





Seedy Mill average flow: 76MI/d

Electricity cost: 11p per kWh

Inter-stage pumping station

@880I/s, D/D pumps, \approx 150kW each, 24/7 operation (150(kw)*2) * (24(h)*365(d)) = 2,628MWh/a @ 11p per kWh

+£300,000 per annum effective at construction start date + 20 months

New RGFs

Assume 4 RGF backwashes per day @ 30mins each D/D pumps, ≈ 150 kW each (150(kw)*2)*(2(h)*365(d)) = 219MWh/a @ 11p per kWh Allowance for blowers, valves and actuators = 40MWh/a @ 11p per kWh +£30,000 per annum effective at construction start date + 20 months

TOTAL OPEX INCREASE

£300,000 + £30,000 + 10% contingency for all other new plant = \pm £363k per annum





Appendix B2 Hampton Loade WTW – AMP 7 OPEX

Hampton Loade average flow: 150MI/d

Electricity cost: 11p per kWh

Inter-stage pumping station

@1740I/s, D/D/D pumps, \approx 200kW each, 24/7 operation (200(kw)*3) * (24(h)*365(d)) = 5,256MWh/a @ 11p per kWh

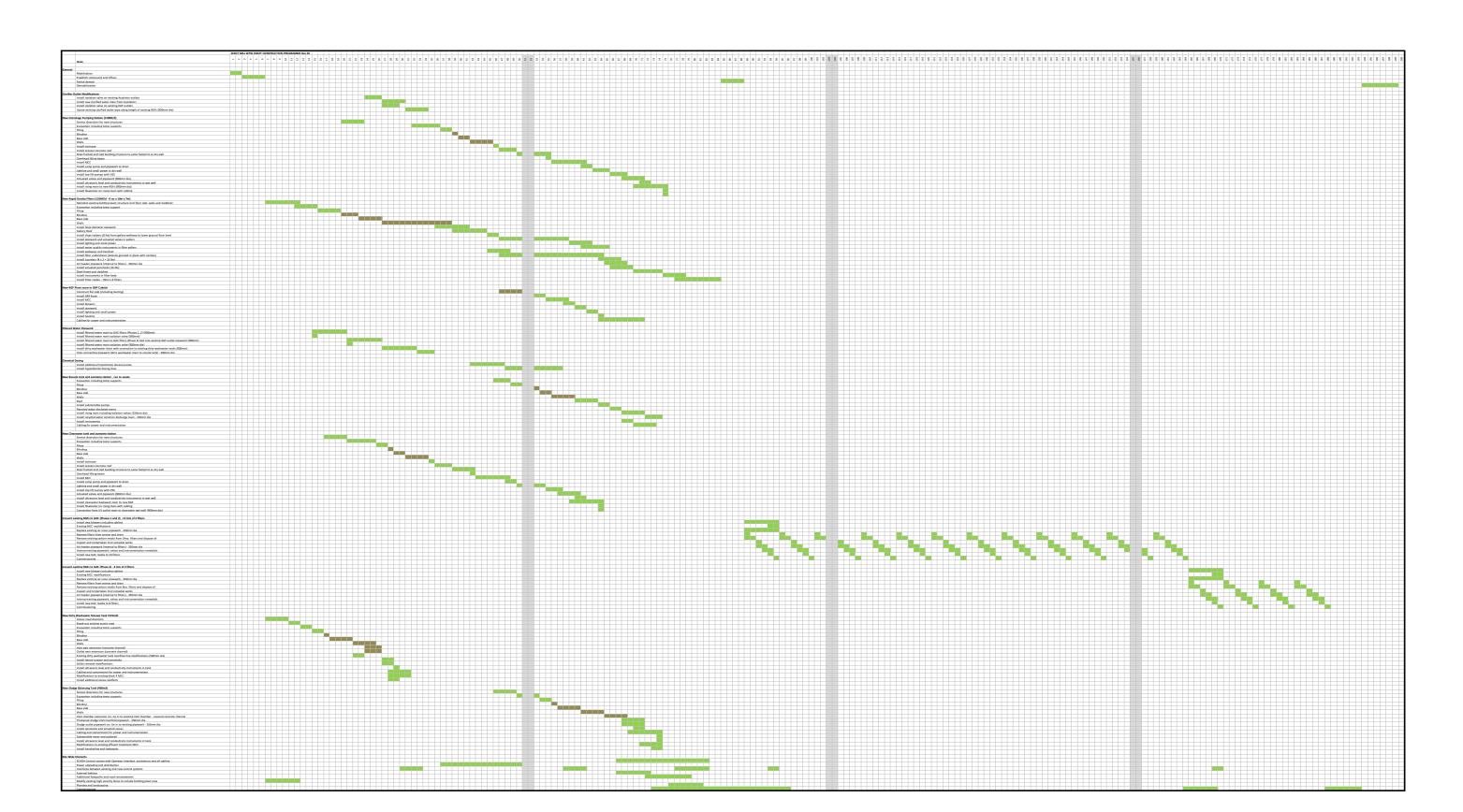
+£580,000 per annum effective at construction start date + 22 months

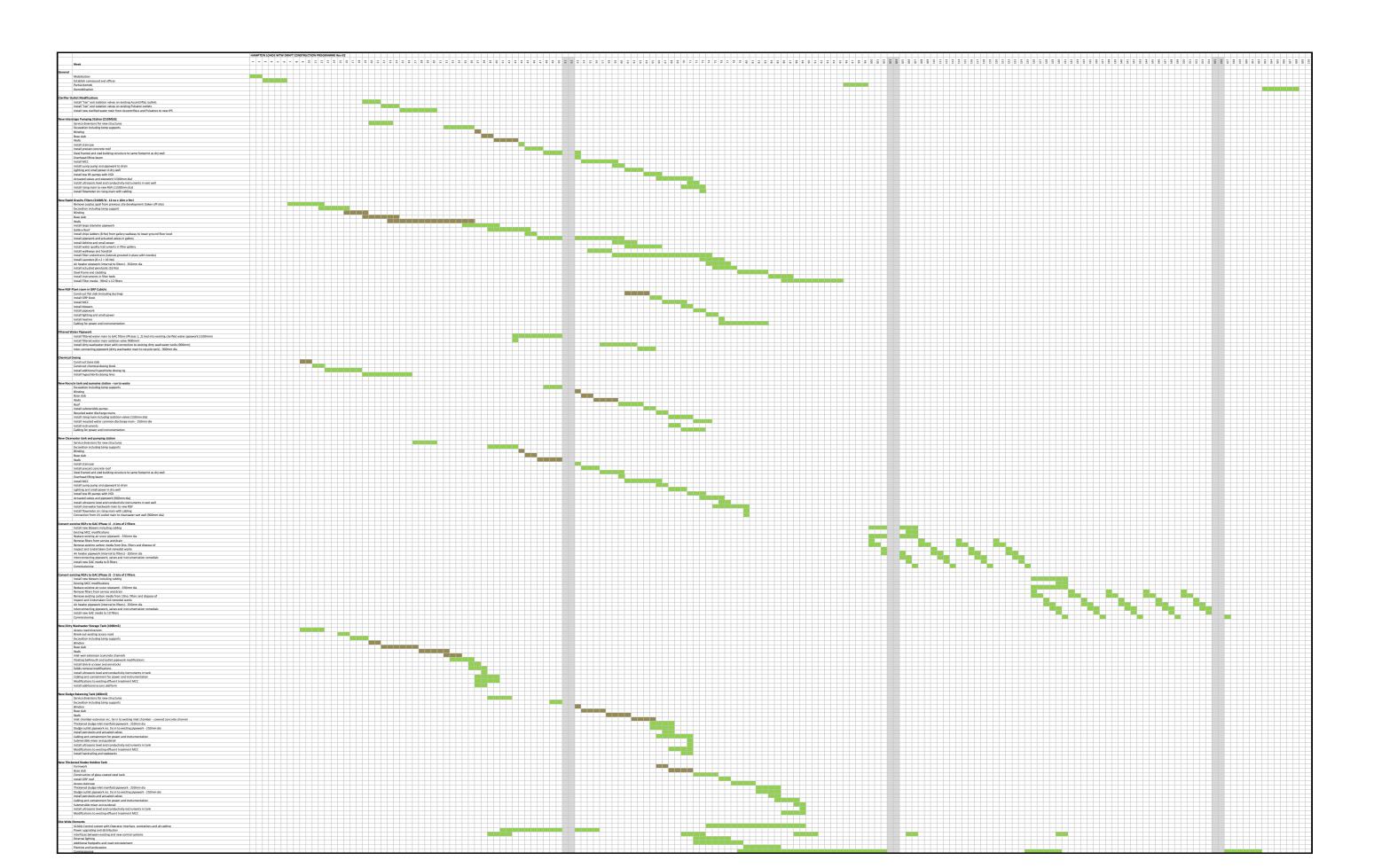
New RGFs

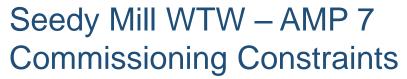
Assume 4 RGF backwashes per day @ 30mins each D/D pumps, ≈ 150 kW each (150(kw)*2)*(2(h)*365(d)) = 219MWh/a @ 11p per kWh Allowance for blowers, valves and actuators = 50MWh/a @ 11p per kWh +£30,000 per annum effective at construction start date + 22 months

TOTAL OPEX INCREASE

£580,000 + £30,000 + 10% contingency for all other new plant = $\frac{+£671k per annum}{}$











Tie-in location	Details	Tie-in strategy	Forecast Date and Duration	Operational impact	Notes and Contingency		
Accelator 1 and 4 clarified water	Tie-in to existing 750mm diameter buried mains	Installation of "T" complete with isolation valves	Date: flexible around production Duration: 2 days each	Accelator 1 then 4 offline for duration of tie-in works	Full treatment capacity retained		
Common Accelator clarified water	Tie-in to existing 750mm dia buried main	Installation of 2no. isolation valves	Date: flexible around production Duration: 2 days	Accelator(s) 2 and 3 offline for duration of tie-in works	Over-pumping can be provided to bring online further Accelators (if required). DAF remains operational		
DAF clarified water	Tie-in to existing 1000mm dia buried main	Installation of "T" complete with isolation valves	Date: flexible around production Duration: 2 days	DAF offline for duration of tie-in works	Over-pumping can be provided to bring online DAF (if required). Accelators remain operational		
UV potable water outlet	New outlet from UV discharge chamber	Installation of plate during shutdown	Date: flexible around production Duration: 12 hours	1 UV "block" offline for duration of tie-in works	50% of UV remains operational		
Conversion of existing RGFs to GAC	Replacement of media and air scour improvements	2 filters taken out of service at any one time	Date: flexible around production Duration: 6wks per bank of two	2 filters taken out of service at any one time	Full treatment capacity retained. Temporary blowers can be provided for air scour (if necessary)		







Tie-in location	Details	Tie-in strategy	Forecast Date and Duration	Operational impact	Notes and Contingency
Accentrifloc 1 and 2 clarified water	Tie-in to existing buried mains	Installation of "T" complete with isolation valves	Date: flexible around production Duration: 2 days each	Accentrifloc 1 then 2 offline for duration of tie-in works	Use of inflatable pipe stopper/bung for isolation. Over-pumping provided (if necessary)
Pulsator 1 and 2 clarified water	Tie-in to existing buried mains	Installation of "T" complete with isolation valves	Date: flexible around production Duration: 2 days each	Accentrifloc 1 then 2 offline for duration of tie-in works	Use of inflatable pipe stopper/bung for isolation. Over-pumping provided (if necessary)
RGFs 1 to 4 inlet water	Tie-in to existing buried inlet mains	Installation of "T" complete with isolation valves	Date: flexible around production Duration: 2 days each	RGFs blocks offline sequentially for duration of tie-ins	Use of inflatable pipe stopper/bung for isolation. Over-pumping provided (if necessary)
Existing RGF water outlet	New tie-in to existing RGF outlet main (clearwater tank supply)	Installation of "T" complete with isolation valves	Date: flexible around production Duration: 2 days	1 RGF "block" (4 filters) offline for duration of tie-in works	Over-pumping can be provided to bring online additional filters (if required).
Conversion of existing RGFs to GAC	Replacement of media and air scour improvements	2 filters taken out of service at any one time	Date: flexible around production Duration: 6wks per bank of two	2 filters taken out of service at any one time	Full treatment capacity retained. Temporary blowers can be provided for air scour (if necessary)

