

Appendix 7.1

Pollution Mass Balance for Removal of Livestock Farms


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Livestock Waste Information System

Yuen Long West District


Yuen Long Creek

Yuen Long Creek is around 60 km long and covers an area of 27 km². It passes through Yuen Long Town before flowing into inner Deep Bay. The major pollution sources were illegal discharges from 29 livestock farms (26 pig farms and 3 poultry farms) and discharge from unsewered villages in the catchment.



Yuen Long Creek

According to the Livestock Keeping Licences issued by Agriculture, Fisheries and Conservation Department, the 29 livestock farms can rear a total maximum stock size of about 45,850 pigs and 107,000 chickens.



- Sung Shan section
- Tai Tong Tsuen section
- Chuk San Tsuen section
- Shan Ha section
- Wong Nai Tuen Tsuen section
- Kung Um section
- Lam Hau Tsuen section

Some existing livestock farms would be resumed for the YLS development, which are discharging their treated livestock sewage to YL nullah and Deep Bay. It is understood that AFCD are implementing discharge license for the livestock farm in the YLS region, namely Lam Hau Tsuen section, Shan Ha section and Kung Um section.

Under the YLS RODP, there are 6 existing livestock farms (3 chicken and 3 pig farms) to be affected, in which only 1 chicken farm namely LK1087 would be retained and the rest would be removed and replaced by the development of YLS PDAs. Hence, the pollution credit would cover 3 pig farms and 2 chicken farms which encompass 7,100 pigs and 46,000 chickens based on site survey. The pollution loadings generated from these livestock farms are identified as one of the distinct source for the current pollution credit to Deep Bay, which can be quantified in order to offset part of the pollution loading being discharged to the YL Nullah and Deep Bay.

As per EPD's Guidelines for Soakaway System, the unit flow factor for pig and chicken are **15L/pig/day** and 0.4L/chicken/3 wash/day (i.e. **0.13L/chicken/day**) respectively. Furthermore, according to Waste Disposal (Livestock Waste) Regulations, owner of the livestock farms who are holding the livestock keeping license issued from the AFCD, shall manage their waste treatment facilities to achieve the required discharge standards, i.e. **both the BOD and SS levels in the effluent to be discharged shall not exceed 50 mg/L.**

Hence the sewage flow from existing livestock farms are estimated to be **112.48m³/day** which are shown as below:

Sewage Flow from Existing Livestock Farm			
	Unit Flow Factor (L/animal/day)	No.	Flow (m ³ /day)
Pig	15	7100	106.5
Chicken	0.13	46000	5.98
Total			112.48

While the sewage pollution loadings (BOD & SS) that could be offset are estimated to be **5.62kg/day** as shown below:

Pollution Load from Existing Livestock Farm			
	Discharge standard		Load
	(mg/L)	(kg/m ³)	(kg/day)
SS	50	0.05	5.62
BOD	50	0.05	5.62

As the TSE would be treated in YLS STW up to the water quality standard as shown below, it could be assumed that both **the BOD and SS levels in the TSE** to be discharged shall **not exceed 10 mg/L & 5mg/L** respectively. Hence taking the BOD and SS concentration in TSE to be **9.9 mg/L & 4.9 mg/L** respectively, the amount of TSE with equivalent BOD and SS loading of 5.62kg/day can be figured out.

Proposed Water Quality Standards of TSE Reuse (as reproduced from Table 2.12)

Water Quality Parameter	Unit	Recommended TSE Standard for Flushing
E. Coli	cfu/100mL	Not detectable
Total residual chlorine (TRC)	mg/L	>1 (out of treatment system) >0.2 (at point-of-use)
Dissolved oxygen (DO)	mg/L	>2
TSS	mg/L	<5
Colour	HU	<20
Turbidity	NTU	<5
pH	-	6 – 9
Threshold odour number (TON)	TON	<100
BOD₅	mg/L	< 10
Ammonia nitrogen	mg/L	<1
Synthetic detergents	mg/L	<5

With the total TSE amount of **20,980m³/day** to be generated from YLS STW, taking into account the amount to be reused in YLS, proposed and existing development, below tables demonstrate that there will be a total of **870m³/day of TSE being discharged into Yuen Long Nullah, taking into account the evaporation loss in reedbed itself (about 870m³/day), a net amount of 570m³/day of TSE which contain 5.62kg/day of BOD and 2.78kg/day of SS (even lesser than 5.61kg/day of SS gained from livestock farms) would be discharged to Yuen Long Nullah.**

	TSE Quality Standard					
	Suspended Solid		Biological Oxygen Demand		Nitrogen	
	Concentration (mg/L)	Loading (kg/day)	Concentration (mg/L)	Loading (kg/day)	Concentration (mg/L)	Loading (kg/day)
Sewage Generation (m3/day) =	23635					
TSE Recovery Rate =	90%					
TSE Generation (m3/day) =	21270	4.9	104.2	9.9	210.6	0.9
Flushing Reuse in YLS (m3/day) =	6660					
Flushing Reuse in Proposed Development, i.e. Long Bin and TKT (m3/day) =	4292					
Discharge to Urmston Road Outfall =	9750					
Discharge to Yuen Long Nullah (m3/day) =	570	4.9	2.78	9.9	5.62	0.9

