

## 1 INTRODUCTION

- 1.1 The pollution loading inventory was compiled for the storm and sewage outfalls within the whole Hong Kong waters for input into the Update Model and the HATS Model for four time horizons, namely 2009, 2013, 2020 and Ultimate Year respectively, for cumulative impact assessment. The methodologies for compiling the pollution loading are given in this Appendix.

## 2 STORM OUTFALLS

- 2.1 The key sources of water pollution in storm outfalls include:
- Pollution due to sewage from unsewered developments (dry weather load)
  - Pollution due to expedient connections from trade and residential premises, and integrity problems of aged drainage and sewerage systems (dry weather load)
  - Pollution due to livestock waste (dry weather load)
  - Rainfall related load.
- 2.2 The total pollution load discharged via the storm system would cover the dry weather load and rainfall related load

### Dry Weather Load

- 2.3 Domestic, commercial and industrial activities are the principle sources of dry weather load in storm drains. Total pollution loads generated from these activities were compiled by catchment areas as shown in **Figure A5-2-1** below with reference to the projected population and employment data provided by the Planning Department (PlanD). Details of these planning data and the methodology for calculating the pollution loads from domestic commercial and industrial activities are given in Section 4 of this Appendix.
- 2.4 It was assumed that a portion of total pollution load generated within a catchment would be lost to the storm system whilst the rest of the flow would be diverted to the sewerage system. The assumed percentages of pollution load discharged into the storm system for different catchments are presented in **Table A5-2-1**.



Figure A5-2-1 Sewage Catchment Boundaries

Table A5-2-1 Assumed % of Pollution Load in the Storm System for 2009, 2013, 2020 and Ultimate Year

Catchment	Catchment ID	Assumed % of Load in the Storm System		Foul interception to:	
		2009	2013 / 2020 / Ultimate Year	2009	2013 / 2020 / Ultimate Year
Sai Kung	1	10%	10%	Sai Kung STW	
Sai Kung Country Park	1a	100%	50%		
Pak Sha Wan	1b	10%	10%		
Clear Water Bay	1c	100%	100%	-	
Tseung Kwan O	2	5%	5%	HATS	
Yau Tong, East Kowloon	4	10%	10%		
North Kowloon, Central Kowloon, South Kowloon	5	10%	10%		
Northwest Kowloon	8	10%	10%		

Catchment	Catchment ID	Assumed % of Load in the Storm System		Foul interception to:	
		2009	2013 / 2020 / Ultimate Year	2009	2013 / 2020 / Ultimate Year
Stonecutters	9a	10%	10%		
Kwai Chung and Tsuen Wan East	10a	10%	10%		
Tsing Yi	10b	10%	10%		
Tsuen Wan West (Rural Area)	11	10%	10%	Sham Tseng STW	
Tuen Mun	12	10%	10%	Pillar Point STW	
Yuen Long and Tin Shui Wai and Deep Bay Streams	12a	10%	10%	San Wan STW	
Kam Tin and Yuen Long New Town	12d	10%	10%	Yuen Long STW	
Discovery Bay	13	0%	0%	Siu Ho Wan STW	
North Lantau	13a	10%	10%		
Chek Lap Kok	13b	0%	0%		
Peng Chau	14	50%	30%	Peng Chau STW	
Mui Wo	15	10%	10%	Mui Wo STW	
South Lantau	15a	100%	100%	-	
Hei Ling Chau	16	0%	0%	Hei Ling Chau STW	
Cheung Chau	17	30%	30%	Cheung Chau STW	
Shek Kwu Chau	17a	100%	100%	-	
Tai A Chau	17b	0%	0%	Tai A Chau PTW	
Shek Pik	18	10%	10%	Shek Pik STW	
Tai O	18a	10%	10%	Tai O STW	
Lamma Island	19	30%	30%	Yung Shue Wan STW and Sok Kwu Wan STW	
Poi Toi Islands	19a	100%	100%	-	
Tung Lung	19b	100%	100%	-	
Pokfulam Sandy Bay	20a	10%	10%	Sandy Bay PTW	HATS
Cyber Port	20b	10%	10%	Cyber Port STW	HATS
Wah Fu Estates and Mt. Kellet	21	10%	10%	Wah Fu PTW	HATS
Aberdeen, Shouson Hill and Repulse Bay, South Bay	22	10%	10%	Aberdeen PTW	HATS
Ap Lei Chau	23	10%	10%	Ap Lei Chau PTW	HATS
Chung Hom Kok	26	10%	10%	Stanley STW	
Stanley	27	10%	10%		
Tai Lam	28	10%	10%		
Shek O	29	10%	10%	Shek O STW	
Chai Wan	30	10%	10%	HATS	
Shau Kei Wan	31	10%	10%		
North Point	32	10%	10%	North Point PTW	HATS
Wan Chai East	33	10%	10%	Wan Chai East PTW	HATS
Wan Chai West	34	10%	10%		
Western and Central, Green Island	35	10%	10%	Central PTW	HATS
Tolo Harbour	37	10%	10%	THEES	
Sheung Shui and Fanling	38	10%	10%	Shek Wo Hui STW	
North New Territories	39	95%	95%		
Sha Tau Kok	40	10%	10%	Sha Tau Kok STW	

2.5 The percentage interceptions assumed in **Table A5-2-1** were based on the implementation schedule for sewerage improvement projects as adopted under the EEFS. A detailed review

on the sewage discharges from Tsuen Wan West (Rural Area) catchment was conducted under this EIA, given their significance to the water quality at Tsuen Wan coast including the eight beaches in the Tsuen Wan District. It is expected that sewerage along the Castle Peak Road would be in place before commissioning of this ADF Project to serve unsewered village and properties around Ting Kau, Sham Tseng and Tsing Lung Tau. Based on the information obtained from IPG of EPD, the % of population within the Tsuen Wan West catchment that would be connected to the STW would be about 95% in 2009. However, for conservative assessment, it was assumed that only 90% of the total sewage flow generated in the catchment would be connected to the STW as a base case for water quality modelling under the 2009, 2013, 2020 and ultimate scenarios.

- 2.6 The pollution loading in the storm system contributed from domestic, commercial and industrial activities was compiled to the catchment levels shown in **Figure A5-2-1**. The pollution loading compiled for each catchment was distributed to appropriate discharge points (i.e. storm culverts / outfalls, rivers and nullahs). It was assumed that these storm pollutions would be evenly distributed amongst the major storm water discharge points within the catchment.
- 2.7 The livestock waste load discharged via rivers / streams adopted under the EEFS as shown in **Table A5-2-2** was directly applied in this EIA for 2009, 2013, 2020 and ultimate year.

**Table A5-2-2 Livestock Waste Load Assumed for 2009, 2013, 2020 and Ultimate Year**

Catchment	River Name	Flow (m <sup>3</sup> /d)	SS (kg/d)	TKN (kg/d)	NH <sub>3</sub> -N (kg/d)	TP (kg/d)	<i>E.coli</i> (counts/d)
Tsuen Kwan O	Tseng Lan Shue River	2	0	0	0	0	6.98E+11
Sheung Shui and Fanling	Shenzhen River	3216	363	41	22	18	9.28E+14
Yuen Long, Tin Shui Wai and Kam Tin	Shan Pui Ho River	5034	568	65	34	28	1.45E+15
	Tin Shui Wai Nullah	4190	473	54	28	24	1.21E+15
Deep Bay	Sheung Pak Nai Stream	97	11	1	1	1	2.79E+13
	Ha Pak Nai Stream	677	76	9	5	4	1.95E+14

- 2.8 The total dry weather load in the storm outfall would include the loading contributed from domestic, commercial and industrial activities and the loading from livestock discharges (if any) as shown in **Table A5-2-2**.

#### Rainfall Related Load

- 2.9 It was assumed that a rainfall volume of greater than 10mm per day (and rainfall intensity greater than 2mm/hr) would give rise to runoff. The runoff percentage was based on the average rainfall data between 1/01/74 and 31/10/05 from the Hong Kong Observatory. The calculation of the runoff percentage is shown below:

$$\text{Runoff percentage} = (\text{Sum of the rainfall volume for the days with rainfall volume} > 10\text{mm and intensity} > 2\text{mm/hr within the season}) \div \text{Total rainfall volume for the season} \times 100\%$$

- 2.10 Rainfall data from May to September represent the values for wet season, and those from November to March represent the values for dry season. Accordingly, the runoff percentage was calculated as 93% and 70% for wet and dry seasons respectively

- 2.11 The 30-year long term average rainfall data were used to determine the daily runoff value as shown below:

$$\text{Daily runoff value (m/day)} = 30\text{year long term average daily rainfall data} \times \text{runoff percentage}$$

- 2.12 Thus, the runoff value was calculated as 0.01104 m/day and 0.00102 m/day for wet and dry seasons respectively.

- 2.13 The amount of rainfall related load that would be discharged into the sea depends on the amount of impermeable area within each catchment. It was assumed that all urbanized/developed areas within the catchment would be impermeable. The daily volume of runoff generated within each catchment was estimated as shown below:

$$\begin{aligned} \text{Daily volume of runoff in each catchment (m}^3\text{/day)} \\ = \text{daily runoff value (m/day)} \times \text{impermeable area within each catchment (m}^2\text{)} \end{aligned}$$

- 2.14 The daily volume of runoff estimated for each catchment was multiplied with the runoff concentrations to derive the rainfall related loading. The assumed runoff concentrations are shown in **Table A5-2-3**.