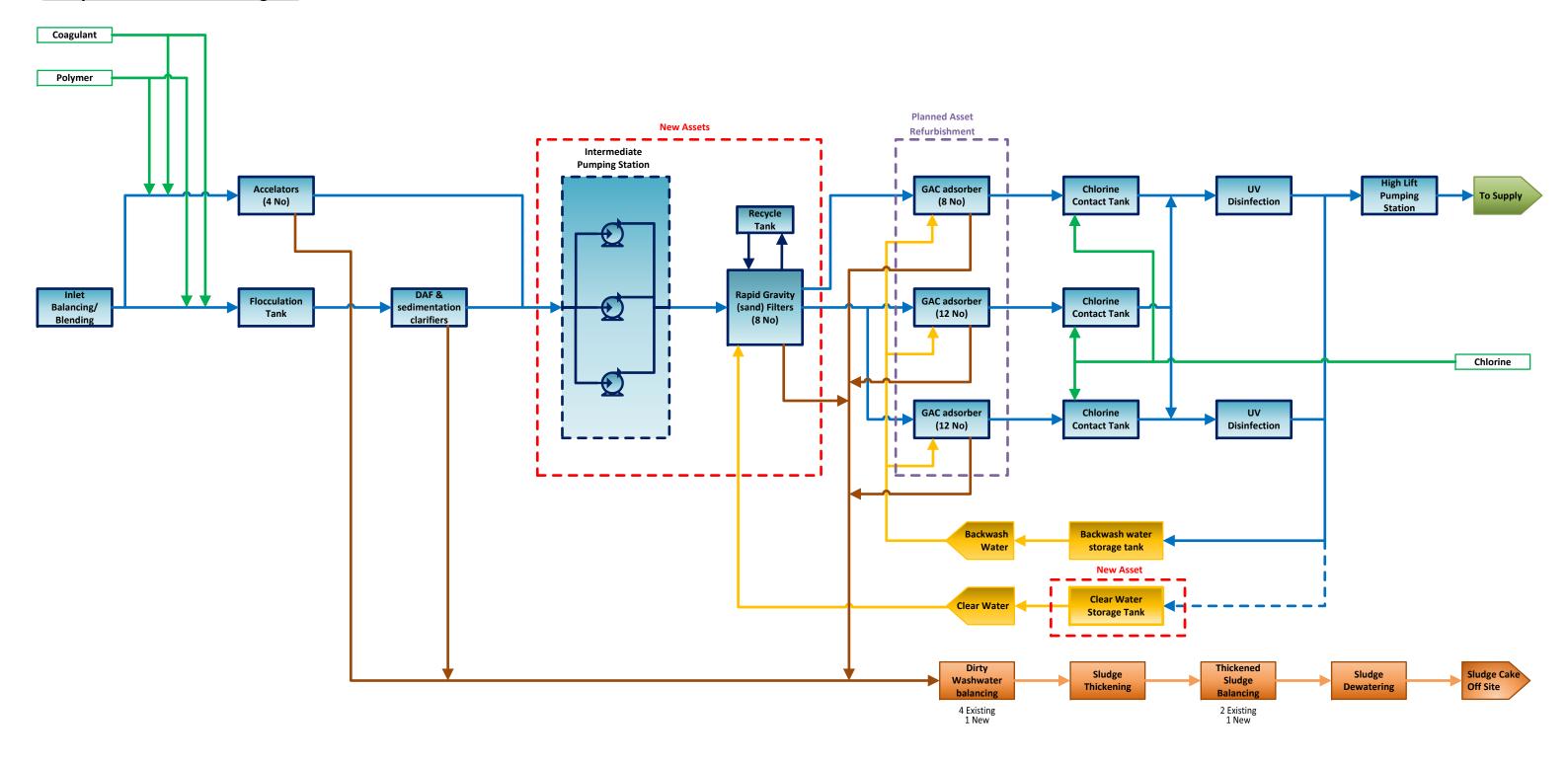




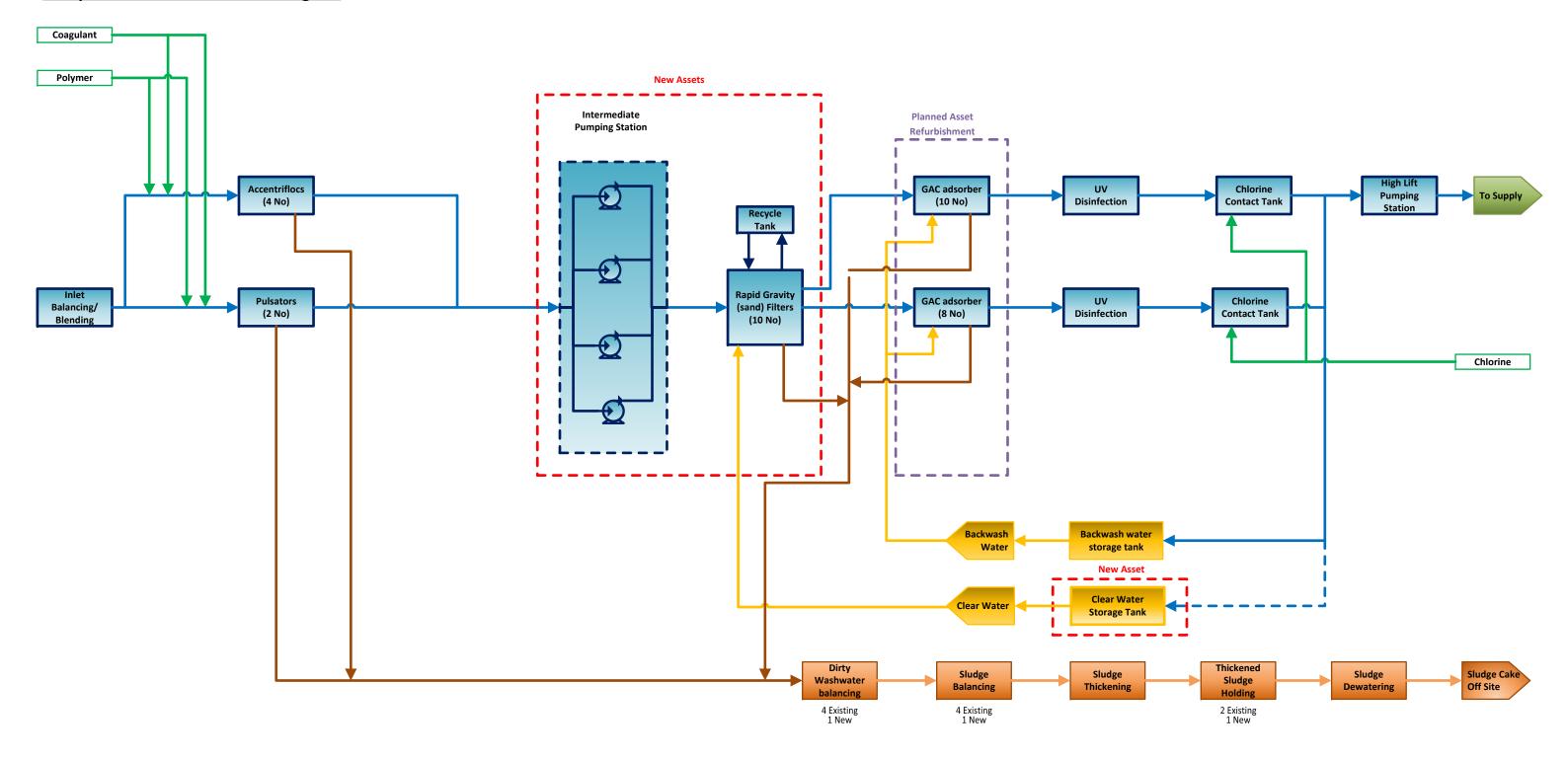




Appendix F1
Seedy Mill Process Block Diagram



Appendix F2
Hampton Loade Process Block Diagram



South Staffordshire Water Seedy Mill WTW Scope of Work and Work Breakdown Structure

