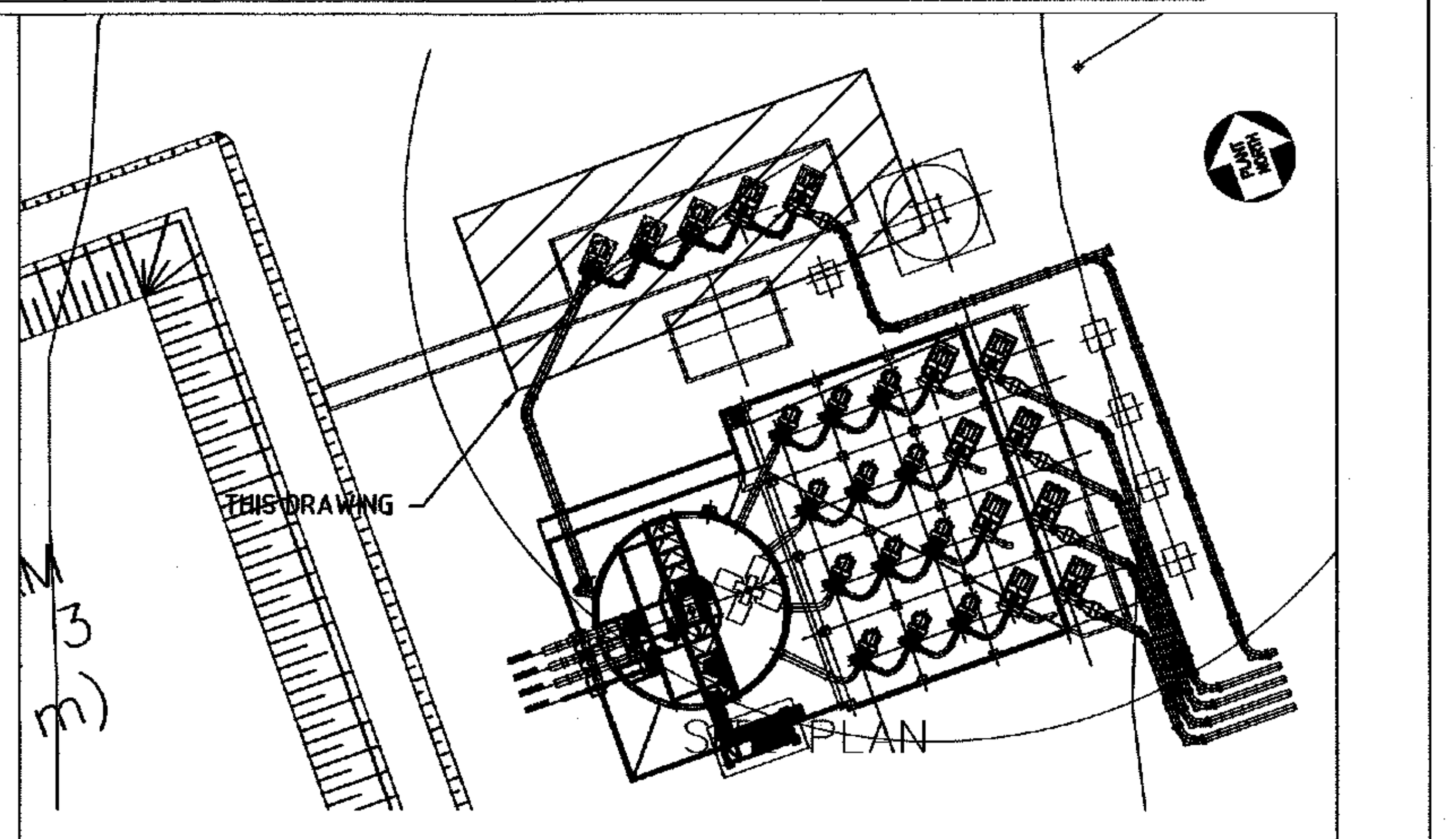
ANGLOGOLD ASHANTI
COPYRIGHT

REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE: RETURN WATER AND DUST SUPPRESSION PIPE SUPPORTS – GA

MET PROJECTS | CWR1806001 | MET-MWS-39-C0068 | REV C

PROJECT No: B/UNIT AREA SEQ. No: SIZE – A1

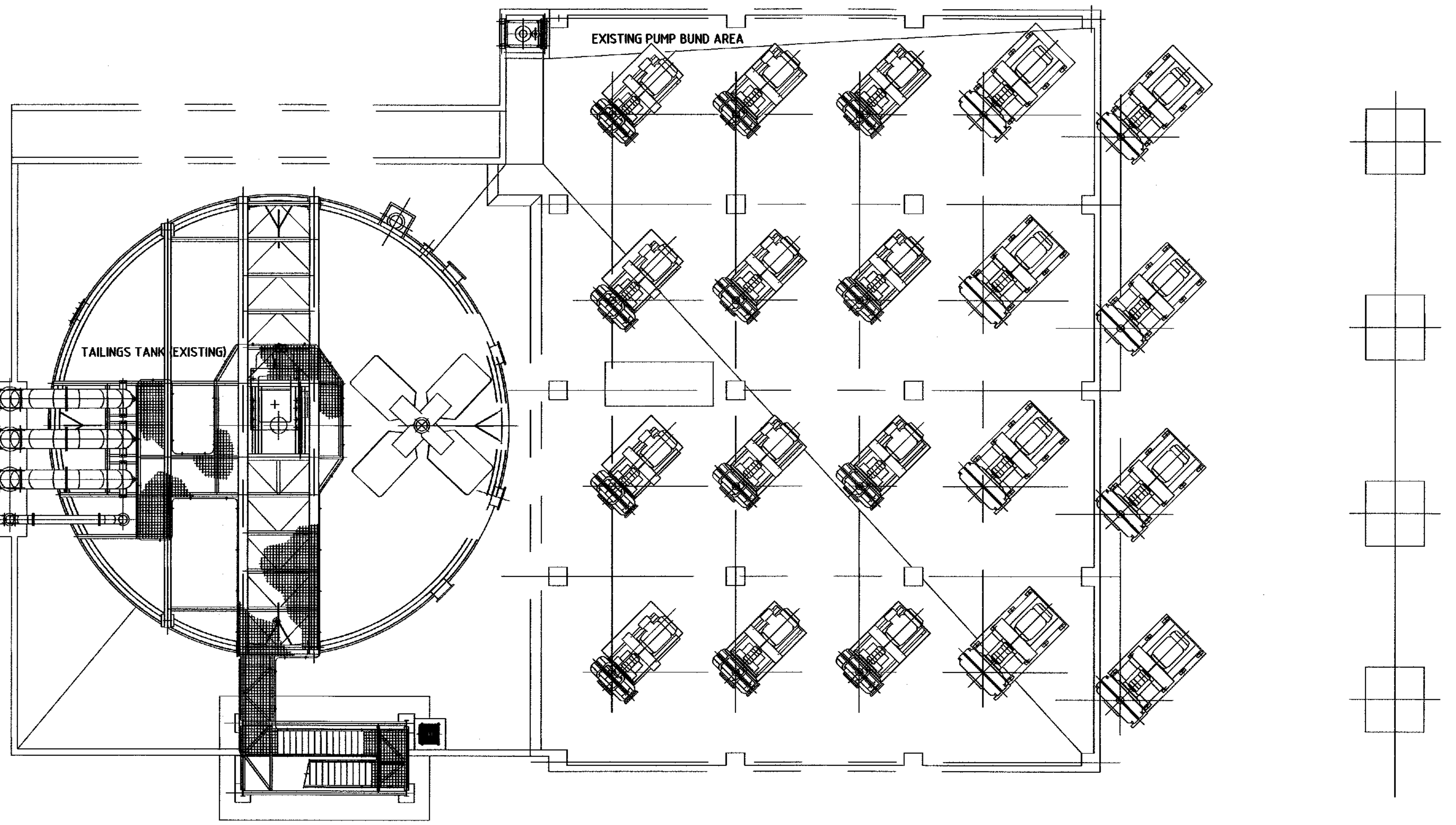




SITE PLAN

EQUIPMENT LIST

EQUIPMENT No	EQUIPMENT DESCRIPTION	MODEL No	MASS
39-PMP-023	PUMP SET No 5 - PUMP 1	14/12 FF-AH	6280 kg
39-PMP-024	PUMP SET No 5 - PUMP 2	14/12 FF-AH	6280 kg
39-PMP-025	PUMP SET No 5 - PUMP 3	14/12 FF-AH	6280 kg
39-PMP-026	PUMP SET No 5 - PUMP 4	14/12 GP-AHPP	12198 kg
39-PMP-027	PUMP SET No 5 - PUMP 5	14/12 GP-AHPP	12198 kg



PLAN ON PUMP TRAIN SET 5

SCALE 1:100

SPECIAL NOTES: PIPE, PUMP, PIPING & VALVES PART 9

PIPING (UP TO 25 BAR)

1. APPLICATION : PUMP SUCTION
2. MEDIUM IN PIPE: SLURRY
3. DYNAMIC HEAD : 189 M
4. DESIGN PRESSURE : 2670 KPa
5. WORKING PRESSURE : 1192 Mpa OR . Bar
6. TEMPERATURE : AMBIENT
7. PIPE SPECIFICATION : SANS 719
8. FITTING SPECIFICATION : SANS 719
9. FLANGE SPECIFICATION : SANS 1123
10. FLANGE MATERIAL : MILD STEEL
11. WELDING SPECIFICATION : TO ASME IX.
12. BOLT SPECIFICATION : TO SANS 1700 CLASS 8.8
13. NUT SPECIFICATION : TO SANS 1700 CLASS 8.
14. GASKET SPECIFICATION : TO AGA SPECIFICATION 415002.
15. CORROSION PROTECTION : TO BE IN ACCORDANCE WITH AGA SPECIFICATION 164050.
    INTERNAL CPS : 8mm RUBBER/HDPE LINED
    EXTERNAL CPS : 137
    FASTENERS : GRADE 4.8 BLACK BOLTS/NUTS TO SANS 1700
16. ALL PIPES MARKED AS "CLOSURES" MUST BE SUPPLIED 300 mm LONGER THAN GIVEN DIMENSIONS WITH ONE FLANGE SUPPLIED LOOSE AND WIRED TO MATING PIECE. SITE CUT AND FIT (TACK WELDED) THEN RETURN TO FABRICATOR FOR FINAL WELDING.
17. CONTRACTOR TO SUPPLY ALL BOLTS, STUDS, NUTS, WASHERS AND GASKETS.
18. ALL BOLTS, STUDS, NUTS AND WASHERS TO BE PLACED IN CONTAINERS, SEALED AND MARKED CLEARLY WITH INSTALLATION LEVEL, DRG No. AND ITEM No. FOR ERECTION PURPOSES.
19. ALL PIPES TO BE CLEARLY MARKED WITH PROJECT No. DRG. No. AND ITEM No. FOR ERECTION PURPOSES.
20. THESE NOTES TO BE READ IN CONJUNCTION WITH AGA SPECIFICATIONS 415003 , 415004, 415005, 415011.
21. LOW PRESSURE PIPING UNDER 25 BAR WILL BE IN ACCORDANCE WITH AGA 415011
22. PIPES 150NB OR SMALLER SHALL BE IN ACCORDANCE WITH SANS 62
23. PIPES OF BIGGER THAN 150NB SHALL BE IN ACCORDANCE WITH SANS 719
24. MEASUREMENTS GIVEN ON HDPE LINED PIPES WILL BE MEASURED FROM HDPE TO HDPE.

NOTE:
ALL SPECIFICATIONS, DRAWINGS & GUIDELINES REFERRED TO WILL BE LATEST ISSUE.

WP	NAME	DATE
Drawn By	APH	31/10/2018
Checked By	NM	08/11/2018
Project Manager		08/11/2018
Process Engineer	AM	08/11/2018
Civil Engineer	GVT	08/11/2018
Mechanical Engineer	NM	08/11/2018
Piping Engineer		08/11/2018

SCALE: 1:100

WorleyParsons resources & energy

WorleyParsons RSA
P.O. Box 61 292, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-ME-DGA-0001-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A.MPHELO	.	20/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J.FERREIRA	.	.

TITLE	DRG. No
.	.
.	.
.	.
.	.
TAILINGS TRANSFER PUMPS - GA	MET-MWS-39-C0050
TAILINGS TRANSFER PUMPS - CIVIL BUND AREA - GA	MET-MWS-39-C0051
TAILINGS TRANSFER PUMP TRAIN SUCTION LINE - GENERAL ARRANGEMENT	MET-MWS-39-M005
TAILINGS TRANSFER PUMP TRAIN - GA SECTION DETAIL	MET-MWS-39-M002

REFERENCE DRAWINGS

DETAIL	MARK	DATE	INIT	APP'D
ISSUE FOR USE	C	29-11-2018	.	.

REVISIONS

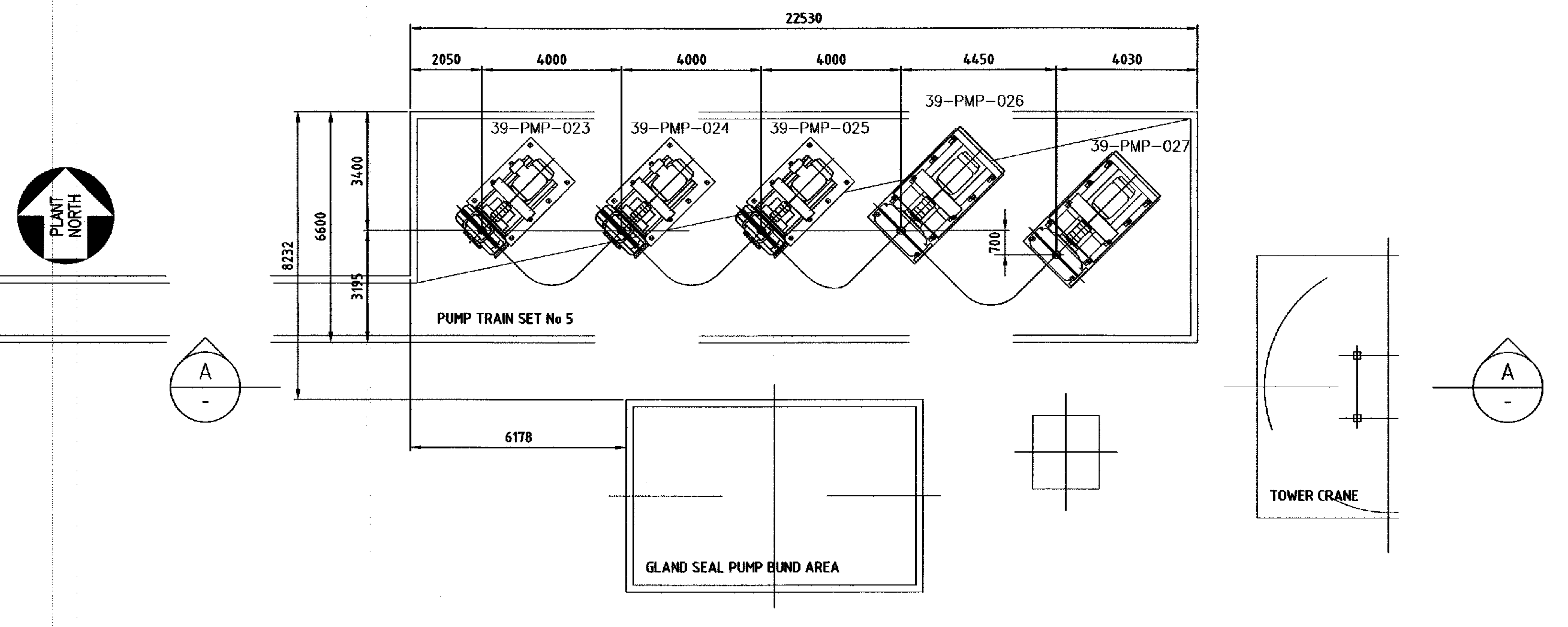
DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	APH	—		31.10.2018
CHECKED	NM	—		08.11.2018
SENIOR DESIGNER MET PROJECTS	.	.		.
PR ENGINEER	.	.		.
PR TECH	.	.		.
PROJECT / MET ENGINEER	.	.		.
MET PROJECTS MANAGER	.	.		.

ANGLOGOLD ASHANTI

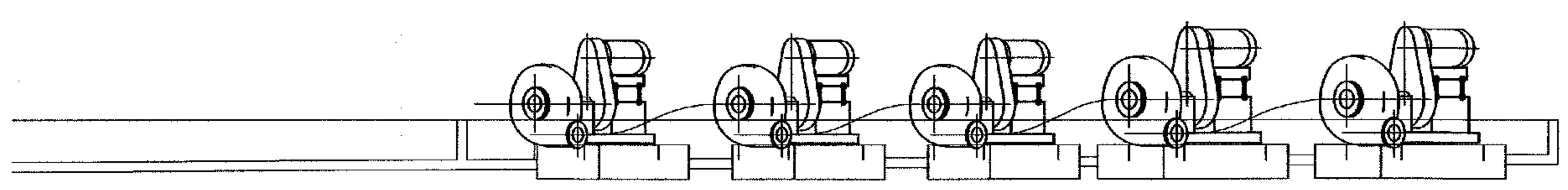
COPYRIGHT

REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT - FEASIBILITY STUDY
DRAWING TITLE TAILINGS TRANSFER PUMP TRAIN No 5 - GENERAL ARRANGEMENT

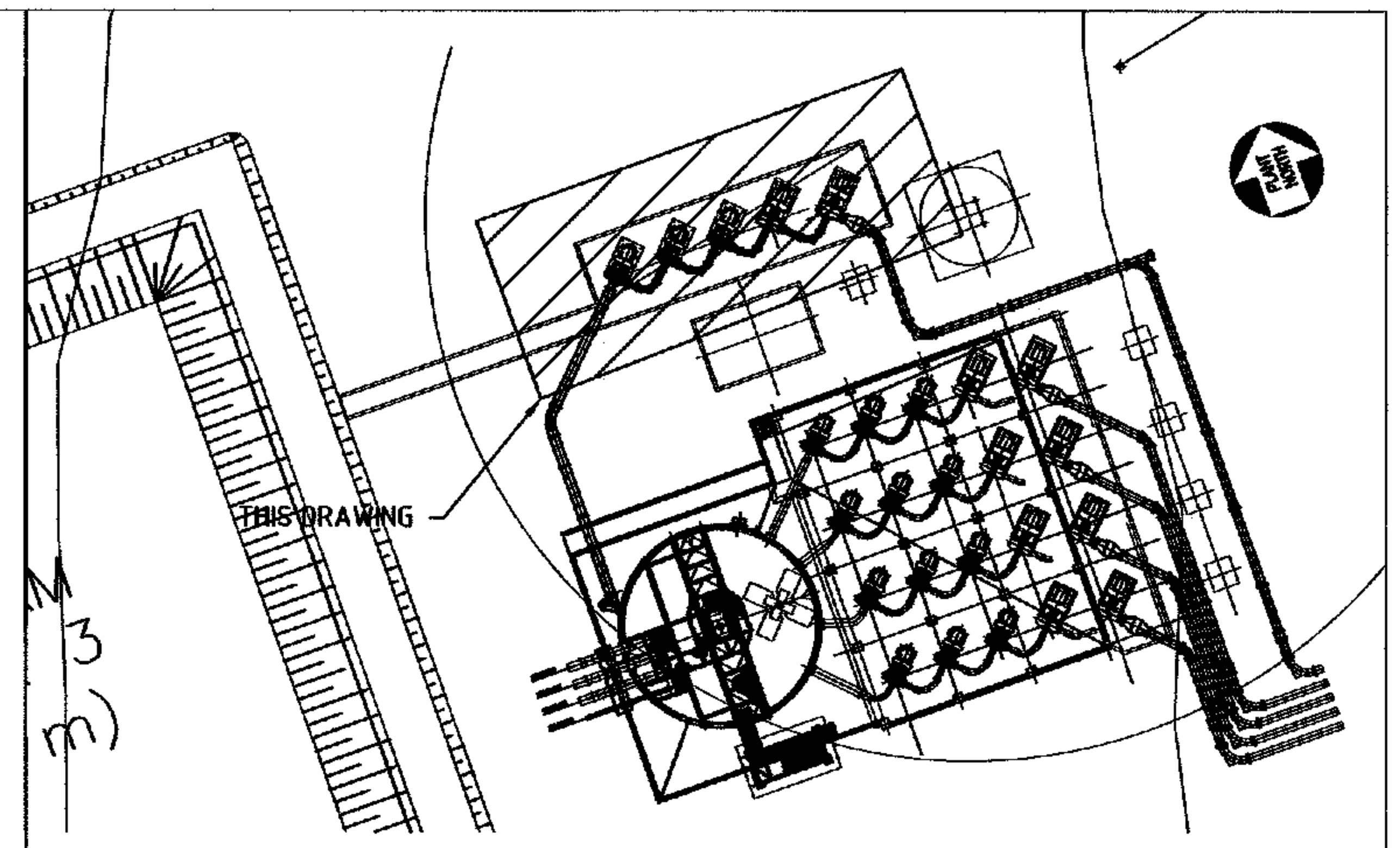
MET PROJECTS	CWR1806001	MET-MWS-39-M0001	REV C
	PROJECT No:	B/UNIT AREA SEQ. No:	SIZE - A1



PLAN ON SUCTION PIPING
SCALE 1:100



VIEW A
SCALE 1:50



SITE PLAN

EQUIPMENT LIST

EQUIPMENT No	EQUIPMENT DESCRIPTION	MODEL No	MASS
39-PMP-023	PUMP SET No 5 – PUMP 1	14/12 FF-AH	6280 kg
39-PMP-024	PUMP SET No 5 – PUMP 2	14/12 FF-AH	6280 kg
39-PMP-025	PUMP SET No 5 – PUMP 3	14/12 FF-AH	6280 kg
39-PMP-026	PUMP SET No 5 – PUMP 4	14/12 GP-AHPP	12198 kg
39-PMP-027	PUMP SET No 5 – PUMP 5	14/12 GP-AHPP	12198 kg

SPECIAL NOTES: PIPE, PUMP, PIPING & VALVES PART 9

PIPING (UP TO 25 BAR)

1. APPLICATION : PUMP SUCTION
2. MEDIUM IN PIPE: SLURRY
3. DYNAMIC HEAD : 189 M
4. DESIGN PRESSURE : 2670 KPa
5. WORKING PRESSURE : 1192 Kpa OR . Bar
6. TEMPERATURE : AMBIENT
7. PIPE SPECIFICATION : SANS 719
8. FITTING SPECIFICATION : SANS 719
9. FLANGE SPECIFICATION : SANS 1123
10. FLANGE MATERIAL : MILD STEEL
11. WELDING SPECIFICATION : TO ASME IX.
12. BOLT SPECIFICATION : TO SANS 1700 CLASS 8.8
13. NUT SPECIFICATION : TO SANS 1700 CLASS 8.
14. GASKET SPECIFICATION : TO AGA SPECIFICATION 415002.
15. CORROSION PROTECTION : TO BE IN ACCORDANCE WITH AGA SPECIFICATION 164050.
    INTERNAL CPS : 8mm RUBBER/HDPE LINED
    EXTERNAL CPS : 137
    FASTENERS : GRADE 4.8 BLACK BOLTS/NUTS TO SANS 1700
16. ALL PIPES MARKED AS "CLOSURES" MUST BE SUPPLIED 300 mm LONGER THAN GIVEN DIMENSIONS WITH ONE FLANGE SUPPLIED LOOSE AND WIRED TO MATING PIECE. SITE CUT AND FIT (TACK WELDED) THEN RETURN TO FABRICATOR FOR FINAL WELDING.
17. CONTRACTOR TO SUPPLY ALL BOLTS, STUDS, NUTS, WASHERS AND GASKETS.
18. ALL BOLTS, STUDS, NUTS AND WASHERS TO BE PLACED IN CONTAINERS, SEALED AND MARKED CLEARLY WITH INSTALLATION LEVEL, DRG No. AND ITEM No. FOR ERECTION PURPOSES.
19. ALL PIPES TO BE CLEARLY MARKED WITH PROJECT No. DRG. No. AND ITEM No. FOR ERECTION PURPOSES.
20. THESE NOTES TO BE READ IN CONJUNCTION WITH AGA SPECIFICATIONS 415003 , 415004, 415005, 415011.
21. LOW PRESSURE PIPING UNDER 25 BAR WILL BE IN ACCORDANCE WITH AGA 415011
22. PIPES 150NB OR SMALLER SHALL BE IN ACCORDANCE WITH SANS 62
23. PIPES OF BIGGER THAN 150NB SHALL BE IN ACCORDANCE WITH SANS 719
24. MEASUREMENTS GIVEN ON HDPE LINED PIPES WILL BE MEASURED FROM HDPE TO HDPE.

NOTE:
ALL SPECIFICATIONS, DRAWINGS & GUIDELINES REFERRED TO WILL BE LATEST ISSUE.

WP	NAME	DATE
Drawn By		01/11/2018
Checked By	NM	08/11/2018
Project Manager		08/11/2018
Process Engineer		08/11/2018
Civil Engineer		08/11/2018
Mechanical Engineer	NM	08/11/2018
Piping Engineer		08/11/2018

SCALE: AS NOTED

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-ME-DGA-0002-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A.MPHELO	.	20/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J.FERREIRA	.	.

TITLE	DRG. No
TAILINGS TRANSFER PUMPS – GA	MET-MWS-39-C0050
TAILINGS TRANSFER PUMPS – CIVIL BUND AREA – GA	MET-MWS-39-C0051
TAILINGS TRANSFER PUMP TRAIN SUCTION LINE – GENERAL ARRANGEMENT	MET-MWS-39-M005
TAILINGS TRANSFER PUMP TRAIN – GENERAL ARRANGEMENT	MET-MWS-39-M001

REFERENCE DRAWINGS

DETAIL	MARK	DATE	INIT	APP'D
ISSUE FOR USE	C	29-11-2018		

REVISIONS

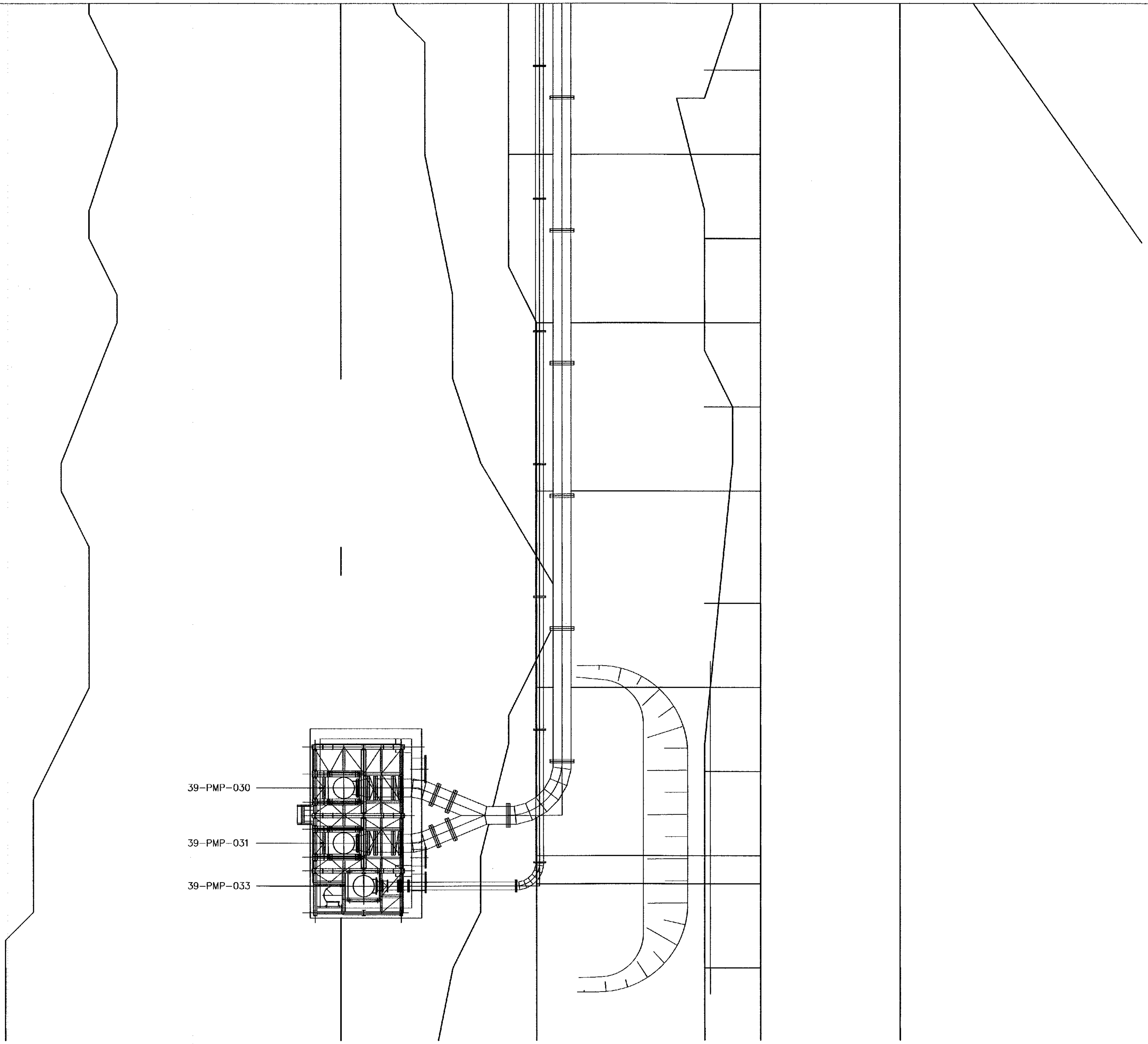
DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	APH			31.10.2018
CHECKED	NM			08.11.2018
SENIOR DESIGNER MET PROJECTS	.	.		.
PR ENGINEER	.	.		.
PR TECH	.	.		.
PROJECT / MET ENGINEER	.	.		.
MET PROJECTS MANAGER	.	.		.

ANGLOGOLD ASHANTI

MET PROJECTS

REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE: TAILINGS TRANSFER PUMP TRAIN No 5 – GA SECTION DATAILS

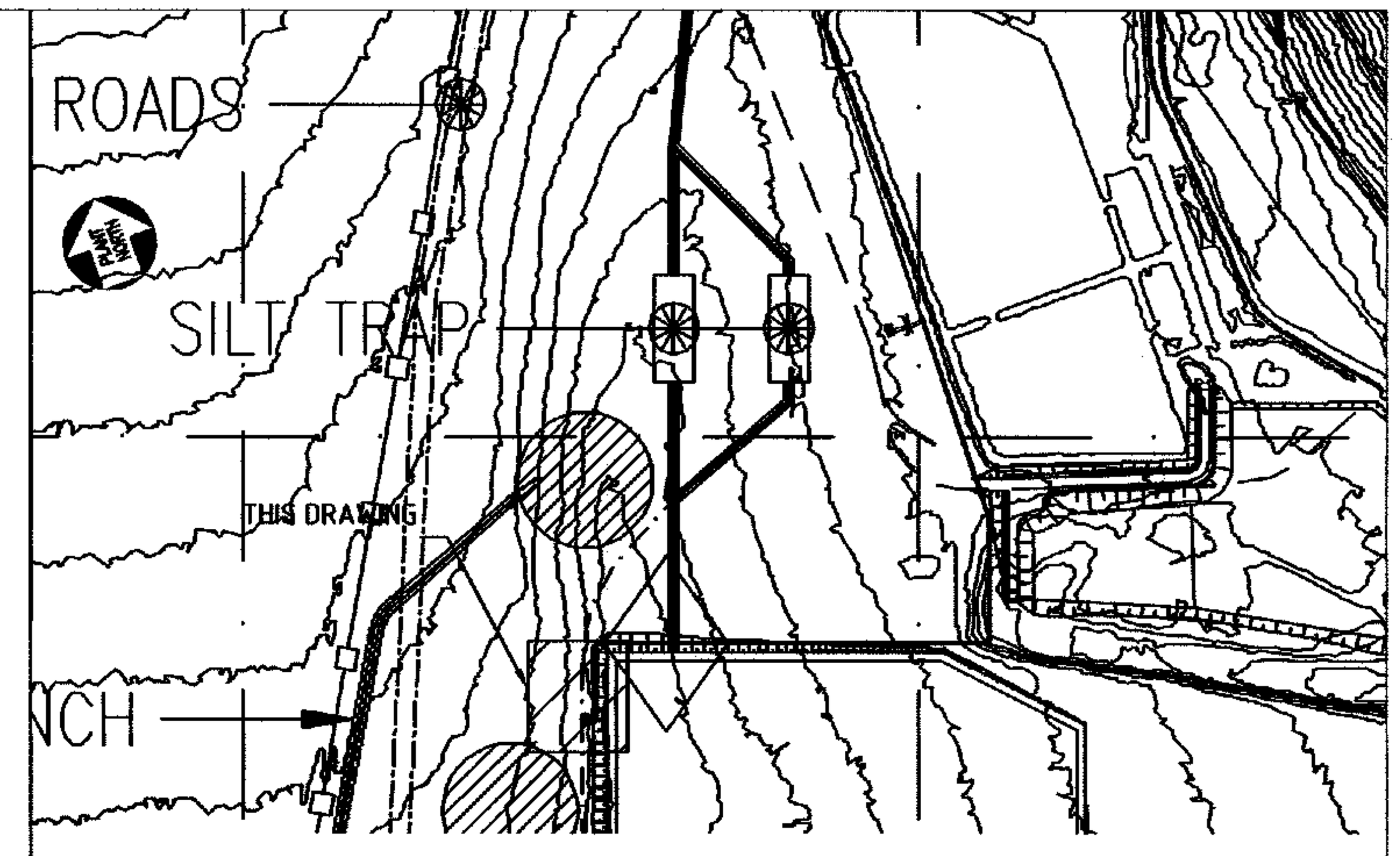
PROJECT No: CWR1806001 | MET-MWS-39-M0002 | REV C
B/UNIT AREA SEQ. No: SIZE – A1



PLAN RETURN WATER PUMP

SCALE 1:xxx

NOTE:
RETURN WATER SUMP LOCATION/ORINTATION TO BE CONFIRMED DURING EXECUTION



SITE PLAN

EQUIPMENT LIST

EQUIPMENT No	EQUIPMENT DESCRIPTION	MODEL No	MASS
39-PMP-030	RETURN WATER PUMP 1	32XHC - 600	3545 kg
39-PMP-031	RETURN WATER PUMP 2	32XHC - 600	3545 kg
39-PMP-033	DUST SUPPRESSION WATER SUMP FEED PUMP 2	SAM - 16607	4900 kg

SPECIAL NOTES: PIPE, PUMP, PIPING & VALVES PART 9

PIPING (UP TO TBC BAR)

1. APPLICATION : PUMP SUCTION
2. MEDIUM IN PIPE: WATER
3. DYNAMIC HEAD : TBC M
4. DESIGN PRESSURE : TBC KPa
5. WORKING PRESSURE : TBC Mpa OR . Bar
6. TEMPERATURE : AMBIENT
7. PIPE SPECIFICATION : SANS 719
8. FITTING SPECIFICATION : SANS 719
9. FLANGE SPECIFICATION : SANS 1123
10. FLANGE MATERIAL : MILD STEEL
11. WELDING SPECIFICATION : TO ASME IX.
12. BOLT SPECIFICATION : TO SANS 1700 CLASS 8.8
13. NUT SPECIFICATION : TO SANS 1700 CLASS 8.
14. GASKET SPECIFICATION : TO AGA SPECIFICATION 415002.
15. CORROSION PROTECTION : TO BE IN ACCORDANCE WITH AGA SPECIFICATION 164050.
    INTERNAL CPS : 8mm RUBBER/HDPE LINED
    EXTERNAL CPS : 137
    FASTENERS : GRADE 4.8 BLACK BOLTS/NUTS TO SANS 1700
16. ALL PIPES MARKED AS "CLOSURES" MUST BE SUPPLIED 300 mm LONGER THAN GIVEN DIMENSIONS WITH ONE FLANGE SUPPLIED LOOSE AND WIRED TO MATING PIECE. SITE CUT AND FIT (TACK WELDED) THEN RETURN TO FABRICATOR FOR FINAL WELDING.
17. CONTRACTOR TO SUPPLY ALL BOLTS, STUDS, NUTS, WASHERS AND GASKETS.
18. ALL BOLTS, STUDS, NUTS AND WASHERS TO BE PLACED IN CONTAINERS, SEALED AND MARKED CLEARLY WITH INSTALLATION LEVEL, DRG No. AND ITEM No. FOR ERECTION PURPOSES.
19. ALL PIPES TO BE CLEARLY MARKED WITH PROJECT No. DRG. No. AND ITEM No. FOR ERECTION PURPOSES.
20. THESE NOTES TO BE READ IN CONJUNCTION WITH AGA SPECIFICATIONS 415003 , 415004, 415005, 415011.
21. LOW PRESSURE PIPING UNDER 25 BAR WILL BE IN ACCORDANCE WITH AGA 415011
22. PIPES 150NB OR SMALLER SHALL BE IN ACCORDANCE WITH SANS 62
23. PIPES OF BIGGER THAN 150NB SHALL BE IN ACCORDANCE WITH SANS 719
24. MEASUREMENTS GIVEN ON HDPE LINED PIPES WILL BE MEASURED FROM HDPE TO HDPE.

NOTE:
ALL SPECIFICATIONS, DRAWINGS & GUIDELINES REFERRED TO WILL BE LATEST ISSUE.

