

detailed design stage to allow buffer distance between air valves and nearby sensitive receivers. For locations where air valves have to be located in close proximity to sensitive receivers, an activated carbon filter should be installed after the air valves to mitigate potential odour emissions.

Termination Chambers:

- 6.5.9.11 A sealed termination chamber shall be provided at the connection of a rising main to a downstream sewer or pipeline, comprising an internal overflow weir set at a level above the rising main soffit to ensure the main remains full when not pumping.

Inverted Siphons:

- 6.5.9.12 Inverted siphons have not been used.

6.6 Design Constraints

- 6.6.1.1 There were several constraining factors to take into account when designing the gravity sewer system for the SEKD. The two main issues were the presence of drainage culverts of considerable size, and the allowable maximum depth at which the gravity sewer pipes could be laid.
- 6.6.1.2 Due to the presence of a large number of drainage culverts over which the sewerage system has to cross, it was most practical to divide SEKD into distinct catchment areas that are bounded by these main drainage culverts. The flows from within each catchment travel through a gravity system to the boundary where it is pumped via a short rising main into the next catchment. Ultimately sewage is pumped from the boundary of SEKD to the receiving PTWs at To Kwa Wan and Kwun Tong.
- 6.6.1.3 Designs to limit the invert depth of the sewerage system to a maximum of six meters below ground level has produced a need for slightly larger pipe sizes to convey the required flows. Increasing the pipe diameters was seen as being more advantageous than adding additional pumping stations as the additional heads required were in the order of one meter.
- 6.6.1.4 Construction of rising mains within SEKD will be relatively easy given there are few existing utilities within SEKD. Rising mains which are constructed outside of SEKD in the hinterland to convey the sewage to the TKWPTW or KTPTW are significantly harder to construct due to the presence of existing utilities which will have to be avoided. The most difficult rising main to construct is expected to be the twin 1,050mm dia rising main leading from PS 4, through Ma Tau Kok, to TKWPTW. Investigation of the route and construction techniques for constructing this rising main have been carried out. Several pipeline routes have been investigated for constructability including existence of major utilities and traffic loading. The preferred route option is shown on **Drawing Nos. 22936/SW/018, 39-41 and 75-77**. Trenchless pipelaying technologies such as pipe jacking are recommended to minimise complications with working around existing utilities. The proposed locations for open trenching and pipe jacking are shown in the longitudinal sections of the rising main on **Drawing Nos. 22936/SW/075 to 077**. The longitudinal sections also show major utilities.
- 6.6.1.5 Sewage generated in catchments furthest from the PTW is pumped through several pump stations, which are connected in series, before its eventual discharge at one of the PTW. The catchments which are being developed first include catchments 1 and A1 which are furthest from TKWPTW where the wastewater is being discharged. Because the sewage has to pass through pump stations 1A, 1, 2 and 4 before it is discharged at the treatment plant, all this infrastructure has to be constructed before the first residents move into catchments 1A and A.

- 6.6.1.6 The construction of these works may not be finished before people are ready to move into the newly developed residential area. It is expected that the construction of the rising main from pump station 4 to To Kwa Wan PTWs will have the longest construction period.
- 6.6.1.7 As an interim measure, as confirmed under Review of Central and East Kowloon SMP, it will be possible to discharge sewage generated by the early developed areas into the existing gravity trunk sewer which passes along Prince Edward Road East. Discussions have been held with the consultants responsible for preparing the 'Central and East Kowloon Sewerage Management Plan (CEKSMP)' in regard to this temporary discharge. In this regard they have advised that the existing sewer in Prince Edward Rd East has been modelled allowing for an average flow of $0.45\text{m}^3/\text{s}$ which will satisfy this SEKD temporary discharge requirement before the completion of the SEKD pumping station no. 4.
- 6.6.1.8 The discharge of sewage from the hinterland (Wong Tai Sin, Wang Tau Hom, Kowloon City, Kowloon Tsai and the western part of San Po Kong) into pump stations other than pump station 4 is also being discussed with the consultants preparing the CEKSMP, DSD, and other government departments.

6.7 Catchment Descriptions

- 6.7.1.1 Drainage culverts act as boundaries to most of the sewerage catchments because the size of the culverts does not allow gravity sewage pipes to pass over or under the culverts necessitating the need to convey the sewage over the culverts in rising mains. The pump stations are mostly situated near the boundary of the catchments and a short rising main conveys the sewage over the boundary, such as drainage culvert, to discharge into the gravity system of the neighboring catchment.
- 6.7.1.2 The sewers and rising mains generally follow roads but where this has not been possible sewerage reserves must be obtained. Where pump stations are not located immediately off roads emergency vehicle access (EVA) is required for maintenance purposes.
- 6.7.1.3 SEKD has been divided into ten separate catchment areas. **Drawing No. 22936/SW/003** shows the catchment boundaries. The catchment descriptions are as follows:

Catchment A

- 6.7.1.4 Located in the north of SEKD catchment A is bounded by drainage culvert R and its branch line V2 and its branch line V1A. Sewage in this catchment and that pumped from catchment A1 gravitates to pump station 1 and is then pumped over culvert R into catchment B.

Catchment A1

- 6.7.1.5 Located in the north of SEKD to the southeast of catchment A catchment A1 is bounded by drainage culvert R and its branch lines V1, V2 and V1A. Sewage in this catchment gravitates to pump station A1 and then pumped over culvert V1A into catchment A.

Catchment B

- 6.7.1.6 Located at the western end of SEKD catchment B is bounded by culvert R and the airport tunnel. Sewage within the catchment along with the flow from pump station 1 travels through a gravity system to pump station 2. The sewage is then pumped into catchment C. Pumping station 3 which pumps sewage from Hinterland areas outside SEKD (Wong Tai Sin, Wang Tau Hom, Kowloon City, Kowloon Tsai and the western part of San Po Kong) is also located within catchment B but the sewage gravitating to this pump station is pumped directly to Pump station 4.