			discin	line responsi	ihility		dimensions	comments / further information	unit cost	accumntions
Modify Existing	Accelator Clarifiers	Civil	Mech	Elec		Process	umensions	comments / ruralet illioritiduoti	unit COSE	assumptions
, = \134118	Divert Accelator 1 outlet pipe (750mm dia)	Y	een				20m	buried ductile iron		
	Divert Accelator 4 outlet pipe (750mm dia)	Y					20m	buried ductile iron		
	Install common outlet from Accelators 1 & 4 (say 900mm dia)	Υ					62m	buried ductile iron		
	Connection to clarified water main near Accelator 2	Υ						buried ductile iron tee piece		
	Manual isolation valves 750 dia (existing accelator discharge lines to existing RGFs) - 4no.		Y					4no 750NB wedge gate valve PN10, manually actuated, in compliance with UU S03	£6,325.60	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
Modify Existing	I PAF			-+	-+	-				
Widdiny Existing	Manual isolation valve (existing DAF discharge to existing RGFs) - 900 dia	-	Y					1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03	£12.651.19	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Manhole chamber for isolation valve	Υ						1500mm diameter, 1m deep		
		1	i							
New Interstage	Pumping Station (110MI/d)									
	Excavation including temp supports	Y								
	Blinding	Y								
	Formwork Reinforcement	Y								
	Concrete chamber (dry well) complete with concrete roof slab (50% floor area)	Y					9m x 13m x 10m deep			ref: "Inter-stage PS plan" and "Inter-stage PS section"
	Concrete chamber (wet well) complete with concrete roof slab	Y					8m x 13m x 10m deep	416m3 working volume (0.5m freeboard)		ref: "Inter-stage PS plan" and "Inter-stage PS section"
	Ultrasonic level instrument	1	i		Υ			PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer	£767.00	ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013
	Conductivity level probes				Υ			E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm	£652.00	ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	Pump plinths	Υ					2m x 2m x 0.5m height	3no.		
	Low lift pumps with VSD (3 Nox 640 l/s x 15m head) - D/D/S		Y		-		circa 2m x 2m x 3m height	3no Hidrostal L12K series (240kW), 650l/s @ 25m		ref: Hidrostal budget quotation 30/01/2018 (Estimate 83780 Rev B)
	Actuated valves (upstream and downstream of pumps) - 900mm dia Miscellaneous interconnecting pipework - 900mm dia		Y				30m	6no 900NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel	£16,388.69	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Lighting in dry well		-	٧	_		30111	scotchikoted steel		
	Sump pump in dry well with integrated level control		Y					1no Flygt N 3085 SH series (2.4kW)	£2,301,00	ref: https://www.pumpsukltd.com/flygt-ns-3085-sh-160-24-sewage-pump.html
	Sump pump pipework to drain including non-return valve (80mm dia)		Y				assume 50m length	plastic pipework		, , , , , , , , , , , , , , , , , ,
	Access staircase from ground floor landing to dry well base		Υ				10m vertical rise			
	Manhole cover to wet well	Υ								
	Steel framed and clad building structure to same footprint as dry well (3m height to eaves)	Υ	Ţ				9m x 13m x 3m height	single-skin cladding to walls and roof		C Bases III. 14 . 1 . 1
	MCL Cabling for power and instrumentation			Y	Y			 		ref: "MCCs" workbook sheet
-	Cabling for power and instrumentation Overhead lifting beam			Ť	т		12m length	capacity 5t		ref: "MCCs" workbook sheet
1	Covernead lifting beam Small power		'	Y	- +		TEIN ICHKUI	2no. 110v sockets		
	Incoming pipework from clarified water main including tie-in connection (1500 dia)	Y		' +			5m	buried ductile iron		
	Isolation valve (route from DAF) - 900 dia		Υ					1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03	£12,651.19	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Isolation valve (route from Accelators) - 900 dia		Υ					1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03		ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Rising main to new RGFs - 900mm dia	Υ					32m	buried ductile iron		
	Flowmeter on rising main with cabling - 900mm dia				Y			siemens/ABB magflow		
New Product	viby Cilhary (44084) (4. 0 no v. 40m v. 7m)				-			 		
New Rapid Gra	vity Filters (110MI/d - 8 no x 10m x 7m) Domalich existing bettling plant structure (incl floor slab, walls and cladding)	Y			-					
	Demolish existing bottling plant structure (incl floor slab, walls and cladding) Excavation including temp support	Y								
	Exception measuring temp support	Y								
	Formwork	Υ								
	Reinforcement	Υ								
	Concrete filters (single bank) and filter gallery	Υ					10m x 7m x 3m deep per filter	8no. filters		
	Sump pump		Y					1no Flygt N 3085 SH series (2.4kW). 80mm NB pipework	£2,301.00	ref: https://www.pumpsukltd.com/flygt-ns-3085-sh-160-24-sewage-pump.html
	Ships ladders (8 No) from gallery walkway to lower ground floor level		Y							
-	Access handrail within gallery and externally including toe-boards Actuated penstocks (16 No say 900mm x 900mm)		Y	-+	-+	-		16no Fig SG3100 900W x 1000D electrically actuated penstock (compliant with UU S03)	EN DAE CO	ref: Ham Baker Adams quotation for Blackburn and Darwen dated 10/05/2016
	Pipework and actuated valves in gallery		Y	+	-+			2002 O SOOT A 2000 Clean any actuated pension (compilate with 00 303)	14,343.03	22.00 Floring quotation for Sidenburn and Datwern dated 10/03/2010
	- Clarified water inlet 1200mm dia manifold pipework		Y				1no. @ 65m length	scotchkoted steel		
	- Clarified water inlet valve (450mm dia)		Y					8no 450NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£3,541.81	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	- Clarified water inlet pipework (450mm dia)		Υ				8no. @ 5m length	scotchkoted steel		
	- Filtered water outlet valve (450mm dia)		Y				0.051.2	8no 450NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£3,541.81	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
-	- Filtered water outlet pipework (450mm dia)		Y		-		8no. @ 5m length	scotchkoted steel		
-	- Filtered water outlet 1200mm dia manifold pipework - Dirty washwater outlet valve (900mm dia)		Y	-+	-+	-	1no. @ 65m length	scotchkoted steel 8no 900NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£16 300 co	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
1	- Dirty Washwater outlet valve (900mm dia) - Dirty Washwater outlet pipework (900mm dia)		Y		- +		8no. @ 5m length	scotchkoted steel	110,300.09	- C
	- Dirty washwater outlet 900mm dia manifold pipework		Y	- +			1no. @ 65m length	scotchkoted steel		
	- Washwater main inlet 900mm dia manifold pipework		Y				1no. @ 65m length	scotchkoted steel		
	- Washwater main inlet valve (900mm dia)		Υ					8no 900NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£16,388.69	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	- Washwater main inlet pipework (900mm dia)		Υ				8no. @5m length	scotchkoted steel		
	- Air scour main inlet 350mm dia manifold pipework		Y				1no. @ 65m length	scotchkoted steel		
	- Air scour main inlet valve (350mm dia)		Y				9no @Em longeth	8no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£3,110.38	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
 	- Air scour main inlet pipework (350mm dia) - Run to waste actuated penstock		Y				8no. @5m length	scotchkoted steel 8no Fig SG3100 900W x 1000D electrically actuated penstock (compliant with UU S03)	EN ONE ES	ref: Ham Baker Adams quotation for Blackburn and Darwen dated 10/05/2016
-	Transfer pipework (external to gallery)	Y	'					5.10. 1.5 555100 500W x 1000D circuitally actuated peristock (compilatit With OU 505)	14,343.03	Control Source Addition designation for practicular and partient dated 10/03/2010
	- Single filtered water main to GAC filters (Phases 1, 2) - 900mm dia	Y					101m	buried ductile iron		
	- Filtered water main isolation valve (900mm dia)		Υ					1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03	£12,651.19	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	- Single filtered water main to GAC filters (Phase 4) tied into existing DAF outlet pipework - 900mm dia	Υ					52m	buried ductile iron		
	- Filtered water main isolation valve (900mm dia)		Y				100	1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03	£12,651.19	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	- Dirty washwater drain with connection to existing dirty washwater tanks - 900mm dia - Dirty washwater drain isolation valve (900mm dia)	Y	v				103m	buried ductile iron 100 900NR wedge gate valve RN10, manually actuated in compliance with LHLS02	C42 CF4 +0	rof: Industrial values question for Plackhurn and Danuan dated 00 for 1994 C
-	- Dirty washwater drain isolation valve (900mm dia) Inter-connecting pipework (dirty washwater main to recycle tank) - 900mm dia		Y	+	+		10m	1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 buried ductile iron	112,051.19	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Dirty washwater main isolation valve (900mm dia)		Y	- +			- 1	1no 900NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£16.388.69	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Recycle water main isolation valve (900mm dia)		Y					1no 900NB wedge gate valve PN10, electrically actuated, in compliance with UU S03		ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Underdrains (laterals grouted in place with nozzles)		Υ							
	- Filter internal pipework, central manifold/header - 450mm dia		Υ				8no. @ 10m length	PVC - floor mounted with concrete surround		
	- Filter internal pipework, laterals - 150mm dia @ 300mm centres		Y				8no. @ 231m length	PVC - 33 laterals per filter, 33 x 7m = 231m of pipework per filter		
	- Filter floor nozzles - grouted in place		Y			Ų	8no. @ 429 heads	500mm centres on each lateral (13 per lateral). 13no. X 33 laterals = 429 heads per filter		rof: D. Pridon amail dated 36/01/2010 "Now PCF and CAC modia"
-	Filter media - 70m2 x 8 filters - Gravel support layer (50mm depth)	Y			-+	Y	0.05*70*8 (+10%) = 30.8m3	gravel support layer (50mm), sand (1100mm), anthracite (400mm) 4 to 6.3mm equivalent size, bulk density 1600kg/m3		ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media"
-	- Gravel support layer (Summ depth) - Sand media (1100mm depth)	Y					1.1*70*8 (+10%) = 30.8m3 1.1*70*8 (+10%) = 677.6m3	0.56 or 0.65mm equivalent size, bulk density 1600kg/m3		ref: D. Brydon email dated 26/01/2018 New RGF and GAC media ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media"
	- Anthracite layer (400mm depth)	Y					0.4*70*8 (+10%) = 246.4m3	1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3		ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media"
	Launders (8 x 2 = 16 No)		Υ				8m long (2 per filter)	stainless steel		,
	Air header pipework (internal to filters) - 350mm dia		Υ				8no. @ 5m length	stainless steel, fixed to concrete filter walls		
	Install roof over new filters	Υ						steel structure with single-skin cladding to roof and walls		
<u> </u>	Lighting		Ţ	Y						
	Small power			Y			99	8no. 110v sockets		
	Install increased diameter pipe to replace existing clarified water pipe along length of existing RGFs - 900mm dia	Y			, l		88m	buried ductile iron PBM 190 Litra 5 (Profibus anabled) and dB10 ultrasonic transducer	6767.00	ref: Bulgar questation 24620 for Livernool West Wildeland OF /44 /2042
1	Ultrasonic level instruments (8no.) Conductivity level probes (8no.)			+	Y	-		PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm		ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013 ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	Turbidity analyser (9no.) - individual filter outlets and common filtered water outlet			+	Y			can consecurity rever properly in properlying 2000min, as properlying 6000minin	1032.00	p.c., ca., quotation 2300200300 for Ever pool www f w dated 03/11/2013
	Manganese analyser (2 No) - common RGF inlet and outlet				Y					
	Temperature transmitter - common RGF clarified water inlet				Υ			E&H TMT162		ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	Outlet flowmeter filtered water 450mm dia - 8no.				Υ			ABB watermaster FEF121 magflow meter (full bore) - DN500	£2,025.00	ref: ABB quotation 13Q1929371-1 for Liverpool WwTW dated 2013
	Sample water drain		Υ		二丁					
	Additional hypochlorite dosing pumps		Y			Υ	100	2no. PROMINENT SIGMA2 dosing pumps (max 0.2kW)	£2,709.00	ref: https://www.anchorpumps.com/prominent-sigma2-motor-driven-pump-148l-hr
	Dosing pipework for chlorination at new RGFs	- 1	Y				100m	dual contained plastic pipework	£100,000.00	<u> </u>
	Provisional sum for improvements to existing chemical storage and dosing systems	-	Y							