WP	NAME	DATE
Drawn By	APH	01/11/2018
Checked By		08/11/2018
Project Manager		08/11/2018
Process Engineer		08/11/2018
Civil Engineer		08/11/2018
Mechanical Engineer	NM	08/11/2018
Piping Engineer		08/11/2018

SCALE: AS NOTED

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-ME-DGA-0003-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A.MPHELO	.	20/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J.FERREIRA	.	.

TITLE	DRG. No
.	.
.	.
.	.
.	.
.	.
RETURN WATER AREA PLINTH BUNDED AREA - GA	MET-MWS-39-C0067
RETURN WATER PIPING GA/LAYOUT	MET-MWS-39-M0007
RETURN WATER PUMP - GA SECTION DETAILS	MET-MWS-39-M0004

REFERENCE DRAWINGS

DETAIL	MARK	DATE	INIT	APP'D
ISSUE FOR USE	C	29-11-2018	.	.

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	APH			31.10.2018
CHECKED	NM			08.11.2018
SENIOR DESIGNER MET PROJECTS	.	.		.
PR ENGINEER	.	.		.
PR TECH	.	.		.
PROJECT / MET ENGINEER	.	.		.
MET PROJECTS MANAGER	.	.		.

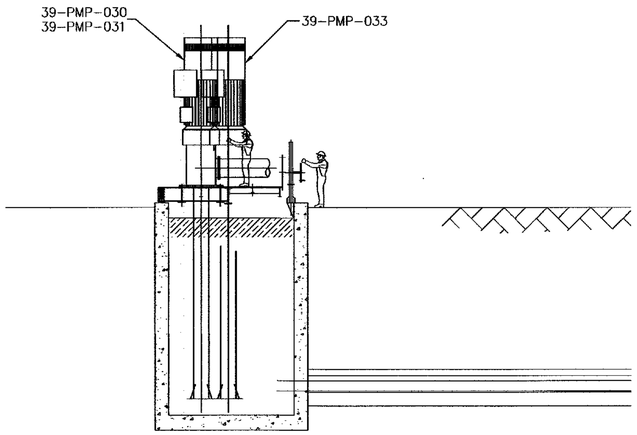
ANGLOGOLD ASHANTI

COPYRIGHT

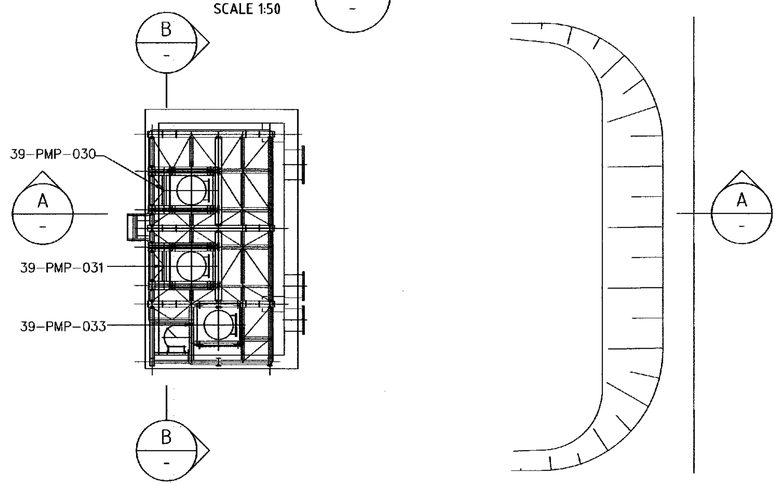
REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT - FEASIBILITY STUDY
DRAWING TITLE RETURN WATER PUMP - GENERAL ARRANGEMENT

MET PROJECTS | CWR1806001 | MET-MWS-39-M0003 | REV C

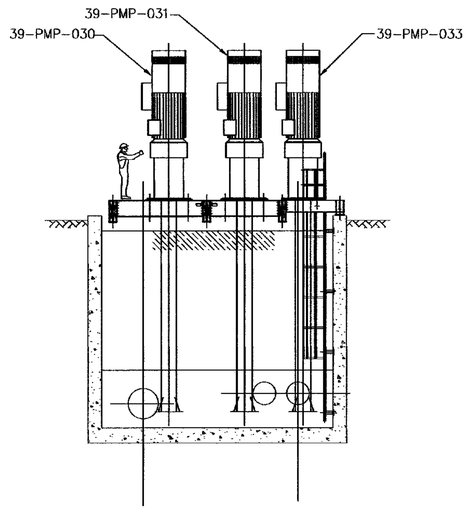
PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE - A1



VIEW A
SCALE 1:50

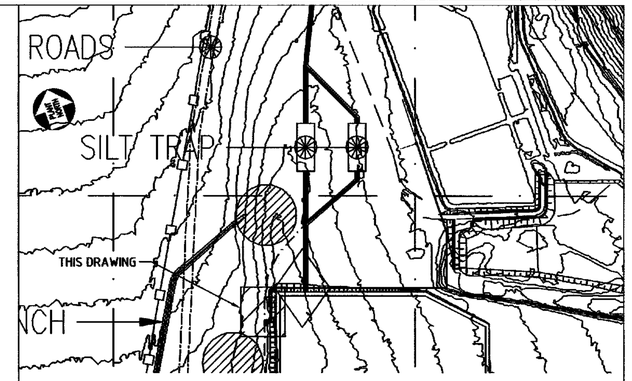


PLAN RETURN WATER PUMP
SCALE 1:100



VIEW B
SCALE 1:50

NOTE:
RETURN WATER SUMP LOCATION/ORIENTATION TO BE CONFIRMED DURING EXECUTION



SITE PLAN

EQUIPMENT LIST

EQUIPMENT No	EQUIPMENT DESCRIPTION	MODEL No	MASS
39-PMP-030	RETURN WATER PUMP 1	32XHC – 600	3545 kg
39-PMP-031	RETURN WATER PUMP 2	32XHC – 600	3545 kg
39-PMP-033	DUST SUPPRESSION WATER SUMP FEED PUMP 2	SAM – 16607	4900 kg

SPECIAL NOTES: PIPE, PUMP, PIPING & VALVES PART 9

PIPING (UP TO TBC BAR)

1. APPLICATION : PUMP SUCTION
2. MEDIUM IN PIPE: SLURRY
3. DYNAMIC HEAD : TBC M
4. DESIGN PRESSURE : TBC KPa
5. WORKING PRESSURE : TBC Mpa OR . Bar
6. TEMPERATURE : AMBIENT
7. PIPE SPECIFICATION : SANS 719
8. FITTING SPECIFICATION : SANS 719
9. FLANGE SPECIFICATION : SANS 1123
10. FLANGE MATERIAL : MILD STEEL
11. WELDING SPECIFICATION : TO ASME IX.
12. BOLT SPECIFICATION : TO SANS 1700 CLASS 8.8
13. NUT SPECIFICATION : TO SANS 1700 CLASS 8.
14. GASKET SPECIFICATION : TO AGA SPECIFICATION 415002.
15. CORROSION PROTECTION : TO BE IN ACCORDANCE WITH AGA SPECIFICATION 164050.
    INTERNAL CPS : 8mm RUBBER/HDPE LINED
    EXTERNAL CPS : 137
    FASTENERS : GRADE 4.8 BLACK BOLTS/NUTS TO SANS 1700
16. ALL PIPES MARKED AS "CLOSURES" MUST BE SUPPLIED 300 mm LONGER THAN GIVEN DIMENSIONS WITH ONE FLANGE SUPPLIED LOOSE AND WIRED TO MATING PIECE. SITE CUT AND FIT (TACK WELDED) THEN RETURN TO FABRICATOR FOR FINAL WELDING.
17. CONTRACTOR TO SUPPLY ALL BOLTS, STUDS, NUTS, WASHERS AND GASKETS.
18. ALL BOLTS, STUDS, NUTS AND WASHERS TO BE PLACED IN CONTAINERS, SEALED AND MARKED CLEARLY WITH INSTALLATION LEVEL, DRG No. AND ITEM No. FOR ERECTION PURPOSES.
19. ALL PIPES TO BE CLEARLY MARKED WITH PROJECT No. DRG. No. AND ITEM No. FOR ERECTION PURPOSES.
20. THESE NOTES TO BE READ IN CONJUNCTION WITH AGA SPECIFICATIONS 415003 , 415004, 415005, 415011.
21. LOW PRESSURE PIPING UNDER 25 BAR WILL BE IN ACCORDANCE WITH AGA 415011
22. PIPES 150NB OR SMALLER SHALL BE IN ACCORDANCE WITH SANS 62
23. PIPES OF BIGGER THAN 150NB SHALL BE IN ACCORDANCE WITH SANS 719
24. MEASUREMENTS GIVEN ON HDPE LINED PIPES WILL BE MEASURED FROM HDPE TO HDPE.

NOTE:
ALL SPECIFICATIONS, DRAWINGS & GUIDELINES REFERRED TO WILL BE LATEST ISSUE.

WP	NAME	DATE
Drawn By	APH	01/11/2018
Checked By		08/11/2018
Project Manager		08/11/2018
Process Engineer		08/11/2018
Civil Engineer		08/11/2018
Mechanical Engineer	NM	08/11/2018
Piping Engineer		08/11/2018

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 68 252, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Int'l Tel: +27 11 218 8000 | Int'l Fax: +27 11 218 5300

C00787-39-ME-DGA-0004-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A.MPHELO	.	20/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J.FERREIRA	.	.

SCALE: 1 :100

REFERENCE DRAWINGS		REVISIONS					
TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D
DUST SUPPRESSION PIPING GA/LAYOUT	MET-MWS-39-M0009	.	.	.	.	.
RETURN WATER AREA PLINTH BUNDED AREA – GA	MET-MWS-39-C0067	.	.	.	.	.
RETURN WATER PIPING GA/LAYOUT	MET-MWS-39-M0007	.	.	.	.	.
RETURN WATER PUMP – GA SECTION DETAILS	MET-MWS-39-M0004	ISSUE FOR USE	C	29-11-2018	.	.

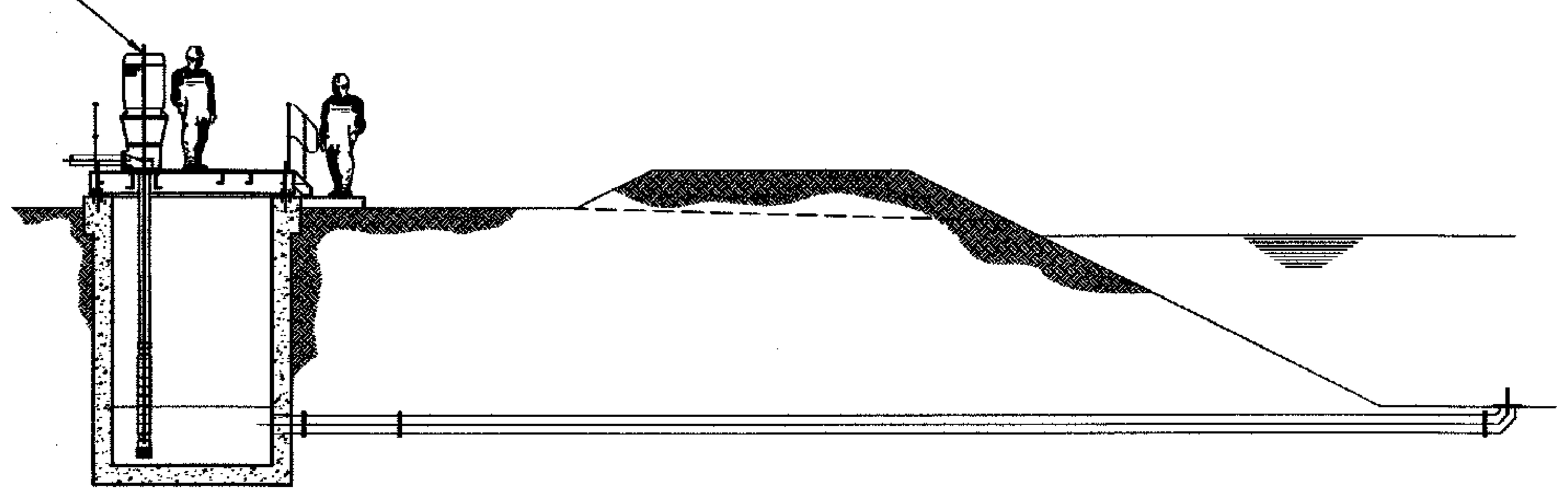
DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	APH			31.10.2018
CHECKED	NM			08.11.2018
SENIOR DESIGNER MET PROJECTS	.	.		.
PR ENGINEER	.	.		.
PR TECH	.	.		.
PROJECT / MET ENGINEER	.	.		.
MET PROJECTS MANAGER	.	.		.

ANGLOGOLD ASHANTI
COPYRIGHT
MET PROJECTS

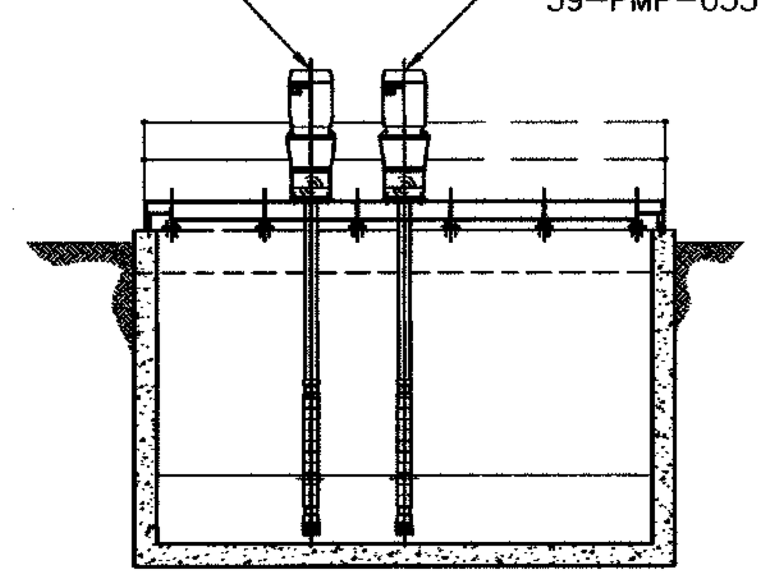
REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE: RETURN WATER/DUST SUPPRESSION PUMPS – SECTION DETAILS – GA

PROJECT No:	B/UNIT	AREA	SEQ. No:	REV	SIZE
CWR1806001	MET	MWS	39-M0004	C	A1

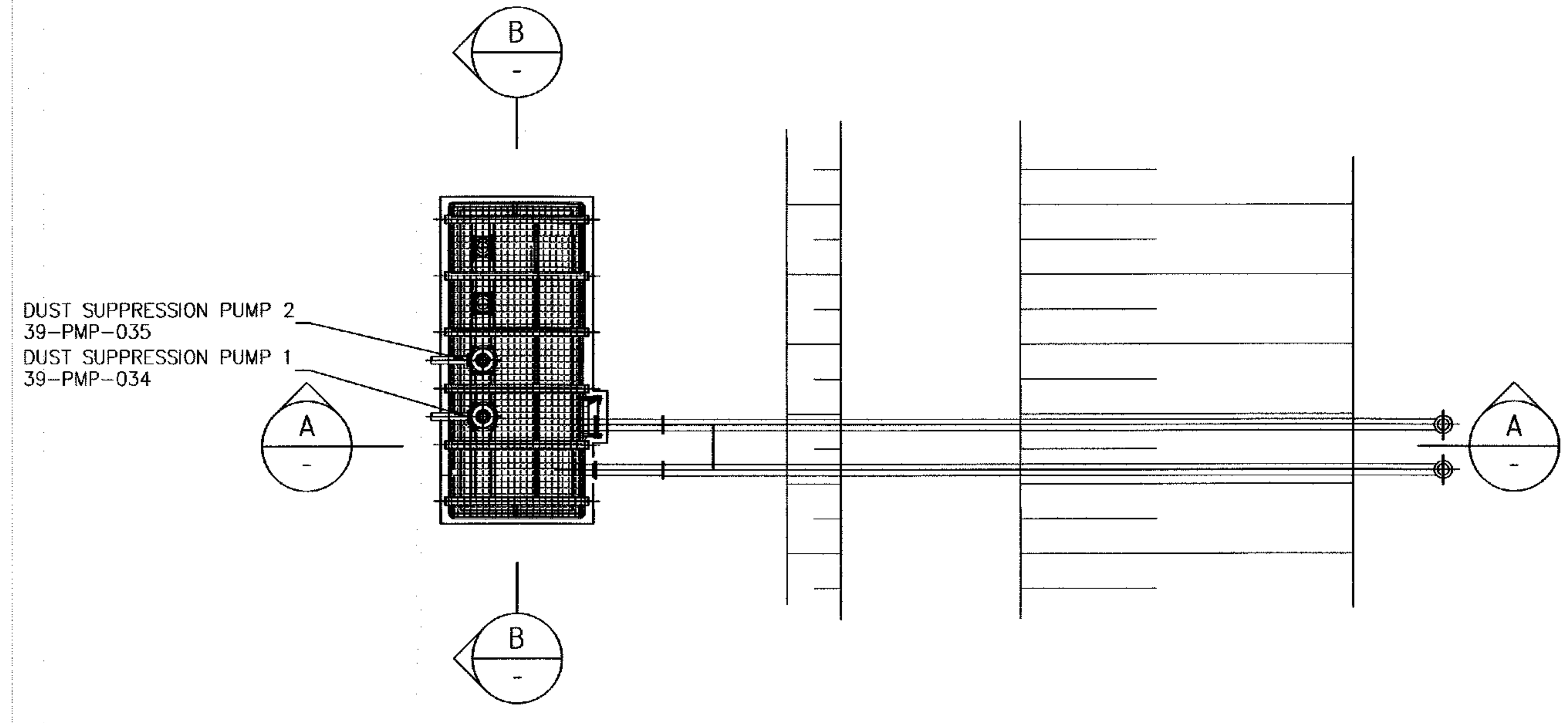
PLANT NORTH



VIEW A
SCALE 1:50

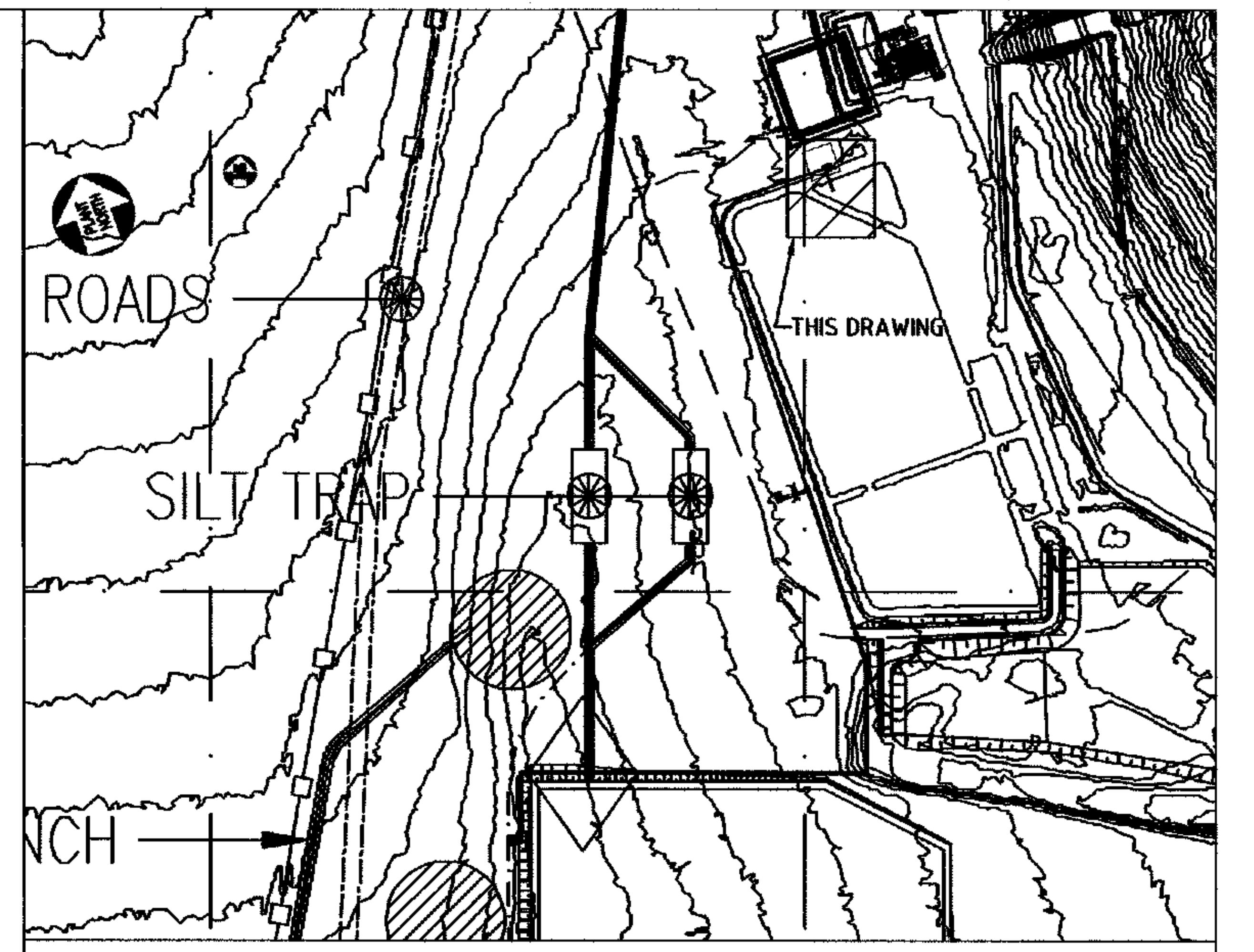


VIEW B
SCALE 1:50



PLAN DUST SUPPRESSION PUMP
SCALE 1:100

NOTE:
RETURN WATER SUMP LOCATION/ORINTATION TO BE CONFIRMED DURING EXECUTION



SITE PLAN

EQUIPMENT LIST

EQUIPMENT No	EQUIPMENT DESCRIPTION	MODEL No	MASS
39-PMP-034	DUST SUPPRESSION PUMP 1	SAM - 1667	4900 kg
39-PMP-035	DUST SUPPRESSION PUMP 2	SAM - 1667	4900 kg

SPECIAL NOTES: PIPE, PUMP, PIPING & VALVES PART 9

PIPING (UP TO TBC BAR)

1. APPLICATION : PUMP SUCTION
2. MEDIUM IN PIPE: SLURRY
3. DYNAMIC HEAD : TBC M
4. DESIGN PRESSURE : TBC KPa
5. WORKING PRESSURE : TBC Mpa OR . Bar
6. TEMPERATURE : AMBIENT
7. PIPE SPECIFICATION : SANS 719
8. FITTING SPECIFICATION : SANS 719
9. FLANGE SPECIFICATION : SANS 1123
10. FLANGE MATERIAL : MILD STEEL
11. WELDING SPECIFICATION : TO ASME IX.
12. BOLT SPECIFICATION : TO SANS 1700 CLASS 8.8
13. NUT SPECIFICATION : TO SANS 1700 CLASS 8.
14. GASKET SPECIFICATION : TO AGA SPECIFICATION 415002.
15. CORROSION PROTECTION : TO BE IN ACCORDANCE WITH AGA SPECIFICATION 164050.
    INTERNAL CPS : 8mm RUBBER/HDPE LINED
    EXTERNAL CPS : 137
    FASTENERS : GRADE 4.8 BLACK BOLTS/NUTS TO SANS 1700
16. ALL PIPES MARKED AS "CLOSURES" MUST BE SUPPLIED 300 mm LONGER THAN GIVEN DIMENSIONS WITH ONE FLANGE SUPPLIED LOOSE AND WIRED TO MATING PIECE. SITE CUT AND FIT (TACK WELDED) THEN RETURN TO FABRICATOR FOR FINAL WELDING.
17. CONTRACTOR TO SUPPLY ALL BOLTS, STUDS, NUTS, WASHERS AND GASKETS.
18. ALL BOLTS, STUDS, NUTS AND WASHERS TO BE PLACED IN CONTAINERS, SEALED AND MARKED CLEARLY WITH INSTALLATION LEVEL, DRG No. AND ITEM No. FOR ERECTION PURPOSES.
19. ALL PIPES TO BE CLEARLY MARKED WITH PROJECT No. DRG. No. AND ITEM No. FOR ERECTION PURPOSES.
20. THESE NOTES TO BE READ IN CONJUNCTION WITH AGA SPECIFICATIONS 415003 , 415004, 415005, 415011.
21. LOW PRESSURE PIPING UNDER 25 BAR WILL BE IN ACCORDANCE WITH AGA 415011
22. PIPES 150NB OR SMALLER SHALL BE IN ACCORDANCE WITH SANS 62
23. PIPES OF BIGGER THAN 150NB SHALL BE IN ACCORDANCE WITH SANS 719
24. MEASUREMENTS GIVEN ON HDPE LINED PIPES WILL BE MEASURED FROM HDPE TO HDPE.

NOTE:
ALL SPECIFICATIONS, DRAWINGS & GUIDELINES REFERRED TO WILL BE LATEST ISSUE.

WP	NAME	DATE
Drawn By	[signature]	01/11/2018
Checked By	[signature]	29/11/2018
Project Manager	[signature]	08/11/2018
Process Engineer	[signature]	08/11/2018
Civil Engineer	[signature]	08/11/2018
Mechanical Engineer	[signature]	08/11/2018
Piping Engineer	[signature]	08/11/2018

SCALE: 1 :100

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-ME-DGA-0005-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A.MPHELO	.	20/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J.FERREIRA	.	.

TITLE	DRG. No
DUST SUPPRESSION - GA/LAYOUT	MET-MWS-39-C0012
DUST SUPPRESSION PIPING SUPPORT - GA	MET-MWS-39-C0068
RETURN WATER PUMP - GA	MET-MWS-39-M0003

REFERENCE DRAWINGS

DETAIL	MARK	DATE	INIT	APP'D
ISSUE FOR USE	C	29-11-2018		

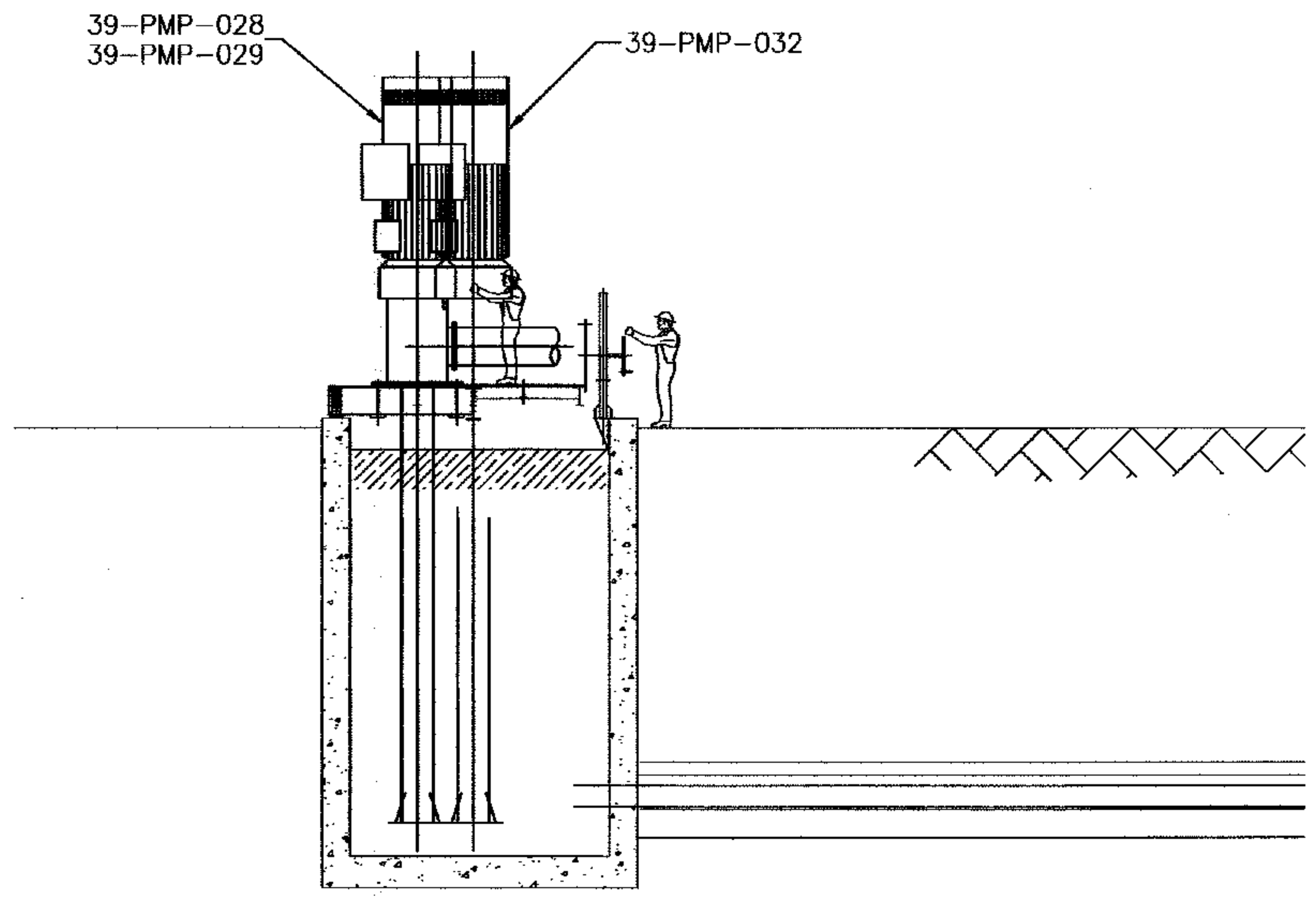
REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	APH		[signature]	31.10.2018
CHECKED	NM			08.11.2018
SENIOR DESIGNER MET PROJECTS	.	.		.
PR ENGINEER	.	.		.
PR TECH	.	.		.
PROJECT / MET ENGINEER	.	.		.
MET PROJECTS MANAGER	.	.		.

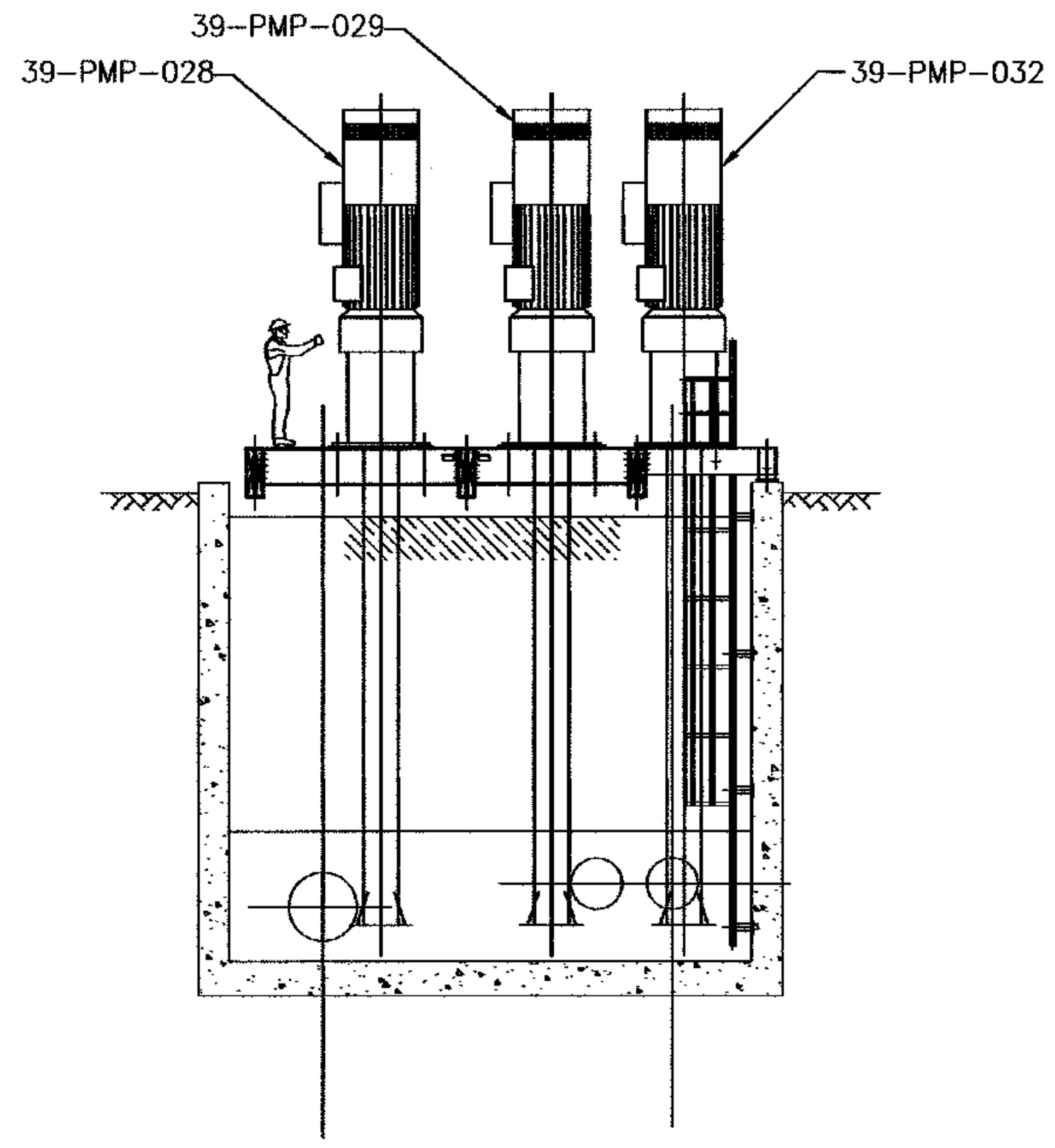
ANGLOGOLD ASHANTI
COPYRIGHT

REGION: SOUTH AFRICA REGION - VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT - FEASIBILITY STUDY
DRAWING TITLE: DUST SUPPRESSION PUMP - GENERAL ARRANGEMENT

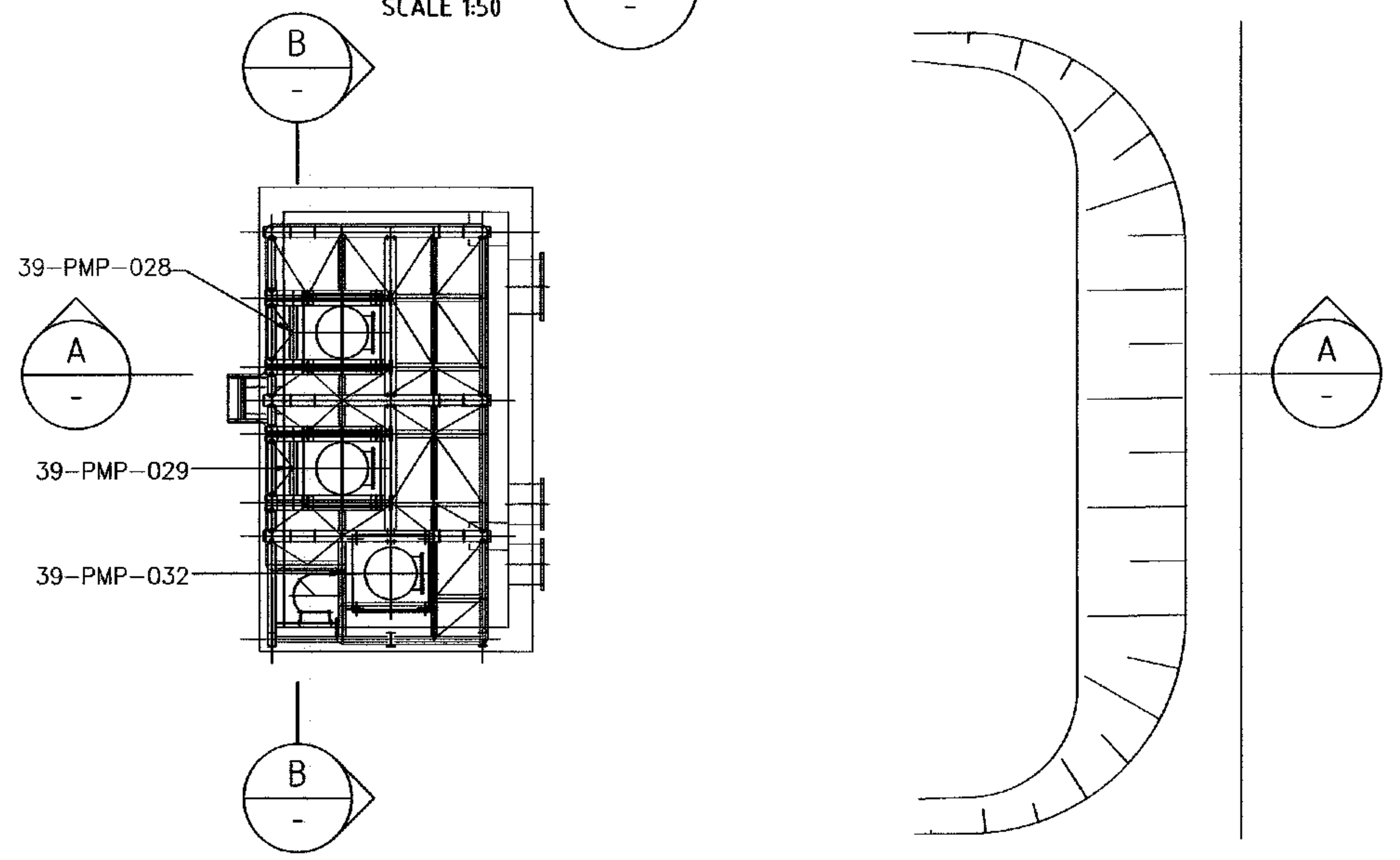
MET PROJECTS | CWR1806001 | MET-MWS-39-M0013 | REV C
PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE - A1



