

### 3.4.2 Result 1

| Middlemen |                   |                                   |         | 1                    | 1        | 2 3.1 |     |      |    |     |    |       |    |    |    |       |     |     |    |        |    |     |    |     |    |    |     | 3.2 |       | Colle |
|-----------|-------------------|-----------------------------------|---------|----------------------|----------|-------|-----|------|----|-----|----|-------|----|----|----|-------|-----|-----|----|--------|----|-----|----|-----|----|----|-----|-----|-------|-------|
| ID No     | Business name     | Address/location                  | Opn Yrs | Main activities      | Plastics |       |     | Bags |    |     |    | Paper |    |    |    | Glass |     |     |    | Metals |    |     |    | Oth | Pl | Ba |     |     |       |       |
|           |                   |                                   |         |                      | MU       | CS    | Tot | PS   | FB | PFB | SB | Tot   | NP | EB | WP | CB    | Tot | Arr | BB | BJ     | Br | Tot | Al | BC  | CB | Fe | Tot | Ba  |       |       |
| MM1       | M.Lafar           | 151 Jayabima,Chilaw               | 10      | Buy/sell recyclables |          |       |     |      | Y  | Y   | Y  | Y     | Y  | Y  |    | Y     | Y   | Y   | Y  | Y      |    | Y   | Y  | Y   | Y  | Y  | Y   | Y   | A,B,E |       |
| MM2       | Daniel Wargaraja  | 159 Puttalam Rd,Thimbila,Jayabima | 9mths   | Buy/sell recyclables |          | Y     | Y   |      | Y  | Y   | Y  | Y     | Y  | Y  |    | Y     | Y   | Y   | Y  | Y      | Y  |     | Y  | Y   | Y  | Y  | Y   | Y   | A     | A     |
| MM3       | Sarona Stores     | 38 Lake Rd,Chilaw                 | 12      | Buy/sell recyclables | Y        |       |     |      | Y  | Y   | Y  | Y     | Y  | Y  |    | Y     | Y   | Y   | Y  | Y      | Y  |     | Y  | Y   | Y  | Y  | Y   | Y   | A,E   | A,E   |
| MM4       | Thangawelu Stores | 77 Puttalam Rd,Chilaw             | 30      | Buy/sell recyclables |          |       |     |      | Y  | Y   | Y  | Y     | Y  | Y  |    | Y     | Y   | Y   | Y  | Y      | Y  |     | Y  | Y   | Y  | Y  | Y   | Y   | B     | B     |
| MM5       | Rejina Stores     | 9 Corea Rd,Chilaw                 | 25      | Buy/sell recyclables | Y        |       | Y   |      | Y  | Y   | Y  | Y     | Y  | Y  |    | Y     | Y   | Y   | Y  | Y      | Y  |     | Y  | Y   | Y  | Y  | Y   | Y   | A     | A     |
| Total     |                   | Total no of middlemen surveyed    | 5       | No                   | 2        | 1     | 2   | 0    | 5  | 4   | 5  | 5     | 5  | 5  | 0  | 1     | 5   | 5   | 5  | 5      | 1  | 5   | 5  | 5   | 5  | 5  | 5   | 5   |       |       |

#### Notes:

1. Cells containing formulae shaded in light blue - do not use.

2. NA = no answer; IR = irrelevant

| Count |   |   |
|-------|---|---|
| A     | 3 | 4 |
| B     | 0 | 1 |
| C     | 0 | 0 |
| D     | 0 | 0 |
| E     | 1 | 2 |
| F     | 0 | 0 |

#### Recycling Factory

| 1                    |                | 1                         |         | 1                   |        | 2  |    | 3.1 |    |            |      | 3.2 |    | 3.3 |    |    | 3.4           |            |                   |            | 4. Worker details |            |    |    |    |    |               |          | 5.1    |  | 5.2 |  | 5.3 |  |
|----------------------|----------------|---------------------------|---------|---------------------|--------|----|----|-----|----|------------|------|-----|----|-----|----|----|---------------|------------|-------------------|------------|-------------------|------------|----|----|----|----|---------------|----------|--------|--|-----|--|-----|--|
| ID No                | Business name  | Address/location          | Opn Yrs | Main activities     | Metals |    |    |     | Me | Metals (%) |      |     | A  | B   | C  | D  | Manager/owner |            | Full-time workers |            | PT workers        |            | Me |    |    | Me | Name, distanc |          |        |  |     |  |     |  |
|                      |                |                           |         |                     | Al     | BC | Fe | Tot |    | H          | C    | I   |    |     |    |    | No            | Hr/wk d/mt | No                | Hr/wk d/mt | No                | Hr/wk d/mt |    |    |    |    |               |          |        |  |     |  |     |  |
| MM6                  | Bhuwalka Steel | Suduwela Village, Madampe | 2       | reinforc. rod manuf |        |    | Y  | Y   | E  | 12.5       | 27.5 | 60  | NA | NA  | NA | NA | 18            | 1296       | 26                | 400        | 28800             | NA         | 20 | NA | NA | D  | TOR steel     | In Kanak | Mr Moi |  |     |  |     |  |
| All over the country |                |                           |         |                     |        |    |    |     |    |            |      |     |    |     |    |    |               |            |                   |            |                   |            |    |    |    |    |               |          |        |  |     |  |     |  |

All over the country including Gampaha, Matale, Colombo, Anuradhapura, Polonnaruwa, Puttalam, Trincomalee, Monaragala, Kandy, Matara.

The above . In total, the scattered ar

|        |       |       |       |       |       | 3.3 Main sources |     |      |     |          |     |      |      |                     |     |      |     |     |     |                  |     |     |                |      |     | 3.4 Coll'n area (%) |     |      |       |               | 4. Worker |     |     |                       |      |      |     |     |            |       |
|--------|-------|-------|-------|-------|-------|------------------|-----|------|-----|----------|-----|------|------|---------------------|-----|------|-----|-----|-----|------------------|-----|-----|----------------|------|-----|---------------------|-----|------|-------|---------------|-----------|-----|-----|-----------------------|------|------|-----|-----|------------|-------|
| ID No  | Pa    | Gl    | Me    | Oth   | Tot   | Plastic (%)      |     |      |     | Bags (%) |     |      |      | Paper/cardboard (%) |     |      |     |     |     | Broken glass (%) |     |     | GI bottles (%) |      |     | Metals (%)          |     |      |       | Batteries (%) |           |     |     | Prop (%)              | A    | B    | C   | D   | Manager/No | Hr/wk |
|        |       |       |       |       |       | H                | C   | I    | O   | H        | Ht  | C    | I    | H                   | C   | Go   | S   | I   | O   | H                | Ht  | O   | H              | Ht   | O   | H                   | C   | I    | O     | H             | I         | C   | O   |                       |      |      |     |     |            |       |
| MM1    | A,B,E | A,B,E | A,B,E | A,B,E | A,B,E |                  |     |      |     | 20       | 0   | 80   | 0    | 80                  | 0   | 10   | 10  | 0   | 0   |                  |     |     | 90             | 10   | 0   | 10                  | 0   | 90   | 0     | 70            | 30        | 0   | 0   | 18.3                  | 30   | 70   |     |     | 1          | 70    |
| MM2    | A     | A     | A     | A     | A     | 0                | 0   | 100  | 0   | 20       | 10  | 70   | 0    | 80                  | 0   | 0    | 0   | 0   | 20  |                  |     |     | 100            | 0    | 0   | 20                  | 0   | 0    | 80    | 80            | 0         | 0   | 20  | 5.9                   | 35   | 50   | 15  |     | 1          | 57    |
| MM3    | A,E   | A,E   | A,E   | A,E   | A,E   | 0                | 0   | 100  | 0   | 0        | 10  | 20   | 70   | 100                 | 0   | 0    | 0   | 0   | 0   |                  |     |     | 100            | 0    | 0   | 20                  | 0   | 80   | 0     | 20            | 0         | 0   | 4.1 | 50                    | 40   |      | 10  | 1   | 48         |       |
| MM4    | B     | B     | B     | B     | B     |                  |     |      |     | 0        | 0   | 100  | 0    | 100                 | 0   | 0    | 0   | 0   | 0   | 100              | 0   | 0   | 100            | 0    | 0   | 82.0                | 0.4 | 0    | 17.56 | 100           | 0         | 0   | 0   | 11.3                  |      | 100  |     |     | 1          | 84    |
| MM5    | A     | A     | A     | A     | A     | 25               | 0   | 75   | 0   | 22       | 0   | 67   | 11.1 | 20                  | 0   | 70   | 10  | 0   | 0   |                  |     |     | 50             | 50   | 0   | 20                  | 0   | 80   | 0     | 30            | 50        | 0   | 20  | 60.5                  | 70   | 20   | 10  |     | 1          | 54    |
| Total  | Avg   |       |       |       |       | 8.3              | 0   | 91.7 | 0   | 12       | 4   | 67   | 16.2 | 76                  | 0   | 16   | 4   | 0   | 4   | 100              | 0   | 0   | 88             | 12   | 0   | 30                  | 0   | 50   | 20    | 72            | 20        | 0   | 8   | Avg                   | 51.9 | 40.7 | 6.9 | 0.4 | 5          |       |
| Wt avg |       |       |       |       |       | 21.1             | 0.0 | 78.9 | 0.0 | 20.0     | 1.7 | 74.5 | 3.7  | 36.7                | 0.0 | 54.3 | 8.7 | 0.0 | 0.4 | 100.0            | 0.0 | 0.0 | 58.8           | 41.2 | 0.0 | 37.6                | 0.1 | 55.1 | 7.1   | 78.2          | 17.6      | 0.0 | 6.2 | Assume ex sector (8h/ |      |      |     |     |            |       |
| 4      |       |       |       |       |       | 4                | 4   | 4    | 4   | 4        | 4   | 4    | 4    | 4                   | 4   | 4    | 4   | 4   | 4   | 4                | 4   | 4   | 4              | 4    | 4   | 4                   | 4   | 4    | 4     | 4             | 4         | 4   | 4   | 4                     | 4    | 4    | 4   | 4   | 4          |       |

Qty's of different materials collected by different middlemen used in calculating weighted average sources (%) in Q3.3

|       | Pl  | Bg   | P/C  | Glass |      | Me   | Ba    |
|-------|-----|------|------|-------|------|------|-------|
|       |     |      |      | Br    | Bo   |      |       |
| MM1   | 0   | 4500 | 140  | 0     | 225  | 225  | 635   |
| MM2   | 15  | 1100 | 25   | 0     | 135  | 135  | 289   |
| MM3   | 50  | 150  | 50   | 0     | 50   | 50   | 106   |
| MM4   | 0   | 13   | 100  | 250   | 500  | 750  | 3415  |
| MM5   | 350 | 1500 | 1000 | 0     | 4000 | 4000 | 7200  |
| Total | 415 | 7263 | 1315 | 250   | 4910 | 5160 | 11645 |

Must adjust this table after entering data to eliminate any values for which there is NA in Q3.3 - do manually

Adjusted cells shaded in orange

MM2 - Other = garage

"Prop" column lists propor from different sources, as sheet - used for calculatin

| 5.5         |        |                  | Exp & Income ched |                     |       | 5.6 Main costs |   |   |   |   |   |   |   |   |   |       | 6.1             | 6.2   | 6.3           |   |  |  |   |  |  |  |  | 6.4 & 6.5                    |                       |
|-------------|--------|------------------|-------------------|---------------------|-------|----------------|---|---|---|---|---|---|---|---|---|-------|-----------------|-------|---------------|---|--|--|---|--|--|--|--|------------------------------|-----------------------|
| ID No       | Income | Expendi-<br>ture | Net<br>income     | Pur-<br>ch.         | Sales | Net<br>Inc     | A | B | C | D | E | F | G | H | I | Other | Qty<br>(kg/mth) | Actio | Main problems |   |  |  |   |  |  |  |  | Comments on how t<br>+ Other |                       |
| MM6         | 32.5   | 32               | 0.5               | 19.8                | 50.4  | 30.6           | 2 |   |   |   | 1 |   | 1 |   | Y |       | 1430            | D     | 1             | 2 |  |  | 3 |  |  |  |  |                              | Scrap availability sh |
| All in M Rs |        |                  |                   | H: all new machines |       |                |   |   |   |   |   |   |   |   |   |       |                 |       |               |   |  |  |   |  |  |  |  |                              |                       |

Suspect the Colombo net income figure is too low while the factory net income may be too high. Actual net income is likely to be somewhere within this range.

| ID No                | Full-time workers |    |       | Part-time workers |    |       | Total<br>H/mth | Equiv<br>FT | 5.1 Processing |      |      |      |        |      | 5.2 5.3 |                          |        |       |       |       | 5.5 Profit Exp and Income |       |                                  |                  |        |               |                  |  |  |   |  |  |  |  |  |
|----------------------|-------------------|----|-------|-------------------|----|-------|----------------|-------------|----------------|------|------|------|--------|------|---------|--------------------------|--------|-------|-------|-------|---------------------------|-------|----------------------------------|------------------|--------|---------------|------------------|--|--|---|--|--|--|--|--|
|                      | d/mth             | No | Hr/wk | d/mth             | No | Hr/wk |                |             | d/mth          | PI   | Ba   | Pa   | GI     | Me   | Oth     | Products                 | PI     | Ba    | Pa    | GI    | Me                        | Oth   | Name, location,<br>distance (km) | Expend-<br>iture | Income | Net<br>income | Recycl<br>Paymer | Recycl<br>Sales  |  |   |  |  |  |  |  |
| MM1                  | 30                | 0  |       |                   | 0  |       | 300            | 1.44        |                | R,WS | R,WS | R,WS | R,WS   | R,WS | R,WS    | IR                       |        | NA    | NA    | NA    | CE                        | NA    | Periya Thambi,Chilaw, Rejina,Col | 40000            | 50000  | 10000         | 33830            | 54409  |  |   |  |  |  |  |  |
| MM2                  | 26                | 0  |       |                   | 0  |       | 212            | 1.02        | R,WS           | R,WS | R,WS | R,WS | R,WS   | R,WS | R,WS    | IR                       | In, CE | In,CE | In,CE | In,CE | In,CE                     | In,CE | DK                               | 10000            | 15000  | 5000          | 10210            | 14023  |  |   |  |  |  |  |  |
| MM3                  | 25                | 0  |       |                   | 2  | 1     | 171            | 0.82        | R,WS           | R,WS | R,WS | R,WS | R,WS   | R,WS | R,WS    | IR                       | In, CE | In,CE | In,CE | In,CE | In,CE                     | In,CE | DK                               | 10000            | 15000  | 5000          | 12360            | 14012  |  |   |  |  |  |  |  |
| MM4                  | 30                | 15 | 840   | 30                | 0  |       | 3660           | 19.04       |                | A    | A    | A    | A      | A    | A       | IR                       |        | F     | F     | F     | F                         | F     | Bhuwarka,Madampe                 | 50000            | 65000  | 15000         | 49998            | 80250  |  |   |  |  |  |  |  |
| MM5                  | 26                | 2  | 108   | 26                | 1  | 24    | 615            | 2.96        | R,WS           | R,WS | R,WS | R,WS | A,R,WS | R,WS | R,WS    | IR                       | In     | In    | In    | In    | In,F                      | In    | Bhuwarka,Madampe                 | 150000           | 185000 | 15000         | 173499           | 221488.5   |  |   |  |  |  |  |  |
| Total                |                   | 17 |       |                   | 3  |       | 5259           | 25.28       |                |      |      |      |        |      |         |                          | Ct     |       |       |       |                           |       | Total                            | 260000           | NA     | NA            | 279884           | 364192.5   |  |   |  |  |  |  |  |
| 208 h/mth in private |                   |    |       |                   |    |       |                |             | R = retail     | 3    | 4    | 4    | 4      | 3    | 4       | In                       | 3      | 3     | 3     | 3     | 3                         | 3     | MMC1 - PT = 3km; Rejina = 80km   |                  |        |               |                  | From recyclable<br>ases and sales                                  |  |   |  |  |  |  |  |
| WS = w/sale          |                   |    |       |                   |    |       |                |             |                | 3    | 4    | 4    | 4      | 4    | 4       | CE                       | 2      | 2     | 2     | 2     | 3                         | 2     |                                  |                  |        |               |                  |  |  |   |  |  |  |  |  |
| A                    |                   |    |       |                   |    |       |                |             |                | 0    | 1    | 1    | 1      | 1    | 1       | T                        | 0      | 0     | 0     | 0     | 0                         | 0     |                                  |                  |        |               |                  |  |  | 1 |  |  |  |  |  |
| B                    |                   |    |       |                   |    |       |                |             |                | 0    | 0    | 0    | 0      | 0    | 0       | F                        | 0      | 1     | 1     | 1     | 2                         | 1     |                                  |                  |        |               |                  |  |  | 2 |  |  |  |  |  |
| C                    |                   |    |       |                   |    |       |                |             |                | 0    | 0    | 0    | 0      | 0    | 0       | Oth                      | 0      | 0     | 0     | 0     | 0                         | 0     |                                  |                  |        |               |                  | From comparison of recyclables<br>and purchases data, suspect data |  | 3 |  |  |  |  |  |
| D                    |                   |    |       |                   |    |       |                |             |                | 0    | 0    | 0    | 0      | 0    | 0       | IR                       | 0      | 0     | 0     | 0     | 0                         | 0     |                                  |                  |        |               |                  | identified   |  | 4 |  |  |  |  |  |
| E                    |                   |    |       |                   |    |       |                |             |                | 0    | 0    | 0    | 0      | 0    | 0       | NA                       | 0      | 0     | 0     | 0     | 0                         | 0     |                                  |                  |        |               |                  | (shaded in orange)   |  | 3 |  |  |  |  |  |
| NA                   |                   |    |       |                   |    |       |                |             |                | 0    | 0    | 0    | 0      | 0    | 0       | Sum                      | 5      | 6     | 6     | 6     | 6                         | 6     |                                  |                  |        |               |                  |  |  | 5 |  |  |  |  |  |
| IR                   |                   |    |       |                   |    |       |                |             |                | 0    | 0    | 0    | 0      | 0    | 0       | Use "In" for individuals |        |       |       |       |                           |       |                                  |                  |        |               |                  |  |  |   |  |  |  |  |  |

|       |  |
|-------|--|
| ID No |  |
| MM6   |  |

|       |            | 5.6 Main Costs |   |   |   |   |   |   |   |   | 6.1          | 6.2 | 6.3           |  |   |   |   |   |   |   | 6.4 & 6.5                                       |   |
|-------|------------|----------------|---|---|---|---|---|---|---|---|--------------|-----|---------------|--|---|---|---|---|---|---|---|---|
| ID No | Net income | A              | B | C | D | E | F | G | H | I | Qty (kg/mth) | Act | Main problems |  |   |   |   |   |   |   | Comments on how to solve these problems + other |   |
| MM1   | 20579      | 1              |   | 2 |   |   | 3 |   |   |   | 15           | C   | 1             |  | 2 | 3 |   |   |   |   |   | Would like good price for recycling goods |
| MM2   | 3813       | 1              |   | 4 |   |   | 3 | 2 |   |   | 15           | C   | 1             |  | 4 | 5 |   |   | 3 | 2 |   | Give aid or low interest loan             |
| MM3   | 1853       | 1              |   | 2 | 4 |   | 3 | 5 |   |   | 30           | B   | 1             |  | 2 | 2 |   |   |   |   |   | Would like good price for recycling goods |
| MM4   | 10255      | 1              |   | 2 | 3 |   | 4 |   |   | 5 | 35           | D   | 1             |  | 4 | 2 |   | 3 |   | 5 |   | Give facilities to get a loan             |
| MM5   | 48000      | 1              |   | 2 | 3 |   |   | 4 |   |   | 300          | B   | 1             |  | 4 |   | 5 | 2 | 3 |   |   | Introduce good market for recyclables     |
| Total | 84299      |                |   |   |   |   |   |   |   |   |              |     |               |  |   |   |   |   |   |   |   |   |

| Rank   | A    | B   | C   | D   | E   | F   | G   | H   | I   |
|--------|------|-----|-----|-----|-----|-----|-----|-----|-----|
| 2.5    | 5    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| 2      | 0    | 0   | 4   | 0   | 0   | 0   | 1   | 0   | 0   |
| 1.5    | 0    | 0   | 0   | 2   | 0   | 3   | 0   | 0   | 0   |
| 1      | 0    | 0   | 1   | 1   | 0   | 1   | 1   | 0   | 0   |
| 0.5    | 0    | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 0   |
| Sum    | 5    | 0   | 5   | 3   | 0   | 4   | 3   | 1   | 0   |
| Wt avg | 12.5 | 0.0 | 9.0 | 4.0 | 0.0 | 5.5 | 3.5 | 0.5 | 0.0 |

6.2

MMC4 Collected by UC

|       |
|-------|
| ID No |
| MM6   |

## 3-108

**Notes:**

- MMC5 Large can-Rs.600 small can-Rs.10**

|         |                |                  |      |       |      |          |     |     |
|---------|----------------|------------------|------|-------|------|----------|-----|-----|
| Section | 1              | Metals - ferrous |      |       |      |          |     |     |
| ID No   | Business name  | Qty              | Unit | Price | Unit | Total    | Dem | SvD |
| MMCS    | Bhuwaika steel | 2200000          | kg   | 9     | /kg  | 19800000 | Y   | <   |

| Section | Cardboard/boxes |      |       |      |       |     |     | Broken glass |      |       |      |       |     |     | Arrack/beer/other bottles |      |         |       |      |       |       | Metals - ferrous |      |      |       |      |       |     | Metals - copper/brass |     |      |       |      |       |  |
|---------|-----------------|------|-------|------|-------|-----|-----|--------------|------|-------|------|-------|-----|-----|---------------------------|------|---------|-------|------|-------|-------|------------------|------|------|-------|------|-------|-----|-----------------------|-----|------|-------|------|-------|--|
| ID No   | Qty             | Unit | Price | Unit | Total | Dem | SvD | Qty          | Unit | Price | Unit | Total | Dem | SvD | Code                      | Qty  | Unit    | Price | Unit | Total | Dem   | SvD              | Qty  | Unit | Price | Unit | Total | Dem | SvD                   | Qty | Unit | Price | Unit | Total |  |
| MMC1    | 40              | kg   | 2     | /kg  | 80    | N   | >   |              | kg   |       | /kg  | 0     |     |     | AR,BR,BJ                  | 225  | Bott    | 3     | ea   | 675   | Y,Y,N | <,<,>            | 500  | kg   | 6.5   | /kg  | 3250  | Y   | <                     | 65  | kg   | 80    | /kg  | 5200  |  |
| MMC2    |                 | kg   |       | /kg  | 0     |     |     |              | kg   |       | /kg  | 0     |     |     | AR,BR,BJ                  | 135  | Bott    | 3     | ea   | 405   | Y,Y,N | <,<,>            | 250  | kg   | 6     | /kg  | 1500  | Y   | >                     | 27  | kg   | 70    | /kg  | 1890  |  |
| MMC3    |                 | kg   |       | /kg  | 0     |     |     |              | kg   |       | /kg  | 0     |     |     | AR,BR                     | 50   | Bott    | 5     | ea   | 250   | Y     | >                | 50   | kg   | 5     | /kg  | 250   | Y   | >                     | 28  | kg   | 50    | /kg  | 1400  |  |
| MMC4    |                 | kg   |       | /kg  | 0     |     |     | 250          | kg   | 1     | /kg  | 250   | Y   | <   | AR,BR,BJ                  | 500  | Bott    | 3.25  | ea   | 1625  | Y     | <                | 3000 | kg   | 6     | /kg  | 18000 | Y   | <                     | 100 | kg   | 50    | /kg  | 5000  |  |
| MMC5    |                 | kg   |       | /kg  | 0     |     |     |              | kg   |       | /kg  | 0     |     |     | AR,BR,BJ                  | 4000 | Bott    | 2.75  | ea   | 11000 | Y,Y,N | >,>,<            | 6000 | kg   | 7.5   | /kg  | 45000 | Y   | >                     | 700 | kg   | 65.7  | /kg  | 45997 |  |
|         | 40              | kg   |       | /kg  | 80    | Rs  |     | 250          | kg   |       | /kg  | 250   | Rs  |     |                           | 4910 | bottles |       | ea   | 13955 | Rs    |                  | 9500 | kg   |       |      | 68000 | Rs  |                       | 920 | kg   |       |      | 59487 |  |

| Section |     |                    |     |      |       |      |       |     |                  |     |      |       |      |       |     |           |      |      |       | Total quantities |         |      |     |               | Actual | Prop'n of total (%) |       |        |   |      |
|---------|-----|--------------------|-----|------|-------|------|-------|-----|------------------|-----|------|-------|------|-------|-----|-----------|------|------|-------|------------------|---------|------|-----|---------------|--------|---------------------|-------|--------|---|------|
|         |     | Metals - Aluminium |     |      |       |      |       |     | Metals -Beer Can |     |      |       |      |       |     | Batteries |      |      |       | Cont-ainers      | Bottles | Bags | Kg  | Payments (Rs) |        |                     |       |        |   |      |
| ID No   | Dem | SvD                | Qty | Unit | Price | Unit | Total | Dem | SvD              | Qty | Unit | Price | Unit | Total | Dem | SvD       | Qty  | Unit | Price | Unit             | Total   | Dem  | SvD |               |        |                     |       |        |   |      |
| MMC1    | Y   | <                  | 60  | kg   | 70    | /kg  | 4200  | Y   | <                | 10  | kg   | 20    | /kg  | 200   | Y   | <         | 300  | kg   | 10    | /kg              | 3000    | Y    | <   | 0             | 225    | 4500                | 1075  | 33830  | = | 18.3 |
| MMC2    | Y   | >                  | 10  | kg   | 55    | /kg  | 550   | Y   | >                | 2   | kg   | 20    | /kg  | 40    | Y   | >         | 50   | kg   | 8     | /kg              | 400     | Y    | >   | 15            | 135    | 1100                | 364   | 10210  | = | 5.9  |
| MMC3    | Y   | >                  | 25  | kg   | 50    | /kg  | 1250  | Y   | >                | 3   | kg   | 20    | /kg  | 60    | Y   | >         | 50   | kg   | 5     | /kg              | 250     | Y    | >   | 50            | 50     | 150                 | 206   | 12360  | = | 4.1  |
| MMC4    | Y   | <                  | 300 | kg   | 40    | /kg  | 12000 | Y   | <                | 15  | kg   | 25    | /kg  | 375   | Y   | <         | 2000 | kg   | 6     | /kg              | 12000   | Y    | <   | 0             | 500    | 13                  | 5768  | 49996  | = | 11.3 |
| MMC5    | Y   | >                  | 300 | kg   | 50    | /kg  | 15000 | Y   | >                | 200 | kg   | 20    | /kg  | 4000  | Y   | >         | 1000 | kg   | 7     | /kg              | 7000    | Y    | >   | 350           | 4000   | 1500                | 9200  | 173499 | = | 60.6 |
|         | Rs  |                    | 695 | kg   |       |      | 33000 | Rs  |                  | 230 | kg   |       |      | 4675  | Rs  |           | 3400 | kg   |       |                  | 22650   |      |     | 415           | 4910   | 7263                | 16610 | 279894 |   | 100  |