**Table A5-2-3 Event Mean Concentrations for Stormwater Runoff**

TSS (g/m <sup>3</sup> )	BOD <sub>5</sub> (g/m <sup>3</sup> )	NH <sub>3</sub> N (g/m <sup>3</sup> )	Cu (g/m <sup>3</sup> )	TP (g/m <sup>3</sup> )	OrthoP (g/m <sup>3</sup> )	Silicate (g/m <sup>3</sup> )	TON (g/m <sup>3</sup> )	TKN (g/m <sup>3</sup> )
43.25	22.48	0.20	0.01	0.20	0.04	3.28	0.40	1.40

Source of reference: EPD Pilot Study of Storm Pollution

- 2.15 The rainfall related loading was compiled to the catchment levels shown in **Figure A5-2-1**. The pollution loading compiled for each catchment was distributed to appropriate discharge points (i.e. culverts, outfalls, rivers and nullahs). It was assumed that the rainfall related loading was evenly distributed amongst the major storm water discharge points within the catchment.

### 3 SEWAGE OUTFALLS

- 3.1 A portion of the total loads from domestic, commercial and industrial activities generated in each catchment was allocated to the sewerage system according to the percentage of storm interception shown in **Table A5-2-1**. The remaining portion of the total load in each catchment was distributed to the storm system.
- 3.2 Besides the pollution loads from domestic, commercial and industrial activities, the sewerage system would also receive pollution loads from landfills and beaches as most of the landfill sites and beach facilities would be connected to the sewerage system. **Table A5-2-4** and **Table A5-2-5** show the pollution load of relevant landfills and beaches adopted under the EEFS. These loading data were directly adopted in this EIA for 2009, 2013, 2020 and ultimate scenarios. The beach loading was included for the wet season simulations only. Loading from landfills and beaches that would not be connected to the STW is given in Section 6 of this Appendix. It is considered that the effect of this point source pollution loading would be localized. As indicated in Section 7 of this Appendix, contributions of these point source pollution loads would be insignificant as compared to the overall pollution loading that would be discharged into the sea. Possible change of these point source loads would unlikely affect the overall modelling results. Thus, the broad assumption of using the same amount of point source pollution loads for all the assessment years is considered acceptable.

**Table A5-2-4 Pollution Flows and Loads from Landfills**

	Discharge Location	Flow (m <sup>3</sup> /d)	BOD (kg/d)	SS (kg/d)	Org-N (kg/d)	NH <sub>3</sub> -N (kg/d)	E-Coli (no./d)	Cu (g/d)
<b>SHUEN WAN LANDFILL</b>								
Shuen Wan Landfill	Foul sewer to Tai Po STW	110	8	28	13	76	7.65E+05	2
<b>NEW STRATEGIC LANDFILLS</b>								
WENT	Foul sewer to NWNT sewage outfall	714	2648	288	190	1690	4.97E+06	14
SENT	Foul sewer to HATS	523	30	131	26	1	3.64E+06	10
NENT	Foul sewer to Shek Wu Hui STW	541	11	53	22	1	3.76E+06	11
<b>NWNT LANDFILLS</b>								
Pillar Point Valley	Foul sewer to Pillar Point STW	3283	3165	822	389	2511	2.28E+07	66
Ngau Tam Mei	Foul sewer to HATS	200	193	50	24	153	1.39E+06	4
Siu Lang Shui								
Gin Drinkers Bay								
Ma Tso Lung								
<b>URBAN LANDFILLS</b>								
Jordan Valley	Foul sewer to HATS	638	615	160	76	488	4.44E+06	13
Ma Yau Tong Central								
Sai Tso Wan								
Ma Yau Tong West								
Ngau Chi Wan								
<b>TKO LANDFILLS</b>								
TKO I	Foul sewer to HATS	69	66	32	8	52	4.77E+05	1

**Table A5-2-5 Pollution Loads from Beach Users in Bathing Season**

Gazetted Beach	Discharge Location	Flow (m <sup>3</sup> /day)	BOD (g/day)	SS (g/day)	Org-N (g/day)	NH <sub>3</sub> -N (g/day)	E.coli. (no./day)	TP (g/day)	OrthoP (g/day)
Big Wave Bay	Shek O STW	3	788	657	432	985	1.04E+13	224	133
Hairpin		1	334	278	183	417	4.41E+12	95	57
Shek O		20	4895	4079	2685	6118	6.46E+13	1393	829
Deep Water Bay	Aberdeen STW for 2009 and HATS for 2014/20XX	22	5436	4530	2982	6795	7.17E+13	1547	921
Middle Bay		3	667	556	366	833	8.80E+12	190	113
Repulse Bay		44	10968	9140	6017	13710	1.45E+14	3121	1858
South Bay		2	584	487	321	730	7.71E+12	166	99
Chung Hom Kok	Stanley STW	1	225	187	123	281	2.96E+12	64	38
St. Stephen's		4	875	729	480	1094	1.15E+13	249	148
Stanley Main		6	1504	1254	825	1880	1.98E+13	428	255
Turtle Cove		1	268	223	147	334	3.53E+12	76	45
Silvermine Bay	Mui Wo STW	0	112	93	61	140	1.47E+12	32	19
Hung Shing Yeh	Yung Shue Wan STW	1	308	256	169	384	4.06E+12	88	52
Lo So Shing		0	68	57	37	85	8.99E+11	19	12
Kwun Yau Wan	Cheung Chau STW	0	94	78	52	117	1.24E+12	27	16
Tung Wan, Cheung		4	1089	908	598	1362	1.44E+13	310	185

Gazetted Beach	Discharge Location	Flow (m <sup>3</sup> /day)	BOD (g/day)	SS (g/day)	Org-N (g/day)	NH <sub>3</sub> -N (g/day)	E.coli. (no./day)	TP (g/day)	OrthoP (g/day)
Chau									
Silverstrand	Sai Kung STW	18	4556	3797	2500	5695	6.01E+13	1297	772
Trio (Hebe Haven)		3	632	527	347	790	8.34E+12	180	107
Anglers' **	Sham Tseng STW	0	87	73	48	109	1.15E+12	25	15
Approach **	Sham Tseng STW	0	77	64	42	96	1.02E+12	22	13
Casam **	Sham Tseng STW	0	63	53	35	79	8.36E+11	18	11
Gemini **	Sham Tseng STW	0	41	34	23	52	5.44E+11	12	7
Hoi Mei Wan **	Sham Tseng STW	0	85	71	47	107	1.13E+12	24	14
Lido **	Sham Tseng STW	3	662	552	363	828	8.74E+12	188	112
Ting Kau **	Sham Tseng STW	0	26	22	14	32	3.42E+11	7	4
Butterfly	Pillar Point STW	17	4248	3540	2331	5310	5.61E+13	1209	720
Castle Peak		2	605	504	332	756	7.98E+12	172	102
Kadoorie		22	5561	4634	3051	6951	7.34E+13	1582	942
New Cafeteria		8	2045	1704	1122	2556	2.70E+13	582	346
Old Cafeteria		3	732	610	401	915	9.65E+12	208	124
Golden Beach		22	5505	4587	3020	6881	7.26E+13	1566	932

Note:

\*\* The beach attendance may be increased in case the beach is re-opened during the ADF stage. Based on the information provided by DSD and EPD, the beach facilities would be connected to Sham Tseng STW during the ADF stage by 2009. It is considered that the effect from the increase in the loading from Sham Tseng STW due to possible increase in the beach loading on the overall water quality modelling results would be negligible.

3.3 The total load generated in the sewerage system would be reduced after the treatment processes. **Table A5-2-6** shows the treatment processes for major STW. It should be noted that SCISTW, Pillar Point Sewage Treatment Works (PPSTW), Siu Ho Wan Sewage Treatment Works (SHWSTW), Tolo Harbour Effluent Export Scheme (THEES), North West New Territories (NWNT) outfall and Sham Tseng Sewage treatment Works (SHTSTW) are not included in **Table A5-2-6** as the methodologies for compiling the loading discharged from these STW are discussed separately in Section 5 of this Appendix. The treatment efficiencies for different treatment processes are given in **Table A5-2-7** for reference.

**Table A5-2-6 Summary of Major Sewage Treatment Works and the Corresponding Treatment Levels**

STW	Treatment Level	
	2009 and 2013	2020 and ultimate year
Stanley	Secondary treatment with disinfection	Secondary treatment with disinfection
Shek O	Preliminary treatment	Preliminary treatment
Tai O	Primary treatment	Primary treatment
Cheung Chau	Primary treatment	Primary treatment
Mui Wo	Secondary treatment with disinfection	Secondary treatment with disinfection
Peng Chau	Secondary treatment with disinfection	Secondary treatment with disinfection
Shek Wu Hui	Secondary treatment with disinfection	Secondary treatment with disinfection
Sha Tau Kok	Secondary treatment with disinfection	Secondary treatment with disinfection
Sai Kung	Secondary treatment with disinfection	Secondary treatment with disinfection
Yung Shue Wan	Secondary treatment with disinfection	Secondary treatment with disinfection
Sok Kwu Wan	Secondary treatment with disinfection	Secondary treatment with disinfection
Hei Ling Chau	Secondary treatment with disinfection	Secondary treatment with disinfection
Shek Pik	Secondary treatment with disinfection	Secondary treatment with disinfection



STW	Treatment Level	
	2009 and 2013	2020 and ultimate year
Cyber Port	Chemically enhanced primary treatment	See Note 1

Note 1 - Effluent from Cyber Port STW would be discharged to the HATS under Stage 2A by 2014.