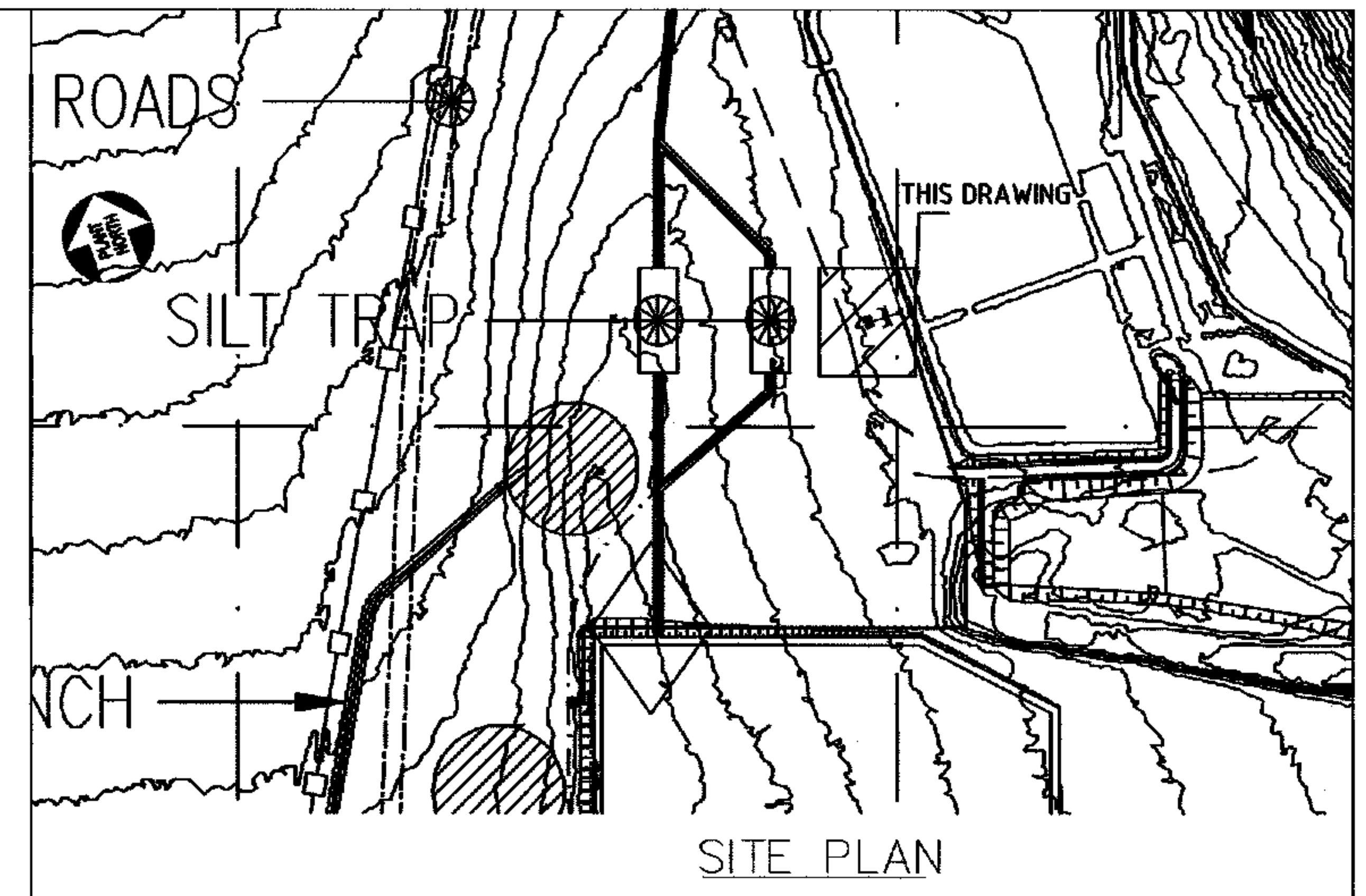
VIEW A
SCALE 1:50



VIEW B
SCALE 1:50



PLAN RETURN WATER PUMP
SCALE 1:100



SITE PLAN

EQUIPMENT LIST

EQUIPMENT No	EQUIPMENT DESCRIPTION	MODEL No	MASS
39-PMP-030	RETURN WATER PUMP 1	32XHC – 600	3545 kg
39-PMP-031	RETURN WATER PUMP 2	32XHC – 600	3545 kg
39-PMP-032	DUST SUPPRESSION WATER SUMP FEED PUMP 2	SAM – 1667	4900 kg

SPECIAL NOTES: PIPE, PUMP, PIPING & VALVES PART 9

PIPING (UP TO TBC BAR)

1. APPLICATION : PUMP SUCTION
2. MEDIUM IN PIPE: SLURRY
3. DYNAMIC HEAD : TBC M
4. DESIGN PRESSURE : TBC KPa
5. WORKING PRESSURE : TBC Mpa OR . Bar
6. TEMPERATURE : AMBIENT
7. PIPE SPECIFICATION : SANS 719
8. FITTING SPECIFICATION : SANS 719
9. FLANGE SPECIFICATION : SANS 1123
10. FLANGE MATERIAL : MILD STEEL
11. WELDING SPECIFICATION : TO ASME IX.
12. BOLT SPECIFICATION : TO SANS 1700 CLASS 8.8
13. NUT SPECIFICATION : TO SANS 1700 CLASS 8.
14. GASKET SPECIFICATION : TO AGA SPECIFICATION 415002.
15. CORROSION PROTECTION : TO BE IN ACCORDANCE WITH AGA SPECIFICATION 164050.
    INTERNAL CPS : 8mm RUBBER/HDPE LINED
    EXTERNAL CPS : 137
    FASTENERS : GRADE 4.8 BLACK BOLTS/NUTS TO SANS 1700
16. ALL PIPES MARKED AS "CLOSURES" MUST BE SUPPLIED 300 mm LONGER THAN GIVEN DIMENSIONS WITH ONE FLANGE SUPPLIED LOOSE AND WIRED TO MATING PIECE. SITE CUT AND FIT (TACK WELDED) THEN RETURN TO FABRICATOR FOR FINAL WELDING.
17. CONTRACTOR TO SUPPLY ALL BOLTS, STUDS, NUTS, WASHERS AND GASKETS.
18. ALL BOLTS, STUDS, NUTS AND WASHERS TO BE PLACED IN CONTAINERS, SEALED AND MARKED CLEARLY WITH INSTALLATION LEVEL, DRG No. AND ITEM No. FOR ERECTION PURPOSES.
19. ALL PIPES TO BE CLEARLY MARKED WITH PROJECT No. DRG. No. AND ITEM No. FOR ERECTION PURPOSES.
20. THESE NOTES TO BE READ IN CONJUNCTION WITH AGA SPECIFICATIONS 415003 , 415004, 415005, 415011.
21. LOW PRESSURE PIPING UNDER 25 BAR WILL BE IN ACCORDANCE WITH AGA 415011
22. PIPES 150NB OR SMALLER SHALL BE IN ACCORDANCE WITH SANS 62
23. PIPES OF BIGGER THAN 150NB SHALL BE IN ACCORDANCE WITH SANS 719
24. MEASUREMENTS GIVEN ON HDPE LINED PIPES WILL BE MEASURED FROM HDPE TO HDPE.

NOTE:
ALL SPECIFICATIONS, DRAWINGS & GUIDELINES REFERRED TO WILL BE LATEST ISSUE.

NOTE:
RETURN WATER SUMP LOCATION/ORINTATION TO BE CONFIRMED DURING EXECUTION

WP	NAME	DATE
Drawn By	APH	01/11/2018
Checked By	NM	29/11/2018
Project Manager		08/11/2018
Process Engineer		08/11/2018
Civil Engineer	GVI	08/11/2018
Mechanical Engineer		08/11/2018
Piping Engineer	LS	08/11/2018

SCALE: 1 :100

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3180

C00787-39-ME-DGA-0006-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A.MPHELO	.	20/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J.FERREIRA	.	.

TITLE	DRG. No
RETURN WATER AREA PLINTH BUNDED AREA – GA	MET-MWS-39-C0067
RETURN WATER PIPING GA/LAYOUT	MET-MWS-39-M0007
RETURN WATER PUMP – GA SECTION DETAILS	MET-MWS-39-M0004

REFERENCE DRAWINGS

DETAIL	MARK	DATE	INIT	APP'D
ISSUE FOR USE	C	29-11-2018	.	.

REVISIONS

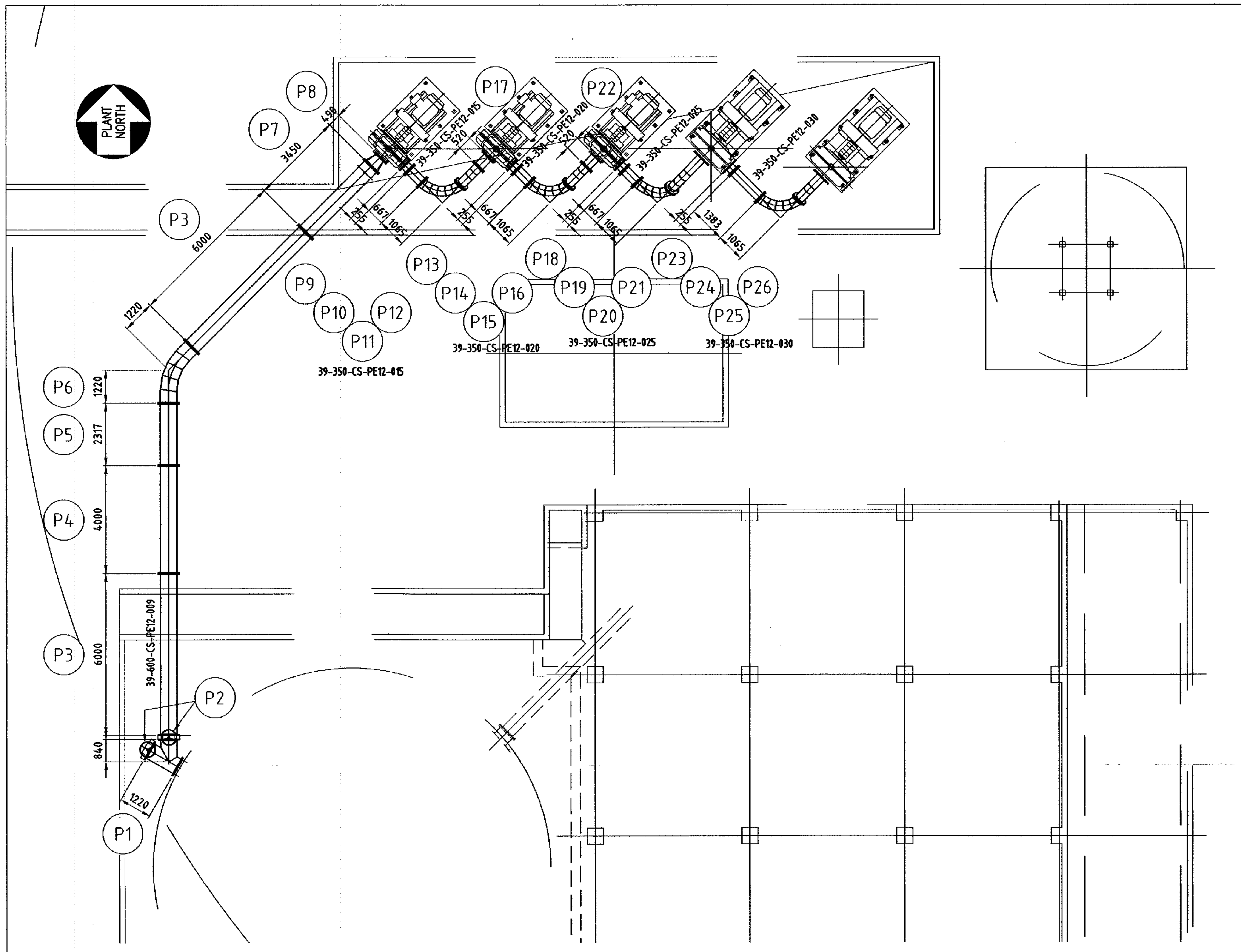
DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	APH			31.10.2018
CHECKED	NM			08.11.2018
SENIOR DESIGNER MET PROJECTS	.	.		.
PR ENGINEER	.	.		.
PR TECH	.	.		.
PROJECT / MET ENGINEER	.	.		.
MET PROJECTS MANAGER	.	.		.

ANGLOGOLD ASHANTI
COPYRIGHT

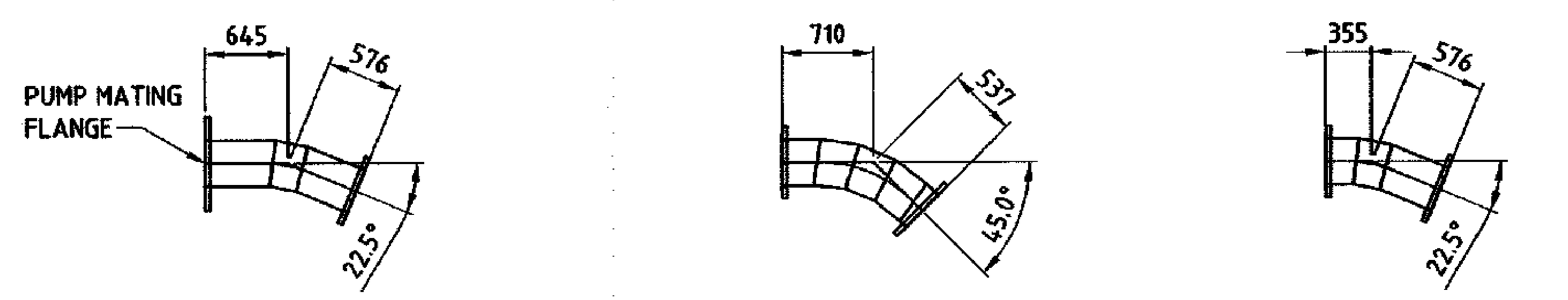
REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE: RETURN WATER PUMP – GENERAL ARRANGEMENT

MET PROJECTS | CWR1806001 | MET-MWS-39-M0014 | REV C

PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE – A1



PLAN ON SUCTION PIPING
SCALE 1:100



DETAIL ITEM 'P26'
SCALE 1:50

DETAIL ITEM 'P21'
SCALE 1:50

DETAIL ITEM 'P12'&'P18'
SCALE 1:50

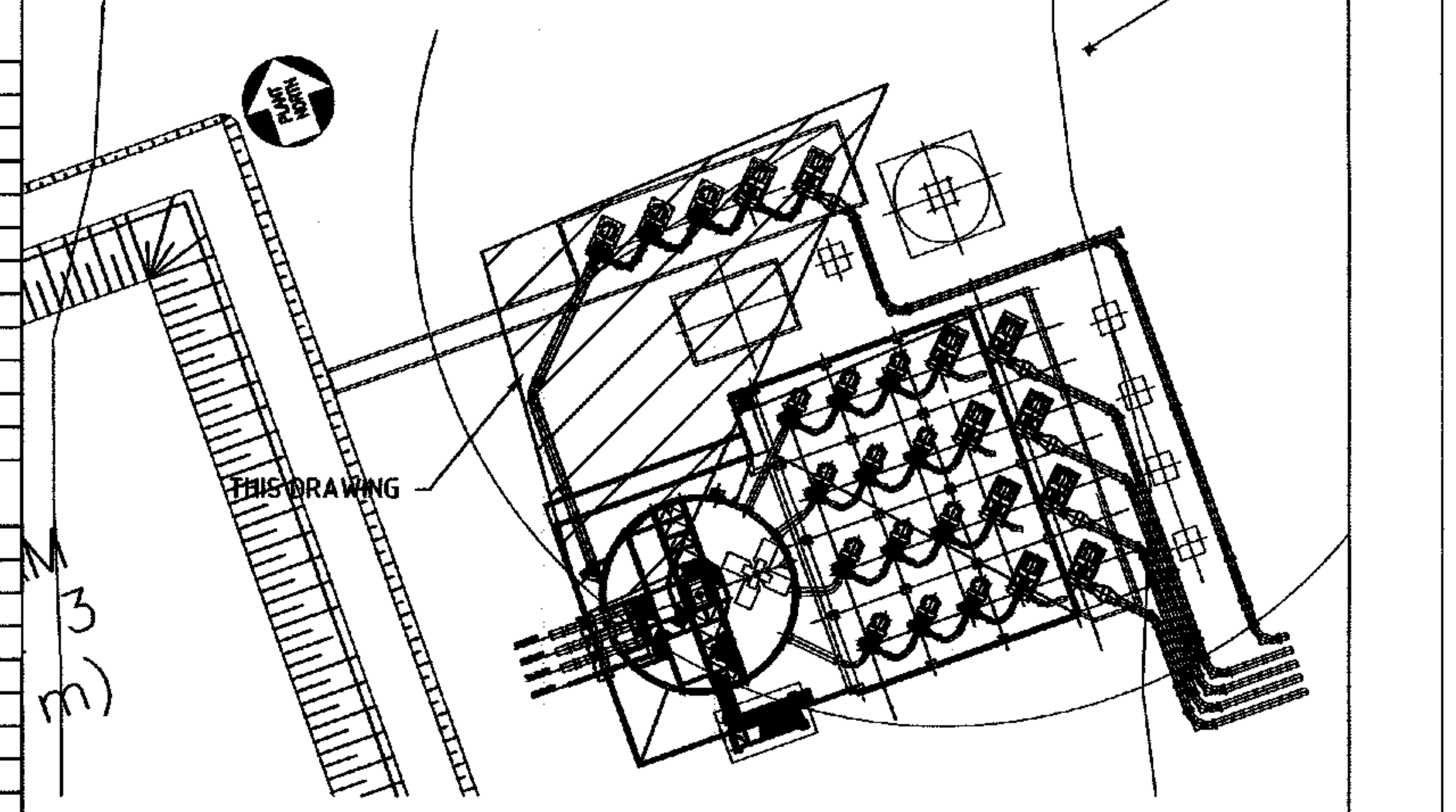
PIPE SCHEDULE				
LINE No / SPEC.		SERVICE	FLANGE RATING	
39-600-CS-PE12-009		SLURRY	1000/3	
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P1	1	600NB	1220 C/F	45 DEG LATERAL TEE
P2	1	600NB	.	KNIFE GATE VALVE
P3	2	600NB	6000 F/F	SPOOL
P4	1	600NB	4000 F/F	SPOOL
P5	1	600NB	2317 F/F	CLOSURE
P6	1	600NB	1220 C/F	45 DEG 3D BEND
P7	1	600NB	3450 F/F	CLOSURE
P8	1	600x350	490 F/F	ECC RED B/FLAT - 600NB FLG x PUMP MATING FLG

PIPE SCHEDULE				
LINE No / SPEC.		SERVICE	FLANGE RATING	
39-350-CS-PE12-015		SLURRY	2500/3	
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P9	1	350x300	255 F/F	CONCENTRIC REDUCER - PUMP MATING FLG x 350NB FLG
P10	1	350NB	667 F/F	CLOSURE
P11	1	350NB	1065 C/F	90 DEG 3D BEND
P12	1	350NB	SEE DETAIL	22.5 DEG 3D BEND
P13	1	350NB	520 F/F	CLOSURE - 350NB FLG x PUMP MATING FLG

PIPE SCHEDULE				
LINE No / SPEC.		SERVICE	FLANGE RATING	
39-350-CS-PE12-020		SLURRY	2500/3	
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P14	1	350x300	255 F/F	CONCENTRIC REDUCER - PUMP MATING FLG x 350NB FLG
P15	1	350NB	667 F/F	CLOSURE
P16	1	350NB	1065 C/F	90 DEG 3D BEND
P17	1	350NB	SEE DETAIL	22.5 DEG 3D BEND
P18	1	350NB	520 F/F	CLOSURE - 350NB FLG x PUMP MATING FLG

PIPE SCHEDULE				
LINE No / SPEC.		SERVICE	FLANGE RATING	
39-350-CS-PE12-025		SLURRY	2500/3	
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P19	1	350x300	255 F/F	CONCENTRIC REDUCER - PUMP MATING FLG x 350NB FLG
P20	1	350NB	667 F/F	CLOSURE
P21	1	350NB	1065 C/F	90 DEG 3D BEND
P22	1	350NB	SEE DETAIL	45 DEG 3D BEND - 350NB FLG x PUMP MATING FLG

PIPE SCHEDULE				
LINE No / SPEC.		SERVICE	FLANGE RATING	
39-350-CS-PE12-030		SLURRY	2500/3	
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P23	1	350x300	255 F/F	CONCENTRIC REDUCER - PUMP MATING FLG x 350NB FLG
P24	1	350NB	1383 F/F	CLOSURE
P25	1	350NB	1065 C/F	90 DEG 3D BEND
P26	1	350NB	SEE DETAIL	22.5 DEG 3D BEND - 350NB FLG x PUMP MATING FLG



SITE PLAN

SPECIAL NOTES: PIPE, PUMP, PIPING & VALVES PART 9

PIPING (UP TO 25 BAR)

1. APPLICATION : PUMP SUCTION
2. MEDIUM IN PIPE: SLURRY
3. STATIC HEAD : .
4. DESIGN PRESSURE : 2500 KPa
5. WORKING PRESSURE : .Mpa OR 25 Bar
6. TEMPERATURE : AMBIENT
7. PIPE SPECIFICATION : SANS 719
8. FITTING SPECIFICATION : SANS 719
9. FLANGE SPECIFICATION : SANS 1123
10. FLANGE MATERIAL : MILD STEEL
11. WELDING SPECIFICATION : TO ASME IX.
12. BOLT SPECIFICATION : TO SANS 1700 CLASS 8.8
13. NUT SPECIFICATION : TO SANS 1700 CLASS 8.
14. GASKET SPECIFICATION : TO AGA SPECIFICATION 415002.
15. CORROSION PROTECTION : TO BE IN ACCORDANCE WITH AGA SPECIFICATION 164050.
    INTERNAL CPS : 8mm RUBBER/HDPE LINED
    EXTERNAL CPS : 137
    FASTENERS : GRADE 8.8 BLACK BOLTS/NUTS TO SANS 1700
16. ALL PIPES MARKED AS "CLOSURES" MUST BE SUPPLIED 300 mm LONGER THAN GIVEN DIMENSIONS WITH ONE FLANGE SUPPLIED LOOSE AND WIRED TO MATING PIECE. SITE CUT AND FIT (TACK WELDED) THEN RETURN TO FABRICATOR FOR FINAL WELDING.
17. CONTRACTOR TO SUPPLY ALL BOLTS, STUDS, NUTS, WASHERS AND GASKETS.
18. ALL BOLTS, STUDS, NUTS AND WASHERS TO BE PLACED IN CONTAINERS, SEALED AND MARKED CLEARLY WITH INSTALLATION LEVEL, DRG No. AND ITEM No. FOR ERECTION PURPOSES.
19. ALL PIPES TO BE CLEARLY MARKED WITH PROJECT No. DRG. No. AND ITEM No. FOR ERECTION PURPOSES.
20. THESE NOTES TO BE READ IN CONJUNCTION WITH AGA SPECIFICATIONS 415003 , 415004, 415005, 415011.
21. LOW PRESSURE PIPING UNDER 25 BAR WILL BE IN ACCORDANCE WITH AGA 415011
22. PIPES 150NB OR SMALLER SHALL BE IN ACCORDANCE WITH SANS 62
23. PIPES OF BIGGER THAN 150NB SHALL BE IN ACCORDANCE WITH SANS 719
24. MEASUREMENTS GIVEN ON HDPE LINED PIPES WILL BE MEASURED FROM HDPE TO HDPE.

NOTE:
ALL SPECIFICATIONS, DRAWINGS & GUIDELINES REFERRED TO WILL BE LATEST ISSUE.

WP	NAME	DATE
Drawn By	APH	29/10/2018
Checked By	LS	31/10/2018
Project Manager	[signature]	27/11/2018
Process Engineer	[signature]	27/11/18
Civil Engineer		
Mechanical Engineer	[signature]	27/11/18
Piping Engineer	[signature]	27/11/2018

SCALE: AS NOTED

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-PE-DAL-0001-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	N/A	L.SCOTT	L.S.	31.10.2018
RISK ASSESSMENT	.	J.FERRERA	.	.
				.

TITLE	DRG. No
.	.
.	.
PID - RESIDUE TANK	MET-MWS-39-P003
PID - STAGE 1 PUMPS	MET-MWS-39-P004
PID - STAGE 2 PUMPS	MET-MWS-39-P005
PID - STAGE 3 PUMPS	MET-MWS-39-P006
PID - STAGE 4 PUMPS	MET-MWS-39-P007
TAILINGS TRANSFER PUMP TRAIN - GENERAL ARRANGEMENT	MET-MWS-39-M001
TAILINGS TRANSFER PUMP TRAIN - GA SECTION DETAIL	MET-MWS-39-M002

REFERENCE DRAWINGS

DETAIL	MARK	DATE	INIT	APP'D
ISSUE FOR USE	C	01-11-2018	.	.

REVISIONS

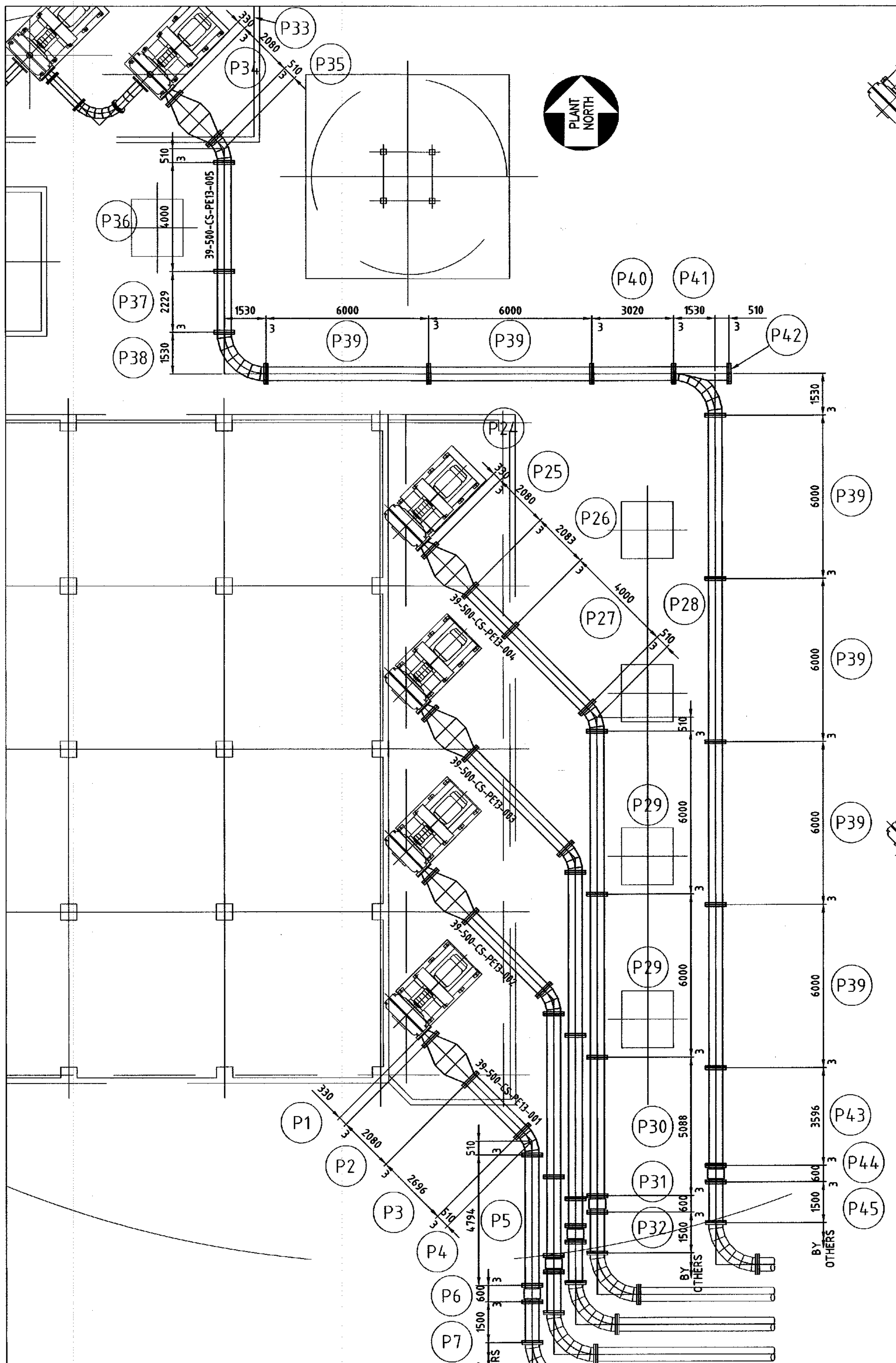
DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	.	.		.
CHECKED	.	.		.
SENIOR DESIGNER MET PROJECTS	.	.		.
PR ENGINEER	.	.		.
PR TECH	.	.		.
PROJECT / MET ENGINEER	.	.		.
MET PROJECTS MANAGER	.	.		.

ANGLOGOLD ASHANTI
COPYRIGHT

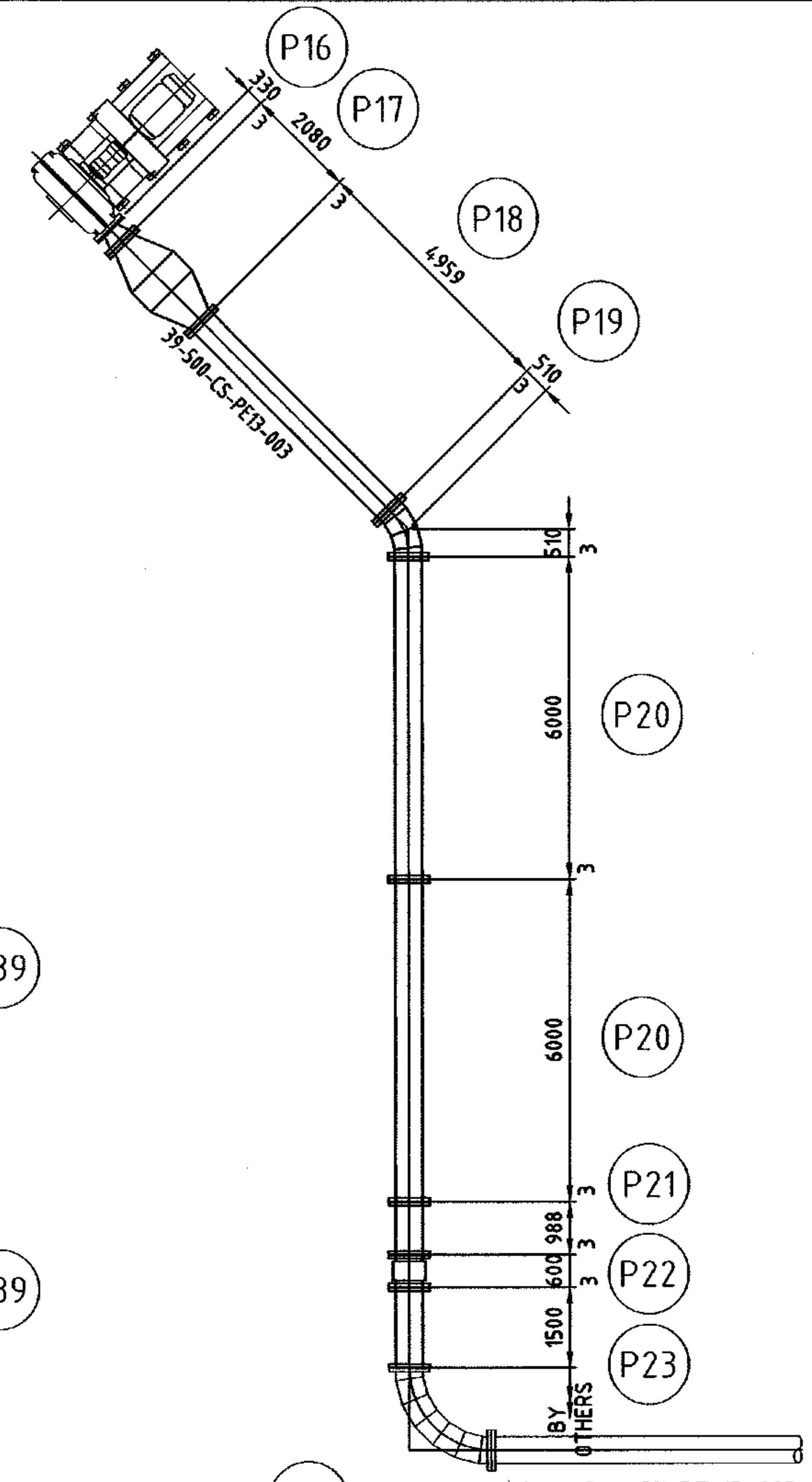
REGION: SOUTH AFRICA REGION - VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT - FEASIBILITY STUDY
DRAWING TITLE: TAILINGS TRANSFER PUMP TRAIN No 5 - SUCTION LINE - GENERAL ARRANGEMENT

MET PROJECTS | CWR1806001 | MET-MWS-39-M0005 | REV C
PROJECT No | B/UNIT | AREA | SEQ. No: | SIZE - A1

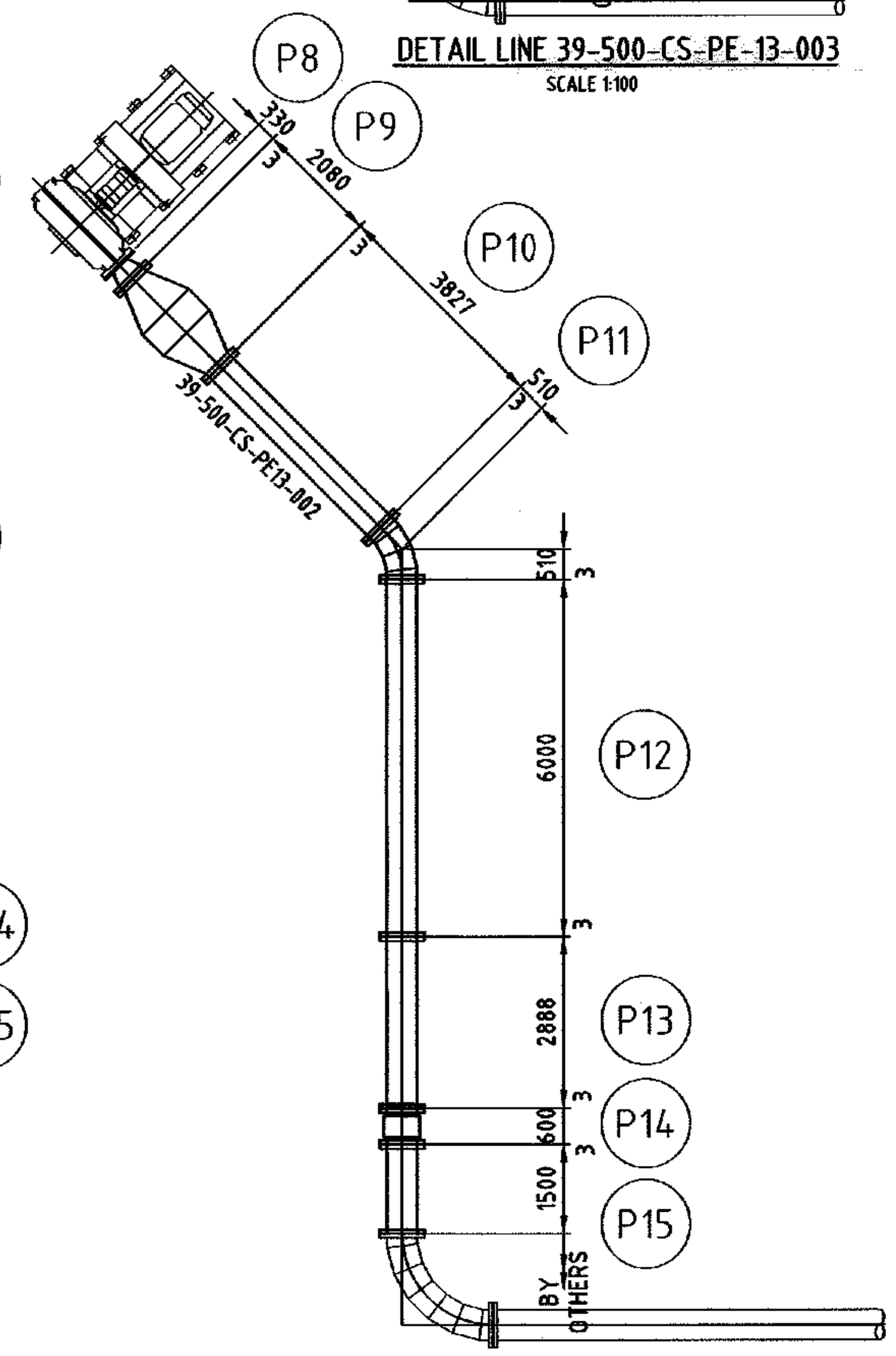
MET PROJECTS | CWR1806001 | MET-MWS-39-M0006 | REV C



