

113451 Cluster 1 - Kromkloof Treatment Works MCC-BFTW1 - Motor and Equipment Schedule										Document Number 113451_MCC-BFTW1_MES				Rev 1	Date 29-Sep-17			
Item No	Tag No	Description	Location	Starter	Submersible (V/N)	Volt	Ph	Rating	Unit	Supply Side Ratings				Typical Equipment Rating			Util. Factor	Standby Power
										S kVA	Amps	PF	Drive Eff.	Amps	PF	Eff.		
1	IN-01	MCC incomer	MCC Room	INCOMER	NO	400	3	1500	A	884	1279	0.85	-	-	-	-	-	
2	0502-PC-01A	High Lift Pump No.1	Pump Station	SS	NO	400	3	315	kW	377.2	544.4	0.87	1	544.4	0.87	0.96	1	NO
3	0502-PC-01B	High Lift Pump No.2	Pump Station	SS	NO	400	3	315	kW	377.2	544.4	0.87	1	544.4	0.87	0.96	1	NO
4	0502-PC-01C	High Lift Pump No.3	Pump Station	SS	NO	400	3	315	kW	377.2	544.4	0.87	1	544.4	0.87	0.96	0	NO
5	0502-FN-01	Ventilation Fan No.1	Pump Station	FDR	NO	400	3	1.1	kW	1.8	2.6	0.81	1	2.6	0.81	0.74	1	NO
6	0502-FN-02	Ventilation Fan No.2	Pump Station	FDR	NO	400	3	1.1	kW	1.8	2.6	0.81	1	2.6	0.81	0.74	1	NO
7	1303-AP-01	Dewatering Buffer Tank Mixer	Dewatering Buffer Tank	DOL	NO	400	3	1.1	kW	1.8	2.6	0.81	1	2.6	0.81	0.74	1	NO
8	1303-PP-01A	Dewatering Pump No.1	Silt Dewatering	DOL	NO	400	3	30	kW	38.4	55.4	0.85	1	55.4	0.85	0.92	1	NO
9	1303-PP-01B	Dewatering Pump No.2	Silt Dewatering	DOL	NO	400	3	30	kW	38.4	55.4	0.85	1	55.4	0.85	0.92	0	NO
10	1100-PC-01A	Backwash Recovery Pump No.1	Silt Backwash Recovery	DOL	NO	400	3	3	kW	4.7	6.9	0.81	1	6.9	0.81	0.78	1	NO
11	1100-PC-01B	Backwash Recovery Pump No.2	Silt Backwash Recovery	DOL	NO	400	3	3	kW	4.7	6.9	0.81	1	6.9	0.81	0.78	0	NO
12	0807-AP-01	Polymer Make-up Mixer	Polymer Mixing Tank	DOL	NO	400	3	1.1	kW	1.8	2.6	0.81	1	2.6	0.81	0.74	1	NO
13	0807-AP-02	Polymer Dosing Tank Mixer	Polymer Dosing Tank	DOL	NO	400	3	1.1	kW	1.8	2.649	0.81	1	2.6	0.81	0.74	1	NO
14	0807-PPC-01A	Polymer Transfer Pump No.1	Polymer Makeup Dosing	DOL	NO	400	3	2.2	kW	3.5	5.0	0.81	1	5.0	0.81	0.78	1	NO
15	0807-PPC-01B	Polymer Transfer Pump No.2	Polymer Makeup & Dosing	DOL	NO	400	3	2.2	kW	3.5	5.0	0.81	1	5.0	0.81	0.78	0	NO
16	0805-AP-01	KMnO4 Make-up Mixer	KMnO4 Mixing Tank	DOL	NO	400	3	1.1	kW	1.8	2.6	0.81	1	2.6	0.81	0.74	1	NO
17	0805-AP-02	KMnO4 Dosing Tank No. 2 Mixer	KMnO4 Dosing Tank No.2	DOL	NO	400	3	1.1	kW	1.8	2.6	0.81	1	2.6	0.81	0.74	1	NO
18	0805-AP-03	KMnO4 Dosing Tank No.3 Mixer	KMnO4 Dosing Tank No.3	DOL	NO	400	3	1.1	kW	1.8	2.6	0.81	1	2.6	0.81	0.74	1	NO
19	0805-PPC-01A	KMnO4 Transfer Pump No.1	KMnO4 Makeup & Dosing	DOL	NO	400	3	2.2	kW	3.5	5.0	0.81	1	5.0	0.81	0.78	1	NO
20	0805-PPC-01B	KMnO4 Transfer Pump No.2	KMnO4 Mixing Tank	DOL	NO	400	3	2.2	kW	3.5	5.0	0.81	1	5.0	0.81	0.78	0	NO
21	0703-PC-01A	Service Water Panel	Service Water System	FDR	NO	400	3	6	kW	8.5	12.3	0.82	1	12.3	0.82	0.86	1	NO
22	0700-BC-01	Compressor No.1	Compressed Air System	DOL	NO	400	3	5.5	kW	7.8	11.3	0.82	1	11.3	0.82	0.86	1	NO
23	0700-BC-02	Compressor No.2	Compressed Air System	DOL	NO	400	3	5.5	kW	7.8	11.3	0.82	1	11.3	0.82	0.86	0	NO
24	DB-PS	Pump Station Power and lighting DB	High Lift Pump Station	FDR	NO	400	3	21	A	14.5	21.0	0.84	1	21.0	0.84	0.88	1	NO
25	DB-AD	Admin Power and lighting DB	Admin Container	FDR	NO	400	3	12	A	8.3	12.0	0.84	1	12.0	0.84	0.87	1	NO
26	DB-ST	Storage Power and lighting DB	Storage Container	FDR	NO	220	1	4	A	0.9	4.0	0.81	1	4.0	0.81	0.78	1	NO
27	DB-CD	Chemical Dosing Power and Lighting DB	Chemical Dosing Plant	FDR	NO	400	3	17	A	11.8	17.0	0.84	1	17.0	0.84	0.88	1	NO
28	EK-01	Streetlighting Kiosk	Site	FDR	NO	400	3	2	A	1.4	2.0	0.81	1	2.0	0.81	0.74	1	NO
29	0102-FCV-01	Flow Control Valve	Inlet Works Filter Feed Line	FDR	NO	400	3	1	kW	1.7	2.5	0.79	1	2.5	0.79	0.74	1	NO
30	0502-XV-01	Actuated Valve	Pump No.1 Suction	FDR	NO	400	3	1	kW	1.7	2.5	0.79	1	2.5	0.79	0.74	1	NO
31	0502-XV-02	Actuated Valve	Pump No.1 Discharge	FDR	NO	400	3	1	kW	1.7	2.5	0.79	1	2.5	0.79	0.74	1	NO
32	0502-XV-03	Actuated Valve	Pump No.2 Suction	FDR	NO	400	3	1	kW	1.7	2.5	0.79	1	2.5	0.79	0.74	1	NO
33	0502-XV-04	Actuated Valve	Pump No.2 Discharge	FDR	NO	400	3	1	kW	1.7	2.5	0.79	1	2.5	0.79	0.74	1	NO
34	0502-XV-05	Actuated Valve	Pump No.3 Suction	FDR	NO	400	3	1	kW	1.7	2.5	0.79	1	2.5	0.79	0.74	1	NO
35	0502-XV-06	Actuated Valve	Pump No.3 Discharge	FDR	NO	400	3	1	kW	1.7	2.5	0.79	1	2.5	0.79	0.74	1	NO

