How to use the pump flow in Sewerage

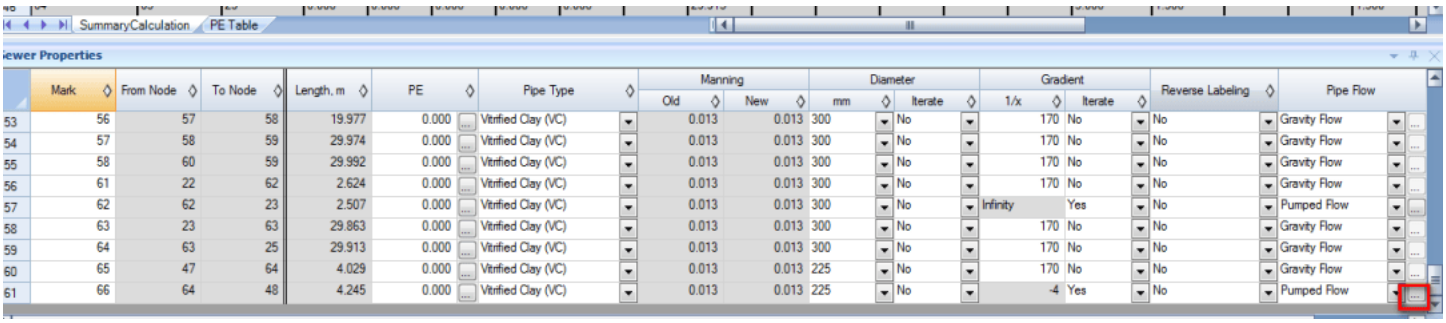
Sewer · https://mes100.com/docs/sewnet-use-pump-flow/

In Sewnet, pump flow is provided in order to **pump the PE from a lower IL to a higher IL**. You will not be able to use a pump to solve the capacity; for this, you will have to change the gradient, the drain size, drain type and the Manning coefficient to do that.

You can also use a pump to **increase the velocity of the sewerage flow** to within a certain limit.

Force Main Design

First, go to the sewer spread input and set the Pipe Flow to **Pumped Flow**,



	Mark	From Node	To Node	Length, m	PE	Pipe Type	Manning		Diameter		Gradient		Reverse Labeling	Pipe Flow
							Old	New	mm	Iterate	1/x	Iterate		
53	56	57	58	19.977	0.000	Vitrified Clay (VC)	0.013	0.013	300	No	170	No	No	Gravity Flow
54	57	58	59	29.974	0.000	Vitrified Clay (VC)	0.013	0.013	300	No	170	No	No	Gravity Flow
55	58	60	59	29.992	0.000	Vitrified Clay (VC)	0.013	0.013	300	No	170	No	No	Gravity Flow
56	61	22	62	2.624	0.000	Vitrified Clay (VC)	0.013	0.013	300	No	170	No	No	Gravity Flow
57	62	62	23	2.507	0.000	Vitrified Clay (VC)	0.013	0.013	300	No	Infinity	Yes	No	Pumped Flow
58	63	23	63	29.863	0.000	Vitrified Clay (VC)	0.013	0.013	300	No	170	No	No	Gravity Flow
59	64	63	25	29.913	0.000	Vitrified Clay (VC)	0.013	0.013	300	No	170	No	No	Gravity Flow
60	65	47	64	4.029	0.000	Vitrified Clay (VC)	0.013	0.013	225	No	170	No	No	Gravity Flow
61	66	64	48	4.245	0.000	Vitrified Clay (VC)	0.013	0.013	225	No	-4	Yes	No	Pumped Flow

Figure 1: the sewer mode spread input

and then click on the ***ellipsis*** in order to set the **Storage Well Dimensions**, the **Pump Properties** and **Other Details**.