PLAN ON DISCHARGE PIPING
SCALE 1:100



DETAIL LINE 39-500-CS-PE-13-003
SCALE 1:100



DETAIL LINE 39-500-CS-PE-13-002
SCALE 1:100

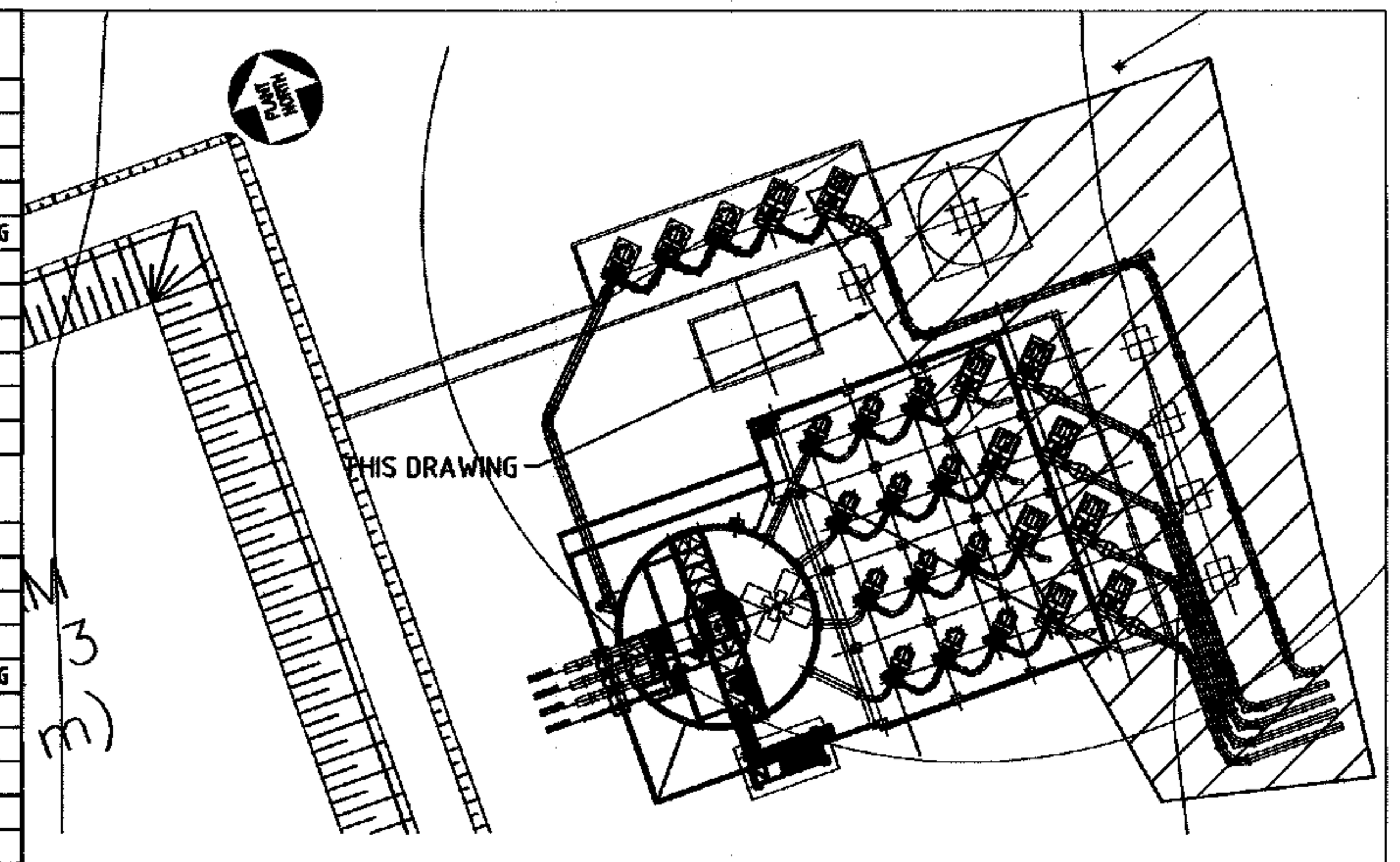
PIPE SCHEDULE				
LINE No / SPEC.		SERVICE		FLANGE RATING
39-500-CS-PE13-001		SLURRY PUMP		4000/3
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P1	1	500x300	330 F/F	ECC RED B/FLAT – PINCH VALVE FLG x PUMP MATING FLG
P2	1	500NB	2080 F/F	PINCH VALVE
P3	1	500NB	2696 F/F	CLOSURE – ONE FLANGE TO MATCH PINCH VALVE
P4	1	500NB	510 C/F	45 DEG 3D BEND
P5	1	500NB	4794 F/F	CLOSURE
P6	1	500NB	600 F/F	FLOW METER
P7	1	500NB	1500 F/F	SPOOL

PIPE SCHEDULE				
LINE No / SPEC.		SERVICE		FLANGE RATING
39-500-CS-PE13-002		SLURRY PUMP		4000/3
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P8	1	500x300	330 F/F	ECC RED B/FLAT – PINCH VALVE FLG x PUMP MATING FLG
P9	1	500NB	2080 F/F	PINCH VALVE
P10	1	500NB	3827 F/F	CLOSURE – ONE FLANGE TO MATCH PINCH VALVE
P11	1	500NB	510 C/F	45 DEG 3D BEND
P12	1	500NB	6000 F/F	SPOOL
P13	1	500NB	988 F/F	CLOSURE
P14	1	500NB	600 F/F	FLOW METER
P15	1	500NB	1500 F/F	SPOOL

PIPE SCHEDULE				
LINE No / SPEC.		SERVICE		FLANGE RATING
39-500-CS-PE13-003		SLURRY PUMP		4000/3
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P16	1	500x300	330 F/F	ECC RED B/FLAT – PINCH VALVE FLG x PUMP MATING FLG
P17	1	500NB	2080 F/F	PINCH VALVE
P18	1	500NB	4959 F/F	CLOSURE – ONE FLANGE TO MATCH PINCH VALVE
P19	1	500NB	510 C/F	45 DEG 3D BEND
P20	2	500NB	6000 F/F	SPOOL
P21	1	500NB	4794 F/F	CLOSURE
P22	1	500NB	600 F/F	FLOW METER
P23	1	500NB	1500 F/F	SPOOL

PIPE SCHEDULE				
LINE No / SPEC.		SERVICE		FLANGE RATING
39-500-CS-PE13-004		SLURRY PUMP		4000/3
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P24	1	500x300	330 F/F	ECC RED B/FLAT – PINCH VALVE FLG x PUMP MATING FLG
P25	1	500NB	2080 F/F	PINCH VALVE
P26	1	500NB	2083 F/F	CLOSURE – ONE FLANGE TO MATCH PINCH VALVE
P27	1	500NB	4000 F/F	SPOOL
P28	1	500NB	510 C/F	45 DEG 3D BEND
P29	2	500NB	6000 F/F	SPOOL
P30	1	500NB	5088 F/F	CLOSURE
P31	1	500NB	600 F/F	FLOW METER
P32	1	500NB	1500 F/F	SPOOL

PIPE SCHEDULE				
LINE No / SPEC.		SERVICE		FLANGE RATING
39-500-CS-PE13-005		SLURRY PUMP		4000/3
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P33	1	500x300	330 F/F	ECC RED B/FLAT – PINCH VALVE FLG x PUMP MATING FLG
P34	1	500NB	2080 F/F	PINCH VALVE
P35	1	500NB	510 C/F	45 DEG 3D BEND – ONE FLANGE TO MATCH PINCH VALVE
P36	1	500NB	4000 F/F	SPOOL
P37	1	500NB	2229 F/F	CLOSURE
P38	1	500NB	1530 C/F	90 DEG 3D BEND
P39	6	500NB	6000 F/F	SPOOL
P40	1	500NB	3020 F/F	CLOSURE
P41	1	500NB	1530 C/F	90 DEG 3D SWEEP BEND
P42	1	500NB	.	BLANK FLANGE
P43	1	500NB	3596 F/F	CLOSURE
P44	1	500NB	600 F/F	FLOW METER
P45	1	500NB	1500 F/F	SPOOL



SITE PLAN

SPECIAL NOTES: PIPE, PUMP, PIPING & VALVES PART 9

PIPING (UP TO 40 BAR)

1. APPLICATION : PUMP DELIVERY
2. MEDIUM IN PIPE: SLURRY
3. STATIC HEAD : .
4. DESIGN PRESSURE : 4000 KPa
5. WORKING PRESSURE : .Mpa OR 40 Bar
6. TEMPERATURE : AMBIENT
7. PIPE SPECIFICATION : SANS 719
8. FITTING SPECIFICATION : SANS 719
9. FLANGE SPECIFICATION : SANS 1123
10. FLANGE MATERIAL : MILD STEEL
11. WELDING SPECIFICATION : TO ASME IX.
12. BOLT SPECIFICATION : TO SANS 1700 CLASS 8.8
13. NUT SPECIFICATION : TO SANS 1700 CLASS 8.
14. GASKET SPECIFICATION : TO AGA SPECIFICATION 415002.
15. CORROSION PROTECTION : TO BE IN ACCORDANCE WITH AGA SPECIFICATION 164050.
    INTERNAL CPS : 8mm RUBBER/HDPE LINED
    EXTERNAL CPS : 137
    FASTENERS : GRADE 8.8 BLACK BOLTS/NUTS TO SANS 1700
16. ALL PIPES MARKED AS "CLOSURES" MUST BE SUPPLIED 300 mm LONGER THAN GIVEN DIMENSIONS WITH ONE FLANGE SUPPLIED LOOSE AND WIRED TO MATING PIECE. SITE CUT AND FIT (TACK WELDED) THEN RETURN TO FABRICATOR FOR FINAL WELDING.
17. CONTRACTOR TO SUPPLY ALL BOLTS, STUDS, NUTS, WASHERS AND GASKETS.
18. ALL BOLTS, STUDS, NUTS AND WASHERS TO BE PLACED IN CONTAINERS, SEALED AND MARKED CLEARLY WITH INSTALLATION LEVEL, DRG No. AND ITEM No. FOR ERECTION PURPOSES.
19. ALL PIPES TO BE CLEARLY MARKED WITH PROJECT No. DRG. No. AND ITEM No. FOR ERECTION PURPOSES.
20. THESE NOTES TO BE READ IN CONJUNCTION WITH AGA SPECIFICATIONS 415003 , 415004, 415005, 415011.
21. LOW PRESSURE PIPING UNDER 25 BAR WILL BE IN ACCORDANCE WITH AGA 415011
22. PIPES 150NB OR SMALLER SHALL BE IN ACCORDANCE WITH SANS 62
23. PIPES OF BIGGER THAN 150NB SHALL BE IN ACCORDANCE WITH SANS 719
24. MEASUREMENTS GIVEN ON HDPE LINED PIPES WILL BE MEASURED FROM HDPE TO HDPE.

NOTE:
ALL SPECIFICATIONS, DRAWINGS & GUIDELINES REFERRED TO WILL BE LATEST ISSUE.

WP	NAME	DATE
Drawn By	APH	29/10/2018
Checked By	LS	31/10/2018
Project Manager	[signature]	27/11/2018
Process Engineer	[signature]	27/11/18
Civil Engineer		
Mechanical Engineer	[signature]	27/11/18
Piping Engineer	[signature]	27/11/2018

SCALE: 1:100

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3180

C00787-39-PE-DAL-0002-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	N/A	L.SCOTT	L.S.	31.10.2018
RISK ASSESSMENT	.	J.FERRERA	.	.

TITLE	DRG. No
.	.
.	.
.	.
.	.
PID – STAGE 5 PUMPS	MET-MWS-39-P010
TAILINGS TRANSFER PUMP TRAIN – GENERAL ARRANGEMENT	MET-MWS-39-M001
TAILINGS TRANSFER PUMP TRAIN – GA SECTION DETAIL	MET-MWS-39-M002

REFERENCE DRAWINGS

DETAIL	MARK	DATE	INIT	APP'D
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
ISSUE FOR USE	C	01-11-2018	.	.

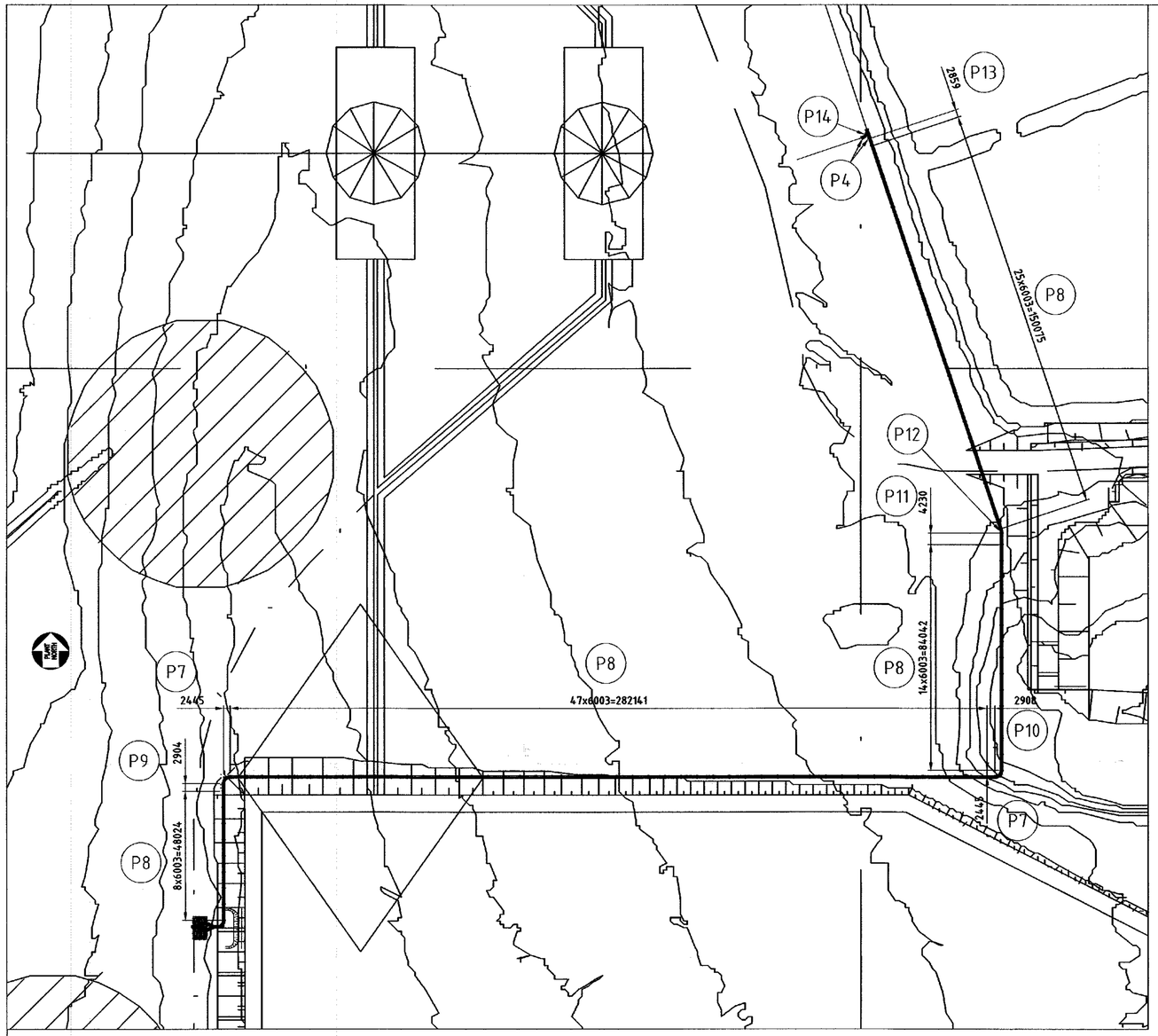
REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	.	.		.
CHECKED	.	.		.
SENIOR DESIGNER MET PROJECTS	.	.		.
PR ENGINEER	.	.		.
PR TECH	.	.		.
PROJECT / MET ENGINEER	.	.		.
MET PROJECTS MANAGER	.	.		.

ANGLOGOLD ASHANTI
COPYRIGHT

REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE: TAILINGS TRANSFER PUMP – TRAIN DISCHARGE LINE – GENERAL ARRANGEMENT

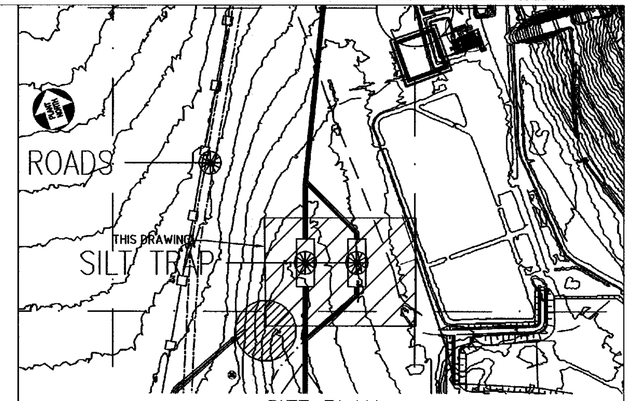
MET PROJECTS	CWR1806001	MET-MWS-39-M0006	REV C
	PROJECT No:	B/UNIT AREA SEQ. No:	SIZE – A1



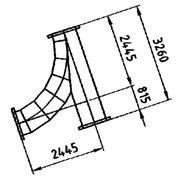
PLAN RETURN WATER PUMP

SCALE 1:1000

PIPE SCHEDULE					
LINE No / SPEC.			SERVICE		FLANGE RATING
39-800-PW-MS6-001			RETURN WATER		2500/3
ITEM	QTY	SIZE	LENGTH	DESCRIPTION	
P1	2	800x600	297 F/F	CONCENTRIC REDUCER - PUMP MATING FLG x 350NB FLG	
P2	2	800NB	356 F/F	CHECK VALVE	
P3	4	800NB	800 F/F	SPOOL	
P4	4	800NB	318 F/F	BUTTERFLY VALVE (GEARED)	
P5	2	800NB	815 C/F	22.5 DEG 3D BEND	
P6	1	800NB	DETAIL	45 DEG Y-PIECE	
P7	3	800NB	2445 C/F	90 DEG 3D BEND	
P8	94	800NB	6000 F/F	SPOOL	
P9	1	800NB	2904 F/F	CLOSURE	
P10	1	800NB	2908 F/F	CLOSURE	
P11	1	800NB	4230 F/F	CLOSURE	
P12	1	800NB	816 C/F	18.6 DEG 3D BEND	
P13	1	800NB	2895 F/F	CLOSURE	
P14	1	800NB	2445 C/F	90 DEG SWEEP TEE	

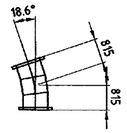


SITE PLAN



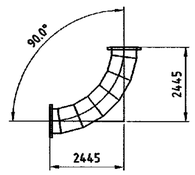
DETAIL ITEM 'P14'

SCALE 1:50



DETAIL ITEM 'P12'

SCALE 1:50



DETAIL ITEM 'P7'

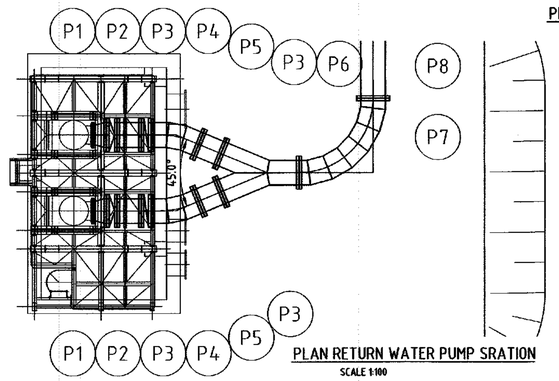
SCALE 1:50

SPECIAL NOTES: PIPE, PUMP, PIPING & VALVES PART 9

PIPING (UP TO 25 BAR)

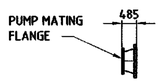
1. APPLICATION : PUMP DISCHARGE (RETURN WATER)
2. MEDIUM IN PIPE: WATER
3. STATIC HEAD : .
4. DESIGN PRESSURE : 2500 KPa
5. WORKING PRESSURE : .Mpa OR 25 Bar
6. TEMPERATURE : AMBIENT
7. PIPE SPECIFICATION : SANS 719
8. FITTING SPECIFICATION : SANS 719
9. FLANGE SPECIFICATION : SANS 1123
10. FLANGE MATERIAL : MILD STEEL
11. WELDING SPECIFICATION : TO ASME IX.
12. BOLT SPECIFICATION : TO SANS 1700 CLASS 8.8
13. NUT SPECIFICATION : TO SANS 1700 CLASS 8.
14. GASKET SPECIFICATION : TO AGA SPECIFICATION 415002.
15. CORROSION PROTECTION : TO BE IN ACCORDANCE WITH AGA SPECIFICATION 164050.
    INTERNAL CPS : N/A
    EXTERNAL CPS : 137
    FASTENERS : GRADE 8.8 BLACK BOLTS/NUTS TO SANS 1700
16. ALL PIPES MARKED AS "CLOSURES" MUST BE SUPPLIED 300 mm LONGER THAN GIVEN DIMENSIONS WITH ONE FLANGE SUPPLIED LOOSE AND WIRED TO MATING PIECE. SITE CUT AND FIT (TACK WELDED) THEN RETURN TO FABRICATOR FOR FINAL WELDING.
17. CONTRACTOR TO SUPPLY ALL BOLTS, STUDS, NUTS, WASHERS AND GASKETS.
18. ALL BOLTS, STUDS, NUTS AND WASHERS TO BE PLACED IN CONTAINERS, SEALED AND MARKED CLEARLY WITH INSTALLATION LEVEL, DRG No. AND ITEM No. FOR ERECTION PURPOSES.
19. ALL PIPES TO BE CLEARLY MARKED WITH PROJECT No. DRG. No. AND ITEM No. FOR ERECTION PURPOSES.
20. THESE NOTES TO BE READ IN CONJUNCTION WITH AGA SPECIFICATIONS 415003 , 415004, 415005, 415011.
21. LOW PRESSURE PIPING UNDER 25 BAR WILL BE IN ACCORDANCE WITH AGA 415011
22. PIPES 150NB OR SMALLER SHALL BE IN ACCORDANCE WITH SANS 62
23. PIPES OF BIGGER THAN 150NB SHALL BE IN ACCORDANCE WITH SANS 719
24. MEASUREMENTS GIVEN ON HDPE LINED PIPES WILL BE MEASURED FROM HDPE TO HDPE.

NOTE:
ALL SPECIFICATIONS, DRAWINGS & GUIDELINES REFERRED TO WILL BE LATEST ISSUE.



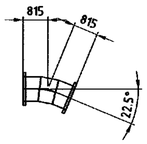
PLAN RETURN WATER PUMP SRATION

SCALE 1:100



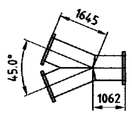
DETAIL ITEM 'P1'

SCALE 1:50



DETAIL ITEM 'P5'

SCALE 1:50



DETAIL ITEM 'P6'

SCALE 1:50

WP	NAME	DATE
Drawn By	APH	29/10/2018
Checked By	LS	31/10/2018
Project Manager		23/11/2018
Process Engineer		23/11/18
Civil Engineer		
Mechanical Engineer		23/11/18
Piping Engineer		23/11/2018

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 252, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Int Tel: +27 11 218 3000 | Int Fax: +27 11 218 3200

C00787-39-PE-DAL-0003-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	N/A	L.SCOTT	L.S.	31.10.2018
RISK ASSESSMENT	.	J.FERRERA	.	.

SCALE: 1:100

REFERENCE DRAWINGS		REVISIONS				
TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D
PID - KAREERAND RETURN WATER DAM AND PUMPING (1)	MET-MWS-39-P008	.	.	.	.	.
PID - KAREERAND RETURN WATER DAM AND PUMPING (2)	MET-MWS-39-P009	.	.	.	.	.
RETURN WATER PUMP - GENERAL ARRANGEMENT	MET-MWS-39-M003	.	.	.	.	.
RETURN WATER PUMP - GA SECTION DETAILS	MET-MWS-39-M004	ISSUE FOR USE	C	01-11-2018	.	.

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	.	.	.	.
CHECKED	.	.	.	.
SENIOR DESIGNER MET PROJECTS	.	.	.	.
PR ENGINEER	.	.	.	.
PR TECH	.	.	.	.
PROJECT / MET ENGINEER	.	.	.	.
MET PROJECTS MANAGER	.	.	.	.

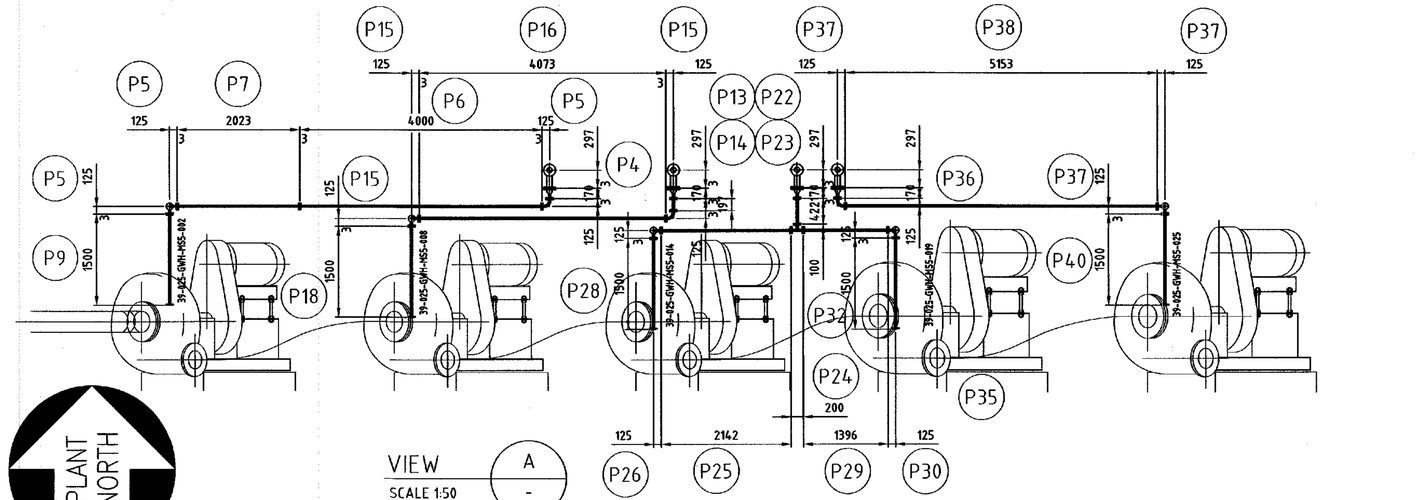
ANGLOGOLD ASHANTI

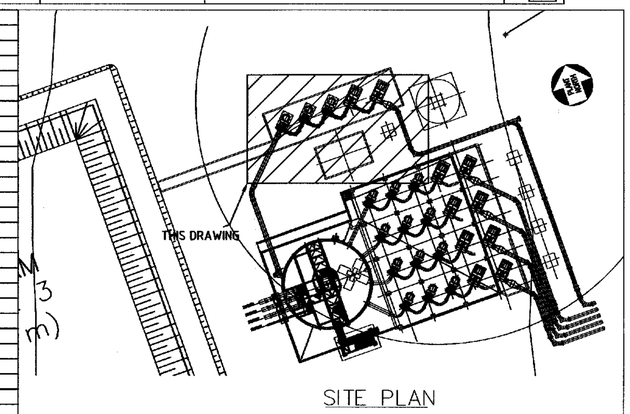
COPYRIGHT

MET PROJECTS

REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT - FEASIBILITY STUDY
DRAWING TITLE RETURN WATER PIPELINE GA/LAYOUT

PROJECT No:	B/UNIT	AREA	SEQ. No:	REV	SIZE
CWR1806001	MET	MWS	39-M0007	C	A1





PIPE SCHEDULE				
LINE No / SPEC.		SERVICE	FLANGE RATING	
39-025-GWH-MSS-002		GLAND SEAL WATER	2500/3	
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P1	1	80NB	297 C/F	90 DEG SWEEP TEE
P2	1	80NB	2523 F/F	CLOSURE
P3	1	80NB	297 C/F	90 DEG 3D BEND
P4	1	80x25	170 F/F	CONCENTRIC REDUCER
P5	3	25NB	125 C/F	90 DEG 3D BEND
P6	1	25NB	4000 F/F	SPOOL
P7	1	25NB	2023 F/F	CLOSURE
P8	1	25NB	1640 F/F	CLOSURE
P9	1	25NB	1500 F/F	CLOSURE

PIPE SCHEDULE				
LINE No / SPEC.		SERVICE	FLANGE RATING	
39-025-GWH-MSS-008		GLAND SEAL WATER	2500/3	
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P10	1	80NB	297 C/F	90 DEG SWEEP TEE
P11	1	80NB	2523 F/F	CLOSURE
P12	1	80NB	297 C/F	90 DEG 3D BEND
P13	1	80x25	170 F/F	CONCENTRIC REDUCER
P14	1	25NB	197 F/F	CLOSURE
P15	3	25NB	125 C/F	90 DEG 3D BEND
P16	1	25NB	6873 F/F	CLOSURE
P17	1	25NB	1640 F/F	CLOSURE
P18	1	25NB	1500 F/F	CLOSURE

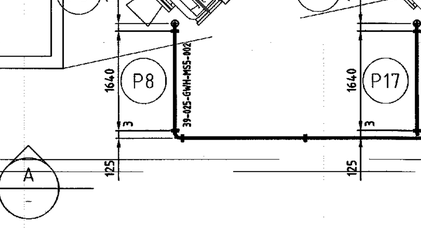
PIPE SCHEDULE				
LINE No / SPEC.		SERVICE	FLANGE RATING	
39-025-GWH-MSS-014		GLAND SEAL WATER	2500/3	
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P19	1	80NB	297 C/F	90 DEG SWEEP TEE
P20	1	80NB	2523 F/F	CLOSURE
P21	1	80NB	297 C/F	90 DEG 3D BEND
P22	1	80x25	170 F/F	CONCENTRIC REDUCER
P23	1	25NB	422 F/F	CLOSURE
P24	1	25NB	100 C/F	EQUAL TEE
P25	1	25NB	2142 F/F	CLOSURE
P26	2	25NB	125 C/F	90 DEG 3D BEND
P27	1	25NB	1640 F/F	CLOSURE
P28	1	25NB	1500 F/F	CLOSURE

PIPE SCHEDULE				
LINE No / SPEC.		SERVICE	FLANGE RATING	
39-025-GWH-MSS-019		GLAND SEAL WATER	2500/3	
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P29	1	25NB	1396 F/F	CLOSURE
P30	2	25NB	125 C/F	90 DEG 3D BEND
P31	1	25NB	1640 F/F	CLOSURE
P32	1	25NB	1500 F/F	CLOSURE

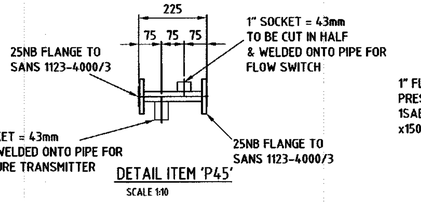
PIPE SCHEDULE				
LINE No / SPEC.		SERVICE	FLANGE RATING	
39-025-GWH-MSS-024		GLAND SEAL WATER	4000/3	
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P33	1	80NB	297 C/F	90 DEG SWEEP TEE
P34	1	80NB	2523 F/F	CLOSURE
P35	1	80NB	297 C/F	90 DEG 3D BEND
P36	1	80x25	190 F/F	CONCENTRIC REDUCER
P37	3	25NB	125 C/F	90 DEG 3D BEND
P38	1	25NB	5153 F/F	CLOSURE
P39	1	25NB	956 F/F	CLOSURE
P40	1	25NB	1500 F/F	CLOSURE

PIPE SCHEDULE				
LINE No / SPEC.			SERVICE	FLANGE RATING
39-025-GWH-MSS-002,008,014,019			GLAND SEAL WATER	2500/3
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P41	4	25NB	100 C/F	EQUAL TEE
P42	4	25NB	225 F/F	STRAIGHT PIPE (SEE DETAIL)
P43	4	25NB	1500	SP12 FLEXIBLE HOSE (SEE DETAIL)
V1	8	25NB	127 F/F	BALL VALVE BA4
V2	4	25NB	127 F/F	SOLENOID VALVE
V3	4	25NB	118 F/F	CHECK VALVE CH1
V4	4	25NB	180 F/F	ORIFICE (15mm & 12mm)

PIPE SCHEDULE				
LINE No / SPEC.			SERVICE	FLANGE RATING
39-025-GWH-MSS-024			GLAND SEAL WATER	4000/3
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P44	1	25NB	100 C/F	EQUAL TEE
P45	1	25NB	225 F/F	STRAIGHT PIPE (SEE DETAIL)
P46	1	25NB	1500	SP12 FLEXIBLE HOSE (SEE DETAIL)
V5	2	25NB	127 F/F	BALL VALVE BA4
V6	1	25NB	127 F/F	SOLENOID VALVE
V7	1	25NB	118 F/F	CHECK VALVE CH1
V8	1	25NB	180 F/F	ORIFICE (15mm & 12mm)



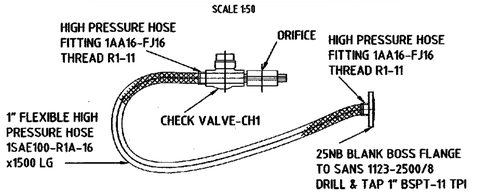
DETAIL ITEM 'P42'
SCALE 1:10



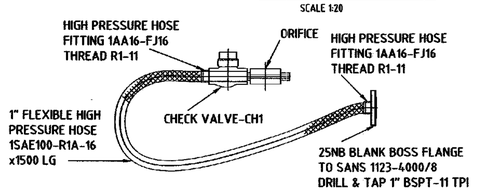
DETAIL ITEM 'P45'
SCALE 1:10

PLAN ON GLAND SEAL PUMPS AND PUMP TRAIN No 5
SCALE 1:50

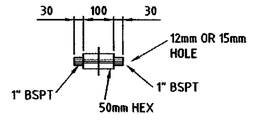
TYPICAL HOSE CONNECTION
SCALE 1:20



DETAIL RUBBER HOSE ITEM 'P43'
SCALE 1:10



DETAIL RUBBER HOSE ITEM 'P46'
SCALE 1:10



DETAIL ORIFICE - ITEM 'V4'
SCALE 1:10

SPECIAL NOTES: PIPE, PUMP, PIPING & VALVES PART 9

PIPING (UP TO 40 BAR)

APPLICATION : GLAND SERVICE
2. MEDIUM IN PIPE: WATER
3. STATIC HEAD : .
4. DESIGN PRESSURE : 2500/4000 KPa
5. WORKING PRESSURE : .Mpa OR 25/40 Bar
6. TEMPERATURE : AMBIENT
7. PIPE SPECIFICATION : SANS 62
8. FITTING SPECIFICATION : BS 1640
9. FLANGE SPECIFICATION : SANS 1123
10. FLANGE MATERIAL : MILD STEEL
11. WELDING SPECIFICATION : TO ASME IX.
12. BOLT SPECIFICATION : TO SANS 1700 CLASS 8.8
13. NUT SPECIFICATION : TO SANS 1700 CLASS 8.
14. GASKET SPECIFICATION : TO AGA SPECIFICATION 415002.
15. CORROSION PROTECTION : TO BE IN ACCORDANCE WITH AGA SPECIFICATION 164050.
INTERNAL CPS : N/A
EXTERNAL CPS : 137
FASTENERS : GRADE 8.8 BLACK BOLTS/NUTS TO SANS 1700
16. ALL PIPES MARKED AS "CLOSURES" MUST BE SUPPLIED 300 mm LONGER THAN GIVEN DIMENSIONS WITH ONE FLANGE SUPPLIED LOOSE AND WIRED TO MATING PIECE. SITE CUT AND FIT (TACK WELDED) THEN RETURN TO FABRICATOR FOR FINAL WELDING.
17. CONTRACTOR TO SUPPLY ALL BOLTS, STUDS, NUTS, WASHERS AND GASKETS.
18. ALL BOLTS, STUDS, NUTS AND WASHERS TO BE PLACED IN CONTAINERS, SEALED AND MARKED CLEARLY WITH INSTALLATION LEVEL, DRG No. AND ITEM No. FOR ERECTION PURPOSES.
19. ALL PIPES TO BE CLEARLY MARKED WITH PROJECT No. DRG. No. AND ITEM No. FOR ERECTION PURPOSES.
20. THESE NOTES TO BE READ IN CONJUNCTION WITH AGA SPECIFICATIONS 415003 , 415004, 415005, 415011.
21. LOW PRESSURE PIPING UNDER 25 BAR WILL BE IN ACCORDANCE WITH AGA 415011
22. PIPES 150NB OR SMALLER SHALL BE IN ACCORDANCE WITH SANS 62
23. PIPES OF BIGGER THAN 150NB SHALL BE IN ACCORDANCE WITH SANS 719
24. MEASUREMENTS GIVEN ON HDPE LINED PIPES WILL BE MEASURED FROM HDPE TO HDPE.

NOTE:
ALL SPECIFICATIONS, DRAWINGS & GUIDELINES REFERRED TO WILL BE LATEST ISSUE.

WP	NAME	DATE
Drawn By	APH	29/10/2018
Checked By	LS	31/10/2018
Project Manager		27/11/2018
Process Engineer		27/11/2018
Civil Engineer		
Mechanical Engineer		27/11/2018
Piping Engineer		27/11/2018

WorleyParsons RSA
P.O. Box 62 292, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 007 007 | Fax: 0861 007 020
Int'l tel: +27 11 238 3000 | Int'l fax: +27 11 238 3100
WorleyParsons resources & energy

C00787-39-PE-DAL-0004-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	N/A	L.SCOTT	L.S.	31.10.2018
RISK ASSESSMENT	.	J.FERRERA	.	.

