

## **Appendix 4-1 Hourly In/Out Traffic Volumes**

Estimation of In-bound Traffic at Proposed Yen Ming Road Depot

| Time Slot                       | Vehicle Type            |            |             |                           |                        |            | Total |
|---------------------------------|-------------------------|------------|-------------|---------------------------|------------------------|------------|-------|
|                                 | General Purpose Vehicle |            |             | Special Purpose Vehicle   |                        |            |       |
|                                 | Light Bus/Large Van     | Medium Van | Light Truck | Refuse Collection Vehicle | Street Washing Vehicle | Grab Lorry |       |
| 0600-0700                       | 3                       |            | 3           |                           | 2                      |            | 8     |
| 0700-0800                       |                         |            |             |                           |                        |            | 0     |
| 0800-0900                       |                         |            |             |                           |                        |            | 0     |
| 0900-1000                       |                         |            |             | 1                         | 1                      |            | 2     |
| 1000-1100                       |                         | 3          |             |                           | 1                      |            | 4     |
| 1100-1200                       | 11                      | 3          | 3           |                           |                        |            | 17    |
| 1200-1300                       | 7                       | 3          | 3           |                           |                        |            | 13    |
| 1300-1400                       |                         |            |             |                           |                        |            | 0     |
| 1400-1500                       |                         | 6          |             | 21                        |                        |            | 27    |
| 1500-1600                       | 11                      | 3          |             |                           | 4                      |            | 18    |
| 1600-1700                       |                         |            |             |                           | 1                      |            | 1     |
| 1700-1800                       | 7                       |            |             | 1                         | 1                      |            | 9     |
| 1800-1900                       |                         | 2          | 3           |                           |                        |            | 5     |
| 1900-2000                       |                         |            | 3           |                           | 1                      |            | 4     |
| 2000-2100                       |                         |            |             |                           |                        |            | 0     |
| 2100-2200                       |                         |            |             |                           |                        |            | 0     |
| 2200-2300                       | 7                       | 9          | 6           |                           | 3                      |            | 25    |
| 2300-2400                       |                         |            |             | 7                         |                        |            | 7     |
| 2400-0100                       |                         |            |             |                           | 2                      |            | 2     |
| 0100-0200                       |                         | 2          | 1           |                           |                        |            | 3     |
| 0200-0300                       | 3                       |            | 3           |                           | 2                      |            | 8     |
| 0300-0400                       |                         |            |             |                           |                        |            | 0     |
| 0400-0500                       |                         | 2          | 1           |                           |                        |            | 3     |
| 0500-0600                       |                         |            |             |                           |                        |            |       |
| Frequency of In-bound vehicles: |                         |            |             |                           |                        |            | 156   |

Estimation of Out-bound Traffic at Proposed Yen Ming Road Depot

| Time Slot                        | Vehicle Type            |            |             |                           |                        |            | Total |
|----------------------------------|-------------------------|------------|-------------|---------------------------|------------------------|------------|-------|
|                                  | General Purpose Vehicle |            |             | Special Purpose Vehicle   |                        |            |       |
|                                  | Light Bus/Large Van     | Medium Van | Light Truck | Refuse Collection Vehicle | Street Washing Vehicle | Grab Lorry |       |
| 0600-0700                        |                         |            |             | 21                        | 1                      |            | 22    |
| 0700-0800                        | 18                      | 9          | 6           |                           | 4                      |            | 37    |
| 0800-0900                        | 7                       |            |             |                           | 1                      |            | 8     |
| 0900-1000                        |                         |            |             |                           |                        |            | 0     |
| 1000-1100                        |                         |            |             | 1                         |                        |            | 1     |
| 1100-1200                        | 11                      | 3          |             |                           | 1                      |            | 15    |
| 1200-1300                        | 7                       | 3          | 3           |                           | 1                      |            | 14    |
| 1300-1400                        |                         | 3          | 3           |                           | 3                      |            | 9     |
| 1400-1500                        |                         | 3          |             |                           |                        |            | 3     |
| 1500-1600                        |                         | 6          |             | 7                         | 3                      |            | 16    |
| 1600-1700                        |                         |            |             |                           |                        |            | 0     |
| 1700-1800                        |                         |            |             |                           | 1                      |            | 1     |
| 1800-1900                        | 7                       |            |             |                           |                        |            | 7     |
| 1900-2000                        |                         | 2          | 3           | 1                         |                        |            | 6     |
| 2000-2100                        |                         |            | 3           |                           | 1                      |            | 4     |
| 2100-2200                        |                         |            |             |                           |                        |            | 0     |
| 2200-2300                        |                         |            |             |                           |                        |            | 0     |
| 2300-2400                        | 3                       | 2          | 3           |                           | 2                      |            | 10    |
| 2400-0100                        |                         |            | 1           |                           |                        |            | 1     |
| 0100-0200                        |                         |            |             |                           | 2                      |            | 2     |
| 0200-0300                        |                         | 2          | 1           |                           |                        |            | 3     |
| 0300-0400                        | 3                       |            | 3           |                           | 2                      |            | 8     |
| 0400-0500                        |                         |            |             |                           |                        |            |       |
| 0500-0600                        |                         |            |             |                           |                        |            |       |
| Frequency of Out-bound vehicles: |                         |            |             |                           |                        |            | 167   |

## **Appendix 4-2 Correspondence with Transport Department**

## Wong, Thomas

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**From:** John Hok Man CHAN/TD/HKSARG <johnhmchan@td.gov.hk>  
**Sent:** 20 June 2013 16:48  
**To:** Lai, Ivan  
**Cc:** 4710 <4710@p-t-group.com> (4710@p-t-group.com); carolshum@fehd.gov.hk; HK - USW-ENV Sai Yee Street vehicle depot; HK - USW-Geot Sai Yee Street vehicle depot; HK - USW-Traffic Sai Yee Street vehicle depot; Lorraine LO 4710 (FEHD) - (lfylo@fehd.gov.hk); T.Y. LUK (PM) 4710 (ASD) - (lukty@archsd.gov.hk); S.H. SAT (SPM) 4710 (ASD) - (satshs@archsd.gov.hk); waitakchan@td.gov.hk  
**Subject:** RE: 9AX 034 - TIA and traffic forecast for EIA in Technical Note 05 (re-send)  
**Attachments:** 2013-123 Consultation DC Paper\_FINAL\_chi.pdf; 2013-123 Plan 1-p4\_low.pdf

Dear Ivan,

First of all, may I clarify that I did not instruct you to use 70sq.m as the average flat size for the private residential units in the Cheung Sha Wan Wholesale Food Market (CSWWFM) Phase 2 site. I however accept this is a reasonable assumption when there is limited information available at this stage.

Overall, the analysis of increase in traffic flows due to the CSWWFM Phase 2 development is considered in order. I have no objection to your conclusion that flows on Sham Mong Road and Lin Cheung Road are not anticipated to increase significantly. Following this, I consider the TIA is still valid and have no objection to adopting the traffic data established based on the forecasting methodology in Technical Note 05 for the purpose of the EIA.

Regards,  
John H M CHAN  
EK/PW2, TE/K, TD

"Lai, Ivan" <ivan.lai@urs.com>

20/06/2013 15:53

To "johnhmchan@td.gov.hk" <johnhmchan@td.gov.hk>  
cc "waitakchan@td.gov.hk" <waitakchan@td.gov.hk>  
"carolshum@fehd.gov.hk" <carolshum@fehd.gov.hk>  
"Lorraine LO 4710 (FEHD) - (lfylo@fehd.gov.hk)" <lfylo@fehd.gov.hk>  
"S.H. SAT (SPM) 4710 (ASD) - (satshs@archsd.gov.hk)" <satshs@archsd.gov.hk>  
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HK - USW-Traffic Sai Yee Street vehicle depot <hk.usw-traffic.sysdepot@urs.com>

Subject RE: 9AX 034 - TIA and traffic forecast for EIA in Technical Note 05 (re-send)

Dear John,

I refer to your comments vide your e-mail dated 19 June 2013. Traffic analysis has been updated and incorporated in the message below for your agreement.

At the meeting held with EPD to discuss the draft EIA Final report on Monday 10 June 2013, EPD advised that if the traffic generated by the housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site is insignificant, FEHD should seek TD's agreement on whether the TIA completed is still valid. If the TIA is still valid, there is no need to re-assess the noise and air impact chapters of the draft EIA Final Report due to the proposed housing development.

According to paragraph 4.3 of SSPDC Paper No. 123/13 which was discussed at the DC meeting held on 18 June 2013, the residential development at this site would involve the provision 900 units under the Home Ownership Scheme and 2,700 units of public rental housing. The planned population is 11,500. A copy of the paper is enclosed below for your reference. The supplementary information regarding the TIA is set out in the ensuing paragraphs for TD's urgent consideration.

Based on trip rates from TPDM, volume of traffic from/to Cheung Sha Wan Wholesale Food Market Phase 2 HOS and PRH residential site would be:

- Morning peak: Outbound: 147 pcu/hour, Inbound: 113 pcu/hour
- Evening peak: Outbound: 83 pcu/hour, Inbound: 104 pcu/hour

| Home Ownership Scheme (HOS): 900 units             |                             |                             |                             |                             |              |                 |                |                 |                |
|--|-----------------------------|-----------------------------|-----------------------------|-----------------------------|--------------|-----------------|----------------|-----------------|----------------|
| Average Flat Size (sq.m)                           | AM Generation Rate (pcu/hr) | AM Attraction Rate (pcu/hr) | PM Generation Rate (pcu/hr) | PM Attraction Rate (pcu/hr) | No. of Flats | AM Out (pcu/hr) | AM In (pcu/hr) | PM Out (pcu/hr) | PM In (pcu/hr) |
| 50   | 0.0622                      | 0.0426                      | 0.0297                      | 0.0401                      | 900          | 56              | 38             | 27              | 36             |
| Public Rental Housing (PRH): 2,700 units           |                             |                             |                             |                             |              |                 |                |                 |                |
| Average Flat Size (sq.m)                           | AM Generation Rate          | AM Attraction Rate          | PM Generation Rate          | PM Attraction Rate          | No. of Flats | AM Out          | AM In          | PM Out          | PM In          |
| 30   | 0.0242                      | 0.0226                      | 0.0177                      | 0.0201                      | 1350         | 33              | 31             | 24              | 27             |
| 40   | 0.0432                      | 0.0326                      | 0.0237                      | 0.0301                      | 1350         | 58              | 44             | 32              | 41             |
| Total (HOS: 900 units + PRH: 2,700 units) pcu/hour |                             |                             |                             |                             |              | 147             | 113            | 83              | 104            |

According to paragraph 4.2 of SSPDC Paper No. 123/13, private residential and hotel developments would be situated at the south part of Cheung Sha Wan Wholesale Food Market Phase 2 site. As the private residential flat numbers and hotel room numbers were not explicitly mentioned in the SSPDC paper, the site area and plot ratio information contained in the paper are adopted as the basis for estimation of traffic generation. Per telephone discussion between Ivan Lai of URS and John Chan of Transport Department, we are advised to project the number of flats using the GFA based on average flat size of 70m square. PlanD has indicated verbally agreement for adopting the above approach for projection. The number of trips would be:

- Morning peak: Outbound: 132 pcu/hour, Inbound: 77 pcu/hour
- Evening peak: Outbound: 53 pcu/hour, Inbound: 71 pcu/hour

|  | Site Area (ha) | Site Area (m square) | Plot Ratio  | GFA (m square) | Average Flat size (m square) | Number of flats |
|--|----------------|----------------------|-------------|----------------|------------------------------|-----------------|
| Private residential                      | 1.9            | 19,000               | 4           | 76,000         | 70                           | 1,486           |
| Private residential / hotel developments | 0.5            | 5,000                | 5.6         | 28,000         |                              |                 |
| <b>Total</b>                             |                | <b>24,000</b>        | <b>----</b> | <b>104,000</b> |                              |                 |

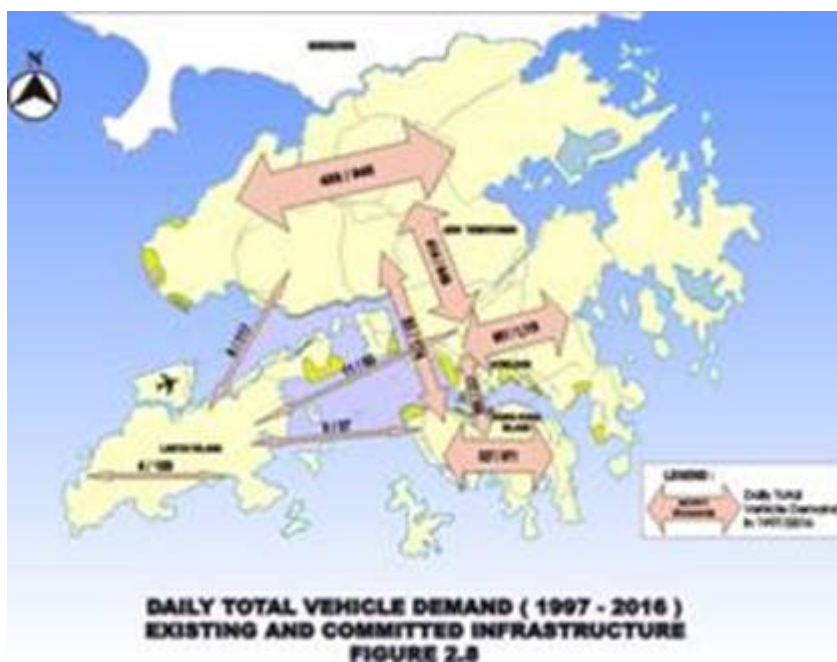
**Private Housing: High-Density / R(A): 1,486 units**

| Average Flat Size (sq.m) | AM Generation Rate (pcu/hr) | AM Attraction Rate | PM Generation Rate | PM Attraction Rate | No. of Flats | AM Out | AM In | PM Out | PM In |
|--------------------------|-----------------------------|--------------------|--------------------|--------------------|--------------|--------|-------|--------|-------|
|--------------------------|-----------------------------|--------------------|--------------------|--------------------|--------------|--------|-------|--------|-------|

|  |        |          |          |          |       |          |          |          |          |
|--|--------|----------|----------|----------|-------|----------|----------|----------|----------|
|  |        | (pcu/hr) | (pcu/hr) | (pcu/hr) |       | (pcu/hr) | (pcu/hr) | (pcu/hr) | (pcu/hr) |
| 70   | 0.0888 | 0.0515   | 0.0356   | 0.048    | 1,486 | 132      | 77       | 53       | 71       |
| Total (Private Housing: High-Density / R(A): 1,486 units) pcu/hour |        |          |          |          |       | 132      | 77       | 53       | 71       |

Trip distributions for proposed adjacent developments are assumed, firstly, based on trip distributions between major geographic areas in the Third Comprehensive Transport Study: Final Report. This is followed by assigning locally the development flows to local road network taking into account traffic conditions on each possible route.

According to Third Comprehensive Transport Study: Final Report, daily total vehicle demand (1997 – 2016) [Figure 2.8 of Third Comprehensive Transport Study: Final Report] travelling within Kowloon (West Kowloon and East Kowloon) is higher than from Kowloon to other destinations namely the New Territories, Hong Kong Island and Lantau Island.