**Table A5-2-7 Treatment Efficiency for Treatment Works**

Types of Treatment Plant	BOD <sub>5</sub>	TSS	NH <sub>3</sub> -N	Org-N	OrthoP	TP	Cu	E.coli
Screening Plants <sup>A</sup>	0%	0%	0%	0%	0%	0%	0%	0%
Primary Treatment (no disinfection)	32.5%	55%	0%	15%	0%	15%	26%	50%
Primary Treatment (with disinfection)	32.5%	55%	0%	15%	0%	15%	26%	99.95%
Chemical Enhanced Primary Treatment (with no disinfection) <sup>B</sup>	55%	70%	10%	45% <sup>C</sup>	60%	60%	80%	50%
Chemical Enhanced Primary Treatment (with disinfection) <sup>B</sup>	55%	70%	10%	45% <sup>C</sup>	60%	60%	80%	99.95%
Secondary Treatment (no disinfection)	85%	90%	75%	80%	35%	50%	74%	94%
Secondary Treatment (with disinfection)	85%	90%	75%	80%	35%	50%	74%	99.97%

Note

- A. It is assumed that the reduction of the pollution parameters is insignificant in screening plants. Therefore, the removal rates for these parameters were all assumed zero.
- B. Based on estimation from the SSDS EIA Study: Technical Note 1 (Revised) Wastewater Flows and Loads and Effluent Characteristics.
- C. The removal rate of org-N is calculated from the removal rates of NH<sub>3</sub>-N and total N (10% and 25% respectively) assuming that NH<sub>3</sub>-N contributes about 57% of total N in raw sewage.

## 4 POLLUTION LOADS FROM DOMESTIC, COMMERCIAL AND INDUSTRIAL ACTIVITIES

### Population and Employment Statistics

#### Time Aspect

- 4.1 The 2003-based Territorial Population and Employment Data Matrices (TPEDM) provided by PlanD were used to compile the pollution loads from domestic, commercial and industrial activities. The TPEDM provides the projected population breakdown by Planning Vision and Strategy (PVS) zones for 2006, 2011 and 2016. For strategic planning purposes, two different scenarios of growth rate are postulated for future population (2011 and 2016) under the 2003-based TPEPM. Scenario I assumed a total population of 7.57 million by 2016. Scenario II assumed a total population of 7.94 million by 2016, which represents about 5% increase in population on top of Scenario I. The population and employment projections for 2006 are only available for Scenario I.
- 4.2 Territorial population projections given by the Census & Statistics Department (C&SD) were used as the control totals for the TPEDM Scenario I. The TPEDM Scenario II was compiled for long-term planning purposes with no given territorial population as the control totals and was used in this EIA for conservative assessment.
- 4.3 Based on the population projections released by C&SD in June 2004, the Hong Kong resident population is projected to increase from 6.80 million in mid-2003 to 8.38 million in mid-2033. **Table A5-2-8** shows the annual population growth rates between mid-2006 and mid-2016 estimated from the C&SD data. There would be no significant variation in the annual growth rates from 2006 to 2016 (ranged from 0.81% to 0.93%). With an increased number of deaths



upon aging of the population, the annual growth rate is expected to slacken to 0.4% towards the end of the projection period (2003-2033). It should be noted that the pollution loading was compiled using the 2003-based TPEDM provided by PlanD. The C&SD data provided in **Table A5-2-8** were solely used as a reference to illustrate the population growth rate.

**Table A5-2-8 Annual Growth Rate of Hong Kong Population**

Year	Annual Growth Rate
Mid-2007	0.81% (between mid-2006 and mid-2007)
Mid-2008	0.90% (between mid-2007 and mid-2008)
Mid-2009	0.91% (between mid-2008 and mid-2009)
Mid-2010	0.92% (between mid-2009 and mid-2010)
Mid-2011	0.93% (between mid-2010 and mid-2011)
Mid-2012	0.91% (between mid-2011 and mid-2012)
Mid-2013	0.89% (between mid-2012 and mid-2013)
Mid-2014	0.85% (between mid-2013 and mid-2014)
Mid-2015	0.83% (between mid-2014 and mid-2015)
Mid-2016	0.81% (between mid-2015 and mid-2016)

- 4.4 The modeling work was carried out for four time horizons, namely 2009, 2013, 2020 and ultimate scenarios. However, the projected population data provided by PlanD at PVS zones are only available for 2006, 2011 and 2016. The population for 2009 was calculated using the TPEDM Scenario I for 2006 and TPEDM Scenario II for 2011 assuming a constant population growth between 2006 and 2011. The population for 2013 was calculated using the TPEDM Scenario II for 2011 and TPEDM Scenario II for 2016 assuming a constant population growth between 2011 and 2016. For the ultimate scenario, the 2000-based Year X population data adopted in the EEFS were used for the HATS catchments. For the purpose of this EIA, the ultimate population for the non-HATS catchments was estimated based on a 10% extrapolation of the 2016 data from the 2003-based TPEDM Scenario II. The population for 2020 was calculated using the ultimate population and the 2016 population from the 2003-based TPEDM Scenario II assuming that the ultimate year represents 2030 and a constant population growth between 2016 and 2030.

#### Spatial Aspect

- 4.5 To facilitate the estimation of pollution loading, the population and employment data are required to be presented at the level of catchment areas shown in **Figure A5-2-1** of this Appendix. However, the projected population from PlanD is provided in a much smaller scale at PVS zones. Population and employment data for each sewage catchment area were estimated by overlaying the PVS zones on top of the layout of the sewage catchment area for allocating the appropriate PVS zones to the sewage catchment area.

#### **Data Manipulation**

- 4.6 The TPEDM provides the number of usual residents, mobile residents and school places within the territory at PVS zones.
- 4.7 Employment population is divided by 12 job types under the TPEDM as listed below:
- J1 Manufacture
  - J2 Electricity, gas & water
  - J3 Transport, storage & communication

- J4 Wholesale and retail
  - J5 Import & export
  - J6 Financial, insurance, real estate & business services
  - J7 Agriculture & fishery
  - J8 Mining & quarrying
  - J9 Construction
  - J10 Restaurants, hotels & boarding houses
  - J11 Community, social & personal services
  - J12 Public administration
- 4.8 The population data from the TPEDM were manipulated and presented at the following categories:
- Residential population (by usual residents and mobile residents)
  - Transient Population (by total employment number and total school places), where total employment = J1+J2+J3+J4+J5+J6+J7+J8+J9+J10+J11+J12
  - Number of employees in commercial sector (by J2, J3, J4, J9, J10 & J11)
  - Number of employees in manufacturing sector (=J1) by 6 sub-categories, namely food, textiles, leather, paper, manufacturing and machinery respectively.
- 4.9 The domestic pollution load to be generated from a catchment would be affected by the number of resident population and transient population within the catchment. The total employee number comprises 12 job types listed above. It is considered that commercial effluents are contributed from job J2 to J4 and J9 to J11. Industrial effluents are contributed from job type J1.
- 4.10 In order to provide a better estimation of pollution loads from industrial processes, the number of employees in manufacturing sector (J1) was further broken down into 6 sub-categories, namely food, textiles, leather, paper, manufacturing and machinery. Projected employment statistics are not available for these 6 sub-categories. It is noted that the size for each of these 6 sub-categories was estimated under the EPD Update Study. To estimate the size of these 6 sub-categories for this EIA, it is assumed that the share of each sub-category in the manufacturing sector provided in the Update Study would be the same as that for 2009, 2013, 2020 and ultimate year. **Table A5-2-9** to **Table A5-2-12** show the population and employment statistics compiled by sewage catchment areas.

**Table A5-2-9 Population and Employment for Year 2009**

ID	Sewage Catchment Area	Residential Population			School	Total Employment Number	Total Employment in Commercial Activities	Manufacturing Industries							
		Land Usual Residents	Mobile Residents	Total	Full-Time School Places			Food	Textile	Leather	Paper	Manufacturing	Machinery	Others	Total
1	Sai Kung	5010	158	5168	970	1599	1240	7	0	0	0	9	3	8	28
2	Tseung Kwan O	HATS 422567	10672	433240	62843	99564	75867	743	121	0	272	1580	194	7726	10636
4	Yau Tong, East Kowloon	HATS 737385	21613	758998	116931	353487	189718	477	520	37	208	175	1102	10032	12551
5	North Kowloon, Central Kowloon, South Kowloon	HATS 524573	16838	541411	107106	391976	219967	1166	383	34	60	121	413	12407	14584
8	Northwest Kowloon	HATS 787442	29770	817212	194070	482079	306872	623	338	28	95	97	929	8054	10164
9A	Stonecutters Island	HATS 5929	168	6098	325	2632	2117	27	4	14	1	16	18	26	106
11	Tsuen Wan West (Rural Area)	30808	1464	32273	468	8153	6122	881	0	0	0	5	1	13	900
12	Tuen Mun	512707	14959	527666	98324	127874	92089	943	505	27	29	543	667	7951	10665
13	Discovery Bay	15534	405	15939	1780	4614	3829	0	0	0	0	0	0	32	32
14	Peng Chau	2523	13	2536	203	569	270	0	0	0	0	0	0	4	4
15	Mui Wo	7151	133	7284	1032	3017	2307	0	0	0	0	0	2	17	19
16	Hei Ling Chau	5070	25	5096	409	1144	543	2	0	1	0	1	1	2	9
17	Cheung Chau	22052	239	22291	4823	5768	3935	25	4	0	3	1	9	60	100
18	Shek Pik	1766	12	1778	289	677	367	6	0	0	0	0	0	0	6
19	Lamma Island	5723	83	5806	342	2147	1903	11	0	0	1	14	0	0	26
20A	Pokfulam Sanday Bay	7558	339	7898	4271	6765	6216	11	0	0	1	2	1	19	33
20B	Cyber Port	14811	742	15553	1852	7093	5209	35	0	0	3	7	2	61	109
21	Wah Fu Estates and Mt. Kellet	39715	1223	40937	7417	7617	6351	0	0	0	0	20	0	45	65
22	Aberdeen, Shouson Hill and Repulse Bay, South Bay	125371	3729	129100	28649	57302	37202	358	8	2	91	216	108	1979	2761
23	Ap Lei Chau	85855	1766	87621	8734	20755	16822	127	1	0	2	99	29	374	632
26	Chung Hom Kok	1582	50	1632	271	563	380	0	0	0	0	0	0	3	3
27	Stanley	15146	478	15624	2438	5218	3415	0	0	0	0	0	0	26	26
28	Tai Tam	4310	120	4430	1455	1713	1391	0	0	0	0	0	3	9	12
29	Shek O	15036	521	15557	3117	7456	3968	998	0	0	0	0	0	0	998
30	Chai Wan	HATS 158022	4901	162922	31159	66715	38906	499	102	25	441	236	417	4845	6565
31	Shau Kei Wan	HATS 181611	5918	187529	22562	59676	36325	55	3	1	49	44	145	868	1166
32	North Point	230402	10034	240436	50502	168137	89965	405	19	6	928	442	316	5355	7473
33	Wan Chai East	83697	3932	87629	27450	137049	75314	95	29	0	215	63	74	1157	1632