1. "Actual" column advises whether actual payments will be higher based on whether or not complete information was supplied.
2. Proportion column calculates the proportion of total materials collected by different enterprises as (no of containers/total containers + no of bottles/total bottles + no of bags/total bags + kg/total kg)/4 \* 100% - used in general spreadsheet

## 3-41

MMC5 Large can: 50 @ Rs.650,  
Small cans: 300 @ Rs.15

MMC4 Bags only for their use

1. Blue shaded cell indicates no quantity or cost information given (NA inserted in units column rather than qty column, as the latter upsets the spreadsheet calculations)  
2. Green shaded cell indicates data that has been modified so that sales and purchases figures are consistent.  
3. NA = no answer

2000T x 70%  
70% goes to mkt; 30% stored on site for  
future sales



| ID No | Dem | Broken glass |      |       |      |       | Glass - Arrack/beer/other bottles |          |      |      |       | Metals - ferrous |       |       |      |      | Metals - copper/brass |      |       |     |     | Metals - Aluminium |       |      |       |     | Metals - Be |      |       |      |       |    |     |    |    |
|-------|-----|--------------|------|-------|------|-------|-----------------------------------|----------|------|------|-------|------------------|-------|-------|------|------|-----------------------|------|-------|-----|-----|--------------------|-------|------|-------|-----|-------------|------|-------|------|-------|----|-----|----|----|
|       |     | Qty          | Unit | Price | Unit | Total | Dem                               | Code     | Qty  | Unit | Price | Unit             | Total | Dem   | Qty  | Unit | Price                 | Unit | Total | Dem | Qty | Unit               | Price | Unit | Total | Dem | Qty         | Unit | Price | Unit | Total |    |     |    |    |
| MMC1  | L   | 0            |      |       | /kg  | 0     |                                   | AR,BR,BJ | 225  | Bott | 3.84  | ea               | 864   | G,G,L | 500  | kg   | 8                     | /kg  | 4000  | G   | 65  | kg                 | 95    | /kg  | 6175  | G   | 60          | kg   | 75    | /kg  | 4500  | G  | 10  | kg | 30 |
| MMC2  |     | 0            |      |       | /kg  | 0     |                                   | AR,BR,BJ | 135  | Bott | 4     | ea               | 540   | L,G,L | 250  | kg   | 7.5                   | /kg  | 1875  | M   | 27  | kg                 | 90    | /kg  | 2430  | M   | 10          | kg   | 65    | /kg  | 650   | M  | 2   | kg | 35 |
| MMC3  |     | 0            |      |       | /kg  | 0     |                                   | AR,BR    | 50   | Bott | 7     | ea               | 350   | L,G   | 50   | kg   | 6                     | /kg  | 300   | G   | 28  | kg                 | 55    | /kg  | 1540  | G   | 25          | kg   | 60    | /kg  | 1500  | G  | 3   | kg | 24 |
| MMC4  |     | 250          | kg   |       | 2    | /kg   | M                                 | AR,BR,BJ | 500  | Bott | 4.8   | ea               | 2400  | M     | 3000 | kg   | 7                     | /kg  | 21000 | M   | 100 | kg                 | 60    | /kg  | 6000  | M   | 300         | kg   | 50    | /kg  | 15000 | M  | 15  | kg | 30 |
| MMC5  |     | 0            |      |       | /kg  | 0     |                                   | AR,BR,BJ | 4000 | Bott | 6     | ea               | 24000 | G,G,L | 6000 | kg   | 8.5                   | /kg  | 51000 | M   | 700 | kg                 | 80    | /kg  | 56000 | G   | 300         | kg   | 60    | /kg  | 18000 | M  | 200 | kg | 30 |
|       | Rs  | 250          | kg   |       | /kg  | 500   | Rs                                |          | 4810 | Bott |       | ea               | 28154 | Rs    | 3600 | kg   |                       | /kg  | 78175 | Rs  | 920 | kg                 |       | /kg  | 72145 | Rs  | 895         | kg   |       | /kg  | 39650 | Rs | 230 | kg |    |

MMC4: 200 beer bottles @ 6Rs ea and 300 other bottles @ 4Rs ea.

|       |           |       |     |           |      |       |      |       | Total quantities |         |      |      |            | Actual |     |
|-------|-----------|-------|-----|-----------|------|-------|------|-------|------------------|---------|------|------|------------|--------|-----|
| ID No | Batteries |       |     | Batteries |      |       |      |       | Cont-ainers      | Bottles | Bags | Kg   | Sales (Rs) |        |     |
|       | Unit      | Total | Dem | Qty       | Unit | Price | Unit | Total |                  |         |      |      |            |        | Dem |
| MMC1  | /kg       | 300   | G   | 300       | kg   | 12    | /kg  | 3600  | G                | 0       | 225  | 4500 | 1075       | 54408  | =   |
| MMC2  | /kg       | 70    | M   | 50        | kg   | 11    | /kg  | 550   | M                | 15      | 135  | 1100 | 304        | 14023  | =   |
| MMC3  | /kg       | 72    | M   | 50        | kg   | 6.5   | /kg  | 325   | G                | 50      | 50   | 150  | 206        | 14012  | =   |
| MMC4  | /kg       | 450   | M   | 2000      | kg   | 7     | /kg  | 14000 | M                | 0       | 500  | 13   | 5765       | 60250  | =   |
| MMC5  | /kg       | 6000  | M   | 1000      | kg   | 9     | /kg  | 9000  | M                | 350     | 4000 | 1500 | 9200       | 221499 | =   |
|       | /kg       | 6892  | Rs  | 3400      | kg   |       | /kg  | 27475 | Rs               | 415     | 4910 | 7263 | 16610      | 364193 |     |
|       |           |       |     |           |      |       |      |       |                  |         |      |      |            |        |     |

### 3.4.5 Data summary for graphs

Q3.3

|                    | Main sources (%) |       |         |            |             |        |           |
|--------------------|------------------|-------|---------|------------|-------------|--------|-----------|
|                    | Plastic          | Bags  | Pa/card | Broken gla | Glass bottl | Metals | Batteries |
| Households         | 21.1             | 20.0  | 36.7    | 100.0      | 56.8        | 37.8   | 76.2      |
| Hotels             | 0.0              | 1.7   | 0.0     | 0.0        | 41.2        | 0.0    | 0.0       |
| Hospitals          | 0.0              | 0.0   | 0.0     | 0.0        | 0.0         | 0.0    | 0.0       |
| Commercial         | 0.0              | 74.5  | 0.0     | 0.0        | 0.0         | 0.1    | 0.0       |
| Markets            | 0.0              | 0.0   | 0.0     | 0.0        | 0.0         | 0.0    | 0.0       |
| Schools            | 0.0              | 0.0   | 8.7     | 0.0        | 0.0         | 0.0    | 0.0       |
| Government offices | 0.0              | 0.0   | 54.3    | 0.0        | 0.0         | 0.0    | 0.0       |
| Industries         | 78.9             | 3.7   | 0.0     | 0.0        | 0.0         | 55.1   | 17.6      |
| Other              | 0.0              | 0.0   | 0.4     | 0.0        | 0.0         | 7.1    | 6.2       |
|                    | 100              | 100.0 | 100.0   | 100.0      | 100.0       | 100.0  | 100.0     |

Q5.6

|   | Rank                  | 1 | 2 | 3 | 4 | 5 | Wt avg |
|---|-----------------------|---|---|---|---|---|--------|
| A | Purchases             | 6 | 0 | 0 | 0 | 0 | 12.5   |
| B | Storage               | 0 | 0 | 0 | 0 | 0 | 0.0    |
| C | Transportation        | 0 | 4 | 0 | 1 | 0 | 9.0    |
| D | Labour                | 0 | 0 | 2 | 1 | 0 | 4.0    |
| E | Other raw materials   | 0 | 0 | 0 | 0 | 0 | 0.0    |
| F | Utilities             | 0 | 0 | 3 | 1 | 0 | 5.5    |
| G | Land/building rental  | 0 | 1 | 0 | 1 | 1 | 3.5    |
| H | Machinery maintenance | 0 | 0 | 0 | 0 | 1 | 0.5    |
| I | Other                 | 0 | 0 | 0 | 0 | 0 | 0.0    |
|   | Sum                   | 6 | 5 | 5 | 4 | 2 | 35.0   |

Q6.3

|   | Rank                           | 1 | 2 | 3 | 4 | 5 | Wt avg |
|---|--------------------------------|---|---|---|---|---|--------|
| A | Shortage of recyclables        | 5 | 0 | 0 | 0 | 0 | 12.5   |
| B | Recyclables contamination/p    | 0 | 0 | 0 | 0 | 0 | 0.0    |
| C | High land/building rental cost | 0 | 1 | 0 | 2 | 0 | 4.0    |
| D | Excessive transportation cost  | 0 | 2 | 1 | 1 | 1 | 7.0    |
| E | Unstable demand                | 0 | 0 | 0 | 0 | 0 | 0.0    |
| F | Utilities                      | 0 | 0 | 1 | 0 | 1 | 2.0    |
| G | Loss of market                 | 0 | 1 | 1 | 0 | 0 | 3.5    |
| H | Obtaining credit               | 0 | 1 | 1 | 0 | 1 | 4.0    |
|   | Sum                            | 6 | 6 | 4 | 3 | 3 | 33.0   |

|                 |      | Percentages of total qty of recyclables |      |  |      |     |     |      |      |      | Tot   | Qty in CUA | Notes |
|-----------------|------|---|------|--|------|-----|-----|------|------|------|-------|------------|-------|
|                 |      | H                                       | Ht   | Hp                                     | C    | M   | S   | GO   | I    | O    |       |            |       |
|                 | PI   | 21.1                                    | 0.0  | 0.0                                    | 0.0  | 0.0 | 0.0 | 0.0  | 78.9 | 0.0  | 100   |            |       |
|                 | Bg   | 20.0                                    | 1.7  | 0.0                                    | 74.5 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 3.7   | 100        |       |
|                 | P/C  | 36.7                                    | 0.0  | 0.0                                    | 0.0  | 0.0 | 8.7 | 54.3 | 0.0  | 0.4  | 100   |            |       |
|                 | Br   | 100                                     | 0.0  | 0.0                                    | 0.0  | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 100   |            |       |
|                 | Bot  | 58.8                                    | 41.2 | 0.0                                    | 0.0  | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 100   |            |       |
|                 | Me   | 37.6                                    | 0.0  | 0.0                                    | 0.1  | 0.0 | 0.0 | 0.0  | 55.1 | 7.1  | 100   |            |       |
|                 | Ba   | 76.2                                    | 0.0  | 0.0                                    | 0.0  | 0.0 | 0.0 | 0.0  | 17.6 | 6.2  | 100   |            |       |
| Tot (kg)        |      |   |      | Actual quantity from different sources |      |     |     |      |      |      |       |            |       |
| 0               | PI   | 0                                       | 0    | 0                                      | 0    | 0   | 0   | 0    | 0    | 0    | 0     | 0.0        | 1     |
| 726             | Bg   | 145                                     | 13   | 0                                      | 541  | 0   | 0   | 0    | 0    | 27   | 726   | 12.4       | 2     |
| 1315            | P/C  | 482                                     | 0    | 0                                      | 0    | 0   | 114 | 714  | 0    | 5    | 1315  | 22.4       |       |
| 250             | Br   | 250                                     | 0    | 0                                      | 0    | 0   | 0   | 0    | 0    | 0    | 250   | 4.3        |       |
| 3241            | Bot  | 1906                                    | 1335 | 0                                      | 0    | 0   | 0   | 0    | 0    | 0    | 3241  | 55.3       | 3     |
| 11645           | Me   | 4382                                    | 0    | 0                                      | 14   | 0   | 0   | 0    | 6416 | 831  | 11644 | 198.7      |       |
| 3400            | Ba   | 2590                                    | 0    | 0                                      | 0    | 0   | 0   | 0    | 600  | 210  | 3400  | 58.0       |       |
| 20577           | Tot  | 9756                                    | 1347 | 0                                      | 555  | 0   | 114 | 714  | 7016 | 1073 | 20575 | 351.2      |       |
| Adjust Tot1     |      | 9756                                    | 1347 | 0                                      | 555  | 0   | 114 | 714  | 7016 | 1073 | 20575 |            | 4     |
| Location factor |      | 70                                      | 80   | 100                                    | 90   | 100 | 100 | 100  | 15   | 40   | 52    |            |       |
| Adjust Tot2     |      | 6795                                    | 1078 | 0                                      | 500  | 0   | 114 | 714  | 1052 | 429  | 10683 |            | 5     |
| Qty             | kg/d | 223                                     | 35   | 0                                      | 16   | 0   | 4   | 23   | 35   | 14   | 351   |            |       |
| Notes:          | %    | 63.6                                    | 10.1 | 0.0                                    | 4.7  | 0.0 | 1.1 | 6.7  | 9.9  | 4.0  | 100.0 |            |       |

- PI quantity specified here omits containers/chairs which are reused rather than recycled
  - One bag weighs 0.1 kg
  - One bottle weighs 0.66 kg (avg weight of 10 beer and arrack bottles) - assume same source distribution for bottles and broken glass.
  - Adj1 - adjust total to a/c for a total of 5 middlemen in Chilaw with all 5 being surveyed (i.e. no adjustment)
  - Adj2 - adjust Adj1 to a/c for 52 % of materials collected in CUA (assume applies to all categories)
    - MMC4 data (all materials collected from outside Chilaw UC limits) indicates:
      - At least 1943 kg collected from households outside Chilaw
      - 205 kg collected from hotels outside Chilaw
      - 31 kg collected from commercial enterprises outside Chilaw
      - 1878 kg collected from industries outside Chilaw
      - 239 kg collected from other places outside Chilaw
- Location factor %s adjusted to take this into account (location factor = % of materials collected within CUA)
- Assume 100 % for Hp and M - no impact as qtls from these sources are zero.
  - Assume 100 % for S and GO - only pa/ca - reasonable to assume comes from these institutes in Chilaw
  - Assume 80 % for hotels (only bags and glass bottles) - although not many hotels within Chilaw suspect the survey answers include some local hotels (i.e. cafes, restaurants); also consistent with MMC4 data
  - Assume 90 % for C - consistent with MMC4 data
  - Assume 15 % for I - consistent with little industry within Chilaw and MMC4 data.
  - Assume 40 % for O - mainly garages & consistent with MMC4 data.
  - Get household total by difference= 70 % or 6795 kg/mth

### 3.5 ORDE Compost Facility - Chilaw

#### 1. ORDE Compost Facility - Materials Received and Compost Production

| Date  | Day       | Line No | No of Labrs | Hrs  | Received          |                      |         |                    |             |         |    | Total kg | Compost kg |
|---|-----------|---------|-------------|------|-------------------|----------------------|---------|--------------------|-------------|---------|----|----------|------------|
|   |           |         |             |      | Compost ables(kg) | King coco shells(no) | Sand kg | For burn- ing (kg) | Plast/PT kg | Tins kg |    |          |            |
| 15-Jul  | Mon       |         |             |      | 390               | ND                   | ND      | ND                 | ND          | ND      |    | ND       | 325        |
| 16-Jul  | Tue       |         |             |      | 420               | ND                   | ND      | ND                 | ND          | ND      |    | ND       |            |
| 17-Jul  | Wed       |         |             |      | 375               | 100                  | 250     | 160                | ND          | ND      |    | 794      | 70         |
| 18-Jul  | Thu       |         |             |      | 330               | 150                  | 250     | 120                | ND          | ND      |    | 713      | 185        |
| 19-Jul  | Fri       |         |             |      | 315               | 200                  | 150     | 120                | ND          | ND      |    | 603      | 615        |
| 20-Jul  | Sat       |         |             |      | 360               | 195                  | 185     | 130                | ND          | ND      |    | 692      | 312        |
| 21-Jul  | Sun       |         |             |      |                   |                      |         |                    |             |         |    |          |            |
| 22-Jul  | Mon       |         |             |      | 480               | 210                  | 275     | 128                | ND          | ND      |    | 901      |            |
| 23-Jul  | Tue (hol) |         |             |      |                   |                      |         |                    |             |         |    |          |            |
| 24-Jul  | Wed       |         |             |      | 0                 | 0                    | 0       | 272                | ND          | ND      |    | 272      |            |
| 25-Jul  | Thu       |         |             |      | 1005              | 310                  | 450     | 46                 | ND          | ND      |    | 1528     | 204        |
| 26-Jul  | Fri       |         |             |      | 450               | 180                  | 175     | 60                 | ND          | ND      |    | 701      | 200        |
| 27-Jul  | Sat       |         |             |      | 390               | 260                  | 250     | 120                | ND          | ND      |    | 783      | 258        |
| 28-Jul  | Sun       |         |             |      |                   |                      |         |                    |             |         |    |          |            |
| 29-Jul  | Mon       |         |             |      | 375               | 210                  | 275     | 112                | ND          | ND      |    | 780      | 100        |
| 30-Jul  | Tue       |         |             |      | 375               | 180                  | 275     | 120                | ND          | ND      |    | 786      | 270        |
| 31-Jul  | Wed       | 7       | 4           | -    | 345               | 235                  | 200     | 160                | 15          | 2       |    | 743      | 250        |
| 1-Aug   | Thu       | 8       | 4           | -    | 435               | 210                  | 250     | 104                | 15          | 5       |    | 827      | ND         |
| 2-Aug   | Fri       | 8       | 4           | -    | 435               | 135                  | ND      | ND                 | 12          | 4       | ND | ND       | ND         |
| 3-Aug   | Sat       | 9       | 4           | -    | 405               | 111                  | 225     | 80                 | 12          | 0       |    | 732      | ND         |
| 4-Aug   | Sun       | --      | --          | --   |                   |                      |         |                    |             |         |    |          |            |
| 5-Aug   | Mon       | 9       | 3           | 3.25 | 405               | 170                  | 525     | 112                | 10          | 7       |    | 1074     |            |
| Total (all data, including incomplete days)           |           |         |             |      | 7290              | 2856                 | 3735    | 1844               | 64          | 18      |    | 15807    | 2789       |
| Total (all data, including incomplete days) in kg     |           |         |             |      | 7290              | 250                  | 3735    | 1844               | 64          | 18      |    | 13201    |            |
| Breakdown of data in kg (%)                           |           |         |             |      | 55.2              | 1.9                  | 28.3    | 14.0               | 0.5         | 0.1     |    | 100      |            |
| Average (based on all days)                           |           |         |             |      | 313               | 122                  | 146     | 79                 | 2           | 1       |    | 663      | 127        |
| No of working days with data                          |           |         |             |      | 18                | 16                   | 15      | 15                 | 5           | 5       |    | 15       | 11         |
| Average (based on working days with data)             |           |         |             |      | 405               | 179                  | 249     | 123                | 13          | 4       |    | 795      | N/a        |
| Total (average data, excluding incomplete days) in kg |           |         |             |      | 405               | 16                   | 249     | 123                | 12.8        | 3.6     |    | 809      |            |
| Breakdown of data in kg (%)                           |           |         |             |      | 50.1              | 1.9                  | 30.8    | 15.2               | 1.6         | 0.4     |    | 100      |            |

#### Notes:

1. ND = no or insufficient data, PT = polythene
2. Average coconut waste received based on 87.5 g per coconut shell = 16 kg/d
3. Average waste inputs = 809 kg/d while total compost production = 127 kg or 15.7 % of inputs
4. Total compostable inputs= 405 kg/d, with compost production being 31.3 % of this

## 2. Income and Expenditure

Actual ( from January 2002 to June 2002 )

| Month    | Est comp prod'n (kg/mth) | Income (Rs) |             |        | Expend-iture (Rs) | Profit/ Loss (Rs) |
|----------|--------------------------|-------------|-------------|--------|-------------------|-------------------|
|          |                          | Comp sales  | Other sales | Total  |                   |                   |
| January  | 2382                     | 19058       | 0           | 19058  | 34801             | -15744            |
| February | 3210                     | 25678       | 0           | 25678  | 43201             | -17523            |
| March    | 1775                     | 14203       | 0           | 14203  | 34698             | -20495            |
| April    | 1582                     | 12656       | 145         | 12801  | 35355             | -22554            |
| May      | 4485                     | 35879       | 160         | 36039  | 45345             | -9306             |
| June     | 4868                     | 38942       | 135         | 39077  | 47492             | -8415             |
| Total    | 18302                    | 146416      | 440         | 146856 | 240891            | -94036            |
| Avg      | 3050                     | 24403       | 73          | 24476  | 40149             | -15673            |

Notes:

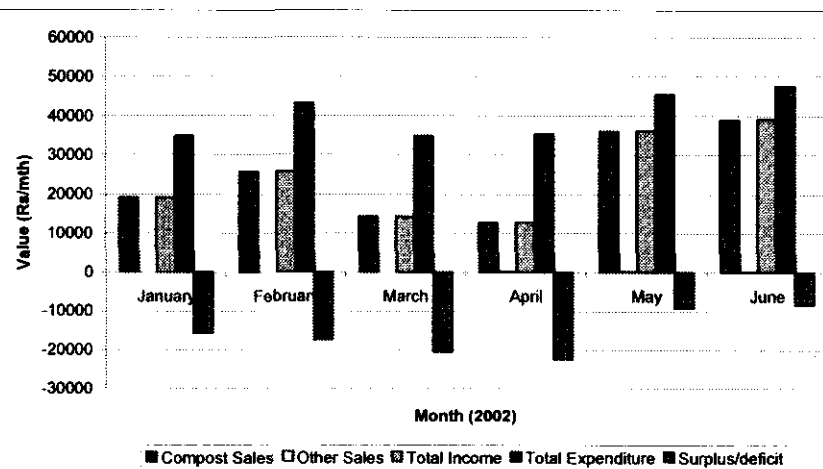
1. Compost prod'n estimated assuming avg sales price of 8 Rs/kg
2. Total capital cost = 1854350 Rs
3. No of working days per mth = 26 days
3. Average Expenditure breakdown shown below:

### Average Monthly Expenditure

| Item        | Unit   | Quantity | Rate (Rs) | Total (Rs) |
|-------------|--------|----------|-----------|------------|
| Supervisor  | No     | 2        | 5000.00   | 10000      |
| Labour      | No     | 6        | 4000.00   | 24000      |
| Generator   | Hr/mth | 104      | 25/h      | 2600       |
| Maintenance | Item   | 1        | 0.00      | 0          |
| Amendments  | Item   | 1        | 400.00    | 400        |
| Bags        | Item   | 1        | ND        | ND         |
| Testing     | Item   | 1        | 0.00      | 0          |
| Total       |        |          |           | 37000      |

Notes:

1. Generator costs based on 26d usage for 4h/d.
2. Amendments = cow dung @ 12.9Rs/kg and straw @ 14Rs/kg
3. Total bagging cost not specified (ND = no data) but the following cost data was obtained:
  - a. 2kg bagging cost = polythene (1.70Rs) + label (2.75Rs) + labour (0.51Rs) = 4.96Rs per bag
  - b. 5kg bagging cost = polythene (5.00Rs) + label (2.75Rs) + labour (0.51Rs) = 8.26Rs per bag
4. Other costs include consultant visit fees (peradeniya university) = 6,000Rs/visit. There have been three visits since the plant started in May 2001.