The entire trip distributions are as follow:

- 55% from/to Kowloon
- 10% from/to the Hong Kong Island; and
- 35% from/to New Territories

| Home Ownership Scheme (HOS): 900 units and Public Rental Housing (PRH): 2,700 units | AM Outbound (pcu/hr) | AM Inbound (pcu/hr) | PM Outbound (pcu/hr) | PM Inbound (pcu/hr) |
|---|----------------------|---------------------|----------------------|---------------------|
| Traffic from/to Kowloon (55%)   | 81                   | 62                  | 46                   | 57                  |
| Traffic from/to Hong Kong Island (10%)  | 15                   | 11                  | 8                    | 10                  |
| Traffic from/to New Territories (35%)   | 51                   | 40                  | 29                   | 36                  |
| Total (HOS: 900 units + PRH: 2,700 units) pcu/hour                                  | 147                  | 113                 | 83                   | 104                 |

| Private Housing: High-Density / R(A): 1,486 units | AM Outbound (pcu/hr) | AM Inbound (pcu/hr) | PM Outbound (pcu/hr) | PM Inbound (pcu/hr) |
|---|----------------------|---------------------|----------------------|---------------------|
| Traffic from/to Kowloon (55%)                     | 73                   | 42                  | 29                   | 39                  |
| Traffic from/to Hong Kong Island (10%)            | 13                   | 8                   | 5                    | 7                   |
| Traffic from/to New Territories (35%)             | 46                   | 27                  | 19                   | 25                  |

|  |     |    |    |    |
|--|-----|----|----|----|
| Total (Private Housing: High-Density / R(A): 1,486 units) pcu/hour | 132 | 77 | 53 | 71 |
|--|-----|----|----|----|

According to para. 4.8 of SSPDC Discussion Paper No. 123/13, given the traffic in Lin Cheung Road is heavy and construction of a new vehicular access from Lin Cheung Road leading to Cheung Sha Wan Wholesale Food Market Phase 2 is not suitable, the new housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site will involve construction of a two-way road linking Hing Wah Street West to other roads, which is located far away from the reprovisioned depot site at Yen Ming Road.

Lai Chi Kok Road is a Primary Distributor near Hing Wah Street West. This road connects Mei Foo to the west and Mong Kok to the east. Traffic from the proposed housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site is expected to use local roads associated with Lai Chi Kok Road. As these roads are far away from FEHD vehicle routings which make use of Tonkin Street West (without overlapping the vehicular routings of the proposed housing project), traffic from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site is anticipated insignificant to the TIA.

Both Sham Mong Road and Lin Cheung Road are study routes in traffic forecast for EIA included in Technical Note 05. Based on road network pattern, it is anticipated that 20% of total traffic from/to Kowloon (generated by the housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site) will use Sham Mong Road and all the Hong Kong Island traffic (traffic generated by the housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site) will use Lin Cheung Road respectively.

| Home Ownership Scheme (HOS): 900 units and Public Rental Housing (PRH): 2,700 units | AM Outbound (pcu/hr) | AM Inbound (pcu/hr) | PM Outbound (pcu/hr) | PM Inbound (pcu/hr) |
|---|----------------------|---------------------|----------------------|---------------------|
| Total traffic from/to Kowloon   | 81                   | 62                  | 46                   | 57                  |
| • <b>assume 12% via Sham Mong Road</b>  | 10                   | 7                   | 5                    | 7                   |
| • <b>assume 8% via Lin Cheung Road</b>  | 6                    | 5                   | 4                    | 5                   |
| • assume 80% via other roads  | 65                   | 50                  | 37                   | 46                  |

| Home Ownership Scheme (HOS): 900 units and Public Rental Housing (PRH): 2,700 units | AM Outbound (pcu/hr) | AM Inbound (pcu/hr) | PM Outbound (pcu/hr) | PM Inbound (pcu/hr) |
|---|----------------------|---------------------|----------------------|---------------------|
| Total traffic from/to Hong Kong Island  | 15                   | 11                  | 8                    | 10                  |
| • <b>assume 100% via Lin Cheung Road</b>  | 15                   | 11                  | 8                    | 10                  |

| Private Housing: High-Density / R(A): 1,486 units | AM Outbound (pcu/hr) | AM Inbound (pcu/hr) | PM Outbound (pcu/hr) | PM Inbound (pcu/hr) |
|---|----------------------|---------------------|----------------------|---------------------|
| Total traffic from/to Kowloon                     | 73                   | 42                  | 29                   | 39                  |
| • <b>assume 12% via Sham Mong Road</b>            | 9                    | 5                   | 3                    | 5                   |
| • <b>assume 8% via Lin Cheung Road</b>            | 6                    | 3                   | 2                    | 3                   |
| • assume 80% via other roads                      | 58                   | 34                  | 23                   | 31                  |

| Private Housing: High-Density / R(A): 1,486 units | AM Outbound (pcu/hr) | AM Inbound (pcu/hr) | PM Outbound (pcu/hr) | PM Inbound (pcu/hr) |
|---|----------------------|---------------------|----------------------|---------------------|
| Total traffic from/to Hong Kong Island            | 13                   | 8                   | 5                    | 7                   |
| • <b>assume 100% via Lin Cheung Road</b>          | 13                   | 8                   | 5                    | 7                   |

Based on above traffic assumption, Sham Mong Road (two-way) will have additional flows 31 pcu/hour (i.e.10+7+9+5) in the AM peak and 20 pcu/hour (i.e.5+7+3+5) in the PM peak, which are generated by the housing developments at Cheung Sha Wan Wholesale Food Market Phase 2 site.

Lin Cheung Road southbound and northbound carriageways are separated by MTRC rail tracks. Lin Cheung Road southbound carriageway would be used by outbound traffic from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site to the Hong Kong Island, it is anticipated to have additional flows 40 pcu/hour (i.e.6+15+6+13) in AM peak and 19 pcu/hour (i.e.4+8+2+5) in PM peak respectively. Lin Cheung Road northbound carriageway would be used by inbound traffic from the Hong Kong Island to housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site, it is anticipated to have additional flows 27 pcu/hour (i.e.5+11+3+8) in AM peak and 25 pcu/hour (i.e.5+10+3+7) in PM peak respectively.

The following table presents average traffic forecast on Sham Mong Road and Lin Cheung Road (2017 without FEHD development scenario) in Technical Note 05 and the revised traffic forecast with additional traffic derived from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site. As conservative analysis, volume of flows (pcu/hour) derived from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site are assumed equal the volume of vehicle flows (vehicles/hour).

| Traffic Forecast in Technical Note 05 (2017 without FEHD development scenario) |                                 |                                 |
|--|---------------------------------|---------------------------------|
| Road Links   | AM peak average (vehicles/hour) | PM peak average (vehicles/hour) |
| Sham Mong Road (2-way flow)  | 860                             | 700                             |
| Lin Cheung Road southbound*  | 2,680                           | 1,530                           |
| Lin Cheung Road northbound*  | 2,300                           | 2,560                           |

| Additional traffic derived from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site [Home Ownership Scheme (HOS): 900 units and Public Rental Housing (PRH): 2,700 units]<br>From/to Kowloon |                                 |                                 |
|---|---------------------------------|---------------------------------|
| Road Links  | AM peak average (vehicles/hour) | PM peak average (vehicles/hour) |
| Sham Mong Road (2-way flow)   | 17                              | 12                              |
| Lin Cheung Road southbound*   | 6                               | 4                               |
| Lin Cheung Road northbound*   | 5                               | 5                               |

| Additional traffic derived from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site [Private Housing: High-Density / R(A): 1,486 units]<br>From/to Kowloon |                                 |                                 |
|---|---------------------------------|---------------------------------|
| Road Links  | AM peak average (vehicles/hour) | PM peak average (vehicles/hour) |
| Sham Mong Road (2-way flow)   | 14                              | 8                               |
| Lin Cheung Road southbound*   | 6                               | 2                               |
| Lin Cheung Road northbound*   | 3                               | 3                               |

| Additional traffic derived from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site [Home Ownership Scheme (HOS): 900 units and Public Rental Housing (PRH): 2,700 units]<br>From/to Hong Kong Island |                                 |                                 |
|--|---------------------------------|---------------------------------|
| Road Links   | AM peak average (vehicles/hour) | PM peak average (vehicles/hour) |
|  |                                 |                                 |



|  |                                    |                                    |
|--|------------------------------------|------------------------------------|
| Sham Mong Road (2-way flow)  | 0                                  | 0                                  |
| Lin Cheung Road southbound*  | 15                                 | 8                                  |
| Lin Cheung Road northbound*  | 11                                 | 10                                 |
| Additional traffic derived from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site [Home Ownership Scheme (HOS): 900 units and Public Rental Housing (PRH): 2,700 units]<br>From/to Hong Kong Island |                                    |                                    |
| Road Links   | AM peak average<br>(vehicles/hour) | PM peak average<br>(vehicles/hour) |
| Sham Mong Road (2-way flow)  | 0                                  | 0                                  |
| Lin Cheung Road southbound*  | 13                                 | 5                                  |
| Lin Cheung Road northbound*  | 8                                  | 7                                  |

|   |                                    |                                    |
|---|------------------------------------|------------------------------------|
| Revised Traffic Forecast (2017 without FEHD development scenario) and with additional traffic derived from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site |                                    |                                    |
| Road Links  | AM peak average<br>(vehicles/hour) | PM peak average<br>(vehicles/hour) |
| Sham Mong Road (2-way flow)   | 891                                | 721                                |
| Lin Cheung Road southbound*   | 2720                               | 1550                               |
| Lin Cheung Road northbound*   | 2327                               | 2585                               |
| Percentage of change with additional traffic derived from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site  |                                    |                                    |
| Road Links  | AM peak average<br>(vehicles/hour) | PM peak average<br>(vehicles/hour) |
| Sham Mong Road (2-way flow)   | 3.6%                               | 2.9%                               |
| Lin Cheung Road southbound*   | 1.5%                               | 1.3%                               |
| Lin Cheung Road northbound*   | 1.2%                               | 1.0%                               |

\*Lin Cheung Road southbound and northbound carriageways are separated by MTRC rail tracks

With additional traffic derived from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site, volume of flows will increase approximate 3% Sham Mong Road and approximate 1% on Lin Cheung Road. Percentage of changes on Sham Mong Road is higher than Lin Cheung Road because traffic flows on Sham Mong Road (approximate 900 vehicles per hour) are relatively lower than Lin Cheung Road (in excess of 2,000 vehicles per hour). However actual flows on Sham Mong Road and Lin Cheung Road are not expected to increase significantly.

Having regard to the above analysis, we would like to have TD's confirmation that the TIA submitted and the traffic forecast for EIA in Technical Note 05 are still valid with the proposed housing development at this new site. FEHD will formally submit the EIA Report to EPD on **24 June 2013 (next Monday)**. TD's urgent confirmation and reply by **close of play today (20 June 2013)** would be much appreciated in order that there will be no further delay, rendering the project infeasible due to the need to meet new Air Quality Objectives which will come into operation in 2014.

Regards,

Ivan Lai

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With effect from 15 April 2013, Scott Wilson Ltd has rebranded as URS Hong Kong Ltd. Please update your address book with my new email

address as shown above.

URS – Local Expertise, Global Resources

**From:** Lai, Ivan

**Sent:** Wednesday, June 19, 2013 10:56 AM

**To:** johnhmchan@td.gov.hk

**Cc:** waitakchan@td.gov.hk; carolshum@fehd.gov.hk; Lorraine LO 4710 (FEHD) - (lfylo@fehd.gov.hk); S.H. SAT (SPM 4710 (ASD) - (satshs@archsd.gov.hk); T.Y. LUK (PM) 4710 (ASD) - (lukty@archsd.gov.hk); 4710 <4710@p-t-group.com> (4710@p-t-group.com); HK - USW-Geot Sai Yee Street vehicle depot; HK - USW-ENV Sai Yee Street vehicle depot; HK - USW-Traffic Sai Yee Street vehicle depot

**Subject:** 9AX 034 - TIA and traffic forecast for EIA in Technical Note 05 (re-send)

*(Re-send due to typo error in previous e-mail [subject: 9AX 034 - TIA and traffic forecast for EIA in Technical Note 05] sent at 10:28am on 19 June 2013)*

Dear John,

At the meeting held with EPD to discuss the draft EIA Final report on Monday 10 June 2013, EPD advised that if the traffic generated by the housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site is insignificant, FEHD should seek TD's agreement on whether the TIA completed is still valid. If the TIA is still valid, there is no need to re-assess the noise and air impact chapters of the draft EIA Final Report due to the proposed housing development.

According to paragraph 4.3 of SSPDC Paper No. 123/13 which will be discussed at the coming DC meeting held on 18 June 2013, the residential development at this site would involve the provision 900 units under the Home Ownership Scheme and 2,700 units of public rental housing. The planned population is 11,500. A copy of the paper is enclosed below for your reference. The supplementary information regarding the TIA is set out in the ensuring paragraphs for TD's urgent consideration.

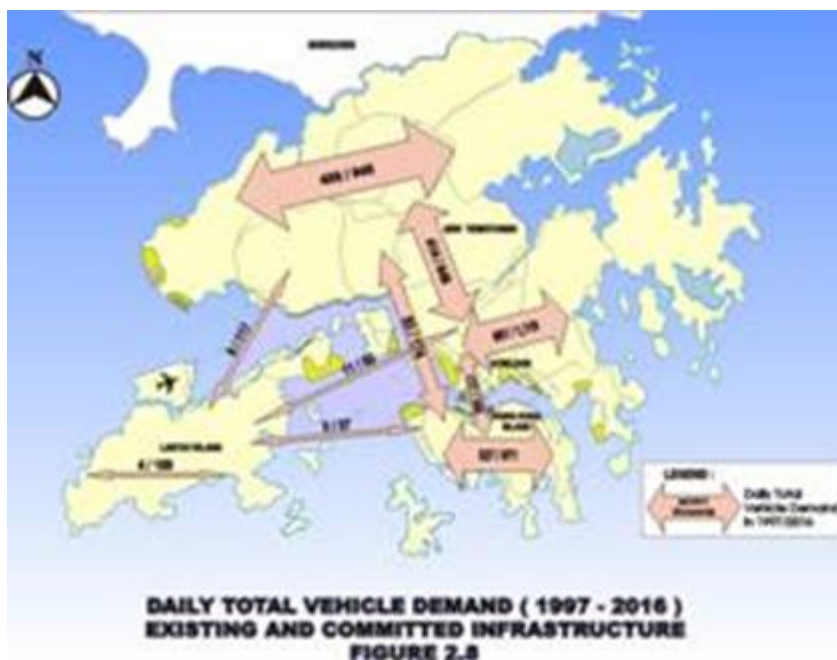
Based on trip rates from TPDM, volume of traffic from/to Cheung Sha Wan Wholesale Food Market Phase 2 residential site would be:

- Morning peak: Outbound: 147 pcu/hour, Inbound: 113 pcu/hour
- Evening peak: Outbound: 83 pcu/hour, Inbound: 104 pcu/hour

| Home Ownership Scheme (HOS): 900 units             |                             |                             |                             |                             |              |                 |                |                 |                |
|--|-----------------------------|-----------------------------|-----------------------------|-----------------------------|--------------|-----------------|----------------|-----------------|----------------|
| Average Flat Size (sq.m)                           | AM Generation Rate (pcu/hr) | AM Attraction Rate (pcu/hr) | PM Generation Rate (pcu/hr) | PM Attraction Rate (pcu/hr) | No. of Flats | AM Out (pcu/hr) | AM In (pcu/hr) | PM Out (pcu/hr) | PM In (pcu/hr) |
| 50   | 0.0622                      | 0.0426                      | 0.0297                      | 0.0401                      | 900          | 56              | 38             | 27              | 36             |
| Public Rental Housing (PRH): 2,700 units           |                             |                             |                             |                             |              |                 |                |                 |                |
| Average Flat Size (sq.m)                           | AM Generation Rate          | AM Attraction Rate          | PM Generation Rate          | PM Attraction Rate          | No. of Flats | AM Out          | AM In          | PM Out          | PM In          |
| 30   | 0.0242                      | 0.0226                      | 0.0177                      | 0.0201                      | 1350         | 33              | 31             | 24              | 27             |
| 40   | 0.0432                      | 0.0326                      | 0.0237                      | 0.0301                      | 1350         | 58              | 44             | 32              | 41             |
| Total (HOS: 900 units + PRH: 2,700 units) pcu/hour |                             |                             |                             |                             |              | 147             | 113            | 83              | 104            |

Trip distributions for proposed adjacent developments are assumed, firstly, based on trip distributions between major geographic areas in the Third Comprehensive Transport Study: Final Report. This is followed by assigning locally the development flows to local road network taking into account traffic conditions on each possible route.

According to Third Comprehensive Transport Study: Final Report, daily total vehicle demand (1997 – 2016) [Figure 2.8 of Third Comprehensive Transport Study: Final Report] travelling within Kowloon (West Kowloon and East Kowloon) is higher than from Kowloon to other destinations namely the New Territories, Hong Kong Island and Lantau Island.



