

7.2. Pipe Material Selection

Piping for storm water pumping mains shall be ductile iron, GRP or HDPE and the pipework within valve chambers and pumping stations is to be ductile iron. The selection of the material is to be based on consideration of the:

- operating pressure
- surge pressure alleviation
- economics
- delivery time
- resilience

In addition to above for Projects in Al Ain Region, uPVC pipe materials can also be considered as an alternate material.

7.3. Hydraulic Design of Pumping Mains

7.3.1. Design Considerations

The Consultant shall perform hydraulic calculations in order to demonstrate that the system will:

- Deliver the required flow
- Operate at the accepted velocities defined below
- Operate within the required pressure range of the pipes and fittings

In addition, the design pressure and the maximum design pressure must be established at appropriate points in the system.

Pipe diameter shall be such that velocity will be in the range of 1 m/s at minimum flow and 2.0 m/s under peak flow. A maximum velocity of 2.5 m/s in emergency scenarios, for example, to avoid flooding where additional standby pumps are brought on line.

Single pump discharge pipes shall be sized such that the discharge velocities in these pipes will be in the range of 1.5 to 2.5 m/s and suction headers shall be sized to achieve a velocity in the range of 0.8 to 1.5 m/s.

The use of twin mains should be considered on a case by case basis. The main factors for consideration include design elements, the risk assessment and cost benefit analysis.

Consideration for design elements comprise the:

- rate of build-up of flow
- range of flow conditions
- range of velocities in mains
- availability of land for twin mains and associated chambers
- added complexity in pumping operation
- O&M requirements and confirmation.

A thorough risk assessment should be carried out, which should include the likelihood of a main bursting, the consequences of failure, areas affected, sensitive receivers affected and the feasibility of temporary diversions.

The cost benefit analysis should include all tangible factors (such as cost of pipework, land costs, energy cost) and intangible factors (such as nuisance).