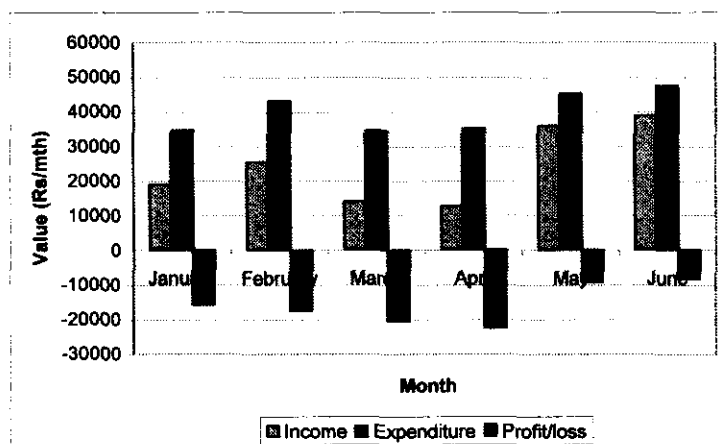


## 3. Compost quality analysis

| Parameter      | Units        | 27-Aug-01                   |        |        | 19-Oct-01                  |        |        | 3-Jan-02                    |        |         | 3-Jan-02 | 19-Jun-02 | Average | St Dev  | Min   | Max     |
|----------------|--------------|-----------------------------|--------|--------|----------------------------|--------|--------|-----------------------------|--------|---------|----------|-----------|---------|---------|-------|---------|
|                |              | Samp 1                      | Samp 2 | Samp 3 | Samp 1                     | Samp 2 | Samp 3 | Samp 4                      | Samp 5 | Samp 12 |          |           |         |         |       |         |
|                |              |                             |        |        |                            |        |        |                             |        |         |          |           |         |         |       |         |
| pH             |              | 8.6                         | 8.1    | 8      | 6.9                        | 7.3    | 7.2    | 7.6                         | 7.7    | 7.6     | 7.7      | 7.7       | 7.67    | 0.46    | 6.90  | 8.60    |
| Organic matter | %            | 18.6                        | 27     | 30.8   | 23.1                       | 29     | 26.7   | 18.3                        | 20     | 26.2    | 26.2     | 26.2      | 24.74   | 4.18    | 18.30 | 30.80   |
| Organic carbon | %            | 10.8                        | 15.7   | 17.8   | 13.4                       | 16.8   | 15.5   | 10.6                        | 11.6   | 15.2    | 5.2      | 15.2      | 13.44   | 3.64    | 5.20  | 17.80   |
| CEC            | cmol/kg soil | 86.5                        | 81.1   | 200.8  | 109.8                      | 70.2   | 68.9   | 39.3                        | 49.9   | 52.1    | 72       | 72        | 82.05   | 43.78   | 39.30 | 200.80  |
| Moisture       | %            | 40.7                        | 40.6   | 33.3   | 44.1                       | 49.9   | 47.4   | 41.3                        | 25.1   | 30.2    | 30       | 30        | 37.51   | 8.17    | 25.10 | 49.90   |
| Density        | g/cm3        | 0.456                       | 0.378  | 0.364  | ND                         | ND     | ND     | 0.485                       | 0.544  | 0.56    | 0.56     | 0.56      | 0.49    | 0.24    | 0.36  | 0.56    |
| Total N        | mg N/kg DM   | 15.2                        | 17.8   | 19.8   | 14.2                       | 15.3   | 13.5   | 10.9                        | 11.5   | 14.5    | 4.5      | 14.5      | 13.79   | 3.97    | 4.50  | 19.80   |
| Phosphorus     | mg P/kg DM   | 3.1                         | 2.76   | 2.99   | 3.6                        | 2.8    | 3.4    | 3.59                        | 2.74   | 3.05    | 3.5      | 3.5       | 3.18    | 0.34    | 2.74  | 3.60    |
| Potassium      | mg/kg DM     | 11.36                       | 9.94   | 11.61  | 398.5                      | 428.6  | 458.5  | 7.44                        | 5.96   | 8.45    | 3.4      | 8.4       | 122.92  | 196.75  | 3.40  | 458.50  |
| Sodium         | mg/kg DM     | 1.93                        | 1.73   | 2.05   | 1890                       | 1430   | 1220   | 1.67                        | 1.32   | 1.76    | 1.7      | 1.7       | 413.99  | 722.51  | 1.32  | 1890.00 |
| Calcium        | mg/kg DM     | 15.1                        | 7.27   | 8.1    | 3420                       | 2780   | 2320   | 4.4                         | 2.53   | 4.9     | 4.8      | 4.9       | 779.27  | 1346.39 | 2.53  | 3420.00 |
|                |              | 1st samples: 13 Jan 02 anal |        |        | 2nd samples: 2 Feb 02 anal |        |        | 3rd samples: 18 Jan 02 anal |        |         |          |           |         |         |       |         |

Note:

1. Exact date of first three samples not confirmed, with the dates specified at the top of this table being based on scribbled notes on the compost quality analysis results.



### 3.6 Disposal sites survey

#### Aluthwatta

| Code | 1.0               | 4.0 |                                      |     |      |       |      |       |      |                  |
|------|-------------------|-----|--------------------------------------|-----|------|-------|------|-------|------|------------------|
|      | 1.1               | 1.2 | 1.3                                  | 4.1 | 4.2  |       |      |       | 4.3  | 4.4              |
|      | Name              | M/F | Address                              | Y/N | Cows | Goats | Pigs | Other | Freq | Health<br>B/NC/M |
| Ch 1 | P.Viniprida       | F   | Aluthwatta, Chilaw                   | 0   |      |       |      |       |      |                  |
| Ch2  | Srenitha Fernando | M   | 139/1 Aluthwatta Chilaw              | 0   |      |       |      |       |      |                  |
| Ch 3 | P.Rodrigo         | F   | 137/22, Aluthwatta, Chilaw           | 0   |      |       |      |       |      |                  |
| Ch 4 | M.Sellino         | F   | 137/14, Aluthwatta, Chilaw           | 0   |      |       |      |       |      |                  |
| Ch 5 | R.M.Areawansa     | M   | Aluthwatta Rd, Wattakkaliya, Chilaw  | 1   | 4    | 12    | 4    | 0     | 1    | NC               |
| Ch 6 | T.Shanmugan       | M   | 137/25, Canal Rd, Aluthwatta, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 7 | P.S.Peris         | M   | 1, Canel Road, Wattakkaliya, Chilaw  | 0   |      |       |      |       |      |                  |
| Ch 8 | K.Fernando        | M   | 37/17, Aluthwatta, Chilaw            | 0   |      |       |      |       |      |                  |

#### Wattakalliya

| Code  | 1.0               | 4.0 |                      |     |      |       |      |       |      |                  |
|-------|-------------------|-----|----------------------|-----|------|-------|------|-------|------|------------------|
|       | 1.1               | 1.2 | 1.3                  | 4.1 | 4.2  |       |      |       | 4.3  | 4.4              |
|       | Name              | M/F | Address              | Y/N | Cows | Goats | Pigs | Other | Freq | Health<br>B/NC/W |
| Ch 9  | S. Rajakumari     | F   | Wattakalliya, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 10 | K.A.C.Maheshika   | F   | Wattakalliya, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 11 | Nilanthi Kumari   | F   | Wattakalliya, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 12 | Kingsley Fernando | M   | Wattakalliya, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 13 | Fransis Fernando  | M   | Wattakalliya, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 14 | K.Sunil           | M   | Wattakalliya, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 15 | S.Rajamathi       | F   | Wattakalliya, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 16 | Shiromi           | F   | Wattakalliya, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 17 | Rex Lowe          | M   | Wattakalliya, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 18 | A.R.Rafeecdeen    | M   | Wattakalliya, Chilaw | 0   |      |       |      |       |      |                  |

#### Sangathattana

| Code  | 1.0                 | 4.0 |                       |     |      |       |      |       |      |                  |
|-------|---------------------|-----|-----------------------|-----|------|-------|------|-------|------|------------------|
|       | 1.1                 | 1.2 | 1.3                   | 4.1 | 4.2  |       |      |       | 4.3  | 4.4              |
|       | Name                | M/F | Address               | Y/N | Cows | Goats | Pigs | Other | Freq | Health<br>B/NC/M |
| Ch 19 | S. Wanasiri         | F   | Sangathattana, chilaw | 0   |      |       |      |       |      |                  |
| Ch 20 | E.A. Ramani         | F   | Sangathattana, chilaw | 0   |      |       |      |       |      |                  |
| Ch 21 | S.A.Chandani        | F   | Sangathattana, chilaw | 0   |      |       |      |       |      |                  |
| Ch 22 | S.L.Abdul Hameed    | M   | Sangathattana, chilaw | 0   |      |       |      |       |      |                  |
| Ch 23 | P.A.Pilamina Fernan | F   | Sangathattana, chilaw | 0   |      |       |      |       |      |                  |
| Ch 24 | K.Gunapala          | M   | Sangathattana, chilaw | 0   |      |       |      |       |      |                  |
| Ch 25 | M. Muttaiya         | M   | Sangathattana, chilaw | 0   |      |       |      |       |      |                  |
| Ch 26 | A.Muhaf             | M   | Sangathattana, chilaw | 0   |      |       |      |       |      |                  |
| Ch 27 | Lio Fernando        | M   | Sangathattana, chilaw | 0   |      |       |      |       |      |                  |
| Ch 28 | W.Anton             | M   | Sangathattana, chilaw | 0   |      |       |      |       |      |                  |

#### Akkarayankotuwa

| Code  | 1.0                 | 4.0 |                                 |     |      |       |      |       |      |                  |
|-------|---------------------|-----|---------------------------------|-----|------|-------|------|-------|------|------------------|
|       | 1.1                 | 1.2 | 1.3                             | 4.1 | 4.2  |       |      |       | 4.3  | 4.4              |
|       | Name                | M/F | Address                         | Y/N | Cows | Goats | Pigs | Other | Freq | Health<br>B/NC/W |
| Ch 29 | Mery Irin Margarat  | F   | Akkarayankotuwa, Chilaw.        | 0   |      |       |      |       |      |                  |
| Ch 30 | W.Manjula           | M   | Akkarayankotuwa, Chilaw.        | 0   |      |       |      |       |      |                  |
| Ch 31 | S.Pulendran         | M   | Akkarayankotuwa, Chilaw.        | 0   |      |       |      |       |      |                  |
| Ch 32 | T Subhashini        | F   | Akkarayankotuwa, Chilaw.        | 0   |      |       |      |       |      |                  |
| Ch 33 | S.Santhi Kumari     | F   | Akkarayankotuwa, Chilaw.        | 0   |      |       |      |       |      |                  |
| Ch 34 | H.A.Nihal           | M   | Akkarayankotuwa, Chilaw.        | 0   |      |       |      |       |      |                  |
| Ch 35 | P.Jina              | F   | Akkarayankotuwa, Chilaw.        | 0   |      |       |      |       |      |                  |
| Ch 36 | M. Kanakarani       | F   | 75, Akkarayankotuwa, Chilaw.    | 0   |      |       |      |       |      |                  |
| Ch 37 | W.S.Fernando        | M   | Rajagahaldama, Chilaw           | 0   |      |       |      |       |      |                  |
| Ch 38 | S.Thambaiya         | M   | Akkarayankotuwa, Chilaw.        | 0   |      |       |      |       |      |                  |
| Ch 39 | P.A.Alphrad Fernand | M   | Sanghathatta, Chilaw.           | 0   |      |       |      |       |      |                  |
| Ch 40 | K.Kaliappu          | M   | Palapolwatta, Watawana, Chilaw. | 0   |      |       |      |       |      |                  |



Suduwalla

| Code  | 1.0             | 4.0 |                             |     |      |       |      |       |      |                  |
|-------|-----------------|-----|-----------------------------|-----|------|-------|------|-------|------|------------------|
|       | 1.1             | 1.2 | 1.3                         | 4.1 | 4.2  |       |      |       | 4.3  | 4.4              |
|       | Name            | M/F | Address                     | Y/N | Cows | Goats | Pigs | Other | Freq | Health<br>B/NC/W |
| Ch 41 | C.H.Perera      | M   | Kurusapaduwa, Walla, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 42 | W.asha Nirmalee | F   | Kurusapaduwa, Walla, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 43 | Sellamma        | F   | Kurusapaduwa, Walla, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 44 | Jood Laxman     | M   | Kurusapaduwa, Walla, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 45 | R.B.M.Appuhami  | M   | Kurusapaduwa, Walla, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 46 | Laxman          | M   | Kurusapaduwa, Walla, Chilaw | 1   |      |       | 3    |       | D    | W                |
| Ch 47 | Lalith Fernando | M   | Kurusapaduwa, Walla, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 48 | M.Calista       | F   | Kurusapaduwa, Walla, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 49 | Nissansala      | F   | Kurusapaduwa, Walla, Chilaw | 0   |      |       |      |       |      |                  |
| Ch 50 | H Kumari        | F   | Kurusapaduwa, Walla, Chilaw | 0   |      |       |      |       |      |                  |

## 3.7 Other Information in Chilaw

### Community Focus Group Discussion 1

|                           |   |
|---------------------------|---|
| Name of the Municipality: | Chilaw Urban Council  |
| Area name:                | Suduwella   |
| Date & Time:              | 2002/08/08, 15:30 – 17:00   |
| Precipitants:             | <ol style="list-style-type: none"> <li>1. Mr. A. DOI (JICA study team)</li> <li>2. Ms. M. Oishi (JICA study team)</li> <li>3. Ms. S. Seneviratne (JICA study team)</li> <li>4. Mr. W.A. Fernando (PHI, CUC)</li> <li>5. Ms. J.K. Nilanthi (DEO, CUC)</li> <li>6. Forty one residents of Suduwella, including a Grama Niladhali Officer</li> </ol> |

#### 1. Participants comments on the solid waste management project presented by the JICA study team

- Majority of the participants are willing to cooperate in the bell collection system, once the punctual collection service is implemented. However they understand the bell collection system is suitable only for those who live near the main road, since the house-to-house collection is more popular than the collection point system in Chilaw Urban Council Areas and people are not used to bring their garbage to the certain points.
- As for the collection frequency, most of the participants said that two to three times per week is enough, but a few who run the small scale fishery business said they strongly prefer everyday collection since they can not keep fish wastes a few days in their premises. Moreover, they prefer the evening collection after they close their daily business.
- Most of the participants are agreed to supervise discharge behaviour of their neighbours, and it is recommended to establish a special community-based group to look after the matter.
- Though one of the participants request for CUC to distribute plastic garbage collection bags to citizens, some of other participants said they can use the fertilizer bags if necessary, and it is much more durable than the plastic garbage bags.
- Participants who live far from the main road prefer the kerb side collection by using the communal bins.
- Problems with tree cutting still remain without effective counter measure. At present branches cut by the electricity board had not been removed by CUC, since no formal information was sent to CUC from the electricity board.

## **2. Overall impression**

As many as more than 40 participants were very much interested in the presentation made by the JICA study team, and useful and concrete feedbacks were obtained from both male and female participants. The active participation in Suduwella assures the future public cooperation in this area. The active involvement of PHI, DEO and supervisors are also worth mentioning here.

## Community Focus Group Discussion 2

|                           |   |
|---------------------------|---|
| Name of the Municipality: | Chilaw Urban Council  |
| Area name:                | Malpura   |
| Date & Time:              | 2002/28/08, 15:30 – 17:00   |
| Precipitants:             | <ul style="list-style-type: none"><li>7. Mr. A. DOI (JICA study team)</li><li>8. Ms. M. Oishi (JICA study team)</li><li>9. Ms. S. Seneviratne (JICA study team)</li><li>10. Mr. W.A. Fernando (PHI, CUC)</li><li>11. Ms. J.K. Nilanthi (DEO, CUC)</li><li>12. Fifty six residents of Malupura, Chilaw, including a Grama Niladhali Officer and a council member</li></ul> |

### 1. Participants comments on the solid waste management project presented by the JICA study team

- As for the collection frequency, some of participants requested everyday collection. In response to the request, the PHI explained that it may be difficult for CUC to expand the service frequency at this stage due to limited resources, however he promised to maximize the service efficiency.
- Some of other participants prefer the garbage collection before 8:00 A.M., and recommended the bell collection at around 8:00 A.M. However, a Grama Niladhali officer pointed out that most of the housewives go to the markets in the morning and come back around 9:00 to 10:00 A.M., so it is important to consult more housewives to decide the collection time.
- Some of the participants are interested in making compost either by using home compost barrels or digging up the compost pit in the yards. Now they buy compost at the price of Rs.10 per kg in the market, and it is costly for them. The problem is they don't know exactly how to make compost.
- As usual, some of the drainage in the area are not cleaned up, and cause unsanitary situation.
- Grama Niladhali point out that the CUC should implement the strong rules and regulations with proper punishment against those who don't follow the rules. Some of the residents discharge bulky wastes such as construction materials on the roads, but no proper penalty has been given to them. The PHI said, in response, the CUC prepare new by-laws regarding the solid waste management, and once it is approved, the CUC will implement the by-law strictly without any favourisation.

## **2. Overall impression**

As many as more than 50 participants were very much interested in the presentation made by the JICA study team, and several useful and concrete feedbacks were obtained from both male and female participants. The active participation in Malpura assures the future public cooperation in implementing the pilot projects in this area. The active involvement of a Grama Niladhali officer, a council member, a PHI, a DEO and supervisors are also worth mentioning here.

## Organizational Information Sheet 1

Interview date : 2002/08/5

|                             |  |
|-----------------------------|--|
| Name of the organization:   | Small Fishers Federation   |
| Name of the chairperson:    | Director, Mr. Anuradha Wickramasinghe  |
| Address and contact number: | Pambala, Kakkapalliya, Chilaw Tel/Fax. 0094 32 47 96 0<br>Tel: 032-48707, 071-212569<br>E-Mail: <a href="mailto:sffl@sri.lanka.net">sffl@sri.lanka.net</a> |
| Year of establishment:      | 1984   |

### 1. General information

#### No. of personnel:

About 70 people including 6 directors.

There are five social economic centers in the project area mentioned in the later part and each social economic center has following officers who are chosen from respective communities

1. Chairman
2. Coordinator
3. Business Manager
4. Bursar

Each center has their own banking facilities and all the financial decision are made at this economic center level. They have a community trust board to make all kinds of decisions. Besides, the training centers are attached to each social economic center.

#### Fund resource

1. NORAD
2. Terre Des Homme (Netherlands)

#### Working area

The project has expanded into the following five districts in Sri Lanka, namely, Monaragala, Matara, Baticaloa, Puttlam and Hambanthota. Each district has social economic centers.

### 2. Main activities

There are 3 categories of their work

1. Social Development- funded by Terre des Homme
2. Social Environment - funded by NORAD
3. Social Economics - funded by NORAD

### 1. Social Development

Under this program they have following programs

- Pre- school children program
- Pre- school mothers income generation program
- Pre- school health program

Program for school dropouts (youngsters)

- Training program for income generation activities
- Small scale entrepreneurship

Women program

Widows' program: income generation activities by providing loans at a low interest (2%)

(They have found that there is a widow for each 5 women in fisheries society)

### 2. Social Environment

- Coastal management, conservation and protection
- Awareness program regarding mangrove conservation for school children
- Awareness program regarding mangrove conservation for fishing community  
Pambala and Kiralakele (Hambanthota)
- Forming environmental committee

### 3. Social Economics

- Income generation program
- Post harvest fisheries
- Micorfinance

## **3. Cooperation with other organizations**

- Ministry of Fisheries
- Ministry of Forest and Environment

## **4. Future cooperation with the pilot project of the study team**

Whenever necessary, they are willing to cooperate with JICA study team. They can conduct awareness program, promote public participation especially among fishing communities.

## Organizational Information Sheet 2

Interview date : 2002/08/08

|                             |   |
|-----------------------------|---|
| Name of the organization:   | Organization for Resource Development and Environment |
| Name of the chairperson:    | Mr. A. H. M. R. Abeyratne                             |
| Address and contact number: | 193, Welewewa, Navagaththegama<br>Tel: 032-23699      |
| Year of establishment:      | 1 <sup>st</sup> of January, 1991                      |

### 1. General information

No. of personnel      27 members

As for the compost plant, there are 12 people working now.

(1 working at the office, 3 members, 6 workers, and 2 volunteers)

Fund resource:

The Community Environmental Initiative Facility (CEIF), a component of the World Bank funded Environmental Action 1 Project (EA1P). This fund was obtained through Ministry of Environment.

Working area:      Chilaw

### 2. Main activities:

Production of organic fertilizer

### 3. Other activities

- Project regarding human-elephant conflict in 1992 – funded by Asia Foundation
- Watershed Management Project – funded by International Water Management Institute (IWMI)
- Citizen Participatory Project (Income generating activity) – funded by USAID
- Forestation project by planting 12000 plants - funded by Ministry of Environment
- Agro-forestry project in Giribawa – funded by IUCN

### 4. Cooperation with other organizations

- A member of CUC's environment committee
- Participants of the NFPO-VSO Sri Lanka co-funded program called "Strengthening the Institutional Capacity of an NGO Network in Sri Lanka". Under this program, a VSO volunteer visit ORDE regularly and give managerial advice for the compost production.



## Activities of Divisional Environmental Officers

Interview date: 2002/07/31

|                             |  |
|-----------------------------|--|
| Name of the Municipality:   | Chilaw Urban Council                     |
| Name of the officer:        | Ms. J.K. Nilanthi                        |
| Year of appointment:        | 2000 February                            |
| Address and contact number: | Chilaw Urban Council, Chilaw. 032- 22275 |

### 1. Organizational information (which department do you belong to in municipalities)

To the deputy director of education and training, in the Central Environment Authority.

To the chairman or secretary in the urban council.

### 2. Main activities

- School education program, ("Environment Pioneer Brigade" / "Eco Clubs" program)
- Issuing the environment protection licensee.

### 3. School Program

There are seven secondary schools and two primary schools in Chilaw Urban Council Areas. The Environmental Pioneer Brigade Groups and Eco Clubs have been established in all these schools. The Environmental Pioneer Brigade Groups have been established in the following secondary schools.

| Name of the school                | No of Groups | Medals obtained |
|-----------------------------------|--------------|-----------------|
| 1. Ananda College National School | 1            | 1               |
| 2. Carmel Girls' College          | 1            | 1               |
| 3. St. Mary's Boys' College       | 1            | 0               |
| 4. Nazria Muslim College          | 1            | 0               |
| 5. Wijaya Vidyalaya               | 1            | 1               |
| 6. St. Bernadeth Tamil School     | 1            | 0               |
| 7. St. Sebesthian School          | 1            | 0               |

The Eco Clubs have been established in the following primary schools.

| Name of the school                         | No of Groups | Medals obtained |
|--|--------------|-----------------|
| 1. Rev. Edmond Peiris Boys' Primary School | 1            | 0               |
| 2. St. Mary's Girls' Primary School        | 1            | 0               |

A district environmental commissioner is Ms. Deepani Priyangika from Wijaya Vidyalaya. The most active schools are Wijaya Vidyalaya, Nazria Muslim College, St. Mary's Boys' College and Carmel Girls' College.

#### **4. Environmental Committee**

An environment committee has been formed in CUC since February 2000. Normally they gather once a month and discuss the existing problems with regard to health and environment. Mainly the chairman, the PHI, the environment officer, the CDO, council members, school children and teachers, and representative of NGOs participate in this environment committee.

#### **5. Other activities**

Plan and implement some activities for specific days such as world environment day, tree planting day etc.

# Chapter 4

## Chilaw Pilot Projects

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## Chapter 4 UCC Pilot Projects – Progress Diary

### 4.1 UCC Initial Meeting – 22 January 2003

**Present:** UCC: Mr Fernando (SPHI), Mr Ravindra (Senior Overseer), ~20 labourers; JICA: Dr Sean, Ms Nayana

#### 4.1.1 Control Board

- Chilaw is long and narrow – UCC favours 7' by 5' board.
- Want to include zone boundaries, collection routes (different colours for HC, 2WT, 4WT, lorry + different line types for different collection frequencies – solid line for daily, dashed line for every 2-3d, dotted line for weekly); temporary collection points, bins, stationary trailers, large waste generators, problem spots (small, big, other environmental, legal action being taken), projects (Shramadama, awareness, mosquito control), disposal sites (temporary, permanent), drains (built, earth, culverts), ORDE.
- Preferred colours = red, yellow, purple, green, blue, brown, black, orange; zone boundaries in purple.
- Prefer using coloured magnets for showing items on map rather than pins (worried about too many holes in map).
- Would like to include central city area at enlarged scale (i.e. inset) – exact area to be finalized. Initially suggested zone 4 + railway boundary + Ananda Mw up to railway + Malpura up to UC limit + Corea Watta; beach area = Suduwella, Madawatta, Ridewella.
- Current map is very old - UDA are currently preparing a new map of Chilaw which should be ready within 2 weeks. UCC would prefer to use the new map.
- Show ORDE with arrow + distance to ORDE from edge of map or pin.