The entire trip distributions are as follow:

- 55% from/to Kowloon
- 10% from/to the Hong Kong Island; and
- 35% from/to New Territories

|                                  | AM Outbound<br>(pcu/hr) | AM Inbound<br>(pcu/hr) | PM Outbound<br>(pcu/hr) | PM Inbound<br>(pcu/hr) |
|----------------------------------|-------------------------|------------------------|-------------------------|------------------------|
| Traffic from/to Kowloon          | 81                      | 62                     | 46                      | 57                     |
| Traffic from/to Hong Kong Island | 15                      | 11                     | 8                       | 10                     |
| Traffic from/to New Territories  | 51                      | 40                     | 29                      | 36                     |
| Total                            | 147                     | 113                    | 83                      | 104                    |

According to para. 4.8 of SSPDC Discussion Paper No. 123/13, given the traffic in Lin Cheung Road is heavy and construction of a new vehicular access from Lin Cheung Road leading to Cheung Sha Wan Wholesale Food Market Phase 2 is not suitable, the new housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site will involve construction of a two-way road linking Hing Wah Street West to other roads, which is located far away from the re-provisioned depot site at Yen Ming Road.

Lai Chi Kok Road is a Primary Distributor near Hing Wah Street West. This road connects Mei Foo to the west and Mong Kok to the east. Traffic from the proposed housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site is expected to use local roads associated with Lai Chi Kok Road. As these roads are far away from FEHD vehicle routings which make use of Tonkin Street West (without overlapping the vehicular routings of the proposed housing project), traffic from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site is anticipated insignificant to the TIA.

Both Sham Mong Road and Lin Cheung Road are study routes in traffic forecast for EIA included in Technical Note 05. Based on road network pattern, it is anticipated that 20% of total traffic from/to Kowloon (generated by the housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site) will use Sham Mong Road and all the Hong Kong Island traffic (traffic generated by the housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site) will use Lin Cheung Road respectively.

|  | AM Outbound<br>(pcu/hr) | AM Inbound<br>(pcu/hr) | PM Outbound<br>(pcu/hr) | PM Inbound<br>(pcu/hr) |
|--|-------------------------|------------------------|-------------------------|------------------------|
|--|-------------------------|------------------------|-------------------------|------------------------|

|  |           |           |          |           |
|--|-----------|-----------|----------|-----------|
| Total traffic from/to Kowloon          | 81        | 62        | 46       | 57        |
| • <b>assume 20% via Sham Mong Road</b> | <b>16</b> | <b>12</b> | <b>9</b> | <b>11</b> |
| • assume 80% via other roads           | 65        | 50        | 37       | 46        |

|  | AM Outbound<br>(pcu/hr) | AM Inbound<br>(pcu/hr) | PM Outbound<br>(pcu/hr) | PM Inbound<br>(pcu/hr) |
|--|-------------------------|------------------------|-------------------------|------------------------|
| Total traffic from/to Hong Kong Island   | 15                      | 11                     | 8                       | 10                     |
| • <b>assume 100% via Lin Cheung Road</b> | <b>15</b>               | <b>11</b>              | <b>8</b>                | <b>10</b>              |

Based on above traffic assumption, Sham Mong Road (two-way) will have additional flows 28 pcu/hour (i.e.16+12) in the AM peak and 20 pcu/hour (i.e.9+11) in the PM peak, which are generated by the housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site.

Lin Cheung Road southbound and northbound carriageways are separated by MTRC rail tracks. Lin Cheung Road southbound carriageway would be used by outbound traffic from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site to the Hong Kong Island, it is anticipated to have additional flows 15 pcu/hour in AM peak and 8 pcu/hour in PM peak respectively. Lin Cheung Road northbound carriageway would be used by inbound traffic from the Hong Kong Island to housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site, it is anticipated to have additional flows 11 pcu/hour in AM peak and 10 pcu/hour in PM peak respectively.

The following table presents average traffic forecast on Sham Mong Road and Lin Cheung Road (2017 without FEHD development scenario) in Technical Note 05 and the revised traffic forecast with additional traffic derived from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site. As conservative analysis, volume of flows (pcu/hour) derived from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site are assumed equal the volume of vehicle flows (vehicles/hour).

| Traffic Forecast in Technical Note 05 (2017 without FEHD development scenario)  |                                    |                                    |
|---|------------------------------------|------------------------------------|
| Road Links  | AM peak average<br>(vehicles/hour) | PM peak average<br>(vehicles/hour) |
| Sham Mong Road (2-way flow)   | 860                                | 700                                |
| Lin Cheung Road southbound *  | 2,680                              | 1,530                              |
| Lin Cheung Road northbound*   | 2,300                              | 2,560                              |
| Additional traffic derived from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site  |                                    |                                    |
| Road Links  | AM peak average<br>(vehicles/hour) | PM peak average<br>(vehicles/hour) |
| Sham Mong Road (2-way flow)   | 28                                 | 20                                 |
| Lin Cheung Road southbound*   | 15                                 | 8                                  |
| Lin Cheung Road northbound*   | 11                                 | 10                                 |
| Revised Traffic Forecast (2017 without FEHD development scenario) and with additional traffic derived from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site |                                    |                                    |
| Road Links  | AM peak average<br>(vehicles/hour) | PM peak average<br>(vehicles/hour) |
| Sham Mong Road (2-way flow)   | 888                                | 720                                |
| Lin Cheung Road southbound*   | 2,695                              | 1,538                              |
| Lin Cheung Road northbound*   | 2,311                              | 2,570                              |
| Percentage of change with additional traffic derived from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site  |                                    |                                    |
| Road Links  | AM peak average<br>(vehicles/hour) | PM peak average<br>(vehicles/hour) |
| Sham Mong Road (2-way flow)   | 3.3%                               | 2.9%                               |

|                             |      |      |
|-----------------------------|------|------|
| Lin Cheung Road southbound* | 0.6% | 0.5% |
| Lin Cheung Road northbound* | 0.5% | 0.4% |

\*Lin Cheung Road southbound and northbound carriageways are separated by MTRC rail tracks

With additional traffic derived from housing development at Cheung Sha Wan Wholesale Food Market Phase 2 site, volume of flows will increase approximate 3% Sham Mong Road and less than 1% on Lin Cheung Road. Percentage of changes on Sham Mong Road is higher than Lin Cheung Road because traffic flows on Sham Mong Road (approximate 800 vehicles per hour) are relatively lower than Lin Cheung Road (in excess of 2,000 vehicles per hour). However actual flows on Sham Mong Road and Lin Cheung Road are not expected to increase significantly.

Having regard to the above analysis, we would like to have TD's confirmation that the TIA submitted and the traffic forecast for EIA in Technical Note 05 are still valid with the proposed housing development at this new site. FEHD will formally submit the EIA Report to EPD on **24 June 2013 (next Monday)**. TD's urgent confirmation and reply by **close of play today** would be much appreciated in order that there will be no further delay, rendering the project infeasible due to the need to meet new Air Quality Objectives which will come into operation in 2014.

Regards,

**Ivan Lai**

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 URS Hong Kong Limited  
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## Fan, Fanny

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**From:** John Hok Man CHAN/TD/HKSARG <johnhmchan@td.gov.hk>  
**Sent:** Thursday, May 09, 2013 6:36 PM  
**To:** Lai, Ivan  
**Cc:** 4710; HK - USW-ENV Sai Yee Street vehicle depot; HK - USW-Geot Sai Yee Street vehicle depot; HK - USW-Traffic Sai Yee Street vehicle depot; Lorraine LO 4710 (FEHD) -; T.Y. LUK (PM) 4710 (ASD) -; S.H. SAT (SPM) 4710 (ASD) -; Vincent LEUNG 4710 (FEHD) -; waitakchan@td.gov.hk  
**Subject:** Re: 9AX 034 (182GK) SYS Depot - Technical Note 05 Traffic Forecast for EIA

Dear Ivan,

Further to the telecon between FEHD with our Mr W T CHAN, I confirm that I have no comment on the traffic forecast methodology described in the Technical Note 05, and have no objection to using traffic data established based on the aforesaid forecasting methodology for the Environmental Impact Assessment for the subject project.

Regards,  
John H M CHAN  
EK/PW2, TE/K, TD

John Hok Man CHAN/TD/HKSARG  
TEK/EKSSP

09/05/2013 11:31

To "Lai, Ivan" <ivan.lai@urs.com>  
cc 4710 <4710@p-t-group.com>  
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"Vincent LEUNG 4710 (FEHD) -" <vypleung@fehd.gov.hk>  
"waitakchan@td.gov.hk" <waitakchan@td.gov.hk>

Subject Re: 9AX 034 (182GK) SYS Depot - Technical Note 05 Traffic Forecast for EIA [Link](#)

Dear Ivan,

I have no comment on the traffic forecast methodology described in the Technical Note 05.

Regards,  
John H M CHAN  
EK/PW2, TE/K, TD

"Lai, Ivan" <ivan.lai@urs.com>

08/05/2013 11:26

To "johnhmchan@td.gov.hk" <johnhmchan@td.gov.hk>  
cc "waitakchan@td.gov.hk" <waitakchan@td.gov.hk>  
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HK - USW-Traffic Sai Yee Street vehicle depot <hk.usw-traffic.sysdepot@urs.com>  
HK - USW-ENV Sai Yee Street vehicle depot <hk.usw-env.sysdepot@urs.com>  
HK - USW-Geot Sai Yee Street vehicle depot <hk.usw-geot.sysdepot@urs.com>  
Subject 9AX 034 (182GK) SYS Depot - Technical Note 05 Traffic Forecast for EIA

Dear John,

**Subject: 9AX 034 Reprovisioning of FEHD Sai Yee Street Environmental Hygiene Offices-cum-vehicle Depot at Yen Ming Road, West Kowloon Reclamation Area Programme No. 182GK – Technical Note 05 – Traffic Forecast for Environmental Impact Assessment**

We have revised the Technical Note 04 Traffic Forecast for EIA to Technical Note 05. The Technical Note 05 can be downloaded by clicking the link below.

The download link(s) will be expired after the given expiry date.

| File   | Size (KB) | Description | Expiry Date         |                          |
|--|-----------|-------------|---------------------|--------------------------|
| File Transfer\Ivan Lai\9AX 034 (2013 05 07)_Technical Note 5\ASD9AX034 FEHD Technical Note 5 - Traffic Forecast for EIA_7 May 2013.pdf | 16024.1   |             | 11/03/2014 16:27:47 | <a href="#">Download</a> |

TD comments on the methodology of traffic forecasting for EIA given in TD's email dated 25/4/2013 and at the meeting (TIA presentation to DD/FEHD) on 2 May 2013 have been addressed in the Technical Note 05.

In addition we have coordinated with Planning Department, regarding the use of planning parameters for adjacent development sites. Please refer to the e-mail between Planning Department and URS dated 7 May 2013 below.

Should you need any further information, please do not hesitate to contact us. In order to provide traffic forecast to EIA consultant to undertake EIA, it is highly appreciated if you can provide us your comments by 9 May 2013.

Regards,

**Ivan Lai**

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## **Appendix 4-2a Conversion Breakdown of the Vehicle Types**



**Appendix 4-2a Conversion Breakdown of the Vehicle Types used in the Forecast Traffic and the 16 Classes defined in EMFAC-HK**

1. The “2010 Licensed Vehicle by Age and Technology Group Fractions” available at EPD’s Website ([http://www.epd.gov.hk/epd/english/environmentinhk/air/guide\\_ref/emfac.html](http://www.epd.gov.hk/epd/english/environmentinhk/air/guide_ref/emfac.html)) provides population of vehicles of the 16 classes in terms of first registration year.
2. Total population of vehicles of the 16 classes and the corresponding proportion are calculated.
3. Breakdown matrix, as below, is formed in accordance with the vehicle class details of EMFAC-HK.

| EMFAC Classes |      |            |     | Conversion from Survey Results |                       |
|---------------|------|------------|-----|--------------------------------|-----------------------|
| 1             | PC-p | PC & LGV   | <-- | PC x 99.5%                     | + LGV x (0.2% + 1.7%) |
| 2             | LGV3 | PC & LGV   | <-- | PC x 0.5%                      | + LGV x 1.4%          |
| 3             | LGV4 | PC & LGV   | <-- |                                | LGV x (1.7% + 60%)    |
| 4             | PLB  | PLB        | <-- | PLB x 49%                      |                       |
| 5             | LGV6 | LGV        | <-- | LGV x 36.6%                    |                       |
| 6             | HGV7 | MHGV       | <-- | HGV/AV x 26%                   |                       |
| 7             | HGV8 | MHGV       | <-- | HGV/AV x 74%                   |                       |
| 8             | FBDD | DDFB       | <-- | Bus x 100% *                   |                       |
| 9             | MC   | MC         | <-- | MC                             |                       |
| 10            | Taxi | Taxi       | <-- | Taxi                           |                       |
| 11            | PV4  | Private LB | <-- | PLB x 28%                      |                       |
| 12            | PV5  | Private LB | <-- | PLB x 23%                      |                       |
| 13            | NFB6 | NFB        | <-- | Coach x 41%                    |                       |
| 14            | NFB7 | NFB        | <-- | Coach x 29%                    |                       |
| 15            | NFB8 | NFB        | <-- | Coach x 30%                    |                       |
| 16            | FBSD | SDFB       | <-- | Bus x 0% *                     |                       |

**Remark:**

\* No single neck franchised buses observed from survey

## **Appendix 4-3 Estimation of Composite Emission Factors (Open Roads)**

















Table with 24 columns: 2017 with Development, Road ID, Road Length (m), Road Type, Speed (km/hr), Temp, RH, PC, TAXI, LGV3, LGV4, LGV6, HGV7, HGV8, HGV9, HGV10, HGV11, HGV12, HGV13, HGV14, HGV15, HGV16, HGV17, HGV18, HGV19, HGV20, HGV21, HGV22, HGV23, HGV24, HGV25, HGV26, HGV27, HGV28, HGV29, HGV30, HGV31, HGV32, HGV33, HGV34, HGV35, HGV36, HGV37, HGV38, HGV39, HGV40, HGV41, HGV42, HGV43, HGV44, HGV45, HGV46, HGV47, HGV48, HGV49, HGV50, HGV51, HGV52, HGV53, HGV54, HGV55, HGV56, HGV57, HGV58, HGV59, HGV60, HGV61, HGV62, HGV63, HGV64, HGV65, HGV66, HGV67, HGV68, HGV69, HGV70, HGV71, HGV72, HGV73, HGV74, HGV75, HGV76, HGV77, HGV78, HGV79, HGV80, HGV81, HGV82, HGV83, HGV84, HGV85, HGV86, HGV87, HGV88, HGV89, HGV90, HGV91, HGV92, HGV93, HGV94, HGV95, HGV96, HGV97, HGV98, HGV99, HGV100. Rows include various road types and speeds (30, 40, 50, 60, 70, 80 km/hr).























## **Appendix 4-4 Estimation of Composite Emission Factors (Within Depot Area)**

## **Appendix 4-4 Traveling Emission within Depot**

### Methodology

1. No mechanical ventilation would be provided in car park area of the Depot as it is designed for natural ventilation through louvers at sidewalls. Hence, the emissions is then assumed to be released as volume sources through each opening in proportion to size of opening area
2. The total emission from the Depot traffic is estimated by Emfac mode of EMFAC-HK v2.5.1, with the following assumption:
  - a. Diurnal traffic flow as provided by FEHD are shown in **Annex 1**;
  - b. Total population of vehicles of the 16 classes and the corresponding proportion are calculated as below, is formed in accordance with the vehicle class details of EMFAC-HK. Details of the calculation are shown in **Annex 2**
  - c. All vehicle will travel longest distance of 420m distance within the Site as a conservative approach;
  - d. As a conservative approach all vehicles are assumed to be travelling at speed of 5kph; and
  - e. 1 cold start for each trip is assumed
3. The total vehicular emission from travelling within the Depot is then estimated as total emission in grams at hourly basis in accordance with the hourly traffic data, whereas the details area shown in **Annex 3**.
4. Since, no mechanical ventilation would be provided in car park area of the Depot as it is designed for natural ventilation through all 45 openings at sidewalls, the travelling emission is assumed to be released through each opening is then estimated in proportion to its opening area. Whereas the details area shown in **Annex 4 and** location of volume source at each level is shown in Annex 6.
5. Detail calculation of each volume sources are shown in **Annex 5**.

