

4.8.2. Outfall Structures

The soffit of all outfall pipes shall lie below Mean Spring Low Water tide level.

The layout of outfall structures is shown in Volume 2: Standard Drawings.

A chamber shall be located on the pipe upstream of the outfall with cover level at a point above HAT (i.e above 0.8m – Level to New Abu Dhabi Datum (m) NADD) and shall include non-return valve, such that the network or pumping station is protected by non-return valve against seawater ingress. Such valves shall be a double hinged flap valve or a flexible duck-bill or cone type of valve. The valves shall close under a minimum of head difference and shall prevent any backflow into the network. This chamber shall also include a trash screen with vertical bars at 100mm spacing. The chamber shall be located to give good access for maintenance purposes, including the removal of trash.

All materials that could come into contact with sea water or diluted sea water shall be specified for the appropriate corrosion resistance.

Safety Note – Outfall Safety Grill

Every outfall structure shall incorporate a safety grill to prevent unauthorised access into the outfall pipe. The grill shall be fabricated from 20mm diameter stainless steel bars and the maximum spacing of bars shall be 150mm. Refer to the Standard Drawings and Specifications for details.

For projects in Al Ain region, galvanized bars with the size 20mmx10mm or 15mmx10mm or 10mmx10mm to be used. Refer to the Al Ain Municipality Standard Drawings and Specifications for details.

4.9. Trenchless Technologies

The Consultant should be aware of the different technologies available for trenchless construction and the benefits these can bring to cost, safety and environmental impact. Such construction may be beneficial where:

- An open cut trench would be unacceptably deep for the particular location
- The ground conditions are unsuitable for open trenches
- A road, railway, powerlines or body of water crossing is required

The primary methods for trenchless construction are:

- Tunnel boring machine (TBM) with segmental rings for larger diameters.
- Pipe jacking - diameter 900mm to 2400mm and above
- Micro-tunnelling - diameter range 300mm to 900mm
- Auger boring – diameters up to 1000mm
- Directional drilling - diameter range 300mm to 1500mm

Note that significant areas are required for working shafts/pits at each end of a trenchless technique and possibly at intermediate points depending on length and conditions. The shafts/pits can be large in order to allow the insertion and removal of the tunnelling equipment.

Trenchless construction can provide safety, environmental and cost benefits where used appropriately. The successful use of trenchless construction relies heavily on:

- comprehensive knowledge of the ground conditions and buried obstacles from a detailed ground investigation
- the advice of an experienced geotechnical engineer