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SEWER PUMP STATION HYDRAU Rev 4: Based on updated details SMSF Complete 847.8EP		CALCULATIONS	Designed : IN	Rev 4 15	Duty / Stdby	DATE: 1	12/12/2019	FOR REVIEW (Not for Constructi	on)	Project: <i>CP</i>	Drayton Wellcamp <i>Outfall</i>
FLOW CALCS		based on	WSA 04 / TR	C / Client info)						
No. of Dwellings	=	314	From client in	fo				Main total length	=	1905	m
EP/ Dwelling	=	2.7						Max. Detention time	=	2	hrs
Estimated Population	=	848						System Detention Time	=	12.50	hrs based on ADWF
ADWF per EP	=	150	l/EP/d					System Starts / hr	=	1.16	
PDWF factor (C2)	=	2.32						Maximum Starts / hr	=	8.00	
Assumed ADWF-PWWF factor	=	5.00						Maximum velocity (m/s)	=	3	
				N				Maximum Detention time for			
ADWF	=	1.47	l/s	Note:	a ia mauu 200		2	Emergency Storage	=	4	hrs @ ADWF
PDWF	=	3.41	l/s		n is now 200		J				
PWWF	=	7.36	l/s	report	as per the v		inter				
Minimum & Maximum Pipe Inter	nal	Diameter						Head Loss Calcs			
Minimum ID	=	129	mm					Suction RL	=	509.42	m
Maximum ID	=	188	mm					Overflow level	=	513.70	m
								Control Point	=	558.453	m <i>Outfall</i>
								Static Lift (Max.)	=	49.14	m
Pipe selection & Scour stripping of	cons	traints						Static Lift (Min.)	=	44.75	m
								Loss due to pipe and fittings	=	14.63	m
								Total Head Loss (Min.)	=	59.38	m
		Vertical Riser	Horizontal	Combined	RM	1		Total Head Loss (Max.) -			
			RM 1	RM		,		Duty/Stdby	=	63.76	m
Nominal Diameter (mm)	=	150	150	150	200),					
Material	=	DICL	DICL	DIEL	PVC O						
PN Class (bar)	=	16	16	16	20)					
Internal Diameter (mm)	=	161	161	161	217.1			Minimum, Maximum & Selec	ted Fl	ow	
Internal Area of the main (m ²)	=	0.0204	0.0204	0.0204	0.0370)					
Roughness (mm)	=	0.3	0.3	0.3	0.6	Wallingfo	ord et al.	Minimum flow	=	39.00	l/s
Slime stripping flow (I/s)	=	20.13	20.13	20.13	38.29	1		Maximum flow $Q_{p(max)}$	=	23.57	l/s
Length of RM (m)	=	4	2	2	1897			Selected Flow Q _p	=	39.00	l/s
Volume of Main (m ³)	=	0.08	0.04	0.04	70.25						
Fittngs & Valves HL K _f	=	0.75	3.85	1.65	3	ref Fitting	losses				DECEI
Avg. Velocity (m/s)	=	1.91	1.91	1.91	1.05						





SEWER PUMP STATION HYDRAULIC CALCULATIONS

SMSF Complete 847.8EP

PUMP STATION SIZING

Finished surface level RL	=	514.7	m
Inlet IL	=	510.7	m
Inlet size	=	DICL PN20 375	mm
Overflow below NS	=	1	m
Max. Starts per hour	=	8.00	
Well Diameter	=	3.2	m
Wetwell Pump control volume	=	4387.50	I .
Pump cut in / cut out depth	=	0.545	m
*Depth to Pump cut in from Inlet IL	=	1.01	m
Duty cut in RL	=	509.69	m
Pump cut out RL	=	509.14	m
Mean duty pump operating level	=	509.42	m
Stdby cut in RL	=	509.84	m
**Highlevel alarm above Stdby cut in	=	0.58	m
Highlevel alarm RL		510.42	m
Lowlevel alarm below pump cut out	=	0.15	m
Lowlevel alarm RL		508.99	m
Submergence below lowlevel alarm	=	0.53	m
Well Floor RL	=	508.465	m
Precise Well Floor Level RL	=	508.46	m
Total well depth	=	6.24	m