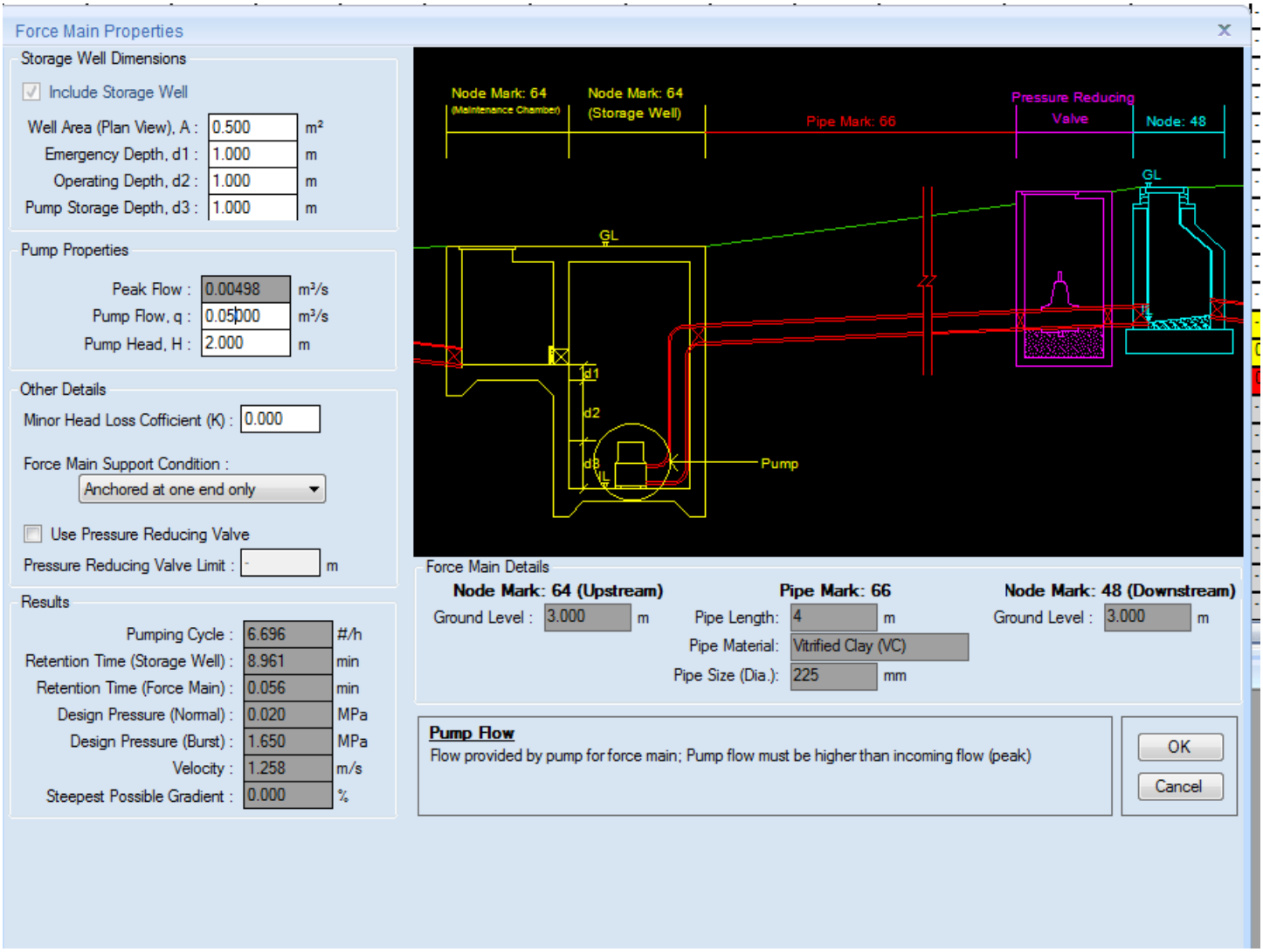


Figure 2: the pump design properties

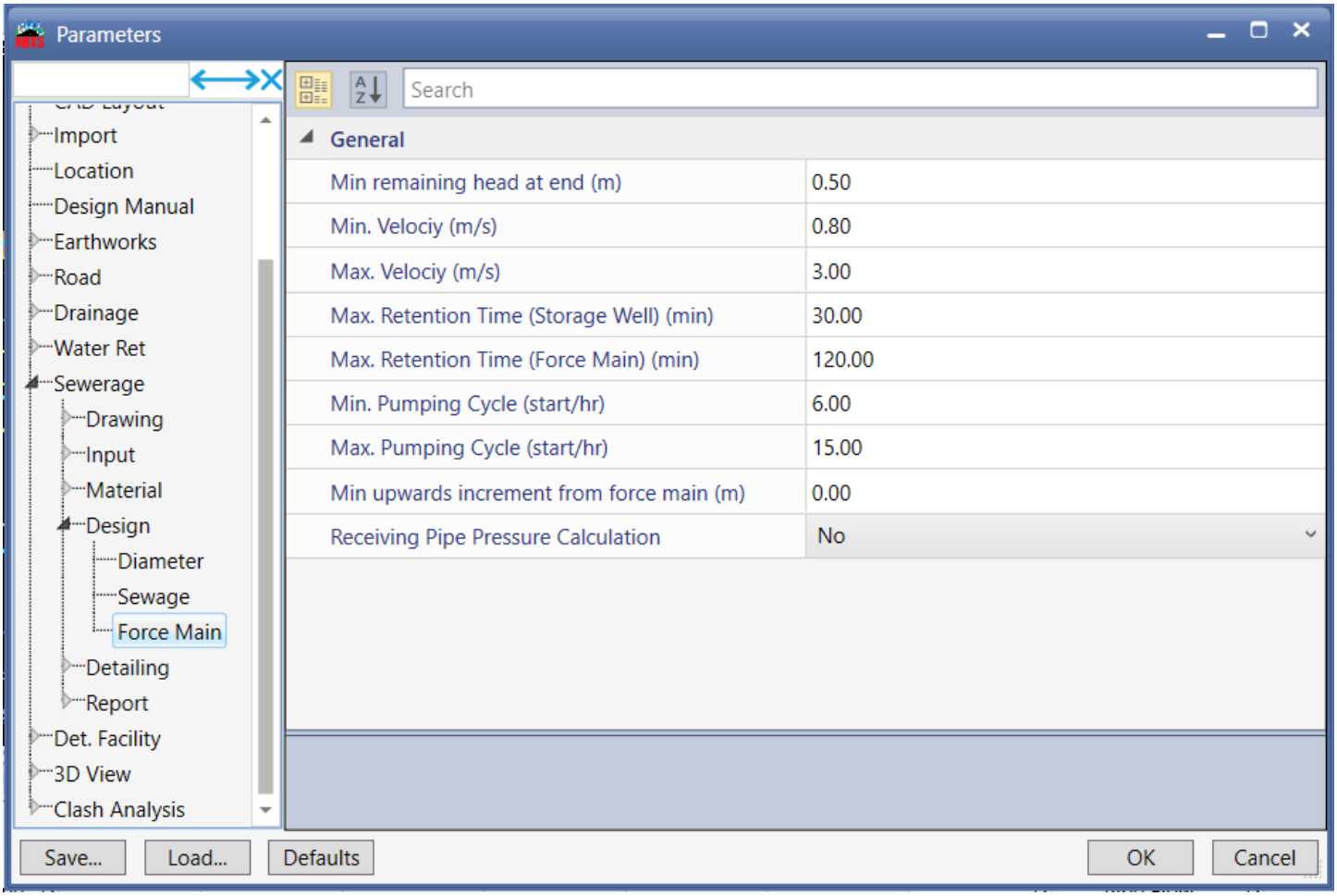
For Force Main design, you will first have to make sure that the **pump flow q is bigger than peak flow** in the above Figure 2.

Parameters

Then, adjust the various properties in **Storage Well Dimensions, pump properties, Other Details** etc to make sure that

1. **Pumping cycle**
2. **retention time (storage wall and force main)**
3. **Velocity**

are within the constraints set by the Parameters (Options->Project Parameters->Sewerage ->Design->Force Main).