Annex 1 – Diurnal Traffic Flow

Annex 2 – 16 Vehicle breakdowns

Annex 3 – Emission Inventory Estimation

Annex 4 – Openings Area

Annex 5 – Emissions rate at each opening

Annex 6 – Locations of volume sources

Estimation of Vehicle in / out at Proposed Yen Ming Road Depot

| Time Slot                      | Vehicle Type            |            |             |                           |                        |            |    | Total |
|--------------------------------|-------------------------|------------|-------------|---------------------------|------------------------|------------|----|-------|
|                                | General Purpose Vehicle |            |             | Special Purpose Vehicle   |                        |            |    |       |
|                                | Light Bus/Large Van     | Medium Van | Light Truck | Refuse Collection Vehicle | Street Washing Vehicle | Grab Lorry |    |       |
| 0100-0200                      | 0                       | 2          | 1           | 0                         | 2                      | 0          | 5  |       |
| 0200-0300                      | 3                       | 2          | 4           | 0                         | 2                      | 0          | 11 |       |
| 0300-0400                      | 3                       | 0          | 3           | 0                         | 2                      | 0          | 8  |       |
| 0400-0500                      | 0                       | 2          | 1           | 0                         | 0                      | 0          | 3  |       |
| 0500-0600                      | 0                       | 0          | 0           | 0                         | 0                      | 0          | 0  |       |
| 0600-0700                      | 3                       | 0          | 3           | 21                        | 3                      | 0          | 30 |       |
| 0700-0800                      | 18                      | 9          | 6           | 0                         | 4                      | 0          | 37 |       |
| 0800-0900                      | 7                       | 0          | 0           | 0                         | 1                      | 0          | 8  |       |
| 0900-1000                      | 0                       | 0          | 0           | 1                         | 1                      | 0          | 2  |       |
| 1000-1100                      | 0                       | 3          | 0           | 1                         | 1                      | 0          | 5  |       |
| 1100-1200                      | 22                      | 6          | 3           | 0                         | 1                      | 0          | 32 |       |
| 1200-1300                      | 14                      | 6          | 6           | 0                         | 1                      | 0          | 27 |       |
| 1300-1400                      | 0                       | 3          | 3           | 0                         | 3                      | 0          | 9  |       |
| 1400-1500                      | 0                       | 9          | 0           | 21                        | 0                      | 0          | 30 |       |
| 1500-1600                      | 11                      | 9          | 0           | 7                         | 7                      | 0          | 34 |       |
| 1600-1700                      | 0                       | 0          | 0           | 0                         | 1                      | 0          | 1  |       |
| 1700-1800                      | 7                       | 0          | 0           | 1                         | 2                      | 0          | 10 |       |
| 1800-1900                      | 7                       | 2          | 3           | 0                         | 0                      | 0          | 12 |       |
| 1900-2000                      | 0                       | 2          | 6           | 1                         | 1                      | 0          | 10 |       |
| 2000-2100                      | 0                       | 0          | 3           | 0                         | 1                      | 0          | 4  |       |
| 2100-2200                      | 0                       | 0          | 0           | 0                         | 0                      | 0          | 0  |       |
| 2200-2300                      | 7                       | 9          | 6           | 0                         | 3                      | 0          | 25 |       |
| 2300-2400                      | 3                       | 2          | 3           | 7                         | 2                      | 0          | 17 |       |
| 2400-0100                      | 0                       | 0          | 1           | 0                         | 2                      | 0          | 3  |       |
| Frequency of vheicle in & out: |                         |            |             |                           |                        |            |    | 323   |

| Hr | Veh Nos/hr             |           |                                 |                                 |                                |                                |                                |                         |                               |                              |                               |                                 |                              |                          |                          |                       |
|----|------------------------|-----------|---------------------------------|---------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------------|-------------------------------|------------------------------|-------------------------------|---------------------------------|------------------------------|--------------------------|--------------------------|-----------------------|
|    | 01 - Private Cars (PC) | 03 - Taxi | 04 - Light Goods Vehicles<=2.5t | 05 - Lt Goods Vehicles 2.5-3.5t | 06 - Light Goods Vehicles>3.5t | 07 - Heavy Goods Vehicles<=15t | 08 - Heavy Goods Vehicles >15t | 11 - Public Light Buses | 12 - Private Light Bus <=3.5t | 13 - Private Light Bus >3.5t | 14 - Non-franchised Bus<=6.4t | 15 - Non-franchised Bus 6.4-15t | 16 - Non-franchised Bus >15t | 17 - Franchised Bus (SD) | 18 - Franchised Bus (DD) | 19 - Motorcycles (MC) |
| 1  | 0                      | 0         | 0                               | 0                               | 3                              | 1                              | 1                              | 0                       | 0                             | 0                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 2  | 0                      | 0         | 0                               | 0                               | 6                              | 1                              | 1                              | 0                       | 2                             | 1                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 3  | 0                      | 0         | 0                               | 0                               | 3                              | 1                              | 1                              | 0                       | 2                             | 1                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 4  | 0                      | 0         | 0                               | 0                               | 3                              | 0                              | 0                              | 0                       | 0                             | 0                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 5  | 0                      | 0         | 0                               | 0                               | 0                              | 0                              | 0                              | 0                       | 0                             | 0                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 6  | 0                      | 0         | 0                               | 0                               | 3                              | 6                              | 18                             | 0                       | 2                             | 1                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 7  | 0                      | 0         | 0                               | 0                               | 15                             | 1                              | 3                              | 0                       | 10                            | 8                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 8  | 0                      | 0         | 0                               | 0                               | 0                              | 0                              | 1                              | 0                       | 4                             | 3                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 9  | 0                      | 0         | 0                               | 0                               | 0                              | 1                              | 1                              | 0                       | 0                             | 0                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 10 | 0                      | 0         | 0                               | 0                               | 3                              | 1                              | 1                              | 0                       | 0                             | 0                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 11 | 0                      | 0         | 0                               | 0                               | 9                              | 0                              | 1                              | 0                       | 12                            | 10                           | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 12 | 0                      | 0         | 0                               | 0                               | 12                             | 0                              | 1                              | 0                       | 8                             | 6                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 13 | 0                      | 0         | 0                               | 0                               | 6                              | 1                              | 2                              | 0                       | 0                             | 0                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 14 | 0                      | 0         | 0                               | 0                               | 9                              | 5                              | 16                             | 0                       | 0                             | 0                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 15 | 0                      | 0         | 0                               | 0                               | 9                              | 4                              | 10                             | 0                       | 6                             | 5                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 16 | 0                      | 0         | 0                               | 0                               | 0                              | 0                              | 1                              | 0                       | 0                             | 0                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 17 | 0                      | 0         | 0                               | 0                               | 0                              | 1                              | 2                              | 0                       | 4                             | 3                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 18 | 0                      | 0         | 0                               | 0                               | 5                              | 0                              | 0                              | 0                       | 4                             | 3                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 19 | 0                      | 0         | 0                               | 0                               | 8                              | 1                              | 1                              | 0                       | 0                             | 0                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 20 | 0                      | 0         | 0                               | 0                               | 3                              | 0                              | 1                              | 0                       | 0                             | 0                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 21 | 0                      | 0         | 0                               | 0                               | 0                              | 0                              | 0                              | 0                       | 0                             | 0                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 22 | 0                      | 0         | 0                               | 0                               | 15                             | 1                              | 2                              | 0                       | 4                             | 3                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 23 | 0                      | 0         | 0                               | 0                               | 5                              | 2                              | 7                              | 0                       | 2                             | 1                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |
| 24 | 0                      | 0         | 0                               | 0                               | 1                              | 1                              | 1                              | 0                       | 0                             | 0                            | 0                             | 0                               | 0                            | 0                        | 0                        | 0                     |

Note:

06 - Light Goods Vehicles>3.5t = Medium Van + Light Truck

07 - Heavy Goods Vehicles<=15t = (Refuse Collection Vehicle + Street Washing Vehicle + Grab Lorry ) x 26%

08 - Heavy Goods Vehicles>15t = (Refuse Collection Vehicle + Street Washing Vehicle + Grab Lorry ) x 74%

12 - Private Light Bus <=3.5t = Light Bus/Large Van x 55%

13 - Private Light Bus > 3.5t = Light Bus/Large Van x 45%





| Veh Breakdown |      |                |                        |                        |           |                                 |                                 |                                |                                |                                |                         |                               |                              |                               |                                 |                              |                          |                          |                       |
|---------------|------|----------------|------------------------|------------------------|-----------|---------------------------------|---------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------------|-------------------------------|------------------------------|-------------------------------|---------------------------------|------------------------------|--------------------------|--------------------------|-----------------------|
| Road ID       | Time | Total (veh/hr) | Travelling Speed (KPH) | 01 - Private Cars (PC) | 03 - Taxi | 04 - Light Goods Vehicles<=2.5t | 05 - Lt Goods Vehicles 2.5-3.5t | 06 - Light Goods Vehicles>3.5t | 07 - Heavy Goods Vehicles<=15t | 08 - Heavy Goods Vehicles >15t | 11 - Public Light Buses | 12 - Private Light Bus <=3.5t | 13 - Private Light Bus >3.5t | 14 - Non-franchised Bus<=6.4t | 15 - Non-franchised Bus 6.4-15t | 16 - Non-franchised Bus >15t | 17 - Franchised Bus (SD) | 18 - Franchised Bus (DD) | 19 - Motorcycles (MC) |
| YMD           | Hr1  | 5              | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 60.00%                          | 20.00%                         | 0.00%                          | 0.00%                          | 20.00%                  | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 0.00%                    | 0.00%                 |
| YMD           | Hr2  | 11             | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 54.55%                          | 9.09%                          | 0.00%                          | 18.18%                         | 9.09%                   | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 9.09%                    | 0.00%                 |
| YMD           | Hr3  | 8              | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 37.50%                          | 12.50%                         | 0.00%                          | 25.00%                         | 12.50%                  | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 12.50%                   | 0.00%                 |
| YMD           | Hr4  | 3              | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 100.00%                         | 0.00%                          | 0.00%                          | 0.00%                          | 0.00%                   | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 0.00%                    | 0.00%                 |
| YMD           | Hr5  | 0              | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 0.00%                           | 0.00%                          | 0.00%                          | 0.00%                          | 0.00%                   | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 0.00%                    | 0.00%                 |
| YMD           | Hr6  | 30             | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 10.00%                          | 60.00%                         | 0.00%                          | 6.67%                          | 20.00%                  | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 3.33%                    | 0.00%                 |
| YMD           | Hr7  | 37             | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 40.54%                          | 8.11%                          | 0.00%                          | 27.03%                         | 2.70%                   | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 21.62%                   | 0.00%                 |
| YMD           | Hr8  | 8              | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 0.00%                           | 12.50%                         | 0.00%                          | 50.00%                         | 0.00%                   | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 37.50%                   | 0.00%                 |
| YMD           | Hr9  | 2              | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 0.00%                           | 50.00%                         | 0.00%                          | 0.00%                          | 50.00%                  | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 0.00%                    | 0.00%                 |
| YMD           | Hr10 | 5              | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 60.00%                          | 20.00%                         | 0.00%                          | 0.00%                          | 20.00%                  | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 0.00%                    | 0.00%                 |
| YMD           | Hr11 | 32             | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 28.13%                          | 3.13%                          | 0.00%                          | 37.50%                         | 0.00%                   | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 31.25%                   | 0.00%                 |
| YMD           | Hr12 | 27             | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 44.44%                          | 3.70%                          | 0.00%                          | 29.63%                         | 0.00%                   | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 22.22%                   | 0.00%                 |
| YMD           | Hr13 | 9              | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 66.67%                          | 22.22%                         | 0.00%                          | 0.00%                          | 11.11%                  | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 0.00%                    | 0.00%                 |
| YMD           | Hr14 | 30             | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 30.00%                          | 53.33%                         | 0.00%                          | 0.00%                          | 16.67%                  | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 0.00%                    | 0.00%                 |
| YMD           | Hr15 | 34             | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 26.47%                          | 29.41%                         | 0.00%                          | 17.65%                         | 11.76%                  | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 14.71%                   | 0.00%                 |
| YMD           | Hr16 | 1              | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 0.00%                           | 100.00%                        | 0.00%                          | 0.00%                          | 0.00%                   | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 0.00%                    | 0.00%                 |
| YMD           | Hr17 | 10             | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 0.00%                           | 20.00%                         | 0.00%                          | 40.00%                         | 10.00%                  | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 30.00%                   | 0.00%                 |
| YMD           | Hr18 | 12             | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 41.67%                          | 0.00%                          | 0.00%                          | 33.33%                         | 0.00%                   | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 25.00%                   | 0.00%                 |
| YMD           | Hr19 | 10             | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 80.00%                          | 10.00%                         | 0.00%                          | 0.00%                          | 10.00%                  | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 0.00%                    | 0.00%                 |
| YMD           | Hr20 | 4              | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 75.00%                          | 25.00%                         | 0.00%                          | 0.00%                          | 0.00%                   | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 0.00%                    | 0.00%                 |
| YMD           | Hr21 | 0              | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 0.00%                           | 0.00%                          | 0.00%                          | 0.00%                          | 0.00%                   | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 0.00%                    | 0.00%                 |
| YMD           | Hr22 | 25             | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 60.00%                          | 8.00%                          | 0.00%                          | 16.00%                         | 4.00%                   | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 12.00%                   | 0.00%                 |
| YMD           | Hr23 | 17             | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 29.41%                          | 41.18%                         | 0.00%                          | 11.76%                         | 11.76%                  | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 5.88%                    | 0.00%                 |
| YMD           | Hr24 | 3              | 5                      | 0.00%                  | 0.00%     | 0.00%                           | 33.33%                          | 33.33%                         | 0.00%                          | 0.00%                          | 33.33%                  | 0.00%                         | 0.00%                        | 0.00%                         | 0.00%                           | 0.00%                        | 0.00%                    | 0.00%                    | 0.00%                 |