*Depth is to match with the PS depth for ultimate stage

**Amended to match with HLA for ultimate stage

Rev 4	Project:	Drayton Wel	lcamp	
ADWF STORAGE VESSEL SIZING				
Total Storage required (based on assumed ADWF)	=	21200.00	1	
Min. storage required in between HLA and OFL as per Concept drawings Storage available in Ret. Pipes Storage available in Manholes Storage in wet-well above HLA Total Storage available Additional Storage Req No Additional Storage Required	= = = =	0.00 0.00 26391.14 26391.14 -5.19	kl I I Kl	
Max. dia. of storage vessel	=	2.78	m	
TOP RL	514.7			
Q100 Level	ТВА			
OVERFLOW IL	513.70		Outlet IL	
High High lovel Alarm	513 20			



Drayton Wellcamp				Rev 4				Fitting Losses								
Vertical RM (DIEL)					Horizontal RM (DIEL)				Combined F		Rising main PVC-O					
Fitting	tting K factor Nos Total K		otal K	Fitting	K factor Nos		otal K	Fitting	K factor	Nos	Total K	Fitting	K factor	los	Tot	al K
Entry	0.25	1	0.25	Entry	0.25	0	0	Entry	0.25		0 0	Entry	0.25		0	0
enlargement exit	0.35	0	0	enlargement exit	0.35	0	0	sudden enlargement	0.15		1 0.15	enlargement exit	0.35		1	0.35
Sluice Valve	0.2	0	0	Sluice Valve	0.2	1	0.2	Sluice Valve	0.2	(0 0	Sluice Valve	0.2		0	0
Reflux valve	2.5	0	0	Reflux valve	2.5	1	2.5	Reflux valve	2.5	(0 0	Reflux valve	2.5		0	0
Ball check valve	5	0	0	Ball check valve	5	0	0	Ball check valve	5	(0 0	Ball check valve	5		0	0
Flow meter	1	0	0	Flow meter	1	0	0	Flow meter	1		1 1	Flow meter	1		0	0
Gas release valve	0.1	0	0	Gas release valve	0.1	0	0	Gas release valve	0.1	(0 0	Gas release valve	0.1		0	0
Tee (in line)	0.35	0	0	Tee (in line)	0.35	1	0.35	Tee (in line)	0.35		0 0	Tee (in line)	0.35		3	1.05
Tee (branch to line)				Tee (branch to line) 90				Tee (branch to line) 90				Tee (branch to line) 90	C			
90 deg	0.8	0	0	deg	0.8	1	0.8	deg	0.8		0 0	deg	0.8		0	0
Angle branch (in line)	0.35		0	Angle branch (in line)	0.35		0	Angle branch (in line)	0.35		0 0	Angle branch (in line)	0.35			0
Angle branch (45 deg)	0.6	0	0	Angle branch (45 deg)	0.6	0	0	Angle branch (45 deg)	0.6		0 0	Angle branch (45 deg)	0.6		0	0
90 deg LR bend	0.5	1	0.5	90 deg LR bend	0.5	0	0	90 deg LR bend	0.5		L 0.5	90 deg LR bend	0.5		0	0
45 deg LR bend	0.2	0	0	45 deg LR bend	0.2	0	0	45 deg LR bend	0.2		0 0	45 deg LR bend	0.2		5	1
22.5 deg LR bend	0.1	0	0	22.5 deg LR bend	0.1	0	0	22.5 deg LR bend	0.1		0 0	22.5 deg LR bend	0.1		4	0.4
11.25 deg LR bend	0.05	0	0	11.25 deg LR bend	0.05	0	0	11.25 deg LR bend	0.05		0 0	11.25 deg LR bend	0.05		4	0.2
90 deg elbow	1.1	0	0	90 deg elbow	1.1	0	0	90 deg elbow	1.1		0 0	90 deg elbow	1.1		0	0
45 deg elbow	0.35	0	0	45 deg elbow	0.35	0	0	45 deg elbow	0.35		0 0	45 deg elbow	0.35		0	0
22.5 deg elbow	0.1	0	0	22.5 deg elbow	0.1	0	0	22.5 deg elbow	0.1		0 0	22.5 deg elbow	0.1		0	0
11.25 deg elbow	0.05	0	0	11.25 deg elbow	0.05	0	0	11.25 deg elbow	0.05		0 0	11.25 deg elbow	0.05		0	0
additional				additional				additional				additional				
Sum			0.75	Sum			3.85	Sum			1.65	Sum				3

