

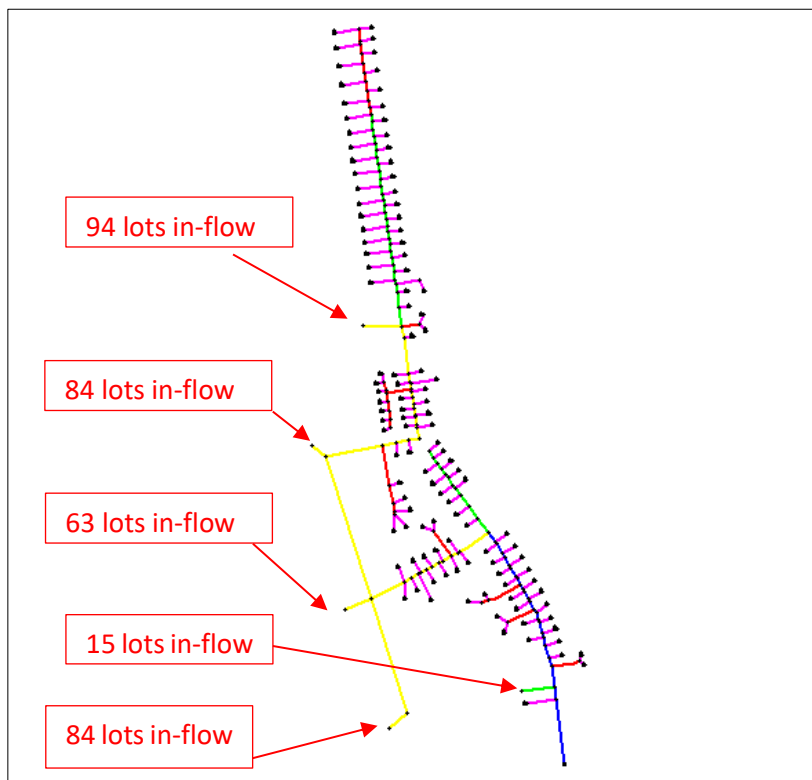
Cashmere Park Development (Revised for increase future 340 lots)

Hydraulic Result Summary

Adopted pressure sewer network parameters:

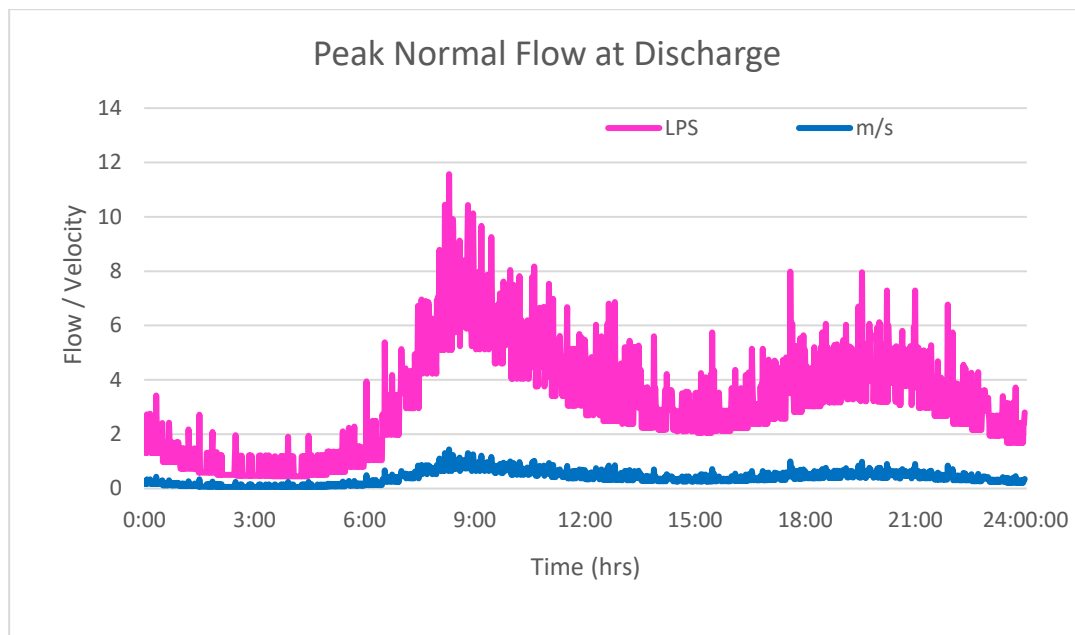
- Design ADWF loading per lot = 594L;
- Each property will produce 300L during a 24hr power outage;
- Minimum scouring velocities of 0.6 m/s per day;
- Peak Summer Day velocity less than 2.5 m/s;
- Power outage recovery period - velocity not restricted;
- No tanks to spill (*not greater than 95% full*) during 24hr power outage;
- Ideal maximum operating pressures for individual property pumps should not exceed 56m head based on pump curves from manufacturers for optimal performance;
- Pipe sizes are based on polyethylene pipes (*PE100 PN16*); and
- Pump cut-in level for residential = 0.452m (varies in peak shifting mode) cut-out = 0.351m
- Hydraulic design based on **119** residential connections and **340** future lots as inflow nodes
- Eone pumps were used for all residential connections within the network
- Simplex tank = 2010 iP Eone tank
- Site assumed to be reasonably flat with discharge point being slightly higher than the rest to give a fully primed network