SCALE: 1:50

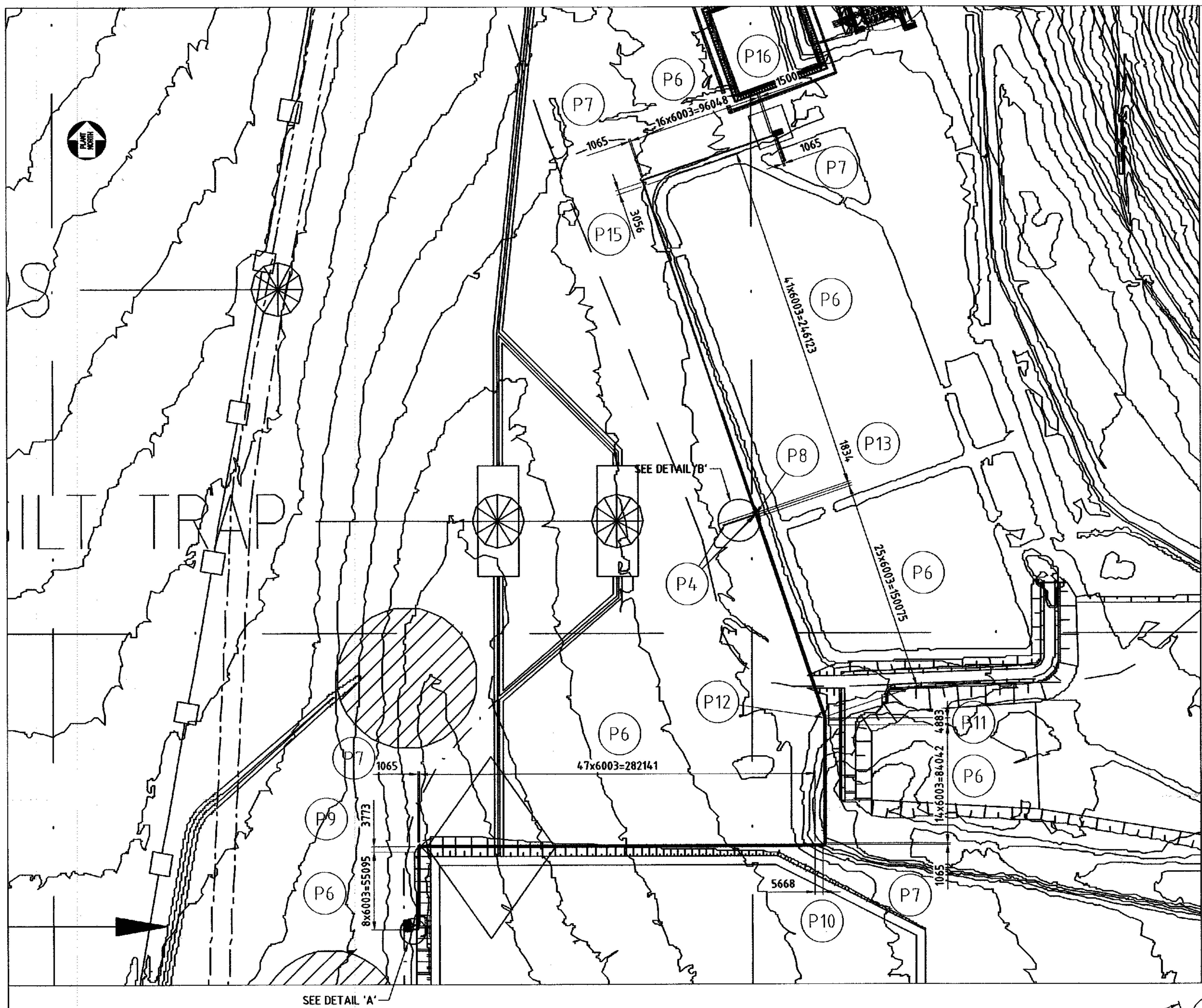
REFERENCE DRAWINGS			REVISIONS				
TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D
.	.	.	.	.	.	.
PID - STAGE 1 PUMPS	MET-MWS-39-P004	.	.	.	.	.
PID - STAGE 2 PUMPS	MET-MWS-39-P005	.	.	.	.	.
PID - STAGE 3 PUMPS	MET-MWS-39-P006	.	.	.	.	.
PID - STAGE 4 PUMPS	MET-MWS-39-P007	.	.	.	.	.
PID - STAGE 5 PUMPS	MET-MWS-39-P010	.	.	.	.	.
TAILINGS TRANSFER PUMP TRAIN - GENERAL ARRANGEMENT	MET-MWS-39-M001	.	.	.	.	.
TAILINGS TRANSFER PUMP TRAIN - GA SECTION DETAIL	MET-MWS-39-M002	ISSUE FOR USE	C	01-11-2018	.	.

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	.	.		
CHECKED	.	.		
SENIOR DESIGNER MET PROJECTS	.	.		
PR ENGINEER	.	.		
PR TECH	.	.		
PROJECT / MET ENGINEER	.	.		
MET PROJECTS MANAGER	.	.		

ANGLOGOLD ASHANTI
COPYRIGHT
MET PROJECTS

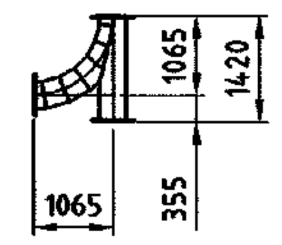
REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT - FEASIBILITY STUDY
DRAWING TITLE GLAND SEAL WATER PIPELINE GA - (FOR NEW PUMP TRAIN No 5)

PROJECT No:	B/UNIT	AREA	SEQ. No:	REV	SIZE
CWR1806001	MET-MWS-39-M0008			C	A1

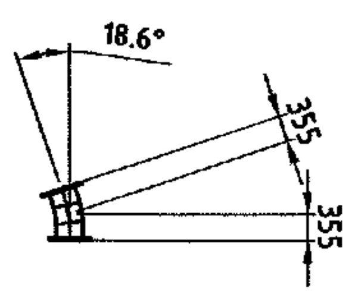


PLAN RETURN WATER PUMP
SCALE 1:2000

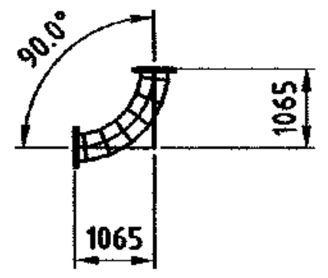
PIPE SCHEDULE				
LINE No / SPEC.		SERVICE		FLANGE RATING
39-800-PW-MS6-001		RETURN WATER		2500/3
ITEM	QTY	SIZE	LENGTH	DESCRIPTION
P1	2	300x200	280 F/F	CONCENTRIC REDUCER – PUMP MATING FLG x 300NB FLG
P2	2	350NB	184 F/F	CHECK VALVE
P3	2	350NB	500 F/F	SPOOL
P4	4	350NB	100 F/F	BUTTERFLY VALVE (GEARED)
P5	1	350NB	358 F/F	CLOSURE
P6	153	350NB	6000 F/F	SPOOL
P7	5	350NB	1065 C/F	90 DEG 3D BEND
P8	1	350NB	1065 C/F	90 DEG SWEEP TEE
P9	1	350NB	3773 F/F	CLOSURE
P10	1	350NB	3668 F/F	CLOSURE
P11	1	350NB	4883 F/F	CLOSURE
P12	1	350NB	355 C/F	18.6 DEG 3D BEND
P13	1	350NB	1834 F/F	CLOSURE
P14	1	350NB	3983 F/F	CLOSURE
P15	1	350NB	3056 F/F	CLOSURE
P16	1	350NB	1500 F/F	CLOSURE



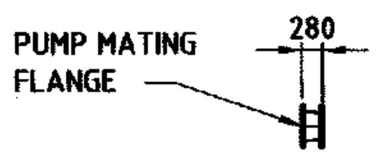
DETAIL ITEM 'P8'
SCALE 1:50



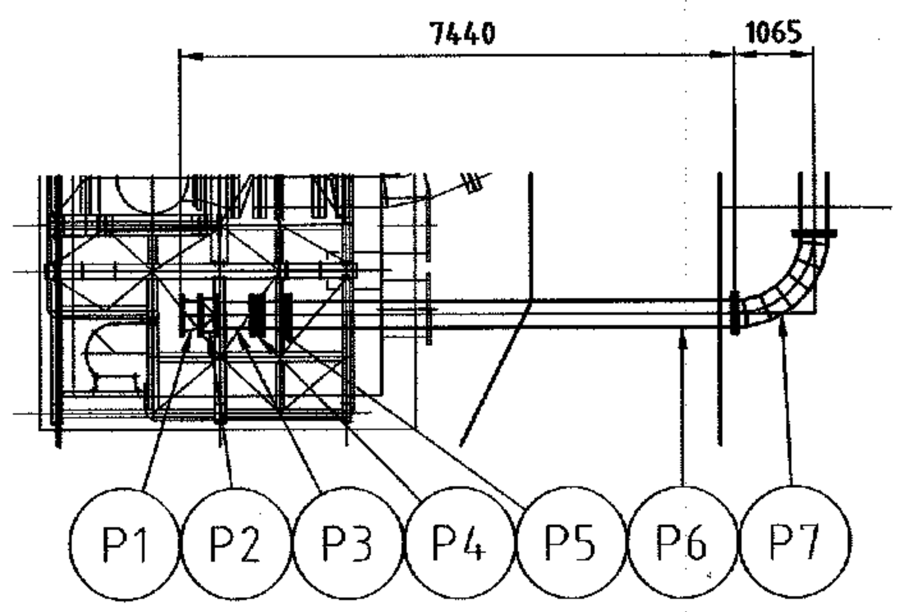
DETAIL ITEM 'P12'
SCALE 1:50



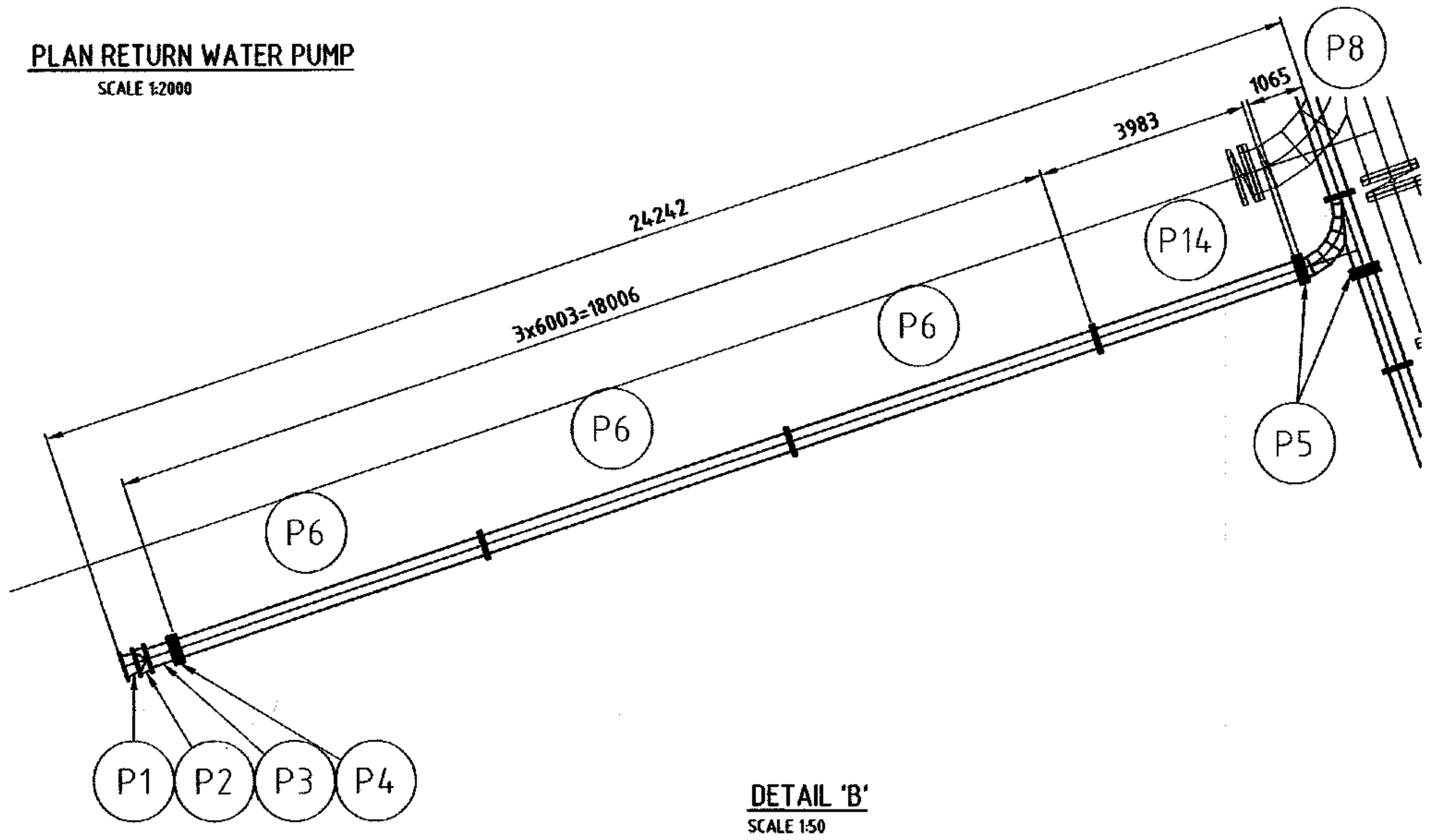
DETAIL ITEM 'P7'
SCALE 1:50



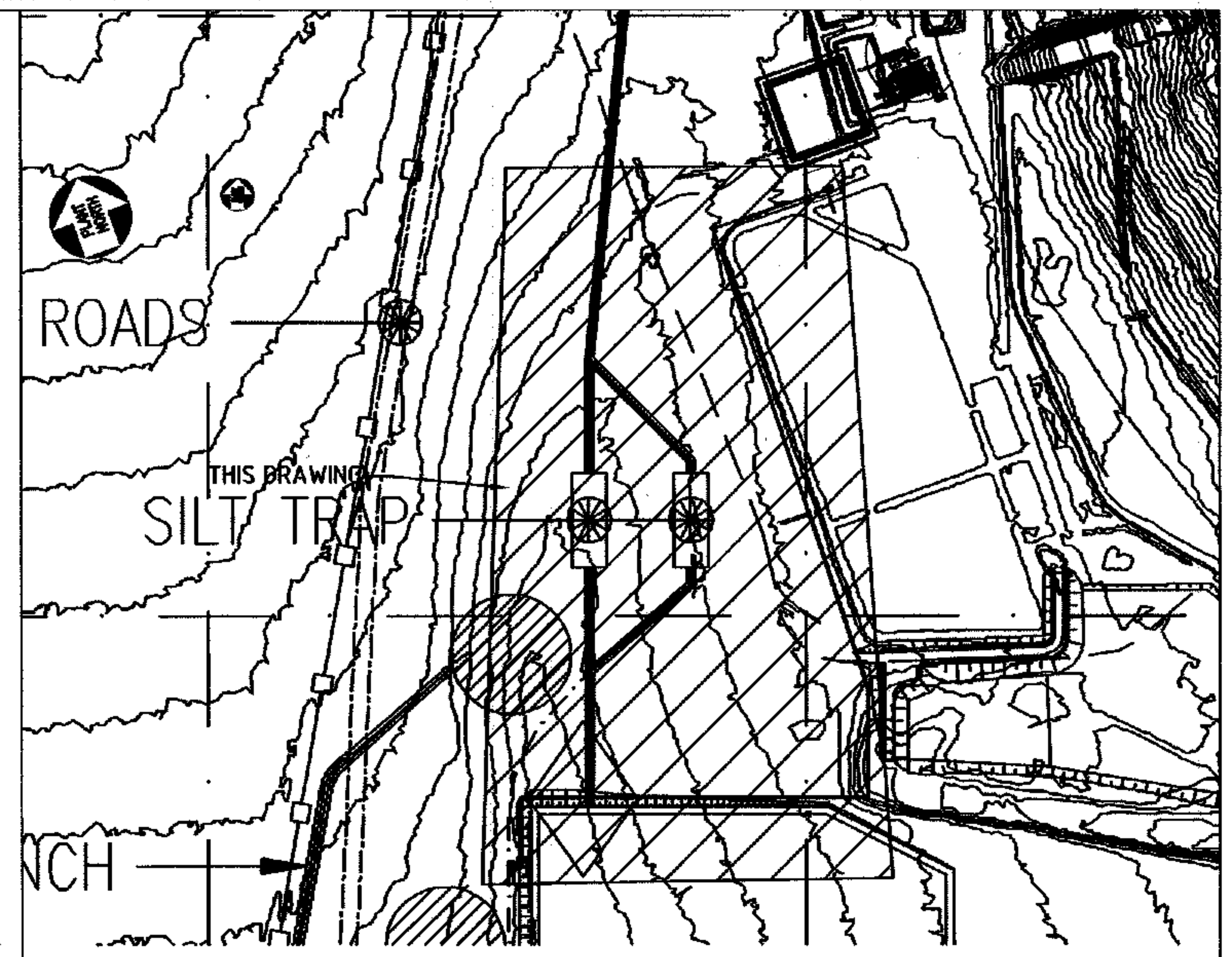
DETAIL ITEM 'P1'
SCALE 1:50



DETAIL 'A'
SCALE 1:50



DETAIL 'B'
SCALE 1:50



SITE PLAN

SPECIAL NOTES: PIPE, PUMP, PIPING & VALVES PART 9

PIPING (UP TO 25 BAR)

1. APPLICATION : PUMP DISCHARGE (RETURN WATER)
2. MEDIUM IN PIPE: WATER
3. STATIC HEAD : .
4. DESIGN PRESSURE : 2500 KPa
5. WORKING PRESSURE : .Mpa OR 25 Bar
6. TEMPERATURE : AMBIENT
7. PIPE SPECIFICATION : SANS 719
8. FITTING SPECIFICATION : SANS 719
9. FLANGE SPECIFICATION : SANS 1123
10. FLANGE MATERIAL : MILD STEEL
11. WELDING SPECIFICATION : TO ASME IX.
12. BOLT SPECIFICATION : TO SANS 1700 CLASS 8.8
13. NUT SPECIFICATION : TO SANS 1700 CLASS 8.
14. GASKET SPECIFICATION : TO AGA SPECIFICATION 415002.
15. CORROSION PROTECTION : TO BE IN ACCORDANCE WITH AGA SPECIFICATION 164050.
    INTERNAL CPS : N/A
    EXTERNAL CPS : 137
    FASTENERS : GRADE 8.8 BLACK BOLTS/NUTS TO SANS 1700
16. ALL PIPES MARKED AS "CLOSURES" MUST BE SUPPLIED 300 mm LONGER THAN GIVEN DIMENSIONS WITH ONE FLANGE SUPPLIED LOOSE AND WIRED TO MATING PIECE. SITE CUT AND FIT (TACK WELDED) THEN RETURN TO FABRICATOR FOR FINAL WELDING.
17. CONTRACTOR TO SUPPLY ALL BOLTS, STUDS, NUTS, WASHERS AND GASKETS.
18. ALL BOLTS, STUDS, NUTS AND WASHERS TO BE PLACED IN CONTAINERS, SEALED AND MARKED CLEARLY WITH INSTALLATION LEVEL, DRG No. AND ITEM No. FOR ERECTION PURPOSES.
19. ALL PIPES TO BE CLEARLY MARKED WITH PROJECT No. DRG. No. AND ITEM No. FOR ERECTION PURPOSES.
20. THESE NOTES TO BE READ IN CONJUNCTION WITH AGA SPECIFICATIONS 415003 , 415004, 415005, 415011.
21. LOW PRESSURE PIPING UNDER 25 BAR WILL BE IN ACCORDANCE WITH AGA 415011
22. PIPES 150NB OR SMALLER SHALL BE IN ACCORDANCE WITH SANS 62
23. PIPES OF BIGGER THAN 150NB SHALL BE IN ACCORDANCE WITH SANS 719
24. MEASUREMENTS GIVEN ON HDPE LINED PIPES WILL BE MEASURED FROM HDPE TO HDPE.

NOTE:
ALL SPECIFICATIONS, DRAWINGS & GUIDELINES REFERRED TO WILL BE LATEST ISSUE.

WP	NAME	DATE
Drawn By	APH	26/11/2018
Checked By	LS	2711/2018
Project Manager	[signature]	27/11/2018
Process Engineer	[signature]	27/11/2018
Civil Engineer		
Mechanical Engineer	[signature]	27/11/2018
Piping Engineer	[signature]	27/11/2018

SCALE: 1:100

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-PE-DAL-0005-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	N/A	L.SCOTT	L.S.	27.11.2018
RISK ASSESSMENT	.	J.FERRERA	.	

TITLE	DRG. No	MARK	DATE	DETAIL
PID – KAREERAND RETURN WATER DAM AND PUMPING (1)	MET-MWS-39-P008			
PID – KAREERAND RETURN WATER DAM AND PUMPING (2)	MET-MWS-39-P009			
RETURN WATER PIPELINE	MET-MWS-39-M007	C	27-11-2018	ISSUE FOR USE

REFERENCE DRAWINGS | REVISIONS

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

ANGLOGOLD ASHANTI

REGION: SOUTH AFRICA REGION – VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE: DUST SUPPRESSION – GA/LAYOUT

MET PROJECTS | CWR1806001 | MET-MWS-39-M0009 | REV C
PROJECT No: | B/UNIT | AREA | SEQ. No: | SIZE – A1

TYPICAL INSTRUMENTATION SYMBOLS

INSTRUMENTATION SYMBOLS

SYMBOLS	DESCRIPTION
	FIELD MOUNTED INSTRUMENT
	FRONT OF PANEL MOUNTED INSTRUMENT
	REAR OF PANEL MOUNTED INSTRUMENT
PNL	LOCAL MOUNTED INSTRUMENT PANEL
	INSTRUMENTS LOCATED IN COMMON HOUSING
	PILOT LIGHT
	MOTOR DRIVE
	SCADA FUNCTION (ACCESSIBLE TO OPERATOR)
	SCADA FUNCTION (INACCESSIBLE TO OPERATOR)
HH H L LL	– HIGH HIGH – HIGH – LOW – LOW LOW — ALARMING
F	FUZZY LOGISTIC CONTROL
XX	G2 CONTROL
I	INTERLOCK
VS	VARIABLE SPEED DRIVE
CCTV	CLOSED CIRCUIT TV
SJB	SIGNAL JUNCTION BOX
PDB	POWER DISTRIBUTION BOARD

INSTRUMENTATION LINE SYMBOLS

SYMBOLS	DESCRIPTION
	ELECTRIC BINARY SIGNAL
	PNEUMATIC SIGNAL
	PROCESS INSTRUMENT LINE
	HYDRAULIC SIGNAL
	ELECTRIC SIGNAL
	CAPILLARY TUBE
	ELECTROMACNETIC OR SONIC GUIDED SIGNAL
	ELECTROMACNETIC OR SONIC UNGUIDED SIGNAL
	SOFTWARE DATA LINK
	FUTURE LINK
	MECHANICAL LINK
	RESPONSIBILITY INTERFACE LINK

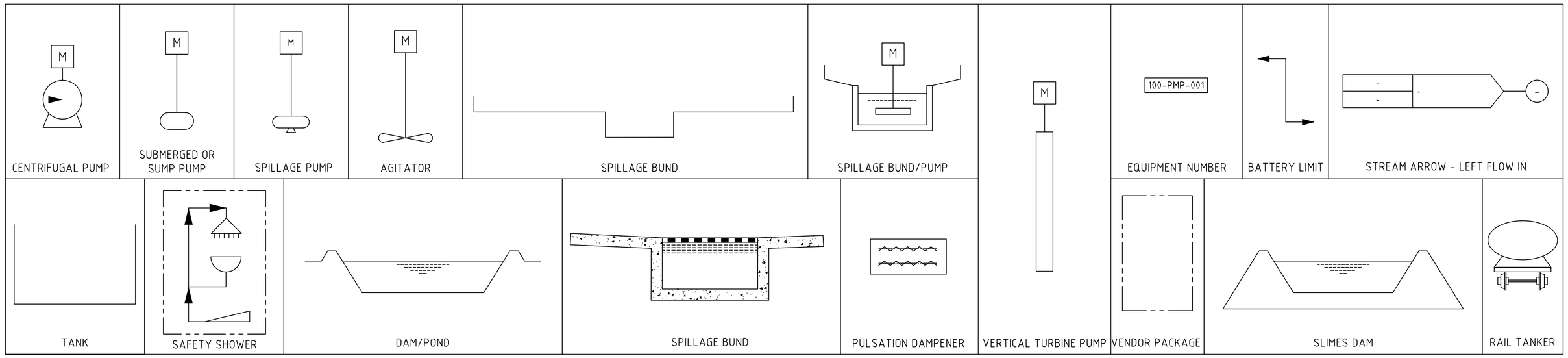
DRIVE CONTROL FUNCTION SYMBOLS

1. INCOMER
2. CONTROL TRANSFORMER
3. WELDING SOCKET
4. DIRECT ON-LINE (DOL) DRIVE
5. VSD
6. DUAL DRIVE
7. FORWARD / REVERSING DRIVE
8. MONITORED FEEDER
9. NON-MONITORED FEEDER
10. SUMP PUMP – NOTE 2
11. SUBMERSIBLE PUMP
12. EMERGENCY PANEL
13. FORWARD / REVERSE PANEL
14. BRUSHGEAR LIFTING
15. QUAD DRIVE
16. DIRECT ON-LINE DRIVE (DOL)
17. DOL EMERGENCY MCC
18. VSD EMERGENCY MCC
19. TWO PHASE FEEDER

DRIVE CIRCUIT TYPE CODE

NC-A – START FORWARD
NC-B – VSD SPEED REFERENCE
NI-A – RUN FORWARD
NI-B – RUN REVERSE
NI-C – DRIVE TRIPPED
NI-D – DRIVE RUNNING HOURS
NI-E – DRIVE CURRENT
NI-F – MCC HEALTHY
NI-G – FIELD HEALTHY

TYPICAL EQUIPMENT SYMBOLS



PIPING & INSTRUMENTATION SYMBOLS

SYMBOLS	DESCRIPTION	SYMBOLS	DESCRIPTION	SYMBOLS	DESCRIPTION	SYMBOLS	DESCRIPTION	SYMBOLS	DESCRIPTION	SYMBOLS	DESCRIPTION	SYMBOLS	DESCRIPTION
	GATE VALVE (OPEN)		KNIFE GATE VALVE (OPEN)	SET @ kPa	BURSTING DISC VACUUM	ARV	AIR RELIEF VALVE		PRESSURE REGULATOR		ECCENTRIC REDUCER		ANY UNDEFINED LINE STRAINER
	GATE VALVE (CLOSE)		KNIFE GATE VALVE (CLOSED)		DAMPER / LOUVRE		DIAPHRAGM SEAL				END CAP	T	TRAP
	BUTTERFLY VALVE (CLOSE)		ANGLE VALVE	M	MAGNETIC FLOW METER		DIAPHRAGM OPERATOR (CONTROL VALVE)		PRESSURE		SCREW CAP	F	FILTER
	BUTTERFLY VALVE (OPEN)		FLOAT VALVE		ORIFICE PLATE FLOWMETER	T	HAND OPERATOR				HOSE CONNECTION		EXPANSION JOINT
	GLOBE VALVE (OPEN)		FLOW CONTROL VALVE		VENTURI TUBE OR FLOW NOZZLE		RELIEF OPERATOR		SELF-REGULATING PRESSURE CONTROL VALVE		QUICK DISCONNECT		EXHAUST
	GLOBE VALVE (CLOSE)		3-WAY VALVE UNDEFINED RIGHT PORT (CLOSED)		TURBINE METER	M	MOTOR OPERATOR				BREATHER CAP		MIXING TEE
	PLUG VALVE		MANUAL REGULATOR		VORTEX SENSOR	E/H	ELECTROHYDRAULIC OPERATOR		SELF-REGULATING TEMPERATURE CONTROL VALVE		FLANGE		SPRAY NOZZLE
	CONTROL FLOW DIAPHRAGM VALVE (OPEN)		PRESSURE SAFETY VALVE		DOPPLER FLOW METER						UNION		RADIOACTIVE SOURCE
	CONTROL FLOW DIAPHRAGM VALVE (CLOSE)		PRESSURE SAFETY VALVE (VACUUM)		FLUME	S	SOLENOID OPERATOR		SHEET CONNECTOR		LOOP SEAL / SYPHON		STILLING WELL
	PINCH VALVE (OPEN)		BALL CHECK VALVE		WEIR						ATMOSPHERIC GOOSE NECK VENT		
	PINCH VALVE (CLOSE)		CHOKE VALVE		FLOW STRAIGHTEN VALVE		PRESSURE BALANCED DIAPHRAGM OPERATOR		SHEET CONNECTOR INSTRUMENTATION/ELECTRICAL	RS	REMOVABLE SPOOL		LEVEL INDICATOR
	CAMFLEX VALVE (OPEN)		CHECK VALVE		INSULATION PIPING						FLEXIBLE CONNECTOR		
	CAMFLEX VALVE (CLOSED)		STOP CHECK VALVE		ELECTRICALLY TRACED LINE			XXXX XXXX	SPEC CHANGE		STRAINER 'T' TYPE MARK T		EMERGENCY SHOWER & EYE BATH
	BALL VALVE (OPEN)		ANGLE CHECK VALVE		MANUAL SLIDE VALVE (OPEN)		CYCLINDER OPERATOR		FLOW ARROW		DUAL STRAINER		
	BALL VALVE (CLOSED)	SET @ kPa	BURSTING DISC PRESSURE		SPECTACLE BLIND (OPEN)				CONCENTRIC REDUCER		'Y' TYPE STRAINER		

WP	NAME	DATE
Drawn By	ES	16/10/2018
Checked By	VP	28/11/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-PR-DWG-0001-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	N/A	N/A	–	–
RISK ASSESSMENT	N/A	N/A	–	–

SCALE: 1:1

TITLE	DRG. No

REFERENCE DRAWINGS

DETAIL	MARK	DATE	INIT	APP'D
ISSUED FOR USE	D	28/11/2018	DB	VP

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	ES			26/09/2018
CHECKED	VP			28/11/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

ANGLOGOLD ASHANTI
COPYRIGHT
MET PROJECTS

REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE LEGEND SHEET 1 PIPING & INSTRUMENTATION DIAGRAM

PROJECT No:	B/UNIT	AREA	SEQ. No:	REV	SIZE
CWR1806001	MET-MWS	39	P0027	D	A1

PIPELINE NUMBER IDENTIFICATION

35-150-CW-MS1-001

- 001 — LINE SEQUENCE NUMBER
- MS1 — PIPE MATERIAL CODE
- CW — FLUID IDENTIFICATION
- 150 — LINE SIZE
- 35 — AREA CODE (EST CODE)

VALVE IDENTIFICATION

H-KA1-001

H-BA4-001 / 80

- 001 — VALVE NUMBER
- KA1 — VALVE TYPE & CHARACTERISTICS
- H — VALVE OPERATION (HAND WHEEL)

INSTRUMENT NUMBER IDENTIFICATION

0100-PIT-001

- 001 — LOOP MODIFIER (3 DIGITS)
- PIT — FUNCTION IDENTIFICATION (4 LETTERS MAX)
- 0100 — AREA IDENTIFICATION (4 LETTERS)

EQUIPMENT NUMBER IDENTIFICATION

35-PMP-001

- 001 — SEQUENTIAL NUMBER (3 DIGITS)
- PMP — EQUIPMENT CODE NO (3 LETTERS)
- 35 — PLANT AREA NO (2 DIGITS)

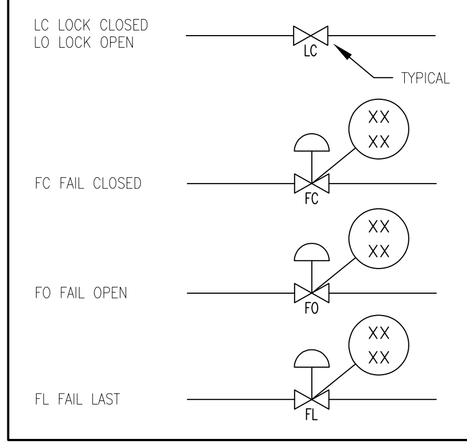
TYPICAL EQUIPMENT SYMBOLS

FIRST LETTER	INITIATING OR MEASURED VARIABLE	CONTROLLERS				READOUT DEVICES		SWITCHES & ALARM DEVICES			TRANSMITTERS			SOLENOIDS RELAYS COMP. DEVICES	PRIMARY ELEMENT	TEST POINT	WELL OR PROBE	VIEWING DEVICE & GLASS	SAFETY DEVICE	FINAL ELEMENT	OTHER POSSIBLE COMBINATIONS	
		RECORDING	INDICATING	BLIND	SELF-ACTUATOR CONTROL VALVES	RECORDING	INDICATING	HIGH	LOW	COMB.	RECORDING	INDICATING	BLIND								FIRST LETTER	INITIATING OR MEASURED VARIABLE
A	ANALYSIS	ARC	AIC	AC		AR	AI	ASH	ASL	ASHL	ART	AIT	AT	AY	AE	AP	AW			AV	FO	RESTRICTION ORIFICE
B	BURNER, COMBUSTION	BRC	BIC	BC		BR	BI	BSH	BSL	BSHL	BRT	BIT	BT	BY	BE		BW	BG		BZ	FRK, HIK	CONTROL STATIONS
C	USER'S CHOICE																				FX	ACCESSORIES
D	USER'S CHOICE																				TJR	SCANNING RECORDER
E	VOLTAGE	ERC	EIC	EC		ER	EI	ESH	ESL	ESHL	ERT	EIT	ET	EY	EE					EZ	LLH	PILOT LIGHT
F	FLOW RATE	FRC	FIC	FC	FCV, FICV	FR	FI	FSH	FSL	FSHL	FRT	FIT	FT	FY	FE	FP		FG		FV	PFR	RADIO
FQ	FLOW QUANTITY	FQRC	FQIC			FQR	FQI	FQSH	FQSL			FQIT	FQT	FQY	FQE					FQV	KQI	RUNNING TIME INDICATOR
FF	FLOW RATIO	FFRC	FFIC	FFC		FFR	FFI	FFSH	FFSL						FE					FFV	QQI	INDICATING COUNTER
G	USER'S CHOICE																				WKIC	RATE OF WEIGH LOSS CONTROLLER
H	HAND		HIC	HC						HS										HV	HMS	HAND MOMENTARY SWITCH
I	CURRENT	IRC	IIC			IR	II	ISH	ISL	ISHL	IRT	IIT	IT	IY	IE					IZ		
J	POWER	JRC	JIC			JR	JI	JSH	JSL	JSHL	JRT	JIT	JT	JY	JE					JV		
K	TIME	KRC	KIC	KC	KCV	KR	KI	KSH	KSL	KSHL	KRT	KIT	KT	KY	KE					KV		
L	LEVEL	LRC	LIC	LC	LCV	LR	LI	LSH	LSL	LSHL	LRT	LIT	LT	LY	LE		LW	LG		LV		
M	USER'S CHOICE																					
N	USER'S CHOICE																					
O	USER'S CHOICE																					
P	PRESSURE / VACUUM	PRC	PIC	PC	PCV	PR	PI	PSH	PSL	PSHL	PRT	PIT	PT	PY	PE	PP			PSV & PSE	PV		
PD	PRESSURE, DIFFERENTIAL	PDRC	PDIL	PDC	PDCV	PDR	PDI	PDSH	PDSL		PDRT	PDIT	PDT	PDY	PDE	PP				PDV		
Q	QUANTITY	QRC	QIC			QR	QI	QSH	QSL	QSHL	QRT	QIT	QT	QY	QE					QZ		
R	RADIATION	RRC	RIC	RC		RR	RI	RSH	RSL	RSHL	RRT	RIT	RT	RY	RE		RW			RZ		
S	SPEED / FREQUENCY	SRC	SIC	SC	SCV	SR	SI	SSH	SSL	SSHL	SRT	SIT	ST	SY	SE					SV		
T	TEMPERATURE	TRC	TIC	TC	TCV	TR	TI	TSH	TSL	TSHL	TRT	TIT	TT	TY	TE	TP	TW		TSE	TV		
TD	TEMPERATURE, DIFFERENTIAL	TDRC	TDIC	TDC	TDCV	TDR	TDI	TDSH	TDSL		TDRT	TDIT	TDT	TDY	TE	TP	TW			TDV		
U	MULTI-VARIABLE					UR	UI	.						UY						UV		
V	VIBRATION / MACHINERY ANALYSIS					VR	VI	VSH	VSL	VSHL	VRT	VIT	VT	VY	VE					VZ		
W	WEIGHT / FORCE	WRC	WIC	WC	WCV	WR	WI	WSH	WSL	WSHL	WRT	WIT	WT	WY	WE					WZ		
WD	WEIGHT / FORCE / DIFFERENTIAL	WDRC	WDIC	WDC	WDCV	WDR	WDI	WDSH	WDSL		WDRT	WDIT	WDT	WDY	WDE					WDZ		
X	UNCASSIFIED																					
Y	EVENT / STATE / PRESENCE		YIC	YC		YR	YI	YSH	YSL				YT	YY	YE					YZ		
Z	POSITION / DIMENSION	ZRC	ZIC	ZC	ZCV	ZR	ZI	ZSH	ZSL	ZSHL	ZRT	ZIT	ZT	ZY	ZE					ZV		
ZD	GAUGING / DEVIATION	ZDRC	ZDIC	ZDG	ZDCV	ZDR	ZDI	ZDSH	ZDSL		ZDRT	ZDIT	ZDT	ZDY	ZDE					ZDV		

NOTE:

THIS TABLE IS NOT ALL-INCLUSIVE.
* A, ALARM, THE ANNUNCIATING DEVICE, MAY BE USED IN THE SAME FASHION AS S, SWITCH, THE ACTUATING DEVICE.
** THE LETTERS H AND L MAY BE OMITTED IN THE UNDEFINED CASE.