#### 4.1.2 Pilot Process Improvement Projects (PIP)

JICA discussed SWM process improvement projects with UCC staff and labourers – their comments and response/action summarized below:

##### 4.1.2.1 Litter bins

| Issue  | Response/Action  |
|--|--|
| Corrosion  | Galvanising too expensive and possibly difficult due to size of litter bin. Fibreglass bin was suggested but too expensive (Neil Marine boatyard said possibly 4,000Rs). |
| Put holes in bins (metal and plastic) to discourage people from stealing them                                | Should be relatively easy to do for metal bins; check for plastic (extra cost + weakening of base).  |
| Half barrel size OK for lifting  | Confirmed through discussion with labourers – may weigh 30-40kg if full (100L x 300-400kg/m3).   |
| Write UCC on bin + “Rs*** fine if stolen) + handover to shop/house for their care (get them to sign for bin) | Check colour + words to write (who – LA or manufacturer) – unique no to each bin + date. Write or stamp?   |

#### 4.1.2.2 Modified Handcart (bincart)

| Issue  | Response/Action   |
|--|---|
| One labourer worried it will take longer to load than present HC – more difficult to empty gunny sack into bucket. | Disagree.   |
| Use wheelbarrow in market – consider use of narrow handcart due to passage width between stalls                    | Passage width in vege market = 1.6m. OK.  |
| Large wheel + front & back brackets for balance  | Support front and back brackets – front for resting on when HC stopped; back to stop tipping too far forward – need to decide on clearance to ground. |
| Put holes in buckets to discourage people from stealing them.  | Check manufacturer - extra cost + weakening of bucket bottom.   |

#### 4.1.2.3 Stationary Trailer

| Issue  | Response   |
|--|--|
| No one can stand inside and press down load.   | Should not be necessary – trailer should be able to be loaded more fully than existing trailer (with single metal plate at rear).  |
| Where can labourers stand during transport to disposal site? (at least one labourer normally goes with driver to assist in unloading). Suggested installing standing platform or seat on front section of trailer (but said problems for seat with nearly touching wheel when turning) or attachment at back (problem when unloading). | Should not be issue if tractor goes to proper disposal site, where labourers are present.<br>Illegal to provide standing/sitting room on trailer in Sri Lanka – no action. |
| Open downwards rather than upwards – safety (Sato worried if open downwards, door may be more liable to open during transit to landfill c.f. door opening upwards).  | Discussed with manufacturer – said door opening downwards is better.   |
| Security of waste transfer platform – need to fix in place or padlock to pole  | Installation issue.  |

## 4.2 UCC Planning Meeting, 31 Jan 2003

**Present:** UCC: Mr Fernando (SPHI), Mr Ravindra (Senior Overseer); JICA: Dr Sean, Ms Nayana.

### 4.2.1 Bell collection

- Publicity - Inform people as part of overall education programme, including via churches and schools. Meeting/training arranged for labourers on 7 Feb and zone leaders meeting.
- Waste discharge rule discussed. JICA to draft discharge rule for discussion with UCC based on public notice already prepared by UCC.
- Noticeboard: Suggested format discussed – 70-80% printed common part; 20-30% handprinted with information specific to location.
- Amplifier/speaker units: SPHI suggested these should be detachable.
- Non-cooperation discussed: Supervisors should go to these places & advise them. If they continue such practice, UCC should get name & address of such places & send notice to them → prosecute.

### **4.2.2 Stationary Trailers**

- Three locations - fish/vegetable market, bus stand and retail market. SPHI suggested trying this system for 2 weeks and then alternate system with one spare trailer & other trailers at two locations (bus stand and fish/vegetable market) for another two weeks. Given that these locations lie within a very short distance of each other, using 3 trailers at 3 different locations is probably more efficient.
- Security – SPHI worried about this, especially at fish/vegetable market. Suggested park at UCC at night or build wall & gate around trailer or install post concreted into ground with chain and padlock.
- Need in one colour - suggested colour is orange (Gamudava colour)
- Words suggested for painting on two sides of trailer in sinhala & tamil - “This is your town - keep it clean”. SPHI to confirm these words with chairman.

### **4.2.3 Litter bins**

- Introduction, location and management of litter bins discussed.
- SPHI suggested asking lottery ticket sellers to tell their customers “don’t throw away your tickets, put them in to litter bin”.

## **4.3 UCC Planning Meeting, 7 Feb 2003**

**Present:** UCC: Mr Fernando (SPHI), 6 supervisors; JICA: Dr Sean, Ms Nayana

### **4.3.1 Bell Collection**

- Noticeboard locations: SPHI suggested the following locations for some noticeboards – fish market – stationary trailer (1); by bridge (1); Neil Marine boatyard (1); St Sebastian primary school (1); St Sebastian church (1); statue (beachside) (1), bakery near Mable building (1); Post office (1); housing schemes (1+). UCC to identify and finalise 50 locations for noticeboards.
- Notice Board: draft discussed and finalised, subject to approval of chairman.
- UCC wants to introduce bell collection system step by step rather than all at once
- Supported using handcarts with horns in areas not accessible by tractor + some areas suitable for kerbside collection.
- Publicity via tractor loudspeaker to begin on 17<sup>th</sup> – no time for public meetings if planning to start new system on 20<sup>th</sup>.
- Trial for 2 wks on small scale → identify problems → solve and expand.
- Other issues discussed but nothing decided – wanted chairman’s input.
- Supervisors pointed out vehicle breakdown is problem here – will affect performance of any new system.

- UCC to advise by Tues: no of vehicles to install speaker/amplifier to (they have 2 x 2WT, 3 x 4WT, lorry, but 1 2WT very old + lorry used for other purposes); bell collection areas; what system to use in other areas – HC with horns + no of horns required; kerbside collection areas.

#### **4.3.2 Stationary Trailers**

- Minor civil works required at proposed location for stationary trailer at bus stand - fill in and level bus stand area , while maintaining drainage.
- Chairman recommended using chain + padlock to secure stationary trailers to concrete post.

#### **4.3.3 Other**

- Chairman confirmed colour of everything (litter bins, HCs, trailers, etc.) = orange.

### **4.4 UCC Mar-May Status Report**

*This report covers the period March-May 2003. It was compiled following a progress meeting with UCC on 20 May.*

#### **4.4.1 Management Improvement**

##### **4.4.1.1 Progress**

- Model bylaws: UCC have sent their proposed SWM bylaws to relevant authorities for approval in Jan/Feb 2003. JICA gave copy of draft model bylaws to UCC on 22 May.
- Monthly report: UCC have started using from 1 May.
- UCC have made up a standard form to handover to people not following discharge rules. These forms are proving to be effective.
- Chairman has instructed PHI to prepare “service conditions” for supervisors and drivers.
- In cases where there are some large waste piles with no one claiming responsibility for them or knowledge of who dumped them, UCC has been threatening to take photos of people doing such things using the digital camera. Apparently, this has resulted in some people stopping doing this!
- One motorbike being used by PHI and DEO.

##### **4.4.1.2 Existing Problems**

- No response from relevant authorities concerning Chilaw’s proposed SWM bylaws.
- Control board not in use due to issue with map.
- Motorbikes are not being fully utilized.

##### **4.4.1.3 Required Actions**

- Investigate whether it is possible to “fast track” Chilaw bylaws approval process.
- UCC to make a new original of Chilaw map for JICA, who will then give this to the printers to make a new control board.
- UCC to start using control board.



- UCC should record, type and circulate minutes from JICA/UCC meetings, noting action points, including responsible person and deadline.
- Decide whether to pursue the chairman's following ideas:
  - Issuing permanent labourers with orange aprons each with a unique no on them.
  - Repainting existing trailers and handcarts in orange, like the JICA trailers.

#### **4.4.2 Waste Collection Improvement Publicity**

##### **4.4.2.1 Progress**

- Systematic publicity in zone 3 (announcements, leaflets and presentations). Less systematic publicity in other zones (some presentations, church announcements).
- Noticeboards: At least 34 have been filled with supervisor, collection and animator details (nominated by supervisors).

##### **4.4.2.2 Existing Problems**

- Noticeboards not installed yet as Chairman wants to check whether nominated animators are willing to do the job.
- Noticeboards are too small and not highly visible.
- Chairman believes need for more education.

##### **4.4.2.3 Required Actions**

- UCC to confirm animator details and then install noticeboards.
- Noticeboard locations should be shown on control board.
- DEO to provide followup education.

#### **4.4.3 Bell collection**

##### **4.4.3.1 Progress**

- Amplifiers/speakers now installed and operational on 3 x 4WTs and lorry.
- Chilaw divided into areas for daily or 3x weekly collection, with Sat morning being allocated for Shramadana cleanup days.
- Bell collection started on 1 Apr and now operational in all zones.
- Initial bell collection feedback:
  - Widespread public support (~60-70%).
  - Easier loading work for labourers.
  - No reduction in collection time. One supervisor think this is partly due to having to collect drain cleanings in his zone; another (zone 3) due to the large no of concrete bins in his zone that are still being used.
  - Increase in waste discharge: ranges from none (most supervisors) to some. One supervisor thinks more people are now using the collection service than previously.

#### 4.4.3.2 Existing Problems

- Main problem = UCC not keeping to collection schedule, meaning residents are never sure when the tractor will actually come. Hence, they continue to discharge waste to the roadside as previously.
- Other problems = floating population don't know about new system; garbage being thrown from vehicles by outsiders.
- 2WT speaker/amplifier system installation not yet complete.
- Possibly some speakers/amplifiers installed incorrectly (e.g. direct connection to battery on 4WT, amplifier box lid on top so rain may enter if open).
- Concrete bins are still being used by some residents which take a long time to empty.

#### 4.4.3.3 Required Actions

- UCC has to keep to the decided collection schedule.
- UCC to check speaker/amplifier installation and to make any necessary changes.
- UCC to complete 2WT speaker/amplifier installation and set up battery recharging system.
- UCC should consider removing concrete bins in areas where bell collection is working well.

#### 4.4.4 Stationary Trailers

##### 4.4.4.1 Progress

- 4 stationary trailers – 3 x JICA + 1 x UCC.
- One labourer assigned to wash fish market trailer daily and other trailers weekly.

##### 4.4.4.2 Existing Problems

No problems observed. The system is functioning well.

##### 4.4.4.3 Required Actions

Show trailer locations on the control board.

#### 4.4.5 Modified handcarts

##### 4.4.5.1 Progress

Three out of five in use using 4x50L and 2x32L orange buckets.

##### 4.4.5.2 Existing Problems

Handcart capacity is not enough, according to labourers – it takes more time and trips to cover the same area as before. Supervisors think the main problem is the type of waste being collected in Chilaw – lot of organic matter, including banana leaves and king coconut shells – this takes up a lot of space in buckets.

#### **4.4.5.3 Required Actions**

The modified handcart is not being used correctly – it is not designed for primary collection of residential waste but is suitable for street waste (e.g. mainly dirt and litter). The basic idea is to replace primary handcart collection with direct collection by tractors, with handcarts then being used for street sweeping. If this policy can't be kept, the new handcarts may be modified to the old style by UCC.

#### **4.4.6 Litter bins and plastic buckets**

##### **4.4.6.1 Progress**

- 20 fixed litter bins and 10 movable bins installed.
- 4 buckets distributed to each of 10 schools – 3 supplied by ORDE + 1 of JICA 50L buckets.
- Handover involved people putting their name and signature next to bin no acknowledging responsibility for it.

##### **4.4.6.2 Existing Problems**

Mobile bins – only 10 distributed. Some traders don't like having litter bins in front of their premises as they don't want other peoples' garbage/litter deposited in front of their shops. Supervisors think barrels are being used for garbage and litter

##### **4.4.6.3 Required Actions**

- Arrange for distribution of remaining 10 movable litter bins (as appropriate) and 40 plastic buckets.
- More explanation/education to supervisors and traders required to help them understand these facilities are for litter generated by visitors and not for garbage.
- Bin locations should be recorded on the control board.

#### **4.4.7 Other**

##### **4.4.7.1 Progress**

- New PHI has reduced total number of handcarts in use in Chilaw to 6. This includes removing them from some byroads where supervisors say they were very useful.
- New PHI has also stopped handcarts collecting street sweepings and drain cleanings in some areas, with tractors collecting these instead.
- ORDE is now receiving all Chilaw's waste for composting.

##### **4.4.7.2 Existing Problems**

- Some supervisors have complained about the above changes made by the PHI.
- ORDE is finding some needles, syringes and clinical waste in the garbage it receives from the hospital.

- *ORDE's expenditure is still exceeding income.*

#### **4.4.7.3 Required Actions**

- Check where handcart usage is necessary in each zone for primary collection, street sweeping and drain cleaning and allocate handcarts accordingly.
- PHI should liaise with the Base hospital to ensure only normal garbage is collected from them by UCC. Otherwise, an alternative disposal site may be required.
- UCC should provide some financial contribution to ORDE, as agreed at JICA Feb seminar.

#### **4.4.8 Environmental Education**

##### **4.4.8.1 Progress**

- DEO has been working actively for environmental education.
- DEO has carried out educational activities using the provided equipment effectively in accordance with the schedule planned in February.
- DEO has replaced the digital photo display periodically with new photos.
- DEO has conducted on-site education in 6 communities and 3 primary schools.
- UCC has carried out a "Shramadana" educational campaign, the main purpose being cleaning up drainage and surroundings in order to prevent dengue fever.

##### **4.4.8.2 Existing Problems**

- The capacity of the environmental education centre has not been fully utilized. The number of visitors can be increased.
- Existing human resources for environmental education is not sufficient due to additional work assigned to the DEO such as communication with animators.
- Insufficient involvement of citizens for execution of Shramadana.

##### **4.4.8.3 Required Actions**

- Input of additional human resources for the operation of the environmental education centre may be necessary to increase the visitors. Utilization of CDO or volunteers such as retired PHI should be considered.
- The participation of citizens in Shramadana should be encouraged.

#### **4.4.9 Social Approach**

##### **4.4.9.1 Progress**

- Animator system has been introduced in certain areas and has started functioning. This is a new important communication channel between UCC and citizens not only for waste problems but also for various other issues.

- Four animators have been selected. Two of these are very active, actually writing letters to people in their areas responsible for bad behaviour and copying these to UCC for followup. The DEO is responsible for this and currently has 14 complaints to deal with.

#### 4.4.9.2 Existing Problems

- DEO is quite busy handling complaints from animators.
- UCC takes few proper actions in response to requests from animators.
- Animator selection not completed.

#### 4.4.9.3 Required Actions

- More sincere response by UCC to animators' requests is essential to get public cooperation.
- Animator selection to be completed.
- Animator roles/duties to be finalised.

#### 4.4.10 Overall Required Action

- Strengthening the internal communication system.
- Strengthening the internal cooperation, collection work – education.

### 4.5 UCC Progress Meeting, 25 July 2003

**Present:** UCC: Chairman, Secretary, PHI; JICA: Kitajima-san, Kurupu, Nayana, Dr Sean

Meeting began at 9am. The meeting was spent going through the action plan items of the Mar-May monthly report. Required actions are highlighted in bold.

#### 4.5.1 Management Improvement

- Model bylaws: Chilaw bylaws are still with Provincial Council. Chairman feels their ability to implement SWM improvements is hampered by not having their bylaws in place yet. Chairman requested JICA's assistance in trying to get the Chilaw bylaws approved, either by contacting the Chief Minister, Western Province, or through the Minister of Local Government and Provincial Councils. **Dr Sean to check if there is anything JICA can do.**
- Monthly report: not yet completed, although UCC said they had started filling on 1 May. Mr Dharik said he has been too busy to complete this. The chairman said he needs to delegate more. **UCC are going to assign this task to Shanika (clerk) to do.**
- Service conditions: prepared for supervisors and drivers. Meeting held on 10 Jul with supervisors informing them of punishment and demotion system (they will be demoted to labourers if they don't perform well). 1-2 supervisors have been punished so far.
- Map: **Revised map to be finished by 30 Jul for collection by JICA and sending to printers, so that control board can be revised.**
- Motorbikes: one is being used by PHI; the other is being kept at UCC for use for investigating/dealing with sudden problems that arise.
- Minutes from UCC/JICA meetings are being circulated.

- Some orange aprons (5) have been issued to labourers during recent Church festival. **UCC hopes to finish issuing additional aprons to all labourers by end of 2003. Chairman proposes to add a simple message to these, such as “please help us”.**
- **Existing trailers and handcarts to be repainted in orange in due course.**
- Chairman observed that there is a small conflict between the PHI and DEO. He has asked the PHI to cooperate with the JICA project. **He will call both of them to discuss this issue.**
- UCC was ranked first amongst UCs in NW province in recent assessment.
- *Chairman supports further supervisor training, stating they must be “brainwashed” to improve their dedication and work ethic.*
- Action plan to be discussed at all day UCC/JICA meeting on 12 Aug. **UCC staff will discuss action plan ideas/content prior to this internally.**

## **4.5.2 Waste Collection Improvement**

### **4.5.2.1 Bell collection**

- Noticeboards: **UCC will fix these by Sept 11 (Munneswaram festival).**
- DEO is providing ongoing followup education. Lions have offered their assistance for education provision.
- Amplifiers/speakers installed and operational on all vehicles. 2WT battery recharging system established - UCC takes to nearby garage for overnight charging and collects the next morning.
- Chairman commented that bell collection system is not working properly in some areas. UCC are still having problems keeping to the collection schedule due to vehicle breakdowns and labourer shortages. PHI commented that it would be useful to be able to hire a tractor when a UCC vehicle is broken down. **Chairman has agreed to PHI’s request that spare trailer (2), tractor front (2) and back (2) wheels be purchased and held by UCC. Chairman has requested one new tractor under the SL govt/Indian loan scheme (refer newspaper advertisement).**
- Drain cleaners and sweeping system has been changed so that these labourers do this work before the tractor comes.
- “Garbage being thrown from vehicles by outsiders” – difficult issue to address. Chairman suggested putting up noticeboards at entrance to town and also at beach.
- UCC is discouraging people from using concrete bins. **UCC will consider whether to remove these bins in due course.**

### **4.5.2.2 Stationary Trailers, Modified Handcarts and Litter Bins**

- Parking area has been filled in at bus stand for one stationary trailer.
- *Stationary trailer near fish market had rear doors open. These should be kept shut and the trailer loaded from the sides.*
- Steps/platforms not being used. PHI asked if JICA could take these back and replace them with something more useful. **Dr Sean to discuss with Mr Sato.**

- UCC has stopped using the modified handcarts. JICA repeated that UCC may modify these.

#### 4.5.2.3 Other

- Chairman does some informal supervision. Recently, he observed a huge garbage dump at Aluthwatta. On investigation, he found two people were responsible – one building a house, the other a business. He instructed the PHI to give them spot fines of 1,000Rs and 500Rs respectively, which they paid. It took three tractor loads to remove this garbage dump. Again, having the bylaws would make a “spot fine” system much easier to implement.
- PHI had meeting with MOH, DMO, DEO and ORDE about hospital waste being taken to ORDE. Parties agreed to daily collection by UCC of normal hospital garbage only with this garbage being delivered to ORDE before 5pm. However, the PHI did a spot check recently of hospital normal garbage and found some blood stained materials. **PHI to discuss with hospital staff again next week.**
- Around 3-4 tractor loads per day of garbage are being taken to ORDE, the remaining garbage being taken to a dumping site in Wattakaliya. PHI said that labourers complain about having to wait at ORDE until they are instructed where to unload while ORDE Technical Advisor states this is not true.

#### 4.5.3 Environmental Education

Not discussed due to DEO being absent from meeting.

However, it was noted that the Environmental Education Centre (EEC) was closed today because of the DEO's absence. The EEC should be open regularly during UCC official working hours regardless of the DEO's work schedule so that citizens and school children can visit the EEC at any time. UCC should assign a person to care for the EEC and attend to visitors. Then, the EEC will have more visitors, while the DEO can deal with on-site education and other environmental education activities. This point will be discussed at the next meeting when the DEO is present.

#### 4.5.4 Social Approach

Not discussed due to DEO being absent from meeting.

Meeting finished at 10:10am, followed by informal discussion with PHI until 11am.

### 4.6 UCC Progress Meeting, 22 August 2003

**Present:** UCC: Chairman, Secretary, Mr Ravindra, Nilanthi, Shanika; JICA: Ms Kitajima, Kurupu, Nayana, Dr Sean

Meeting began at 4:30pm. The meeting was spent going through the action items of the Jul monthly report. Required actions are highlighted in bold.

### 4.6.1 Management Improvement

- **SWM Management Changes:** A Council member has been made responsible for overall supervision of SWM and has been allocated one of the JICA motorcycles for this purpose. Having lost some of his power, the PHI has lost interest in SWM and is likely to leave Chilaw within the next two weeks. Ms Nilanthi is also seeking a transfer from Chilaw, but the chairman is encouraging her to stay. **UCC to find a new PHI to replace Mr Dharik.**
- **Model bylaws:** No progress on getting approval for UCC bylaws. **Dr Sean suggested adopting model bylaws instead and is to check details of how UCC can do this. UCC to fax JICA copy of their bylaws.**
- **Monthly report:** manpower and equipment sections now being filled in by Shanika (clerk). JICA provided her with some training today on how to fill in other parts of the report and also provided some draft daily report forms for use by UCC staff and ORDE in hard copy form and on floppy diskette. **UCC to continue filling in monthly reports and to trial daily forms, identifying any modifications and extra training required.**
- **Control board:** Revised map has now been fixed to the board. **UCC must start using it.**
- **UCC hopes to finish issuing orange aprons to all labourers by end of 2003.**
- **Existing trailers and handcarts to be repainted in orange by 30 Sep 2003.**
- Revised draft Action plan in English handed over to chairman. Kitajima-san discussed with Nilanthi today about the preparation of an Education action plan. **Chairman and UCC staff will discuss action plan internally before meeting with JICA on 4 September to produce final draft action plan. Nilanthi to prepare draft education action plan for UCC internal discussion.**
- UCC were informed about national seminar on 31 October. They are keen to participate.

### 4.6.2 Waste Collection Improvement

#### 4.6.2.1 Bell collection

- **Noticeboards: UCC will fix these by Sept 11 (Munneswaram festival).**
- JICA informed UCC that battery not necessary for 2WT – amplifier can be connected to headlamp instead. As UCC has purchased a battery and set up a recharging system, they will continue using this, until the battery is exhausted, when they will consider adopting the alternative system.
- UCC still has some problems keeping to collection schedule, mainly due to vehicle problems. UCC have received acknowledgment of their request for one new tractor under the SL govt/Indian loan scheme. In the meantime, it would be useful to be able to hire a tractor when a UCC vehicle breaks down + to keep a stock of essential spare parts. **Chairman instructed secretary to arrange for spare trailer (2), tractor front (2) and back (2) wheels to be purchased and stored by UCC. UCC also to pursue purchase of new tractor through SL govt/Indian loan scheme.**



- **UCC will consider putting up noticeboards at entrance to town and also at beach to deter outsiders throwing garbage from vehicles in 2004, as part of Action plan.**
- **UCC will plan to remove communal bins in 2004-05 as part of Action plan.**

#### 4.6.2.2 Stationary Trailers, Modified Handcarts and Litter Bins

- Steps/platforms: JICA can not replace these with other items. UCC is currently using these as benches.
- UCC is using the modified handcarts on some occasions, mainly during festivals. For example, a Grand Exhibition is scheduled for Chilaw from 28-31 Aug, during which time UCC will send labourers with these handcarts to clean the exhibition area and other relevant places.

#### 4.6.2.3 Other

- Hospital waste: UCC have received letter from Regional Director of Health, which indicates the Base hospital might be provided with a stationary trailer for its use, but not when. **UCC to followup with relevant authorities.**
- Drain cleaners provided with wheelbarrows for drain cleanings, emptying their loads either into a stationary trailer or onto vacant land. Chairman is not happy with this. The idea of using modified handcarts and buckets for this purpose was discussed. Instead, chairman wants to repair some old handcarts and assign these to drain cleaners, with their loads being taken to the nearest stationary trailer for unloading by shovel. **UCC to arrange for repair of old handcarts and implement this idea.**

#### 4.6.3 Environmental Education

- UCC will discuss about short-term and annual program of environmental education based on their action plan. By the next meeting on 4 September UCC will finalize their draft idea and prepare a plan for environmental education.
- UCC have a "human resources" budget item of 100,000Rs which can be utilised for maintenance of the Environmental Education Centre.
- The chairman intends to employ Miss Shanika as a permanent officer of UCC in future because DEO is likely to transfer from Chilaw in these years. The chairman instructed DEO to train her gradually in all matters related to environmental education.

#### 4.6.4 Social Approach

- DEO is going to hold awareness program for Samurdhi groups on 1 and 2 of September and explain to them about bell collection system.
- Cleaning programme to be conducted on Sep 3-4 with assistance of Lions and possibly the Hatton National bank as part of the Munneswaram festival, involving cleaning of the beach, market, bazaar, Edmund Peiris Mw, Kurunegela Rd, bus stand and Munneswaram temple. Some labourers

will be stationed permanently at the beachside from Sep 1 until the end of the Munneswaram festival.

Meeting finished at 5:50pm.