ID	Sewage Catchment Area		Residential Population			School	Total Employment Number	Total Employment in Commercial Activities	Manufacturing Industries							
			Land Usual Residents	Mobile Residents	Total	Full-Time School Places			Food	Textile	Leather	Paper	Manufacturing	Machinery	Others	Total
34	Wan Chai West		66041	2976	69017	17884	255792	91859	145	6	0	241	181	402	1832	2807
35	Western and Central, Green Island		211601	6510	218112	45625	219846	102576	793	19	15	166	264	107	3409	4773
37	Tolo Harbour		962666	31355	994021	193227	314392	211313	2921	82	10	135	520	1085	14782	19536
38	Sheung Shui and Fanling		297215	9867	307082	57214	73554	52486	596	60	14	39	315	391	2684	4099
39	North New Territories		15297	258	15554	793	5797	2694	20	2	4	3	50	62	188	330
40	Sha Tau Kok		9413	238	9651	1226	2252	1355	29	1	0	16	7	6	16	75
10A	Kwai Chung and Tsuen Wan East	HATS	546423	18014	564437	95019	325482	167089	892	1238	96	195	596	1776	21421	26214
10B	Tsing Yi	HATS	192829	6503	199332	28830	43769	32444	47	72	0	2	127	64	1854	2168
12A	Yuen Long and Tin Shui Wai and Deepbay Streams		453869	13399	467269	83348	99749	76524	1123	93	0	41	284	406	1842	3790
12D	Yuen Long New Town and Kam Tin		134035	4058	138093	17197	35973	25337	878	0	29	0	260	396	2557	4120
13A	North Lantau		104051	4268	108319	15589	37385	33798	10	1	5	1	6	7	851	880
13B	Chek Lap Kok		2	0	2	0	52442	33949	0	0	0	0	6841	0	0	6841
15A	South Lantau		3074	25	3099	493	1074	597	0	0	0	0	0	1	9	10
17A	Shek Kwu Chau		142	1	143	23	54	29	0	0	0	0	0	0	0	0
17B	Tai A Chau		142	1	143	23	54	29	0	0	0	0	0	0	0	0
18A	Tai O		3049	21	3069	499	1168	633	6	0	0	0	0	0	5	11
19A	Poi Toi Islands		79	0	79	0	24	9	0	0	0	0	0	0	0	0
19B	Tung Lung		1094	44	1138	129	263	222	0	0	0	0	0	0	0	0
1A	Sai Kung Country Park		38454	1121	39576	7211	14438	10937	79	0	0	0	0	4	183	266
1B	Pak Sha Wan		35499	1249	36748	6645	7637	6214	37	0	0	0	5	7	56	105
1C	Clear Water Bay		3952	160	4111	464	951	802	0	0	0	0	0	0	4	4

**Table A5-2-10 Population and Employment for Year 2013**

ID	Sewage Catchment Area		Residential Population			School	Total Employment Number	Total Employment in Commercial Activities	Manufacturing Industries							
			Land Usual Residents	Mobile Residents	Total	Full-Time School Places			Food	Textile	Leather	Paper	Manufacturing	Machinery	Others	Total
1	Sai Kung		5182	176	5358	977	1710	1337	8	0	0	0	10	3	9	30
2	Tseung Kwan O	HATS	449817	11863	461680	63536	114532	86639	846	138	0	310	1799	221	8799	12113
4	Yau Tong, East Kowloon	HATS	769324	24055	793379	116911	385856	207599	274	299	21	120	101	633	5766	7213
5	North Kowloon, Central Kowloon, South Kowloon	HATS	569994	19607	589600	107677	419142	237006	960	315	28	49	100	340	10216	12008
8	Northwest Kowloon	HATS	842577	34675	877251	195178	503568	322715	488	265	22	74	76	728	6307	7959
9A	Stonecutters Island	HATS	7474	230	7704	325	2793	2263	26	4	14	1	16	17	25	103
11	Tsuen Wan West (Rural Area)		32737	1661	34398	468	8974	6926	851	0	0	0	5	1	13	870
12	Tuen Mun		536117	17189	553306	98486	136797	99032	1041	558	30	32	599	736	8775	11770
13	Discovery Bay		16175	456	16631	1780	5186	4386	0	0	0	0	0	0	31	31
14	Peng Chau		2557	14	2571	203	581	287	0	0	0	0	0	0	4	4
15	Mui Wo		7952	220	8172	1032	3306	2588	0	0	0	0	0	2	17	19
16	Hei Ling Chau		5138	29	5167	409	1168	576	2	0	1	0	1	1	2	9
17	Cheung Chau		22300	257	22557	4823	5746	4052	24	3	0	2	0	8	58	97
18	Shek Pik		1837	13	1851	289	876	564	6	0	0	0	0	0	0	6
19	Lamma Island		6103	100	6203	342	2220	1978	11	0	0	1	13	0	0	25
20A	Pokfulam Sanday Bay		7825	383	8207	4290	6956	6407	10	0	0	1	2	1	18	32
20B	Cyber Port		15761	868	16630	1878	7528	5643	34	0	0	3	7	2	59	105
21	Wah Fu Estates and Mt. Kellat		38031	1268	39299	7419	7787	6544	0	0	0	0	19	0	43	63
22	Aberdeen, Shouson Hill and Repulse Bay, South Bay		129911	4013	133924	28656	60942	39980	233	5	1	59	140	70	1287	1796
23	Ap Lei Chau		84247	1864	86111	8734	21245	17415	123	1	0	2	95	28	362	611
26	Chung Hom Kok		1554	53	1606	271	574	390	0	0	0	0	0	0	0	0
27	Stanley		14855	498	15353	2438	5298	3486	0	0	0	0	0	0	25	25
28	Tai Tam		4229	127	4356	1455	1748	1434	0	0	0	0	0	3	9	12
29	Shek O		15125	562	15687	3117	8072	4198	1087	0	0	0	0	0	0	1087
30	Chai Wan	HATS	154216	5140	159356	31358	70762	41010	459	94	23	406	217	384	4461	6044
31	Shau Kei Wan	HATS	179728	6269	185996	22568	62901	37867	60	3	1	54	48	159	950	1276

ID	Sewage Catchment Area		Residential Population			School	Total Employment Number	Total Employment in Commercial Activities	Manufacturing Industries							
			Land Usual Residents	Mobile Residents	Total	Full-Time School Places			Food	Textile	Leather	Paper	Manufacturing	Machinery	Others	Total
32	North Point		233959	10956	244915	50562	173931	96241	373	18	5	853	406	290	4921	6867
33	Wan Chai East		84965	4335	89300	27540	138427	76801	94	29	0	213	62	73	1147	1619
34	Wan Chai West		67265	3250	70515	17938	267181	97232	166	7	0	276	207	461	2101	3219
35	Western and Central, Green Island	HATS	222336	7276	229612	45832	225574	106510	817	20	16	171	272	111	3515	4921
37	Tolo Harbour		1002755	35492	1038247	193645	339785	227874	3071	86	11	142	547	1141	15544	20542
38	Sheung Shui and Fanling		313281	11151	324432	57200	75812	54913	576	58	13	38	305	378	2595	3962
39	North New Territories		16676	311	16987	793	5898	2858	19	2	4	3	49	60	182	319
40	Sha Tau Kok		10643	289	10932	1226	2367	1505	28	1	0	16	6	6	16	73
10A	Kwai Chung and Tsuen Wan East	HATS	551887	19583	571470	95116	350029	181287	762	1058	82	167	509	1517	18301	22396
10B	Tsing Yi		188052	6824	194876	28942	57411	36450	131	200	1	6	352	177	5129	5995
12A	Yuen Long and Tin Shui Wai and Deepbay Streams		489931	15440	505371	83169	108767	83627	1029	86	0	38	260	372	1689	3474
12D	Yuen Long New Town and Kam Tin		158532	5194	163726	17200	38824	28467	849	0	28	0	252	382	2471	3982
13A	North Lantau		149768	7005	156773	15795	57855	52766	0	0	0	0	0	0	1390	1390
13B	Chek Lap Kok		2	0	2	0	61031	37949	0	0	0	0	7948	0	0	7948
15A	South Lantau		3234	28	3262	495	1385	905	0	0	0	0	0	1	9	9
17A	Shek Kwu Chau		147	1	148	23	70	45	0	0	0	0	0	0	0	0
17B	Tai A Chau		148	1	149	23	70	45	0	0	0	0	0	0	0	0
18A	Tai O		3172	23	3195	499	1513	974	6	0	0	0	0	0	4	10
19A	Poi Toi Islands		119	0	119	0	22	12	0	0	0	0	0	0	0	0
19B	Tung Lung		1135	50	1184	129	264	226	1	0	0	0	0	0	0	1
1A	Sai Kung Country Park		39451	1238	40689	7290	15185	11639	80	0	0	0	0	4	186	271
1B	Pak Sha Wan		36657	1412	38069	6663	8171	6719	37	0	0	0	5	7	56	104
1C	Clear Water Bay		4098	179	4277	466	954	816	0	0	0	0	0	0	4	4