VALVE DESIGNATIONS



VALVE OPERATIONS

CODE	DESCRIPTION
H :	HAND WHEEL
C :	CHAIN
P :	PISTON OR CYLINDER
E :	SOLENOID
D :	DOSC (DIAPHRAGM OPERATED SPRING CONTROLLED)
S :	SPRING CONTROLLED
G :	GEAR OPERATED
W :	WRENCH OPERATED
A :	SELF OPERATED
F :	FLOAT
Y :	HYDRAULIC

VALVE TYPE

CODE	DESCRIPTION
KA :	"A" TYPE DIAPHRAGM
KB :	"KB" TYPE DIAPHRAGM
GA :	GATE
KN :	KNIFE EDGE GATE
GL :	GLOBE
BU :	BUTTERFLY
M :	MULT PORT
CH :	CHECK
PI :	PINCH
BA :	BALL
PL :	PLUG
NE :	NEEDLE

PIPING SPECIFICATION

CODE	DESCRIPTION
MS :	MILD STEEL
GS :	GALVANISED STEEL
RL :	RUBBER LINDE
SS :	STAINLESS STEEL
PE :	HDPE

SPECIFICATION

GS :	CARBON STEEL, SANS 62/719 GALVANISED
MS1 :	CARBON STEEL, SANS 62/719 10 BAR
MS5 :	CARBON STEEL, ASTM A53 GR A
MS6 :	CARBON STEEL, SANS 62/719 25 BAR
PE12 :	CARBON STEEL, SANS 62/719 HDPE/RUBBER LINED 25 BAR
PE13 :	CARBON STEEL, SANS 62/719 HDPE/RUBBER LINED 40 BAR

WP	NAME	DATE
Drawn By	ES	16/10/2018
Checked By	VP	16/10/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

SCALE: 1:1

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-PR-DWG-0001-02

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	N/A	N/A	-	-
RISK ASSESSMENT	N/A	N/A	-	-

MARK	DETAIL	DATE	INIT	APP'D
D	ISSUED FOR USE	28/11/2018	DB	VP

REFERENCE DRAWINGS

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	ES			26/09/2018
CHECKED	VP			28/11/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

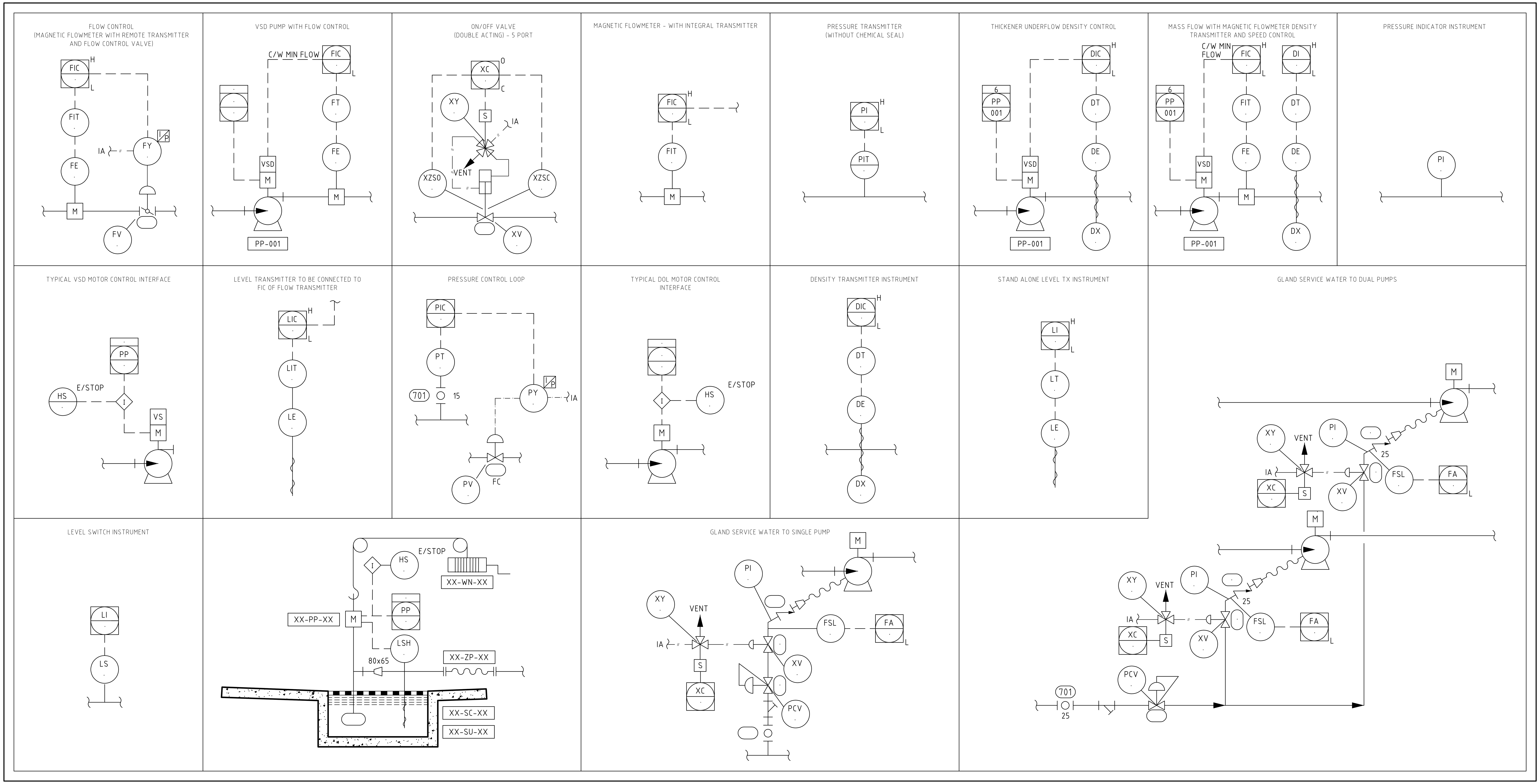
ANGLOGOLD ASHANTI

COPYRIGHT

MET PROJECTS

REGION SOUTH AFRICA REGION - VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT - FEASIBILITY STUDY
DRAWING TITLE LEGEND SHEET 2 PIPING & INSTRUMENTATION DIAGRAM

PROJECT No:	B/UNIT	AREA	SEQ. No:	REV	SIZE
CWR1806001	MET	MWS	P0028	D	A1



WP	NAME	DATE
Drawn By	ES	16/10/2018
Checked By	VP	16/10/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

SCALE: 1:1

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-PR-DWG-0001-03

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	N/A	N/A	-	-
RISK ASSESSMENT	N/A	N/A	-	-

TITLE	DRG. No
.	.

REFERENCE DRAWINGS

DETAIL	MARK	DATE	INIT	APP'D
ISSUED FOR USE	D	28/11/2018	DB	VP

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	ES			26/09/2018
CHECKED	VP			28/11/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

ANGLOGOLD ASHANTI
COPYRIGHT

REGION: SOUTH AFRICA REGION - VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT - FEASIBILITY STUDY
DRAWING TITLE: LEGEND SHEET 3 PIPING & INSTRUMENTATION DIAGRAM

MET PROJECTS	PROJECT No: CWR1806001	B/UNIT AREA SEQ. No: MET-MWS-39-P0029	REV D

SIZE - A1

EQUIPMENT LIST

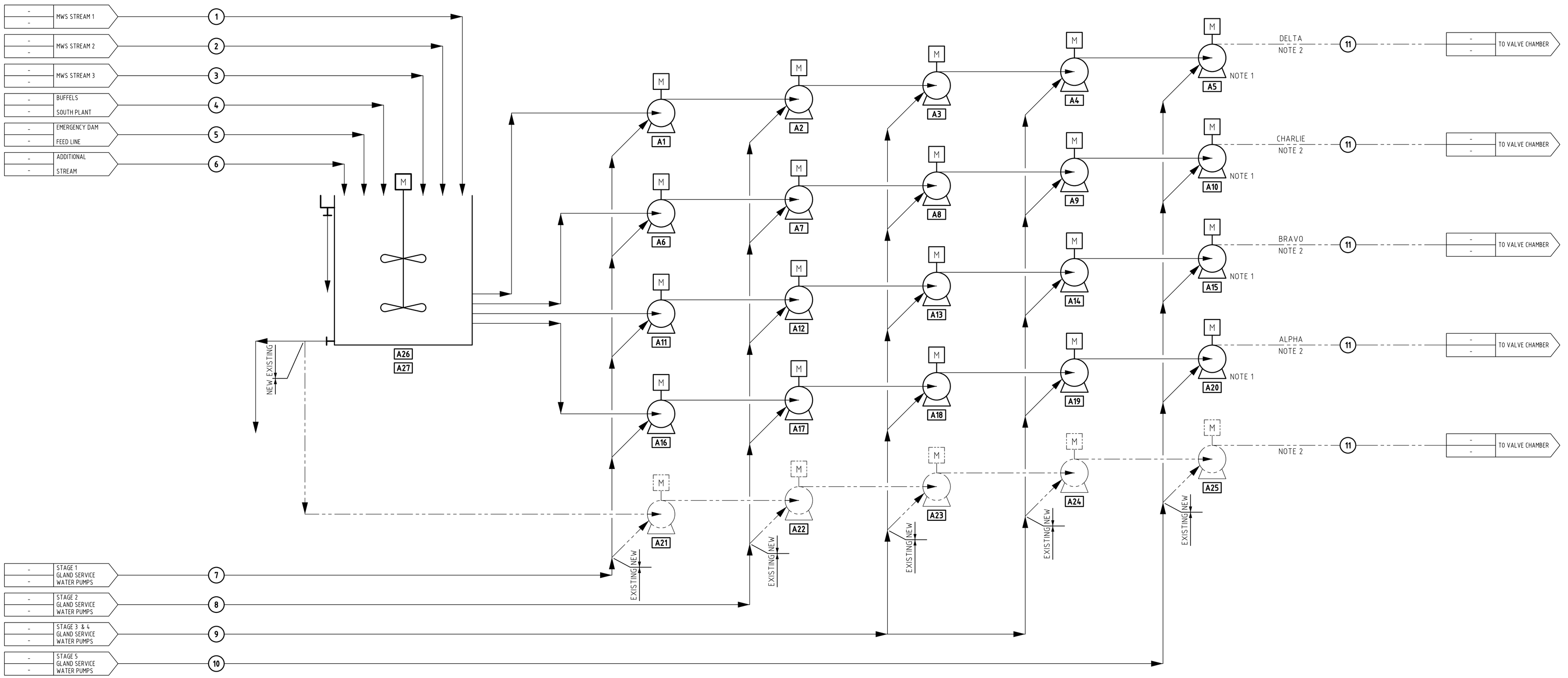
Item	Equipment No.	Description	No. Off	Material	Size	kW
A1	39-PMP-001	Set 1 Pump 1	1	Cast Iron	14/12 AH	400
A2	39-PMP-002	Set 1 Pump 2	1	Cast Iron	14/12 AH	400
A3	39-PMP-003	Set 1 Pump 3	1	Cast Iron	14/12 AH	400
A4	39-PMP-004	Set 1 Pump 4	1	Cast Iron	14/12 AH	400
A5	39-PMP-005	Set 1 Pump 5	1	Cast Iron	14/12 AH	400
A6	39-PMP-006	Set 2 Pump 1	1	Cast Iron	14/12 AH	400
A7	39-PMP-007	Set 2 Pump 2	1	Cast Iron	14/12 AH	400
A8	39-PMP-008	Set 2 Pump 3	1	Cast Iron	14/12 AH	400
A9	39-PMP-009	Set 2 Pump 4	1	Cast Iron	14/12 AH	400
A10	39-PMP-010	Set 2 Pump 5	1	Cast Iron	14/12 AH	400

EQUIPMENT LIST

Item	Equipment No.	Description	No. Off	Material	Size	kW
A11	39-PMP-011	Set 3 Pump 1	1	Cast Iron	14/12 AH	400
A12	39-PMP-012	Set 3 Pump 2	1	Cast Iron	14/12 AH	400
A13	39-PMP-015	Set 3 Pump 3	1	Cast Iron	14/12 AH	400
A14	39-PMP-016	Set 3 Pump 4	1	Cast Iron	14/12 AH	400
A15	39-PMP-017	Set 3 Pump 5	1	Cast Iron	14/12 AH	400
A16	39-PMP-018	Set 4 Pump 1	1	Cast Iron	14/12 AH	400
A17	39-PMP-019	Set 4 Pump 2	1	Cast Iron	14/12 AH	400
A18	39-PMP-020	Set 4 Pump 3	1	Cast Iron	14/12 AH	400
A19	39-PMP-021	Set 4 Pump 4	1	Cast Iron	14/12 AH	400
A20	39-PMP-022	Set 4 Pump 5	1	Cast Iron	14/12 AH	400

EQUIPMENT LIST

Item	Equipment No.	Description	No. Off	Material	Size	kW
A21	39-PMP-023	Set 5 Pump 1	1	Cast Iron	14/12 AH	400
A22	39-PMP-024	Set 5 Pump 2	1	Cast Iron	14/12 AH	400
A23	39-PMP-025	Set 5 Pump 3	1	Cast Iron	14/12 AH	400
A24	39-PMP-026	Set 5 Pump 4	1	Cast Iron	14/12 AH	400
A25	39-PMP-027	Set 5 Pump 5	1	Cast Iron	14/12 AH	400
A26	39-TNK-001	Existing Residue Tank	1	TBC	3000 m^3	-
A27	39-AGT-001	Existing Residue Tank Agitator	1	TBC	-	220



Stream No.	1		2		3		4		5	6	7	8	9	10	11	
Description	MWS Steam 1 - Nominal	MWS Steam 1 - Design	MWS Steam 2 - Nominal	MWS Steam 2 - Design	MWS Steam 3 - Nominal	MWS Steam 3 - Design	Buffels South Plant - Nominal	Buffels South Plant - Design	Emergency Dam Feed	Additional Lines	GSW to Stage 1	GSW to Stage 2	GSW to Stage 3 & 4	GSW to Stage 5	Residue to Cyclones - Nominal	Residue to Cyclones - Design
Monthly Solids Flow (kt/month)	538.0	708.0	805.8	891.7	805.8	891.7	150.0	170.0							599.9	665.3
Solids Flow (t/h)	904.8	1004.0	1142.6	1264.5	1142.6	1264.5	212.7	241.1							850.7	943.5
Water (t/h)	1275.4	1066.1	1610.7	1342.7	1610.7	1342.7	299.8	256.0			28.8	28.8	57.6	28.8	1235.2	1037.9
Total Flow (t/h)	2180.2	2070.1	2753.3	2607.1	2753.3	2607.1	512.6	497.1			28.8	28.8	57.6	28.8	2085.9	1981.3
Pulp (m^3/h)	1610.5	1438.0	2033.9	1811.0	2033.9	1811.0	378.6	345.3			28.8	28.8	57.6	28.8	1550.2	1387.30
% Solids (w/w)	41.5%	48.5%	41.5%	48.5%	41.5%	48.5%	41.5%	48.5%							40.8%	47.6%
% Solids (v/v)	20.8%	25.9%	20.8%	25.9%	20.8%	25.9%	20.8%	25.9%							20.3%	25.2%
S.G. Solids	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70							2.70	2.70
S.G. Pulp	1.35	1.44	1.35	1.44	1.35	1.44	1.35	1.44			1.00	1.00	1.00	1.00	1.35	1.43
Particle Size. d_{50} (μ	75	75	75	75	75	75	75	75							75	75
Comments											7.2 m^3/hr per Pump	7.2 m^3/hr per Pump	7.2 m^3/hr per Pump	7.2 m^3/hr per Pump	Flow Through 1 of 4 Operating Pump Trains	

NOTES:

1. FIFTH PUMP TO BE ADDED ONTO EXISTING TRAIN BY OTHERS.
2. 25 BAR LINE TO BE REPLACED WITH 40 BAR LINE

LEGEND:

EXISTING
NEW

WP	NAME	DATE
Drawn By	ES	16/10/2018
Checked By	VP	16/10/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

SCALE: 1:1

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787–39–PR–PFD–0001–01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET–MWS–39–S0004	A MPHELO		28/11/2018
RISK ASSESSMENT	MET–MWS–39–R0001/3	J FERREIRA		24/10/2018

REFERENCE DRAWINGS		REVISIONS				
TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D
		ISSUED FOR USE	D	28/11/2018	DB	VP

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	ES			05/11/2018
CHECKED	VP			05/11/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

ANGLOGOLD ASHANTI

COPYRIGHT

MET PROJECTS

REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE TAILINGS DISPOSAL PROCESS FLOW DIAGRAM

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE – A1
CWR1806001	MET–MWS–39–P0001			REV D

EQUIPMENT LIST

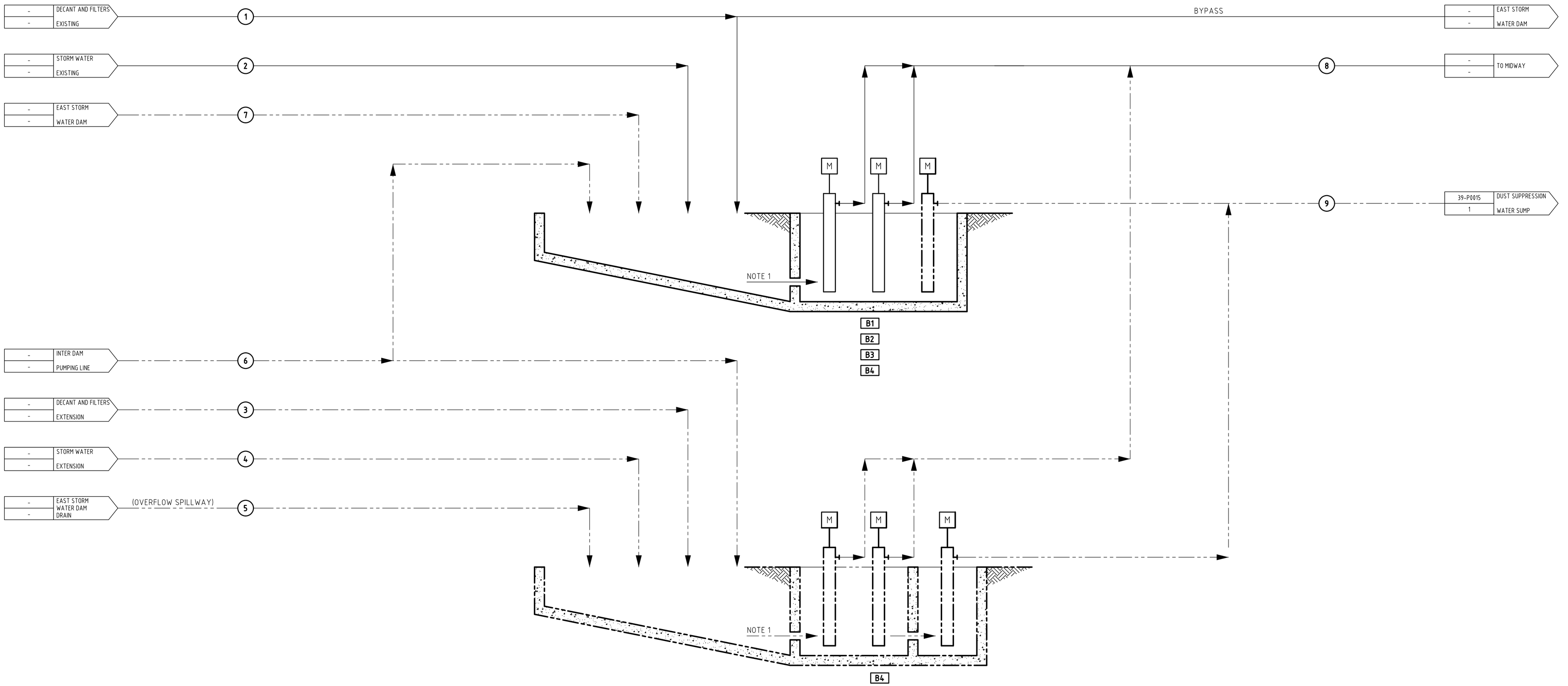
Item	Equipment No.	Description	No. Off	Material	Size	kW
B1	39-DAM-001	Existing Return Water Dam	1		169 830 m^3	
B2	39-PMP-028	Existing Return Water Pump 1	1			850
B3	39-PMP-029	Existing Return Water Pump 2	1			850
B4	39-PMP-032	Dust Suppression Water Sump Feed Pump 1	1			220
B5	39-DAM-002	New Return Water Dam	1		425 510 m^3	
B6	39-PMP-030	New Return Water Pump 1	1			850
B7	39-PMP-031	New Return Water Pump 2	1			850
B8	39-PMP-033	Dust Suppression Water Sump Feed Pump 2	1			220

EQUIPMENT LIST

Item	Equipment No.	Description	No. Off	Material	Size	kW

EQUIPMENT LIST

Item	Equipment No.	Description	No. Off	Material	Size	kW



Stream No.	1		2		3		4		3		6		7		8		9	
Description	Existing Decant and Filters - Nominal	Existing Decant and Filters - Design	Existing Storm Water - Nominal	Existing Storm Water - Design	Extension Decant and Filters - Nominal	Extension Decant and Filters - Design	Extension Storm Water - Nominal	Extension Storm Water - Design	East Storm Water Dam Drain - Nominal	East Storm Water Dam Drain -Design	Interdam Pumping - Nominal	Interdam Pumping - Design	East Storm Water Dam - Nominal	East Storm Water Dam- Design	Return Water - Nominal	Return Water - Design	Dust Suppression Water -Nominal	Dust Suppression Water -Design
Solids Flow (t/h)															0.0	0.0		0.0
Water (t/h)															3600.0	4100.0		500.0
Total Flow (t/h)															3600.0	4100.0		500.0
Total Volumetric Flow (m^3/h)															3600.0	4100.0		500.0
% Solids (w/w)															0.0%	0.0%		0.0%
S.G. Solids																		
S.G. Pulp															1.00	1.00		1.00
Comments																		

NOTES:

1. 2x750NB AND 1x1000NB PUDDLE PIPES.

LEGEND:

EXISTING
NEW

WP	NAME	DATE
Drawn By	DB	15/11/2018
Checked By	VP	15/11/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

SCALE: 1:1

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-PR-PFD-0002-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO		28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA		24/11/2018

REFERENCE DRAWINGS		REVISIONS				
TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D
		ISSUED FOR USE	D	28/11/2018	DB	VP

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	ES			23/10/2018
CHECKED	VP			23/10/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

ANGLOGOLD ASHANTI

MET PROJECTS

REGION SOUTH AFRICA REGION
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE RETURN WATER DAM AND PUMPING PROCESS FLOW DIAGRAM

PROJECT No:	B/UNIT	AREA	SEQ. No:	REV	SIZE
CWR1806001	MET	MWS	39-P0002	D	A1

EQUIPMENT LIST

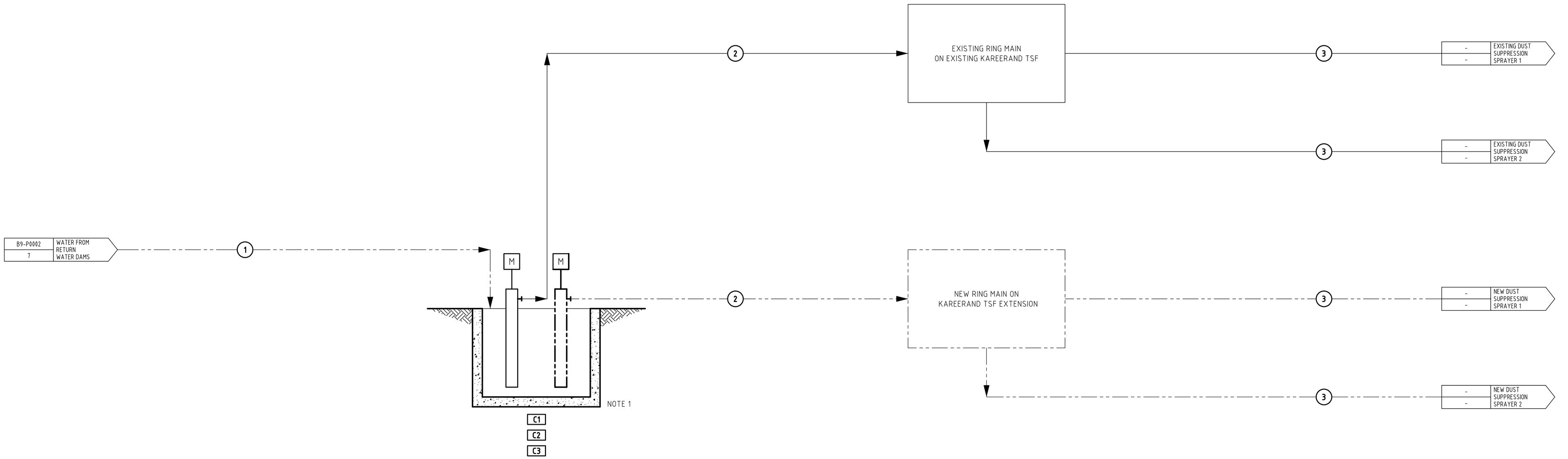
Item	Equipment No.	Description	No. Off	Material	Size	kW
C1	39-DAM-001	Dust Suppression Water Sump	1		TBC	
C2	39-PMP-028	ExistingTSF Dust Suppression Water Pump	1			220
C3	39-PMP-029	TSF Extension Dust Suppression Water Pump	1			250

EQUIPMENT LIST

Item	Equipment No.	Description	No. Off	Material	Size	kW

EQUIPMENT LIST

Item	Equipment No.	Description	No. Off	Material	Size	kW



Stream No.	1		2		3	
Description	Return Water - Nominal	Return Water - Design	Water Delivery to Ring Main - Nominal	Water Delivery to Ring Main - Design	Existing Water Deliver to Sprayers - Nominal	Existing Water Deliver to Sprayers - Design
Solids Flow (t/h)		0.0		0.0		0.0
Water (t/h)		500.0		250.0		125.0
Total Flow (t/h)		500.0		250.0		125.0
Total Volumetric Flow (m^3/h)		500.0		250.0		125.0
% Solids (w/w)		0.0%		0.0%		0.0%
S.G. Solids						
S.G. Pulp		1.00		1.00		1.00
Comments						

NOTES:

1. A HOT STANDBY PUMP WILL BE MAINTAINED IN STORE.

LEGEND:

EXISTING
NEW

WP	NAME	DATE
Drawn By	DB	15/11/2018
Checked By	VP	15/11/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

SCALE: 1:1

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 63.232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 8000 | Intl Fax: +27 11 218 3100

C00787-39-PR-PFD-0003-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO		28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA		24/10/2018

TITLE	DRG. No
REFERENCE DRAWINGS	

MARK	DETAIL	DATE	INIT	APP'D
D	ISSUED FOR USE	28/11/2018	DB	VP

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	DB			15/11/2018
CHECKED	VP			15/11/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

ANGLOGOLD ASHANTI

COPYRIGHT

MET PROJECTS

REGION SOUTH AFRICA REGION
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE DUST SUPPRESSION WATER & PUMPING PROCESS FLOW DIAGRAM

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE	REV
CWR1806001	MET	MWS	39-P0026	A1	D

39-AGT-001

RESIDUE TANK AGITATOR
MODEL : TBC
RATING : 220kW
MATERIAL : CSRL

39-TNK-001

RESIDUE TANK
SIZE : 3000m³
MATERIAL : CS

MWS STREAM 1 – 39-600-CS-PE12-001
MWS STREAM 2 – 39-600-CS-PE12-002
MWS STREAM 3 – 39-600-CS-PE12-003
BUFFELS SOUTH PLANT – 39-350-CS-PE12-004
EMERGENCY DAM FEED LINE – 39-200-CS-PE12-036
ADDITIONAL STREAM – 39-200-CS-PE12-035

4 AGT TBC
E/STOP HS TBC
LIC TBC (H/L)
LIT TBC
LE TBC
M
39-500-CS-MS1-001
TP 001
39-600-CS-PE12-037
NEW / EXISTING
600
39-TNK-001
39-AGT-001

IA
XYC TBC
XYO TBC
XZSO TBC
XZSC TBC
VENT
FL 600
XV TBC

39-600-CS-PE12-005 → SET 1 PUMP 1 39-PMP-001 → MET-MWS-39-P0004
39-600-CS-PE12-006 → SET 2 PUMP 1 39-PMP-006 → MET-MWS-39-P0004
39-600-CS-PE12-007 → SET 3 PUMP 1 39-PMP-011 → MET-MWS-39-P0004
39-600-CS-PE12-008 → SET 4 PUMP 1 39-PMP-018 → MET-MWS-39-P0004
39-600-CS-PE12-009 → SET5 PUMP 1 39-PMP-023 → MET-MWS-39-P0004

FL 150
XV TBC
39-150-CS-PE12-010 → DRAIN TO FLOOR
39-150-CS-PE12-011 → DRAIN TO FLOOR
39-150-CS-PE12-012 → DRAIN TO FLOOR
39-150-CS-PE12-013 → DRAIN TO FLOOR
39-150-CS-PE12-014 → DRAIN TO FLOOR

INSTRUMENT AIR – 39-025-IA-G5-001 – NOTE 1 – 25

NOTES:

1. INSTRUMENT AIR BY OTHERS

LEGEND:

EXISTING
NEW

WP	NAME	DATE
Drawn By	ES	16/10/2018
Checked By	VP	16/10/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-PR-PID-0001-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO		28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA		24/10/2018

SCALE: 1:1

KAREERAND TAILINGS DISPOSAL	MET-MWS-39-P0001
TITLE	DRG. No
REFERENCE DRAWINGS	

MARK	DATE	INIT	APP'D	DETAIL
D	28/11/2018	DB	VP	ISSUED FOR USE

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	ES			26/09/2018
CHECKED	VP			26/09/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

ANGLOGOLD ASHANTI
COPYRIGHT
MET PROJECTS

REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE RESIDUE TANK PIPING & INSTRUMENTATION DIAGRAM

PROJECT No:	B/UNIT	AREA	SEQ. No:	REV	SIZE
CWR1806001	MET-MWS-39-P0003			D	A1

39-PMP-001
SET 1 PUMP 1
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH LP
RATING : 400kW
39-PMP-006
SET 2 PUMP 1
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH LP
RATING : 400kW
39-PMP-001
SET 3 PUMP 1
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH LP
RATING : 400kW
39-PMP-018
SET 4 PUMP 1
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH LP
RATING : 400kW
39-PMP-023
SET 5 PUMP 1
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH LP
RATING : 400kW
RESIDUE TANK
39-TNK-001
MET-MWS-39-P0003
39-600-CS-PE12-009
39-600-CS-PE12-008
39-600-CS-PE12-007
39-600-CS-PE12-006
39-600-CS-PE12-005
ALPHA
BRAVO
CHARLIE
DELTA
39-PMP-023
39-PMP-018
39-PMP-011
39-PMP-006
39-PMP-001
E/STOP
PMP
TBC
HS
TBC
VS
M
HSO
XY
XZSO
XZSC
XV
PI
FSL
FAL
FO
VENT
IA
600
600X350
300X350
25
39-350-CS-PE12-015
39-350-CS-PE12-016
39-350-CS-PE12-017
39-350-CS-PE12-018
39-350-CS-PE12-019
SET 5 PUMP 2
39-PMP-024
SET 4 PUMP 2
39-PMP-019
SET 3 PUMP 2
39-PMP-012
SET 2 PUMP 2
39-PMP-007
SET 1 PUMP 2
39-PMP-002
MET-MWS-39-P0005
INSTRUMENT AIR
39-025-IA-GS-002
NOTE 1
GLAND SERVICE WATER
39-080-GWH-MS5-001
80
EXISTING NEW
39-025-GWH-MS5-002
39-025-GWH-MS5-003
39-025-GWH-MS5-004
39-025-GWH-MS5-005
39-025-GWH-MS5-006
80X25
TP
005

NOTES:

1. INSTRUMENT AIR BY OTHERS

LEGEND:

EXISTING
NEW

WP	NAME	DATE
Drawn By	ES	16/10/2018
Checked By	VP	16/10/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

SCALE: 1:1

WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

WorleyParsons
resources & energy

C00787-39-PR-PID-0001-02

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO		28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA		24/10/2018

REFERENCE DRAWINGS

TITLE	DRG. No
KAREERAND TAILINGS DISPOSAL	MET-MWS-P0001

REVISIONS

DETAIL	MARK	DATE	INIT	APP'D
ISSUED FOR USE	D	28/11/2018	DB	VP

DESIGNATION	NAME	REGISTRATION No	SIGNATURE	DATE
DRAWN	ES			26/09/2018
CHECKED	VP			26/09/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

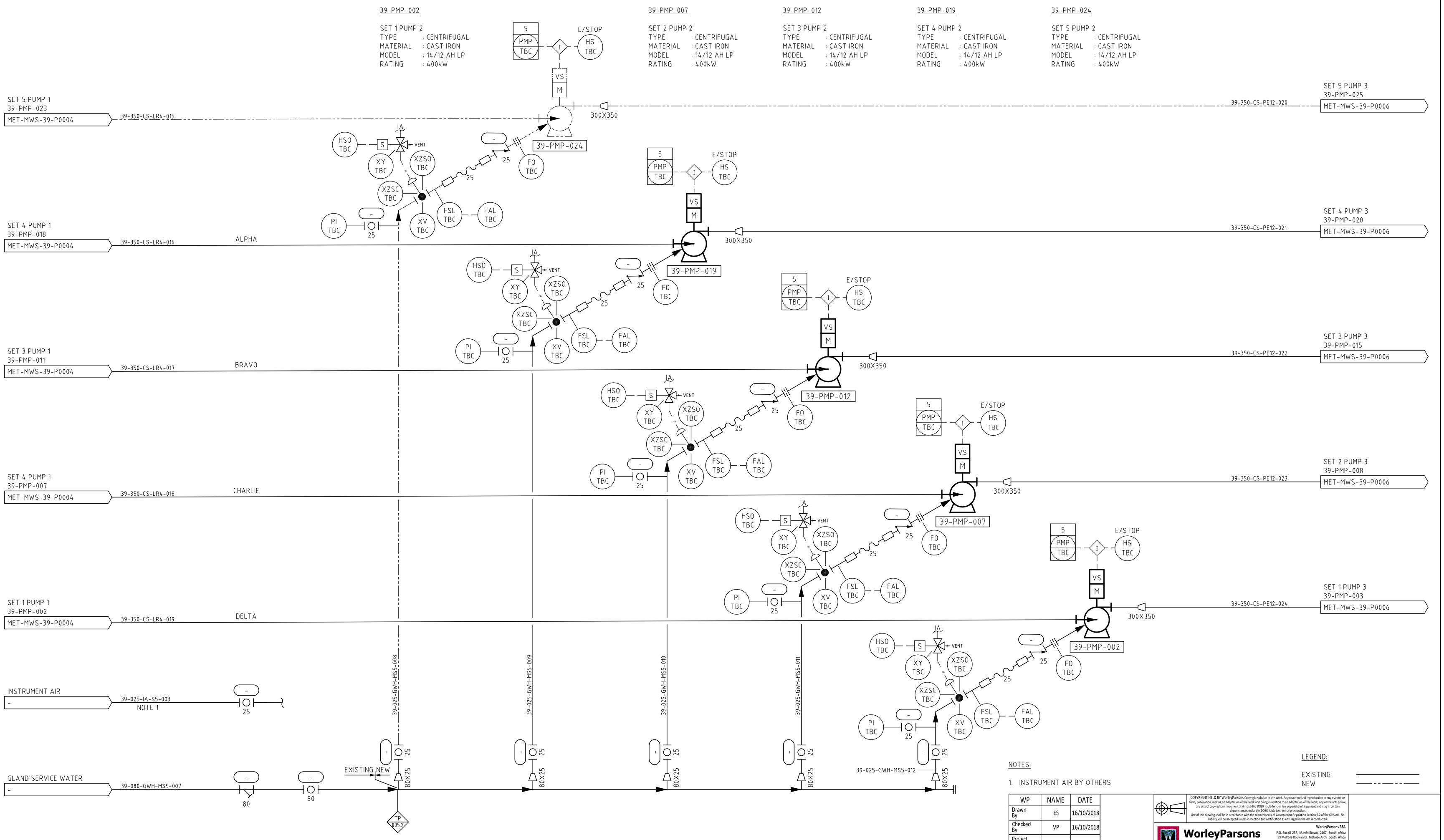
ANGLOGOLD ASHANTI

COPYRIGHT

REGION: SOUTH AFRICA REGION - VR
BUSINESS UNIT: MINE WASTE SOLUTIONS
PROJECT: KAREERAND TSF EXPANSION PROJECT - FEASIBILITY STUDY
DRAWING TITLE: STAGE 1 PUMPS PIPING & INSTRUMENTATION DIAGRAM

MET PROJECTS	PROJECT No: CWR1806001	B/UNIT AREA SEQ. No: MET-MWS-39-P0004	REV D

SIZE - A1



NOTES:

1. INSTRUMENT AIR BY OTHERS

LEGEND:

EXISTING
NEW

WP	NAME	DATE
Drawn By	ES	16/10/2018
Checked By	VP	16/10/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

SCALE: 1:1

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 282, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-PR-PID-0001-03

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO		28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA		24/10/2018

KAREERAND TAILINGS DISPOSAL	MET-MWS-39-P0001	ISSUED FOR USE	D	28/11/2018	DB	VP
TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D
REFERENCE DRAWINGS		REVISIONS				

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	ES			26/09/2018
CHECKED	VP			26/09/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