| Time | NOx E.F. (g/VKT)       |           |                                 |                                 |                                |                                |                                |                         |                               |                              |                               |                                 |                              |                          |                          |                       | NOx E.F. (g/VKT) |
|------|------------------------|-----------|---------------------------------|---------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------------|-------------------------------|------------------------------|-------------------------------|---------------------------------|------------------------------|--------------------------|--------------------------|-----------------------|------------------|
|      | 01 - Private Cars (PC) | 03 - Taxi | 04 - Light Goods Vehicles<=2.5t | 05 - Lt Goods Vehicles 2.5-3.5t | 06 - Light Goods Vehicles>3.5t | 07 - Heavy Goods Vehicles<=15t | 08 - Heavy Goods Vehicles >15t | 11 - Public Light Buses | 12 - Private Light Bus <=3.5t | 13 - Private Light Bus >3.5t | 14 - Non-franchised Bus<=6.4t | 15 - Non-franchised Bus 6.4-15t | 16 - Non-franchised Bus >15t | 17 - Franchised Bus (SD) | 18 - Franchised Bus (DD) | 19 - Motorcycles (MC) |                  |
| Hr1  | 0.1233                 | 1.9468    | 3.1784                          | 1.652                           | 4.8471                         | 5.7831                         | 11.062                         | 7.4794                  | 0.4638                        | 4.0995                       | 4.4322                        | 8.3449                          | 13.1681                      | 10.9841                  | 19.4207                  | 0.6818                | 3.46             |
| Hr2  | 0.1233                 | 1.9468    | 3.1784                          | 1.652                           | 4.8471                         | 5.7831                         | 11.062                         | 7.4794                  | 0.4638                        | 4.0995                       | 4.4322                        | 8.3449                          | 13.1681                      | 10.9841                  | 19.4207                  | 0.6818                | 5.80             |
| Hr3  | 0.1233                 | 1.9468    | 3.1784                          | 1.652                           | 4.8471                         | 5.7831                         | 11.062                         | 7.4794                  | 0.4638                        | 4.0995                       | 4.4322                        | 8.3449                          | 13.1681                      | 10.9841                  | 19.4207                  | 0.6818                | 7.35             |
| Hr4  | 0.1233                 | 1.9468    | 3.1784                          | 1.652                           | 4.8471                         | 5.7831                         | 11.062                         | 7.4794                  | 0.4638                        | 4.0995                       | 4.4322                        | 8.3449                          | 13.1681                      | 10.9841                  | 19.4207                  | 0.6818                | 1.65             |
| Hr5  | 0.1233                 | 1.9468    | 3.1784                          | 1.652                           | 4.8471                         | 5.7831                         | 11.062                         | 7.4794                  | 0.4638                        | 4.0995                       | 4.4322                        | 8.3449                          | 13.1681                      | 10.9841                  | 19.4207                  | 0.6818                | 0.00             |
| Hr6  | 0.1233                 | 1.9468    | 3.1784                          | 1.652                           | 4.8471                         | 5.7831                         | 11.062                         | 7.4794                  | 0.4638                        | 4.0995                       | 4.4322                        | 8.3449                          | 13.1681                      | 10.9841                  | 19.4207                  | 0.6818                | 5.95             |
| Hr7  | 0.1233                 | 1.9468    | 3.1784                          | 1.652                           | 4.8471                         | 5.7831                         | 11.062                         | 7.4794                  | 0.4638                        | 4.0995                       | 4.4322                        | 8.3449                          | 13.1681                      | 10.9841                  | 19.4207                  | 0.6818                | 8.45             |
| Hr8  | 0.1241                 | 1.9601    | 3.2055                          | 1.6679                          | 4.8941                         | 5.8391                         | 11.1692                        | 7.5028                  | 0.4678                        | 4.1173                       | 4.4752                        | 8.4257                          | 13.2957                      | 11.0905                  | 19.6088                  | 0.6904                | 13.55            |
| Hr9  | 0.1224                 | 1.9335    | 3.1765                          | 1.6561                          | 4.8605                         | 5.799                          | 11.0924                        | 7.4086                  | 0.4597                        | 4.071                        | 4.4444                        | 8.3679                          | 13.2043                      | 11.0143                  | 19.4741                  | 0.6774                | 6.13             |
| Hr10 | 0.1207                 | 1.9059    | 3.1401                          | 1.639                           | 4.8109                         | 5.7398                         | 10.9793                        | 7.3166                  | 0.4512                        | 4.0232                       | 4.3991                        | 8.2825                          | 13.0697                      | 10.902                   | 19.2755                  | 0.6626                | 3.41             |
| Hr11 | 0.1216                 | 1.9214    | 3.171                           | 1.657                           | 4.8642                         | 5.8034                         | 11.101                         | 7.343                   | 0.4557                        | 4.0433                       | 4.4478                        | 8.3743                          | 13.2145                      | 11.0228                  | 19.4891                  | 0.6723                | 10.87            |
| Hr12 | 0.12                   | 1.8943    | 3.129                           | 1.6347                          | 4.7991                         | 5.7257                         | 10.9523                        | 7.315                   | 0.4467                        | 4.0205                       | 4.3883                        | 8.2622                          | 13.0375                      | 10.8752                  | 19.2281                  | 0.6607                | 8.42             |
| Hr13 | 0.1203                 | 1.8999    | 3.1401                          | 1.6411                          | 4.818                          | 5.7483                         | 10.9955                        | 7.3244                  | 0.4483                        | 4.0276                       | 4.4056                        | 8.2947                          | 13.0889                      | 10.9181                  | 19.3039                  | 0.6641                | 2.98             |
| Hr14 | 0.1203                 | 1.8999    | 3.1401                          | 1.6411                          | 4.818                          | 5.7483                         | 10.9955                        | 7.3244                  | 0.4483                        | 4.0276                       | 4.4056                        | 8.2947                          | 13.0889                      | 10.9181                  | 19.3039                  | 0.6641                | 4.28             |
| Hr15 | 0.1203                 | 1.8999    | 3.1401                          | 1.6411                          | 4.818                          | 5.7483                         | 10.9955                        | 7.3244                  | 0.4483                        | 4.0276                       | 4.4056                        | 8.2947                          | 13.0889                      | 10.9181                  | 19.3039                  | 0.6641                | 7.49             |
| Hr16 | 0.1196                 | 1.8888    | 3.118                           | 1.6283                          | 4.7801                         | 5.7031                         | 10.9091                        | 7.3057                  | 0.4452                        | 4.0134                       | 4.371                         | 8.2296                          | 12.9861                      | 10.8323                  | 19.1522                  | 0.6572                | 4.78             |
| Hr17 | 0.121                  | 1.9111    | 3.1504                          | 1.645                           | 4.8287                         | 5.761                          | 11.0199                        | 7.3254                  | 0.4527                        | 4.0299                       | 4.4153                        | 8.3131                          | 13.118                       | 10.9423                  | 19.3467                  | 0.6658                | 11.91            |
| Hr18 | 0.1227                 | 1.9383    | 3.1861                          | 1.6618                          | 4.8772                         | 5.8189                         | 11.1305                        | 7.4169                  | 0.4611                        | 4.0773                       | 4.4597                        | 8.3966                          | 13.2497                      | 11.0521                  | 19.5409                  | 0.6805                | 9.29             |
| Hr19 | 0.1222                 | 1.9287    | 3.1668                          | 1.6505                          | 4.8438                         | 5.7791                         | 11.0544                        | 7.4003                  | 0.4583                        | 4.0647                       | 4.4292                        | 8.3392                          | 13.159                       | 10.9765                  | 19.4072                  | 0.6744                | 2.54             |
| Hr20 | 0.1216                 | 1.9191    | 3.1475                          | 1.6392                          | 4.8104                         | 5.7393                         | 10.9782                        | 7.3837                  | 0.4555                        | 4.0521                       | 4.3987                        | 8.2817                          | 13.0684                      | 10.9009                  | 19.2736                  | 0.6682                | 2.43             |
| Hr21 | 0.1216                 | 1.9191    | 3.1475                          | 1.6392                          | 4.8104                         | 5.7393                         | 10.9782                        | 7.3837                  | 0.4555                        | 4.0521                       | 4.3987                        | 8.2817                          | 13.0684                      | 10.9009                  | 19.2736                  | 0.6682                | 0.00             |
| Hr22 | 0.1213                 | 1.9143    | 3.1379                          | 1.6335                          | 4.7937                         | 5.7194                         | 10.9401                        | 7.3755                  | 0.4541                        | 4.0458                       | 4.3834                        | 8.253                           | 13.0231                      | 10.8631                  | 19.2067                  | 0.6652                | 5.71             |
| Hr23 | 0.1236                 | 1.9513    | 3.1874                          | 1.6573                          | 4.8628                         | 5.8017                         | 11.0977                        | 7.4872                  | 0.4651                        | 4.1054                       | 4.4465                        | 8.3719                          | 13.2106                      | 11.0196                  | 19.4834                  | 0.6846                | 5.82             |
| Hr24 | 0.1236                 | 1.9513    | 3.1874                          | 1.6573                          | 4.8628                         | 5.8017                         | 11.0977                        | 7.4872                  | 0.4651                        | 4.1054                       | 4.4465                        | 8.3719                          | 13.2106                      | 11.0196                  | 19.4834                  | 0.6846                | 4.67             |

| Time | PM10 E.F. (g/VKT)      |           |                                 |                                 |                                |                                |                                |                         |                               |                              |                               |                                 |                              |                          |                          | PM10 E.F. (g/VKT) |                       |
|------|------------------------|-----------|---------------------------------|---------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------------|-------------------------------|------------------------------|-------------------------------|---------------------------------|------------------------------|--------------------------|--------------------------|-------------------|-----------------------|
|      | 01 - Private Cars (PC) | 03 - Taxi | 04 - Light Goods Vehicles<=2.5t | 05 - Lt Goods Vehicles 2.5-3.5t | 06 - Light Goods Vehicles>3.5t | 07 - Heavy Goods Vehicles<=15t | 08 - Heavy Goods Vehicles >15t | 11 - Public Light Buses | 12 - Private Light Bus <=3.5t | 13 - Private Light Bus >3.5t | 14 - Non-franchised Bus<=6.4t | 15 - Non-franchised Bus 6.4-15t | 16 - Non-franchised Bus >15t | 17 - Franchised Bus (SD) | 18 - Franchised Bus (DD) |                   | 19 - Motorcycles (MC) |
| Hr1  | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.21                  |
| Hr2  | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.36                  |
| Hr3  | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.43                  |
| Hr4  | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.16                  |
| Hr5  | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.00                  |
| Hr6  | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.33                  |
| Hr7  | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.43                  |
| Hr8  | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.65                  |
| Hr9  | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.29                  |
| Hr10 | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.21                  |
| Hr11 | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.52                  |
| Hr12 | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.45                  |
| Hr13 | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.21                  |
| Hr14 | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.25                  |
| Hr15 | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.38                  |
| Hr16 | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.29                  |
| Hr17 | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.58                  |
| Hr18 | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.48                  |
| Hr19 | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.19                  |
| Hr20 | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.20                  |
| Hr21 | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.00                  |
| Hr22 | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.33                  |
| Hr23 | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.34                  |
| Hr24 | 0.0199                 | 0         | 0.3582                          | 0.163                           | 0.2911                         | 0.6715                         | 1.0702                         | 0.2917                  | 0.0746                        | 0.1052                       | 0.3967                        | 0.5367                          | 0.7937                       | 0.0825                   | 0.2145                   | 0.0512            | 0.25                  |

|      |                        |                |                |               |               | Total Opening Area     | 1355.97                 |
|------|------------------------|----------------|----------------|---------------|---------------|------------------------|-------------------------|
| Time | Traveling Distance (m) | NOx E.M (g/hr) | PM10E.M (g/hr) | NOx E.M (g/s) | PM10E.M (g/s) | NOx g/s/m <sup>2</sup> | PM10 g/s/m <sup>2</sup> |
| Hr1  | 420                    | 7.259          | 0.0078         | 0.0020        | 0.000002      | 0.0000015              | 0.0000000               |
| Hr2  | 420                    | 26.789         | 0.1049         | 0.0074        | 0.000029      | 0.0000055              | 0.0000000               |
| Hr3  | 420                    | 24.707         | 0.0847         | 0.0069        | 0.000024      | 0.0000051              | 0.0000000               |
| Hr4  | 420                    | 2.082          | 0.0010         | 0.0006        | 0.000000      | 0.0000004              | 0.0000000               |
| Hr5  | 420                    | 0.000          | 0.0000         | 0.0000        | 0.000000      | 0.0000000              | 0.0000000               |
| Hr6  | 420                    | 75.022         | 0.7378         | 0.0208        | 0.000205      | 0.0000154              | 0.0000002               |
| Hr7  | 420                    | 131.370        | 2.1056         | 0.0365        | 0.000585      | 0.0000269              | 0.0000004               |
| Hr8  | 420                    | 45.527         | 0.2374         | 0.0126        | 0.000066      | 0.0000093              | 0.0000000               |
| Hr9  | 420                    | 5.153          | 0.0030         | 0.0014        | 0.000001      | 0.0000011              | 0.0000000               |
| Hr10 | 420                    | 7.159          | 0.0077         | 0.0020        | 0.000002      | 0.0000015              | 0.0000000               |
| Hr11 | 420                    | 146.110        | 2.4467         | 0.0406        | 0.000680      | 0.0000299              | 0.0000005               |
| Hr12 | 420                    | 95.509         | 1.1552         | 0.0265        | 0.000321      | 0.0000196              | 0.0000002               |
| Hr13 | 420                    | 11.259         | 0.0209         | 0.0031        | 0.000006      | 0.0000023              | 0.0000000               |
| Hr14 | 420                    | 53.962         | 0.4092         | 0.0150        | 0.000114      | 0.0000111              | 0.0000001               |
| Hr15 | 420                    | 106.991        | 1.3950         | 0.0297        | 0.000387      | 0.0000219              | 0.0000003               |
| Hr16 | 420                    | 2.008          | 0.0006         | 0.0006        | 0.000000      | 0.0000004              | 0.0000000               |
| Hr17 | 420                    | 50.023         | 0.2900         | 0.0139        | 0.000081      | 0.0000102              | 0.0000001               |
| Hr18 | 420                    | 46.811         | 0.2687         | 0.0130        | 0.000075      | 0.0000096              | 0.0000001               |
| Hr19 | 420                    | 10.688         | 0.0202         | 0.0030        | 0.000006      | 0.0000022              | 0.0000000               |
| Hr20 | 420                    | 4.086          | 0.0032         | 0.0011        | 0.000001      | 0.0000008              | 0.0000000               |
| Hr21 | 420                    | 0.000          | 0.0000         | 0.0000        | 0.000000      | 0.0000000              | 0.0000000               |
| Hr22 | 420                    | 59.995         | 0.4946         | 0.0167        | 0.000137      | 0.0000123              | 0.0000001               |
| Hr23 | 420                    | 41.571         | 0.2407         | 0.0115        | 0.000067      | 0.0000085              | 0.0000000               |
| Hr24 | 420                    | 5.883          | 0.0044         | 0.0016        | 0.000001      | 0.0000012              | 0.0000000               |
|      |                        |                | Total          | 0.041         | 0.000680      |                        |                         |

|                  |  |
|------------------|--|
| TYPE :           | AcDbPolyline   |
| DXF_file :       | X:\HomeAdmin\12133 - FEHD SYS Depot\20 EIA\04 Air Quality\VCSTWall Opening Exhaust.dxf |
| DATE :           | 17:22:40 31/8/2012   |
| No. of Element : | 45   |