**Table A5-2-11 Population and Employment for Year 2020**

ID	Sewage Catchment Area		Residential Population			School	Total Employment Number	Total Employment in Commercial Activities	Manufacturing Industries							
			Land Usual Residents	Mobile Residents	Total	Full-Time School Places			Food	Textile	Leather	Paper	Manufacturing	Machinery	Others	Total
1	Sai Kung		5075	265	5340	1004	1772	1403	9	0	0	0	11	3	10	33
2	Tseung Kwan O	HATS	470990	14454	485444	65345	116543	88117	950	155	0	348	2022	248	9885	13608
4	Yau Tong, East Kowloon	HATS	835360	36303	871664	120231	434738	230496	400	436	31	175	147	924	8415	10528
5	North Kowloon, Central Kowloon, South Kowloon	HATS	642979	41968	684947	110716	456397	259497	1036	340	30	53	108	367	11028	12963
8	Northwest Kowloon	HATS	899327	56938	956265	200673	535203	342928	676	367	31	103	105	1008	8738	11028
9A	Stonecutters Island	HATS	8812	469	9281	334	2604	1999	27	4	15	1	17	19	27	109
11	Tsuen Wan West (Rural Area)		36464	2453	38917	481	8810	6696	929	0	0	0	6	1	14	950
12	Tuen Mun		576343	19543	595886	101285	143273	104255	1071	574	31	33	616	757	9026	12107
13	Discovery Bay		16255	487	16742	1831	5751	4915	0	0	0	0	0	0	32	32
14	Peng Chau		2589	16	2605	209	597	297	0	0	0	0	0	0	4	4
15	Mui Wo		8466	289	8756	1062	3628	2886	0	0	0	0	0	2	17	19
16	Hei Ling Chau		5203	32	5235	420	1199	598	2	0	1	0	1	1	2	9
17	Cheung Chau		22362	271	22634	4961	5830	4164	25	4	0	3	1	9	59	99
18	Shek Pik		1914	14	1928	297	1174	853	6	0	0	0	0	0	0	6
19	Lamma Island		6294	115	6409	352	2306	2057	11	0	0	1	14	0	0	26
20A	Pokfulam Sanday Bay	HATS	9211	622	9833	4410	7031	6390	25	0	0	2	5	2	44	78
20B	Cyber Port	HATS	16355	1208	17563	1929	8966	6339	109	2	1	8	23	8	190	340
21	Wah Fu Estates and Mt. Kellat	HATS	39266	2044	41310	7631	8176	6935	0	0	0	0	19	0	43	61
22	Aberdeen , Shouson Hill and Repulse Bay, South Bay	HATS	128593	6138	134731	29474	70070	42620	278	6	2	71	167	84	1536	2143
23	Ap Lei Chau	HATS	82661	3007	85668	8984	24576	17760	317	2	0	6	246	73	935	1579
26	Chung Hom Kok		1567	78	1645	279	574	376	0	0	0	0	0	0	4	4
27	Stanley		15017	750	15766	2507	5448	3454	0	0	0	39	0	0	2851	39
28	Tai Tam		4900	279	5180	1497	1924	1529	0	0	0	0	0	10	29	10
29	Shek O		15583	788	16371	3206	9134	4571	1150	0	0	0	0	0	0	1150
30	Chai Wan	HATS	155606	7524	163130	32241	80207	44834	1789	366	88	1580	845	1497	17375	6166
31	Shau Kei Wan	HATS	179441	8994	188435	23213	67993	39246	351	20	6	315	284	930	5562	1905



ID	Sewage Catchment Area		Residential Population			School	Total Employment Number	Total Employment in Commercial Activities	Manufacturing Industries							
			Land Usual Residents	Mobile Residents	Total	Full-Time School Places			Food	Textile	Leather	Paper	Manufacturing	Machinery	Others	Total
32	North Point	HATS	228050	15704	243754	51998	181235	101075	1292	62	19	2958	1409	1007	17062	6746
33	Wan Chai East	HATS	85640	8132	93772	28319	142531	78287	402	122	0	908	264	311	4878	2006
34	Wan Chai West	HATS	65575	7316	72891	18445	285340	104663	621	27	0	1034	775	1724	7863	4181
35	Western and Central, Green Island	HATS	234676	14075	248751	47110	237575	111541	3176	76	62	664	1058	430	13656	5465
37	Tolo Harbour		1039046	39123	1078169	199121	358937	238781	13364	376	47	619	2380	4963	67636	21749
38	Sheung Shui and Fanling		322312	12057	334370	58831	78182	56757	1717	173	40	112	909	1125	7732	4075
39	North New Territories		17692	352	18044	816	6011	2928	46	6	9	6	116	145	436	328
40	Sha Tau Kok		12487	351	12838	1261	2472	1621	37	1	0	21	8	7	21	75
10A	Kwai Chung and Tsuen Wan East	HATS	560736	27597	588333	97817	385769	199122	920	1276	99	201	614	1830	22080	27021
10B	Tsing Yi	HATS	187472	8700	196172	29755	75830	40660	277	422	2	13	742	373	10822	12650
12A	Yuen Long and Tin Shui Wai and Deepbay Streams		520670	17007	537678	85546	114439	87605	986	82	0	36	250	357	1618	3329
12D	Yuen Long New Town and Kam Tin		179571	6071	185642	17691	41067	30491	873	0	29	0	259	393	2542	4096
13A	North Lantau		205807	9928	215736	16244	77355	71157	0	0	0	0	0	0	1429	1429
13B	Chek Lap Kok		2	0	2	0	68785	41880	0	0	0	0	9233	0	0	9233
15A	South Lantau		3446	32	3478	509	1844	1350	0	0	0	0	0	1	9	10
17A	Shek Kwu Chau		154	1	155	24	94	68	0	0	0	0	0	0	0	0
17B	Tai A Chau		154	1	155	24	94	69	0	0	0	0	0	0	0	0
18A	Tai O		3304	25	3329	513	2028	1473	6	0	0	0	0	0	5	11
19A	Poi Toi Islands		170	0	170	0	22	15	0	0	0	0	0	0	0	0
19B	Tung Lung		1024	64	1088	133	238	202	0	0	0	0	0	0	0	1
1A	Sai Kung Country Park		37684	2180	39865	7486	15611	12153	92	0	0	0	0	5	213	310
1B	Pak Sha Wan		37573	1913	39486	6851	8330	6928	37	0	0	0	5	7	57	106
1C	Clear Water Bay		3698	231	3929	479	860	728	0	0	0	0	0	0	3	3

**Table A5-2-12 Population and Employment for Ultimate Year**

ID	Sewage Catchment Area		Residential Population			School	Total Employment Number	Total Employment in Commercial Activities	Manufacturing Industries							
			Land Usual Residents	Mobile Residents	Total	Full-Time School Places			Food	Textile	Leather	Paper	Manufacturing	Machinery	Others	Total
1	Sai Kung		4761	460	5222	1073	1843	1485	11	0	0	0	14	4	12	42
2	Tseung Kwan O	HATS	510457	19403	529860	69883	114123	84916	1212	197	0	444	2577	316	12601	17346
4	Yau Tong, East Kowloon	HATS	944379	61871	1006250	128580	516811	268791	1030	1123	80	450	378	2381	21677	27119
5	North Kowloon, Central Kowloon, South Kowloon	HATS	774260	93600	867860	118404	513205	299002	1495	491	43	76	155	529	15905	18695
8	Northwest Kowloon	HATS	973223	103889	1077112	214609	579674	374944	1226	665	55	187	191	1829	15847	20000
9A	Stonecutters Island	HATS	10816	977	11793	357	2290	1533	31	5	17	2	19	21	31	126
11	Tsuen Wan West (Rural Area)		47110	4292	51401	515	8159	5878	1125	0	0	0	7	1	17	1149
12	Tuen Mun		616366	20901	637267	108318	153223	111495	1145	613	33	35	659	809	9652	12947
13	Discovery Bay		17384	521	17904	1958	6150	5257	0	0	0	0	0	0	34	34
14	Peng Chau		2769	17	2786	224	638	318	0	0	0	0	0	0	5	5
15	Mui Wo		9054	309	9364	1135	3880	3086	0	0	0	0	0	2	18	20
16	Hei Ling Chau		5564	34	5599	450	1282	639	2	0	2	0	2	2	2	9
17	Cheung Chau		23915	290	24205	5306	6235	4453	27	4	0	3	1	9	63	106
18	Shek Pik		2047	15	2062	318	1256	912	7	0	0	0	0	0	0	7
19	Lamma Island		6732	123	6855	376	2466	2200	12	0	0	1	15	0	0	28
20A	Pokfulam Sanday Bay	HATS	13020	1199	14219	4716	6982	6109	62	1	0	5	13	4	108	193
20B	Cyber Port	HATS	19067	2010	21077	2063	12373	7885	296	4	2	22	63	21	519	928
21	Wah Fu Estates and Mt. Kellet	HATS	45563	3922	49485	8160	9211	7926	0	0	0	0	18	0	40	58
22	Aberdeen , Shouson Hill and Repulse Bay, South Bay	HATS	135476	11260	146736	31521	88152	46562	550	13	3	140	331	166	3039	4241
23	Ap Lei Chau	HATS	84597	5755	90353	9608	32779	18337	804	4	0	14	624	185	2368	3999
26	Chung Hom Kok		1678	140	1818	298	576	341	0	0	0	0	0	0	7	7
27	Stanley		16144	1351	17495	2681	5827	3379	0	0	0	74	0	0	5367	74
28	Tai Tam		6907	653	7560	1600	2367	1767	0	0	0	0	0	4	12	4
29	Shek O		16848	1296	18144	3429	11579	5364	1411	0	0	0	0	0	0	1411
30	Chai Wan	HATS	166645	13125	179769	34480	100704	52555	2404	492	119	2123	1136	2011	23343	8284
31	Shau Kei Wan	HATS	188415	15360	203775	24825	79852	41946	669	38	11	601	541	1774	10615	3635