# Chapter 5

## Chilaw Waste Stream Analysis

# **A. Household garbage collection service, garden waste and recycling/composting survey data**

| 2.1&2.2 Garbage coll'n | No  | %     |
|------------------------|-----|-------|
| Have and use           | 81  | 67.5  |
| Have but don't use     | 33  | 27.5  |
| Don't have             | 6   | 5.0   |
| Total                  | 120 | 100.0 |

| 3.8 Garden waste | No  | %     |
|------------------|-----|-------|
| Yes              | 64  | 53.3  |
| No               | 56  | 46.7  |
| Total            | 120 | 100.0 |

## **Q4-5 to 4-8 Recycling**

| Qns                          | Yes | No  | Fd/Ki | Paper | Textile | Plastic | Gr/Wd | Le/Ru | Metal | Glass | Ce/St | Other | Total |
|------------------------------|-----|-----|-------|-------|---------|---------|-------|-------|-------|-------|-------|-------|-------|
| 4.5/4.6 Individual collector | 87  | 33  | 0     | 18    | 0       | 0       | 0     | 0     | 11    | 47    | 0     | 0     | 52    |
| 4.7/4.8 Take to shop         | 28  | 92  | 0     | 5     | 0       | 0       | 0     | 0     | 0     | 23    | 0     | 0     | 28    |
| 4.9 Comp ki &/or ga waste    | 0   | 120 | 0     | 0     | 0       | 0       | 0     | 0     | 0     | 0     | 0     | 0     | 0     |

87 come but only 52 actually give

## **Notes:**

- Household questionnaire listed paper and cardboard separately and "metal can" and "other metal" separately, whereas these items were a single category in WACS. Hence, as more responses were obtained for paper compared with cardboard, it was assumed total paper = paper (not paper + cardboard)
- Hence, as more responses obtained for metal can compared with other metal, it was assumed total metal = metal can (not metal can + other)
- Assume same people are both giving/selling things to collectors and taking things to shops so that total doing some recycling is max no from these 2 questions, not sum

## **B. Other household survey data and calculation of discharge/behaviour method %s for surveyed area**

### **WACS Collection Vehicle Waste Composition - wt %**

|        | Fd/Ki | Paper | Textile | Plastic | Gr/Wd | Le/Ru | Metal | Glass | Ce/St | other | Total  |
|--------|-------|-------|---------|---------|-------|-------|-------|-------|-------|-------|--------|
| Kandy  | 58.21 | 11.95 | 1.40    | 7.94    | 12.31 | 0.68  | 0.84  | 1.13  | 5.13  | 0.40  | 99.99  |
| Matale | 61.29 | 6.40  | 1.07    | 4.35    | 18.14 | 1.11  | 0.42  | 0.36  | 6.60  | 0.26  | 100.00 |
| Chilaw | 36.60 | 6.75  | 1.34    | 4.11    | 29.70 | 0.13  | 0.81  | 0.25  | 12.13 | 8.18  | 100.00 |

### **Average Household waste composition - wt %**

|         | Fd/Ki | Paper | Textile | Plastic | Gr/Wd | Le/Ru | Metal | Glass | Ce/St | other | Total  |
|---------|-------|-------|---------|---------|-------|-------|-------|-------|-------|-------|--------|
| Kandy   | 69.90 | 6.93  | 1.11    | 5.08    | 11.70 | 0.41  | 0.96  | 1.07  | 2.65  | 0.18  | 100.00 |
| Matale  | 66.50 | 6.98  | 1.34    | 3.59    | 15.68 | 0.40  | 0.37  | 1.33  | 3.36  | 0.46  | 100.00 |
| Chilaw  | 41.83 | 5.64  | 1.37    | 3.01    | 26.96 | 0.06  | 0.82  | 0.58  | 6.22  | 9.00  | 95.49  |
| Adopted | 43.81 | 5.90  | 1.43    | 3.15    | 28.23 | 0.07  | 0.86  | 0.61  | 6.52  | 9.42  | 100.00 |

| Household survey<br>(120 respondents) | Q3.1 garb disp |       | 5.9 others<br>behaviour | Weighted no of responses to different methods of waste disposal for different waste types |       |         |         |       |       |       |       |       |       |       | Wt avg | Rev'd | Rev'd % |
|---------------------------------------|----------------|-------|-------------------------|---|-------|---------|---------|-------|-------|-------|-------|-------|-------|-------|--------|-------|---------|
|                                       | Main           | Other |                         | Fd/Ki   | Paper | Textile | Plastic | Gr/Wd | Le/Ru | Metal | Glass | Ce/St | other | Total |        |       |         |
| LA colln                              | 74             | 9     | 76                      | 61  | 61    | 61      | 61      | 24    | 61    | 61    | 61    | 61    | 61    | 573   | 52.4   | 52.4  | 53.8    |
| Self-disp (OSD)                       | 16             | 24    | 9                       | 17.6  | 17.6  | 17.6    | 17.6    | 39    | 17.6  | 17.6  | 17.6  | 17.6  | 17.6  | 197.4 | 29.3   | 18.1  | 18.6    |
| Compost                               | 0              | 0     | 0                       | 0   | 0     | 0       | 0       | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0.0    | 0.0   | 0.0     |
| Recycle                               | 0              | 0     | 0                       | 0   | 18    | 0       | 0       | 0     | 0     | 11    | 47    | 0     | 0     | 76    | 1.2    | 1.0   | 1.1     |
| Open dump                             | 30             | 2     | 45                      | 24.4  | 24.4  | 24.4    | 24.4    | 1     | 24.4  | 24.4  | 24.4  | 24.4  | 24.4  | 220.6 | 17.2   | 25.9  | 26.6    |
| Total                                 | 120            | 35    | 130                     | 103   | 121   | 103     | 103     | 64    | 103   | 114   | 150   | 103   | 103   | 1067  | 100    | 97.4  | 100.0   |
| Weight                                | 0.8            | 0.2   |                         | Q3.9  |       |         |         |       |       |       |       |       |       |       |        |       |         |

## **Notes:**

- Chilaw household weighted average composition data calculated for each waste type as Chilaw VWC x 0.5 x (Kandy HHWC/Kandy VWC + Matale HHWC/Matale VWC) assuming:
    - variations in VWC between towns reflects variations in local conditions; and
    - the ratio of town HHWC/town VWC is approximately constant
- where VWC = vehicle waste composition and HHWC = household waste composition. The calculated %s are then adjusted on a pro rata basis to give a total of 100%.

2. Q5.9 generally supports Q3.1 results except for suggesting open dumping is more common and OSD less common. Q3.1 result used in preliminary analysis, applying wts to main/other answers as shown.

1.e. no of households disposing of each kind of waste by particular method = (no using this as main method) x 80% + (no using this as secondary method) x 20% (for LA colln, OSD and open dumping)

3. For compost and recycle options, use answers from other questions as indicated, rather than 3.1.

a. For those recycling different materials, assumed 90 % of materials generated are recycled - gives revised total shown in last column

4. Open dumping % considered to be too low based on observation and Q5.9. Q5.9 open dump % = 34.6 % - revise open dumping % to be avg of tabulated (17.2%) & this value

5. Self-disposal % considered to be too high based on observation, disposal site tonnages and Q5.9. Q5.9 OSD % = 6.9 % - revise OSD % to be avg of tabulated (29.3%) & this value

### C. Extension of survey results to entire CUA area

Household waste stream results in final column of above table have been adopted as representative of surveyed areas. This survey was undertaken in areas where 95% of households receive a garbage collection service (see Q2.1 & 2.2). Discussions with CUC Supervisors indicated that the CUA service coverage is approx. 80 % (75-85%)

Hence, the calculated %s must be adjusted to account for the service coverage in the surveyed area being different from the entire CUA. This is done below:

| Area (fraction) | Formulae |            |       | Survey area |            |       | Overall |         |       |
|-----------------|----------|------------|-------|-------------|------------|-------|---------|---------|-------|
|                 | Serviced | Unserviced | Total | Serviced    | Unserviced | Total | Serv.   | Unserv. | Total |
|                 | 0.95     | 0.05       | 1     | 0.95        | 0.05       | 1     | 0.8     | 0.2     | 100   |
| LA collection   | X1       | 0          | 53.8  | 56.6        | 0.00       | 53.8  | 56.6    | 0.0     | 43.30 |
| Self-disposal   | X2       | Y2         | 18.6  | 17.4        | 40.19      | 18.6  | 17.4    | 40.2    | 21.99 |
| Compost         | X3       | Y3         | 0.0   | 0.0         | 0.00       | 0.0   | 0.0     | 0.0     | 0.00  |
| Recycle         | X4       | Y4         | 1.1   | 1.0         | 2.30       | 1.1   | 1.0     | 2.3     | 1.26  |
| Open dump       | X5       | Y5         | 26.6  | 24.9        | 57.51      | 26.6  | 24.9    | 57.5    | 31.46 |
| Total           | 100      | 100        | 100   | 100         | 100        | 100.0 | 100.0   | 100.0   | 100.0 |

#### Notes:

1. In general:

a.  $X1 = 53.8/0.95$

b.  $X2*0.95 + Y2*0.05 = 18.6$ ;  $X3*0.95 + Y3*0.05 = 0.0$ ; etc.

c. Assume for areas not provided with collection service, waste is disposed of by other methods in proportion to %s in serviced areas.

1.e.  $X2/(X2+X3+X4+X5) = Y2/(Y2+Y3+Y4+Y5)$  which simplifying becomes  $X2/(100-X1) = Y2/100$  as  $Y2+Y3+Y4+Y5 = 100$ ; etc. for X3, X4, X5

d. Combining b and c gives  $Y2*(0.95*(100-X1)/100+0.05) = 18.6$ ; etc.

Solving these equations gives the relative %s for different disposal methods in serviced and unserviced areas within the survey area.

2. These %s are then assumed applicable to all CUA:

a. Overall %s calculated as  $((\% \text{ serviced area}) \times (\text{disposal method \% in that area}) + (\% \text{ unserviced area}) \times (\text{disposal method \% in that area}))/100\%$

e.g. self-disposal =  $(80*17.4+20*40.2)/100 = 22.0\%$

#### D. Waste Generation Rate (WGR) data

| Town/city | Pop'n   | WGR<br>(kg/cap.d) | HH Ga waste<br>Comp (%) |
|-----------|---------|-------------------|-------------------------|
| Kandy     | 110,049 | 0.545             | 11.70                   |
| Matale    | 36,331  | 0.451             | 15.68                   |
| Chilaw    | 24,105  |                   | 28.23                   |

2001 population data quoted here (for comparison purposes only - not used in these calculations)

These are estimated WGRs based on measured waste discharge rates in Kandy and Matale.

Chilaw and Matale are similar sized cities. However, Chilaw household garden waste % is approx 1.8x that of Matale, indicating a lot more garden waste is being generated and/or collected in Chilaw, compared with Matale. Increased garden waste generation may be due to the different climate & also due to many low income

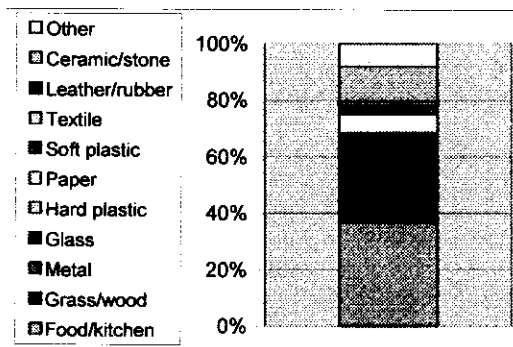
households using coconut palm thatched roofs in Chilaw, which require regular replacement. Increased garden waste collection is consistent with WACS data and observation.

Based on these comments, Chilaw WGR is estimated as follows:

- Adopt Matale WGR, as Matale and Chilaw are similar sized cities = 0.451 kg/cap.d but adjust this to account for > garden waste collection in Chilaw
- Matale non-garden waste generation rate =  $(100-15.68)/100 \times 0.451 = 0.380$  kg/cap.d = Chilaw non-garden waste generation rate =  $(100-28.23)/100 \times \text{WGR}$
- Chilaw WGR =  $(100-15.68)/(100-28.23) \times 0.451 = 0.530$  kg/cap.d = adopted value

#### Graphical Data Graphical data

|        | Food/kitchen | Grass/wood | Metal | Glass | Hard plastic | Paper | Soft plastic | Textile | Leather/rubber | Ceramic/stone | Other | Total  |
|--------|--------------|------------|-------|-------|--------------|-------|--------------|---------|----------------|---------------|-------|--------|
| Chilaw | 36.60        | 29.70      | 0.81  | 0.25  | 1.00         | 6.75  | 3.11         | 1.34    | 0.13           | 12.13         | 8.18  | 100.00 |



#### Collection worker recycling (data from collection worker survey)

| Item   | Total |
|--|-------|
| No of workers collecting items for recycling         | 5     |
| Total no of workers interviewed                      | 30    |
| Average recycling income(Rs/mth)                     | 59    |
| % of those interviewed collecting recyclables        | 17    |
| Total no of SWM workers                              | 74    |
| % interviewed/total workers                          | 41    |
| Estimated total no of workers collecting recyclables | 12    |

#### Notes:

- Three collection workers indicated all recyclables are taken to Rejina Stores; two others didn't know.
- Total SWM workers = 68 labourers + 6 drivers from waste management tasks breakdown table.

#### Collection worker - recycling quantities

| Collection worker - Recycling quantities |               |       |           |       |       |                  |                |        |           |                      |           |
|--|---------------|-------|-----------|-------|-------|------------------|----------------|--------|-----------|----------------------|-----------|
| Item                                     | No collecting | Qty   | Units     | Price | Units | Est total kg/mth | Est total kg/d | Income |           | Revised total (kg/d) | (kg/mth)  |
| Bottles                                  | 4             | 134.0 | kg/mth    | 1-1.5 | Rs ea | 330              | 11.0           | 167    | Rs/mth    | 22.8                 | 685       |
| Iron                                     | 2             | 14.0  | kg/mth    | 4-5   | Rs/kg | 35               | 1.2            | 63     |           | 2.4                  | 72        |
| Aluminium                                | 1             | 0.5   | kg/mth    | 50    | Rs/kg | 1                | 0.0            | 25     |           | 0.1                  | 3         |
| Total quantity                           | 5             | 148.5 | kg/mth    |       |       | 366              | 12.2           | 255    | Rs/mth    | 25.3                 | 759       |
| Est qty/labr                             |               | 30    | kg/lr.mth |       |       |                  | Avg            | 51.1   | Rs/lr.mth | 106                  | Rs/lr.mth |
| Est tot qty - all labrs                  |               | 366   | kg/mth    |       |       |                  |                |        |           |                      |           |

#### Notes:

- Average weight of bottles (mainly beer and arrack) = 0.66 kg ea (average weight, based on measurements of 5 arrack and 5 beer bottles)
  - No of bottles collected per month = 203 bottles/mth, converted to kg/mth using above average weight
  - Overall quantity recycled = 12.2 kg/d, which is very small. However, household survey indicates lot of recyclables collected at discharge + MM survey indicates very few middlemen receive recyclables from collection workers.
  - From time and motion study, 4WT crew (1 driver and 3 labourers) said they collect recyclables, comprising mainly glass bottles and some metals which they sell at 1Rs/bottle, 5Rs/kg tins, 50Rs/kg Al and 60Rs/kg copper/brass to a middleman on Correa Mw, earning about 150Rs/wk for the entire crew. This equates to 38 Rs/lr.wk or 161 Rs/labr.mth, which is about 2.9 times higher than the amount calculated from the collection worker survey recyclables quantities = 51 Rs/labr.mth and stated recycling income generation of 58 Rs/labr.mth
  - It is expected that a 4WT crew will collect more recyclables than 2WT crews and HC labourers - hence 4WT crew income can be regarded as an upper limit, while the survey data is more likely to be a lower limit as it includes all labourers, including drain cleaners and sweepers.
- Hence, adopted colln worker recyclable amt =  $25.3 \text{ kg/d} = (\text{T\&M income} + \text{colln labr qty data income}) / (\text{colln labr qty data income} \times 2) \times \text{colln labr qty}$
- This adopted quantity is very small and has a very small impact on the waste stream.

#### Final disposal site - recycling

- Chilaw uses a large number of disposal sites, most of which are located on private land and/or in low, lying swampy areas.
  - Interviews of 50 residents living close to five different disposal sites found no one involved in collecting recyclable materials or food/kitchen waste for animal feed from any of these sites.
  - Two people allowed some of their animals (4 cows, 12 goats, 4 pigs @ Aluthwatta and 3 pigs at Suduwella) to graze on these disposal sites on a daily basis.
  - Total final disposal site recycling is assumed to be 0 kg/d
- This is considered reasonable given that most of these disposal sites are located on private land and/or in low lying swampy areas, making them not very accessible for scavenging, together with the high number of household collectors.

# 1. WASTE STREAM HOUSEHOLD, COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL DATA

| a. Residential              | Permanent |        | Floating |        | Notes |
|-----------------------------|-----------|--------|----------|--------|-------|
|                             | H'holds   | People | H'holds  | People |       |
| July 2001 census            |           | 24105  |          |        | 1     |
| Divisional Secretariat data |           |        |          | 2000   | 2     |
| Adopted                     | 0         | 24105  | n/a      | 2000   |       |

Other data:

Area = 4 486 km2 (unchanged since 1981 census)  
(net area, allowing for lagoon; total area = 5.173km2)

## Notes:

- Provisional July 2001 census results
  - Floating population data from Clerk, Population Section, Divisional Secretariat - very rough estimate as no actual data available
  - Population growth rate based on the following data:
    - Census data (from UDA Draft Development Plan). This gives
      - Chilaw popn cmpd growth rate (1981-2001) = 0.74%
      - Chilaw popn cmpd growth rate (1946-2001) = 1.79%
    - UDA population projection based on 1.7% annual growth
    - Census data for the Puttalam district from 1981 & 2001 gives an average annual compound growth rate of 1.81%
    - Adopted value = 1.8 %
- This is much higher than the actual cmpd growth rate for Chilaw between 1981-2001 but consistent with longer term growth rate data for Chilaw (1946-2001), UDA adopted figures and actual growth in Puttalam district over the last 20yrs.
- Chilaw 2002 population = 24539

| Year | Pop'n | Cmpd gr rate (%) |             |
|------|-------|------------------|-------------|
|      |       | bet census       | rel to 1946 |
| 1946 | 9108  |                  |             |
| 1953 | 11392 | 3.25             | 3.25        |
| 1963 | 14090 | 2.15             | 2.60        |
| 1971 | 17308 | 2.60             | 2.60        |
| 1981 | 20810 | 1.86             | 2.39        |
| 2001 | 24105 | 0.74             | 1.79        |

## General Notes on Shading

- Yellow indicates waste generators surveyed/interviewed during this study.
- Blue relates to specific notes described under relevant items.
- Purple shows data used in waste stream calculations
- Brown indicates cells affected by changes in collection tonnages

## Abbreviations

- Waste type codes: F = food/kitchen, G = garden, Hz = hazardous, P = paper/cardboard, Pl = plastic, M = metal, M/F = meat/fish, R = rubber/leather, In = inert, T = textile
- Disposal method codes: A-D = LA collection; E-F = on-site disposal, G = recycling, H = composting, I = illegal dumping, J = other
- Waste stream codes: OSD = on-site disposal, comp = composting, LA colln = NMC collection, Recy = recycling, ID = illegal dumping, DH = direct haulage
- Other: WDR = waste discharge rate, WGR = waste generation rate, SW = solid waste



## 2. COMMERCIAL & INDUSTRIAL SECTOR - DETAILED INFORMATION

### a. General

| Cate-<br>gory | Name                        | Address                 | Relevant Data |                      | SW gen<br>(kg/d) | Main 3<br>wastes | Disposal |        | OSD  | Comp | LA<br>colln | Recy | ID  | Total | Notes             |
|---------------|-----------------------------|-------------------------|---------------|----------------------|------------------|------------------|----------|--------|------|------|-------------|------|-----|-------|-------------------|
|               |                             |                         | No staff      | Type                 |                  |                  | Main     | other  |      |      |             |      |     |       |                   |
| Small         |                             |                         |               |                      |                  |                  |          |        |      |      |             |      |     |       |                   |
| SW1           | Thafroban Communication     | Bridge St,Chilaw        | 3             | Communication        | 0.5              | P>F>PI           | A        |        | 0.0  | 0.0  | 0.5         | 0.0  | 0.0 | 0.5   |                   |
| SW2           | New Beauty Salon            | Bridge St,Chilaw        | 3             | Salon                | 0.5              | H>P>PI           | A        |        | 0.0  | 0.0  | 0.5         | 0.0  | 0.0 | 0.5   |                   |
| SW3           | Rathna Garage               | 25 Colombo Rd,Chilaw    | 3             | Garage               | 3.0              | M>F>Ga           | F        | C,G    | 1.1  | 0.0  | 1.7         | 0.2  | 0.0 | 3.0   |                   |
| SW4           | Desha Pharmacy              | 23 Port Rd,Chilaw       | 2             | Pharmacy             | 2.0              | P>PI>Hz          | F        | C,G    | 0.9  | 0.0  | 0.6         | 0.6  | 0.0 | 2.0   |                   |
| SW5           | Sudasuna Printers           | Jetty St, Chilaw        | 11            | Printing             | 15.0             | P>G>F            | C        | G      | 0.0  | 0.0  | 14.7        | 0.3  | 0.0 | 15.0  |                   |
| SW6           | Darshika Shoe Mart          | 3 Koraya Mw,Chilaw      | 4             | Shoes                | 1.0              | PI>P>F           | C        |        | 0.0  | 0.0  | 1.0         | 0.0  | 0.0 | 1.0   |                   |
| SW7           | St. Meris Nylon Centre      | 82 Bridge St, Chilaw    | 2             | Selling nylon items  | 1.0              | P>M>F            | A        |        | 0.0  | 0.0  | 1.0         | 0.0  | 0.0 | 1.0   |                   |
| SW9           | Cargills Food City          | Jetty St, Chilaw        | 34            | Goods                | 8.0              | PI>P>F           | D        | G      | 0.0  | 0.0  | 6.0         | 2.0  | 0.0 | 8.0   |                   |
| SW10          | Copes City                  | 41 Colombo Rd,Chilaw    | 4             | Goods                | 2.0              | PI>P>F           | E        | B      | 1.2  | 0.0  | 0.8         | 0.0  | 0.0 | 2.0   |                   |
| SW12          | Tasini Cool Spot & Grocery  | 4-A Radaguru Mw,Chilaw  | 6             | Restaurant           | 4.0              | F>In>P>PI        | B        |        | 0.0  | 0.0  | 4.0         | 0.0  | 0.0 | 4.0   |                   |
| SW13          | Mangalika Hotel             | 21 Kurunegala Rd,Chilaw | NA            | Restaurant           | 10.0             | F>P>PI           | C        |        | 0.0  | 0.0  | 10.0        | 0.0  | 0.0 | 10.0  |                   |
| SW14          | Mayura Centre               | 53 Kurunegala Rd,Chilaw | NA            | Restaurant           | 5.0              | F>P>In           | D        | G      | 0.0  | 0.0  | 2.0         | 3.0  | 0.0 | 5.0   |                   |
| SW15          | The Finance Company         | 53-A Puttalam Rd,Chilaw | 20            | Finance company      | 10.0             | F>P>PI           | C        |        | 0.0  | 0.0  | 10.0        | 0.0  | 0.0 | 10.0  |                   |
| SW17          | Bank of Ceylon              | Bridge St,Chilaw        | 32            | Bank                 | 10.0             | P>F>G            | B        | F,H    | 3.9  | 0.3  | 5.8         | 0.0  | 0.0 | 10.0  |                   |
| Large         |                             |                         | Small         |                      | WGR=             | 5.14             | kg/ent.d |        |      |      |             |      |     |       |                   |
| SW8           | Dhammika Furniture          | Colombo Rd,Chilaw       | 30            | Furn. makers/sellers | 25.0             | Sw>F>PI          | F        | G      | 25.0 | 0.0  | 0.0         | 0.0  | 0.0 | 25.0  | Sw =sawdust       |
| LW9           | Sri Lanka Telecom           | Puttalam Rd,Chilaw      | 95            | Comm                 | 51.0             | G>F>P            | A        | F      | 20.4 | 0.0  | 30.6        | 0.0  | 0.0 | 51.0  |                   |
| LW11          | Main Post Office            | Chilaw                  | 65            | PO                   | 35.0             | P>G>F            | A        | F      | 14.0 | 0.0  | 21.0        | 0.0  | 0.0 | 35.0  |                   |
| LW12          | National Savings Bank       | Kurunegala Rd,Chilaw    | 23            | Bank                 | 50.0             | P>F>PI           | C        |        | 0.0  | 0.0  | 50.0        | 0.0  | 0.0 | 50.0  |                   |
| SW11          | Suhada Pharmacy             | 2 Colombo Rd,Chilaw     | 15            | Phar/grocery         | 20.0             | P>PI>F           | B        |        | 0.0  | 0.0  | 20.0        | 0.0  | 0.0 | 20.0  |                   |
| LW1           | Serandib Chinese Restaurant | 86,Puttalam Rd,Chilaw   | 5             | Restaurant           | 40.0             | G>F>PI           | A        | G      | 0.0  | 0.0  | 37.0        | 3.0  | 0.0 | 40.0  | Avg guests = 35/d |
| LW2           | Chilaw Rest House           | Palam Veediya,Chilaw    | 16            | Hotel                | 25.0             | F>G>PI           | F        | G      | 23.3 | 0.0  | 0.0         | 1.7  | 0.0 | 25.0  | Avg guests = 15/d |
| LW3           | Chilaw Chinese Restaurant   | 168,Puttalam Rd,Chilaw  | 3             | Hotel                | 35.0             | F>G>PI           | B        | G      | 0.0  | 0.0  | 33.9        | 1.1  | 0.0 | 35.0  | Avg guests = 40/d |
| Total         |                             |                         |               |                      | 353.0            | 5.14286          |          |        | 89.8 | 0.3  | 251.0       | 11.9 | 0.0 | 353.0 |                   |
| Notes:        |                             |                         | Large         | WGR=                 | 35.1             | kg/ent.d         |          | Disp % | 25.4 | 0.1  | 71.1        | 3.4  | 0.0 | 100.0 |                   |