| Layer  | Elev  | X 1         | Y 1      | X 2         | Y 2         | X 3         | Y 3         | X 4         | Y 4         | Area (m <sup>2</sup> ) |
|--------|-------|-------------|----------|-------------|-------------|-------------|-------------|-------------|-------------|------------------------|
| Trav1  | 4.7   | 833933.1048 | 820551.2 | 833937.816  | 820547.2913 | 833933.8628 | 820542.5801 | 833929.1517 | 820546.5333 | 25.22                  |
| Trav2  | 15.25 | 833932.3771 | 820551.9 | 833937.816  | 820547.2913 | 833933.2522 | 820541.8524 | 833927.8133 | 820546.4162 | 29.11                  |
| Trav3  | 21.75 | 833934.522  | 820550.1 | 833937.816  | 820547.2913 | 833935.052  | 820543.9973 | 833931.758  | 820546.7613 | 9.03                   |
| Trav4  | 21.75 | 833925.7479 | 820539.6 | 833915.2914 | 820548.3728 | 833924.0655 | 820558.8293 | 833934.522  | 820550.0553 | 55.97                  |
| Trav5  | 15.25 | 833943.0446 | 820542.6 | 833948.4835 | 820538.0791 | 833943.9197 | 820532.6402 | 833938.4808 | 820537.204  | 29.11                  |
| Trav6  | 15.25 | 833957.8922 | 820530   | 833964.0589 | 820524.8161 | 833958.8845 | 820518.6495 | 833952.7178 | 820523.8239 | 33.01                  |
| Trav7  | 15.25 | 833968.7371 | 820521.1 | 833972.2226 | 820518.1324 | 833969.2979 | 820514.6469 | 833965.8124 | 820517.5715 | 18.66                  |
| Trav8  | 15.25 | 833977.6615 | 820513.6 | 833978.9638 | 820512.4758 | 833977.871  | 820511.1736 | 833976.5688 | 820512.2663 | 6.97                   |
| Trav9  | 4.7   | 833977.6615 | 820513.6 | 833983.3302 | 820508.8119 | 833978.5736 | 820503.1432 | 833972.9049 | 820507.8998 | 44.40                  |
| Trav10 | 10.7  | 833983.3302 | 820508.8 | 833978.8129 | 820512.6025 | 833975.0224 | 820508.0851 | 833979.5397 | 820504.2946 | 11.50                  |
| Trav11 | 15.25 | 833944.3398 | 820603.7 | 833946.8467 | 820606.6811 | 833943.8591 | 820609.188  | 833941.3522 | 820606.2004 | 15.99                  |
| Trav12 | 15.25 | 833943.472  | 820602.7 | 833936.9607 | 820608.1231 | 833931.497  | 820601.6117 | 833938.0083 | 820596.148  | 34.85                  |
| Trav13 | 15.25 | 833937.1406 | 820595.1 | 833930.3913 | 820587.0704 | 833922.3478 | 820593.8197 | 833929.0971 | 820601.8631 | 43.05                  |
| Trav14 | 5.1   | 833966.9733 | 820612.4 | 833975.0934 | 820605.5628 | 833981.907  | 820613.6828 | 833973.7869 | 820620.4964 | 75.26                  |
| Trav15 | 5.1   | 833975.7829 | 820605   | 833983.9029 | 820598.1707 | 833990.7165 | 820606.2908 | 833982.5964 | 820613.1043 | 75.26                  |
| Trav16 | 5.1   | 833993.4019 | 820590.2 | 834001.5219 | 820583.3866 | 834008.3355 | 820591.5067 | 834000.2154 | 820598.3202 | 75.26                  |
| Trav17 | 5.1   | 834002.2114 | 820582.8 | 834010.3315 | 820575.9945 | 834017.145  | 820584.1146 | 834009.0249 | 820590.9282 | 75.26                  |
| Trav18 | 5.1   | 834011.0209 | 820575.4 | 834019.141  | 820568.6025 | 834025.9545 | 820576.7226 | 834017.8344 | 820583.5361 | 75.26                  |
| Trav19 | 15.25 | 833969.6545 | 820610.1 | 833973.14   | 820607.2019 | 833976.0647 | 820610.6874 | 833972.5792 | 820613.6121 | 18.66                  |
| Trav20 | 15.25 | 833977.7586 | 820603.4 | 833981.9719 | 820599.8365 | 833985.5072 | 820604.0498 | 833981.294  | 820607.5851 | 22.55                  |
| Trav21 | 15.25 | 833986.5099 | 820595.9 | 833989.8755 | 820593.0003 | 833992.7867 | 820596.3659 | 833989.421  | 820599.2771 | 18.25                  |
| Trav22 | 15.25 | 833993.4019 | 820590.2 | 833999.4903 | 820584.9339 | 834004.7566 | 820591.0224 | 833998.6681 | 820596.2886 | 33.01                  |
| Trav23 | 15.25 | 834004.1696 | 820581.2 | 834008.3295 | 820577.5741 | 834011.9275 | 820581.7339 | 834007.7677 | 820585.3319 | 22.55                  |
| Trav24 | 15.25 | 834013.0291 | 820573.8 | 834017.1889 | 820570.2458 | 834020.7869 | 820574.4057 | 834016.6271 | 820578.0037 | 22.55                  |
| Trav25 | 15.25 | 834021.7269 | 820566.3 | 834023.8068 | 820564.5217 | 834025.6058 | 820566.6016 | 834023.5259 | 820568.4006 | 11.28                  |
| Trav26 | 21.75 | 833969.6545 | 820610.1 | 833973.14   | 820607.2019 | 833976.0647 | 820610.6874 | 833972.5792 | 820613.6121 | 18.66                  |
| Trav27 | 21.75 | 833977.7586 | 820603.4 | 833981.9719 | 820599.8365 | 833985.5072 | 820604.0498 | 833981.294  | 820607.5851 | 22.55                  |
| Trav28 | 21.75 | 833986.5099 | 820595.9 | 833989.8755 | 820593.0003 | 833992.7867 | 820596.3659 | 833989.421  | 820599.2771 | 18.25                  |
| Trav29 | 21.75 | 834013.0291 | 820573.8 | 834017.1889 | 820570.2458 | 834020.7869 | 820574.4057 | 834016.6271 | 820578.0037 | 22.55                  |
| Trav30 | 21.75 | 834021.7269 | 820566.3 | 834023.8068 | 820564.5217 | 834025.6058 | 820566.6016 | 834023.5259 | 820568.4006 | 11.28                  |
| Trav31 | 21.75 | 834004.8882 | 820580.6 | 834002.241  | 820582.8403 | 834004.5307 | 820585.4874 | 834007.1779 | 820583.1978 | 14.35                  |
| Trav32 | 21.75 | 833993.4019 | 820590.2 | 834001.419  | 820583.2657 | 834008.3534 | 820591.2828 | 834000.3363 | 820598.2173 | 43.46                  |
| Trav33 | 6.55  | 833996.5552 | 820520.8 | 834004.2315 | 820514.439  | 833997.8226 | 820506.7626 | 833990.1463 | 820513.1715 | 44.02                  |
| Trav34 | 6.55  | 834001.8105 | 820527.1 | 834009.8707 | 820520.4131 | 834016.6    | 820528.4732 | 834008.5399 | 820535.2026 | 43.58                  |
| Trav35 | 10.7  | 834001.8105 | 820527.1 | 834009.8707 | 820520.4131 | 834016.6    | 820528.4732 | 834008.5399 | 820535.2026 | 20.48                  |
| Trav36 | 10.7  | 833990.1463 | 820513.2 | 833996.5944 | 820507.7881 | 834001.9779 | 820514.2362 | 833995.5298 | 820519.6197 | 16.40                  |
| Trav37 | 14.85 | 833996.5552 | 820520.8 | 833999.8177 | 820518.1241 | 833997.0939 | 820514.8616 | 833993.8314 | 820517.5854 | 17.43                  |
| Trav38 | 14.85 | 834008.5399 | 820535.2 | 834011.8023 | 820532.4788 | 834009.0785 | 820529.2164 | 834005.8161 | 820531.9402 | 17.43                  |
| Trav39 | 14.85 | 834014.8526 | 820542.8 | 834018.1151 | 820540.04   | 834015.3913 | 820536.7776 | 834012.1289 | 820539.5013 | 17.43                  |
| Trav40 | 14.85 | 834021.1654 | 820550.3 | 834024.4278 | 820547.6012 | 834021.7041 | 820544.3387 | 834018.4416 | 820547.0625 | 17.43                  |
| Trav41 | 21.35 | 834014.8526 | 820542.8 | 834018.1151 | 820540.04   | 834015.3913 | 820536.7776 | 834012.1289 | 820539.5013 | 17.43                  |
| Trav42 | 21.35 | 834021.1654 | 820550.3 | 834024.4278 | 820547.6012 | 834021.7041 | 820544.3387 | 834018.4416 | 820547.0625 | 17.43                  |
| Trav43 | 21.75 | 833944.3398 | 820603.7 | 833946.8467 | 820606.6811 | 833943.8591 | 820609.188  | 833941.3522 | 820606.2004 | 15.99                  |
| Trav44 | 21.75 | 833943.472  | 820602.7 | 833936.9607 | 820608.1231 | 833931.497  | 820601.6117 | 833938.0083 | 820596.148  | 34.85                  |
| Trav45 | 21.75 | 833937.1406 | 820595.1 | 833930.3913 | 820587.0704 | 833922.3478 | 820593.8197 | 833929.0971 | 820601.8631 | 43.05                  |

|        |               | Nox           |           | Init. Lat. Dim. (m) | Init. Vert. Dim. (m) | Max Emission Rate (g/s) |           |           |                   |                             |                  |              |              |        |
|--------|---------------|---------------|-----------|---------------------|----------------------|-------------------------|-----------|-----------|-------------------|-----------------------------|------------------|--------------|--------------|--------|
| ID     | X-Coordinates | Y-Coordinates | Elevation |                     | Sigma Y              | Sigma Z                 | NOx       | RSP       | Opening Width (m) | Adjcant building height (m) | Opening Area (m) | Bottom (mPD) | Center (mPD) | Height |
| Trav1  | 833933.4838   | 820546.9      | 4.7       |                     | 2.86                 | 14.28                   | 0.0007547 | 0.0000126 | 6.15              | 30.7                        | 25.215           | 4.7          | 6.75         | 4.1    |
| Trav2  | 833932.8146   | 820546.9      | 4.7       |                     | 3.30                 | 14.28                   | 0.0008713 | 0.0000146 | 7.1               | 30.7                        | 29.11            | 15.25        | 17.3         | 4.1    |
| Trav3  | 833934.787    | 820547        | 4.7       |                     | 2.00                 | 14.28                   | 0.0002703 | 0.0000045 | 4.3               | 30.7                        | 9.03             | 21.75        | 22.8         | 2.1    |
| Trav4  | 833924.9067   | 820549.2      | 4.7       |                     | 6.35                 | 14.28                   | 0.0016751 | 0.0000281 | 13.65             | 30.7                        | 55.965           | 21.75        | 23.8         | 4.1    |
| Trav5  | 833943.4821   | 820537.6      | 4.7       |                     | 3.30                 | 14.28                   | 0.0008713 | 0.0000146 | 7.1               | 30.7                        | 29.11            | 15.25        | 17.3         | 4.1    |
| Trav6  | 833958.3883   | 820524.3      | 4.7       |                     | 3.74                 | 14.28                   | 0.0009879 | 0.0000165 | 8.05              | 30.7                        | 33.005           | 15.25        | 17.3         | 4.1    |
| Trav7  | 833969.0175   | 820517.9      | 4.7       |                     | 2.12                 | 14.28                   | 0.0005584 | 0.0000094 | 4.55              | 30.7                        | 18.655           | 15.25        | 17.3         | 4.1    |
| Trav8  | 833977.7663   | 820512.4      | 4.7       |                     | 0.79                 | 14.28                   | 0.0002086 | 0.0000035 | 1.7               | 30.7                        | 6.97             | 15.25        | 17.3         | 4.1    |
| Trav9  | 833978.1176   | 820508.4      | 4.7       |                     | 3.44                 | 14.28                   | 0.0013290 | 0.0000223 | 7.4               | 30.7                        | 44.4             | 4.7          | 7.7          | 6      |
| Trav10 | 833979.1763   | 820508.4      | 4.7       |                     | 2.74                 | 14.28                   | 0.0003442 | 0.0000058 | 5.897             | 30.7                        | 11.499           | 10.7         | 11.675       | 1.95   |
| Trav11 | 833944.0994   | 820606.4      | 4.7       |                     | 1.81                 | 14.28                   | 0.0004786 | 0.0000080 | 3.9               | 30.7                        | 15.99            | 15.25        | 17.3         | 4.1    |
| Trav12 | 833937.4845   | 820602.1      | 4.7       |                     | 3.95                 | 14.28                   | 0.0010431 | 0.0000175 | 8.5               | 30.7                        | 34.85            | 15.25        | 17.3         | 4.1    |
| Trav13 | 833929.7442   | 820594.5      | 4.7       |                     | 4.88                 | 14.28                   | 0.0012885 | 0.0000216 | 10.5              | 30.7                        | 43.05            | 15.25        | 17.3         | 4.1    |
| Trav14 | 833974.4402   | 820613        | 4.7       |                     | 4.93                 | 14.28                   | 0.0022526 | 0.0000377 | 10.6              | 30.7                        | 75.26            | 5.1          | 8.65         | 7.1    |
| Trav15 | 833983.2497   | 820605.6      | 4.7       |                     | 4.93                 | 14.28                   | 0.0022526 | 0.0000377 | 10.6              | 30.7                        | 75.26            | 5.1          | 8.65         | 7.1    |
| Trav16 | 834000.8687   | 820590.9      | 4.7       |                     | 4.93                 | 14.28                   | 0.0022526 | 0.0000377 | 10.6              | 30.7                        | 75.26            | 5.1          | 8.65         | 7.1    |
| Trav17 | 834009.6782   | 820583.5      | 4.7       |                     | 4.93                 | 14.28                   | 0.0022526 | 0.0000377 | 10.6              | 30.7                        | 75.26            | 5.1          | 8.65         | 7.1    |
| Trav18 | 834018.4877   | 820576.1      | 4.7       |                     | 4.93                 | 14.28                   | 0.0022526 | 0.0000377 | 10.6              | 30.7                        | 75.26            | 5.1          | 8.65         | 7.1    |
| Trav19 | 833972.8596   | 820610.4      | 4.7       |                     | 2.12                 | 14.28                   | 0.0005584 | 0.0000094 | 4.55              | 30.7                        | 18.655           | 15.25        | 17.3         | 4.1    |
| Trav20 | 833981.6329   | 820603.7      | 4.7       |                     | 2.56                 | 14.28                   | 0.0006750 | 0.0000113 | 5.5               | 30.7                        | 22.55            | 15.25        | 17.3         | 4.1    |
| Trav21 | 833989.6483   | 820596.1      | 4.7       |                     | 2.07                 | 14.28                   | 0.0005461 | 0.0000091 | 4.45              | 30.7                        | 18.245           | 15.25        | 17.3         | 4.1    |
| Trav22 | 833999.0792   | 820590.6      | 4.7       |                     | 3.74                 | 14.28                   | 0.0009879 | 0.0000165 | 8.05              | 30.7                        | 33.005           | 15.25        | 17.3         | 4.1    |
| Trav23 | 834008.0486   | 820581.5      | 4.7       |                     | 2.56                 | 14.28                   | 0.0006750 | 0.0000113 | 5.5               | 30.7                        | 22.55            | 15.25        | 17.3         | 4.1    |
| Trav24 | 834016.908    | 820574.1      | 4.7       |                     | 2.56                 | 14.28                   | 0.0006750 | 0.0000113 | 5.5               | 30.7                        | 22.55            | 15.25        | 17.3         | 4.1    |
| Trav25 | 834023.6663   | 820566.5      | 4.7       |                     | 1.28                 | 14.28                   | 0.0003375 | 0.0000057 | 2.75              | 30.7                        | 11.275           | 15.25        | 17.3         | 4.1    |
| Trav26 | 833972.8596   | 820610.4      | 4.7       |                     | 2.12                 | 14.28                   | 0.0005584 | 0.0000094 | 4.55              | 30.7                        | 18.655           | 21.75        | 23.8         | 4.1    |
| Trav27 | 833981.6329   | 820603.7      | 4.7       |                     | 2.56                 | 14.28                   | 0.0006750 | 0.0000113 | 5.5               | 30.7                        | 22.55            | 21.75        | 23.8         | 4.1    |
| Trav28 | 833989.6483   | 820596.1      | 4.7       |                     | 2.07                 | 14.28                   | 0.0005461 | 0.0000091 | 4.45              | 30.7                        | 18.245           | 21.75        | 23.8         | 4.1    |
| Trav29 | 834016.908    | 820574.1      | 4.7       |                     | 2.56                 | 14.28                   | 0.0006750 | 0.0000113 | 5.5               | 30.7                        | 22.55            | 21.75        | 23.8         | 4.1    |
| Trav30 | 834023.6663   | 820566.5      | 4.7       |                     | 1.28                 | 14.28                   | 0.0003375 | 0.0000057 | 2.75              | 30.7                        | 11.275           | 21.75        | 23.8         | 4.1    |
| Trav31 | 834004.7094   | 820583        | 4.7       |                     | 1.63                 | 14.28                   | 0.0004295 | 0.0000072 | 3.5               | 30.7                        | 14.35            | 21.75        | 23.8         | 4.1    |
| Trav32 | 834000.8776   | 820590.7      | 4.7       |                     | 4.93                 | 14.28                   | 0.0013008 | 0.0000218 | 10.6              | 30.7                        | 43.46            | 21.75        | 23.8         | 4.1    |
| Trav33 | 833997.1889   | 820513.8      | 4.7       |                     | 4.65                 | 14.28                   | 0.0013175 | 0.0000221 | 10                | 30.7                        | 44.016           | 5.7          | 7.9          | 4.4    |
| Trav34 | 834009.2053   | 820527.8      | 4.7       |                     | 4.88                 | 14.28                   | 0.0013043 | 0.0000218 | 10.5              | 30.7                        | 43.575           | 6.55         | 8.625        | 4.15   |
| Trav35 | 834009.2053   | 820527.8      | 4.7       |                     | 4.88                 | 14.28                   | 0.0006128 | 0.0000103 | 10.5              | 30.7                        | 20.475           | 10.7         | 11.675       | 1.95   |
| Trav36 | 833996.0621   | 820513.7      | 4.7       |                     | 3.91                 | 14.28                   | 0.0004909 | 0.0000082 | 8.4               | 30.7                        | 16.4             | 10.7         | 11.68        | 1.96   |
| Trav37 | 833996.8246   | 820517.9      | 4.7       |                     | 1.98                 | 14.28                   | 0.0005216 | 0.0000087 | 4.25              | 30.7                        | 17.425           | 14.85        | 16.9         | 4.1    |
| Trav38 | 834008.8092   | 820532.2      | 4.7       |                     | 1.98                 | 14.28                   | 0.0005216 | 0.0000087 | 4.25              | 30.7                        | 17.425           | 14.85        | 16.9         | 4.1    |
| Trav39 | 834015.122    | 820539.8      | 4.7       |                     | 1.98                 | 14.28                   | 0.0005216 | 0.0000087 | 4.25              | 30.7                        | 17.425           | 14.85        | 16.9         | 4.1    |
| Trav40 | 834021.4347   | 820547.3      | 4.7       |                     | 1.98                 | 14.28                   | 0.0005216 | 0.0000087 | 4.25              | 30.7                        | 17.425           | 14.85        | 16.9         | 4.1    |
| Trav41 | 834015.122    | 820539.8      | 4.7       |                     | 1.98                 | 14.28                   | 0.0005216 | 0.0000087 | 4.25              | 30.7                        | 17.425           | 21.35        | 23.4         | 4.1    |
| Trav42 | 834021.4347   | 820547.3      | 4.7       |                     | 1.98                 | 14.28                   | 0.0005216 | 0.0000087 | 4.25              | 30.7                        | 17.425           | 21.35        | 23.4         | 4.1    |
| Trav43 | 833944.0994   | 820606.4      | 4.7       |                     | 1.81                 | 14.28                   | 0.0004786 | 0.0000080 | 3.9               | 30.7                        | 15.99            | 21.75        | 23.8         | 4.1    |
| Trav44 | 833937.4845   | 820602.1      | 4.7       |                     | 3.95                 | 14.28                   | 0.0010431 | 0.0000175 | 8.5               | 30.7                        | 34.85            | 21.75        | 23.8         | 4.1    |
| Trav45 | 833929.7442   | 820594.5      | 4.7       |                     | 4.88                 | 14.28                   | 0.0012885 | 0.0000216 | 10.5              | 30.7                        | 43.05            | 21.75        | 23.8         | 4.1    |
| Total  |               |               |           |                     |                      |                         | 0.0405860 | 0.0006796 |                   |                             |                  |              |              |        |