ID	Sewage Catchment Area		Residential Population			School	Total Employment Number	Total Employment in Commercial Activities	Manufacturing Industries							
			Land Usual Residents	Mobile Residents	Total	Full-Time School Places			Food	Textile	Leather	Paper	Manufacturing	Machinery	Others	Total
32	North Point	HATS	229933	26908	256841	55609	188749	100719	1513	73	22	3465	1651	1179	19987	7902
33	Wan Chai East	HATS	87426	16992	104418	30286	150048	80303	564	171	0	1275	371	436	6851	2818
34	Wan Chai West	HATS	65080	17235	82315	19726	292850	108947	702	31	0	1169	876	1949	8888	4727
35	Western and Central, Green Island	HATS	256768	30007	286775	50381	260025	119376	3829	92	75	800	1275	519	16467	6590
37	Tolo Harbour		1111556	42945	1154501	212949	384014	255764	14283	402	50	662	2543	5305	72287	23245
38	Sheung Shui and Fanling		344695	12895	357590	62916	83612	60698	1836	185	42	120	972	1203	8269	4358
39	North New Territories		18921	376	19297	872	6428	3131	50	6	9	7	124	155	466	351
40	Sha Tau Kok		13354	375	13729	1349	2643	1733	40	1	0	22	9	8	22	80
10A	Kwai Chung and Tsuen Wan East	HATS	599274	45742	645016	104610	445796	231040	1434	1989	154	314	957	2852	34410	42110
10B	Tsing Yi	HATS	196193	12870	209063	31822	83197	45385	321	489	2	15	860	433	12547	14666
12A	Yuen Long and Tin Shui Wai and Deepbay Streams		556828	18188	575016	91486	122386	93688	1054	88	0	39	267	381	1730	3560
12D	Yuen Long New Town and Kam Tin		192041	6493	198534	18919	43918	32608	934	0	31	0	277	421	2719	4381
13A	North Lantau		220100	10618	230717	17373	82727	76098	0	0	0	0	0	0	1528	1528
13B	Chek Lap Kok		2	0	2	0	73562	44789	0	0	0	0	9874	0	0	9874
15A	South Lantau		3686	35	3720	544	1973	1443	0	0	0	0	0	1	9	10
17A	Shek Kwu Chau		164	1	165	25	101	73	0	0	0	0	0	0	0	1
17B	Tai A Chau		164	1	166	26	101	73	0	0	0	0	0	0	0	1
18A	Tai O		3534	26	3560	548	2168	1575	6	0	0	0	0	0	5	11
19A	Poi Toi Islands		181	0	181	0	23	16	0	0	0	0	0	0	0	0
19B	Tung Lung		708	92	800	142	158	126	0	0	0	0	0	0	0	0
1A	Sai Kung Country Park		32699	4354	37054	8006	16110	12819	121	0	0	0	0	6	280	407
1B	Pak Sha Wan		38827	2949	41776	7327	8485	7203	39	0	0	0	5	7	59	110
1C	Clear Water Bay		2558	333	2891	513	570	455	0	0	0	0	0	0	1	1

### Unit Flow and Load Factors

- 4.11 Relevant per head flow and load were assigned to residential, transient, commercial and industrial population to obtain the quantity and quality of total untreated wastewater by individual catchment areas. **Table A5-2-13** to **Table A5-2-17** shows the flow and load factors.

**Table A5-2-13 Domestic Flow and Load Factors for Resident Population**

Description	Flow <sup>1</sup> (m <sup>3</sup> /d/head)		SS <sup>2</sup>	BOD <sub>5</sub> <sup>2</sup>	TKN <sup>2</sup>	NH <sub>3</sub> -N <sup>2</sup>	TP <sup>3</sup>	Cu <sup>3</sup>	E. coli <sup>2</sup>
	2009	2013 /2020 /ultimate							
(all in g/d/head except E.coli in no./d/head)									
<b>Usual residents</b>									
Sandy Bay	0.341	0.35	40	42	8.5	5.0	1.33	0.0065	4.3E+10
Stanley, Discovery Bay	0.29	0.29	40	42	8.5	5.0	1.33	0.0065	4.3E+10
Shek O	0.329	0.35	40	42	8.5	5.0	1.33	0.0065	4.3E+10
Outlying Island, Sai Kung	0.27	0.27	40	42	8.5	5.0	1.33	0.0065	4.3E+10
Yuen Long, Mui Wo	0.244	0.25	40	42	8.5	5.0	1.33	0.0065	4.3E+10
Aberdeen, Wan Chai, North Lantau	0.23	0.23	40	42	8.5	5.0	1.33	0.0065	4.3E+10
Sha Tin, Tai Po	0.22	0.22	40	42	8.5	5.0	1.33	0.0065	4.3E+10
San Wai	0.221	0.23	40	42	8.5	5.0	1.33	0.0065	4.3E+10
Wah Fu, Shek Wu Hui, N	0.207	0.21	40	42	8.5	5.0	1.33	0.0065	4.3E+10
Northwest Kowloon, Tuen Mun, Central, North Point	0.2	0.2	40	42	8.5	5.0	1.33	0.0065	4.3E+10
Ap Lei Chau, Chai Wan, Shau Kei Wan, Central Kowloon, East Kowloon, Kwai Chung, Tsing Yi, Tseung Kwan O	0.19	0.19	40	42	8.5	5.0	1.33	0.0065	4.3E+10
<b>Mobile residents</b>	0.19		40	42	8.5	5.0	1.33	0.0065	4.3E+10

Source of reference:

- Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (Version 1.0), EPD, March 2005
- DSD Sewerage Manual
- EPD Update Study

**Table A5-2-14 Domestic Flow and Load Factors for Transient Population**

Description	Flow <sup>1</sup> (m <sup>3</sup> /d/head)	SS <sup>2</sup>	BOD <sub>5</sub> <sup>2</sup>	TKN <sup>2</sup>	NH <sub>3</sub> -N <sup>2</sup>	TP <sup>3</sup>	Cu <sup>3</sup>	E. coli <sup>2</sup>
Employed population	0.08	34	34	6.7	4.0	1.06	0.0052	3.5E+10
Students	0.04	34	34	6.7	4.0	1.06	0.0052	3.5E+10

Source of reference:

- Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (Version 1.0), EPD, March 2005
- DSD Sewerage Manual
- EPD Update Study

**Table A5-2-15 Flow and Load Factors for Commercial Activities**

Description	Flow <sup>1</sup> (m <sup>3</sup> /d/employee)	SS <sup>2</sup>	BOD <sub>5</sub> <sup>2</sup>	TKN <sup>2</sup>	NH <sub>3</sub> -N <sup>2</sup>	TP <sup>3</sup>	E.coli <sup>2</sup>
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		(all in g/d/head except <i>E.coli</i> in no./d/head)					
J2 Electricity Gas & Water	0.25	25	53	2.5	0.8	0.53	0
J3 Transport, Storage & Communication	0.1	25	53	2.5	0.8	0.53	0
J4 Wholesale & Retail	0.2	25	53	2.5	0.8	0.53	0
J9 Construction	0.15	25	53	2.5	0.8	0.53	0
J10 Restaurants & Hotels	1.5	25	53	2.5	0.8	0.53	0
J11 Community, Social & Personal Services	0.2	25	53	2.5	0.8	0.53	0

Source of reference:

1. Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (Version 1.0), EPD, March 2005
2. DSD Sewerage Manual
3. EPD Update Study

**Table A5-2-16 Flow Factors for Industrial Activities**

Catchment	Flow <sup>1</sup> (m <sup>3</sup> /d/employee)
<b>J1 Manufacturing</b>	
Hong Kong Island (except Aberdeen & Ap Lei Chau), San Po Kong	0.25
North West Kowloon	0.45
East Kowloon, Sha Tin, Lantau Island (except Mui Wo)	0.45
Central Kowloon, North District, Aberdeen, Ap Lei Chau	0.55
Tsuen Wan, Kwai Chung	0.65
Tai Po	0.75
Tuen Mun, Tseung Kwan O, Yau Tong, Cheung Chau, Mui Wo	1
Tsing Yi	1.5
Sai Kung, Yuen Long	2

Source of reference:

1. Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (Version 1.0), EPD, March 2005

**Table A5-2-17 Load Factors for Industrial Activities**

Category	SS <sup>1</sup>	BOD <sub>5</sub> <sup>1</sup>	TKN <sup>1</sup>	NH <sub>3</sub> -N <sup>1</sup>	Cu <sup>1</sup>	<i>E.coli</i> <sup>1</sup>
	(all in g/d/employee except <i>E.coli</i> in no./d/employee)					
<b>J1 Manufacturing</b>						
Food	502	713	39	0	0	0
Textiles	2095	3680	67	0	4.4	0
Leather	115	115	29	7	0.1	0
Paper	2228	2150	33	0	0	0
Manufacturing	355	931	0	0	2.4	0
Machinery	40	90	29	22	0.9	0

Source of reference:

1. EPD Update Study

4.12 Pollution load generation factors for OrthoP and silica are not available. The following assumptions were adopted for calculating OrthoP and silica loading in raw sewage.

- TP to OrthoP is 1.68 based on the actual measurements of raw sewage at Sha Tin STW and Yuen Long STW.
- The silica content is approximately 9 mg/l based on the actual measurements of raw sewage at Sha Tin STW.

## 5 CONCURRENT DISCHARGES FROM HATS AND OTHER MAJOR STW

5.1 Effluent discharges from the key STW within the modelling areas were considered separately. These key discharges include the effluent flow from SCISTW, PPSTW, SHWSTW, NWNT outfall, SHTSTW and THEES. The assumed effluent concentrations assumed for these discharges are tabulated in [Appendix 5-4](#) which are based on the information from recent studies and actual measurements.