i			discip	pline respon	sibility	dimensions	comments / further information	unit cost	assumptions
New Recycle	tank and pumping station - run to waste			$\vdash \vdash \vdash$					
.vew necycle	Recycle tank (wet well) - 250m3	Y	\vdash			7m x 6m x 6m depth	buried concrete tank. Include for benching to tank corners		
	Ultrasonic level instrument				Υ		PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer		ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013
<u> </u>	Conductivity level probes Submorphila number with VSD (2ng. V.75L/s v. 20m head). D/S configuration	-	Y	——'	Y		E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm		ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013 ref: Xylem quotation 13-SALSHQ-06770 Alt. 1 Ver. 7 for Liverpool WwTW dated 04/02/2014
	Submersible pumps with VSD (2no. X 75l/s x 20m head) - D/S configuration Non-return valves - 150mm dia	-	Y			+	2no Flygt NP3202.090 (30kW), 75l/s @ 22m head 2no.	±10,850.20	iei. Ayieiii quotatioii 15-5AL5HQ-00770 AIT. 1 Ver. 7 Tor Liverpool WWTW dated 04/02/2014
	Recycled water discharge mains - 150mm dia		Y	\vdash		10m	2no one per submersible pump. Scotchkoted steel		
	Rising main isolation valves - 150mm dia		Υ				2no 150NB wedge gate valve PN10, manually actuated, in compliance with UU S03	£107.24	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Flowmeter on rising main with cabling - 150mm dia		 -'	 -'	Y		ABB watermaster FEF121 magflow meter (full bore) - DN200	£859.00	ref: ABB quotation 13Q1929371-1 for Liverpool WwTW dated 2013
	Recycled water common discharge main - 150mm dia	Y	——'	——'		50m	buried ductile iron		
New RGF Pla	I I I Troom in GRP Cubicle		$\vdash \vdash$	Н					
	GRP kiosk	Y				8m x 12m x 3m height			
	Flat concrete floor slab	Υ	\square	\square		8.5m x 12.5m			
	Blowers (D/S)		Y	─ ─′	\leftarrow		2no 1890m3/hour @350mbar. 2no. Sulzer HST2500-2-L, 90kW		ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016
	Actuated valves (downstream of blowers) - 350mm dia Air scour main flowmeter (350mm dia)		Y		Y		2no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£3,110.38	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Air scour main pressure switch		\vdash	\vdash	Y		Guardian series pressure switch model P1201	£245.00	ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	Air scour main (350mm dia)		Υ			15m	scotchkoted steel		
	Heating / air conditioning		└─ ─'	Y	\vdash		4no. ceiling mounted cassette units and external condensers		
	Lighting Small power			Y			2no. 110v sockets		
	Sman power MCC		$\vdash \vdash$	Y	Y		2110. 110V 30CKEIS		ref: "MCCs" workbook sheet
	Cabling for power and instrumentation		$\overline{}$	Y	Y				ref: "MCCs" workbook sheet
New Clearwa	ter tank and pumping station	· ·	——'	——'	$\overline{}$	-	1		
	Excavation including temp supports Blinding	Y							
	Formwork	Y	-	$\overline{}$					
	Reinforcement	Y							
	Concrete chamber (dry well) complete with concrete roof slab (50% floor area)	Y				9m x 13m x 10m deep			
	Concrete chamber (wet well) complete with concrete roof slab	Y	 '	 '	H 11	8m x 13m x 10m deep			f n l
	Ultrasonic level instrument Conductivity level probes	 	$\vdash \vdash \vdash$	┌──	Y	1	PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm		ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013 ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	Pump plinths	Y	\vdash	-		2m x 2m x 0.5m height	3no.	1032.00	ce. Eart quotation 2500200500 for Electpool www w dated 05/11/2015
	Low lift backwash pumps with VSD (3 No x 560 l/s x 25m head) - D/D/S		Υ			circa 2m x 2m x 3m height	3no Hidrostal L12K series (240kW), 650l/s @ 25m		ref: Hidrostal budget quotation 30/01/2018 (Estimate 83780 Rev B)
	Actuated valves (upstream and downstream of pumps) - 900mm dia		Y	└	\longrightarrow		6no 900NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£16,388.69	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Miscellaneous interconnecting pipework - 900mm dia Backwash main flowmeter (1 No) - 900mm dia		Y	 '	V	30m	scotchkoted steel		
	Backwash main pressure transmitter				- 		E&H Cerabar M PMC51	£830 30	ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	Clearwater backwash main to new RGF (900mm dia)	Y	\vdash	$\overline{}$		115m	buried ductile iron	2030.30	ten datation 2500200500 for Ever poor WWW dated 05/11/2015
	Lighting in dry well			Y					
	Sump pump in dry well with integrated level control		Y	 -'	\longrightarrow		1no Flygt N 3085 SH series (2.4kW)	£2,301.00	ref: https://www.pumpsukltd.com/flygt-ns-3085-sh-160-24-sewage-pump.html
	Sump pump rising main to drain including non-return valve (80mm dia) Access staircase from ground floor landing to dry well base		Y		\leftarrow	assume 50m length 10m vertical rise	plastic pipework		
	Steel framed and clad building structure to same footprint as dry well (3m height to eaves)	Y	\vdash	Н		9m x 13m x 3m height	single-skin cladding to walls and roof		
	MCC		\vdash	Y	Y				ref: "MCCs" workbook sheet
	Cabling for power and instrumentation			Y	Υ				ref: "MCCs" workbook sheet
	Overhead lifting beam		Y	 -	\leftarrow	12m length	capacity 5t		
	Small power Connection from UV outlet main to clearwater wet well (900mm dia)	Y	+	Y	+-+-	15m length of pipework	2no. 110v sockets buried ductile iron		
	Manual isolation valve (UV outlet connection) - 900 dia	<u> </u>	Y	-		15iii leligili ol pipewolk	1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03	£12.651.19	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
							, , , , , , , , , , , , , , , , , , , ,	,,,,	
Convert exist	ing RGFs to GAC Phases 1 and 2) - individual filter footprint 6m x 4.5m		└ ──'	└ ──'					
	Remove existing carbon media from 24no. filters and dispose of Replace existing air scour pipework	Y	Y	——'		972m3 of media	media quantity - 24 filters x 27m2 surface area x 1.5m depth = 972m3		
	- Air scour main inlet 350mm dia manifold pipework		Y	$\vdash \vdash$		1no. @ 65m length	scotchkoted steel		
	- Air scour main inlet valve (350mm dia)		Y				24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£3,110.38	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	- Air scour main inlet pipework (350mm dia)		Υ			24no. @5m length	scotchkoted steel		
	Air header pipework (internal to filters) - 350mm dia		Y	 -'	\vdash	8no. @ 5m length	stainless steel, fixed to concrete filter walls		
	Replace existing blowers MCC Feeder and cabling upgrade		Y		+		2no 2117m3/hour @350mbar. 2no. Sulzer HST2500-2-L, 90kW		
	Install new GAC media to 24 filters	Y						£58,612.50	ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016
			1 1	-		1296m3 of media	6m x 4.5m x 2m depth (assumed depth - to be confirmed) x 24 filters	£58,612.50	ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCS" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons
						1296m3 of media	6m x 4.5m x 2m depth (assumed depth - to be confirmed) x 24 filters	£58,612.50	ref: "MCCs" workbook sheet
Convert exist	ing RGFs to GAC (Phase 4) - individual filter footprint 7m x 5m							£58,612.50	ref: "MCCs" workbook sheet
Convert exist	Remove existing carbon media from 8no. filters and dispose of	Y				1296m3 of media 420m3 of media	6m x 4.5m x 2m depth (assumed depth - to be confirmed) x 24 filters media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3	£58,612.50	ref: "MCCs" workbook sheet
Convert exist	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework	Y	Y			420m3 of media	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3	£58,612.50	ref: "MCCs" workbook sheet
Convert exist	Remove existing carbon media from 8no. filters and dispose of	Y	Y Y Y						ref: "MCCs" workbook sheet
Convert exist	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia)	Y	Y Y Y			420m3 of media 1no. @ 65m length 8no. @5m length	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scottchkoted steel 8no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU 503 scottchkoted steel		ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons
Convert exist	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) Air shader pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia	Y	Y Y Y Y			420m3 of media 1no. @ 65m length	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scotchkoted steel 8no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls	£3,110.38	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
Convert exist	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 950mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers	Y	Y Y Y			420m3 of media 1no. @ 65m length 8no. @5m length	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scottchkoted steel 8no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU 503 scottchkoted steel	£3,110.38	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016
Convert exis	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) Air shader pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia	Y	Y Y Y Y	Y		420m3 of media 1no. @ 65m length 8no. @5m length	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scotchkoted steel 8no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls	£3,110.38	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 90mm dia manifold pipework - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters	Y	Y Y Y Y	Y		420m3 of media 1no. @ 65m length 8no. @5m length 8no. @5m length	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scottchkoted steel 8no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU 503 scottchkoted steel stainless steel, fixed to concrete filter walls 2no 2117m3/hour @350mbar. 2no. Sulzer HST2500-2-L, 90kW	£3,110.38	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet
	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters	Y	Y Y Y Y	Y		420m3 of media 1no. @ 65m length 8no. @5m length 8no. @5m length 560m3 of media	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scotchkoted steel 8no - 350N8 wedge gate valve PN10, electrically actuated, in compliance with UU 503 scotchkoted steel stainless steel, fixed to concrete filter walls 2no - 2117m3/hour @350mbar. 2no. Sulzer HST2500-2-L, 90kW 7m x 5m x 2m depth (assumed depth - to be confirmed) x 8 filters Note: existing dirty washwater storage (4no. @ 16m x 10m x 3m TWL)	£3,110.38	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet
	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet yalve (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipiework (internal to filters) - 350mm dia Replace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters	Y	Y Y Y Y	Y		420m3 of media 1no. @ 65m length 8no. @5m length 8no. @5m length	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scotchkoted steel 8no 350MB wedge gate valve PN10, electrically actuated, in compliance with UU 503 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 2117m3/hour @350mbar. 2no. Sulzer HST2500-2-L, 90kW 7m x 5m x 2m depth (assumed depth - to be confirmed) x 8 filters	£3,110.38	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet
	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 90mm dia manifold pipework - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters sakwater Storage Tank (576m3) Access road diversion Break-out existing access road	Y	Y Y Y Y	Y		420m3 of media 1no. @ 65m length 8no. @5m length 8no. @5m length 560m3 of media	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scotchkoted steel 8no - 350N8 wedge gate valve PN10, electrically actuated, in compliance with UU 503 scotchkoted steel stainless steel, fixed to concrete filter walls 2no - 2117m3/hour @350mbar. 2no. Sulzer HST2500-2-L, 90kW 7m x 5m x 2m depth (assumed depth - to be confirmed) x 8 filters Note: existing dirty washwater storage (4no. @ 16m x 10m x 3m TWL)	£3,110.38	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet
	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet yalve (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipiework (internal to filters) - 350mm dia Replace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters	Y	Y Y Y Y	Y		420m3 of media 1no. @ 65m length 8no. @5m length 8no. @5m length 560m3 of media	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scotchkoted steel 8no - 350N8 wedge gate valve PN10, electrically actuated, in compliance with UU 503 scotchkoted steel stainless steel, fixed to concrete filter walls 2no - 2117m3/hour @350mbar. 2no. Sulzer HST2500-2-L, 90kW 7m x 5m x 2m depth (assumed depth - to be confirmed) x 8 filters Note: existing dirty washwater storage (4no. @ 16m x 10m x 3m TWL)	£3,110.38	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet
	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 50mm dia manifold pipework - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Install new GAC media to 8 filters Access road diversion Break-out existing access road Excavation including temp supports Blinding Formwork	Y Y Y Y Y Y Y Y	Y Y Y Y	Y		420m3 of media 1no. @ 65m length 8no. @5m length 8no. @5m length 560m3 of media	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scotchkoted steel 8no - 350N8 wedge gate valve PN10, electrically actuated, in compliance with UU 503 scotchkoted steel stainless steel, fixed to concrete filter walls 2no - 2117m3/hour @350mbar. 2no. Sulzer HST2500-2-L, 90kW 7m x 5m x 2m depth (assumed depth - to be confirmed) x 8 filters Note: existing dirty washwater storage (4no. @ 16m x 10m x 3m TWL)	£3,110.38	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet
	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet yelework (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal filters) - 350mm dia Replace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters ashwater Storage Tank (576m3) Access road diversion Break-out existing access road Excavation including temp supports Blinding Formwork Reinforcement	Y Y Y Y Y Y Y Y	Y Y Y Y	Y		420m3 of media 1no. @ 65m length 8no. @5m length 8no. @5m length 560m3 of media 50m length @ 7m wide	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scotchkoted steel 8no - 350NB wedge gate valve PN10, electrically actuated, in compliance with UU 503 scotchkoted steel stainless steel, fixed to concrete filter walls 2no - 2117m3/hour @350mbar . 2no . Sulzer HST2500-2-L, 90kW 7m x 5m x 2m depth (assumed depth - to be confirmed) x 8 filters Note: existing dirty washwater storage (4no . @ 16m x 10m x 3m TWL) tarmac surface and white-lining	£3,110.38	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet
	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (intera) - 350mm dia Replace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters MCC Feeder and cabling upgrade Install new GAC media to 8 filters MCC Feeder and cabling upgrade Install new GAC media to 8 filters MCC Feeder and cabling upgrade Install new GAC media to 8 filters MCC Feeder and cabling upgrade MCC Feeder and cabling upgrade	Y Y Y Y Y Y Y Y	Y Y Y Y	Y		420m3 of media 1no. @ 65m length 8no. @5m length 8no. @5m length 560m3 of media	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scotchkoted steel 8no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU 503 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 2117m3/hour @350mbar. 2no. Sulzer HST2500-2-L, 90kW 7m x 5m x 2m depth (assumed depth - to be confirmed) x 8 filters Note: existing dirty washwater storage (4no. @ 16m x 10m x 3m TWL) tarmac surface and white-lining	£3,110.38 £58,612.50	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons
	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers MCC, Feeder and cabling upgrade Install new GAC media to 8 filters Install new GAC media to 8 filters Sashwater Storage Tank (576m3) - Access road diversion - Break-out existing access road - Excavation including temp supports - Bilinding - Formwork - Reinforcement - Concrete chamber (tank) buried to level of existing backwash tanks - Ultrasonic level instrument	Y Y Y Y Y Y Y Y	Y Y Y Y	Y	Y	420m3 of media 1no. @ 65m length 8no. @5m length 8no. @5m length 560m3 of media 50m length @ 7m wide	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scotchkoted steel 8no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 2117m3/hour @350mbar. 2no. Sulzer HST2500-2-L, 90kW 7m x 5m x 2m depth (assumed depth - to be confirmed) x 8 filters Note: existing dirty washwater storage (4no. @ 16m x 10m x 3m TWL) tarmac surface and white-lining top water level @3m depth. Tie-in to existing dirty washwater tank(s) PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer	£3,110.38 £58,612.50	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons
	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (intera) - 350mm dia Replace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Seplace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters MCC Feeder and cabling upgrade Install new GAC media to 8 filters MCC Feeder and cabling upgrade Install new GAC media to 8 filters MCC Feeder and cabling upgrade Install new GAC media to 8 filters MCC Feeder and cabling upgrade MCC Feeder and cabling upgrade	Y Y Y Y Y Y Y Y	Y Y Y Y	Y		420m3 of media 1no. @ 65m length 8no. @5m length 8no. @5m length 560m3 of media 50m length @ 7m wide	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scotchkoted steel 8no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU 503 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 2117m3/hour @350mbar. 2no. Sulzer HST2500-2-L, 90kW 7m x 5m x 2m depth (assumed depth - to be confirmed) x 8 filters Note: existing dirty washwater storage (4no. @ 16m x 10m x 3m TWL) tarmac surface and white-lining	£3,110.38 £58,612.50	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons
	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Install new GAC media to 8 filters Sahwater Storage Tank (576m3) - Access road diversion - Break-out existing access road - Excavation including temp supports - Bilinding - Formwork - Reinforcement - Concrete chamber (tank) buried to level of existing backwash tanks - Ultrasonic level instrument - Conductivity level probes - Inlet weir extension (concrete channel) - Floating bellmouth outet inc. outlet pipework	Y Y Y Y Y Y Y Y Y	Y Y Y Y Y	У		420m3 of media 1no. @ 65m length 8no. @ 5m length 8no. @ 5m length 560m3 of media 50m length @ 7m wide 16m x 12m x 3.5m deep 1m wide, 12m long, 3.5m deep	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scotchkoted steel 8no 350N8 wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 2117m3/hour @350mbar. 2no. Sulzer HST2500-2-L, 90kW 7m x 5m x 2m depth (assumed depth - to be confirmed) x 8 filters Note: existing dirty washwater storage (4no. @ 16m x 10m x 3m TWL) tarmac surface and white-lining top water level @3m depth. Tie-in to existing dirty washwater tank(s) PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm tied into existing inlet channel - assume 300mm thick walls	£3,110.38 £58,612.50	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons
	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 90mm dia manifold pipework - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (160mm dia) - Air scour main inlet pipework (internal to filters) - 350mm dia Replace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Maccess road diversion	Y Y Y Y Y Y Y Y Y Y Y Y Y	Y Y Y Y	Y		420m3 of media 1no. @ 65m length 8no. @5m length 8no. @5m length 560m3 of media 50m length @ 7m wide 16m x 12m x 3.5m deep 1m wide, 12m long, 3.5m deep assume 20m length	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scotchkoted steel 8no 350N8 wedge gate valve PN10, electrically actuated, in compliance with UU 503 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 2117m3/hour @350mbar. 2no. Sulzer HST2500-2-L, 90kW 7m x 5m x 2m depth (assumed depth - to be confirmed) x 8 filters Note: existing dirty washwater storage (4no. @ 16m x 10m x 3m TWL) tarmac surface and white-lining top water level @3m depth. Tie-in to existing dirty washwater tank(s) PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm tied into existing inlet channel - assume 300mm thick walls	£3,110.38 £58,612.50	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons
	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main intel 350mm dia manifold pipework - Air scour main intel typework (350mm dia) - Air scour main intel typework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers MCC Feeder and cabling upgrade Install new AGC media to 8 filters MCC Feeder and cabling upgrade Install new AGC media to 8 filters Access road diversion Break-out existing access road Excavation including temp supports Blinding Fornwork Concrete chamber (tank) buried to level of existing backwash tanks Ultrasonic level instrument Concrete chamber (tank) buried to level of existing backwash tanks Ultrasonic level instrument Concrete chamber (tank) touched to level of existing backwash tanks Ultrasonic level instrument Concrete chamber (tank) united to level of existing backwash tanks Ultrasonic level instrument Concrete chamber (tank) united to level of existing backwash tanks Ultrasonic level instrument Concrete chamber (tank) united to level of existing backwash tanks Ultrasonic level instrument Concrete chamber (tank) united to level of existing backwash tanks Ultrasonic level instrument Concrete chamber (tank) united to level of existing backwash tanks Ultrasonic level instrument Concrete chamber (tank) united to level of existing backwash tanks Ultrasonic level instrument Concrete chamber (tank) united to level of existing backwash tanks Ultrasonic level instrument Concrete chamber (tank) united to level of existing durity washwater tank overflow line modifications (500mm dia)	Y Y Y Y Y Y Y Y Y	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	У		420m3 of media 1no. @ 65m length 8no. @ 5m length 8no. @ 5m length 560m3 of media 50m length @ 7m wide 16m x 12m x 3.5m deep 1m wide, 12m long, 3.5m deep	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scotchkoted steel 8no 350N8 wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 2117m3/hour @350mbar. 2no. Sulzer HST2500-2-L, 90kW 7m x 5m x 2m depth (assumed depth - to be confirmed) x 8 filters Note: existing dirty washwater storage (4no. @ 16m x 10m x 3m TWL) tarmac surface and white-lining top water level @3m depth. Tie-in to existing dirty washwater tank(s) PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm tied into existing inlet channel - assume 300mm thick walls	£3,110.38 £58,612.50	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons
	Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main intel 350mm dia manifold pipework - Air scour main intel 50mm dia manifold pipework - Air scour main intel pipework (350mm dia) - Air scour main intel pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers MCC Feeder and cabling upgrade Install new GAC media to 8 filters Install new GAC media to 8 filters sahwater Storage Tank (576m3) - Access road diversion Break-out existing access road Excavation including temp supports Bilinding Formwork Reinforcement Concrete chamber (tank) buried to level of existing backwash tanks Ultrasonic level instrument Conductivity level probes Inlet weir extension (concrete channel) Floating bellmouth outlet inc. outlet pipework Connection to existing outlet manifold - 200 dia Existing dirty washwater tank overflow line modifications (500mm dia) Settled solids lateral scraper inc. support fixings and drive	Y Y Y Y Y Y Y Y Y Y Y Y Y	Y Y Y Y Y	Y		420m3 of media 1no. @ 65m length 8no. @ 5m length 8no. @ 5m length 560m3 of media 50m length @ 7m wide 16m x 12m x 3.5m deep 1m wide, 12m long, 3.5m deep assume 20m length assume 20m length	media quantity - 8 filters x 35m2 surface area x 1.5m depth = 420m3 scotchkoted steel 8no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 2117m3/hour @350mbar. 2no. Sulzer HST2500-2-L, 90kW 7m x 5m x 2m depth (assumed depth - to be confirmed) x 8 filters Note: existing dirty washwater storage (4no. @ 16m x 10m x 3m TWL) tarmac surface and white-lining top water level @3m depth. Tie-in to existing dirty washwater tank(s) PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm tied into existing inlet channel - assume 300mm thick walls scotchkoted steel buried DI - requires removal of existing pipework and tie-in for overflow from new tank	£3,110.38 £58,612.50	ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Evoqua AquaCarb® 830 and 1240 Carbons
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		1	disc	ipline respo	nsibility		dimensions	comments / further information	unit cost	assumptions
lew Sludge R	alancing Tank (420m3)		1	1	Τ ,		umensions	Commence / Tortier information		
iew sidage b	Excavation including temp supports	Y		1	1					
	Blinding	Y		1	1		1			
	Formwork	Y			_					
	Reinforcement	Y			_					
	Concrete chamber (tank) buried to level of existing backwash tanks	Y		1	+		14m x 10m x 3.5m deep	top water level @3m depth.		
	Ultrasonic level instrument			1	Y		1411 X 1011 X 3.511 uccp	PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer	£767.00	ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013
	Conductivity level probes				Y			E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm		ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	Inlet chamber extension inc. tie in to existing inlet chamber - covered concrete channel	Υ			+ -		2m wide x 8m long x 3.5m deep	concrete channel with lid	1032.00	Tel. Earl quotation 2500200500 for Electpool WWTW dated 05/11/2015
	Inlet enamble extension inc. be in to existing linet chamber - covered concrete chamber Inlet penstock (1 No say 900mm x 900mm)	<u> </u>	Y		_		2111 Wide X 8111 lolig X 3.5111 deep	1no Fig SG3100 900W x 1000D electrically actuated penstock (compliant with UU S03)	£4 04E 63	ref: Ham Baker Adams quotation for Blackburn and Darwen dated 10/05/2016
	Thickened sludge inlet manifold pipework - 250mm dia	Y	<u> </u>		1		assume 20m length	scotchkoted steel	£4,945.05	rei. Haili Bakei Adaliis quotation for Biackburn and Darwen dated 10/05/2016
	Thickened sludge inlet rainfind pipework - 250mm dia Thickened sludge inlet valves - 250mm dia	- 1	Y	-	+		assume 2011 length	3no 250NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£3 120 E6	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
			Y							
	Sludge outlet valve - 250mm diameter	Y	Y					1no 250NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£2,139.50	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Sludge outlet pipework inc. tie in to existing pipework - 250mm dia	Ť	· ·					buried ductile iron	co 202 00	and Flore and the fee Boardhood AADT dated OA (OA (OA)
	Submersible mixer and guiderail		Y		_			Flygt S4650 5.5kW mixer	£8,283.00	ref: Flygt quotation for Bredbury MBT dated 01/04/2014
	Lifting davit and socket		Y	-	+	-	+	# E COMMON COMMU 40000 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
	Sludge tank 2 to 3 balancing penstock (1 No say 900mm x 900mm)		Y					1no Fig SG3100 900W x 1000D electrically actuated penstock (compliant with UU S03)	£4,945.63	ref: Ham Baker Adams quotation for Blackburn and Darwen dated 10/05/2016
	Cabling for power and instrumentation		ļ	Y	Y	-	+	The state of the s		ref: "MCCs" workbook sheet
	Modifications to existing effluent treatment MCC			Y	Y		ļ	new starters and additional I/O for instrumentation		ref: "MCCs" workbook sheet
	Handrailing, toeboards and 1no. 3.5m vertical ladder		Y	├			35m length			
te Wide Elei										
	SCADA Control system with Operator Interface, outstations and all cabling				Y					
	Power upgrading and distribution			Y						ref: "MCCs" workbook sheet
	Interfaces between existing and new control systems				Y					
	External lighting			Y				12no. lighting columns		
	Additional footpaths and road reinstatement	Y								
	Modify existing high security fence to include bottling plant area	Y					200m total length			
	Planting and landscaping	Υ								
	Lightning protection to new RGFs??			Y						
	Pipework fittings, joints, couplers etc.	Y	Y						20% of pipework mats	
	Service diversions for new structures	Υ						applies to inter-stage pumping station and clearwater storage tank		
	Modifications to existing drainage system	Υ					100m length allowance	assume 4no. new manholes and additional 200NB pipework		
	Valve chambers for buried valves	Υ						12no. 1500mm diameter manhole rings to a depth of 1m		
eliminaries										
	Preparation and reinstatement of site compound for offices and car parking	Υ								
	Site offices and stores	Υ								
	Mess and welfare facilities	Υ								
	Design	Υ	i	1	1	i	i		İ	
	Staff	Υ	i	1	1	İ	1			
	Insurances	Y	i	1	1	İ	1			
	Risk	Y		1			1			
	Plant	Y	l -	1	1		1			
	Site security, signage and demarcation	Y	l -	1	1		1			
	Site Security, signings and estimated on Utility services to site offices	Y	l -	1	1		1			
	Site topo and condition surveys	Y		1	1					
	Temporary over-pumping	Y	-	1	+		 		 	
		Y	-	1	+		 		 	
	Temporary lighting	-	I	+	+	 	+		+	
ptional Elen	I construction		-	+	-	-	+		+	
		Y	—	1	+		+	steelwork frame, single-skin cladding to walls and roof		
ptional Lien	Cover existing RGFs when converted to GAC									