Parameters		Defaults	Assumptions	
Fault Level	15	kA		
Voltage	400	400	Maximum sustained conductor temperature	70°C
Ambient Temperature	30	30	Short Circuit max conductor temp is 160°C for 1 sec	
Conductor Operating Temperature	70	70	Powerfactor	1
Ground Temperature	25	25	Balanced Phases	
Ground Thermal Resistivity	1.2	1.2	Multicore PVC Cu Insulated Cables	
Depth of laying to top of cable	0.6	0.5	Assumed Frequencies	49-61HZ
Method of installation in ground	ground	ground/ pipes	Resistivity of conductor material at average temp during SC ($\Omega \cdot \text{mm}^2/\text{m}$)	0.023
At coast or highveld	Highveld	Coastal/ Highveld	for further assumptions refer to SANS 10142-1	

Item No	Cable Route				Circuit Type	Estimate Length	Cores		Armouring	Supply Current (A)	Load Current (A)	Installation method	Allowable Volt Drop	Derating factor	Actual Volt Drop	Cable Type	Circuit Breaker		Earth		Field Control	
	From		To				Cores per cable	# of cores per phase									Estimated Circuit breaker	Ii (A)	ECC BCEW (mm²)	# of Cores	Size (mm²)	
	Equipment Tag No.	Description	Equipment Tag No	Description																		
1	SUP-01	Transformer	IN-01	MCC incomer	INCOMER	30	1	4	AWA	1279.0	1279	ground	1.5%	0.85	0.62%	4 x 1C x240mm² / P + N	1,500	3,000	70			
2	MCC-BFTW1	MCC	0502-PC-01A	High Lift Pump No.1	SS	30	4	2	SWA	544.4	544	meth_4or6	3.0%	0.87	0.59%	2 x 4C x185mm²	630	1,260		4C	1.5	
3	MCC-BFTW1	MCC	0502-PC-01B	High Lift Pump No.2	SS	30	4	2	SWA	544.4	544	meth_4or6	3.0%	0.87	0.59%	2 x 4C x185mm²	630	1,260		4C	1.5	
4	MCC-BFTW1	MCC	0502-PC-01C	High Lift Pump No.3	SS	30	4	2	SWA	544.4	544	meth_4or6	3.0%	0.87	0.59%	2 x 4C x185mm²	630	1,260		4C	1.5	
5	MCC-BFTW1	MCC	0502-FN-01	Ventilation Fan No.1	FDR																	
6	MCC-BFTW1	MCC	0502-FN-02	Ventilation Fan No.2	FDR																	
Supplied from DB-PS																						
7	MCC-BFTW1	MCC	1303-AP-01	Dewatering Buffer Tank Mixer	DOL	100	4	1	SWA	2.6	3	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	10	20		4C	1.5	
8	MCC-BFTW1	MCC	1303-PP-01A	Dewatering Pump No.1	DOL	100	4	1	SWA	55.4	55	ground	3.0%	0.85	2.39%	1 x 4C x25mm²	63	126		4C	1.5	
9	MCC-BFTW1	MCC	1303-PP-01B	Dewatering Pump No.2	DOL	100	4	1	SWA	55.4	55	ground	3.0%	0.85	2.39%	1 x 4C x25mm²	63	126		4C	1.5	
10	MCC-BFTW1	MCC	1100-PC-01A	Backwash Recovery Pump No.1	DOL	100	4	1	SWA	6.9	7	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	10	20		4C	1.5	
11	MCC-BFTW1	MCC	1100-PC-01B	Backwash Recovery Pump No.2	DOL	100	4	1	SWA	6.9	7	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	10	20		4C	1.5	
12	MCC-BFTW1	MCC	0807-AP-01	Polymer Make-up Mixer	DOL	100	4	1	SWA	2.6	3	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	10	20		4C	1.5	
13	MCC-BFTW1	MCC	0807-AP-02	Polymer Dosing Tank Mixer	DOL	100	4	1	SWA	2.6	3	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	10	20		4C	1.5	
14	MCC-BFTW1	MCC	0807-PPC-01A	Polymer Transfer Pump No.1	DOL	100	4	1	SWA	5.0	5	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	10	20		4C	1.5	
15	MCC-BFTW1	MCC	0807-PPC-01B	Polymer Transfer Pump No.2	DOL	100	4	1	SWA	5.0	5	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	10	20		4C	1.5	
16	MCC-BFTW1	MCC	0805-AP-01	KMnO4 Make-up Mixer	DOL	100	4	1	SWA	2.6	3	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	10	20		4C	1.5	
17	MCC-BFTW1	MCC	0805-AP-02	KMnO4 Dosing Tank No. 2 Mixer	DOL	100	4	1	SWA	2.6	3	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	10	20		4C	1.5	
18	MCC-BFTW1	MCC	0805-AP-03	KMnO4 Dosing Tank No.3 Mixer	DOL	100	4	1	SWA	2.6	3	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	10	20		4C	1.5	
