

Hydraulic Analysis - Summary

**A sewerage Model is developed with the following assumptions / parameters:**

- 1) Latest DSD Drainage Record Plan
- 2) Occupied rate of office = 100%
- 3) Unit Flow Factors are adopted as follows:
 

a. Staff of Plant	40	
b. Unit Flow Staff (J2)	0.33 m <sup>3</sup> /d	
c. Visitor	60	
d. Unit Flow (Student)	0.04 m <sup>3</sup> /d	(assume the Unit Flow generated by Visitor is equal to Student)
- 4) The RO Cleaning Cleaning Water will be pumped into the sewer by pump. Uniformed flow is assumed in the assessment

**Estimate Quantity of Sewage**

Catchment	Visitor	Staff	Av. Flow from Visitor		Av. Flow from Employee		Subtotal		Contribution Population
			(m3/day)	(m3/s)	(m3/day)	(m3/s)	(m3/day)	(m3/s)	
Desal Plant	60	40	2.4	0.00003	13.2	0.00015	15.60000	0.00018	58

**Add**

	m3/cleaning	m3/day (dewater in 4 day, i.e. 96 hours)	Subtotal	Contribution Population
RO Chemical Cleaning	514.8	128.7000	0.00149	477

**Check for Downstream Sewerage Infrastructure**

The design capacity of Tseung Kwan O PS is 6.85 m3/s  
 The Flow generated from Desal Plant 0.00167 m3/s  
 Assume peaking factor is 3, the max. flow is 0.00203 m3/s (excluding stormwater allowance)  
 % when compared with the TKO PS is 0.03 %  
 Since the increase is 0.03% only, hence the impact is considered to be insignificant.

**Check for Existing Immediately Downstream 600mm Sewer (FMH4035449 to FMH4035450)**

**Parameters**

Surface roughness  $k_s$  = 3 mm (Assume poor condition slimed sewer [Clayware])  
 kinematic viscosity  $\nu$  = 1.14 mm<sup>2</sup>/s  
 Frictional gradient  $S_f$  1 in = 820

**Capacity of Drain**

Pipe size  $D$  = 600 mm  
 Hydraulic radius  $R = D/4$  = 0.15 m

Mean velocity (Colebrook-White)  $\bar{V} = -\sqrt{32gRS} \log \left[ \frac{k_s}{148R} + \frac{1.255\nu}{R\sqrt{32gRS}} \right]$

Capacity provided  $Q = \bar{V} \times \text{Cross Section Area of Drain} = 0.19 \text{ m}^3/\text{s}$

Allow for 10% siltation  $Q_{90\%} = 0.17 \text{ m}^3/\text{s}$   
 Assume peaking factor is 6, the max. flow is 0.00257 m3/s (excluding stormwater allowance)

% when compared with the existing 600mm Sewer is **1.33%**  
 Since the increase is around 1.33% only, hence the impact is considered to be insignificant.