Taking Trav1 as an example for better understanding:

X-Coordinates and Y-Coordinates as centroid of source

Sigma Y = Width of plume / 2.15 = 6.15 / 2.15 = 2.86

Sigma Z = Top of plume / 2.15 = (35.4 - 4.7) / 2.15 = 14.28

NOx Emission Rate = Total Emission x Area of Trav1 / Total Area for Emission = 0.041 x 25.215 / 1,355.97 = 0.0007547g/s

RSP Emission Rate = Total Emission x Area of Trav1 / Total Area for Emission = 0.00068 x 25.215 / 1,355.97 = 0.0000126g/s

Opening Width = 6.15

Adjacent Building Height = Building Height - Ground Level = 35.4 - 4.7 = 30.7m

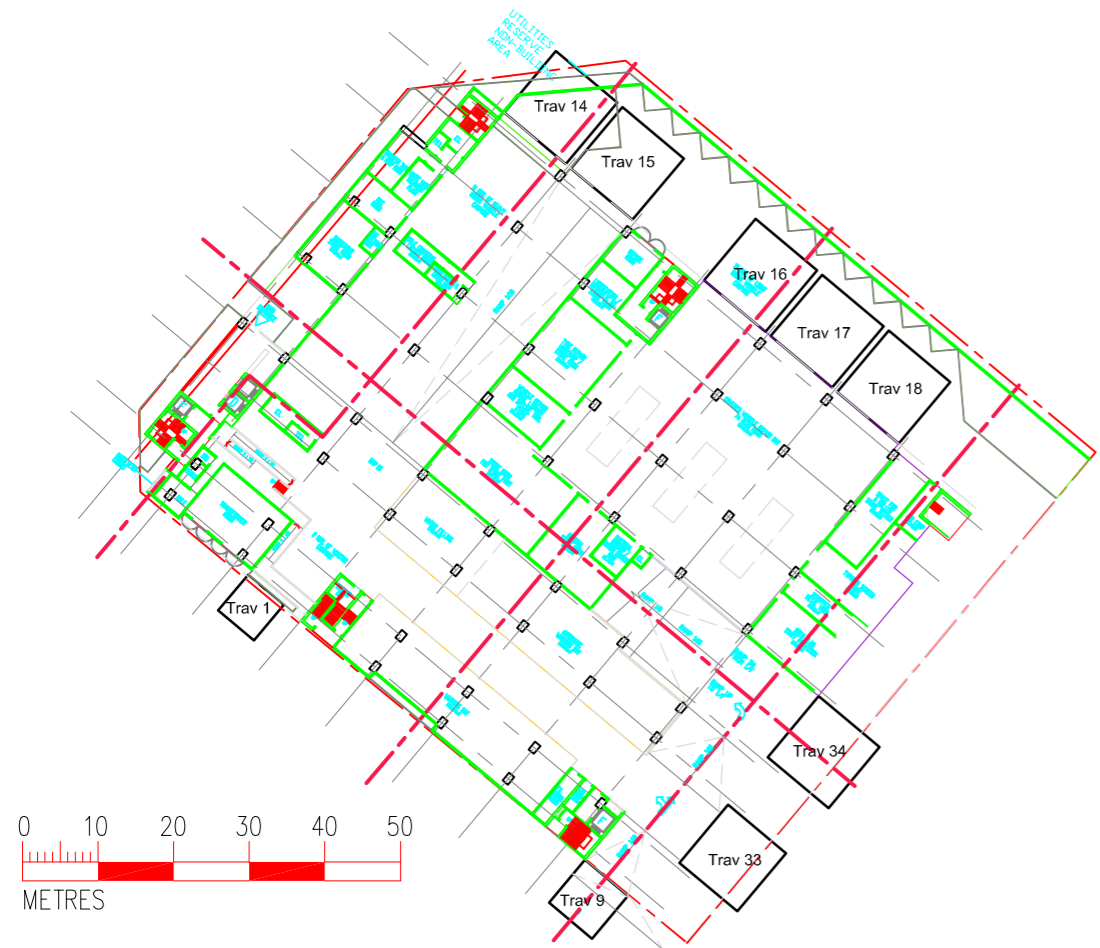
Opening Area = 6.15 x 4.1 = 25.215m<sup>2</sup>

Bottom = 4.7m (= ground level)

Centre = 4.7 + 4.1 / 2 = 6.75m (centre of opening)

Height = 4.1m (= height of opening)

NOTES:



**Opening at Ground Floor**



**Opening at Upper Ground Floor**



**Opening at 1 Floor**



**Opening at 2 Floor**

| Rev. | Date | Description | Drawn | Checked |
|------|------|-------------|-------|---------|
|      |      |             |       |         |

Department (Project Proponent) 部門(項目申請人):  

**FOOD AND ENVIRONMENTAL HYGIENE DEPARTMENT**  
 食物環境衛生署

Department (Works) 部門(工程):  

**ARCHITECTURAL SERVICES DEPARTMENT**  
 建築署

Lead Architect (Consultancy Agreement No. 9AX 034)  
 建築顧問(顧問合約編號9AX 034):  

**P&T Architects and Engineers Ltd**  
 巴馬丹拿建築及工程師有限公司

Project Title 項目名稱:  
 REPROVISIONING OF FEHD SAI YEE STREET ENVIRONMENTAL HYGIENE OFFICES-CUM-VEHICLE DEPOT AT YEN MING ROAD, WEST KOWLOON RECLAMATION AREA  
 在西九龍填海區欽明路重新置食物環境衛生署洗衣街環境衛生辦事處暨車房

Drawing Title 圖則名稱:  
**Volume Source Locations from Traveling within Depot Area**

|                  |                        |            |           |          |
|------------------|------------------------|------------|-----------|----------|
| Drawing No. 圖則編號 | Appendix 4-4 - Annex 6 |            |           |          |
| Designed 設計      | Drawn 繪圖               | Checked 校核 | ICWR 比例   | Scale 比例 |
| Approved 批准      | HTMI                   | Date 日期    | Status 狀態 | FINAL    |

URS Hong Kong Ltd 



## **Appendix 4-5 Estimation of Idling Emission Factors within Depot Area**

## Determination of idling emission factors within FEHD Yen Ming Road

### 1. Background

While the latest Emfac-HK model would generate a set of accurate prediction of the travelling vehicle emission factors, it was not dedicated to the calculation of idling emissions from vehicles, which account for most of the emissions from the Depot. Other more appropriate approach to estimating the idling emissions from the Depot has therefore been sought.

Appendix of the report “Road Tunnels: Vehicle Emissions and Air Demand for Ventilation” published by the Permanent International Association of Road Congresses (PIARC) in November 2004 presented the emission factors for different Euro engine types under different traveling speeds and gradients, including idling mode (i.e.  $v=0$ ). Emission factors presented in the document has been adopted for deriving the idling emission factors for this project.

In determining the composite idling emission factors in the assessment year, it takes account of the technology fraction of different engine types. Although, the existing vehicles will most likely be replaced with vehicles complying with the standards for environmental friendly (EF) petrol cars or Euro V standard or above for commercial vehicles in the prevailing policy, no implementation schedule is determined in the stage of this EIA study. As shown in **Annex 1**, vehicles will be at least EURO II or better, it has been assumed that the vehicles to be EURO II on conservative side.

As the maintenance works involving idling emission would be come-and-go basis, maximum engine on-time per each vehicle is assumed to be maximal 15 minutes for conservative approach. The number vehicle under maintenance is assumed to be **3** at each time as it is limited by the number of maintenance bay. Although, the maintenance period for each vehicle is about 2 to 3 hours, 15 minutes of idling emissions were assumed in each hour of the maintenance period of each vehicle throughout all working hours every day as conservative approach.

For washing of RCVs, engine needs to be turned on twice for each vehicle washing to up-lift the tailgate (rear hopper) before the washing and lower down the tailgate after each vehicle washing. The total engine on-time would be 5 minutes for each vehicle washing which last for about 30 minutes.

The number of RCVs being manually washed is assumed to be 2 at the same time as limited by the number of washing bays. It leads to total of **4** RCV to be assumed in each hour throughout all working hours every day as conservative approach.

**Annex 2-3** presents the detailed calculations of emission rates and locations of the sources assumed, whereas **Annex 4** illustrate the location of exhaust fans.

On average, such engine run would be repeated at an interval of two to three hours during the 12 hours of major maintenance works (from 0700 to 1900 hours). The operation schedule therefore is asumed to 100% from 7:00 to 19:00 every day, as shown in **Annex 6**

**Table 1**

| <u>Emission Standard</u> | <u>Vehicle Type</u>                                   | <u>GVW (kg)</u> | <u>Fuel</u> | <u>GVW 500</u> | <u>Vehicle</u> |
|--------------------------|---|-----------------|-------------|----------------|----------------|
| Euro II                  | Medium Bus (20-passenger)                             | 4790            | Diesel      | 4500           | HGV            |
| Euro IV                  | Small Saloon Car                                      | 1445            | Petrol      | 1000           | LGV            |
| Euro III                 | Small Motorcycle                                      | 338             | Petrol      | 0              | LGV            |
| Euro III                 | Small Motorcycle                                      | 338             | Petrol      | 0              | LGV            |
| Euro III                 | Small Motorcycle                                      | 338             | Petrol      | 0              | LGV            |
| Euro III                 | Small Motorcycle                                      | 338             | Petrol      | 0              | LGV            |
| Euro II                  | Small Motorcycle                                      | 277             | Petrol      | 0              | LGV            |
| Euro IV                  | Medium HP Van (5-passenger)                           | 2800            | Petrol      | 2500           | HGV            |
| Euro II                  | Small Motorcycle                                      | 0               | Petrol      | 0              | LGV            |
| Euro II                  | Small Motorcycle                                      | 277             | Petrol      | 0              | LGV            |
| Euro II                  | Small Motorcycle                                      | 277             | Petrol      | 0              | LGV            |
| Euro II                  | Small Motorcycle                                      | 0               | Petrol      | 0              | LGV            |
| Euro II                  | Small Motorcycle                                      | 277             | Petrol      | 0              | LGV            |
| Euro II                  | Small Motorcycle                                      | 0               | Petrol      | 0              | LGV            |
| Euro II                  | Small Motorcycle                                      | 278             | Petrol      | 0              | LGV            |
| Electricity              | Small Saloon Car (Electric)                           | 1450            | Electrical  | 1000           | LGV            |
| Euro II                  | Medium Window Van (7-passenger)                       | 2755            | Petrol      | 2500           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)                           | 2800            | Petrol      | 2500           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)                           | 2800            | Petrol      | 2500           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)                           | 3100            | Petrol      | 3000           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)                           | 3100            | Petrol      | 3000           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)                           | 3100            | Petrol      | 3000           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)                           | 3100            | Petrol      | 3000           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)                           | 3100            | Petrol      | 3000           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)                           | 3100            | Petrol      | 3000           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)                           | 3100            | Petrol      | 3000           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)                           | 3100            | Petrol      | 3000           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)                           | 3100            | Petrol      | 3000           | HGV            |
| Euro III                 | Broadcasting Van (L HP Van)                           | 3500            | Petrol      | 3500           | HGV            |
| Euro III                 | C&C Truck (Light Truck C Cab)                         | 5500            | Diesel      | 5500           | HGV            |
| Euro II                  | Tipper Lorry  | 10170           | Diesel      | 10000          | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                          | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Mobile Publicity Vehicle (Large Panel Van LPG)        | 4600            | LPG         | 4500           | HGV            |
| Euro III                 | Large Window Van (10-passenger)                       | 3500            | Petrol      | 3500           | HGV            |
| Euro IV                  | Large Window Van (11-passenger)                       | 3500            | Petrol      | 3500           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)                           | 2800            | Petrol      | 2500           | HGV            |
| Euro III                 | Large Window Van (10-passenger)                       | 3500            | Petrol      | 3500           | HGV            |
| Euro III                 | Recovery Vehicle (M Truck S Cab 11-T GVW) 2-passenger | 11990           | Diesel      | 11500          | HGV            |
| Euro IV                  | Multi-purpose Car (7-passenger)                       | 2135            | Petrol      | 2000           | HGV            |
| Euro III                 | Grab-Tipper Lorry (M Truck S Cab)                     | 11990           | Diesel      | 11500          | HGV            |
| Euro II                  | Tipper Lorry  | 10170           | Diesel      | 10000          | HGV            |