1. Waste generation calcs, based on additional info from CUC supervisors:

- a. LW9 states waste gen'n = 1.00 Tr = 357 kg/d, assuming small tractor of vol 2.1 m<sup>3</sup>, 85 % full & 200 kg/m<sup>3</sup> density as per Chilaw CV survey  
This is much too high - CUC supervisors said 3 polysacks/d @ 3kg ea. = 9kg/d - seems too low. If assume 1 tr/wk, waste amt = 51 kg/d, which seems reasonable, especially when compared with PO
- b. Silva Hotel generates 2.00 bins/d @ 120 L x 85 % full = 61.2 kg/d, using waste density of 300 kg/m<sup>3</sup>, as mainly F/K waste
- c. Nisamiya Hotel generates 1.00 bin/d @ 120 L x 85 % full = 30.6 kg/d, using waste density of 300 kg/m<sup>3</sup>, as mainly F/K waste
- d. Muththu Hotel generates 1.00 bin/d @ 120 L x 85 % full = 30.6 kg/d, using waste density of 300 kg/m<sup>3</sup>, as mainly F/K waste
- e. Mannar Hotel generates 3.00 bks/d @ 30 L x 85 % full = 23.0 kg/d, using waste density of 300 kg/m<sup>3</sup>, as mainly F/K waste
- f. Siripala Hotel generates 2.00 polysacks/d @ 10 kg/sack = 20.0 kg/d
- g. Master Motors generates 0.50 HC/d of rubber, timber, oil, filters, tyre, metal (lathe) waste = 60.5 kg/d, based on 0.12 T/H
- Revised WGR for large enterprises (JICA survey and CUC data) = 36.2 kg/ent.d (small difference from JICA survey value - use the higher value, as it is based on more data)
2. Waste stream breakdown based on main/other disposal method responses and specific recycling data, as follows:
- a. SW3 sells 5kg/mth of metals = 0.17 kg/d - 5.6% of waste gen'n; assume 60 % of remaining waste goes to OSD; remainder to LA colln
- b. SW4 gives away 10kg/mth of cardboard + 12kg/mth of plastics = 0.73 kg/d - 37% of waste gen'n - seems too high-assume 75 % of this amt is recycled & 60 % of residual waste to OSD; rest to LA colln
- c. SW5 sells 10kg/mth of paper = 0.33 kg/d - seems low but possibly high internal recycling of waste paper.
- d. SW9 sells 10kg/mth of paper and 50kg/mth of cardboard = 2.00 kg/d - 25% of waste generation - OK
- e. SW10 - assume 60 % of waste buried on site, remainder goes to LA colln
- f. SW14 gives away 90kg/mth of F/K waste for animal feed = 3.00 kg/d - seems slightly high but assume OK as F/K waste is main waste type
- g. SW17 composts 10kg/mth of F/K waste for own use = 0.33 kg/d - assume 60 % of remaining waste goes to LA colln; rest is OSD
- h. SW8 sells 3 plastic containers per mth to factory - assume this is for reuse
- i. LW9 & LW11 - assume 60 % of waste given to LA collection, remaining to OSD
- j. LW1 sells 100 bottles/mth, 20 plastic containers/mth and gives away 20kg/mth of F/K waste for animal feed = 90 kg/mth = 3 kg/d, assuming 0.66kg/bottle & 0.2kg/pl contr
- k. LW2 sells 63 bottles/mth and gives away 10kg/mth of F/K waste for animal feed = 51.6 kg/mth = 1.7 kg/d
- l. LW3 sells 50 bottles/mth = 33 kg/mth = 1.1 kg/d

### 3. Waste collection based on CUC Supervisors data:

a. The Special Zone mainly covers the Chilaw commercial area including the fish/vegetable markets, Bazaar, Bus stand and Bridge St areas. The Special Zone Supervisor indicated they collect approx. 1 4WT/d from the fish/vegetable markets, 1 lorry/d from Bazaar, 6 HC/d from bus stand and 3HC/d from Bridge St. Excluding the fish/vege market waste, comm waste collection =

|   |  |
|---|--|
| i. Bazaar - no of lorry loads/d =       | 1 LL/d @ 0.81 T/load = 0.81 T/d  |
| ii. Bus stand - no of handcart loads =  | 6 HC/d @ 0.12 T/load = 0.73 T/d  |
| iii. Bridge St - no of handcart loads = | 3 HC/d @ 0.12 T/load = 0.36 T/d  |
| + Retail market =                       | 2 HC/d @ 0.12 T/load = 0.24 T/d (retail mkt waste collected by Z2 tractor - waste collection amount based on time and motion study observations) |
|   | 2.14 T/d collection  |

4. Waste generation based on estimated actual no of commercial enterprises within CUA = 413 enterprises from "Chilaw Waste Generation Places" data (TLs not used as some enterprises may have more than one TL)

|   |                             |                            |                        |                                   |
|---|-----------------------------|----------------------------|------------------------|-----------------------------------|
| a. Assume small waste generators =  | 84 % of total =             | 347 enterprises with WGR = | 5.14 kg/shop.d =       | 1.78 T/d                          |
| b. Assume large waste generators =  | 16 % of total =             | 66 enterprises with WGR =  | 36.2 kg/enterprise.d = | 2.40 T/d                          |
| (see supporting data)   |                             | 413                        | Total =                | 4.18 T/d or 10.12 kg/enterprise.d |
| d. Check working backwards from waste str data where LA colln =   | 71.1 % representing         | 2.14 T/d; gen =            |                        | 3.01 T/d or 7.30 kg/enterprise.d  |
| These two figures considered to represent upper and lower limits for comm waste generation - decided to adopt the average = |                             |                            | 3.60 T/d or            | 8.71 kg/enterprise.d              |
| f. Summary: No of commercial enterprises =  | 413 with waste generation = | 3.60 T/d, equiv to         | 8.71 kg/enterprise.d   |                                   |

### b. Markets

| ID | Name                           | No of stalls |           |       |       | Stalls |           |          | Total | WD (kg/d) | WDR kg/stall.d | Main wastes | Recy  | LA colln | ID  | Notes                      |
|----|--------------------------------|--------------|-----------|-------|-------|--------|-----------|----------|-------|-----------|----------------|-------------|-------|----------|-----|----------------------------|
|    |                                | Meat/Fish    | Veg/Fruit | Goods | Other | Meat   | Fish ref. | Fish ws. |       |           |                |             |       |          |     |                            |
|    | <b>Fish/meat and vegetable</b> |              |           |       |       |        |           |          |       |           |                |             |       |          |     |                            |
| FM | Fish Market                    |              |           |       |       | 1      | 250       | 25       | 276   |           |                |             |       |          |     | 100 tables and 150 baskets |
| VM | Vegetable Market               | 0            | 225       | 25    | 15    |        |           |          | 265   |           |                |             |       |          |     |                            |
|    | Sub-total                      | 0            | 225       | 25    | 15    |        |           |          | 541   | 809       | 1.50           | Note 2      | 30.67 | 809      | 0   |                            |
|    |                                |              |           |       |       |        |           |          |       |           |                |             | 3.7   | 98.3     | 0.0 |                            |
| RM | Retail                         | 9            | 2         | 58    | 9     |        |           |          | 78    | 242       | 3.10           | Note 2      | 0.67  | 242      | 0   |                            |

Notes: In this case, F/K = vegetable/fruit waste/leaves, coconut shells, etc.

1. No pola in Chilaw; main waste types (combined markets) = coconuts > meat/fish > fruit/vege > paper > polythene

2. Stall data: 5 stalls closed at retail market; 1 at the fish market

3. Waste stream breakdown based on:

a. CUC waste collection data - 1 4WT/d from fish/vege market taken to ORDE compost facility; retail mkt waste collected by 4WT & taken to disposal site.

b. ORDE data gives average inputs of 809 kg/d of waste materials from the fish/vege market (405kg compostable materials, 170 king coconuts (16kg/d), 249kg/d sand, 123kg/d for burning, 17kg/d recyclables) while 1 4WT/d = 1000 kg/d ORDE data adopted as considered more reliable.

c. Retail market - from time and motion study, waste gen'n estimated to be 2 HC/d @ 0.12 T/HC = 242 kg/d - this has been included under commercial waste.

d. Combined 3 markets recycle 25kg/mth paper, 15kg/mth cardboard, 500kg/mth organic waste for animal feed, 200kg/mth king coconuts and 200kg/mth animal parts.

Assumed organic waste, king coconuts and animal parts recycling originates from fish/vege mkt due to low no of meat/fish and vege/fruit stalls at retail market =

Assumed paper/cardboard waste recycling split 50:50 between vege/fish and retail markets, based on relative nos of goods and other stalls at different places =

30 kg/d

0.67 kg/d for each

### c. Industries

#### 1. Shrimp/Prawn Farms/Hatcheries

|    | Industries                         | Address                 | Type                     | No of Staff | SW Gen (kg/d) | Main 3 wastes | Waste disposal |       | Waste disposal |      |          |      |     |       | Total |
|----|------------------------------------|-------------------------|--------------------------|-------------|---------------|---------------|----------------|-------|----------------|------|----------|------|-----|-------|-------|
|    |                                    |                         |                          |             |               |               | Main           | Other | OSD            | Comp | LA colln | Recy | ID  |       |       |
| 1  | Fumishel Aqua Project              | Meda Watta,Chilaw       | Prawn hatchery, water te | 4           | 2             | P>F>M         | J              | F     | 0.8            | 0    | 0        | 0    | 1.2 | 2.0   | LW18  |
| 2  | Prima Shrimp Farm                  | Meda Watta,Chilaw       | Shrimp farm              | 20          | 30            | P>G>F         | F              | G     | 27.5           | 0    | 0        | 2.5  | 0   | 30.0  | LW17  |
|    | Sub-total                          |                         | Total                    | 24          | 32            |               |                |       | 28.3           | 0    | 0        | 2.5  | 1.2 | 32    |       |
|    |                                    |                         |                          |             |               |               | % disposal     |       | 88.4           | 0.0  | 0.0      | 7.8  | 3.8 | 100.0 |       |
| 3  | Kings Akvarian & Aquaculture Suppl | Colombo Rd, Chilaw      | Shrimp farm              |             |               |               |                |       |                |      |          |      |     |       |       |
| 4  | S.C.M.Kooralage                    | Chilaw                  | Shrimp farm              |             |               |               |                |       |                |      |          |      |     |       |       |
| 5  | Baduradeen Mohomad Hameese         | 58A,Puttalam Rd, Chilaw | Shrimp farm              |             |               |               |                |       |                |      |          |      |     |       |       |
| 6  | R.A.Sarath Nandasiri               | Puttalam Rd,Chilaw      | Shrimp farm              |             |               |               |                |       |                |      |          |      |     |       |       |
| 7  | Ceylon De Food                     | Maddawatta,Chilaw       | Shrimp farm              |             |               |               |                |       |                |      |          |      |     |       |       |
| 8  | Aqua Service Limited               | Viddyalla Rd, Chilaw    | Shrimp farm              |             |               |               |                |       |                |      |          |      |     |       |       |
| 9  | R.Gurusamil                        | Puttalam Rd, Chilaw     | Shrimp farm              |             |               |               |                |       |                |      |          |      |     |       |       |
| 10 | Edmanlote                          | Puttalam Rd, Chilaw     | Shrimp farm              |             |               |               |                |       |                |      |          |      |     |       |       |

## Notes:

1. Waste stream data based on JICA survey:
  - a. LW18: J = owner takes out of premises to unknown place - assume illegal dumping for 60 % of waste; rest = OSD
  - b. LW17 sells 700 paper bags/mth and 3 metal barrels/mth - assume 2.5 kg/d recycled
2. For all prawn/shrimp farms, assumed:
  - a. Waste generation rate = 16 kg/industry from survey results for two industries
  - b. Trade licence data specifies 14 hatcheries, which is assumed to represent the total no of prawn/shrimp farms/hatcheries, of which 10 are listed above (details not known for other 4).
  - c. Total waste generation = 224 kg/d from all 14 shrimp/prawns farms/hatcheries
  - d. Waste stream breakdown based on survey data for two industries.
  - e. It seems reasonable that waste generation is relatively small and that most waste is disposed of on-site or recycled, given the nature of this industry.

## 2. Sawmills

| No  | Name                     | Location                 | Avg no workers | SW gen (kg/d) | Waste disposal |      |          |      |     |       |
|-----|--------------------------|--------------------------|----------------|---------------|----------------|------|----------|------|-----|-------|
|     |                          |                          |                |               | OSD            | Comp | LA colln | Recy | ID  | Total |
| SW1 | Mahalekam Timber Depot   | 1 Kurunegala Rd, Chilaw  | 6              | 25            | 0              | 0    | 0        | 25   | 0   | 25    |
| SW2 | Be Lings Sawmill         | 43 Kurunegala Rd, Chilaw | 4              | 237           | 0              | 0    | 0        | 237  | 0   | 237   |
| SW3 | St Anthonys Timber Depot | 137 Puttalam Rd, Chilaw  | 2              | 66            | 0              | 0    | 0        | 66   | 0   | 66    |
| SW4 | Siripura Sawmill         | 35 Sena St, Chilaw       | 6              | 275           | 163            | 0    | 0        | 112  | 0   | 275   |
| SW5 | Clodiyas Timber Shop     | 57 Colombo Rd, Chilaw    | 1              | 57            | 13             | 0    | 0        | 44   | 0   | 57    |
|     | Total                    |                          | 19             | 659           | 176            | 0    | 0        | 484  | 0   | 659   |
|     |                          |                          |                | Disposal %    | 26.7           | 0.0  | 0.0      | 73.3 | 0.0 | 100   |

## Notes:

1. Waste stream breakdown based on:
  - a. SW1 produces about 0.75 T/mth of sawdust, which it gives away for free (recycling)
  - b. SW2 produces about 3.75 T/mth of sawdust, which it gives away (recy) and 3.35 T/mth of woodchips which it sells = recycling
  - c. SW3 produces about 1.5 T/mth of sawdust, which it gives away (recy) and 0.48 T/mth of woodchips which are used for firewood (recycling)
  - d. SW4 produces about 4.9 T/mth of sawdust, which it disposes of on-site and 3.35 T/mth of woodchips which it uses or sells (recycling)
  - e. SW5 produces about 0.75 T/mth of sawdust which it burns or gives away - assume 50% OSD, 50% recycling and 0.95 T/mth of woodchips which it uses/sells (recycling)
2. Total no of sawmills within Chilaw = 5 - no need to modify survey data

## 3. Other Industries

|   | Other industries          | Address                   | Type                   | No of Staff | SW Gen (kg/d) | Main 3 wastes | Waste disposal |       | Waste disposal |      |          |      |      |       |
|---|---------------------------|---------------------------|------------------------|-------------|---------------|---------------|----------------|-------|----------------|------|----------|------|------|-------|
|   |                           |                           |                        |             |               |               | Main           | Other | OSD            | Comp | LA colln | Recy | ID   | Total |
| 1 | Bata Shoe Co              | Chilaw                    | Shoe packaging         |             | 121           |               |                |       | 0              | 0    | 121      | 0    | 0    | 121   |
| 2 | Sri Lanka Fisheries Board | Chilaw                    | Ice production?        |             | 12.5          |               |                |       | 8.1            | 0.0  | 4.4      | 0    | 0    | 12.5  |
| 3 | Ice Factory               | 20, Rediwellia, Chilaw    | ice production         | 4           | 20            | P>P>F         | C              | E, F  | 16.8           | 0    | 3.2      | 0    | 0    | 20.0  |
| 4 | Neil Fernando & Co        | Rediwellia, Talawatta     | Fibreglass boat making | 15          | 5             | P>M>Hz        | D              | G     | 0              | 0    | 20       | 0    | 0    | 20.0  |
| 5 | Justin Kure Boat Yard     | Egoda Watta, Chilaw       | Fibreglass boat making | 5           | 10            | Hz>P>F        | I              |       | 0              | 0    | 0        | 0    | 10   | 10.0  |
| 6 | Mid Garment Factory       | 98, Kurundu watta, Chilaw | garment                | 10          | 15            | Te>P>F        | B              | E, G  | 15.0           | 0.0  | 0.0      | 0.0  | 0    | 15.0  |
|   | Sub-total                 |                           | Surveyed places only = | 34          | 50            |               |                |       | 39.9           | 0.0  | 148.6    | 0.0  | 10.0 | 198.5 |
|   |                           |                           |                        |             |               |               | % disp         |       | 20.1           | 0.0  | 74.8     | 0.0  | 5.0  | 100.0 |

## Notes:

1. Waste generation data based on JICA survey (above) and some additional information from CUC for Bata: 8 industries in total
  - a. Bata Shoe co produces 1 HC/d from their shoe packing operations, which is collected by CUC @ 0.123 T/HC
2. Waste stream breakdown based on:
  - a. LW15 recycles 15 metal barrels/mth - assume 2.5 kg/d recycled, based on most common waste types not including metal
  - b. LW16 - assume 60 % to LA coll'n; remaining to OSD
  - c. LW14 gives away 10kg/mth of cardboard and 150kg/mth of textiles = 5.3 kg/d; assume 60 % of remaining waste to LA coll'n; rest to OSD
  - d. Sri Lanka Fisheries Board is believed to be an ice factory (not confirmed) - assume average industry waste generation 65 % OSD; rest = LA colln
3. Neil Fernando & Co is part of Neil Marine Boatyard in Negombo

### 3. INSTITUTIONS - DETAILED INFORMATION

#### a. Schools

| a. Schools |                               |                    |               |          |       |                         |      |           | Waste Stream Data |      |          |      |       |       |      |  |     |  |      |  |     |  |
|------------|-------------------------------|--------------------|---------------|----------|-------|-------------------------|------|-----------|-------------------|------|----------|------|-------|-------|------|--|-----|--|------|--|-----|--|
|            | Schools                       | Location           | Students      | Teachers | Total | Hostel                  | Type | SW (kg/d) | OSD               | Comp | LA colln | Recy | ID    | Total |      |  |     |  |      |  |     |  |
| 1          | Ananda College                | Chilaw             | 3000          | 109      | 3109  | 0                       | Nat  | 357.0     | 142.8             | 0.0  | 0.0      | 0.0  | 214.2 | 357.0 |      |  |     |  |      |  |     |  |
| 2          | Carmel Girls Central College  | Chilaw             | 1344          | 50       | 1394  | 30                      | 1AB  | 111.4     | 12.0              | 0.1  | 18.0     | 0.0  | 0.0   | 30.0  |      |  |     |  |      |  |     |  |
| 3          | St Marys Boys College         | Puttalam Rd,Chilaw | 1324          | 52       | 1376  | 37                      | 1AB  | 110.0     | 50.0              | 0.0  | 0.0      | 0.0  | 0.0   | 50.0  |      |  |     |  |      |  |     |  |
| 4          | Vijaya College                | Chilaw             | 858           | 20       | 878   |                         |      | 105.9     | 0.0               | 0.0  | 105.9    | 0.0  | 0.0   | 105.9 |      |  |     |  |      |  |     |  |
| 5          | Egodawella College            | Chilaw             | 797           | 23       | 820   |                         | 2    | 67.5      | 54.0              | 0.0  | 13.5     | 0.0  | 0.0   | 67.5  |      |  |     |  |      |  |     |  |
| 6          | Nassriya Muslim College       | Chilaw             | 1122          | 34       | 1156  |                         | 1AB  | 92.4      | 19.9              | 0.0  | 72.5     | 0.0  | 0.0   | 92.4  |      |  |     |  |      |  |     |  |
| 7          | St Bernadette Tamil College   | Chilaw             | 698           | 26       | 724   |                         | 1AB  | 57.9      | 12.5              | 0.0  | 45.4     | 0.0  | 0.0   | 57.9  |      |  |     |  |      |  |     |  |
| 8          | St Marys Girls Primary School | Chilaw             | 989           | 28       | 1017  |                         |      | 81.3      | 17.5              | 0.0  | 63.8     | 0.0  | 0.0   | 81.3  |      |  |     |  |      |  |     |  |
| 9          | Bishop Edmund Pieris College  | Chilaw             | 1046          | 36       | 1082  | 0                       |      | 86.5      | 0.0               | 0.0  | 102.0    | 0.0  | 0.0   | 102.0 |      |  |     |  |      |  |     |  |
|            | Total                         |                    | 11178         | 378      | 11556 |                         |      | 1069.8    | 308.6             | 0.1  | 421.0    | 0.0  | 214.2 | 943.9 |      |  |     |  |      |  |     |  |
| Notes:     |                               |                    | Revised WGR = |          |       | 0.093 kg/(stud+staff).d |      |           | Dispo %           |      | 32.7     |      | 0.0   |       | 44.6 |  | 0.0 |  | 22.7 |  | 100 |  |

#### Notes:

1. Student and teacher nos updated from JICA survey data for surveyed schools.

| JICA Survey Results       |                              |   | Students | Staff | St + St | SW (kg/d) | Waste Types    | Disposal |                              | Waste Stream Data |          |       |     |       |       |
|---------------------------|------------------------------|---|----------|-------|---------|-----------|----------------|----------|------------------------------|-------------------|----------|-------|-----|-------|-------|
|                           |                              | Main  |          |       |         |           |                | Other    | OSD                          | Comp              | LA colln | Recy  | ID  | Total |       |
| LW4                       | St Marys Boys College        | Puttalam Rd, Chilaw                                 | 1324     | 52    | 1376    | 50        | P>G>F          | F        |                              | 50.0              | 0.0      | 0.0   | 0.0 | 0.0   | 50.0  |
| LW5                       | Carmel Girls Central College | Chilaw  | 1344     | 50    | 1394    | 30        | F>P>G          | C        | F, H                         | 12.0              | 0.1      | 18.0  | 0.0 | 0.0   | 30.0  |
| LW6                       | Bishop Edmund Pieris College | Chilaw  | 1046     | 36    | 1082    | 102       | G>F>PI         | B        |                              | 0.0               | 0.0      | 102.0 | 0.0 | 0.0   | 102.0 |
| LW7                       | Ananda College               | Chilaw  | 3000     | 109   | 3109    | 357       | G>P>F          | I        | F                            | 142.8             | 0.0      | 0.0   | 0.0 | 214.2 | 357.0 |
| CUC                       | Egodawella College           | Chilaw  | 797      | 23    | 820     | NA        |                | E-F      | A-D                          |                   |          |       |     |       |       |
| CUC                       | Vijaya College               | Chilaw  | 858      | 20    | 878     | 106       |                | A-D      |                              | 0.0               | 0.0      | 105.9 | 0.0 | 0.0   | 105.9 |
| Total                     |                              |   | 8369     | 290   | 8659    | 645       |                |          |                              | 204.8             | 0.1      | 225.8 | 0.0 | 214.2 | 644.9 |
| Notes:                    |                              | WGR (excl Egodawella) = 0.082 kg/(students+staff).d |          |       |         |           | Waste stream % |          | 31.8 0.0 35.0 0.0 33.2 100.0 |                   |          |       |     |       |       |
| 1. Waste generation data: |                              |   |          |       |         |           | excl Ananda    |          | 21.5 0.0 78.4 0.0 0.0 100.0  |                   |          |       |     |       |       |

#### Notes:

1. Waste generation data:

a. LW6 produces

3 barrels/d, assume 200 L capacity x

b. LW7 produces

1 Tr/d, assume small tr=

2.1 m<sup>3</sup> x

85 % full x

200 kg/m<sup>3</sup> (as per Chilaw CV vehicle (ga waste most common)

200 kg/m<sup>3</sup> density (as per Chilaw CV vehicle (Ga waste most common)

Additional data obtained from CUC:

c. 6 schools produce around

1 Tr/d of garbage, comprising mainly paper and garden waste, which is collected by CUC. These schools are:

St Marys Boys College, St Marys Primary School, St Bernadette Tamil College, Bishop Edmund Pieris College, Nassriya College and Carmel Central Girls College

For these six schools, total staff+ students =

6749 while

1 4WT/d=

1078

T/d, giving a WGR =

0.160 kg/(staff+students).d, which is high

JICA survey data indicates 3 of these schools comprising

3852 staff+students produce

182 kg/d, giving a WGR =

0.047 kg/(staff+students).d, which is low

Consider CUC estimate too high and JICA survey data too low - adopt waste gen =

0.5 4WT/d =

539.5 kg/d, giving a WGR =

0.080 kg/(staff+students).d for these six schools

This WGR has been used to recalculate the waste generation amount for these six schools in the top table.

d. Vijaya College generates 0.75-1.0 HCs/d =

0.875 x

0.121 kg/HC =

106 kg/d - included in analysis

2. Waste stream breakdown based on:

a. LW5 composts

2 kg/mth of garden waste for own use; assume

60 % of remaining waste to LA coll'n, rest OSD

b. LW7 illegally dumps most of its waste into a cemetery; assume

60 % = ID; remainder = OSD

c. Egodawella College (St Sebastian) (off Wadiya Rd) has a big garden and generally disposes of its waste on-site. Sometimes, it will ask CUC to collect. Assume

80 % OSD,

20 % LA coll'n

d. As Ananda College's illegal dumping distorts the waste stream %, these %s have been recalculated excluding Ananda college data (bottom row of JICA study table) with this and WGR data then being applied to unsurveyed schools to get revised waste stream %s (bottom row of top table)

e. Revised WGR calculated at bottom of top table to account for survey data being adjusted based on CUC data for six schools in zone 3 - see Note 1c above.

3. Surveyed schools =

75 % of school student+staff population

4. Bishop Edmund Pieris College is also known as St Marys Boys Primary School, while St Sebastian school is also known as Egodawella College.

