Appendix 5

Sewerage Calculation

MOS 461 - SEWAGE DISPOSAL ASSESSMENT

A. G.F.A.

Location	Exisitng G.F.A.	Proposed G.F.A.	Net Reduction / Addition of G.F.A.
Hotel	**50,576.787**	**0**	**-50,576.787**
Commercial	**4,776.228**	**3,067**	**-1709.228**
Residential	**0**	**45,680**	**(45,680)**
Exhibition/ Convention Hall	**0**	**998**	**(998)**

Sewage Discharge Estimation

Existing Hotel Development	
GFA of Hotel (sq. m)	50,576.787
GFA of Commercial (sq.m)	4,776.228
No. of Employee for Hotel / 100 sq. m of GFA [1]	1.40
No. of Employee for Commercial / 100 sq. m of GFA [1]	5.10
Total of Employees (Hotel + Commercial)	952
Unit Flow Factor (cu.m / day) [3]	1.58
Total Foul Water Flow (cu.m /day)	**1,504.16**
Proposed Residential Development	
No. of residential flat	772
Total no. of head	2162
Unit Flow Factor (cu. m/day) [2, 4]	0.19
Foul Water Flow (cu.m/day) for Residential	**410.78**
GFA of Commercial (sq.m)	3,067
No. of Employee for Commercial/100 sq.m of GFA[1]	5.10
Total of Employees	157
Unit Flow Factor (cu. m/day)[3]	1.58
Foul Water Flow (cu.m/day) for Employee	**248.06**
GFA of Exhibition/ Convention Hall (sq. m)	998
No. of Employee for Commercial/100 sq.m of GFA[1]	2.30
Total of Employees	23
Unit Flow Factor (cu. m/day)[3]	0.28
Foul Water Flow (cu.m/day) for Employee	**6.44**
Total Foul Water Flow (cu.m/day)	**665.28**

[1.] **Fig 16 of CIFSUS; PlanD**

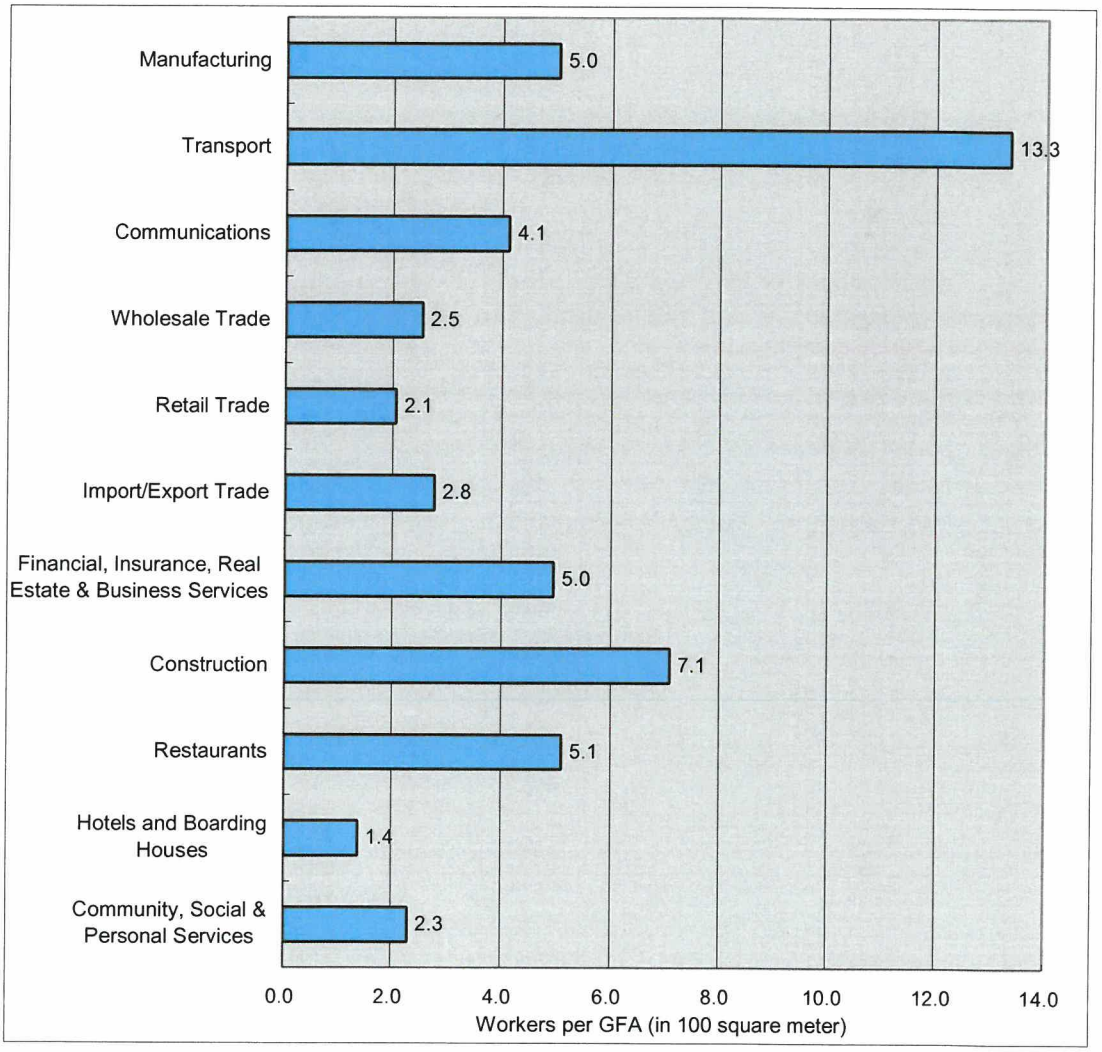
[2 & 3] **Table T-1 & T-2; EPD/TP 1/05, DSD**