- Buried pipework is ductile iron spigot and socket unless otherwise indicated
 Pipework in gallery, Interstage PS or above ground is coated steel unless otherwise indicated
 Products in contact with water must be approved for this application
 Actuated valves will provide process control and isolation. No additional manual isolation valves provided

South Staffordshire Water Hampton Loade WTW Scope of Work and Work Breakdown Structure

		$\overline{}$	disc	cipline respor	nsibility		dimensions	comments / further information	unit cost	assumptions
Connection to	Existing Clarifier Outlets	Civil				Process	difficisions	Comments y further information	unit cost	assumptions
30	Connection to Accentrifloc 1 outlet pipe (750mm dia - install 2nr tees)	Y	IVICUIT	LICL	100		5m	buried ductile iron including a vertical 45 degree bend	+	
	Connection to Accentrifice 2 outlet pipe (750mm dia - install 2nr tees)	Y	t				5m	buried ductile iron including a vertical 45 degree bend	1	
	Connection to Pulsator 3 outlet pipe (1100mm dia - install 2nr tees)	Y	1				5m	buried ductile iron including a vertical 45 degree bend		
	Connection to Pulsator 4 outlet pipe (1100mm dia - install 2nr tees)	Υ					5m	buried ductile iron including a vertical 45 degree bend		
	Install common Clarified Water pipe (say 1500mm dia) inc. connection to IPS	Υ					60m	buried ductile iron with 4 tee connections (2 x 750dia and 2 x 1100dia)		
	Manual isolation valves 1100 dia (existing Pulsator discharge lines to existing RGFs) - 4no.		Y				4.000	4no 750NB wedge gate valve PN10, manually actuated, in compliance with UU S03		
	Manual isolation valves 750 dia (existing Accentrifloc discharge lines to existing RGFs) - 4no.		Y				4.000	4no 750NB wedge gate valve PN10, manually actuated, in compliance with UU S03	£6,325.60	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
New Interstage	e Pumping Station (210MI/d)									
	Excavation including temp supports	Υ								
	Blinding	Υ								
	Formwork	Υ								
	Reinforcement	Υ	\bot							
	Concrete chamber (dry well) complete with concrete roof slab (50% floor area)	Y					9m x 13m x 10m deep			
	Concrete chamber (wet well) complete with concrete roof slab	Y	\bot				8m x 13m x 10m deep	416m3 working volume (0.5m freeboard)		
	Ultrasonic level instrument	\bot	\bot		Υ			PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer		ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013
	Conductivity level probes	+			Y			E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm	£652.00	ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	Pump plinths	Y	+	+	_		2m x 2m x 0.5m height	4no.	1	
	Low lift pumps with VSD (4 No x 820 l/s x 20m head) - D/D/D/S		Y				circa 2m x 2m x 3m height	4no Hidrostal L12K series (240kW), 650l/s @ 25m	£70,000.00	Plug rate based on: Hidrostal budget quotation 30/01/2018 (Estimate 83780 Rev B). Increased by £18k to cover ris
	And the state of t	+-	 						050 455 05	The state of the s
	Actuated valves (upstream and downstream of pumps) - 1500mm dia		Y					8no 1500NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£53,456.25	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 (Knife Gate Valve rate used 2 Bar rati
	Miscellaneous interconnecting pipework - 1500mm dia		Y				40m	scotchkoted steel		
	Lighting in dry well			Y						
	Sump pump in dry well with integrated level control		Y					1no Flygt N 3085 SH series (2.4kW)	£2,301.00	ref: https://www.pumpsukltd.com/flygt-ns-3085-sh-160-24-sewage-pump.html
	Sump pump pipework to drain including non-return valve (80mm dia)		Y				assume 50m length	plastic pipework		
	Access staircase from ground floor landing to dry well base	L	Y				10m vertical rise			
	Manhole cover to wet well	Υ								
	Steel framed and clad building structure to same footprint as dry well (3m height to eaves)	Y	上二				9m x 13m x 3m height	single-skin cladding to walls and roof		
	MCC		L	Υ	Υ		1			ref: "MCCs" workbook sheet
	Cabling for power and instrumentation			Y	Y					ref: "MCCs" workbook sheet
	Overhead lifting beam	L	Y				12m length	capacity 5t		
	Small power	1		Y				2no. 110v sockets		
	Rising main to new RGFs - 1500mm dia	Y	T				20m	buried ductile iron	T	
	Flowmeter on rising main with cabling - 1500mm dia	T	L		Y		<u> </u>	siemens/ABB magflow		
		1								
New Rapid Gra	avity Filters (210Ml/d - 12 no x 10m x 9m)	L	L							
	Remove surplus spoil from previous site development	Υ					40m x 60m x 1m deep	Assume inert material disposed off site		
	Excavation including temp support	Y		1	1 1					
	Blinding	Y		1	1 1					
	Formwork	Y		1	1 1					
	Reinforcement	Y			1 1					
	Concrete filters double bank) and filter gallery - see separate worksheet	Y	1		1 1		10m x 9m x 3m deep per filter	12no. filters		
	Sump pump	1	Υ		1 1			1no Flygt N 3085 SH series (2.4kW). 80mm NB pipework	£2,301.00	ref: https://www.pumpsukltd.com/flygt-ns-3085-sh-160-24-sewage-pump.html
	Ships ladders (12 No) from gallery walkway to lower ground floor level	1	Υ	1	1 1					, , ,
	Access handrail within gallery and externally including toe-boards		Y		1 1					
	Penstocks (24 No say 900mm x 900mm)	1	Y		1 1		1	24no Fig SG3100 900W x 1000D electrically actuated penstock (compliant with UU S03)	£4,945.63	ref: Ham Baker Adams quotation for Blackburn and Darwen dated 10/05/2016
	Pipework and actuated valves in gallery	1	Υ				1			
	- Clarified water inlet 1500mm dia manifold pipework	1	Υ		1 1		1no. @ 60m length	scotchkoted steel		
	- Clarified water inlet valve (450mm dia)	1	Υ	1	1 1			12no 450NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£3,541.81	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	- Clarified water inlet pipework (450mm dia)	+	Y		1 1		12no. @ 5m length	scotchkoted steel		
	- Filtered water outlet valve (450mm dia)	1	Υ					12no 450NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£3.541.81	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	- Filtered water outlet pipework (450mm dia)	+	Y		1 1		12no. @ 5m length	scotchkoted steel		
	- Filtered water outlet 1500mm dia manifold pipework	1	Υ				1no. @ 60m length	scotchkoted steel		
	- Dirty washwater outlet valve (900mm dia)	+	Y		1 1			12no 900NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£16,388.69	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	- Dirty washwater outlet pipework (900mm dia)	1	Y				12no. @ 5m length	scotchkoted steel		
	- Dirty washwater outlet 900mm dia manifold pipework	+	Y		1 1		1no. @ 60m length	scotchkoted steel		
	- Washwater main inlet 900mm dia manifold pipework	1	Y				1no. @ 60m length	scotchkoted steel		
	- Washwater main inlet valve (900mm dia)	+	Y		1 1			12no 900NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£16.388.69	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	- Washwater main inlet pipework (900mm dia)	+	Y		1 1		12no. @5m length	scotchkoted steel	1	
	- Air scour main inlet 350mm dia manifold pipework	+-	Y	1	1 1		1no. @ 60m length	scotchkoted steel	1	
	- Air scour main inlet valve (350mm dia)	+	· v	1	1 1		and the contraction	12no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£3 110 38	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	- Air scour main inlet pipework (350mm dia)	+	Y	+ -	+ +		12no. @5m length	scotchkoted steel	13,110.30	DEFECT OF STATES QUALITY FOR STATES AND DESTRUCTION OF STATES AND
	Transfer pipework (external to gallery)	Y	 	+	1 1				1	
	- Single filtered water main to GAC filters (Phases 1, 2) - 1500mm dia	Y	+		1 1		110m	buried ductile iron		
	<u> </u>	T	T						İ	Plug rate based on : Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 (Knife Gate Valve rat
1	- Filtered water main isolation valve (1500mm dia)	1	Y				1	1no 1500NB wedge gate valve PN10, manually actuated, in compliance with UU S03	£45,000.00	used 2 Bar rating). Reduced by £8k as manually actuated.
	- Dirty washwater drain with connection to existing dirty washwater tanks - 900mm dia	Y					60m	buried ductile iron		
1	- Dirty washwater drain isolation valve (900mm dia)		Y					1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03	£12,651.19	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
			Y							
	Underdrains (laterals grouted in place with nozzles)		Y				12no. @ 10m length	PVC - floor mounted with concrete surround		
	- Filter internal pipework, central manifold/header - 450mm dia						12no. @ 297m length	PVC - 33 laterals per filter, 33 x 9m = 297m of pipework per filter		
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres	\pm	Υ		1 T		8no. @ 561 heads	500mm centres on each lateral (17 per lateral). 17no. X 33 laterals = 561 heads per filter	1	
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place		Y							
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres	=				Υ		gravel support layer (50mm), sand (1100mm), anthracite (400mm)		ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media"
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth)	Y				Υ	0.05*90*12 (+10%) = 59.4m3	4 to 6.3mm equivalent size, bulk density 1600kg/m3		ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media"
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Sand media (1100mm depth)	Y				Y	0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient <1.3		ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media"
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth)					Y	0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient < 1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3		ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media"
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Sand media (1100mm depth) - Anthracite Japer (400mm depth) Launders (12 x 2 = 24 No)	Y	Y			Y	0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3 10m long (2 per filter)	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient <1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3 stainless steel		ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media"
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place - Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Sand media (1100mm depth) - Anthracite layer (400mm depth)	Y	Y			Y	0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient < 1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3		ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media"
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Sand media (1100mm depth) - Anthracite Japer (400mm depth) Launders (12 x 2 = 24 No)	Y	Y			Y	0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3 10m long (2 per filter)	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient <1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3 stainless steel		ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media"
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Sand media (1100mm depth) - Anthracite layer (400mm depth) - Launders (12 x 2 - 24 No) Air header pipework (internal to filters) - 350mm dia	Y	Y	Y		Y	0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3 10m long (2 per filter)	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient < 1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3 stainless steel stainless steel, fixed to concrete filter walls		ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media"
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place - Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Sand media (1100mm depth) - Anthracite layer (400mm depth) - Launders (12 x 2 = 24 No) - Air header pipework (internal to filters) - 350mm dia - Install roof over new filters - Lighting - Small power	Y	Y	Y		Y	0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3 10m long (2 per filter)	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient < 1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3 stainless steel stainless steel, fixed to concrete filter walls		ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media"
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Sand media (1100mm depth) - Anthracite layer (400mm depth) - Launders (12 x 2 = 24 No) Air header pipework (internal to filters) - 350mm dia Install roof over new filters Lighting	Y	Y		Y	Y	0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3 10m long (2 per filter)	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient <1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3 stainless steel stainless steel, fixed to concrete filter walls steel structure with single-skin cladding to roof and walls	£767.00	ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media"
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place - Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Sand media (1100mm depth) - Anthracite layer (400mm depth) - Launders (12 x 2 = 24 No) - Air header pipework (internal to filters) - 350mm dia - Install roof over new filters - Lighting - Small power	Y	Y		Y	Y	0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3 10m long (2 per filter)	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient <1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3 stainless steel stainless steel stainless steel, fixed to concrete filter walls steel structure with single-skin cladding to roof and walls 12no. 110v sockets		ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media"
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Sand media (1100mm depth) - Anthracite layer (400mm depth) - Anthracite layer (400mm depth) - Launders (12 x 2 = 24 No) - Air header pipework (Internal to filters) - 350mm dia - Install roof over new filters - Uighting - Small power - Uitrasonic level instruments (12no.)	Y	Y			Y	0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3 10m long (2 per filter)	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient < 1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3 stainless steel stainless steel stainless steel, fixed to concrete filter walls steel structure with single-skin cladding to roof and walls 12no. 110v sockets PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer		ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Anthracite layer (400mm depth) - Anthracite layer (400mm depth) - Launders (12 x 2 = 24 No) - Air header pipework (internal to filters) - 350mm dia - Install roof over new filters - Lighting - Small power - Ultrasonic level instruments (12no.) - Conductivity level probes (12no.)	Y	Y		Y	Y	0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3 10m long (2 per filter)	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient < 1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3 stainless steel stainless steel stainless steel, fixed to concrete filter walls steel structure with single-skin cladding to roof and walls 12no. 110v sockets PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer		ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place - Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Sand media (1100mm depth) - Anthracite layer (400mm depth) - Anthracite layer (400mm depth) - Launders (12 x 2 = 24 No) - Air header pipework (internal to filters) - 350mm dia - Install roof over new filters - Lighting - Small power - Ultrasonic level instruments (12no.) - Conductivity level probes (12no.) - Turbidity analyser (13no.) - individual filter outlets and common filtered water outlet	Y	Y		Y	Y	0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3 10m long (2 per filter)	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient < 1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3 stainless steel stainless steel stainless steel, fixed to concrete filter walls steel structure with single-skin cladding to roof and walls 12no. 110v sockets PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer	£652.00	ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter finor nozzles - grouted in place - Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Anthracite layer (400mm depth) - Anthracite layer (400mm depth) - Launders (12 x 2 = 24 No) - Air header pipework (internal to filters) - 350mm dia - Install roof over new filters - Lighting - Small power - Uitrasonic level instruments (12no.) - Conductivity level probes (12no.) - Turbidity analyser (13no.) - individual filter outlets and common filtered water outlet - Manganese analyser (2 No) - common RGF inlet and outlet	Y	Y		Y Y Y	Y	0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3 10m long (2 per filter)	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient < 1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3 stainless steel stainless steel, fixed to concrete filter walls steel structure with single-skin cladding to roof and walls 12no. 110v sockets PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm E&H TMT162	£652.00 £762.40	ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013 ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013 ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place - Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Anthracite layer (400mm depth) - Anthracite layer (400mm depth) - Launders (12 x 2 = 24 No) - Air header pipework (internal to filters) - 350mm dia - Install roof over new filters - Lighting - Small power - Ultrasonic level instruments (12no.) - Conductivity level probes (12no.) - Turbidity analyser (13no.) - individual filter outlets and common filtered water outlet - Manganese analyser (2 No) - common RGF inlet and outlet - Temperature transmitter - common RGF clarified water inlet	Y	Y		Y Y Y	Y	0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3 10m long (2 per filter)	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient < 1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3 stainless steel stainless steel, fixed to concrete filter walls steel structure with single-skin cladding to roof and walls 12no. 110v sockets PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm	£652.00 £762.40	ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013 ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter finor nozzles - grouted in place Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Anthracite layer (400mm depth) - Anthracite layer (400mm depth) - Launders (12 x 2 = 24 No) - Air header pipework (Internal to filters) - 350mm dia - Install roof over new filters - Ughting - Small power - Ultrasonic level instruments (12no.) - Conductivity level probes (12no.) - Turbidity analyser (13no.) - individual filter outlets and common filtered water outlet - Manganese analyser (2 No) - common RGF clarified water inlet - Outlet flowmeter filtered water 450mm dia - 12no Sample water drain	Y	Y		Y Y Y	Y	0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3 10m long (2 per filter)	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient < 1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3 stainless steel stainless steel, fixed to concrete filter walls steel structure with single-skin cladding to roof and walls 12no. 110v sockets PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm E&H TMT162	£652.00 £762.40 £2,025.00	ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013 ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013 ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013 ref: ABB quotation 13Q1929371-1 for Liverpool WwTW dated 2013
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter finor nozzles - grouted in place Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Sand media (1100mm depth) - Anthracite layer (400mm depth) - Launders (12 x 2 = 24 No) - Air header pipework (internal to filters) - 350mm dia - Install roof over new filters - Lighting - Small power - Ultrasonic level instruments (12no.) - Conductivity level probes (12no.) - Turbidity analyser (13no.) - individual filter outlets and common filtered water outlet - Manganese analyser (2 No) - common RGF clarified water inlet - Outlet flowmeter filtered water 450mm dia - 12no.	Y	Y Y		Y Y Y		0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3 10m long (2 per filter)	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient < 1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3 stainless steel stainless steel, fixed to concrete filter walls steel structure with single-skin cladding to roof and walls 12no. 110v sockets PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm E&H TMT162 ABB watermaster FEF121 magflow meter (full bore) - DN500	£652.00 £762.40 £2,025.00	ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013 ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013 ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place - Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Anthracite layer (400mm depth) - Anthracite layer (400mm depth) - Launders (12 x 2 = 24 No) - Alr header pipework (internal to filters) - 350mm dia - Install roof over new filters - Lighting - Small power - Ultrasonic level instruments (12no.) - Conductivity level probes (12no.) - Turbidity analyser (13no.) - individual filter outlets and common filtered water outlet - Manganese analyser (2 No.) - common RGF inlet and outlet - Temperature transmitter - common RGF clarified water inlet - Outlet flowmeter filtered water 450mm dia - 12no Sample water drain - Additional hypochlorite dosing rig. including pumps, containment, valves, instrumentation etc.	Y	Y		Y Y Y		0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3 10m long (2 per filter)	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient <1.3 1.38 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3 stainless steel stainless steel, fixed to concrete filter walls steel structure with single-skin cladding to roof and walls 12no. 1100 vockets PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm E&H TMT162 ABB watermaster FEF121 magflow meter (full bore) - DN500 2no. PROMINENT SIGMA2 dosing pumps (max 0.2kW)	£652.00 £762.40 £2,025.00	ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013 ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013 ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013 ref: ABB quotation 13Q1929371-1 for Liverpool WwTW dated 2013
	- Filter internal pipework, central manifold/header - 450mm dia - Filter internal pipework, laterals - 150mm dia @ 300mm centres - Filter floor nozzles - grouted in place Filter media - 90m2 x 12 filters - Gravel support layer (50mm depth) - Anthracite layer (400mm depth) - Anthracite layer (400mm depth) - Anthracite layer (400mm depth) - Launders (12 x 2 = 24 No) - Air header pipework (internal to filters) - 350mm dia - Install roof over new filters - Lighting - Small power - Ultrasonic level instruments (12no.) - Conductivity level probes (12no.) - Turbidity analyser (13no.) - individual filter outlets and common filtered water outlet - Manganese analyser (2 No) - common RGF clarified water inlet - Outlet flowmeter filtered water 450mm dia - 12no Sample water drain - Additional hypochlorite dosing rig, including pumps, containment, valves, instrumentation etc Dosing pipework for chlorination at new RGFs	Y	Y		Y Y Y		0.05*90*12 (+10%) = 59.4m3 1.1*90*12 (+10%) = 1306m3 0.4*90*12 (+10%) = 475m3 10m long (2 per filter) 12no. @ 5m length	4 to 6.3mm equivalent size, bulk density 1600kg/m3 0.56 or 0.65mm equivalent size, uniformity coefficient <1.3 1.18 to 2.5mm equivalent size (grade 2), bulk density 1600kg/m3 stainless steel stainless steel, fixed to concrete filter walls steel structure with single-skin cladding to roof and walls 12no. 110v sockets PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm E&H TMT162 ABB watermaster FEF121 magflow meter (full bore) - DN500 2no. PROMINENT SIGMA2 dosing pumps (max 0.2kW) dual contained plastic pipework	£652.00 £762.40 £2,025.00	ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: D. Brydon email dated 26/01/2018 "New RGF and GAC media" ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013 ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013 ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013 ref: ABB quotation 13Q1929371-1 for Liverpool WwTW dated 2013