## b. Other Educational Institutes

| b. Other Educational Institutes |                             |         |           |       |          |                |        |        |      |      |          | Gen  | Waste Stream Data |       |       |  |  |
|---------------------------------|-----------------------------|---------|-----------|-------|----------|----------------|--------|--------|------|------|----------|------|-------------------|-------|-------|--|--|
|                                 | Name                        | Address | Type      | Staff | Students | Total          | Hostel | (kg/d) | OSD  | Comp | LA colln | Recy | ID                | Total |       |  |  |
| 1                               | Withanika Technical College | Chilaw  | tech coll | 13    | 400      | 413            | NA     | 34.0   | 11.1 | 0.0  | 15.2     | 0.0  | 7.7               | 34.0  |       |  |  |
| 2                               | Vidyakara Pirivena          | Chilaw  | tuition   | 10    | 650      | 660            | NA     | 30.0   | 30.0 | 0.0  | 0.0      | 0.0  | 0.0               | 30.0  |       |  |  |
| 3                               | Small Tuition Centres (7-8) | Chilaw  | tuition   | 27    | 800      | 827            | NA     | 37.6   | 18.8 | 0.0  | 18.8     | 0.0  | 0.0               | 37.6  |       |  |  |
| 4                               | International Schools (2)   | Chilaw  | intl sch  | 7     | 200      | 207            | NA     | 17.0   | 5.6  | 0.0  | 7.6      | 0.0  | 3.9               | 17.0  |       |  |  |
| Total                           |                             |         |           | 57    | 2050     | 2107           |        | 118.6  | 65.5 | 0.0  | 41.5     | 0.0  | 11.6              | 118.6 |       |  |  |
| JICA Survey data                |                             |         |           | WGR = |          | 0.056 kg/S+S/d |        | Disp % |      | 58.2 | 0.0      | 35.0 | 0.0               | 9.8   | 100.0 |  |  |

## JICA Survey data

| ID | Name               | Address | Type    | Staff | No of students | Staff + students | No of residents | Wt (kg) | WGR (kg/(S+S types) | Waste types |       | Main | Oth | OSD  | Waste Stream Data |          |      |      |
|----|--------------------|---------|---------|-------|----------------|------------------|-----------------|---------|---------------------|-------------|-------|------|-----|------|-------------------|----------|------|------|
|    |                    |         |         |       |                |                  |                 |         |                     | WGR         | Waste |      |     |      | Comp              | LA colln | Recy | ID   |
| 1  | Vidyakara Pirivena | Chilaw  | Tuition | 10    | 650            | 660              | 0               | 30      | 0.045               | G>P>F       | F     |      |     | 30.0 | 0.0               | 0.0      | 0.0  | 30.0 |

## Notes:

- Student nos are approx. for all other educational institutes except for the Vidyakara Pirivena. In these cases, staff no estimated based on ratio of 30 students/staff member
- There are 7-8 small tuition centres with ~100 or more students each - assumed 8 x 100 students ea. = 800 students in total
- Waste generation and breakdown based on:
  - Assume technical college and international colleges have same WGR and same waste stream breakdown as schools.
  - Assume small tuition centres have same WGR as large one and that 50 % of their waste is collected by LA; 50 % disposed of on site
  - The Pirivena is a buddhist seminary but has a tuition centre attached to it - the survey results apply to the tuition centre only.

## c. Hospitals

| Name  | Location               | Type | No of beds | Bed Occup. (%) | Avg no per day | Staff | Patients + Staff | SW (kg/d) survey | WDR (kg/(P+S waste types) | Main types | Notes                  |
|-------|------------------------|------|------------|----------------|----------------|-------|------------------|------------------|---------------------------|------------|------------------------|
| CBH   | Chilaw Base Hospital   | govt | 460        | 76.6           | 774            | 418   | 531              | 2075             | 673                       | 0.324      | F>P>PI                 |
| CC    | Chilaw Clinic          | priv | 8          | 100.0          | 60             | 10    | 6                | 84               | 20                        | 0.238      | O>G>PI                 |
| SM    | St Mary's Nursing Home | priv | 20         | 100.0          | 100            | 10    | 32               | 162              | 25                        | 0.154      | F>G>P                  |
| Total |                        |      | 488        | 77.9           | 934            | 438   | 569              | 2321             | 718                       | 0.309      | = Dr Washington's hosp |

## Notes:

- CBH waste discharge = 0.75 bins/d; bin = 2.99m<sup>3</sup> capacity; assume density = 300kg/m<sup>3</sup>
- WDR = 0.309 kg/(patients+staff)/d - c.f. Kandy = 0.374 & Galle = 0.28 - OK

## JICA survey data

|                |                        | All waste (normal + HH) |       |      |          |      |     | Healthcare hazardous (HH) waste generation and disposal |       |          |       |       |       | Assumptions                        |
|----------------|------------------------|-------------------------|-------|------|----------|------|-----|---|-------|----------|-------|-------|-------|------------------------------------|
|                |                        | Normal (Main/Other)     | OSD   | Comp | LA colln | Recy | ID  | HH  | Total | LA Colln | OSD   | Small | Small |                                    |
| CBH            | Chilaw Base Hospital   | A                       | 56.2  | 0.0  | 672.8    | 12.9 | 0.0 | 741.8   | F,E   | 56.2     | 0.0   | 56.2  |       | Add OSD; assume LA already counted |
| CC             | Chilaw Clinic          | D/G                     | Small | 0.0  | 20.0     | 1.1  | 0.0 | 21.1  | D,E   | Small    | Small | Small |       | Assume negligible                  |
| SM             | St Mary's Nursing Home | D                       | Small | 0.0  | 25.0     | 0.0  | 0.0 | 25.0  | D,F   | 0.23     | 0.23  | Small |       | Assume LA already counted          |
| Total          |                        |                         | 56.2  | 0.0  | 717.8    | 14.0 | 0.0 | 787.9   |       | 56.4     | 0.2   | 56.2  |       |                                    |
| Waste stream % |                        |                         | 7.1   | 0.0  | 91.1     | 1.8  | 0.0 | 100.0   |       |          |       |       |       |                                    |

## Notes:

- Codes: A-D = LA/contr/r colln; E/F = burn/bury, G = recy, H = comp, I = incinerate J = open dump, K = other
- Waste stream assumptions:
  - CBH recycles an estimated 10,000 pl containers, 500-1,000 glass syrup bottles and 10,000 glass vials per 6 mths + unspecified qty of coconut shells. Recycling qty stated above does not inci coconut shells.
  - CC recycles ~1000 glass bottles at irregular intervals - assumed to be every 6 mths
  - From hospital survey, estimated hazardous healthcare waste generation and disposal is summarised in right hand side of above table
- Hospital WGR = 0.338 kg/(patients+staff).d

## d. Government Institutions

|    | Name                                  | Address                      | Avg workers | SW Gen (kg/d) | Main 3 wastes | Disposal methods |       | OSD   | Comp | LA colln | Recy | ID  | Total | Notes                              |
|----|---------------------------------------|------------------------------|-------------|---------------|---------------|------------------|-------|-------|------|----------|------|-----|-------|------------------------------------|
|    |                                       |                              |             |               |               | Main             | Other |       |      |          |      |     |       |                                    |
| 1  | Excise Dept                           | Chilaw                       | 18          | 3.7           |               |                  |       |       |      |          |      |     |       |                                    |
| 2  | Govijanasewa Office                   | Chilaw                       | 33          | 6.8           |               |                  |       |       |      |          |      |     |       |                                    |
| 3  | Land Registration Office              | Puttalam Rd, Chilaw          | 12          | 6             | P>G>F         | F                | B     | 3.6   | 0    | 2.4      | 0    | 0   | 6     | SW16                               |
| 4  | Court Complex                         | Library Rd, Chilaw           | 34          | 7.0           |               |                  |       |       |      |          |      |     |       |                                    |
| 5  | Probation & Children Care Dept        | Library Rd, Chilaw           | 5           | 1.0           |               |                  |       |       |      |          |      |     |       |                                    |
| 6  | Forest Office                         | Ichchampiya (Kuru Rd) Chilaw | 18          | 3.7           |               |                  |       |       |      |          |      |     |       |                                    |
| 7  | M.O.H. Office                         | Malpura Chilaw               | 66          | 13.6          |               |                  |       |       |      |          |      |     |       |                                    |
| 8  | A.G.S. Office                         | Rediwella, Chilaw            | 44          | 9.1           |               |                  |       |       |      |          |      |     |       |                                    |
| 9  | Road Development Authority            | Rediwella, Chilaw            | 15          | 3.1           |               |                  |       |       |      |          |      |     |       |                                    |
| 10 | Engineering Office                    | Chilaw                       | 25          | 5.2           |               |                  |       |       |      |          |      |     |       |                                    |
| 11 | National Youth Service Society        | Library Rd, Chilaw           | 17          | 3.5           |               |                  |       |       |      |          |      |     |       |                                    |
| 12 | Divisional Education Office           | Baber St, Chilaw             | 80          | 60            | F>G>P         | F                | G     | 59.67 | 0    | 0        | 0.33 | 0   | 60    | LW8                                |
| 13 | Foreign Employment Bureau             | Douglas Fernando Rd          | 9           | 1.9           |               |                  |       |       |      |          |      |     |       |                                    |
| 14 | Provincial Fisheries & Social Service | Kurunegala Rd, Chilaw        | 44          | 9.1           |               |                  |       |       |      |          |      |     |       | prov govt                          |
| 15 | Chilaw Urban Council                  | Chilaw                       | 215         | 250           | G>F>P         | D                | E     | 100   | 0    | 150      | 0    | 0   | 250   | LWC10, prov. 144 perm, 71 temp     |
| 16 | Police Station                        | Chilaw                       | 227         | 270           |               | A-D              |       | 0     | 0    | 270      | 0    | 0   | 270   |                                    |
| 18 | Prison                                | Chilaw                       | 36          | 71            |               | A-D              |       | 0     | 0    | 71       | 0    | 0   | 71    | Prison workers includes 10 inmates |
|    | Sub-total                             |                              | 898         | 725           | 0             |                  |       | 163   | 0    | 494      | 0    | 0   | 657   |                                    |
|    |                                       |                              |             |               |               |                  | %     | 24.8  | 0.0  | 75.1     | 0.1  | 0.0 | 100   |                                    |

## Notes:

Overall WGR = 0.807 kg/worker.d

1. Worker numbers obtained from individual places, either by telephone or survey

2. Other govt institutions not included in above list:

- a. Post Office Puttalam Rd, Chilaw
- b. Ceylon Electricity Board Near Peoples Bank, Chilaw
- c. Sri Lanka Telecom Puttalam Rd, Chilaw
- d. C.T.B. Depot Puttalam Rd, Chilaw
- e. Bank of Ceylon Bridge St, Chilaw
- f. People's Bank Baudhaloka Mw, Chilaw
- g. National Savings Bank Kurunegala Rd, Chilaw

3. Waste generation based on survey data and following additional data supplied by CUC

- a. Police Station discharges about 0.5 4WT loads/2d for LA colln = 270 kg/d based on 1070 kg/4WT
- b. Prison (26 workers and 10 inmates) produces about 500kg/wk of waste = 71 kg/d

4. Waste stream breakdown based on:

- a. SW16 - assume 60 % = OSD; remainder = LA colln
- b. LW8 recycles 10kg/mth of paper = 0.33 kg/d
- c. LW10 - assume 60 % = LA colln, remainder = OSD

4. WGR = 1.27 kg/worker.d based on 657 kg/d from 570 workers - this is very high.

From corresponding data for Galle, Kandy, Matale and Negombo, average govt office WGR = 0.207 kg/worker.d

This WGR is applied to the non-surveyed places (blue cells) to estimate total waste generation.

## e. Religious Institutes

| Name     | No | No of "workers" |
|----------|----|-----------------|
| Buddhist | 3  | 18              |
| Hindu    | 2  | 6               |
| Mosques  | 3  | 9               |
| Churches | 4  | 12              |
| Total    | 12 | 45              |

## Notes:

1. CUC data for no of religious places gave 3 buddhist, 1 hindu, 3 mosques and 4 churches = 11 places but "waste generation in Chilaw" lists 12 places - hence, hindu places increased by 1 to give total of 12

2. Waste stream data based on:

- a. buddhist institutes - average of 4 monks at each place + additional 6 at Pirivena (see other education institutes)
- b. Hindu kovil - average of 3 clergy at each place
- c. Mosque - average of 3 clergy at each place
- d. Churches - average of 3 clergy at each place

3. Assume average WGR = 1.01 kg/clergy.d, with OSD = 20 % and LA colln = 80 %, based on data for Matale and Kandy

#### 4. OTHER WASTE

| Other                    |                | Location             | SW<br>(kg/d) |
|--------------------------|----------------|----------------------|--------------|
| Parks                    | Childrens Park | Nr Magistrates Court | 182          |
|                          | Stadium        |                      | 121          |
|                          | Total          |                      | 303          |
| Roads and Drain Cleaning |                | Length (km)          |              |
| Roads                    |                | 8.25                 | 200          |
| Drains                   |                | 26.1                 | 200          |
|                          |                |                      | 300          |

##### Notes:

- Parks' waste stream data based on following data from CUC PHI:
  - CUC collects 1.5 HC/d from Childrens' Park @ 0.12 T/HC
  - CUC collects 1 HC/d from Stadium
- Roads and drain cleaning based on:
  - CUC rd data gives 8.25km of tarmac rds, 13.1km of gravel roads and 0.73km of sand rds, giving total road length of 22.1km. This agrees well with "Waste generation places in Chilaw" which gives a total road length of 23.2km. CUC PHI said they normally clean only the tarmac roads = 8.25 km
  - CUC drains data gives a total concrete drain length of 26.1 km
  - Average road sweeping waste estimate = 49.1 kg/km.d from three other JICA studies in Poland, Honduras and Dar-es-salaam

Assuming that 20 % of all roads are swept daily, total waste gen'n = 200 kg/d or 1.7 HC/d based on 121 kg/HC
- Assuming drain/canal cleanings are of similar magnitude to road sweepings = 200 kg/d
- Total road/drains/canal cleaning waste = 390 kg/d or 3.3 HC/d, collected by 3 handcarts, each HC doing 0.55 km/d
- This is considered reasonable, by comparison with other study towns and taking into account specific conditions within CUA, including their often being a shortage of drain cleaners.
- It is assumed all of this waste is collected by GMC.

## 5. WASTE STREAM ESTIMATION

| Waste Source                       | Waste Generation Rate (WGR) |                       | No    | Gen'n<br>(T/d) | Sub-total |          | OSD<br>Disp | Comp | LA<br>colln | Recycle | ID   | ORDE<br>Comp | Total<br>(check) | Notes |
|------------------------------------|-----------------------------|-----------------------|-------|----------------|-----------|----------|-------------|------|-------------|---------|------|--------------|------------------|-------|
|                                    | WGR                         | Units                 |       |                | (T/d)     | (%)      |             |      |             |         |      |              |                  |       |
| Households                         | 0.530                       | kg/cap.d              | 24539 | 13.00          | 13.00     | 59.2     | 2.86        | 0.00 | 5.89        | 0.16    | 4.09 | 0.00         | 13.00            | 1     |
| Commercial                         | 8.71                        | kg/enterprise.d       | 413   | 3.60           | 3.60      | 16.4     | 0.91        | 0.00 | 2.56        | 0.12    | 0.00 | 0.00         | 3.60             | 2     |
| Markets                            | 1.55                        | kg/stall.d            | 541   | 0.84           | 0.84      | 3.8      | 0.00        | 0.00 | 0.81        | 0.03    | 0.00 | 0.00         | 0.84             | 3     |
| Institutions                       |                             |                       |       |                |           |          |             |      |             |         |      |              |                  |       |
| a. Schools                         | 0.093                       | kg/(students+staff).d | 11556 | 1.07           |           |          | 0.35        | 0.00 | 0.48        | 0.00    | 0.24 | 0.00         | 1.07             | 4     |
| b. Other Education                 | 0.056                       | kg/(students+staff).d | 2107  | 0.12           |           |          | 0.07        | 0.00 | 0.04        | 0.00    | 0.01 | 0.00         | 0.12             | 5     |
| b. Hospitals                       | 0.339                       | kg/(patients+staff).d | 2321  | 0.79           |           |          | 0.06        | 0.00 | 0.72        | 0.01    | 0.00 | 0.00         | 0.79             | 6     |
| d. Govt offices + Police & Prison  | 0.807                       | kg/worker.d           | 898   | 0.72           |           |          | 0.18        | 0.00 | 0.54        | 0.00    | 0.00 | 0.00         | 0.72             | 7     |
| e. Religious                       | 1.01                        | kg/clergy.d           | 45    | 0.05           | 2.75      | 12.5     | 0.01        | 0.00 | 0.04        | 0.00    | 0.00 | 0.00         | 0.05             | 8     |
| Industries                         |                             |                       |       |                |           |          |             |      |             |         |      |              |                  |       |
| a. Shrimp/prawn farms              | 16                          | kg/farm.d             | 14    | 0.22           |           |          | 0.20        | 0.00 | 0.00        | 0.02    | 0.01 | 0.00         | 0.22             | 9     |
| b. Sawmills                        | 34.7                        | kg/worker.d           | 19    | 0.66           |           |          | 0.18        | 0.00 | 0.00        | 0.48    | 0.00 | 0.00         | 0.66             | 10    |
| c. Other industries (6)            | 0.20                        | T/d                   |       | 0.20           | 1.08      | 4.9      | 0.04        | 0.00 | 0.15        | 0.00    | 0.01 | 0.00         | 0.20             | 11    |
| Other                              |                             |                       |       |                |           |          |             |      |             |         |      |              |                  |       |
| a. Public spaces                   | 0.30                        | T/d                   |       | 0.30           |           |          | 0.00        | 0.00 | 0.30        | 0.00    | 0.00 | 0.00         | 0.30             | 12    |
| b. Road and drain cleaning         | 0.40                        | T/d                   |       | 0.40           | 0.70      | 3.2      | 0.00        | 0.00 | 0.40        | 0.00    | 0.00 | 0.00         | 0.40             | 13    |
| Total                              | 0.90                        | kg/cap.d              | 24539 | 21.97          | 21.97     | 100.0    | 4.85        | 0.00 | 11.92       | 0.83    | 4.36 | 0.00         | 21.97            |       |
| CUC Collection (CUC vehicle data)  |                             |                       |       |                |           | Adjust = | 0.00        |      | 11.92       |         | 0.00 |              |                  | 14    |
| Recycling from discharge           |                             |                       |       |                |           |          |             |      | 0.00        | 0.00    |      |              |                  | 15a   |
| Recycling from collection          |                             |                       |       |                |           |          |             |      | -0.03       | 0.03    |      |              |                  | 15b   |
| Market waste to ORDE Compost Plant |                             |                       |       |                |           |          |             |      | -0.81       |         |      | 0.81         |                  | 15c   |
| Adjusted totals                    |                             |                       |       |                |           |          | 4.85        | 0.00 | 11.09       | 0.86    | 4.36 | 0.81         | 21.97            |       |
| Recycling from final disposal      |                             |                       |       |                |           |          |             |      | 0.00        | 0.00    |      |              |                  | 15d   |
| Recycling from illegal dumps       |                             |                       |       |                |           |          |             |      | 0.00        | 0.00    |      |              |                  | 15e   |
| Revised total                      |                             |                       |       | 21.97          | 21.97     |          | 4.85        | 0.00 | 11.09       | 0.86    | 4.36 | 0.81         | 21.97            |       |

### Notes:

- Household WGR was determined from Kandy, Matale & Chilaw WACS data while waste stream %s were calculated using household survey data and taking into account service coverage, which gave the following %s:
- Commercial waste generation calculated from interview survey results and other data collected.
- Market waste generation calculated from interview survey results and other data collected - see details above.
- School's waste stream data calculated from interview survey results - see calculations under school staff and students data
- Other educational institutes data calculated from interview survey results (one tuition centre) and using school data as well as data from other towns/cities in Sri Lanka.
- Hospital waste stream data calculated from interview survey results - see calculations under hospital data; assumed recycling figure includes recycling going to middlemen
- Govt offices + Police & Prison calculated based on no of workers and estimated WGR (obtained using limited data); includes police & prison as no separate Forces category in this case.
- All religious institutes treated together, with waste stream data being estimated using data from Kandy and Matale.
- Shrimp/prawn farms/hatcheries waste stream data estimated from survey interview data - see separate table.
- Sawmills waste stream data estimated from survey interview data - see separate table.
- Other industries comprises six industries of which four were surveyed - see separate table.
- Public spaces waste comes from Children's Park and stadium with total waste generation estimated to be 2.5 HC/d - see details above.
- Road and drain cleaning estimated based on approx. total length of roads/drains, data from other studies, and approx. distance one HC can cover per day - see details above.
- CUC collection vehicle trips data was too high and adjusted until collection = discharge = 11.92 T/d
- Recycling at discharge: 0.00 T/d, assumed negligible due to high at source recycling (collectors/direct to shops) + very few scavengers seen collecting recyclables after discharge
- Recycling during collection: 0.025 T/d, from collection worker's survey data
- Market waste to ORDE compost plant = 0.809 T/d, from ORDE records
- Recycling at final disposal sites: 0.000 T/d, from disposal site survey, field observations and PHI & Supervisor comments.
- Recycling from illegal dumps: 0.000 T/d, as per official disposal sites, as there is very little difference in this case between the CUC disposal sites and illegal dumping sites.

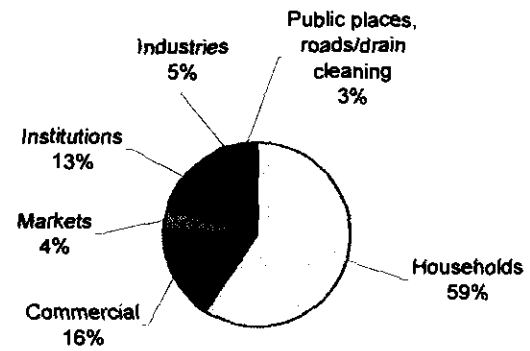
|        |      |      |       |      |      |     |       |
|--------|------|------|-------|------|------|-----|-------|
| %      | 22.1 | 0.0  | 50.5  | 3.9  | 19.9 | 3.7 | 100.0 |
| Method | OSD  | Comp | Disch | Recy | ID   | DH  | Total |
| %      | 22.0 | 0.0  | 45.3  | 1.3  | 31.3 | 0.0 | 100.0 |

% details on  
separate sheet



Data for Waste Generation by source graph

| Waste Source                        | Generation (T/d) |
|-------------------------------------|------------------|
| Households                          | 13.0             |
| Commercial                          | 3.6              |
| Markets                             | 0.8              |
| Institutions                        | 2.7              |
| Industries                          | 1.1              |
| Public places, roads/drain cleaning | 0.7              |
| Total                               | 22.0             |



## 6. SUPPORTING DATA

### a. Trade Licence Data

| TL No | Category                       | No of trade licences |
|-------|--------------------------------|----------------------|
| 1     | Western pharmacy               | 9                    |
| 2     | Ayurvedic pharmacy             | 7                    |
| 3     | Studios                        | 4                    |
| 4     | Tyre stores                    | 2                    |
| 5     | Tailor shops                   | 11                   |
| 6     | Fishery equipment sales        | 4                    |
| 7     | Printers                       | 3                    |
| 8     | Tyre vulcanising               | 1                    |
| 9     | Jewelry                        | 32                   |
| 10    | Tea/coffee shops               | 29                   |
| 11    | Betting centres                | 5                    |
| 12    | Local hotels/canteens          | 22                   |
| 13    | Bakeries                       | 6                    |
| 14    | Restaurants                    | 7                    |
| 15    | Cool meat/fish sales           | 4                    |
| 16    | Garages                        | 7                    |
| 17    | Bicycle repairs                | 4                    |
| 18    | Sawmills                       | 5                    |
| 19    | Cool Spots                     | 9                    |
| 20    | Timber shops                   | 13                   |
| 21    | Middlemen                      | 5                    |
| 22    | Chicken sellers                | 3                    |
| 23    | Metal workshops                | 2                    |
| 24    | Petrol/diesel sheds            | 8                    |
| 25    | Welding/lathe machines         | 9                    |
| 26    | Salons                         | 13                   |
| 27    | Laundry                        | 1                    |
| 28    | Firewood stores                | 1                    |
| 29    | Radio repairs                  | 3                    |
| 30    | Stationery                     | 13                   |
| 31    | Animal feed                    | 1                    |
| 32    | Aquariums                      | 3                    |
| 33    | Blacksmiths                    | 2                    |
| 34    | Carpentry shops                | 3                    |
| 35    | Rice mills                     | 4                    |
| 36    | Cement stores                  | 4                    |
| 37    | Jewelry production             | 11                   |
| 38    | Boatyards                      | 2                    |
| 39    | Motor services                 | 1                    |
| 40    | Ice cream, fruit, sweet prod'n | 15                   |
| 41    | Ice factories                  | 1                    |
| 42    | Motor vehicle spare parts      | 6                    |
| 43    | Bicycle spare parts            | 7                    |
| 44    | Photo framing                  | 3                    |
| 45    | Wrist watch repair             | 4                    |
| 46    | Copra products                 | 1                    |
| 47    | Poppadom prod'n                | 2                    |
| 48    | Fruit sales                    | 4                    |
| 49    | Cane, plastic mats/goods sales | 11                   |
| 50    | Furniture                      | 7                    |

TL data specified 3 but 5 surveyed within CUA - increased to 5

TL data specifies 4 but 5 surveyed within CUA - increased to 5

See list below

See list below

| TL No | Category                          | No of trade licences |
|-------|-----------------------------------|----------------------|
| 51    | Medical centres                   | 4                    |
| 52    | Video centres                     | 1                    |
| 53    | Meat sales                        | 1                    |
| 54    | Communications                    | 9                    |
| 55    | Opticians/glasses                 | 3                    |
| 56    | Private hospitals                 | 2                    |
| 57    | Prawn sales                       | 2                    |
| 58    | Building planning                 | 3                    |
| 59    | Funeral parlours                  | 2                    |
| 60    | Hatcheries                        | 14                   |
| 61    | Private banks                     | 13                   |
| 62    | Computer centres                  | 3                    |
| 63    | International schools             | 2                    |
| 64    | Textiles                          | 39                   |
| 65    | Rice sales (wholesale)            | 7                    |
| 66    | Rice sales (retail)               | 86                   |
| 67    | Hardware                          | 7                    |
| 68    | Paint sales                       | 5                    |
| 69    | Electric tools sales              | 12                   |
| 70    | Radio, TV, cassette, fridge sales | 11                   |
| 71    | Footwear sales                    | 11                   |
| 72    | Machine sales                     | 7                    |
| 73    | Various shops                     | 48                   |
| 74    | Pawning centres                   | 5                    |
| Total |                                   | 631                  |

**Notes:**

1. CUC issues some trade licences (TL) on an activity rather than "shop" basis. Hence, the TL no will be greater than the no of actual shops.