19	MCC-BFTW1	MCC	0805-PPC-01A	KMnO4 Transfer Pump No.1	DOL	100	4	1	SWA	5.0	5	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	10	20		4C	1.5	
20	MCC-BFTW1	MCC	0805-PPC-01B	KMnO4 Transfer Pump No.2	DOL	100	4	1	SWA	5.0	5	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	10	20		4C	1.5	
21	MCC-BFTW1	MCC	0703-PC-01A	Service Water Panel	FDR	50	4	1	SWA	12.3	12	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	20	40	4			
22	MCC-BFTW1	MCC	0700-BC-01	Compressor No.1	DOL	50	4	1	SWA	11.3	11	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	20	40		4C	1.5	
23	MCC-BFTW1	MCC	0700-BC-02	Compressor No.2	DOL	50	4	1	SWA	11.3	11	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	20	40		4C	1.5	
24	MCC-BFTW1	MCC	DB-PS	Pump Station Power and lighting DB	FDR	10	4	1	SWA	21.0	21	ground	1.5%	0.85	0.76%	1 x 4C x4mm²	32	64	4			
25	MCC-BFTW1	MCC	DB-AD	Admin Power and lighting DB	FDR	60	4	1	SWA	12.0	12	ground	1.5%	0.85	0.91%	1 x 4C x10mm²	16	32	10			
26	MCC-BFTW1	MCC	DB-ST	Storage Power and lighting DB	FDR	60	3	1	SWA	4.0	4	ground	1.5%	0.85	0.23%	1 x 3C x25mm²	10	20	4			
27	MCC-BFTW1	MCC	DB-CD	Chemical Dosing Power and Lighting DB	FDR	100	4	1	SWA	17.0	17	ground	1.5%	0.85	1.49%	1 x 4C x16mm²	25	50	16			
28	MCC-BFTW1	MCC	EK-01	Streetlighting Kiosk	FDR	50	4	1	SWA	2.0	2	ground	1.5%	0.85	1.20%	1 x 4C x16mm²	10	20	16			
29	MCC-BFTW1	MCC	0102-FCV-01	Flow Control Valve	FDR	100	4	1	SWA	2.5	2	ground	3.0%	0.85	2.39%	1 x 4C x4mm²	10	20	4			
30	MCC-BFTW1	MCC	0502-XV-01	Actuated Valve	FDR	30	4	1	SWA	2.5	2	ground	3.0%	0.85	1.15%	1 x 4C x2.5mm²	10	20				
31	MCC-BFTW1	MCC	0502-XV-02	Actuated Valve	FDR	30	4	1	SWA	2.5	2	ground	3.0%	0.85	1.15%	1 x 4C x2.5mm²	10	20				
32	MCC-BFTW1	MCC	0502-XV-03	Actuated Valve	FDR	30	4	1	SWA	2.5	2	ground	3.0%	0.85	1.15%	1 x 4C x2.5mm²	10	20				
33	MCC-BFTW1	MCC	0502-XV-04	Actuated Valve	FDR	30	4	1	SWA	2.5	2	ground	3.0%	0.85	1.15%	1 x 4C x2.5mm²	10	20				
34	MCC-BFTW1	MCC	0502-XV-05	Actuated Valve	FDR	30	4	1	SWA	2.5	2	ground	3.0%	0.85	1.15%	1 x 4C x2.5mm²	10	20				

113451
 Cluster 1 - Kromkloof Treatment Works
 MCC-BFTW1 - Cable Schedule

Document Number
 113451_MCC-BFTW1_CAB

Rev
 1

Date
 29-Sep-17

Parameters		Defaults	Assumptions												
Fault Level	15	kA													
Voltage	400	400	Maximum sustained conductor temperature										70°C		
Ambient Temperature	30	30	Short Circuit max conductor temp is 160°C for 1 sec												
Conductor Operating Temperature	70	70	Powerfactor										1		
Ground Temperature	25	25	Balanced Phases												
Ground Thermal Resistivity	1.2	1.2	Multicore PVC Cu Insulated Cables												
Depth of laying to top of cable	0.6	0.5	Assumed Frequencies										49-61HZ		
Method of installation in ground	ground	ground/ pipes	Resistivity of conductor material at average temp during SC ($\Omega \cdot \text{mm}^2/\text{m}$)										0.023		
At coast or highveld	Highveld	Coastal/ Highveld	for further assumptions refer to SANS 10142-1												

Cable Route															Circuit Breaker		Earth	Field Control			
Item No	From		To		Circuit Type	Estimate Length	Cores		Armouring	Supply Current (A)	Load Current (A)	Installation method	Allowable Volt Drop	Derating factor	Actual Volt Drop	Cable Type	Estimated Circuit breaker	li (A)	ECC BCEW (mm ²)	# of Cores	Size (mm ²)
	Equipment Tag No.	Description	Equipment Tag No	Description			Cores per cable	# of cores per phase													
35	MCC-BFTW1	MCC	0502-XV-06	Actuated Valve	FDR	30	4	1	SWA	2.5	2	ground	3.0%	0.85	1.15%	1 x 4C x2.5mm ²	10	20			