The methodology for compiling the flow rates of these key STW is given below.

### Flow Estimation for 2009, 2012 and 2020

- 5.2 For the purpose of water quality modelling, it was proposed to use the average flow calculated using the unit flow factors from the GESF<sup>1</sup> and the methodologies discussed in Section 3 and Section 4 for the discharge from SCISTW, PPSTW, SHWSTW, NWNT outfall, SHTSTW and THEES. The average flow used for these STW discharges had also taken into account the catchment inflow factors ( $P_{CIF}$ ) from the GESF as shown in **Table A5-2-18** below. Flow from relevant landfills and beach facilities as shown in **Table A5-2-4** and **Table A5-2-5** was also included in the flow estimation wherever applicable.

**Table A5-2-18 Catchment Inflow Factors from the GESF**

Catchment	Catchment Inflow Factor
Central, North Point, Sandy Bay, Wan Chai, Wah Fu, Central Kowloon, Stanley, Yuen Long, San Wai, North District, Tai Po, North Lantau, Mui Wo	1.00
Chai Wan, Kwai Chung, Tsing Yi, East Kowloon, Tuen Mun	1.10
Sha Tin	1.15
Tseung Kwan O	1.20
Shau Kei Wan	1.25
Aberdeen, Ap Lei Chau, Northwest Kowloon, Sai Kung	1.30
Cheung Chau, Shek O	1.50

- 5.3 It was assumed that the sewage flow discharged from the catchments of HATS, PPSTW, SHWSTW, NWNT outfall, SHTSTW and THEES was 105% of the total estimated flow that would be generated in the catchment for conservative assessment. For example, as shown in **Table A5-2-1**, 10% of the total sewage flow generated in the Chai Wan catchment would be lost to the storm. For the purpose of modelling, 95% of the total flow generated in the Chai Wan catchment was assumed for discharge to the SCISTW for treatment (i.e. 105% of the total flow was used). For regions outside the catchments of SCISTW, SHWSTW, PPSTW, NWNT outfall, SHTSTW and THEES, it was assumed that the total flow would remain 100%.
- 5.4 **Table A5-2-19** gives the effluent flow for SCISTW calculated for 2009, 2013 and 2020 using the methodology described above.

**Table A5-2-19 Estimated Effluent Flow for SCISTW**

Year	Flow Rate (m <sup>3</sup> /day) With $P_{CIF}$
2009	1576300
2013	1661100
2020	2341600

### Flow Estimation for Ultimate Scenario

- 5.5 It was proposed to use the design plant capacity to calculate the loading discharged from the major STW for ultimate year as shown below:
- PPSTW – 558,000 m<sup>3</sup>/day
  - SHWSTW – 168,937 m<sup>3</sup>/day
  - YLSTW – 70,000 m<sup>3</sup>/day
  - SWSTW – 246,000 m<sup>3</sup>/day
  - THEES – 470,000 m<sup>3</sup>/day
  - SCISTW – 2,800,000 m<sup>3</sup>/day
  - SHTSTW – 16,848 m<sup>3</sup>/day

<sup>1</sup> Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (Version 1.0), EPD, March 2005

## 6 POINT SOURCE POLLUTION LOADS

6.1 The pollution loads from typhoon shelters, marine culture zones adopted in the EEFS are summarized in **Table A5-2-20** and **Table A5-2-21**. These pollution loads were included in the water quality model under 2009, 2013, 2020 and ultimate scenarios for cumulative assessment. Loading from landfills and beaches that would not be connected to the STW is summarized in **Table A5-2-22** and **Table A5-2-23**.

**Table A5-2-20 Pollution Flows and Loads from Typhoon Shelter**

Typhoon shelters	Flow (m <sup>3</sup> /d)	BOD (g/d)	SS (g/d)	Org-N (g/d)	NH3-N (g/d)	E.coli (no./d)	Copper (g/d)	TP (g/d)	OrthoP (g/d)	Silicate (g/d)
Shau Kei Wan	149	41670	39686	3473	4961	4.27E+14	6	1320	785	1279
Sam Ka Tsuen	39	10803	10289	900	1286	1.11E+13	2	342	204	332
Kwun Tong	22	6055	5766	505	721	6.20E+12	1	192	114	186
Causeway Bay	179	50099	47714	4175	5964	5.13E+13	8	1586	944	1538
Yau Ma Tei	184	51643	49183	4304	6148	5.29E+13	8	1635	973	1586
Rambler Channel	36	10032	9554	836	1194	1.03E+13	2	318	189	308
Aberdeen	388	108746	103568	9062	12946	1.11E+14	17	3444	2050	3339
Tuen Mun	138	38643	36803	3220	4600	3.96E+13	6	1224	728	1186
Cheung Chau	166	46597	44378	3883	5547	4.77E+13	7	1476	878	1431
Shuen Wan (Yim Tin Tsai)	49	13712	13059	1143	1632	1.40E+13	2	434	258	421
Sai Kung	81	22794	21709	1899	2714	2.33E+13	4	722	430	700
Chai Wan	44	12347	11759	1029	1470	1.26E+13	2	391	233	379
To Kwa Wan	53	14840	14133	1237	1767	1.52E+13	2	470	280	456

**Table A5-2-21 Pollution Flows and Loads from Marine Culture Zone**

Marine Culture Zone	BOD (g/d)	SS (g/d)	Org-N (g/d)	NH3-N (g/d)	TP (g/d)	OrthoP (g/d)
Sha Tau Kok	42806	124916	10569	38075	2038	1595
Ap Chau	999	2915	247	888	48	37
Kat O	7705	22485	1902	6854	367	287
O Pui Tong	25113	73284	6200	22338	1196	936
Sai Lau Kong	1712	4997	423	1523	82	64
Wong Wan	5351	15615	1321	4759	255	199
Tap Mun	17217	50244	4251	15315	820	642
Kau Lau Wan	2663	7773	658	2369	127	99
Sham Wan	42948	125333	10604	38202	2045	1600
Lo Fu Wat	1284	3747	317	1142	61	48
Yung Shue Au	81330	237341	20081	72343	3872	3031
Leung Shuen Wan	4114	12006	1016	3659	196	153
Tiu Cham Wan	4043	11798	998	3596	192	151
Tai Tau Chau	14934	43582	3687	13284	711	557
Kai Lung Wan	6432	18769	1588	5721	306	240
Kau Sai	10987	32062	2713	9773	523	409
Ma Nam Wat	9536	27829	2355	8482	454	355
Po Toi O	9084	26510	2243	8080	432	339
Po Toi	33579	97990	8291	29868	1599	1251
Sok Kwu Wan	25969	75783	6412	23099	1236	968
Lo Tik Wan	11011	32131	2719	9794	524	410
Ma Wan	50939	148650	12577	45310	2425	1898
Yim Tin Tsai	35552	103750	8778	31624	1693	1325
Cheung Sha Wan	19025	55518	4697	16922	906	709
Yim Tin Tsai (East)	35499	103750	4406	31754	1197	1051
Tung Lung Chau	18996	55518	2358	16992	640	562



**Table A5-2-22 Pollution Flows and Loads from Landfills**

Landfill	Flow (m <sup>3</sup> /d)	BOD (kg/d)	SS (kg/d)	Org-N (kg/d)	NH <sub>3</sub> -N (kg/d)	<i>E-Coli</i> (no./d)	Cu (g/d)
Shuen Wan Landfill Leachate seepage into coastal waters	50	10	10	10	90	3.48E+05	1

**Table A5-2-23 Pollution Flows and Loads from Beaches**

Gazetted Beach	Flow (m <sup>3</sup> /d)	BOD (g/d)	SS (g/d)	Org-N (g/d)	NH <sub>3</sub> -N (g/d)	<i>E.coli.</i> (no./d)	TP (g/d)	OrthoP (g/d)
Cheung Sha Lower	1	245	204	135	307	3.24E+12	70	42
Cheung Sha Upper	0	95	79	52	118	1.25E+12	27	16
Pui O	1	152	126	83	190	2.00E+12	43	26
Tong Fuk	1	188	156	103	234	2.48E+12	53	32
Hap Mun Bay	13	3204	2670	1757	4004	4.23E+13	912	543
Kiu Tsui	1	353	294	194	441	4.66E+12	100	60
Tung Wan, Ma Wan	2	485	404	266	607	6.40E+12	138	82
Clear Water Bay 1 <sup>st</sup>	5	1340	1117	735	1675	1.77E+13	381	227
Clear Water Bay 2 <sup>nd</sup>	46	11385	9487	6246	14231	1.50E+14	3240	1928

## 7 CONTRIBUTIONS OF POLLUTION LOADS FROM MAJOR SOURCES

- 7.1 The contributions of pollution loads from major sources for selected parameters are provided in **Table A5-2-24**, **Table A5-2-25**, **Table A5-2-26** and **Table A5-2-27** for 2009, 2013, 2020 and ultimate scenarios respectively. The loads contributed from treated sewage effluent for the non-HATS catchments would reduce in 2013 as compared to those in 2009 due to the assumption that the treatment level of PPSTW would be upgraded in 2013. After collection of the sewage from PTWs in the western and southern Hong Kong Island under HATS Stage 2A, the pollution loads contributed from the HATS treated effluent would significantly increase in 2020. However, the contribution from HATS would significantly reduce under the ultimate scenario as it was assumed that the treatment level of SCISTW would be upgraded under HATS Stage 2B. The tables also showed that the contributions from landfills, beaches, marine culture zones, livestock wastes and typhoon shelters were all very small.