Revised modelled network layout:



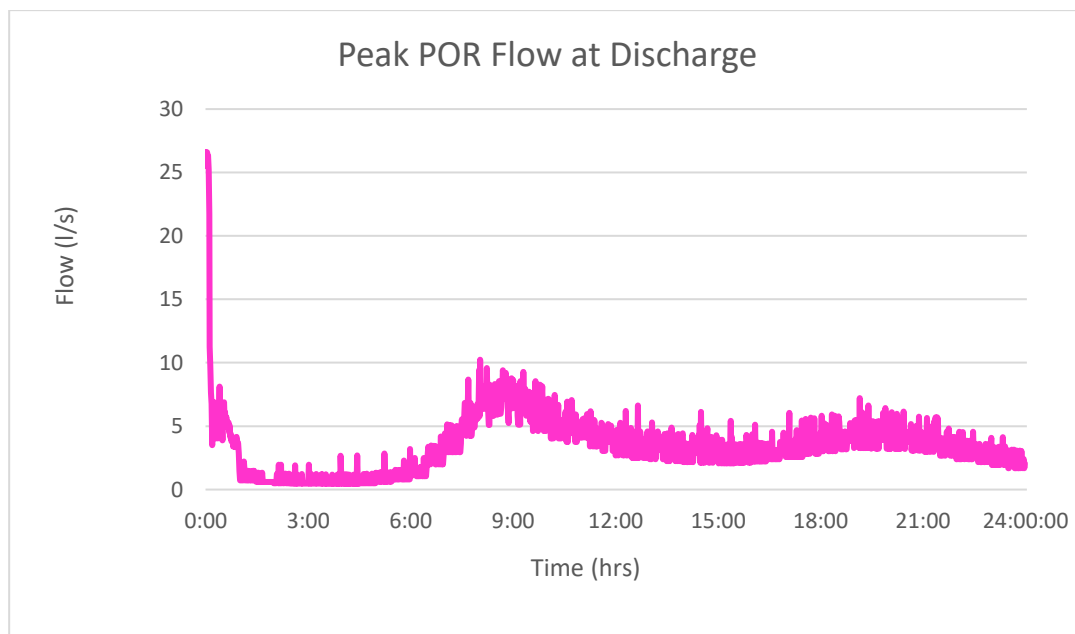
Pipe sizes shown by colour with red = OD40, green = OD63, yellow = OD90, blue = OD125