			disci	pline respor	nsibility	dimensions	comments / further information	unit cost	assumptions
New RGF Plan	room in GRP Cubicle	Y		 	+	8m x 15m x 3m height			
	Flat concrete floor slab	Y Y		 	+ +	8.5m x 15.5m			
	Blowers (D/S)	<u> </u>	Y			0.3.11 × 13.3.11	2no 2430m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW	£76,387.50	ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016
	Actuated valves (downstream of blowers) - 350mm dia		Υ				2no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£3,110.38	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Air scour main flowmeter (350mm dia)				Y				
	Air scour main pressure switch	ļ		ļ	Y		Guardian series pressure switch model P1201	£245.00	ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	Air scour main (350mm dia)	<u> </u>	Y	- v	+	15m	scotchkoted steel		
	Heating / air conditioning	-	1	Y	+ +		4no. ceiling mounted cassette units and external condensers		
	Lighting Small power		_	Y	+ +		2no. 110v sockets		
	Smar power	-		Y	Y		210. 1104 30CKCIS		ref: "MCCs" workbook sheet
	Cabling for power and instrumentation			Y	Y				ref: "MCCs" workbook sheet
New Recycle	ank and pumping station - run to waste								
	Recycle tank (wet well) - 288m3	Y				8m x 6m x 6m depth	buried concrete tank. Include for benching to tank corners		
	Ultrasonic level instrument				Y		PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer		ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013
	Conductivity level probes	<u> </u>			Y		E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm		ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	Submersible pumps with VSD (2no. X 75l/s x 20m head) - D/S configuration Non-return valves - 150mm dia	<u> </u>	Y	1	+		2no Flygt NP3202.090 (30kW), 75l/s @ 22m head	£10,850.20	ref: Xylem quotation 13-SALSHQ-06770 Alt. 1 Ver. 7 for Liverpool WwTW dated 04/02/2014
	Recycled water discharge main - 150mm dia	<u> </u>	Y	1	+ +	10m	2no one per submersible pump. Scotchkoted steel		
	Rising mains isolation valves - 150mm dia	-	Ý		 	10111	2no 150NB wedge gate valve PN10, manually actuated, in compliance with UU S03	£107.24	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Flowmeter on rising main with cabling - 150mm dia				Y		ABB watermaster FEF121 magflow meter (full bore) - DN200		ref: ABB quotation 13Q1929371-1 for Liverpool WwTW dated 2013
	Recycled water common discharge main - 150mm dia	Y			1 1	100m	buried ductile iron		
lew Clearwa	er tank and pumping station								
	Excavation including temp supports	Υ			$\perp \perp \perp$				
	Blinding	Y		1	\vdash		+		
	Formwork Reinforcement	Y	+	1	+ +		+		
	Reinforcement Concrete chamber (dry well) complete with concrete roof slab (50% floor area)	Y	-	+	+	9m x 13m x 10m deep	+		
	Concrete chamber (dry well) complete with concrete roof slab (50% floor area) Concrete chamber (wet well) complete with concrete roof slab	Y	+	1	+ +	9m x 13m x 10m deep 8m x 13m x 10m deep	+	+	
	Ultrasonic level instrument	 	t -	1	Y	0111 x 25111 x 20111 ueep	PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer	£767 00	ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013
	Conductivity level probes	†		1	Y		E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm		ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	Pump plinths	Y				2m x 2m x 0.5m height	3no.		
	Low lift backwash pumps with VSD (3 No x 560 l/s x 25m head) - D/D/S		Υ			circa 2m x 2m x 3m height	3no Hidrostal L12K series (240kW), 650l/s @ 25m		ref: Hidrostal budget quotation 30/01/2018 (Estimate 83780 Rev B)
	Actuated valves (upstream and downstream of pumps) - 900mm dia		Υ				6no 900NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£16,388.69	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Miscellaneous interconnecting pipework - 900mm dia		Y			30m	scotchkoted steel		
	Backwash main flowmeter (1 No) - 900mm dia	ļ			Y				
	Backwash main pressure transmitter		-		Y	450	E&H Cerabar M PMC51	£830.30	ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	Clearwater backwash main to new RGF (900mm dia)	Y	_	V	+	150m	buried ductile iron		
	Lighting in dry well Sump pump in dry well with integrated level control		Y	<u> </u>	+ +		1no Flygt N 3085 SH series (2.4kW)	£2 301 00	ref: https://www.pumpsukltd.com/flygt-ns-3085-sh-160-24-sewage-pump.html
	Sump pump rising main to drain including non-return valve (80mm dia)		Y			assume 50m length	plastic pipework	22,501.00	Tel. https://www.pumpsuktu.com/nygt hs 3003 3h 100 24 3cwage pump.html
	Access staircase from ground floor landing to dry well base		Y			10m vertical rise	Francisco Piperonia		
	Steel framed and clad building structure to same footprint as dry well (3m height to eaves)	Y				9m x 13m x 3m height	single-skin cladding to walls and roof		
	мсс			Y	Y				ref: "MCCs" workbook sheet
	Cabling for power and instrumentation			Y	Y				ref: "MCCs" workbook sheet
	Overhead lifting beam		Y		\perp	12m length	capacity 5t		
	Small power		-	Y		45 1 11 6 1	2no. 110v sockets		
	Connection from UV outlet main to clearwater wet well (900mm dia)	Y	_	Y		15m length of pipework	buried ductile iron	£12 ££1 10	rafi Industrial universe sustation for Disabbuse and Danuar dated 00 (NE /2016
		Y	Y	Y		15m length of pipework		£12,651.19	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
Convert exist	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia	Y	Y	Y		15m length of pipework	buried ductile iron	£12,651.19	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
Convert exist	Connection from UV outlet main to clearwater wet well (900mm dia)	Y	Y	Y		15m length of pipework	buried ductile iron	£12,651.19	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
Convert exist	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia Ig Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m	Y	Y	Y			buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03	£12,651.19	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
Convert exist	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia Ing Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework	Y	Y Y	Y			buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel		
Convert exist	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia Ig Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia)	Y	Y Y Y	Y		1200m3 of media 1no. @ 75m length	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03		ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
Convert exist	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia g Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia)	Y	Y Y Y	Y		1200m3 of media 1no. @ 75m length 8no. @5m length	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel		
Convert exist	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia Ig Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia	Y	Y Y Y Y Y Y	Y		1200m3 of media 1no. @ 75m length	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls	£3,110.38	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
Convert exist	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia Ig Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers	Y	Y Y Y	Y		1200m3 of media 1no. @ 75m length 8no. @5m length	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel	£3,110.38	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016
Convert exist	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia g Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade	Y	Y Y Y Y Y Y			1200m3 of media 1no. @ 75m length 8no. @5m length 8no. @ 5m length	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scottchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scottchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW	£3,110.38 £76,387.50	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCS" workbook sheet
Convert exis	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia Ig Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers	Y	Y Y Y Y Y Y			1200m3 of media 1no. @ 75m length 8no. @5m length	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls	£3,110.38	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016
	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia g Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade	Y	Y Y Y Y Y Y			1200m3 of media 1no. @ 75m length 8no. @5m length 8no. @ 5m length	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scottchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scottchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW	£3,110.38 £76,387.50	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCS" workbook sheet
	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia Ig Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade Install new GAC media to 8 filters	Y	Y Y Y Y Y Y			1200m3 of media 1no. @ 75m length 8no. @5m length 8no. @ 5m length	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scottchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scottchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW	£3,110.38 £76,387.50	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCS" workbook sheet
	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia Ing Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabiling upgrade Install new GAC media to 8 filters Install new GAC media to 8 filters B Phase 2 RGFs to GAC - 10nr individual filter footprint 10m x 10m Remove existing air scour pipework Replace existing air scour pipework	Y	Y Y Y Y Y Y			1200m3 of media 1no. @ 75m length 8no. @5m length 8no. @ 5m length 1600m3 of media	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 8 filters media quantity - 10 filters x 100m2 surface area x 1.5m depth = 1500m3	£3,110.38 £76,387.50	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCS" workbook sheet
	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia g Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet solomm dia manifold pipework - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (internal to filters) - 350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade Install new GAC media to 8 filters g Phase 2 RGFs to GAC - 10nr individual filter footprint 10m x 10m Remove existing carbon media from 10no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework	Y	Y Y Y Y Y Y			1200m3 of media 1no. @ 75m length 8no. @5m length 8no. @ 5m length 1600m3 of media	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 8 filters media quantity - 10 filters x 100m2 surface area x 1.5m depth = 1500m3 scotchkoted steel	£3,110.38 £76,387.50 675/m3	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Carbsorb30 Chemviron quote February 2018
	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia g Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade Install new GAC media to 8 filters g Phase 2 RGFs to GAC - 10nr individual filter footprint 10m x 10m Remove existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework	Y	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y			1200m3 of media 1no. @ 75m length 8no. @5m length 8no. @ 5m length 1600m3 of media 1500m3 of media	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 8 filters media quantity - 10 filters x 100m2 surface area x 1.5m depth = 1500m3 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£3,110.38 £76,387.50 675/m3	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCS" workbook sheet
	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia Ing Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade Install new GAC media to 8 filters g Phase 2 RGFs to GAC - 10nr individual filter footprint 10m x 10m Remove existing carbon media from 10no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia)	Y	Y Y Y Y Y Y			1200m3 of media 1no. @ 75m length 8no. @5m length 8no. @ 5m length 1600m3 of media 1500m3 of media 1no. @ 75m length	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 8 filters media quantity - 10 filters x 100m2 surface area x 1.5m depth = 1500m3 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel	£3,110.38 £76,387.50 675/m3	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Carbsorb30 Chemviron quote February 2018
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	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia g Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air socur pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade install new GAC media to 8 filters g Phase 2 RGFs to GAC - 10nr individual filter footprint 10m x 10m Remove existing air scour pipework - Air scour main inlet 30mm dia manifold pipework - Air scour main inlet 30mm dia manifold pipework - Air scour main inlet 430mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet tylework (350mm dia) Replace existing blowers	Y	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y			1200m3 of media 1no. @ 75m length 8no. @5m length 8no. @ 5m length 1600m3 of media 1500m3 of media 1no. @ 75m length	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 8 filters media quantity - 10 filters x 100m2 surface area x 1.5m depth = 1500m3 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel	£3,110.38 £76,387.50 675/m3	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Carbsorb30 Chemviron quote February 2018
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Convert exist	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia g Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air socur pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade Install new GAC media to 8 filters g Phase 2 RGFs to GAC - 10nr individual filter footprint 10m x 10m Remove existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet talve (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade Install new GAC media to 10 filters	Y	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	Y		1200m3 of media 1no. @ 75m length 8no. @5m length 8no. @ 5m length 1600m3 of media 1500m3 of media 1no. @ 75m length 10no. @5m length	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 8 filters media quantity - 10 filters x 100m2 surface area x 1.5m depth = 1500m3 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW	£3,110.38 £76,387.50 675/m3 £3,110.38	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Carbsorb30 Chemviron quote February 2018 ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016
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onvert exist	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia Ig Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade Install new GAC media to 8 filters - Air scour main inlet scour pipework - Air scour main inlet scour pipework - Air scour main inlet air scour pipework - Air scour main inlet air scour pipework - Air scour main inlet scour pipework - Air scour main inlet scour pipework - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade Install new GAC media to 10 filters - Air scour main inlet scour pipework - Air scour main inlet scour pipework - Air scour main inlet scour pipework - Air scour main inlet scour pipework - Air scour main inlet scour pipework - Air scour main inlet scour pipework - Air scour main inlet scour pipework - Air scour main inlet scour pipework - Air scour main inlet pipework (350mm dia) - Air scour main inlet scour pipework - Air scour main inlet scour pipework - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	Y		1200m3 of media 1no. @ 75m length 8no. @5m length 8no. @ 5m length 1600m3 of media 1500m3 of media 1no. @ 75m length 10no. @5m length 2000m3 of media	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 8 filters media quantity - 10 filters x 100m2 surface area x 1.5m depth = 1500m3 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 11no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 10 filters Note: existing dirty washwater storage (4no. @ 22m x 11m x 3m TWL)	£3,110.38 £76,387.50 675/m3 £3,110.38	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Carbsorb30 Chemviron quote February 2018 ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016