113451 Cluster 1 - Kromkloof Treatment Works PLC-BFTW1 - Instrumentation and Control Cable Schedule								Document Number 113451_MCC-BFTW1_I&CS				Rev T0	Date 29-Sep-17			
Item No	FROM		TO		Location	P&ID	Estimate Length	Signal		Power Cables		Control Cables		Instrumentation Cables		Function
	Tag No	Description	Tag No	Description				Analog	Digital	Cores	Size mm ²	Type	Size mm ²	Pairs	Size mm ²	
-																
1	PLC-BFTW1	PLC	0102-FCV-01	Flow Control Valve	Inlet Works_Filter Feed Line	MFD-0001	100	x				7C	1.5			Open/Close Cmd feedback
2	PLC-BFTW1	PLC	0502-XV-01	Actuated Valve	Pump No.1 Suction	MFD-0003	30		x			7C	1.5			Open/Close Cmd feedback
3	PLC-BFTW1	PLC	0502-XV-02	Actuated Valve	Pump No.1 Discharge	MFD-0003	30		x			7C	1.5			Open/Close Cmd feedback
4	PLC-BFTW1	PLC	0502-XV-03	Actuated Valve	Pump No.2 Suction	MFD-0003	30		x			7C	1.5			Open/Close Cmd feedback
5	PLC-BFTW1	PLC	0502-XV-04	Actuated Valve	Pump No.2 Discharge	MFD-0003	30		x			7C	1.5			Open/Close Cmd feedback
6	PLC-BFTW1	PLC	0502-XV-05	Actuated Valve	Pump No.3 Suction	MFD-0003	30		x			7C	1.5			Open/Close Cmd feedback
7	PLC-BFTW1	PLC	0502-XV-06	Actuated Valve	Pump No.3 Discharge	MFD-0003	30		x			7C	1.5			Open/Close Cmd feedback
8	PLC-BFTW1	PLC	0904-XV-01	Solenoid Valve	Calcium Hypochlorite Dosing Unit Feed Line	MFD-0006	100		x			3C	1.5			Open/Close
9	PLC-BFTW1	PLC	0904-XV-02	Solenoid Valve	Service Water Supply to Venturi	MFD-0006	100		x			3C	1.5			Open/Close
10	PLC-BFTW1	PLC	0802-XV-01	Solenoid Valve	Service Water Supply to Venturi	MFD-0007	100		x			3C	1.5			Open/Close
11	PLC-BFTW1	PLC	0807-XV-01	Solenoid Valve	Service Water Supply to Venturi	MFD-0008	100		x			3C	1.5			Open/Close
12	PLC-BFTW1	PLC	0805-XV-01	Solenoid Valve	Service Water Supply to Venturi	MFD-0009	100		x			3C	1.5			Open/Close
13	PLC-BFTW1	PLC	0102-FT-01	Electromagnetic Flow Transmitter	Inlet works - Borehole Inlet	MFD-0001	100	x		3C	2.5			2	1.5	
14	PLC-BFTW1	PLC	0102-FT-02	Electromagnetic Flow Transmitter	Inlet works - Borehole Inlet	MFD-0001	100	x		3C	2.5			2	1.5	
15	PLC-BFTW1	PLC	0102-FT-03	Electromagnetic Flow Transmitter	Inlet works - Borehole Inlet	MFD-0001	100	x		3C	2.5			2	1.5	
16	PLC-BFTW1	PLC	0102-FT-04	Electromagnetic Flow Transmitter	Inlet works - Backwash Recovery line	MFD-0001	100	x		3C	2.5			2	1.5	
17	PLC-BFTW1	PLC	0102-LT-01	Ultrasonic Level Transmitter	Inlet works - Blending Tank	MFD-0001	100	x		3C	2.5			1	1.5	
18	PLC-BFTW1	PLC	0102-LSH-01	Hydrostatic Level switch	Inlet works - Blending Tank	MFD-0001	100		x					1	1.5	
19	PLC-BFTW1	PLC	0102-LSL-01	Hydrostatic Level switch	Inlet works - Blending Tank	MFD-0001	100		x					1	1.5	
20	PLC-BFTW1	PLC	0102-FT-05	Electromagnetic Flow Transmitter	Inlet works -Filter line	MFD-0001	100	x		3C	2.5			2	1.5	
21	PLC-BFTW1	PLC	0102-AT-01	Analyzer Transmitter	Inlet works -Filter line	MFD-0001	100	x		3C	2.5			1	1.5	
22	PLC-BFTW1	PLC	0102-AT-02	Analyzer Transmitter	Inlet works -Filter line	MFD-0001	100	x		3C	2.5			1	1.5	
23	PLC-BFTW1	PLC	0501-FT-05	Electromagnetic Flow Transmitter	Filters - Dewatering Line	MFD-0002	100	x		3C	2.5			2	1.5	
24	PLC-BFTW1	PLC	0501-AT-01	Analyzer Transmitter	Filters - Cl Contact Tank Line	MFD-0002	100	x		3C	2.5			1	1.5	
25	PLC-BFTW1	PLC	0501-AT-01	Analyzer Transmitter	Filters - Cl Contact Tank Line	MFD-0002	100	x		3C	2.5			1	1.5	
26	PLC-BFTW1	PLC	0601-LT-01	Ultrasonic Level Transmitter	Chlorine Contact Tank	MFD-0003	50	x		3C	2.5			1	1.5	
27	PLC-BFTW1	PLC	0602-AT-01	Analyzer Transmitter	Clearwell	MFD-0003	50	x		3C	2.5			1	1.5	
28	PLC-BFTW1	PLC	0602-AT-02	Analyzer Transmitter	Clearwell	MFD-0003	50	x		3C	2.5			1	1.5	
29	PLC-BFTW1	PLC	0602-AT-03	Analyzer Transmitter	Clearwell	MFD-0003	50	x		3C	2.5			1	1.5	
30	PLC-BFTW1	PLC	0602-AT-04	Analyzer Transmitter	Clearwell	MFD-0003	50	x		3C	2.5			1	1.5	
31	PLC-BFTW1	PLC	0602-LIT-01	Ultrasonic Level Transmitter	Clearwell	MFD-0003	50	x		3C	2.5			1	1.5	
32	PLC-BFTW1	PLC	JB-01	Highlift Pump No.1 Junction Box	High Lift Pump Station	-	30	x		4C	2.5					