**Table A5-2-24 Contributions from Major Pollution Sources for 2009**

Pollution Sources	BOD		SS		Org-N		NH <sub>3</sub> -N		E.coli	
	g/d	% contribution	g/d	% contribution	g/d	% contribution	g/d	% contribution	no./day	% contribution
Storm outfalls – dry weather load - rainfall related load not included – <b>HATS</b> catchments	40304785	8.37%	34555698	6.81%	2766746	5.19%	3696147	5.74%	3.09E+16	9.25%
Storm outfalls – dry weather load - rainfall related load not included – <b>non HATS</b> catchments	24506057	5.09%	21421356	4.22%	1773022	3.33%	2385558	3.70%	2.01E+16	6.01%
<b>HATS</b> outfall – Stage 1 (after treatment)	107188400	22.26%	66204600	13.04%	15652659	29.39%	27474909	42.66%	1.58E+17	47.22%
Other sewage outfalls (after treatment) - <b>Non HATS</b> sewage effluent	198257082	41.18%	181373773	35.73%	26513235	49.78%	24181419	37.54%	1.20E+17	35.86%
Rainfall related loading (for wet season) in <b>HATS</b> catchments	28360688	5.89%	54564046	10.75%	1513916	2.84%	252319	0.39%	0	0.00%
Rainfall related loading (for wet season) in <b>non HATS</b> catchments	75067062	15.59%	144423952	28.45%	4007139	7.52%	667856	1.04%	0	0.00%
Landfills	6746000	1.40%	1574000	0.31%	758000	1.42%	5062000	7.86%	4.26E+07	0.00%
Beaches	70587	0.01%	58821	0.01%	38725	0.07%	88229	0.14%	9.31E+14	0.28%
Marine culture zones	518828	0.11%	1514296	0.30%	121411	0.23%	461766	0.72%	0	0.00%
Livestock wastes	0	0.00%	1491000	0.29%	80000	0.15%	90000	0.14%	3.81E+15	1.14%
Typhoon shelters	427981	0.09%	407601	0.08%	35666	0.07%	50950	0.08%	8.22E+14	0.25%
<b>Total</b>	<b>481447471</b>	<b>100.00%</b>	<b>507589144</b>	<b>100.00%</b>	<b>53260519</b>	<b>100.00%</b>	<b>64411155</b>	<b>100.00%</b>	<b>3.34E+17</b>	<b>100.00%</b>

**Table A5-2-25 Contributions from Major Pollution Sources for 2013**

Pollution Sources	BOD		SS		Org-N		NH <sub>3</sub> -N		E.coli	
	g/d	% contribution	g/d	% contribution	g/d	% contribution	g/d	% contribution	no./day	% contribution
Storm outfalls – dry weather load - rainfall related load not included – <b>HATS</b>	41888350	8.98%	35906851	7.60%	2883907	5.62%	3857647	5.86%	3.22E+16	10.87%

Pollution Sources	BOD		SS		Org-N		NH <sub>3</sub> -N		E.coli	
	g/d	% contribution	g/d	% contribution	g/d	% contribution	g/d	% contribution	no./day	% contribution
catchments										
Storm outfalls – dry weather load - rainfall related load not included – <b>non HATS</b> catchments	24586906	5.27%	21460865	4.54%	1776178	3.46%	2388607	3.63%	2.01E+16	6.77%
<b>HATS</b> outfall – Stage 1 (after treatment)	112954800	24.22%	69766200	14.77%	16494723	32.13%	28952973	43.95%	1.66E+17	56.03%
Other sewage outfalls (after treatment) - <b>Non HATS</b> sewage effluent	175733277	37.68%	141180446	29.89%	23629288	46.03%	23998075	36.43%	7.25E+16	24.45%
Rainfall related loading (for wet season) in <b>HATS</b> catchments	28360688	6.08%	54564046	11.55%	1513916	2.95%	252319	0.38%	0	0.00%
Rainfall related loading (for wet season) in <b>non HATS</b> catchments	75067062	16.10%	144423952	30.58%	4007139	7.81%	667856	1.01%	0	0.00%
Landfills	6746000	1.45%	1574000	0.33%	758000	1.48%	5062000	7.68%	4.26E+07	0.00%
Beaches	70587	0.02%	58821	0.01%	38725	0.08%	88229	0.13%	9.31E+14	0.31%
Marine culture zones	518828	0.11%	1514296	0.32%	121411	0.24%	461766	0.70%	0.00E+00	0.00%
Livestock wastes	0	0.00%	1491000	0.32%	80000	0.16%	90000	0.14%	3.81E+15	1.29%
Typhoon shelters	427981	0.09%	407601	0.09%	35666	0.07%	50950	0.08%	8.22E+14	0.28%
<b>Total</b>	<b>466354480</b>	<b>100.00%</b>	<b>472348079</b>	<b>100.00%</b>	<b>51338953</b>	<b>100.00%</b>	<b>65870422</b>	<b>100.00%</b>	<b>2.96E+17</b>	<b>100.00%</b>

**Table A5-2-26 Contributions from Major Pollution Sources for 2020**

Pollution Sources	BOD		SS		Org-N		NH <sub>3</sub> -N		E.coli	
	g/d	% contribution	g/d	% contribution	g/d	% contribution	g/d	% contribution	no./day	% contribution
Storm outfalls – dry weather load - rainfall related load not included – <b>HATS</b> catchments	47353303	10.79%	40415034	9.28%	3145086	5.89%	4146103	5.75%	3.45E+16	11.58%
Storm outfalls – dry weather load -	27552496	6.28%	23715389	5.44%	1939831	3.63%	2547807	3.54%	2.13E+16	7.15%

Pollution Sources	BOD		SS		Org-N		NH <sub>3</sub> -N		E.coli	
	g/d	% contribution	g/d	% contribution	g/d	% contribution	g/d	% contribution	no./day	% contribution
rainfall related load not included – <b>non HATS</b> catchments										
<b>HATS</b> outfall – Stage 2A (after treatment)	159228800	36.30%	98347200	22.58%	23252088	43.51%	40814088	56.63%	2.34E+17	78.51%
Other sewage outfalls (after treatment) - <b>Non HATS</b> sewage effluent	93369656	21.28%	69036457	15.85%	18548691	34.71%	17885197	24.82%	2.68E+15	0.90%
Rainfall related loading (for wet season) in <b>HATS</b> catchments	28360688	6.46%	54564046	12.53%	1513916	2.83%	252319	0.35%	0.00E+00	0.00%
Rainfall related loading (for wet season) in <b>non HATS</b> catchments	75067062	17.11%	144423952	33.16%	4007139	7.50%	667856	0.93%	0.00E+00	0.00%
Landfills	6746000	1.54%	1574000	0.36%	758000	1.42%	5062000	7.02%	4.26E+07	0.00%
Beaches	70587	0.02%	58821	0.01%	38725	0.07%	88229	0.12%	9.31E+14	0.31%
Marine culture zones	518828	0.12%	1514296	0.35%	121411	0.23%	461766	0.64%	0.00E+00	0.00%
Livestock wastes	0	0.00%	1491000	0.34%	80000	0.15%	90000	0.12%	3.81E+15	1.28%
Typhoon shelters	427981	0.10%	407601	0.09%	35666	0.07%	50950	0.07%	8.22E+14	0.28%
<b>Total</b>	<b>438695402</b>	<b>100.00%</b>	<b>435547796</b>	<b>100.00%</b>	<b>53440552</b>	<b>100.00%</b>	<b>72066315</b>	<b>100.00%</b>	<b>2.98E+17</b>	<b>100.00%</b>

**Table A5-2-27 Contributions from Major Pollution Sources for Ultimate Scenario**

Pollution Sources	BOD		SS		Org-N		NH <sub>3</sub> -N		E.coli	
	g/d	% contribution	g/d	% contribution	g/d	% contribution	g/d	% contribution	no./day	% contribution
Storm outfalls – dry weather load - rainfall related load not included – <b>HATS</b> catchments	54573743	12.26%	46377408	10.32%	3569775	7.29%	4673577	9.12%	3.89E+16	48.86%
Storm outfalls – dry weather load - rainfall related load not included – <b>non HATS</b> catchments	29317389	6.59%	25227973	5.61%	2062550	4.21%	2706001	5.28%	2.26E+16	28.47%
<b>HATS</b> outfall – Stage 2B (after treatment)	67200000	15.09%	44800000	9.97%	7000000	14.30%	5600000	10.92%	8.28E+15	10.41%

Pollution Sources	BOD		SS		Org-N		NH <sub>3</sub> -N		E.coli	
	g/d	% contribution	g/d	% contribution	g/d	% contribution	g/d	% contribution	no./day	% contribution
Other sewage outfalls (after treatment) - <b>Non HATS</b> sewage effluent	182903664	41.08%	128931535	28.69%	29779379	60.82%	31606789	61.66%	4.20E+15	5.28%
Rainfall related loading (for wet season) in <b>HATS</b> catchments	28360688	6.37%	54564046	12.14%	1513916	3.09%	252319	0.49%	0.00E+00	0.00%
Rainfall related loading (for wet season) in <b>non HATS</b> catchments	75067062	16.86%	144423952	32.14%	4007139	8.18%	667856	1.30%	0.00E+00	0.00%
Landfills	6746000	1.52%	1574000	0.35%	758000	1.55%	5062000	9.88%	4.26E+07	0.00%
Beaches	70587	0.02%	58821	0.01%	38725	0.08%	88229	0.17%	9.31E+14	1.17%
Marine culture zones	518828	0.12%	1514296	0.34%	121411	0.25%	461766	0.90%	0.00E+00	0.00%
Livestock wastes	0	0.00%	1491000	0.33%	80000	0.16%	90000	0.18%	3.81E+15	4.79%
Typhoon shelters	427981	0.10%	407601	0.09%	35666	0.07%	50950	0.10%	8.22E+14	1.03%
<b>Total</b>	<b>445185943</b>	<b>100.00%</b>	<b>449370633</b>	<b>100.00%</b>	<b>48966560</b>	<b>100.00%</b>	<b>51259488</b>	<b>100.00%</b>	3.89E+16	48.86%