[4] **R1 zoning**

Private Commercials (excluding shops)

In Private Commercials (excluding shops), the highest worker density was found amongst Transport establishments (13.3), which was more than six times of the worker density for Retail Industries (2.1) and more than nine times higher than Hotels and Boarding Houses (1.4). (Figure 16)

Figure16: Worker Density in Private Commercials (excluding shops) by Industry Group



8. UNIT FLOW FACTORS – COMMERCIAL AND INSTITUTIONAL FLOWS

8.1 Commercial flows comprise flows due to commercial activities and due to employees. Flows from Job types J2 – J12 are classified as commercial flows. The unit flow factors of the 11 Job types are provided in **Table T-2** below. The derivation of the UFFs of employees and students were presented in **Appendix III.**

Table T-2 : Unit Flow Factors of Commercial Flows and Student Flows

	Unit (per)	Datum (2002) (m^3/day)	Increase per Annum (m^3/day)	Planning for Future (m^3/day)
Commercial Employee	employee	0.080	-	0.080
Commercial activities				
(a) Specific trades:				
J2 Electricity Gas & Water	employee	0.250	-	0.250
J3 Transport, Storage & Communication	employee	0.100	-	0.100
J4 Wholesale & Retail	employee	0.200	-	0.200
J5 Import & Export	employee	-	-	-
J6 Finance, Insurance, Real Estate & Business Services	employee	-	-	-
J7 Agriculture & Fishing	employee	-	-	-
J8 Mining & Quarrying	employee	-	-	-
J9 Construction	employee	0.150	-	0.150
J10 Restaurants & Hotels	employee	1.500	-	1.500
J11 Community, Social & Personal Services	employee	0.200	-	0.200
J12 Public Administration	employee	-	-	-
(b) General –territorial average	employee	0.200	-	0.200
School student	person	0.040	-	0.040

Notes of Table T-2:

(1) For planning of a new sewerage system, the planning unit flow factors should be used and the worst possible combination of commercial flows for the future development scenarios should be considered to ensure that the sewerage system under planning will be sustainable.

(2) For job types J10 and J11, the "per-employee" unit flow factor takes into account the flows of customers and/or tenants.

(3) The total unit flow generated from an employee in a particular trade is the sum of the unit flow factor of employee and the unit flow factor of commercial activities of a particular trade under consideration.