ANGLOGOLD ASHANTI
COPYRIGHT
MET PROJECTS

REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE STAGE 2 PUMPS PIPING & INSTRUMENTATION DIAGRAM

PROJECT No:	B/UNIT	AREA	SEQ. No:	REV	SIZE
CWR1806001	MET	MWS	39-P0005	D	A1

39-PMP-003

SET 1 PUMP 3
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH LP
RATING : 400kW

39-PMP-008

SET 2 PUMP 3
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH LP
RATING : 400kW

39-PMP-015

SET 3 PUMP 3
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH LP
RATING : 400kW

39-PMP-020

SET 4 PUMP 3
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH LP
RATING : 400kW

39-PMP-025

SET 5 PUMP 3
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH LP
RATING : 400kW

SET 5 PUMP 2
39-PMP-024
MET-MWS-39-P0005
39-350-CS-PE12-020
300X350
39-PMP-025
39-350-CS-PE12-025
SET 5 PUMP 4
39-PMP-026
MET-MWS-39-P0007

SET 4 PUMP 2
39-PMP-019
MET-MWS-39-P0005
39-350-CS-PE12-021
ALPHA
300X350
39-PMP-020
39-350-CS-PE12-026
SET 4 PUMP 4
39-PMP-021
MET-MWS-39-P0007

SET 3 PUMP 2
39-PMP-012
MET-MWS-39-P0005
39-350-CS-PE12-022
BRAVO
300X350
39-PMP-015
39-350-CS-PE12-027
SET 3 PUMP 4
39-PMP-016
MET-MWS-39-P0007

SET 2 PUMP 2
39-PMP-004
MET-MWS-39-P0005
39-350-CS-PE12-023
CHARLIE
300X350
39-PMP-008
39-350-CS-PE12-028
SET 2 PUMP 4
39-PMP-009
MET-MWS-39-P0007

SET 1 PUMP 2
39-PMP-002
MET-MWS-39-P0005
39-350-CS-PE12-024
DELTA
300X350
39-PMP-003
39-350-CS-PE12-029
SET 1 PUMP 4
39-PMP-004
MET-MWS-39-P0007

INSTRUMENT AIR
-
39-025-IA-GS-004
NOTE 1

GLAND SERVICE WATER
-
39-080-GWH-MS5-013

39-025-GWH-MS5-014
39-025-GWH-MS5-015
39-025-GWH-MS5-016
39-025-GWH-MS5-017
39-025-GWH-MS5-018
EXISTING NEW
80X25
TP 005 3

39-80-GWH-MS5-013
STAGE 4 PUMPS
39-PMP-004/009/016/021/026
MET-MWS-39-P0007

NOTES:

1. INSTRUMENT AIR BY OTHERS

LEGEND:

EXISTING
NEW

WP	NAME	DATE
Drawn By	ES	16/10/2018
Checked By	VP	16/10/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

SCALE: 1:1

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 63 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-PR-PID-0001-04

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO		28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA		24/10/2018

KAREERAND TAILINGS DISPOSAL	MET-MWS-39-P0001	ISSUED FOR USE	D	28/11/2018	DB	VP
TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D
REFERENCE DRAWINGS		REVISIONS				

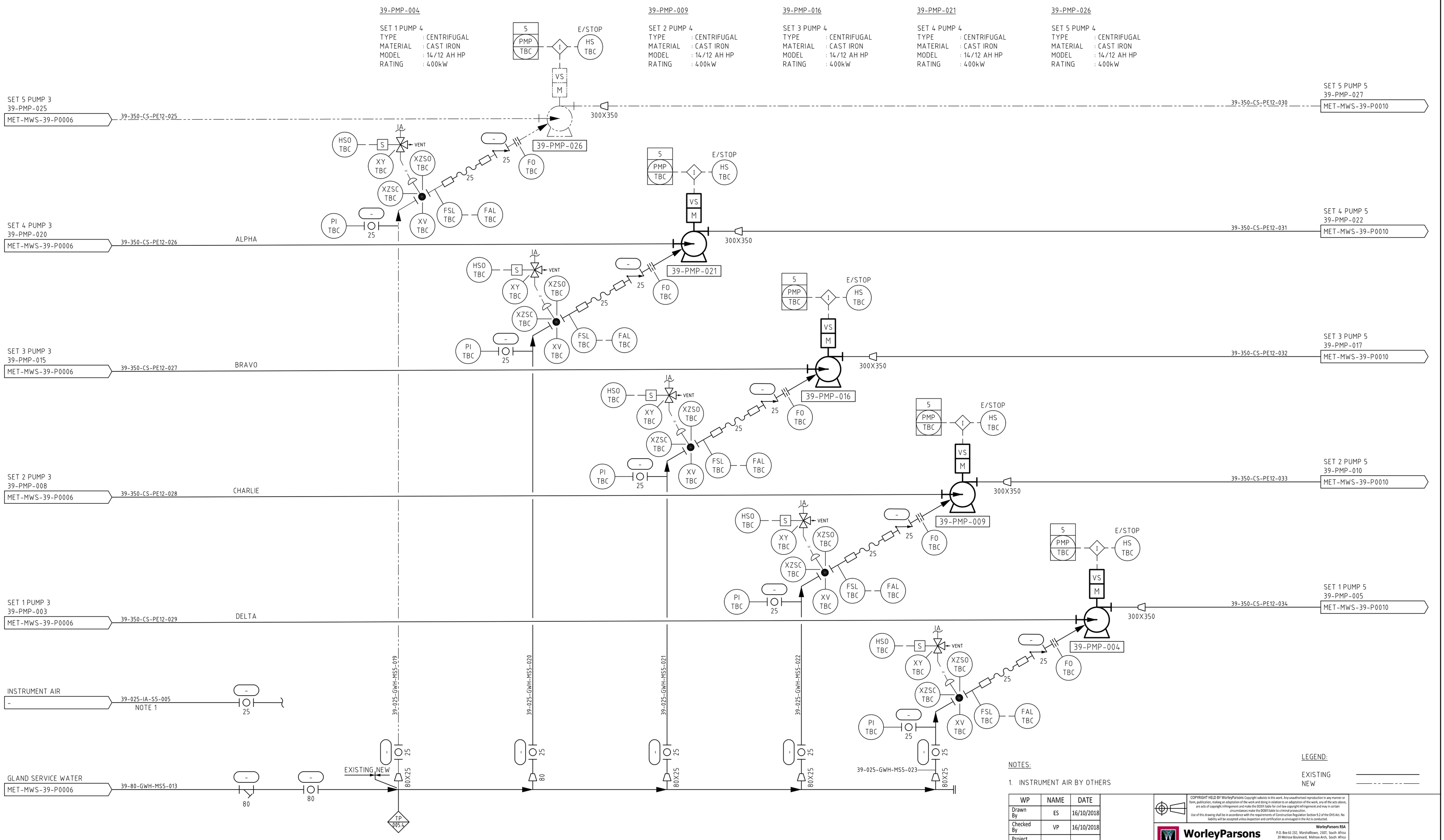
DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	ES			26/09/2018
CHECKED	VP			26/09/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

ANGLOGOLD ASHANTI
COPYRIGHT
MET PROJECTS

REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE STAGE 3 PUMPS PIPING & INSTRUMENTATION DIAGRAM

PROJECT No:	B/UNIT	AREA	SEQ. No:	REV
CWR1806001	MET	MWS	39-P0006	D

SIZE – A1



NOTES:

1. INSTRUMENT AIR BY OTHERS

LEGEND:

EXISTING
NEW

WP	NAME	DATE
Drawn By	ES	16/10/2018
Checked By	VP	16/10/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

SCALE: 1:1

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 282, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-PR-PID-0001-05

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO		28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA		24/10/2018

TITLE	DRG. No
KAREERAND TAILINGS DISPOSAL	MET-MWS-39-P0001

REFERENCE DRAWINGS

MARK	DATE	INIT	APP'D	DETAIL
D	28/11/2018	DB	VP	ISSUED FOR USE

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	ES			26/09/2018
CHECKED	VP			26/09/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

ANGLOGOLD ASHANTI

COPYRIGHT

MET PROJECTS

REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE STAGE 4 PUMPS PIPING & INSTRUMENTATION DIAGRAM

PROJECT No:	B/UNIT	AREA	SEQ. No:	REV	SIZE
CWR1806001	MET-MWS-39-P0007			D	A1

39-PMP-005

SET 1 PUMP 5
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH HP
RATING : 400kW

39-PMP-010

SET 2 PUMP 5
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH HP
RATING : 400kW

39-PMP-017

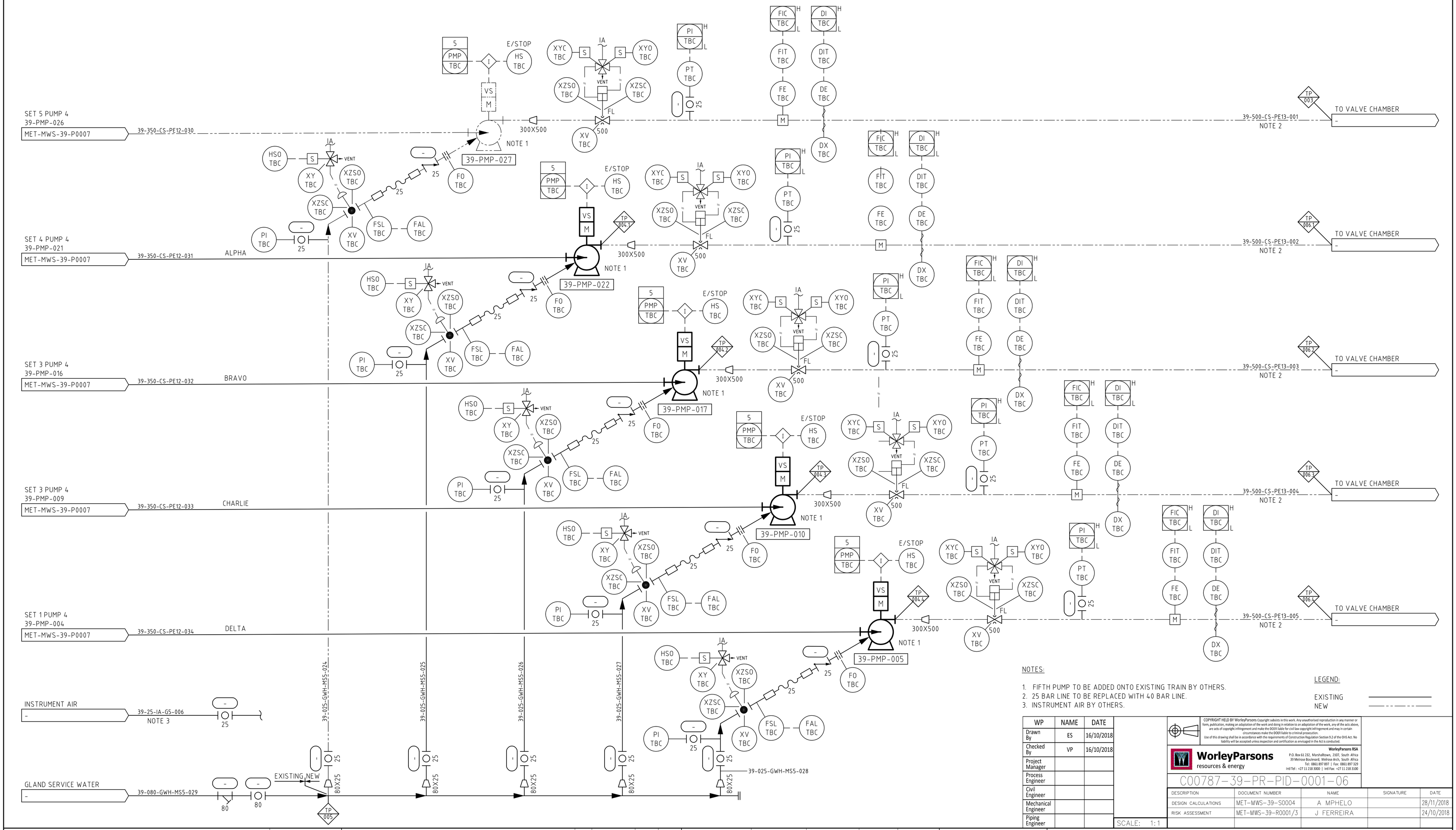
SET 3 PUMP 5
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH HP
RATING : 400kW

39-PMP-022

SET 4 PUMP 5
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH HP
RATING : 400kW

39-PMP-027

SET 5 PUMP 5
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : 14/12 AH HP
RATING : 400kW



NOTES:

1. FIFTH PUMP TO BE ADDED ONTO EXISTING TRAIN BY OTHERS.
2. 25 BAR LINE TO BE REPLACED WITH 40 BAR LINE.
3. INSTRUMENT AIR BY OTHERS.

LEGEND:

EXISTING
NEW

WP	NAME	DATE
Drawn By	ES	16/10/2018
Checked By	VP	16/10/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

SCALE: 1:1

WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-PR-PID-0001-06

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO		28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA		24/10/2018

MARK	DATE	INIT	APP'D
D	28/11/2018	DB	VP

KAREERAND TAILINGS DISPOSAL | MET-MWS-39-P0001 | ISSUED FOR USE
TITLE | DRG. No | DETAIL
REFERENCE DRAWINGS | REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	ES			26/09/2018
CHECKED	VP			26/09/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

ANGLOGOLD ASHANTI
COPYRIGHT
MET PROJECTS

REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE STAGE 5 PUMPS PIPING & INSTRUMENTATION DIAGRAM

PROJECT No:	B/UNIT	AREA	SEQ. No:	REV
CWR1806001	MET	MWS	39-P0030	D

SIZE – A1

39-DAM-001

EXISTING RETURN WATER DAM
CAPACITY : 169 830m³

39-PMP-028

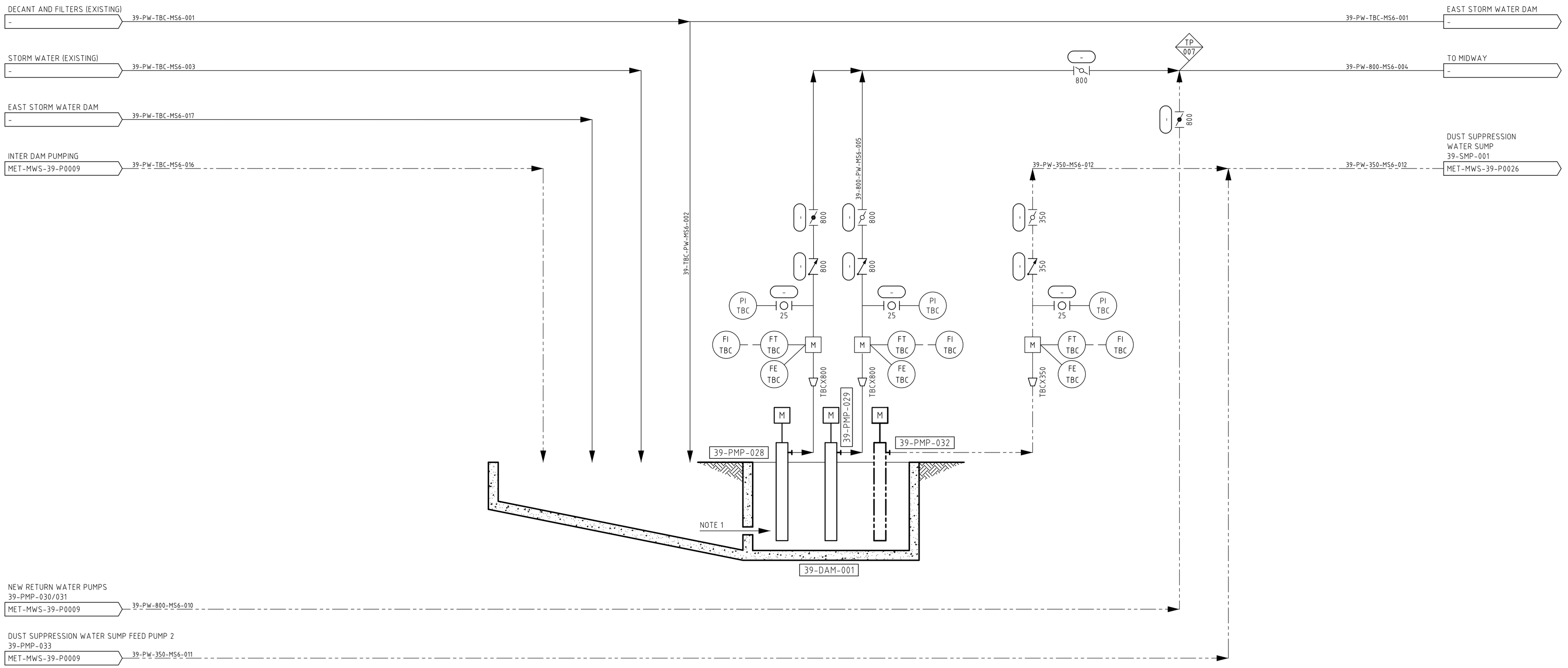
EXISTING RETURN WATER PUMP 1
TYPE : VERTICAL TURBINE
MATERIAL : TBC
MODEL : VTP 32XHC
RATING : 850kW
(DUTY)

39-PMP-029

EXISTING RETURN WATER PUMP 2
TYPE : VERTICAL TURBINE
MATERIAL : TBC
MODEL : VTP 32XHC
RATING : 850kW
(STANDBY)

39-PMP-032

DUST SUPPRESSION WATER SUMP FEED PUMP 1
TYPE : VERTICAL TURBINE
MATERIAL : TBC
MODEL : VP M14VTMC
RATING : 220kW



NOTES:

1. 2X750NB AND 1X1000NB PUDDLE PIPES.

LEGEND:

EXISTING
NEW

WP	NAME	DATE
Drawn By	ES	30/10/2018
Checked By	VP	30/10/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

SCALE: 1:1

WorleyParsons
resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-PR-PID-0002-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO		28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA		24/10/2018

TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D
KAREERAND RETURN WATER	MET-MWS-39-P0002	ISSUED FOR USE	D	28/11/2018	DB	VP

REFERENCE DRAWINGS

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	ES			30/10/2018
CHECKED	VP			30/10/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

ANGLOGOLD ASHANTI

REGION SOUTH AFRICA REGION
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE RETURN WATER DAM AND PUMPING PIPING & INSTRUMENTATION DIAGRAM

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE – A1
CWR1806001	MET-MWS-39-P0008			REV D

39-DAM-002

NEW RETURN WATER DAM
CAPACITY : 425 510m³

39-PMP-030

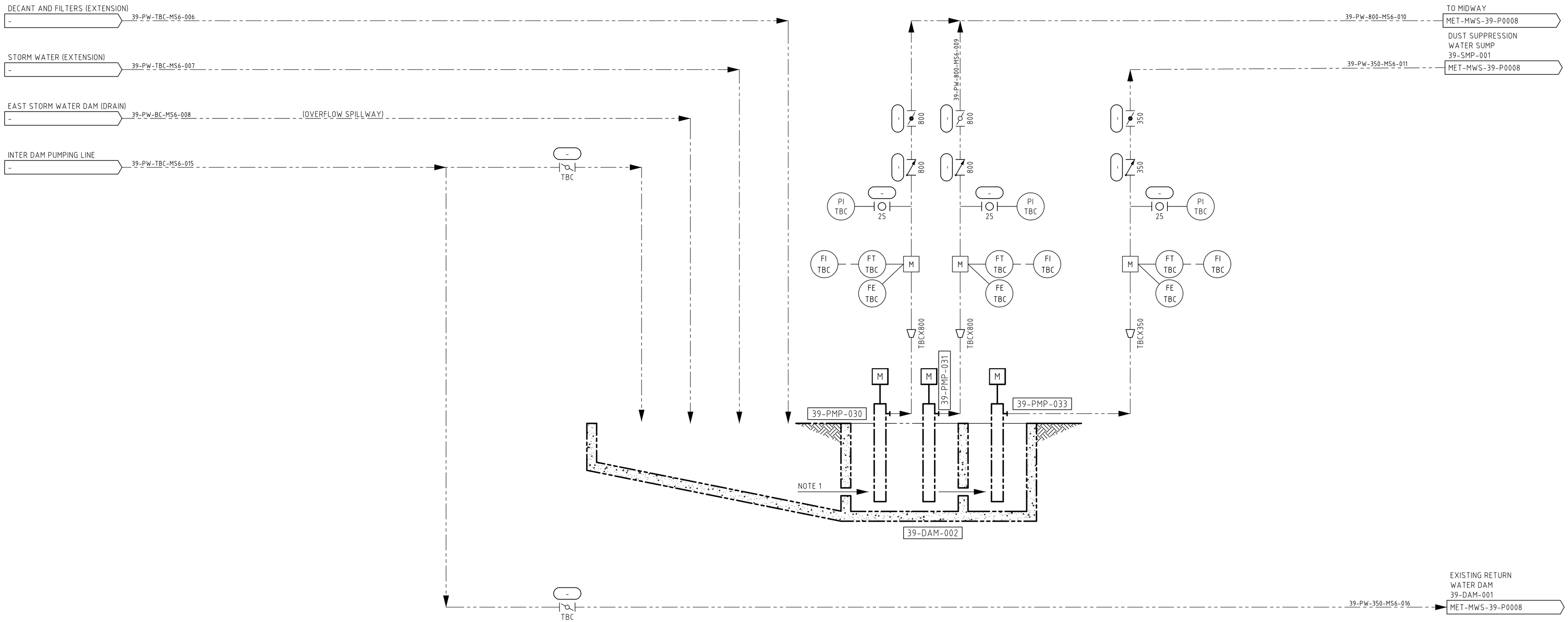
NEW RETURN WATER PUMP 1
TYPE : VERTICAL TURBINE
MATERIAL : TBC
MODEL : VTP 32XHC
RATING : 850kW
(DUTY)

39-PMP-031

NEW RETURN WATER PUMP 2
TYPE : VERTICAL TURBINE
MATERIAL : TBC
MODEL : VTP 32X HC
RATING : 850kW
(STANDBY)

39-PMP-033

DUST SUPPRESSION WATER SUMP FEED PUMP 2
TYPE : VERTICAL TURBINE
MATERIAL : TBC
MODEL : VP M14VTMC
RATING : 220kW



NOTES:

1. 2X750NB AND 1X1000NB PUDDLE PIPES.

LEGEND:

EXISTING
NEW

WP	NAME	DATE
Drawn By	ES	30/10/2018
Checked By	VP	30/10/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

SCALE: 1:1

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-PR-PID-0002-02

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO		28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA		24/10/2018

TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D
KAREERAND RETURN WATER	MET-MWS-39-P0002	ISSUED FOR USE	D	28/11/2018	DB	VP

REFERENCE DRAWINGS

REVISIONS

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	ES			15/11/2018
CHECKED	VP			15/11/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

ANGLOGOLD ASHANTI

COPYRIGHT

MET PROJECTS

REGION SOUTH AFRICA REGION
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT
DRAWING TITLE RETURN WATER DAM AND PUMPING PIPING & INSTRUMENTATION DIAGRAM

PROJECT No:	B/UNIT	AREA	SEQ. No:	REV	SIZE
CWR1806001	MET	MWS	39-P0009	D	A1

39-SMP-001

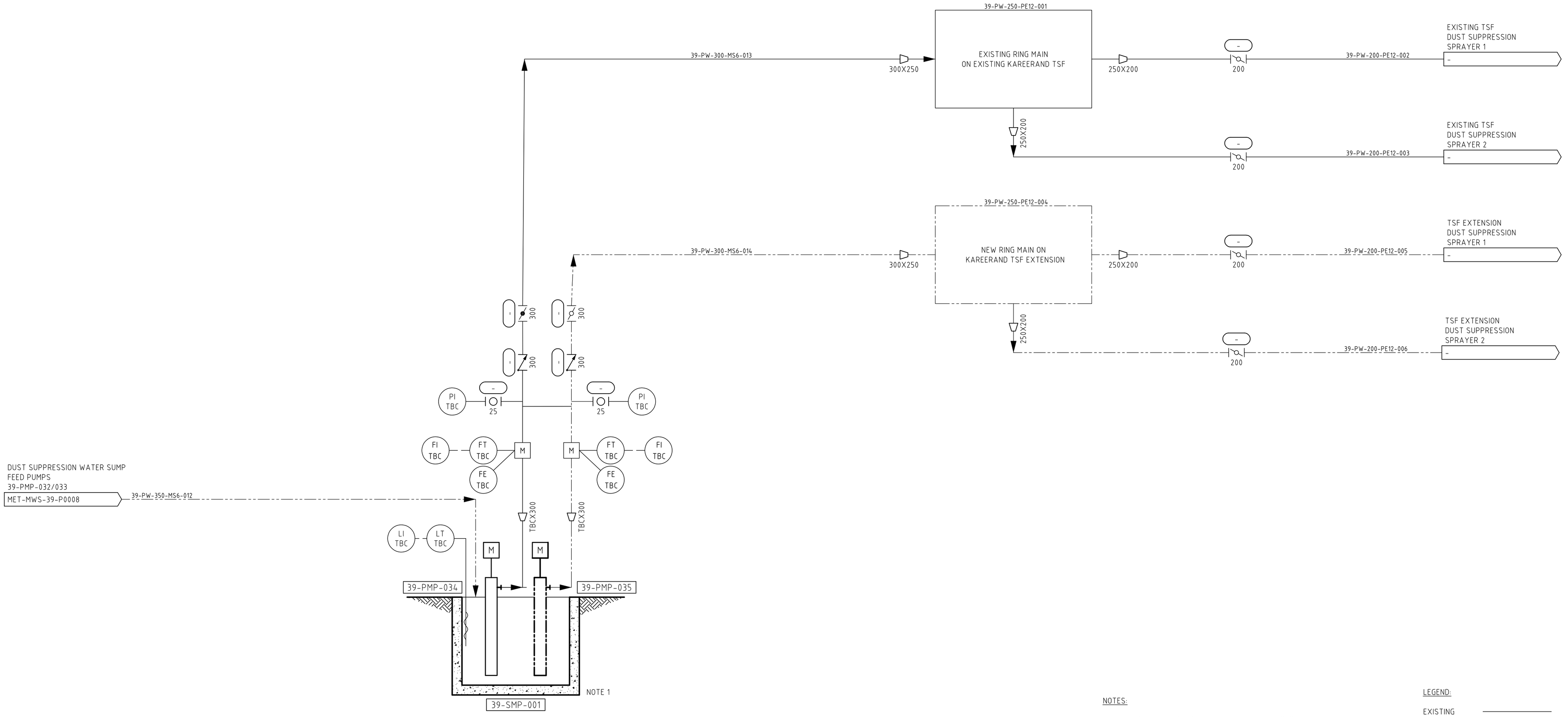
DUST SUPPRESSION
WATER SUMP
CAPACITY : TBC

39-PMP-034

EXISTING TSF
DUST SUPPRESSION WATER PUMP
TYPE : VERTICAL TURBINE
MATERIAL : TBC
MODEL : VP M14VTMC
RATING : 220 kW

39-PMP-035

TSF EXTENSION
DUST SUPPRESSION WATER PUMP
TYPE : VERTICAL TURBINE
MATERIAL : TBC
MODEL : VP M14VTMC
RATING : 250 kW



NOTES:

1. A HOT STANDBY PUMP WILL BE MAINTAINED IN STORE.

LEGEND:

EXISTING
NEW

WP	NAME	DATE
Drawn By	DB	15/11/2018
Checked By	VP	15/11/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

SCALE: 1:1

WorleyParsons
resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel: +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-PR-PID-0003-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO		28/11/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA		24/10/2018

REFERENCE DRAWINGS		REVISIONS				
TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D
KAREERAND RETURN WATER	MET-MWS-39-P0002	ISSUED FOR USE	D	28/11/2018	DB	VP

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	DB			15/11/2018
CHECKED	VP			15/11/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

ANGLOGOLD ASHANTI
COPYRIGHT
MET PROJECTS

REGION SOUTH AFRICA REGION
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE DUST SUPPRESSION WATER & PUMPING PIPING & INSTRUMENTATION DIAGRAM

PROJECT No:	B/UNIT	AREA	SEQ. No:	REV	SIZE
CWR1806001	MET	MWS	39-P0025	D	A1

39-DAM-001

EXISTING RETURN WATER DAM

39-PMP-034

SUBMERSIBLE GSW PUMP 1
TYPE : SUBMERSIBLE
MATERIAL : TBC
MODEL : SULZER J 405
RATING : 22kW

39-PMP-035

SUBMERSIBLE GSW PUMP 2
TYPE : SUBMERSIBLE
MATERIAL : TBC
MODEL : SULZER J 405
RATING : 22kW

39-PMP-036

STAGE 1 GSW PUMP 1
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : WARMAN B5
RATING : 75kW

39-PMP-037

STAGE 1 GSW PUMP 2
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : WARMAN B5
RATING : 75kW

39-PMP-038

STAGE 2 GSW PUMP 1
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : WARMAN B5
RATING : 75kW

39-PMP-039

STAGE 2 GSW PUMP 2
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : WARMAN B5
RATING : 75kW

39-PMP-040

STAGE 3 & 4 GSW PUMP 1
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : WARMAN B5
RATING : 75kW

39-PMP-041

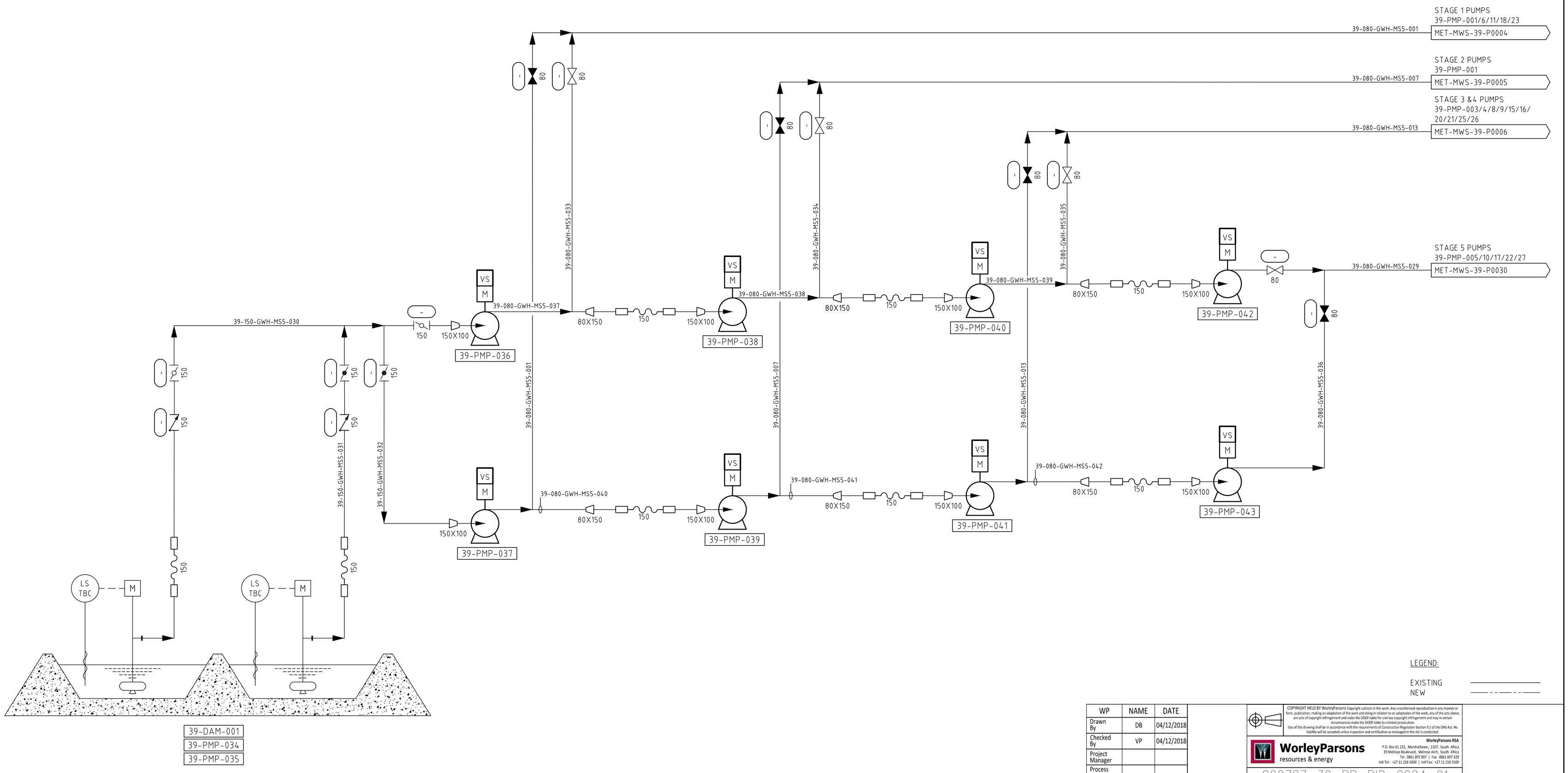
STAGE 3 & 4 GSW PUMP 2
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : WARMAN B5
RATING : 75kW

39-PMP-042

STAGE 3&4 GSW PUMP 1
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : WARMAN B5
RATING : 75kW

39-PMP-043

STAGE 5 GSW PUMP 2
TYPE : CENTRIFUGAL
MATERIAL : CAST IRON
MODEL : WARMAN B5
RATING : 75kW



LEGEND:

EXISTING
NEW

WP	NAME	DATE
Drawn By	DB	04/12/2018
Checked By	VP	04/12/2018
Project Manager		
Process Engineer		
Civil Engineer		
Mechanical Engineer		
Piping Engineer		

SCALE: 1:1

WorleyParsons resources & energy
WorleyParsons RSA
P.O. Box 61 232, Marshalltown, 2107, South Africa
39 Melrose Boulevard, Melrose Arch, South Africa
Tel: 0861 897 897 | Fax: 0861 897 329
Intl Tel : +27 11 218 3000 | Intl Fax: +27 11 218 3100

C00787-39-PR-PID-0004-01

DESCRIPTION	DOCUMENT NUMBER	NAME	SIGNATURE	DATE
DESIGN CALCULATIONS	MET-MWS-39-S0004	A MPHELO		10/12/2018
RISK ASSESSMENT	MET-MWS-39-R0001/3	J FERREIRA		10/12/2018

REFERENCE DRAWINGS		REVISIONS				
GLAND SERVICE WATER PFD.	MET-MWS-39-P0031	ISSUED FOR USE	D	10/12/2018	DB	VP
TITLE	DRG. No	DETAIL	MARK	DATE	INIT	APP'D

DESIGNATION	NAME	REGISTRATION No:	SIGNATURE	DATE
DRAWN	DB			04/12/2018
CHECKED	VP			04/12/2018
SENIOR DESIGNER MET PROJECTS				
PR ENGINEER				
PR TECH				
PROJECT / MET ENGINEER				
MET PROJECTS MANAGER				

ANGLOGOLD ASHANTI

COPYRIGHT

MET PROJECTS

REGION SOUTH AFRICA REGION – VR
BUSINESS UNIT MINE WASTE SOLUTIONS
PROJECT KAREERAND TSF EXPANSION PROJECT – FEASIBILITY STUDY
DRAWING TITLE GLAND SERVICE WATER PIPING & INSTRUMENTATION DIAGRAM

PROJECT No:	B/UNIT	AREA	SEQ. No:	SIZE – A1
CWR1806001	MET-MWS-39-P0032			REV D

APPENDIX H

Risk Assessment

SOUTH AFRICA REGION
PROJECT ENGINEERING SERVICES
DESIGN RISK ASSESSMENT (IN ACCORDANCE WITH QSP113)

Project No:

Project Title:

Document No: **XXX-XDXXXX**

Project Narrative:

Relevant Reference drawings:

Approved by: | Date: | Signature:
MET. PROJECT MANAGER

Approved by: | Date: | Signature:
DESIGN OFFICE MANAGER - SAR PES

Compiled by: | Date: | Signature:

Accepted by: | Date: | Signature:
CLIENT

PRE DESIGN ASSESSMENT								POST DESIGN ASSESSMENT							
			DESIGN REVIEW DATE							FINAL RISK ASSESSMENT DATE		DD/MM/20YY			
ITEM Nº	HAZARD SOURCE AS PER QSP113	ACTUAL HAZARD OR RISK EVENT	RISK AREA IMPACTED	CONSEQUENCE	LIKELIHOOD	RISK INDEX	ROBOT	RECOMMENDED ACTION	RESPONSIBLE PERSON	MITIGATION DUE DATE (end position)	CONSEQUENCE	LIKELIHOOD	RISK INDEX	ROBOT	COMMENTS
1		**Slope failure**													
1.1	Design Integrity	Slope/Embankment failure	Social & Community Damage	Extreme	Unlikely	32		Develop monitoring procedure of all trickering events and maintainance thereof	Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Design Integrity	Slope/Embankment failure	Financial Loss	Extreme	Unlikely	32		Design the dam wall with the required factor of safety of minimum 1.5	Client	During Construction	Moderate	Very Unlikely	15		
	Design Integrity	Slope/Embankment failure	Reputational Damage	Extreme	Unlikely	32			Client	Ongoing	Moderate	Very Unlikely	15		
	Design Integrity	Slope/Embankment failure	Social & Community Damage	Extreme	Unlikely	32			Client		Moderate	Very Unlikely	15		
	Design Integrity	Slope/Embankment failure	Legal and Regulatory Issue	Major	Unlikely	28			Client		Moderate	Very Unlikely	15		
	Design Integrity	Slope/Embankment failure	Environmental Damage	Major	Unlikely	28			Client	Ongoing	Moderate	Very Unlikely	15		
1.2	Design Integrity	Slope failure due to High phreatic surface	Social & Community Damage	Extreme	Likely	34		Maintain small pool and centralized it. Monitor and maintain drainage system	Client	During Operation	Moderate	Very Unlikely	15		
	Design Integrity	Slope failure due to High phreatic surface	Financial Loss	Extreme	Likely	34		Drainage system is adequately designed to ensure that the phreatic surface is lowered to required levels.	Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Design Integrity	Slope failure due to High phreatic surface	Reputational Damage	Extreme	Likely	34		Permeability of wall and tailings material must be carefully assessed, and seepage analysis well modelled to ensure proper seepage flow	Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Design Integrity	Slope failure due to High phreatic surface	Social & Community Damage	Extreme	Likely	34			Client	Ongoing	Moderate	Very Unlikely	15		
	Design Integrity	Slope failure due to High phreatic surface	Legal and Regulatory Issue	Major	Likely	29			Client	Ongoing	Moderate	Very Unlikely	15		
	Design Integrity	Slope failure due to High phreatic surface	Environmental Damage	Major	Likely	29			Client	Ongoing	Moderate	Very Unlikely	15		
1.3	Vibration	Slope failure due to Seismic event	Health & Safety Loss	Extreme	Likely	32		Design consideration. Ensure that the slopes are checked against possible seismic events during design stage.	Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Vibration	Slope failure due to Seismic event	Financial Loss	Extreme	Likely	32		Ensure that the wall foundation is of good material	Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Vibration	Slope failure due to Seismic event	Reputational Damage	Extreme	Likely	32		Develop monitoring procedure of all trickering events and maintainance thereof	Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Vibration	Slope failure due to Seismic event	Social & Community Damage	Extreme	Likely	32			Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Vibration	Slope failure due to Seismic event	Legal and Regulatory Issue	Major	Likely	28			Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Vibration	Slope failure due to Seismic event	Environmental Damage	Major	Likely	28			Client	During Detail Design Phase	Moderate	Very Unlikely	15		
1.4	Design Integrity	Slope failure due to Drainage system failure	Social & Community Damage	Extreme	Likely	32		Develop monitoring procedure of all trickering events and maintainance thereof	Client	Ongoing	Moderate	Unlikely	16		
	Design Integrity	Slope failure due to Drainage system failure	Financial Loss	Extreme	Likely	32			Client	Ongoing	Moderate	Unlikely	16		
	Design Integrity	Slope failure due to Drainage system failure	Reputational Damage	Extreme	Likely	32			Client	Ongoing	Moderate	Unlikely	16		
	Design Integrity	Slope failure due to Drainage system failure	Environmental Damage	Extreme	Likely	32			Client	Ongoing	Moderate	Unlikely	16		
	Design Integrity	Slope failure due to Drainage system failure	Legal and Regulatory Issue	Major	Likely	28			Client	Ongoing	Moderate	Unlikely	16		
	Design Integrity	Slope failure due to Drainage system failure	Health & Safety Loss	Major	Likely	28			Client	Ongoing	Moderate	Unlikely	16		
1.5	Design Integrity	Slope failure due to Pool near outer wall	Social & Community Damage	Moderate	Likely	18		Develop monitoring procedure of all trickering events and maintainance thereof	Client	Ongoing	Moderate	Very Unlikely	15		
	Design Integrity	Slope failure due to Pool near outer wall	Financial Loss	Moderate	Likely	18			Client	Ongoing	Moderate	Very Unlikely	15		
	Design Integrity	Slope failure due to Pool near outer wall	Reputational Damage	Moderate	Likely	18			Client	Ongoing	Moderate	Very Unlikely	15		
	Design Integrity	Slope failure due to Pool near outer wall	Social & Community Damage	Moderate	Likely	18			Client	Ongoing	Moderate	Very Unlikely	15		
	Design Integrity	Slope failure due to Pool near outer wall	Legal and Regulatory Issue	Minor	Likely	11			Client	Ongoing	Moderate	Very Unlikely	15		
	Design Integrity	Slope failure due to Pool near outer wall	Environmental Damage	Minor	Likely	11			Client	Ongoing	Moderate	Very Unlikely	15		
2		**Over topping**													
2.1	Flooding	Over topping due to Insufficient freeboard	Social & Community Damage	Major	Unlikely	28		Develop monitoring procedure of all trickering events and maintainance thereof	Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Flooding	Over topping due to Insufficient freeboard	Environmental Damage	Major	Unlikely	28			Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Flooding	Over topping due to Insufficient freeboard	Health & Safety Loss	Major	Unlikely	28			Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Flooding	Over topping due to Insufficient freeboard	Financial Loss	Major	Unlikely	28			Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Flooding	Over topping due to Insufficient freeboard	Legal and Regulatory Issue	Major	Unlikely	28			Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Flooding	Over topping due to Insufficient freeboard	Reputational Damage	Major	Unlikely	28			Client	During Detail Design Phase	Moderate	Very Unlikely	15		
2.2	Flooding	Over topping due to Erosion of outer dam walls	Social & Community Damage	Moderate	Likely	32		Develop monitoring procedure of all trickering events and maintainance thereof	Client	Ongoing	Moderate	Very Unlikely	15		
	Flooding	Over topping due to Erosion of outer dam walls	Environmental Damage	Moderate	Likely	32			Client	Ongoing	Moderate	Very Unlikely	15		
	Flooding	Over topping due to Erosion of outer dam walls	Health & Safety Loss	Moderate	Likely	32			Client	Ongoing	Moderate	Very Unlikely	15		
	Flooding	Over topping due to Erosion of outer dam walls	Legal and Regulatory Issue	Moderate	Likely	32			Client	Ongoing	Moderate	Very Unlikely	15		
	Flooding	Over topping due to Erosion of outer dam walls	Financial Loss	Minor	Likely	28			Client	Ongoing	Moderate	Very Unlikely	15		
	Flooding	Over topping due to Erosion of outer dam walls	Reputational Damage	Moderate	Likely	28			Client	Ongoing	Moderate	Very Unlikely	15		
2.3	Flooding	Over topping due to Excessive storm event	Social & Community Damage	High	Likely	24		Adhering to the monitoring procedures and decanting excessive water from the dam	Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Flooding	Over topping due to Excessive storm event	Environmental Damage	High	Likely	24			Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Flooding	Over topping due to Excessive storm event	Health & Safety Loss	High	Likely	24			Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Flooding	Over topping due to Excessive storm event	Legal and Regulatory Issue	High	Likely	24			Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Flooding	Over topping due to Excessive storm event	Financial Loss	High	Likely	24			Client	During Detail Design Phase	Moderate	Very Unlikely	15		
	Flooding	Over topping due to Excessive storm event	Reputational Damage	High	Likely	24			Client	During Detail Design Phase	Moderate	Very Unlikely	15		

ITEM Nº	HAZARD SOURCE AS PER QSP113	ACTUAL HAZARD OR RISK EVENT	RISK AREA IMPACTED	CONSEQUENCE	LIKELIHOOD	RISK INDEX	ROBOT	RECOMMENDED ACTION	RESPONSIBLE PERSON	MITIGATION DUE DATE (end position)	CONSEQUENCE	LIKELIHOOD	RISK INDEX	ROBOT	COMMENTS
2.4	Flooding	Over topping due to Pool near outer wall	Social & Community Damage	High	Very Likely	25		Adhering to the monitoring procedures and maintaining beach levels	Client	Ongoing	Moderate	Almost Impossible	8		
	Flooding	Over topping due to Pool near outer wall	Health & Safety Loss	High	Very Likely	25			Client	Ongoing	Moderate	Almost Impossible	8		
	Flooding	Over topping due to Pool near outer wall	Legal and Regulatory Issue	High	Very Likely	25			Client	Ongoing	Moderate	Almost Impossible	8		
	Flooding	Over topping due to Pool near outer wall	Environmental Damage	High	Very Likely	25			Client	Ongoing	Moderate	Almost Impossible	8		
	Flooding	Over topping due to Pool near outer wall	Financial Loss	High	Very Likely	25			Client	Ongoing	Moderate	Almost Impossible	8		
	Flooding	Over topping due to Pool near outer wall	Reputational Damage	High	Very Likely	25			Client	Ongoing	Moderate	Almost Impossible	8		
3		**Piping**													
3.1	Operability	Piping along the old solution trench	Environmental Damage	Minor	Unlikely	10		Design to reduce possibility of piping	Client	Ongoing	Insignificant	Very Unlikely	3		
	Operability	Piping along the old solution trench	Health & Safety Loss	Minor	Unlikely	10			Client	Ongoing	Insignificant	Very Unlikely	3		
	Operability	Piping along the old solution trench	Financial Loss	Minor	Unlikely	10			Client	Ongoing	Insignificant	Very Unlikely	3		
	Operability	Piping along the old solution trench	Reputational Damage	Minor	Unlikely	10			Client	Ongoing	Insignificant	Very Unlikely	3		
	Operability	Piping along the old solution trench	Legal and Regulatory Issue	Minor	Unlikely	10			Client	Ongoing	Insignificant	Very Unlikely	3		
	Operability	Piping along the old solution trench	Social & Community Damage	Minor	Unlikely	10			Client	Ongoing	Insignificant	Very Unlikely	3		
3.2	Operability	Piping along the penstock outfall pipe	Environmental Damage	Moderate	Unlikely	16		Design to reduce possibility of piping	Client	Ongoing	Minor	Very Unlikely	9		
	Operability	Piping along the penstock outfall pipe	Health & Safety Loss	Moderate	Unlikely	16			Client	Ongoing	Minor	Very Unlikely	9		
	Operability	Piping along the penstock outfall pipe	Financial Loss	Moderate	Unlikely	16			Client	Ongoing	Minor	Very Unlikely	9		
	Operability	Piping along the penstock outfall pipe	Reputational Damage	Moderate	Unlikely	16			Client	Ongoing	Minor	Very Unlikely	9		
	Operability	Piping along the penstock outfall pipe	Legal and Regulatory Issue	Moderate	Unlikely	16			Client	Ongoing	Minor	Very Unlikely	9		
	Operability	Piping along the penstock outfall pipe	Social & Community Damage	Moderate	Unlikely	16			Client	Ongoing	Minor	Very Unlikely	9		
3.3	Operability	Piping along burried pipeline	Environmental Damage	Moderate	Unlikely	16		Design to reduce possibility of piping	Client	Ongoing	Minor	Very Unlikely	9		
	Operability	Piping along burried pipeline	Health & Safety Loss	Moderate	Unlikely	16			Client	Ongoing	Minor	Very Unlikely	9		
	Operability	Piping along burried pipeline	Financial Loss	Moderate	Unlikely	16			Client	Ongoing	Minor	Very Unlikely	9		
	Operability	Piping along burried pipeline	Reputational Damage	Moderate	Unlikely	16			Client	Ongoing	Insignificant	Very Unlikely	3		
	Operability	Piping along burried pipeline	Legal and Regulatory Issue	Moderate	Unlikely	16			Client	Ongoing	Insignificant	Very Unlikely	3		
	Operability	Piping along burried pipeline	Social & Community Damage	Moderate	Unlikely	16			Client	Ongoing	Insignificant	Very Unlikely	3		
4		**Pollution**							Client						
4.1	Hazardous materials	Ground water pollution	Environmental Damage	Moderate	Very Likely	19		Continueous monitoring of borehole water quality and extraction	Client	Ongoing	Minor	Likely	11		
	Hazardous materials	Ground water pollution	Health & Safety Loss	Moderate	Very Likely	19			Client	Ongoing	Minor	Likely	11		
	Hazardous materials	Ground water pollution	Legal and Regulatory Issue	Moderate	Very Likely	19			Client	Ongoing	Minor	Likely	11		
	Hazardous materials	Ground water pollution	Social & Community Damage	Moderate	Very Likely	19			Client	Ongoing	Minor	Likely	11		
	Hazardous materials	Ground water pollution	Financial Loss	Moderate	Very Likely	19			Client	Ongoing	Minor	Likely	11		
	Hazardous materials	Ground water pollution	Reputational Damage	Moderate	Very Likely	19			Client	Ongoing	Minor	Likely	11		
4.2	Dust	Dust pollution	Environmental Damage	Moderate	Very Likely	19		Dust suppression	Client	Ongoing	Minor	Likely	11		
	Dust	Dust pollution	Health & Safety Loss	Moderate	Very Likely	19			Client	Ongoing	Insignificant	Likely	5		
	Dust	Dust pollution	Legal and Regulatory Issue	Moderate	Very Likely	19			Client	Ongoing	Insignificant	Likely	5		
	Dust	Dust pollution	Social & Community Damage	Moderate	Very Likely	19			Client	Ongoing	Minor	Likely	11		
	Dust	Dust pollution	Financial Loss	Moderate	Very Likely	19			Client	Ongoing	Minor	Likely	11		
	Dust	Dust pollution	Reputational Damage	Moderate	Very Likely	19			Client	Ongoing	Minor	Likely	11		
									Client	Ongoing					
5		**Decant failure**													
5.1	Maintainability	Decant failure due to Penstock blockages	Environmental Damage	High	Likely	24		Develop monitoring and maintanance procedure of system to minimize tailings migration	Client	Ongoing	Minor	Unlikely	10		
	Maintainability	Decant failure due to Penstock blockages	Health & Safety Loss	High	Likely	24			Client	Ongoing	Minor	Unlikely	10		
	Maintainability	Decant failure due to Penstock blockages	Legal and Regulatory Issue	High	Likely	24			Client	Ongoing	Minor	Unlikely	10		
	Maintainability	Decant failure due to Penstock blockages	Social & Community Damage	High	Likely	24			Client	Ongoing	Insignificant	Unlikely	4		
	Maintainability	Decant failure due to Penstock blockages	Financial Loss	High	Likely	24			Client	Ongoing	Minor	Unlikely	10		
	Maintainability	Decant failure due to Penstock blockages	Reputational Damage	High	Likely	24			Client	Ongoing	Minor	Unlikely	10		
5.2	Accessibility	Decant failure due to Penstock intake tower inaccessible	Environmental Damage	Moderate	Likely	18		Ensure that walkways are constantly monitored and maintained	Client	Ongoing	Insignificant	Almost Impossible	1		
	Accessibility	Decant failure due to Penstock intake tower inaccessible	Health & Safety Loss	Moderate	Likely	18			Client	Ongoing	Insignificant	Almost Impossible	1		
	Accessibility	Decant failure due to Penstock intake tower inaccessible	Legal and Regulatory Issue	Moderate	Likely	18			Client	Ongoing	Insignificant	Almost Impossible	1		
	Accessibility	Decant failure due to Penstock intake tower inaccessible	Social & Community Damage	Moderate	Likely	18			Client	Ongoing	Insignificant	Almost Impossible	1		
	Accessibility	Decant failure due to Penstock intake tower inaccessible	Financial Loss	Moderate	Likely	18			Client	Ongoing	Insignificant	Almost Impossible	1		
	Accessibility	Decant failure due to Penstock intake tower inaccessible	Reputational Damage	Moderate	Likely	18			Client	Ongoing	Insignificant	Almost Impossible	1		
5.3	Maintainability	Decant failure due to Penstock failure/crushing	Environmental Damage	Major	Very Unlikely	27		Develop monitoring and maintanance procedure of system	Client	Ongoing	Minor	Very Unlikely	9		
	Maintainability	Decant failure due to Penstock failure/crushing	Health & Safety Loss	Major	Very Unlikely	27			Client	Ongoing	Minor	Very Unlikely	9		
	Maintainability	Decant failure due to Penstock failure/crushing	Legal and Regulatory Issue	Major	Very Unlikely	27			Client	Ongoing	Minor	Very Unlikely	9		
	Maintainability	Decant failure due to Penstock failure/crushing	Social & Community Damage	Major	Very Unlikely	27			Client	Ongoing	Minor	Very Unlikely	9		
	Maintainability	Decant failure due to Penstock failure/crushing	Financial Loss	Major	Very Unlikely	27			Client	Ongoing	Minor	Very Unlikely	9		
	Maintainability	Decant failure due to Penstock failure/crushing	Reputational Damage	Major	Very Unlikely	27			Client	Ongoing	Minor	Very Unlikely	9		
6		**Lack of outer wedge development**													
6.1	Pressure	Poor pressure in the delivery system to maintain good uf/of split	Health & Safety Loss	Minor	Likely	11			Client	Ongoing	Insignificant	Very Unlikely	3		
	Pressure	Poor pressure in the delivery system to maintain good uf/of split	Environmental Damage	Minor	Likely	11					Insignificant	Very Unlikely	3		
	Pressure	Poor pressure in the delivery system to maintain good uf/of split	Financial Loss	Minor	Likely	11					Insignificant	Very Unlikely	3		
	Pressure	Poor pressure in the delivery system to maintain good uf/of split	Reputational Damage	Insignificant	Likely	5					Insignificant	Very Unlikely	3		
	Pressure	Poor pressure in the delivery system to maintain good uf/of split	Legal and Regulatory Issue	Minor	Likely	11					Insignificant	Very Unlikely	3		
	Pressure	Poor pressure in the delivery system to maintain good uf/of split	Social & Community Damage	Insignificant	Likely	5					Insignificant	Very Unlikely	3		
6.2	Hazardous chemicals	Tailings charecteristics changing	Health & Safety Loss	Insignificant	Unlikely	4		Continous monitoring and tesiting of tailings material to check for any changes in characterics		Ongoing	Insignificant	Unlikely	4		
	Hazardous chemicals	Tailings charecteristics changing	Environmental Damage	Minor	Unlikely	10					Insignificant	Unlikely	4		
	Hazardous chemicals	Tailings charecteristics changing	Financial Loss	Insignificant	Unlikely	4					Insignificant	Unlikely	4		
	Hazardous chemicals	Tailings charecteristics changing	Reputational Damage	Insignificant	Unlikely	4					Insignificant	Unlikely	4		
	Hazardous chemicals	Tailings charecteristics changing	Legal and Regulatory Issue	Minor	Unlikely	10					Insignificant	Unlikely	4		
	Hazardous chemicals	Tailings charecteristics changing	Social & Community Damage	Insignificant	Unlikely	4					Insignificant	Unlikely	4		
7		**Delivery pipeline failure**													
7.1	Maintainability	Delivery pipeline failure due to Valve burst	Environmental Damage	Moderate	Likely	18		Develop monitoring and maintanance procedure of pipe system	Client	Ongoing	Minor	Unlikely	10		
	Maintainability	Delivery pipeline failure due to Valve burst	Health & Safety Loss	Moderate	Likely	18					Minor	Unlikely	10		
	Maintainability	Delivery pipeline failure due to Valve burst	Financial Loss	Moderate	Likely	18					Minor	Unlikely	10		
	Maintainability	Delivery pipeline failure due to Valve burst	Reputational Damage	Insignificant	Likely	5					Insignificant	Very Unlikely	3		
	Maintainability	Delivery pipeline failure due to Valve burst	Legal and Regulatory Issue	Minor	Likely	11					Insignificant	Very Unlikely	3		
	Maintainability	Delivery pipeline failure due to Valve burst	Social & Community Damage	Insignificant	Likely	5					Insignificant	Very Unlikely	3		
7.2	Maintainability	Delivery pipeline failure due to Pipe burst	Environmental Damage	Moderate	Likely	18		Develop monitoring and maintanance procedure of pipe system	Client	Ongoing	Minor	Unlikely	10		
	Maintainability	Delivery pipeline failure due to Pipe burst	Health & Safety Loss	Minor	Likely	11					Insignificant	Unlikely	4		
	Maintainability	Delivery pipeline failure due to Pipe burst	Financial Loss	Moderate	Likely	18					Minor	Unlikely	10		

ITEM Nº	HAZARD SOURCE AS PER QSP113	ACTUAL HAZARD OR RISK EVENT	RISK AREA IMPACTED	CONSEQUENCE	LIKELIHOOD	RISK INDEX	ROBOT	RECOMMENDED ACTION	RESPONSIBLE PERSON	MITIGATION DUE DATE (end position)	CONSEQUENCE	LIKELIHOOD	RISK INDEX	ROBOT	COMMENTS
	Maintainability	Delivery pipeline failure due to Pipe burst	Reputational Damage	Insignificant	Likely	5					Insignificant	Very Unlikely	3		
	Maintainability	Delivery pipeline failure due to Pipe burst	Legal and Regulatory Issue	Minor	Likely	11					Insignificant	Very Unlikely	3		
	Maintainability	Delivery pipeline failure due to Pipe burst	Social & Community Damage	Insignificant	Likely	5					Insignificant	Very Unlikely	3		
7.3	Maintainability	Delivery pipeline failure due to Cyclone failures	Environmental Damage	Minor	Likely	11		Deposition methods to be constantly monitored and revisited to ensure compliance	Client	Ongoing	Minor	Unlikely	10		
	Maintainability	Delivery pipeline failure due to Cyclone failures	Health & Safety Loss	Minor	Likely	11					Insignificant	Unlikely	4		
	Maintainability	Delivery pipeline failure due to Cyclone failures	Financial Loss	Moderate	Likely	18					Minor	Unlikely	10		
	Maintainability	Delivery pipeline failure due to Cyclone failures	Reputational Damage	Insignificant	Likely	5					Insignificant	Very Unlikely	3		
	Maintainability	Delivery pipeline failure due to Cyclone failures	Legal and Regulatory Issue	Minor	Likely	11					Insignificant	Unlikely	4		
	Maintainability	Delivery pipeline failure due to Cyclone failures	Social & Community Damage	Minor	Likely	11					Insignificant	Very Unlikely	3		
7.4	Maintainability	Delivery pipeline failure due to Pipe blockages	Environmental Damage	Minor	Unlikely	10		Develop monitoring and maintanance procedure of pipe system	Client	Ongoing	Insignificant	Unlikely	4		
	Maintainability	Delivery pipeline failure due to Pipe blockages	Health & Safety Loss	Minor	Unlikely	10					Insignificant	Unlikely	4		
	Maintainability	Delivery pipeline failure due to Pipe blockages	Financial Loss	Moderate	Unlikely	16					Minor	Unlikely	10		
	Maintainability	Delivery pipeline failure due to Pipe blockages	Reputational Damage	Insignificant	Unlikely	4					Insignificant	Very Unlikely	3		
	Maintainability	Delivery pipeline failure due to Pipe blockages	Legal and Regulatory Issue	Minor	Unlikely	10					Insignificant	Unlikely	4		
	Maintainability	Delivery pipeline failure due to Pipe blockages	Social & Community Damage	Minor	Unlikely	10					Insignificant	Very Unlikely	3		
8		**Pool Wall Raise**													
8.1	Operability	Pool wall raise delayed	Financial Loss	High	Unlikely	23		Operation management	Client	Ongoing	Minor	Very Unlikely	9		
	Operability	Pool wall raise delayed	Health & Safety Loss	Insignificant	Unlikely	4					Insignificant	Very Unlikely	3		
	Operability	Pool wall raise delayed	Environmental Damage	Insignificant	Unlikely	4					Insignificant	Very Unlikely	3		
	Operability	Pool wall raise delayed	Reputational Damage	Insignificant	Unlikely	4					Insignificant	Very Unlikely	3		
	Operability	Pool wall raise delayed	Legal and Regulatory Issue	Insignificant	Unlikely	4					Insignificant	Very Unlikely	3		
	Operability	Pool wall raise delayed	Social & Community Damage	Insignificant	Unlikely	4					Insignificant	Very Unlikely	3		
8.2	Operability	Pipe buried on pool wall	Financial Loss	Minor	Unlikely	10		Operation management	Client	Ongoing	Insignificant	Very Unlikely	3		
	Operability	Pipe buried on pool wall	Health & Safety Loss	Insignificant	Unlikely	4					Insignificant	Very Unlikely	3		
	Operability	Pipe buried on pool wall	Environmental Damage	Insignificant	Unlikely	4					Insignificant	Very Unlikely	3		
	Operability	Pipe buried on pool wall	Reputational Damage	Insignificant	Unlikely	4					Insignificant	Very Unlikely	3		
	Operability	Pipe buried on pool wall	Legal and Regulatory Issue	Insignificant	Unlikely	4					Insignificant	Very Unlikely	3		
	Operability	Pipe buried on pool wall	Social & Community Damage	Insignificant	Unlikely	4					Insignificant	Very Unlikely	3		
9		**Pipe Failure**													
9.1	Maintainability	Pipe Failure due to HDPE butt weld failure	Health & Safety Loss	Moderate	Likely	18		Welding equipment readily available	Client	Ongoing	Minor	Unlikely	10		
	Maintainability	Pipe Failure due to HDPE butt weld failure	Environmental Damage	Moderate	Likely	18					Minor	Unlikely	10		
	Maintainability	Pipe Failure due to HDPE butt weld failure	Financial Loss	Moderate	Likely	18					Minor	Unlikely	10		
	Maintainability	Pipe Failure due to HDPE butt weld failure	Reputational Damage	Minor	Likely	11					Insignificant	Unlikely	4		
	Maintainability	Pipe Failure due to HDPE butt weld failure	Legal and Regulatory Issue	Moderate	Likely	18					Minor	Unlikely	10		
	Maintainability	Pipe Failure due to HDPE butt weld failure	Social & Community Damage	Minor	Likely	11					Insignificant	Unlikely	4		
9.2	Maintainability	Pipe Failure due to Steel pipe failure	Health & Safety Loss	Moderate	Likely	18		Spare pipe can be readily adapted	Client	Ongoing	Minor	Unlikely	10		
	Maintainability	Pipe Failure due to Steel pipe failure	Environmental Damage	Moderate	Likely	18					Minor	Unlikely	10		
	Maintainability	Pipe Failure due to Steel pipe failure	Financial Loss	Moderate	Likely	18					Minor	Unlikely	10		
	Maintainability	Pipe Failure due to Steel pipe failure	Reputational Damage	Insignificant	Likely	5					Insignificant	Unlikely	4		
	Maintainability	Pipe Failure due to Steel pipe failure	Legal and Regulatory Issue	Minor	Likely	11					Insignificant	Unlikely	4		
	Maintainability	Pipe Failure due to Steel pipe failure	Social & Community Damage	Insignificant	Likely	5					Insignificant	Unlikely	4		
9.3	Maintainability	Pipe Failure due to Valve failure	Health & Safety Loss	Minor	Likely	11		Spare valves to be kept on site	Client	Ongoing	Insignificant	Unlikely	4		
	Maintainability	Pipe Failure due to Valve failure	Environmental Damage	Minor	Likely	11					Insignificant	Unlikely	4		
	Maintainability	Pipe Failure due to Valve failure	Financial Loss	Moderate	Likely	18					Minor	Unlikely	10		
	Maintainability	Pipe Failure due to Valve failure	Reputational Damage	Insignificant	Likely	5					Insignificant	Unlikely	4		
	Maintainability	Pipe Failure due to Valve failure	Legal and Regulatory Issue	Minor	Likely	11					Insignificant	Unlikely	4		
	Maintainability	Pipe Failure due to Valve failure	Social & Community Damage	Insignificant	Likely	5					Insignificant	Unlikely	4		
9.4	Maintainability	Pipe Failure due to Pipe floats fail	Health & Safety Loss	Minor	Unlikely	10		Spare floats to be kept on site	Client	Ongoing	Insignificant	Unlikely	4		
	Maintainability	Pipe Failure due to Pipe floats fail	Environmental Damage	Minor	Unlikely	10					Insignificant	Very Unlikely	3		
	Maintainability	Pipe Failure due to Pipe floats fail	Financial Loss	Moderate	Unlikely	16					Minor	Very Unlikely	9		
	Maintainability	Pipe Failure due to Pipe floats fail	Reputational Damage	Insignificant	Unlikely	4					Insignificant	Very Unlikely	3		
	Maintainability	Pipe Failure due to Pipe floats fail	Legal and Regulatory Issue	Minor	Unlikely	10					Insignificant	Very Unlikely	3		
	Maintainability	Pipe Failure due to Pipe floats fail	Social & Community Damage	Insignificant	Unlikely	4					Insignificant	Very Unlikely	3		
10		**Personnel Risk**													
	Accessibility	Drowning at penstock intake	Health & Safety Loss	Major	Unlikely	28		Walkways and pool levels to be constantly checked and	Client	Ongoing	Moderate	Very Unlikely	15		
	Accessibility	Drowning at penstock intake	Environmental Damage	Insignificant	Unlikely	4					Insignificant	Very Unlikely	3		
	Accessibility	Drowning at penstock intake	Financial Loss	High	Unlikely	23					Minor	Unlikely	10		
	Accessibility	Drowning at penstock intake	Reputational Damage	Major	Unlikely	28					Minor	Very Unlikely	9		
	Accessibility	Drowning at penstock intake	Legal and Regulatory Issue	Major	Unlikely	28					Minor	Very Unlikely	9		
	Accessibility	Drowning at penstock intake	Social & Community Damage	Insignificant	Unlikely	4					Insignificant	Very Unlikely	3		

Risk Classification:	Minimum Required Actions:			
	Response:	Report to:	Monitoring:	Downside Risk Planning:
(31-36)	Immediate and urgent action	VII, VI, ERO, RO & Board	Weekly	Business continuity/ contingency and emergency plans mandatory
(25-30)	Proactive management	V, ERO, RO & Board	Monthly	
(16-24)	Active management	IV & RO	Quarterly	Business continuity/ contingency and emergency plans advisory
(9-15)	Manage routinely	III & RC	Routinely	-
(1-8)				

LEGEND
HIGH RISK
MODERATE TO HIGH RISK
MODERATE RISK
LOW TO MODERATE RISK
LOW RISK

AngloGold Ashanti Group Risk Assessment and Reporting Matrix

Part of every step in the business process...

We continually re-assess risks to benefit from opportunities and cope with threats and uncertainty

Risk Classification *(Risk Index):*

THREATS *('NEGATIVE' or 'DOWNSIDE' RISK)*						: Negative Impacts								: Positive Impacts	***OPPORTUNITIES*** *('POSITIVE' or 'UPSIDE' RISK)*					
Potential Treatments: *Terminate (eliminate/ redesign/avoid/ substitute) - Treat (mitigate/ control) - Transfer - Tolerate (currently retain/ accept)*															*Potential Treatments:* *Exploit - Share - Maximise/ Enhance - Currently Forgo*					
Safety is our first value	*We respect the environment*	*We are accountable for our actions & undertake to deliver on our commitments*	*We treat each other with dignity & respect & we value diversity*		*The communities & societies in which we operate will be better off*										*Safety is our first value*	*We respect the environment*	*We are accountable for our actions & undertake to deliver on our commitments*	*We treat each other with dignity & respect & we value diversity*		*The communities & societies in which we operate will be better off*
Health and safety loss	***Environmental damage***	***Financial loss***	***Reputational damage***	***Legal and regulatory issue***	***Social and community damage***										***Health and safety benefits***	***Environmental improvement***	***Financial gain***	***Reputational enhancement***	***Legal and regulatory benefit***	***Social 'licence to operate'***
Multiple fatalities	Extreme environmental effect with impairment of ecosystem function. Long-term, widespread effects on significant area	> US$50 million	Extreme international public/ media outcry. Damaging NGO campaign. Social/ legal licence to operate severely threatened	Significant fine/ imprisonment loss of mining right	Extreme, widespread social impact. Irreparable damage to highly valued cultural heritage	***Extreme***	***C6***	-/+21	-/+30	-/+32	-/+34	-/+35	-/+36	***Exceptional***	Total elimination of OH&S hazards & risk	Exceptional, very long-term and widespread environmental improvement	> US$50 million	Ongoing recognition and absence of criticism plus favourable shareholder/ analyst commentary	Rights or permits to exceptional deposits or projects	Exceptional socio-economic improvements
Fatality/ multiple disablement/ occupational disease cases	Serious environmental effect with some impairment of ecosystem function. Relatively widespread, medium-long term impact	US$10 million - 50 million	Serious adverse national media/ public/ NGO attention. Social/ legal licence to operate questioned	Major breach of regulation/ major litigation	Persistent social issues. Serious damage to/ infringement to valued cultural heritage	***Major***	***C5***	-/+17	-/+27	-/+28	-/+29	-/+31	-/+33	***Substantial***	Substitution of material, substance, equipment or process with one less hazardous	Substantial, long-term and widespread environmental improvement	US$10 million - 50 million	Substantial recognition and absence of criticism plus favourable shareholder/ analyst commentary	Rights or permits to substantial deposits (stability and royalty)	Substantial socio-economic improvements
Permanent disability	Significant effect on biological or physical environment not affecting ecosystem function. Significant short-medium term widespread impact	US$1 million - 10 million	Concerted attention from media and/ or heightened community concern	Serious breach of regulation with report to authority	On-going social issues. High damage to valued cultural heritage.	***High***	***C4***	-/+14	-/+22	-/+23	-/+24	-/+25	-/+26	***Valuable***	Adoption of safer practices through redesign of tools, equipment or work process	Valuable, short-term and widespread environmental improvement	US$1 million - 10 million	Expression of recognition and absence of criticism plus favourable shareholder/ analyst commentary	Valuable operational support agreements (tax/ stability and royalty)	Valuable socio-economic improvements
Temporary disability	Moderate effect on biological or physical environment. Moderate, short-medium term damage to minimal, low significance area	US$100.000 - 1 million	Moderate, adverse local public media attention/ complaints	Minor legal issue/ non-compliance/ breach of regulation	Moderate medium-term social impact on local population. Moderate damage to heritage	***Moderate***	***C3***	-/+8	-/+15	-/+16	-/+18	-/+19	-/+20	***Significant***	Worker separation/ isolation from hazard through barriers, guards, trip switches, alarms, etc	Significant, *ad hoc* and widespread environmental improvement	US$100.000 - 1 million	Ongoing absence of criticism	Significant operational support agreements (tax/ stability and royalty)	Significant socio-economic improvements
Medical treatment case	No lasting effect/ low-level impact on biological or physical environment. Minor damage to small, low significance area	US$10.000 - 100.000	Public concern restricted to local complaints. On-going regulator scrutiny/ attention	No legal issues but breach of company guidelines	Low-level social or cultural impact. Minor repairable damage to commonplace structures	***Minor***	***C2***	-/+2	-/+9	-/+10	-/+11	-/+12	-/+13	***Useful***	Administrative controls (job rotation/ timing, maintenance and housekeeping, training, etc)	Useful, *ad hoc* and local environmental improvement	US$10.000 - 100.000	Period of absence of criticism	Positive ranking in legal and regulatory surveys	Useful local community projects and initiatives
No injury	Negligible	< US$10.000	Negligible			***Insignificant***	***C1***	-/+1	-/+3	-/+4	-/+5	-/+6	-/+7	***Insignificant***	Provision of suitable and properly maintained PPE and training in its use	Limited local environmental improvement	< US$10.000	Negligible		
								L1	***L2***	***L3***	***L4***	***L5***	***L6***							
						Probability:	(probability %)	<1%	1-33%	33-50%	50-66%	66-96%	96-100%							
							(description)	***Almost impossible***	***Very unlikely***	***Unlikely***	***Likely***	***Very likely***	***Almost certain***							
								Likelihood over project life												

(Likelihood = probability of event x exposure probability)

Consider:

Cure *Support* *Prevent* *Well-being*	*Reduce* *Renewable energy* *'Green' organisation* *Sustainable ecosystem*	*Shareholder value* *Stakeholder confidence* *Continual training* *Technological edge*	*Improved record* *Access to funding*	*Quick permitting* *Good relations* *'Corporate citizen'*	*Extra income sources* *Transparency* *Better work conditions* *Corporate culture*

AngloGold Ashanti group risk management process aims to ensure that:
- All material risks are identified and managed;
- Decisions can be made with confidence;
- We operate at known, acceptable and mitigated risk levels to cope with change and uncertainty;
- We apply the right risk techniques to all tasks; and
- Risk assessment and management are part of every step in the business process.

Risk title **=** ***Event*** *caused by* ***Mechanism*** **(***on* ***Object*****)(***at* ***Location*****)**

Minimum required actions per post-treatment risk classification index:

Post-treatment risk classification index:	*Response:*	*Report to Stratum:*	*Monitoring:*	*Risk analysis:*	*Threat planning:*
31 to 36	Immediate and urgent action	VII/ VI/ ExCom & Board	Monitor according to the underlying nature of the risk, with those with the greatest impact potential and highest risk velocity to receive the most frequent monitoring	Quantitative where appropriate	Business continuity/ contingency and emergency plans mandatory
25 to 30	Proactive management	VI/ V/ & ExCom			
16 to 24	Active management	IV & risk owner		Semi-quantitative/ qualitative if appropriate	Business continuity/ contingency and emergency plans advisory
9 to 15	Manage routinely	III & risk champion			-
1 to 8				-	

Project risk assessments:

Project cost variance:	*Project quality/ 'Fit-for-purpose' issues:*	*Project schedule deviation (time):*
>50%	Requiring substantial intervention to maintain performance or could affect production/ performance by >20%	>50%
25 to 50%	Requiring significant intervention to maintain performance or could affect production/ performance by 10 to 20%	25 to 50%
10 to 25%	That could be addressed during ramp-up or could affect production/ performance by 5 to 10%	10 to 25%
5 to 10%	That could be addressed during ramp-up or could affect production/ performance by 1 to 5%	5 to 10%
1 to 5%	Minor quality issues or could affect production/ performance by <1%	1 to 5%
< 1%	Insignificant quality issues or effect on production/ performance	< 1%

For group reporting purposes, all project consequences per this table are to be converted to a total financial consequence (US$) and used to determine the group financial impact level in the matrix above.

Notes:
1. Where an event has more than one impact/ consequence the highest impact/ consequence shall be selected
2. Refer to AngloGold Ashanti *Group Risk Management Policy Statement, Standard and Guidelines*
3. Please report any problems with the risk management process to Vice President: Risk Management
4. All current, supporting information that relates to the group risk management process can be found on the Risk Management Community of Practice: http://moss/sites/it/CoPMain/Risk%20Management/Default.aspx