113451 Cluster 1 - Kromkloof Treatment Works PLC-BFTW1 - Instrumentation and Control Cable Schedule								Document Number 113451_MCC-BFTW1_I&CS				Rev T0	Date 29-Sep-17			
Item No	FROM		TO		Location	P&ID	Estimate Length	Signal		Power Cables		Control Cables		Instrumentation Cables		Function
	Tag No	Description	Tag No	Description				Analog	Digital	Cores	Size mm ²	Type	Size mm ²	Pairs	Size mm ²	
33	PLC-BFTW1	PLC	JB-01	Highlift Pump No.1 Junction Box	High Lift Pump Station	-	30	x						12	1.5	
34	PLC-BFTW1	PLC	JB-01	Highlift Pump No.1 Junction Box	High Lift Pump Station	-	30	x						12	1.5	
35	MCC-BFTW1	MCC	JB-01	Highlift Pump No.1 Junction Box	High Lift Pump Station	-	30	x				7C	1.5			Relay outputs from flow transmitters
36	MCC-BFTW1	MCC	JB-01	Highlift Pump No.1 Junction Box	High Lift Pump Station	-	30	x				17C	1.5			Relay outputs from universal controllers for winding, bearing and vibration
37	JB-01	Highlift Pump No.1 Junction Box	0502-FT-01	Electromagnetic Flow Transmitter	Pump No.1 Suction	MFD-0003	10	x		3C	2.5			2	1.5	
38	JB-01	Highlift Pump No.1 Junction Box	0502-FT-02	Electromagnetic Flow Transmitter	Pump No.1 Discharge	MFD-0003	10	x		3C	2.5			2	1.5	
39	JB-01	Highlift Pump No.1 Junction Box	0502-FT-01R	Flow Transmitter Relay Output	Pump No.1 Suction	MFD-0003	10		x			3C	1.5			Relay output for pump protection
40	JB-01	Highlift Pump No.1 Junction Box	0502-FT-02R	Flow Transmitter Relay Output	Pump No.1 Discharge	MFD-0003	10		x			3C	1.5			Relay output for pump protection
41	JB-01	Highlift Pump No.1 Junction Box	0502-PT-01	JB-01	Highlift Pump No.1 Junction Box	MFD-0003	10	x		3C	2.5			1	1.5	
42	JB-01	Highlift Pump No.1 Junction Box	0502-PT-02	Pressure Transmitter	Pump No.1 Discharge	MFD-0003	10	x		3C	2.5			1	1.5	
43	JB-01	Highlift Pump No.1 Junction Box	0502-VT-01	Vibration Transmitter	Pump No.1 Casing Vibration X Axis	MFD-0003	10	x		3C	2.5			1	1.5	
44	JB-01	Highlift Pump No.1 Junction Box	0502-VT-02	Vibration Transmitter	Pump No.1 Casing Vibration Y Axis	MFD-0003	10	x		3C	2.5			1	1.5	
45	JB-01	Highlift Pump No.1 Junction Box	0502-TT-01	Temperature Transmitter	Pump No.1 DE Bearing Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
46	JB-01	Highlift Pump No.1 Junction Box	0502-TT-02	Temperature Transmitter	Pump No.1 NDE Bearing Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
47	JB-01	Highlift Pump No.1 Junction Box	0502-TT-03	Temperature Transmitter	Motor No.1 DE Bearing Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
48	JB-01	Highlift Pump No.1 Junction Box	0502-TT-04	Temperature Transmitter	Motor No.1 NDE Bearing Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
49	JB-01	Highlift Pump No.1 Junction Box	0502-TT-05	Temperature Transmitter	Motor No.1 Phase 1 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
50	JB-01	Highlift Pump No.1 Junction Box	0502-TT-06	Temperature Transmitter	Motor No.1 Phase 1 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
51	JB-01	Highlift Pump No.1 Junction Box	0502-TT-07	Temperature Transmitter	Motor No.1 Phase 2 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
52	JB-01	Highlift Pump No.1 Junction Box	0502-TT-08	Temperature Transmitter	Motor No.1 Phase 2 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
53	JB-01	Highlift Pump No.1 Junction Box	0502-TT-09	Temperature Transmitter	Motor No.1 Phase 3 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
54	JB-01	Highlift Pump No.1 Junction Box	0502-TT-10	Temperature Transmitter	Motor No.1 Phase 3 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
55	PLC-BFTW1	PLC	JB-02	Highlift Pump No.2 Junction Box	High Lift Pump Station	-	30	x		4C	2.5					
56	PLC-BFTW1	PLC	JB-02	Highlift Pump No.2 Junction Box	High Lift Pump Station	-	30	x						12	1.5	
57	PLC-BFTW1	PLC	JB-02	Highlift Pump No.2 Junction Box	High Lift Pump Station	-	30	x						12	1.5	
58	MCC-BFTW1	MCC	JB-02	Highlift Pump No.2 Junction Box	High Lift Pump Station	-	30	x				7C	1.5			Relay outputs from flow transmitters
59	MCC-BFTW1	MCC	JB-02	Highlift Pump No.2 Junction Box	High Lift Pump Station	-	30	x				7C	1.5			Relay outputs from universal controllers for winding, bearing and vibration
60	JB-02	Highlift Pump No.2 Junction Box	0502-FT-03	Electromagnetic Flow Transmitter	Pump No.2 Suction	MFD-0003	10	x		3C	2.5			2	1.5	
61	JB-02	Highlift Pump No.2 Junction Box	0502-FT-04	Electromagnetic Flow Transmitter	Pump No.2 Discharge	MFD-0003	10	x		3C	2.5			2	1.5	
62	JB-02	Highlift Pump No.2 Junction Box	0502-FT-03R	Flow Transmitter Relay Output	Pump No.2 Suction	MFD-0003	10		x			3C	1.5			Relay output for pump protection
63	JB-02	Highlift Pump No.2 Junction Box	0502-FT-04R	Flow Transmitter Relay Output	Pump No.2 Discharge	MFD-0003	10		x			3C	1.5			Relay output for pump protection