Convert exist	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia g Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade Install new GAC media to 8 filters - Replace existing carbon media from 10no. filters and dispose of Remove existing carbon media from 10no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet pipework (350mm dia) - Air header pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade Install new GAC media to 10 filters) - Access road diversion Break-out existing access road Excavation including temp supports Blinding	Y Y Y Y Y Y Y Y Y Y Y Y	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	Y		1200m3 of media 1no. @ 75m length 8no. @5m length 8no. @ 5m length 1600m3 of media 1500m3 of media 1no. @ 75m length 10no. @5m length 2000m3 of media	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 8 filters media quantity - 10 filters x 100m2 surface area x 1.5m depth = 1500m3 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 11no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 10 filters Note: existing dirty washwater storage (4no. @ 22m x 11m x 3m TWL)	£3,110.38 £76,387.50 675/m3 £3,110.38	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Carbsorb30 Chemviron quote February 2018 ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016
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onvert exist	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade Install new GAC media to 8 filters g Phase 2 RGFs to GAC - 10nr individual filter footprint 10m x 10m Remove existing air scour pipework - Air scour main inlet scour pipework - Air scour main inlet sourm dia manifold pipework - Air scour main inlet sourm dia manifold pipework - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) Replace existing blowers Feeder and cabiling upgrade Install new GAC media to 10 filters) Install new GAC media to 10 filters - Air scour main inlet sourmation to filters of the scour and the	Y Y Y Y Y Y	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	Y		1200m3 of media 1no. @ 75m length 8no. @5m length 8no. @ 5m length 1600m3 of media 1500m3 of media 1no. @ 75m length 10no. @ 5m length 2000m3 of media	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 8 filters media quantity - 10 filters x 100m2 surface area x 1.5m depth = 1500m3 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 10 filters Note: existing dirty washwater storage (4no. @ 22m x 11m x 3m TWL) tarmac surface and white-lining top water level @3m depth. Tie-in to existing dirty washwater tank(s) PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer	£3,110.38 £76,387.50 675/m3 £3,110.38 £76,387.50 675/m3	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Carbsorb30 Chemviron quote February 2018 ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Carbsorb30 Chemviron quote February 2018
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Convert exist	Connection from UV outlet main to clearwater wet well (900mm dia) Manual Isolation valve (UV outlet connection) - 900 dia g Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet pipework (350mm dia) - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade Install new GAC media to 8 filters g Phase 2 RGFs to GAC - 10nr individual filter footprint 10m x 10m Remove existing carbon media from 10no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet pipework (350mm dia) Air header pipework (internal to filters) - 350mm dia Replace existing blowers Feeder and cabling upgrade Install new GAC media to 10 filters Newater Storage Tank (1000m3) Access road diversion Break-out existing access road Excavation including temp supports Bilinding Formwork Reinforcement Concrete chamber (tank) buried to level of existing backwash tanks Ultrasonic level instrument Conductivity level probes Inlet weir extension (concrete channel) Floating bellmouth outlet inc. outlet pipework Connection to existing outlet manifold - 200 dia	Y Y Y Y Y Y Y Y Y Y Y Y Y	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	Y		1200m3 of media 1no. @ 75m length 8no. @5m length 8no. @ 5m length 1600m3 of media 1500m3 of media 1no. @ 75m length 10no. @5m length 2000m3 of media 50m length 2000m3 of media	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 8 filters media quantity - 10 filters x 100m2 surface area x 1.5m depth = 1500m3 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 10 filters Note: existing dirty washwater storage (4no. @ 22m x 11m x 3m TWL) tarmac surface and white-lining top water level @3m depth. Tie-in to existing dirty washwater tank(s) PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm	£3,110.38 £76,387.50 675/m3 £3,110.38 £76,387.50 675/m3	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Carbsorb30 Chemviron quote February 2018 ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Carbsorb30 Chemviron quote February 2018
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Convert exist	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia B Phase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia) Replace existing blowers Feeder and cabling upgrade Install new GAC media to 8 filters - Remove existing arbon media from 10no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 30mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet yalve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet yalve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour	Y Y Y Y Y Y Y Y Y Y Y Y Y	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	Y		1200m3 of media 1no. @ 75m length 8no. @5m length 8no. @ 5m length 1600m3 of media 1500m3 of media 1500m3 of media 10no. @ 75m length 10no. @ 5m length 2000m3 of media 2000m3 of media 50m length 2000m3 of media	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 8 filters media quantity - 10 filters x 100m2 surface area x 1.5m depth = 1500m3 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel 10no 350NB wedge ga	£3,110.38 £76,387.50 675/m3 £3,110.38 £76,387.50 675/m3	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Carbsorb30 Chemviron quote February 2018 ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Carbsorb30 Chemviron quote February 2018 ref: "Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013 ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
Convert exist	Connection from UV outlet main to clearwater wet well (900mm dia) Manual isolation valve (UV outlet connection) - 900 dia Brhase 1 RGFs to GAC - 8nr individual filter footprint 10m x 10m Remove existing carbon media from 8no. filters and dispose of Replace existing air scour pipework - Air scour main inlet 350mm dia manifold pipework - Air scour main inlet valve (350mm dia) - Air scour main inlet spiework (350mm dia) - Air scour main inlet spiework (350mm dia) - Air scour main inlet spiework (350mm dia) - Air scour main inlet spiework (350mm dia) - Air scour main inlet spiework (350mm dia) - Air scour main inlet spiework (350mm dia) - Air scour main inlet spiework (350mm dia) - Air scour main spiework (350mm dia) - Replace existing blowers - Replace existing air scour pipework - Air scour main inlet spiework (350mm dia) - Air scour main inlet spiework (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (350mm dia) - Air scour main inlet valve (300mm dia) - Air scour main	Y Y Y Y Y Y Y Y Y Y Y Y Y	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	Y		1200m3 of media 1no. @ 75m length 8no. @5m length 8no. @ 5m length 1600m3 of media 1500m3 of media 1500m3 of media 1no. @ 75m length 10no. @ 5m length 2000m3 of media 2000m3 of media 50m length 2000m3 of media 1m wide, 15m long, 3.5m deep assume 20m length 1m wide, 15m long, 3.5m deep	buried ductile iron 1no 900NB wedge gate valve PN10, manually actuated, in compliance with UU S03 media quantity - 8 filters x 100m2 surface area x 1.5m depth = 1200m3 scotchkoted steel 24no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 8 filters media quantity - 10 filters x 100m2 surface area x 1.5m depth = 1500m3 scotchkoted steel 10no 350NB wedge gate valve PN10, electrically actuated, in compliance with UU S03 scotchkoted steel stainless steel, fixed to concrete filter walls 2no 5040m3/hour @350mbar. 2no. Sulzer HST20-4500-1-150, 150kW 10m x 10m x 2m depth (assumed depth) x 10 filters Note: existing dirty washwater storage (4no. @ 22m x 11m x 3m TWL) tarmac surface and white-lining top water level @3m depth. Tie-in to existing dirty washwater tank(s) PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer E&H conductivity level probe, HIH probe length 2000mm, Lt probe length 8000mmm tied into existing inlet channel - assume 300mm thick walls scotchkoted steel tied into existing solids channel 3no Fig Sc3100 900W x 1000D electrically actuated penstock (compliant with UU S03)	£3,110.38 £76,387.50 675/m3 £3,110.38 £76,387.50 675/m3	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Carbsorb30 Chemviron quote February 2018 ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016 ref: "blower sizing" and Sulzer quotation for Blackburn and Darwen dated 27/10/2016 ref: "MCCs" workbook sheet Carbsorb30 Chemviron quote February 2018
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L			discip	line respons	sibility		dimensions	comments / further information	unit cost	assumptions
	ancing Tank (408m3)							Note: existing sludge balancing tanks (2no. @ 17m x 7m x 3m TWL)		
	Excavation including temp supports	Y								
	Blinding	Y								
	Formwork	Υ								
	Reinforcement	Υ								
	Concrete chamber (tank) buried to level of existing backwash tanks	Υ					17m x 8m x 3.5m deep	top water level @3m depth. Tie-in to existing dirty washwater tank(s)		
	Ultrasonic level instrument				Y			PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer	£767.00	ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013
	Conductivity level probes				Υ			E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm	£652.00	ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	Inlet chamber extension inc. tie in to existing inlet chamber - covered concrete channel	γ					2m wide x 20m long x 3.5m deep	concrete channel with lid		
	Inlet penstock (1 No say 900mm x 900mm)		v			1	Ziii wide x Zoiii long x 3.3iii deep	1no Fig SG3100 900W x 1000D electrically actuated penstock (compliant with UU S03)	£4 945 63	ref: Ham Baker Adams quotation for Blackburn and Darwen dated 10/05/2016
	Thickened sludge inlet manifold pipework - 250mm dia	Υ				+	assume 20m length	scotchkoted steel	14,545.05	Tel. Hall baker Adams quotation for Biackburn and Darwen dated 10/03/2010
	Thickened sludge inlet manifold pipework - 250mm dia Thickened sludge inlet valves - 250mm dia	1	Y				assume zom length	3no 250NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	C2 420 FC	
			Y V			+				ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Sludge outlet valve - 250mm diameter		Y					1no 250NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£2,139.56	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Sludge outlet pipework inc. tie in to existing pipework - 250mm dia	Υ					assume 20m length	buried ductile iron		
	Submersible mixer and guiderail		Υ					Flygt S4650 5.5kW mixer	£8,283.00	ref: Flygt quotation for Bredbury MBT dated 01/04/2014
	Lifting davit and socket		Υ							
	Cabling for power and instrumentation			Υ	Y					ref: "MCCs" workbook sheet
	Modifications to existing effluent treatment MCC			Υ	Υ			new starters and additional I/O for instrumentation		ref: "MCCs" workbook sheet
	Handrailing, toeboards and 1no. 3.5m vertical ladder		Y				50m length			
	-						Ť		İ	
New Thickened	Sludge Holding Tank (250m3) - above ground						1			
	Flat concrete slab	Y				1	8.5m diameter			
	Glass-coated steel storage tank (circular)	Y				+	8m diameter x 5m height	"permastore" tank		
 		Y		_		+	on diameter x on neight	permasture tank		
	GRP tank roof with access hatch	Y				+	+		ļ	
	Lifting davit and socket		Y				1			
	Access staircase from ground floor to tank roof landing		Y				1			
	Submersible mixer and guiderail		Y							
	Ultrasonic level instrument				Υ			PPM 180 Ultra 5 (Profibus enabled) and dB10 ultrasonic transducer	£767.00	ref: Pulsar quotation 24620 for Liverpool WwTW dated 05/11/2013
	Conductivity level probes				Y			E&H conductivity level probes, HH probe length 2000mm, LL probe length 8000mmm	£652.00	ref: E&H quotation 2300200500 for Liverpool WwTW dated 05/11/2013
	Thickened sludge inlet manifold pipework - 250mm dia	Υ					assume 30m length	scotchkoted steel		
	Thickened sludge inlet valves - 250mm dia		Υ					2no 250NB wedge gate valve PN10, electrically actuated, in compliance with UU S03	£2,139.56	ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Sludge outlet valve - 250mm diameter		Υ				assume 50m length	1no 250NB wedge gate valve PN10, electrically actuated, in compliance with UU S03		ref: Industrial valves quotation for Blackburn and Darwen dated 09/05/2016
	Sludge outlet pipework inc. tie in to existing pipework - 250mm dia	Υ				1		buried ductile iron		
	Cabling for power and instrumentation			٧	γ	1		Suited detaile work		ref: "MCCs" workbook sheet
	Modifications to existing effluent treatment MCC			v '	Y	+	1	new starters and additional I/O for instrumentation		ref: "MCCs" workbook sheet
	Modifications to existing emident treatment wice			1	- 1		-	new starters and additional your instrumentation		rer: MICCS WORKDOOK Sneet
						+				
Site Wide Elem										
	SCADA Control system with Operator Interface, outstations and all cabling				Y					
	Power upgrading and distribution			Υ						ref: "MCCs" workbook sheet
	Interfaces between existing and new control systems				Y					
	External lighting			Υ						
	Additional footpaths and road reinstatement	Υ								
	Planting and landscaping	Υ								
	Lightning protection to new RGFs??			Υ		1	1			
	Pipework fittings, joints, couplers etc.	Y	Y				1		20% of pipework mats	
	Service diversions for new structures and pipework	Y				1	1			
 	Modifications to existing drainage system	Y				+	100m length allowance	assume 4no. new manholes and additional 200NB pipework	 	
—	Valve chambers for buried valves	Y				+	100111 letigut allowalite	assume 4no. new mannoies and additional ZOUNB pipework 12no. 1500mm diameter manhole rings to a depth of 1m		
 	valve chambers for buried valves	- 1				+	+	1210. 1300mm diameter mannole rings to a depth of 1111		
						+	+		ļ	
Preliminaries							1			
	Preparation and reinstatement of site compound for offices and car parking	Υ								
	Site offices and stores	Y								
	Mess and welfare facilities	Υ								
	Design	Υ								
	Staff	Y								
	Insurances	Y								
	Risk	Y				+	1			
	Plant	Y				+	 			
						+	+		-	
	Site security, signage and demarcation	Y					1			
	Utility services to site offices	Υ					1			
	Site topo and condition surveys	Υ								
	Temporary over-pumping	Υ								
	Temporary lighting	Υ								
							1			
Optional Eleme	nts					1	1			
	Cover existing RGFs when converted to GAC	Υ				+	 	steelwork frame, single-skin cladding to walls and roof		
—		Y				-	EOm v 20m 2m high nuch wall-	flat concrete slab incorporating drainage. Push walls to two sides		
1	Construct hard standing / push walls for sludge storage area	Ť			I	1	50m x 30m, 3m high push walls	nat concrete siab incorporating uraniage. Push wans to two sides	ı	

- Buried pipework is ductile iron spigot and socket unless otherwise indicated
 Pipework in gallery, Interstage PS or above ground is coated steel unless otherwise indicated
 Products in contact with water must be approved for this application
 Actuated valves will provide process control and isolation. No additional manual isolation valves provided