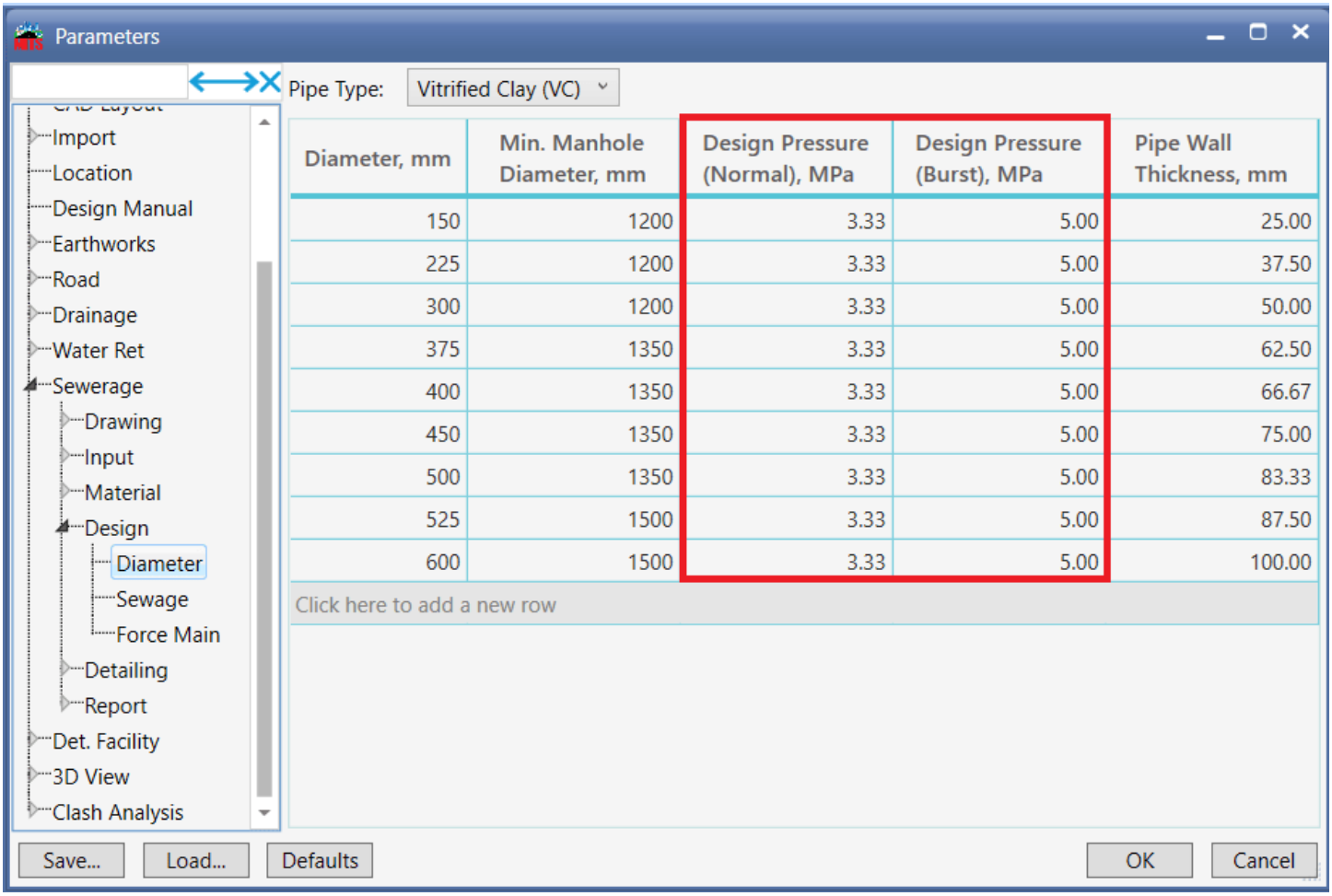
For bending losses, you may need to adjust the ‘Minor Head Loss Coefficient, K’ according to the degrees of the pipe bends. You may also refer to the table below for ‘K’ value:

Bend Angle	Kb, with curve or deflector	Kb, with no special shaping
0	0.02	0.02
15	0.06	0.08
30	0.15	0.21
45	0.29	0.39
60	0.48	0.63
75	0.72	0.93
90	1.02	1.33

*You may refer to this link (please click **here**) for reference.*

Properties of Pipe

Also, you will need to make sure that the **Design Pressure (normal and burst)** is within the designed Pressure of the pipe, which can be found at Options->Parameters->Design->Diameters



In the example above, all the force main pump design parameters are OK, because:

1. The pump cycle is 6.96, which is between 6 and 15 #/hr
2. Retention time (storage wall) is 8961 min, which is less than 30 min
3. Retention time (force main) is 0.056 min, which is less than 120 min
4. Design Pressure (normal) is 0.02, which is less than 3.33Mpa
5. Design Pressure (burst) is 1.650, which is less than 5Mpa
6. Velocity is 1.258, which is less than 0.8 and 3 ms-1.
7. The pump flow q, is bigger than peak flow. In the above case, this is satisfied because 0.05>0.00498m3/s

So the users will have to tune the parameters at Figure 2, in order to make sure that all the pump design parameters are satisfied.

Subsequent Sewerage Design

After you successfully design the sewerage pump, you will have to make sure that the subsequent sewer pipes can handle the incoming PE velocity and have enough capacity to handle the incoming PE flow.

In order to do so, you have to make sure that the Pump Flow, q in Figure 2 above must be less than the subsequent pipe capacity. Usually, during pump flow design, we will set a q that is way larger than the prior flow because we want to make sure that we can satisfy the design constraint for the pump (in figure 2). If the q is too large compared to the prior flow, then you will have to use a bigger pipe size subsequently, after the pump.

In the above example, the q is 0.05m3/s=50L/s, which means that the is your pipe flow must be more than 50L/s. You might need to use a bigger pipe size if you find that the existing pipe cannot cater for the pump flow.

Question: does the program allow me to specify the end IL for my sewerage pump? Can the program thus infer the correct well dimensions and necessary pump head and pump flow?

Currently, the program cannot do this. You will have to guess some well dimensions, pump head and pump flow and click Analyze to get the IL for your end point of sewerage pump. You may need to try different values to get to the IL that you want.

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