113451 Cluster 1 - Kromkloof Treatment Works PLC-BFTW1 - Instrumentation and Control Cable Schedule								Document Number 113451_MCC-BFTW1_I&CS				Rev T0	Date 29-Sep-17			
Item No	FROM		TO		Location	P&ID	Estimate Length	Signal		Power Cables		Control Cables		Instrumentation Cables		Function
	Tag No	Description	Tag No	Description				Analog	Digital	Cores	Size mm ²	Type	Size mm ²	Pairs	Size mm ²	
64	JB-02	Highlift Pump No.2 Junction Box	0502-PT-03	Pressure Transmitter	Pump No.2 Suction	MFD-0003	10	x		3C	2.5			1	1.5	
65	JB-02	Highlift Pump No.2 Junction Box	0502-PT-04	Pressure Transmitter	Pump No.2 Discharge	MFD-0003	10	x		3C	2.5			1	1.5	
66	JB-02	Highlift Pump No.2 Junction Box	0502-VT-03	Vibration Transmitter	Pump No.2 Casing Vibration X Axis	MFD-0003	10	x		3C	2.5			1	1.5	
67	JB-02	Highlift Pump No.2 Junction Box	0502-VT-04	Vibration Transmitter	Pump No.2 Casing Vibration Y Axis	MFD-0003	10	x		3C	2.5			1	1.5	
68	JB-02	Highlift Pump No.2 Junction Box	0502-TT-11	Temperature Transmitter	Pump No.2 DE Bearing Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
69	JB-02	Highlift Pump No.2 Junction Box	0502-TT-12	Temperature Transmitter	Pump No.2 NDE Bearing Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
70	JB-02	Highlift Pump No.2 Junction Box	0502-TT-13	Temperature Transmitter	Motor No.2 DE Bearing Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
71	JB-02	Highlift Pump No.2 Junction Box	0502-TT-14	Temperature Transmitter	Motor No.2 NDE Bearing Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
72	JB-02	Highlift Pump No.2 Junction Box	0502-TT-15	Temperature Transmitter	Motor No.2 Phase 1 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
73	JB-02	Highlift Pump No.2 Junction Box	0502-TT-16	Temperature Transmitter	Motor No.2 Phase 1 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
74	JB-02	Highlift Pump No.2 Junction Box	0502-TT-17	Temperature Transmitter	Motor No.2 Phase 2 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
75	JB-02	Highlift Pump No.2 Junction Box	0502-TT-18	Temperature Transmitter	Motor No.2 Phase 2 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
76	JB-02	Highlift Pump No.2 Junction Box	0502-TT-19	Temperature Transmitter	Motor No.2 Phase 3 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
77	JB-02	Highlift Pump No.2 Junction Box	0502-TT-20	Temperature Transmitter	Motor No.2 Phase 3 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
78	PLC-BFTW1	PLC	JB-03	Highlift Pump No.3 Junction Box	High Lift Pump Station	-	30	x		4C	2.5					
79	PLC-BFTW1	PLC	JB-03	Highlift Pump No.3 Junction Box	High Lift Pump Station	-	30	x						12	1.5	
80	PLC-BFTW1	PLC	JB-03	Highlift Pump No.3 Junction Box	High Lift Pump Station	-	30	x						12	1.5	
81	MCC-BFTW1	MCC	JB-03	Highlift Pump No.3 Junction Box	High Lift Pump Station	-	30	x				7C	1.5			Relay outputs from flow transmitters
82	MCC-BFTW1	MCC	JB-03	Highlift Pump No.3 Junction Box	High Lift Pump Station							7C	1.5			Relay outputs from universal controllers for winding, bearing and vibration
83	JB-03	Highlift Pump No.3 Junction Box	0502-FT-05	Electromagnetic Flow Transmitter	Pump No.3 Suction	MFD-0003	10	x		3C	2.5			2	1.5	
84	JB-03	Highlift Pump No.3 Junction Box	0502-FT-06	Electromagnetic Flow Transmitter	Pump No.3 Discharge	MFD-0003	10	x		3C	2.5			2	1.5	
85	JB-03	Highlift Pump No.3 Junction Box	0502-FT-05R	Flow Transmitter Relay Output	Pump No.3 Suction	PID-0003	10		x			3C	1.5			Relay output for pump protection
86	JB-03	Highlift Pump No.3 Junction Box	0502-FT-06R	Flow Transmitter Relay Output	Pump No.3 Discharge	PID-0003	10		x			3C	1.5			Relay output for pump protection
87	JB-03	Highlift Pump No.3 Junction Box	0502-PT-05	Pressure Transmitter	Pump No.3 Suction	MFD-0003	10	x		3C	2.5			1	1.5	
88	JB-03	Highlift Pump No.3 Junction Box	0502-PT-06	Pressure Transmitter	Pump No.3 Discharge	MFD-0003	10	x		3C	2.5			1	1.5	
89	JB-03	Highlift Pump No.3 Junction Box	0502-VT-05	Vibration Transmitter	Pump No.3 Casing Vibration X Axis	MFD-0003	10	x		3C	2.5			1	1.5	
90	JB-03	Highlift Pump No.3 Junction Box	0502-VT-06	Vibration Transmitter	Pump No.3 Casing Vibration Y Axis	MFD-0003	10	x		3C	2.5			1	1.5	
91	JB-03	Highlift Pump No.3 Junction Box	0502-TT-21	Temperature Transmitter	Pump No.3 DE Bearing Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
92	JB-03	Highlift Pump No.3 Junction Box	0502-TT-22	Temperature Transmitter	Pump No.3 NDE Bearing Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
93	JB-03	Highlift Pump No.3 Junction Box	0502-TT-23	Temperature Transmitter	Motor No.3 DE Bearing Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
94	JB-03	Highlift Pump No.3 Junction Box	0502-TT-24	Temperature Transmitter	Motor No.3 NDE Bearing Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
95	JB-03	Highlift Pump No.3 Junction Box	0502-TT-25	Temperature Transmitter	Motor No.3 Phase 1 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	