| <u>Emission Standard</u> | <u>Vehicle Type</u>                       | <u>GVW (kg)</u> | <u>Fuel</u> | <u>GVW 500</u> | <u>Vehicle</u> |
|--------------------------|---|-----------------|-------------|----------------|----------------|
| Euro IV                  | Large Window Van (11-passenger)           | 3500            | Petrol      | 3500           | HGV            |
| Euro IV                  | Large Window Van (11-passenger)           | 3500            | Petrol      | 3500           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)               | 2800            | Petrol      | 2500           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)               | 2800            | Petrol      | 2500           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | Large Window Van (10-passenger)           | 3500            | Petrol      | 3500           | HGV            |
| Euro III                 | Large Window Van (12-passenger)           | 3500            | Petrol      | 3500           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)               | 2800            | Petrol      | 2500           | HGV            |
| Euro III                 | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| Euro V                   | Light Bus (16-passenger) LPG              | 4350            | LPG         | 4000           | HGV            |
| Euro V                   | Light Bus (16-passenger) LPG              | 4350            | LPG         | 4000           | HGV            |
| Euro V                   | Light Bus (16-passenger) LPG              | 4350            | LPG         | 4000           | HGV            |
| Euro IV                  | Light Bus (16-passenger) LPG              | 4350            | LPG         | 4000           | HGV            |
| Euro IV                  | Light Bus (16-passenger) LPG              | 4350            | LPG         | 4000           | HGV            |
| Euro III                 | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| Euro IV                  | Light Bus (16-passenger) LPG              | 4350            | LPG         | 4000           | HGV            |
| Euro III                 | Large Window Van (12-passenger)           | 3500            | Petrol      | 3500           | HGV            |
| Euro III                 | Large Window Van (12-passenger)           | 3500            | Petrol      | 3500           | HGV            |
| Euro III                 | Large Window Van (12-passenger)           | 3500            | Petrol      | 3500           | HGV            |
| Euro II                  | Light Bus (16-passenger)                  | 4000            | Diesel      | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | Light Truck-C/Cab Tail-lift (5-           | 5500            | Diesel      | 5500           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | Light Truck-C/Cab Tail-lift (5-           | 5500            | Diesel      | 5500           | HGV            |
| Euro III                 | Medium Bus (18-passenger)                 | 5500            | Diesel      | 5500           | HGV            |
| Euro IV                  | Large Window Van (11-passenger)           | 3500            | Petrol      | 3500           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| Euro IV                  | Large Window Van (11-passenger)           | 3500            | Petrol      | 3500           | HGV            |
| Euro V                   | Light Truck-C/Cab Tail-lift (5-passenger) | 5500            | Diesel      | 5500           | HGV            |
| Euro V                   | Light Truck-C/Cab Tail-lift (5-passenger) | 5500            | Diesel      | 5500           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)               | 2800            | Petrol      | 2500           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)               | 2800            | Petrol      | 2500           | HGV            |
| Euro III                 | Street Washer                             | 14500           | Diesel      | 14500          | HGV            |

| <u>Emission Standard</u> | <u>Vehicle Type</u>                           | <u>GVW (kg)</u> | <u>Fuel</u> | <u>GVW 500</u> | <u>Vehicle</u> |
|--------------------------|---|-----------------|-------------|----------------|----------------|
| Euro III                 | Street Washer                                 | 14500           | Diesel      | 14500          | HGV            |
| Euro III                 | Street Washer                                 | 14500           | Diesel      | 14500          | HGV            |
| Euro III                 | Street Washer                                 | 14500           | Diesel      | 14500          | HGV            |
| Euro III                 | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| Euro IV                  | Light Bus (16-passenger) LPG                  | 4350            | LPG         | 4000           | HGV            |
| Euro IV                  | Light Bus (16-passenger) LPG                  | 4350            | LPG         | 4000           | HGV            |
| Euro III                 | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | Light Truck-C/Cab Tail-lift (5-               | 5500            | Diesel      | 5500           | HGV            |
| Euro III                 | Light Truck-C/Cab Tail-lift (5-               | 5500            | Diesel      | 5500           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | Medium Bus (18-passenger)                     | 5500            | Diesel      | 5500           | HGV            |
| Euro III                 | Dead Removal Truck (Medium Truck C Cab (11-T) | 11000           | Diesel      | 11000          | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| Euro IV                  | Large Window Van (11-passenger)               | 3500            | Petrol      | 3500           | HGV            |
| Euro III                 | Light Truck-C/Cab Tail-lift (5-               | 5500            | Diesel      | 5500           | HGV            |
| Euro V                   | Light Truck-C/Cab Tail-lift (5-passenger)     | 5500            | Diesel      | 5500           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG                  | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | Light Truck-C/Cab Tail-lift (5-               | 5500            | Diesel      | 5500           | HGV            |
| Euro V                   | Light Bus (16-passenger) LPG                  | 4350            | LPG         | 4000           | HGV            |
| Euro III                 | Light Truck-C/Cab Tail-lift (5-               | 5500            | Diesel      | 5500           | HGV            |
| Euro III                 | Street Washer                                 | 14500           | Diesel      | 14500          | HGV            |
| Euro III                 | Street Washer                                 | 14500           | Diesel      | 14500          | HGV            |
| Euro III                 | Street Washer                                 | 14500           | Diesel      | 14500          | HGV            |
| Euro III                 | Street Washer                                 | 14500           | Diesel      | 14500          | HGV            |
| Euro III                 | Light Truck-C/Cab Tail-lift (5-               | 5500            | Diesel      | 5500           | HGV            |

| <u>Emission Standard</u> | <u>Vehicle Type</u>                       | <u>GVW (kg)</u> | <u>Fuel</u> | <u>GVW 500</u> | <u>Vehicle</u> |
|--------------------------|---|-----------------|-------------|----------------|----------------|
| Euro V                   | Light Truck-C/Cab Tail-lift (5-passenger) | 5500            | Diesel      | 5500           | HGV            |
| Euro II                  | Extra Large Window Van (19-               | 6600            | Diesel      | 6500           | HGV            |
| Euro III                 | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| Euro IV                  | Light Bus (16-passenger) LPG              | 4350            | LPG         | 4000           | HGV            |
| Euro II                  | Dead Removal Truck (Light Truck C Cab)    | 5500            | Diesel      | 5500           | HGV            |
| Euro II                  | Dead Removal Truck (Light Truck C Cab)    | 5500            | Diesel      | 5500           | HGV            |
| Euro IV                  | Large Window Van (11-passenger)           | 3500            | Petrol      | 3500           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)               | 2800            | Petrol      | 2500           | HGV            |
| Euro V                   | Light Bus (16-passenger) LPG              | 4350            | LPG         | 4000           | HGV            |
| Euro III                 | Light Truck-C/Cab Tail-lift (5-           | 5500            | Diesel      | 5500           | HGV            |
| Euro III                 | Street Washer                             | 14500           | Diesel      | 14500          | HGV            |
| Euro III                 | Street Washer                             | 14500           | Diesel      | 14500          | HGV            |
| Euro III                 | Street Washer                             | 14500           | Diesel      | 14500          | HGV            |
| Euro III                 | Light Truck-C/Cab Tail-lift (5-           | 5500            | Diesel      | 5500           | HGV            |
| Euro III                 | Light Truck-C/Cab Tail-lift (5-           | 5500            | Diesel      | 5500           | HGV            |
| Euro III                 | Street Washer                             | 14500           | Diesel      | 14500          | HGV            |
| Euro III                 | Street Washer                             | 14500           | Diesel      | 14500          | HGV            |
| Euro III                 | Street Washer                             | 14500           | Diesel      | 14500          | HGV            |
| Euro III                 | Street Washer                             | 14500           | Diesel      | 14500          | HGV            |
| Euro III                 | Light Truck-C/Cab Tail-lift (5-           | 5500            | Diesel      | 5500           | HGV            |
| Euro III                 | Light Truck-C/Cab Tail-lift (5-           | 5500            | Diesel      | 5500           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)               | 2800            | Petrol      | 2500           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| No Engine                | RCV Trailer (Bin)                         | 24000           |             | 24000          | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | Medium Bus (20-passenger)                 | 5500            | Diesel      | 5500           | HGV            |
| Euro III                 | Medium HP Van (5-passenger)               | 2755            | Petrol      | 2500           | HGV            |
| Euro IV                  | Medium HP Van (5-passenger)               | 2800            | Petrol      | 2500           | HGV            |
| LPG                      | Light Bus (16-passenger) LPG              | 4000            | LPG         | 4000           | HGV            |
| Euro III                 | RCV 11-ton payload (Bin)                  | 24000           | Diesel      | 24000          | HGV            |
| Euro III                 | RCV 11-ton payload (Bin)                  | 24000           | Diesel      | 24000          | HGV            |

| <u>Emission Standard</u> | <u>Vehicle Type</u>      | <u>GVW (kg)</u> | <u>Fuel</u> | <u>GVW 500</u> | <u>Vehicle</u> |
|--------------------------|--------------------------|-----------------|-------------|----------------|----------------|
| Euro III                 | RCV 11-ton payload (Bin) | 24000           | Diesel      | 24000          | HGV            |
| Euro III                 | RCV 11-ton payload (Bin) | 24000           | Diesel      | 24000          | HGV            |
| Euro II                  | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro II                  | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro II                  | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro II                  | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro II                  | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro II                  | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro III                 | RCV 4-ton payload (Bin)  | 14000           | Diesel      | 14000          | HGV            |
| Euro III                 | RCV 4-ton payload (Bin)  | 14000           | Diesel      | 14000          | HGV            |
| Euro III                 | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro II                  | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro II                  | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro III                 | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro III                 | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro III                 | RCV 12-ton payload (Bin) | 26000           | Diesel      | 26000          | HGV            |
| Euro III                 | RCV 12-ton payload (Bin) | 26000           | Diesel      | 26000          | HGV            |
| Euro III                 | RCV 12-ton payload (Bin) | 26000           | Diesel      | 26000          | HGV            |
| Euro III                 | RCV 12-ton payload (Bin) | 26000           | Diesel      | 26000          | HGV            |
| Euro III                 | RCV 12-ton payload (Bin) | 26000           | Diesel      | 26000          | HGV            |
| Euro III                 | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 11-ton payload (Bin) | 24000           | Diesel      | 24000          | HGV            |
| Euro V                   | RCV 11-ton payload (Bin) | 24000           | Diesel      | 24000          | HGV            |
| Euro V                   | RCV 11-ton payload (Bin) | 24000           | Diesel      | 24000          | HGV            |
| Euro V                   | RCV 11-ton payload (Bin) | 24000           | Diesel      | 24000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin)  | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 11-ton payload (Bin) | 24000           | Diesel      | 24000          | HGV            |
| Euro V                   | RCV 11-ton payload (Bin) | 24000           | Diesel      | 24000          | HGV            |

| <u>Emission Standard</u> | <u>Vehicle Type</u>     | <u>GVW (kg)</u> | <u>Fuel</u> | <u>GVW 500</u> | <u>Vehicle</u> |
|--------------------------|-------------------------|-----------------|-------------|----------------|----------------|
| Euro V                   | RCV 6-ton payload (Bin) | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin) | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin) | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin) | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin) | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin) | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin) | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin) | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin) | 16000           | Diesel      | 16000          | HGV            |
| Euro V                   | RCV 6-ton payload (Bin) | 16000           | Diesel      | 16000          | HGV            |
| Euro III                 | RCV Tractor             | 16000           | Diesel      | 16000          | HGV            |
| Euro III                 | RCV Tractor             | 16000           | Diesel      | 16000          | HGV            |
| No Engine                | RCV Trailer (Bin)       | 18552           |             |                |                |



**Table 4****1. Background** Heavy Goods Vehicle

| Activities  | Tier    | $q_{ex}$ <sup>Note2</sup> | $f_m$ <sup>Note3</sup> | $f_h$ <sup>Note5</sup> | $q_{ne}$ <sup>Note6</sup> | MIRA<br>Correlation<br>factor ( $m^2/g$ )<br><sup>Note4</sup> | Emission<br>Rate (g/h) | Operation time (s) | Corrected<br>PM (g/h)<br>per vehicle | Corrected<br>PM(g/s)<br>per vehicle | Nos of<br>Vehicle | Corrected PM<br>(g/s) |
|-------------|---------|---------------------------|------------------------|------------------------|---------------------------|---|------------------------|--------------------|--------------------------------------|-------------------------------------|-------------------|-----------------------|
| Maintenance | Euro II | 8.4                       | 2.3                    | 1                      | 0                         | 4.7   | 4.11                   | 900                | 1.028                                | 0.000285                            | 3                 | 0.000856              |
| Washing     | Euro II | 8.4                       | 2.3                    | 1                      | 0                         | 4.7   | 4.11                   | 300                | 0.343                                | 0.000095                            | 4                 | 0.000381              |
|             |         |                           |                        |                        |                           |   |                        |                    |                                      |                                     | 7                 | 0.001237              |

1 Euro II idling emission factor for Nox is assumed as conservative approach

2 Source: Tables II.3-52 to II.3-56, Appendix 2 of "Road Tunnels: Vehicle Emission and Air Demand for Ventilation, PIARC, November 2004.

3 **Mass Correction Factor** Source: Table II.3-57, Appendix 2 to "Road Tunnels: Vehicle Emission and Air Demand for Ventilation, PIARC, November 2004.

4 A conversion factor between particulate emission in g and turbidity is given by the MIRA-correlation factor  $1g = 4.7m^2$  (see page 25).

5 Altitude factor, Source: Tables II.3-59 Appendix 2 of "Road Tunnels: Vehicle Emission and Air Demand for Ventilation, PIARC, November 2004.

6 Emission factor for non exhaust particular matter, taken as 0 for  $v(km/h) = 0$ , Source: Tables III.3-2 of "Road Tunnels: Vehicle Emission and Air Demand for Ventilation, PIARC, November 2004.

**Table5****1. Background** Heavy Goods Vehicle

| Activities  | Tier    | $q_{ex}$ <sup>Note2</sup> | $f_m$ <sup>Note3</sup> | $f_h$ <sup>Note4</sup> | $q_{ne}$ <sup>Note5</sup> | Emission Rate (g/h) | Operation time (s) | Corrected NOx (g/h) per vehicle | Corrected NOx (g/s) per vehicle | Nos of Vehicle | Corrected NOx (g/s) |
|-------------|---------|---------------------------|------------------------|------------------------|---------------------------|---------------------|--------------------|---------------------------------|---------------------------------|----------------|---------------------|
| Maintenance | Euro II | 40.8                      | 2.5                    | 1                      | 0                         | 102.00              | 900                | 25.500                          | 0.00708                         | 3              | 0.0212500           |
| Washing     | Euro II | 40.8                      | 2.5                    | 1                      | 0                         | 102.00              | 300                | 8.500                           | 0.00236                         | 4              | 0.0094444           |
|             |         |                           |                        |                        |                           |                     |                    |                                 |                                 | 7              | 0.0306944           |

1 Euro II idling emission factor for Nox is assumed as conservative approach

0.038680556

2 **Basic idling Emission Factor**, Tables II.3-46 to II.3-50, Appendix 2 of Road Tunnels: Vehicle Emission and Air Demand for Ventilation, PIARC, November 2004.

3 **Mass Correction Factor** Source: Table II.3-51, Appendix 2 to "Road Tunnels: Vehicle Emission and Air Demand for Ventilation, PIARC, November 2004.

4 Altitude factor, Source: Tables II.3-59 Appendix 2 of "Road Tunnels: Vehicle Emission and Air Demand for Ventilation, PIARC, November 2004.

5 Emission factor for non exhaust particular matter, 0 for  $v(\text{km/h}) = 0$ , Source: Tables III.3-2 of "Road Tunnels: Vehicle Emission and Air Demand for Ventilation, PIARC, November 2004.



Appendix 4-5 Idling Emissions  
Annex4 Location of Exhaust Fan (IDLE1, IDLE2 and IDLE3)

| Hour  | NOx              | RSP              |
|-------|------------------|------------------|
|       | Operation Factor | Operation Factor |
| 0:00  | 0.00             | 0.00             |
| 1:00  | 0.00             | 0.00             |
| 2:00  | 0.00             | 0.00             |
| 3:00  | 0.00             | 0.00             |
| 4:00  | 0.00             | 0.00             |
| 5:00  | 0.00             | 0.00             |
| 6:00  | 0.00             | 0.00             |
| 7:00  | 1.00             | 1.00             |
| 8:00  | 1.00             | 1.00             |
| 9:00  | 1.00             | 1.00             |
| 10:00 | 1.00             | 1.00             |
| 11:00 | 1.00             | 1.00             |
| 12:00 | 1.00             | 1.00             |
| 13:00 | 1.00             | 1.00             |
| 14:00 | 1.00             | 1.00             |
| 15:00 | 1.00             | 1.00             |
| 16:00 | 1.00             | 1.00             |
| 17:00 | 1.00             | 1.00             |
| 18:00 | 1.00             | 1.00             |
| 19:00 | 0.00             | 0.00             |
| 20:00 | 0.00             | 0.00             |
| 21:00 | 0.00             | 0.00             |
| 22:00 | 0.00             | 0.00             |
| 23:00 | 0.00             | 0.00             |