Peak normal flow = 10.43 l/s (ignoring the instantaneous spike)



Peak POR flow = 26.59 l/s

No spills were recorded during simulation of the power outage recovery – system manages to work itself out. This flow will change once future lots are known and modelled individually

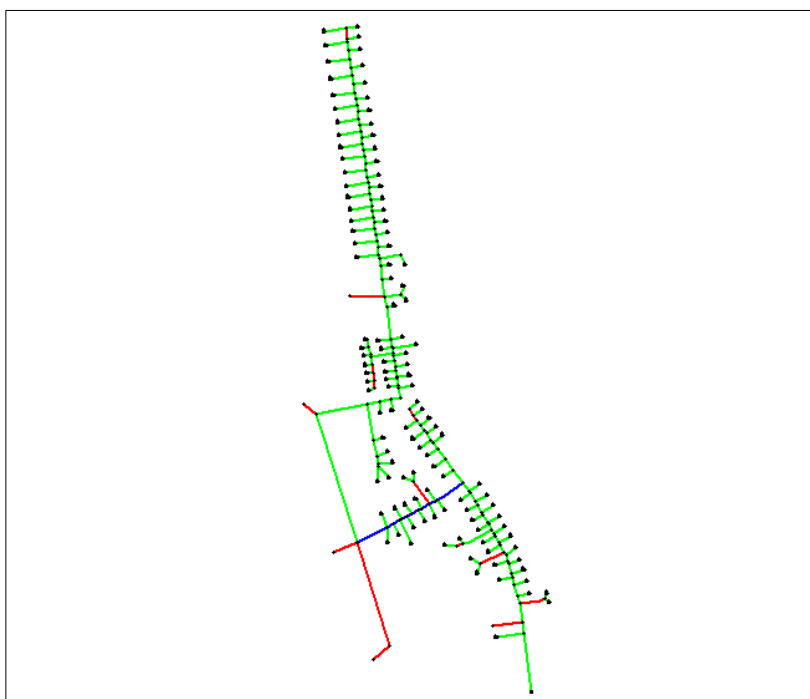


Maximum pressure seen in the normal flow is 39.0m

Network pressures: Green = 0 – 25m, Blue = 25.1 – 45.0, Red = 45.1 – 56m



Maximum velocities within network: Blue = 2.5 – 2.1 m/s, Green = 0.61 – 2.0 m/s, Red = 0.0 – 0.61 m/s



Commentary:

- The model output represents an instance in time at full development and is therefore subject to continual change along with known subdivision layouts and elevations. The low flows are reflective of no flow or single property flow in those sections. The key finding is the self-cleansing flows are achieved throughout the network
- Maximum pipe size used in model OD125mm (ID101) which requires a minimum of 5.0L/s flow to achieve self -cleansing. This can be achieved by providing a minimum of 10 pumps pumping concurrently in flushing mode during the early stages of development. Recommend placing the first 20 properties in flushing mode until the development is 80% connected.
- The increase in future lots to 375 are represented with various in-flow nodes at different locations. A total of 494 lot flows are represented in the network. No further future lots have been considered for this model
- Pressure heads will change once subdivision of lots are known and this current model does not represent the full network pressures due to using in-flows nodes for future lots
- Power outage flows can be skewed due to the inflow nodes representing future lots because they don't reflect individual lots and pressure heads at the location. This scenario is to analyse whether the network can handle such events without tank spills
- The site elevations are assumed relatively flat with the discharge MH elevation being slightly higher than the rest of the network to provide a primed system. No air valves were considered and no odour assessment were taken
- Directions given indicate another discharge point along Cashmere Road, however since the OD125 main has been installed from previous design it is hydraulically best to run all future lots through this original discharge point. Having another discharge point will cause hydraulic issues due to an oversize main at the original discharge alignment. Furthermore, having an interconnecting network as suggested with two discharge points is not optimising the network, which will lead to network issues