113451 Cluster 1 - Kromkloof Treatment Works PLC-BFTW1 - Instrumentation and Control Cable Schedule								Document Number 113451_MCC-BFTW1_I&CS				Rev T0	Date 29-Sep-17			
Item No	FROM		TO		Location	P&ID	Estimate Length	Signal		Power Cables		Control Cables		Instrumentation Cables		Function
	Tag No	Description	Tag No	Description				Analog	Digital	Cores	Size mm ²	Type	Size mm ²	Pairs	Size mm ²	
96	JB-03	Highlift Pump No.3 Junction Box	0502-TT-26	Temperature Transmitter	Motor No.3 Phase 1 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
97	JB-03	Highlift Pump No.3 Junction Box	0502-TT-27	Temperature Transmitter	Motor No.3 Phase 2 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
98	JB-03	Highlift Pump No.3 Junction Box	0502-TT-28	Temperature Transmitter	Motor No.3 Phase 2 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
99	JB-03	Highlift Pump No.3 Junction Box	0502-TT-29	Temperature Transmitter	Motor No.3 Phase 3 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
100	JB-03	Highlift Pump No.3 Junction Box	0502-TT-30	Temperature Transmitter	Motor No.3 Phase 3 Winding Temperature	MFD-0003	10	x		3C	2.5			1	1.5	
101	PLC-BFTW1	PLC	1303-LT-01	Ultrasonic Level Transmitter	Dewatering Buffer Tank	MFD-0004	100	x		3C	2.5			1	1.5	
102	PLC-BFTW1	PLC	1303-LSH-01	Float Level switch	Dewatering Buffer Tank	MFD-0004	100		x					1	1.5	
103	PLC-BFTW1	PLC	1303-LSL-01	Float Level switch	Dewatering Buffer Tank	MFD-0004	100		x					1	1.5	
104	MCC-BFTW1	MCC	1303-PS-01	Pressure Switch	Dewatering Pump No.1 Discharge	MFD-0004	100		x					1	1.5	Motor Safety Interlock
105	MCC-BFTW1	MCC	1303-PS-02	Pressure Switch	Dewatering Pump No.2 Discharge	MFD-0004	100		x					1	1.5	Motor Safety Interlock
106	MCC-BFTW1	MCC	1303-FT-01	Electromagnetic Flow Transmitter	Dewatering Pumps Common Discharge	MFD-0004	100	x		3C	2.5			2	1.5	
107	PLC-BFTW1	PLC	1100-LT-01	Ultrasonic Level Transmitter	Backwash Recovery Sump	MFD-0005	100	x		3C	2.5			1	1.5	
108	PLC-BFTW1	PLC	1100-LSH-01	Float Level switch	Backwash Recovery Sump	MFD-0005	100		x					1	1.5	
109	PLC-BFTW1	PLC	1100-LSL-01	Float Level switch	Backwash Recovery Sump	MFD-0005	100		x					1	1.5	
110	MCC-BFTW1	MCC	1100-PS-01	Pressure Switch	Backwash Recovery Pump No.1 Discharge	MFD-0005	100		x					1	1.5	Motor Safety Interlock
111	MCC-BFTW1	MCC	1100-PS-02	Pressure Switch	Backwash Recovery Pump No.2 Discharge	MFD-0005	100		x					1	1.5	Motor Safety Interlock
112	PLC-BFTW1	PLC	0904-PT-01	Pressure Transmitter	Chlorination - Service Water Line	MFD-0006	50	x		3C	2.5			1	1.5	
113	PLC-BFTW1	PLC	0904-FT-01	Electromagnetic Flow Transmitter	Chlorination - Contact Tank Line	MFD-0006	50	x		3C	2.5			2	1.5	
114	PLC-BFTW1	PLC	0904-LSH-01	Float Level switch	Calcium Chlorite Dosing Unit	MFD-0006	100		x					1	1.5	
115	PLC-BFTW1	PLC	0904-LSL-01	Float Level switch	Calcium Chlorite Dosing Unit	MFD-0006	100		x					1	1.5	
116	PLC-BFTW1	PLC	0802-LT-01	Level Transmitter	Coagulant Dosing Tank No.1	MFD-0007	100	x		3C	2.5			1	1.5	
117	PLC-BFTW1	PLC	0802-LSH-01	Ultrasonic Level Switch	Coagulant Dosing Tank No.1	MFD-0007	100		x					1	1.5	
118	PLC-BFTW1	PLC	0802-LSL-01	Ultrasonic Level Switch	Coagulant Dosing Tank No.1	MFD-0007	100		x					1	1.5	
119	PLC-BFTW1	PLC	0802-LT-02	Ultrasonic Level Transmitter	Coagulant Dosing Tank No.2	MFD-0007	100	x		3C	2.5			1	1.5	
120	PLC-BFTW1	PLC	0802-LSH-02	Ultrasonic Level Switch	Coagulant Dosing Tank No.2	MFD-0007	100		x					1	1.5	
121	PLC-BFTW1	PLC	0802-LSL-02	Ultrasonic Level Switch	Coagulant Dosing Tank No.2	MFD-0007	100		x					1	1.5	
122	PLC-BFTW1	PLC	0802-FT-01	Electromagnetic Flow Transmitter	Coagulant Dosing - Static Mixer Line	MFD-0007	100	x		3C	2.5			2	1.5	
123	PLC-BFTW1	PLC	0807-LSH-01	Ultrasonic Level Switch	Polymer Mixing Tank	MFD-0008	100		x					1	1.5	
124	PLC-BFTW1	PLC	0807-LSL-01	Ultrasonic Level Switch	Polymer Mixing Tank	MFD-0008	100		x					1	1.5	
125	MCC-BFTW1	MCC	0807-PS-01	Pressure Switch	Poly Transfer Pump No.1 Discharge	MFD-0008	100		x					1	1.5	Motor Safety Interlock
126	MCC-BFTW1	MCC	0807-PS-02	Pressure Switch	Poly Transfer Pump No.2 Discharge	MFD-0008	100		x					1	1.5	Motor Safety Interlock
127	PLC-BFTW1	PLC	0807-LT-01	Level Transmitter	Polymer Dosing Tank	MFD-0008	100	x		3C	2.5			1	1.5	

113451 Cluster 1 - Kromkloof Treatment Works PLC-BFTW1 - Instrumentation and Control Cable Schedule								Document Number 113451_MCC-BFTW1_I&CS				Rev T0	Date 29-Sep-17			
Item No	FROM		TO		Location	P&ID	Estimate Length	Signal		Power Cables		Control Cables		Instrumentation Cables		Function
	Tag No	Description	Tag No	Description				Analog	Digital	Cores	Size mm ²	Type	Size mm ²	Pairs	Size mm ²	
128	PLC-BFTW1	PLC	0807-LSH-02	Ultrasonic Level Switch	Polymer Dosing Tank	MFD-0008	100		x					1	1.5	
129	PLC-BFTW1	PLC	0807-LSL-02	Ultrasonic Level Switch	Polymer Dosing Tank	MFD-0008	100		x					1	1.5	
130	PLC-BFTW1	PLC	0807-FT-01	Electromagnetic Flow Transmitter	Polymer Dosing Tank Feed Line	MFD-0008	100	x		3C	2.5			2	1.5	
131	PLC-BFTW1	PLC	0805-LSH-01	Ultrasonic Level Switch	KMnO4 Mixing Tank	MFD-0009	100		x					1	1.5	
132	PLC-BFTW1	PLC	0805-LSL-01	Ultrasonic Level Switch	KMnO4 Mixing Tank	MFD-0009	100		x					1	1.5	
133	MCC-BFTW1	MCC	0805-PS-01	Pressure Switch	KMnO4 Transfer Pump No.1 Discharge	MFD-0009	100		x					1	1.5	Motor Safety Interlock
134	MCC-BFTW1	MCC	0805-PS-02	Pressure Switch	KMnO4 Transfer Pump No.2 Discharge	MFD-0009	100		x					1	1.5	Motor Safety Interlock
135	PLC-BFTW1	PLC	0805-LT-01	Ultrasonic Level Transmitter	KMnO4 Dosing Tank No.2	MFD-0009	100	x		3C	2.5			1	1.5	
136	PLC-BFTW1	PLC	0805-LSH-02	Ultrasonic Level Switch	KMnO4 Dosing Tank No.2	MFD-0009	100		x					1	1.5	
137	PLC-BFTW1	PLC	0805-LSL-02	Ultrasonic Level Switch	KMnO4 Dosing Tank No.2	MFD-0009	100		x					1	1.5	
138	PLC-BFTW1	PLC	0805-LT-02	Ultrasonic Level Transmitter	KMnO4 Dosing Tank No.3	MFD-0009	100	x		3C	2.5			1	1.5	
139	PLC-BFTW1	PLC	0805-LSH-03	Ultrasonic Level Switch	KMnO4 Dosing Tank No.3	MFD-0009	100		x					1	1.5	
140	PLC-BFTW1	PLC	0805-LSL-03	Ultrasonic Level Switch	KMnO4 Dosing Tank No.3	MFD-0009	100		x					1	1.5	
141	PLC-BFTW1	PLC	0805-FT-01	Electromagnetic Flow Transmitter	KMnO4 Dosing Tank Feed Line	MFD-0009	100	x		3C	2.5			2	1.5	
142	PLC-BFTW1	PLC	0703-PT-01	Pressure Transmitter	Service Water	MFD-0010	50	x		3C	2.5			1	1.5	
143	PLC-BFTW1	PLC	0703-FT-01	Electromagnetic Flow Transmitter	Service Water	MFD-0010	50	x		3C	2.5			2	1.5	
144	PLC-BFTW1	PLC	0700-PT-03	Pressure Transmitter	Compressor outlet	MFD-0011	50	x		3C	2.5			1	1.5	

113451 Cluster 1 - Kromkloof Treatment Works PLC-BFTW1 - I/O List											Document Number 113451_MCC-BFTW1_IOList			Rev 1		Date 29-Sep-17								
Item No	Tag No	Description	Digital Input							Digital Output			Analog Input					Analog Output		Remarks				
			Tripped	E-Stop	Running/ Stopped	Opened	Closed	Auto/Man/Off	Overheat	Seal Failure	Other	Start/Stop	Open/Close	Other	Measured Value	Amps	Volt	kW	Run hours		Set Point	Other		
148	0805-LSH-03	Ultrasonic Level Switch								1														
149	0805-LSL-03	Ultrasonic Level Switch								1														
150	0805-FT-01	Electromagnetic Flow Transmitter								1				1										Totalizer
151	0703-PT-01	Pressure Transmitter												1										
152	0703-FT-01	Electromagnetic Flow Transmitter								1				1										Totalizer
153	0700-PT-03	Pressure Transmitter												1										
TOTALS			178							65			82					1						