2. TL no for use in waste stream needs to be adjusted to account for TLs counted under other categories:

|   |         |
|---|---------|
| a. private hospitals  | 2       |
| b. international schools  | 2       |
| c. sawmills   | 5       |
| d. hatcheries   | 14      |
| e. ice factories  | 1       |
| f. boatyards  | 2       |
| g. assuming 1 garment factory and Bata Shoe Co not included in any of above TL categories |         |
| Revised total TLs =   | 605 TLs |

3. No of large waste generators in TL list estimated to be:

|                                    |  |
|------------------------------------|--|
| a. Bakeries                        | 6  |
| b. Restaurants                     | 7  |
| c. Local hotels                    | 22   |
| d. Timber + carpentry shops        | 16   |
| e. Garages                         | 7  |
| f. Welding/lathe + metal workshops | 11   |
| g. Private banks                   | 13   |
| h. Other                           | 15 estimate, allowing for other misc (pharmacies; Telecom, PO, etc.) |
|                                    | 97   |

or 16.0 % of total trade licences

This % is used in calculating waste generation from small and large commercial enterprises in the waste stream.

b. Trade Licence Details

| No | Type   | Owners Name   | Enterprise Name  | Address   |
|----|--|---|--|---|
| 5  | Bakeries<br>(6 in above list)                    | M.A.D.Chandra Saputanthiri<br>Sujeewa Hittatiya<br>Mohammed Isal<br>Dilan Pris<br>Krisanthi Sanika Perera   |  | 63, Kurunegala Rd, Chilaw<br>Colombo Rd, Chilaw<br>23, 2 Cross St, Chilaw<br>1, Prwsher Rd, Chilaw<br>24, Peri St, Chilaw   |
| 7  | Restaurant                                       | Angelo Lawe<br>M Julius Dilan<br>Mahinda Samaranayake<br>Antani Nimal Fernando<br>Niranjan Nalaka<br>P.M.S.K.Sures Kumari Pranando<br>Hilton Lowe   | Tamasha<br>Serandib<br><br>Kuma restaurant<br>Chilaw Chinese Guest<br>Wadiya | 61 Kurunegala Rd, Chilaw<br>86, Puttalam Rd, Chilaw<br>17, Prwsher Rd, Chilaw<br>5, Corea Rd, Chilaw<br>10, Lake Rd, Chilaw<br>167 Puttalam Rd, Chilaw<br>Corea Rd, Chilaw  |
| 21 | Local hotels<br>& canteens<br>(22 in above list) | Siromala Ranjani Mariyans<br>Sunil Jayawardana<br>W.Perli Ursula Pranando<br>S.Raja Rathname<br>Senaka Kabral<br>S.Sathyawell<br>A.M.M.Illhas<br>P.B.Silva<br>C.S.A.Kabeer<br>J.A.Paumi Shaden<br>S.Thiyagaraja<br>Shitthi Ravindra<br>Wasantha Vijesinghe<br>E.Saheeb<br>Sirini Devika Saputanthiri<br>Mohamed Nalirdin<br>Jayantha Rajapaksha<br>Jayantha Thawell<br>Selliya Padma Nadan<br>Sathiya Kumar<br>M.N.Thuser/A.A.Ajmiyas | Belongs to Bishop Canteen<br>New Maulana                                     | 1, Kurunegala Rd, Chilaw<br>2, Kurunegala Rd, Chilaw<br>4, Kurunegala Rd, Chilaw<br>3, 2 Cross St, Chilaw<br>10, Colombo Rd, Chilaw<br>14, Colombo Rd, Chilaw<br>7/B, Colombo Rd, Chilaw<br>59, Puttalam Rd, Chilaw<br>44A, Puttalam Rd, Chilaw<br>81, Puttalam Rd, Chilaw<br>91, Puttalam Rd, Chilaw<br>71, Puttalam Rd, Chilaw<br>99, Puttalam Rd, Chilaw<br>9, Bazaar St, Chilaw<br>15, Bazaar St, Chilaw<br>12, In front of hospital, Chilaw<br>9, In front of hospital, Chilaw<br>Kotuwa Rd, Chilaw<br>10, Kotuwa Rd, Chilaw<br>86, Bridge St, Chilaw<br>74, Bridge St, Chilaw |
| 3  | Chicken sellers                                  | S.D.M.Humsha<br>M.A.Malkeme Liwera<br>M.C.M.Thuslime  |  | Puttalam Rd, Chilaw<br>Bridge St, Chilaw<br>70, Bridge St, Chilaw   |
| 2  | Chilli mills/retail/popadom prod'n               | S.Sellasami<br>Selimen Franando   |  | 39, Bridge St, Chilaw<br>39, Bridge St, Chilaw  |
| 5  | Timber shops<br>(13 in above list)               | Siromala Rajani<br>D.R.Prenarathna Appuhami<br>R.G.Antani<br>K.P.Appuhami<br>B.Jud Ignatius Franando  |  | 41, Kurunegala Rd, Chilaw<br>43, Kurunegala Rd, Chilaw<br>137, Puttalam Rd, Chilaw<br>24, Colombo Rd, Chilaw<br>157, Colombo Rd, Chilaw   |

c. "Waste Generation in Chilaw Places" Data

| No    | Road                  | Road length (m) | H'hlds | Local hotels/ restaurants | Retail shops | Hosp-itals | Religious Places | Schools | Business centres | Coll'n HC/d |
|-------|-----------------------|-----------------|--------|---------------------------|--------------|------------|------------------|---------|------------------|-------------|
| 1     | Singhepura Rd         | 841             | 492    |                           |              | 5          | 1                |         | 1                | 8           |
| 2     | Colombo Road          | 988             | 225    | 8                         | 7            | 2          |                  | 3       | 4                | 10          |
| 3     | Ananda Mawatha        | 495             | 27     |                           |              |            |                  |         |                  | 2           |
| 4     | Vijaya Mw             | 895             | 41     |                           |              |            | 1                | 1       |                  | 2           |
| 5     | Viwers Mw             | 340             | 63     |                           |              |            |                  | 1       | 3                | 3           |
| 6     | St James St           | 400             | 97     |                           | 2            |            |                  |         |                  | 4           |
| 7     | Baber St              | 44              | 236    |                           | 3            |            |                  |         |                  | 6           |
| 8     | St Bernadette Rd      | 130             | 141    |                           |              |            | 1                |         |                  | 5           |
| 9     | Luridu Mw             | 96              | 87     | 1                         |              |            |                  |         | 1                | 4           |
| 10    | Jerry St              | 333             | 80     |                           | 1            |            |                  |         |                  | 4           |
| 11    | Bus Stand             | 112             | 10     | 4                         | 2            |            |                  |         |                  | 2           |
| 12    | Alaba                 | 231             | 357    |                           | 6            |            |                  |         |                  | 10          |
| 13    | Aluthwatta 1st Lane   | 133             | 17     |                           |              |            |                  |         |                  | 2           |
| 14    | Aluthwatta 2nd Lane   | 202             | 30     |                           | 1            |            |                  |         |                  | 3           |
| 15    | Aluthwatta 3rd Lane   | 130             | 32     |                           | 2            |            |                  |         |                  | 2           |
| 16    | Aluthwatta Road       | 740             | 231    |                           | 5            |            |                  |         |                  | 8           |
| 17    | Puttalam Rd           | 907             | 518    | 8                         | 20           | 2          | 2                | 2       | 8                | 20          |
| 18    | Puttalam Rd 1,2 Mw    | 806             | 12     |                           |              |            |                  | 1       | 1                | 2           |
| 19    | Muwer St              | 643             | 326    |                           | 2            |            |                  |         | 1                | 6           |
| 20    | Vidyyala Mw           | 415             | 16     |                           |              |            | 1                | 1       |                  | 4           |
| 21    | Muwer Lane            | 137             | 24     |                           |              |            |                  |         |                  | 2           |
| 22    | Baudhaloka Mw         | 279             | 17     | 2                         | 1            |            |                  |         |                  | 2           |
| 23    | Lanciyawatta HS       | 688             | 125    |                           |              | 2          |                  |         |                  | 4           |
| 24    | Copiyawatta HS        | 622             | 106    |                           | 2            |            |                  |         |                  | 5           |
| 25    | Kurunegala Rd         | 732             | 211    | 7                         | 4            |            | 1                |         | 5                | 10          |
| 26    | Pitipana St & Lane    | 397             | 306    |                           | 2            |            |                  |         | 1                | 8           |
| 27    | Bazaar                | 430             | 108    | 8                         | 108          |            | 1                |         | 30               | 10          |
| 28    | Bazaar Lane           | 396             | 8      | 1                         |              |            |                  |         |                  | 1           |
| 29    | Bridge St & Fish mkt  | 931             | 96     | 6                         | 34           |            |                  |         | 9                | 15          |
| 30    | Corea Rd              | 710             | 304    |                           | 6            | 1          | 1                |         | 6                | 12          |
| 31    | Leth Rd               | 732             | 107    |                           | 8            |            | 1                | 1       | 5                | 5           |
| 32    | Jetty St              | 157             | 30     |                           |              |            |                  | 1       |                  | 4           |
| 33    | St Marys Rd           | 213             | 12     |                           |              |            |                  | 2       |                  | 3           |
| 34    | Wattakaliya           | 1450            | 413    | 1                         | 10           |            |                  |         | 6                | 8           |
| 35    | Noyes Rd              | 689             | 204    |                           | 3            |            |                  |         | 5                | 6           |
| 36    | Waladiya Rd, Rediwela | 1157            | 963    | 4                         | 6            |            | 1                | 1       | 7                | 20          |
| 37    | Ratna Uyana           | 656             | 128    |                           |              |            |                  |         |                  | 6           |
| 38    | William Silva Uyana   | 139             | 51     |                           | 1            |            |                  |         | 3                | 5           |
| 39    | Malpura               | 485             | 163    |                           |              |            |                  |         |                  | 9           |
| 40    | Sedawatta             | 892             | 70     |                           | 4            |            |                  |         |                  | 8           |
| 41    | Coreawatta            | 818             | 59     |                           |              |            |                  | 1       |                  | 12          |
| 42    | Canal Rd              | 101             | 60     |                           | 2            |            |                  |         |                  | 4           |
| 43    | Vilison Mw            | 139             | 22     |                           |              |            |                  |         |                  | 3           |
| 44    | Wasala Wallawa Rd     | 228             | 30     |                           |              |            |                  |         |                  | 6           |
| 45    | Library Rd            | 98              | 15     |                           | 1            |            |                  |         | 15               | 30          |
| 46    | Harin de Corea Rd     | 144             | 82     |                           |              |            |                  |         |                  | 6           |
| 47    | Durga Mw              | 257             | 105    |                           |              |            | 1                |         | 4                | 5           |
| 48    | Thapawatta Rd         | 122             | 40     |                           |              |            |                  |         |                  | 4           |
| 49    | Prison Rd             | 191             | 150    |                           |              |            |                  |         |                  | 10          |
| 50    | Egodawatta            | 290             | 53     |                           |              |            |                  |         |                  | 10          |
| Total |                       | 23161           | 7100   | 50                        | 248          | 5          | 12               | 15      | 115              | 340         |

## Notes:

1. Data from CUC PHI, prepared July 2002
2. Households represents households on both sides of the road.
3. Total number of business centres + retail shops + local hotels/restaurants : 413
4. Total waste coll'n : 41.1 T/d, based on 0.121 T/HC
5. Total households = 7100 while Chilaw household survey gives average no/household = 4.7
- Hence, population estimated from this data = 33370
- which is higher than census data - don't use

# Chapter 6

## Chilaw Waste Collection Analysis

CUC Collection Data - 12-18 August 2002

| Zone    | Vehicle                | Veh No   | 12   | 13   | 14   | 15   | 16   | 17   | 18  | Tot  | Avg     | CF     | Collection | Supr data | Notes |
|---------|------------------------|----------|------|------|------|------|------|------|-----|------|---------|--------|------------|-----------|-------|
|         |                        |          | M    | Tu   | W    | Th   | F    | Sa   | Su  |      | trips/d | T/trip | T/wk       | T/d       |       |
| 1       | Lorry                  | 1        | 2    | 2    | 2    | 3    | 2    | 2    | 0   | 13   | 1.9     | 0.81   | 11         | 1.5       | 2     |
| 2       | 4WT                    | 1        | 2.5  | 2    | 2    | 2    | 2    | 1    | 0   | 11.5 | 1.6     | 1.08   | 12         | 1.8       | 3.4   |
|         | 2WT                    | 1        | 2    | 2    | 2    | 1.5  | 2    | 1    | 0   | 10.5 | 1.5     | 0.57   | 6          | 0.9       |       |
| 3       | 4WT                    | 1        | 4    | 4    | 5    | 4    | 5    | 4    | 2   | 28   | 4.0     | 1.08   | 30         | 4.3       | 3.4   |
|         | HC                     | 2        | 5    | 8    | 7    | 7    | 7    | 4    | 2   | 40   | 5.7     | 0.12   | 5          | 0.7       | 1.2   |
| 4       | Lorry                  | Z1 lorry | 0    | 0    | 0    | 0    | 0    | 0    | 2   | 2    | 0.3     | 0.81   | 2          | 0.2       |       |
|         | 4WT                    | 1        | 3    | 2    | 3    | 3    | 3    | 2    | 2   | 18   | 2.6     | 1.08   | 19         | 2.8       | 3.4   |
|         | 2WT                    | 1        | 4    | 4    | 4    | 4    | 3    | 2    | 0   | 21   | 3.0     | 0.57   | 12         | 1.7       | 5.2   |
|         | HC                     | 1        | 3    | 2.5  | 4    | 4    | 4    | 2    | 0   | 19.5 | 2.8     | 0.12   | 2          | 0.3       | 1.2   |
| 5+6     | 4WT                    | 1        | 3    | 3    | 3    | 2.5  | 2.5  | 2    | 0   | 16   | 2.3     | 1.08   | 17         | 2.5       | 3.4   |
| Special | Lorry                  | Z1 lorry | 1    | 1    | 1    | 1    | 1    | 1    | 1   | 7    | 1.0     | 0.81   | 6          | 0.8       | 0.8   |
|         | 4WT                    | Z2 4WT   | 1    | 1    | 1    | 1    | 1    | 1    | 0   | 6    | 0.9     | 1.08   | 6          | 0.9       | 1.1   |
|         | HC                     | 2        | 10   | 10   | 10   | 10   | 10   | 10   | 70  | 70   | 10.0    | 0.12   | 8          | 1.2       | 3.4   |
| Total   | No                     |          | 40.5 | 41.5 | 44   | 43   | 43   | 32   | 19  | 263  | 37.5    |        | 137        | 19.6      | 20.4  |
| Total   | Lorry                  | 1        | 3    | 3    | 3    | 4    | 3    | 3    | 3   | 22   | 3.1     | 0.81   | 18         | 2.8       | 3.1   |
|         | 4WT                    | 4        | 13.5 | 12   | 14   | 13   | 14   | 10   | 4   | 79.5 | 11.4    | 1.08   | 86         | 12.2      | 2.8   |
|         | 2WT                    | 2        | 6    | 6    | 6    | 5.5  | 5    | 3    | 0   | 31.5 | 4.5     | 0.57   | 18         | 2.6       | 2.3   |
|         | HC (to disposal)       | 3        | 8    | 10.5 | 11   | 11   | 11   | 6    | 2   | 59.5 | 8.5     | 0.12   | 7          | 1.0       | 1.2   |
|         | Total to disposal      |          | 30.5 | 31.5 | 34   | 33   | 33   | 22   | 9   | 193  | 27.5    |        | 129        | 18.4      |       |
|         | HC (transfer only)     | 2        | 10   | 10   | 10   | 10   | 10   | 10   | 10  | 70   | 10      | 0.12   | 8          | 1.21      | 1.2   |
|         | Sum for checking       |          | 40.5 | 41.5 | 44   | 43   | 43   | 32   | 19  | 263  | 37.5    |        | 137        | 19.6      |       |
|         | Disposal tonnage (T/d) |          | 21.4 | 20.1 | 22.3 | 21.2 | 21.2 | 15.7 | 7.0 | 129  | 18.4    |        |            |           |       |

Notes:

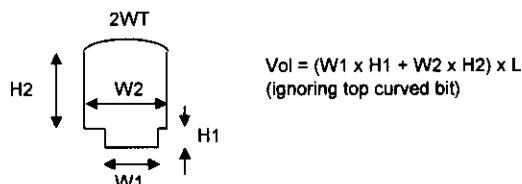
- Distribution of handcarts between zones based on no of trips and supervisor comments
- According to CUC, zones 3 and 4 handcarts dispose their waste directly, rather than transferring it to a tractor or lorry. Hence, collection amounts for these zones must include handcart tonnages. For the special zone, HC waste is normally discharged to the stationary trailer in Zone 2, or another CP and hence should not be included in calculating the final collection quantity.
- There were 4 x 4WTs working during this period, with the Z2 4WT covering the special zone (see note 7)
- Z3 4WT collected the Base hospital waste on Sun during this period, rather than the Z2 4WT.
- Conversion factor takes into account the trailer volume, fill factor and garbage density. Average conversion factors used for 2WT and 4WTs as it is not known where each tractor and trailer was used when this data was recorded.
- Zone Supervisor comments on no of trips:
  - Z1 - 2 lorry loads/d
  - Z2 - 2.5-3.0 4WT loads/d, including 9 HC loads/d from special zone to stationary trailer - these HC loads must be subtracted to get total Z2 loads - 9 HC/d = 1.1 T/d = 1.0 4WT/d (OK - expected it to be ~1 4WT/d)  
Hence, total Z2 trips = 1.5-2.0 4WT/d - use 1.75 4WT/d
  - Z3 - 3 x 4WT/d + 8 HC/d
  - Z4 - 9 x 2WT/d + 6HC/d
  - Z5+6 - 2-3 4WT/d - use 2.5 4WT/d
  - Special - 1 4WT/d + 1 lorry/d + 9 HC/d
- CUC PHI stated that waste collection during this period was high due to:
  - Munneswaram festival occurred during this week, with many visitors coming to Chilaw from other areas. Typically, festival season waste generation is 25-30% higher than normal, with Munneswaram being at the high end of this range.
  - Schools were closed during this week, resulting in increased household waste generation due to students being at home.
  - Zone 4 waste was higher than normal due to a lot of garden waste being discharged this week from houses in this area (mainly coconut palm waste).
  - Also govt offices were on holiday on Sat & Sun, resulting in increased waste generation on Sun compared with normal.
 Due to these factors an extra 4WT was used (from Industry section) during this week and some other vehicles did more trips than normal. Assume:
  - Extra waste collection due to Munneswaram compared with normal = 30 % = 3.58 T/d
  - Extra waste collection due to other factors described above = 10 % = 1.19 T/d
  - Extra waste collection due to data inflation = 14.5 % = 1.73 T/d
  - Normal waste collection = 11.92 T/d (data inflation & adjusted until this figure matches waste stream discharge.  
Check: 1 extra 4WT x 2.8 avg trips/d @ 1.08 T/d = 3.1 T/d - accounts for bulk of Munneswaram waste  
This is considered reasonable and is consistent with the estimated quantity of waste discharged for collection.
- The vehicle distribution during this week is slightly different from that described in the text, this being due to waste collection being significantly higher during this week, requiring some rearrangement of the collection schedule.

### Vehicle Dimensions

| Vehicle Type | Vehicle Reg No | Trailer Reg No | Int. dimensions |        |       |        |        |          | Avg FF | Wt (kg) |
|--------------|----------------|----------------|-----------------|--------|-------|--------|--------|----------|--------|---------|
|              |                |                | H1 (m)          | H2 (m) | L (m) | W1 (m) | W2 (m) | Vol (m3) |        |         |
| Handcart     | N/a            | N/a            | 0.46            | N/a    | 1.22  | 0.76   | N/a    | 0.42     | 0.95   | 121     |
| 2WT          |                | N/a            | 0.40            | 0.88   | 1.70  | 1.02   | 1.30   | 2.64     | 0.80   | 520     |
| 2WT          |                | N/a            | 0.38            | 0.98   | 1.82  | 1.00   | 1.4    | 3.19     | 0.80   | 628     |
| 2WT          | Avg            |                | 0.39            | 0.93   | 1.76  | 1.01   | 1.35   | 2.91     | 0.80   | 574     |
| 4WT          | GH-5202        | GJ-0206        | 1.54            | N/a    | 2.97  | 1.76   | N/a    | 8.05     | 0.60   | 1190    |
| 4WT          | Refer note 3   |                | 1.26            | N/a    | 3.00  | 1.77   | N/a    | 6.69     | 0.60   | 989     |
| 4WT          | Refer note 3   |                | 1.32            | N/a    | 3.00  | 1.88   | N/a    | 7.44     | 0.60   | 1100    |
| 4WT          | Refer note 3   |                | 1.32            | N/a    | 3.00  | 1.77   | N/a    | 7.01     | 0.60   | 1036    |
| 4WT          | Avg            |                | 1.36            | N/a    | 2.99  | 1.80   | N/a    | 7.30     | 0.60   | 1079    |
| Lorry        | 42-4764        |                | 0.39            | N/a    | 4.30  | 1.79   | N/a    | 3.00     | 1.10   | 813     |

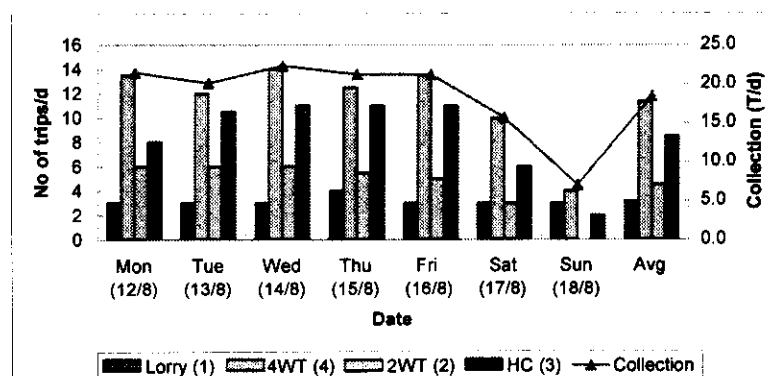
### Notes:

- All dimensions measured except for handcart - in this case, assumed standard size = 4ft x 2.5ft x 1.5ft
- 2WT volume calculated in accordance with sketch shown below.
- 4WT trailer dimensions were all measured but the tractor and trailer reg no was only recorded in one case. It is believed the 2nd tractor + trailer is 37-8986 & 46-3794; 3rd tractor and trailer is GH-5202 & 67-3765; 4th tractor and trailer is 49-1039 & 67-3765 respectively.
- Filling factors based on the following:
  - Handcart - assume 95 % full, as per adopted figures for other study towns
  - Two wheel tractor - assume 80 % full, based on observation
  - Four wheel tractor - assume 60 % full, based on PHI's comments, observation & trailer design - very difficult to fill completely due to only having single metal panel at rear - see photos
  - Lorry is normally filled over 100% according to CUC labourers - assumed fill factor = 110 %
- Tractor volumes converted to tonnages based on internal vol x fill factor x density, where density = 246 kg/m<sup>3</sup>  
Waste density = (Chilaw CV density / (0.5 \* (Kandy + Matale CV density)) x weighbridge density)  
Data: W/bridge 4WT density = 390 kg/m<sup>3</sup>; Kandy coll'n veh (CV) density = 303.4 kg/m<sup>3</sup>; Matale CV density = 330 kg/m<sup>3</sup>; Chilaw CV density = 200 kg/m<sup>3</sup>  
The adopted waste density is considered reasonable based on Chilaw CV density & design of Chilaw trailers, meaning significant compaction of the in-vehicle waste will only occur in the front 0.33-0.5 of the vehicle.
- For handcart tonnage, a waste density of 300 kg/m<sup>3</sup> is used, as per other towns/cities - considered justified as HCs do not normally collect garden waste, which is one of the main reasons for the very low Chilaw CV waste density.



### Graphical Data

| Trips      | Mon (12/8) | Tue (13/8) | Wed (14/8) | Thu (15/8) | Fri (16/8) | Sat (17/8) | Sun (18/8) | Avg  |
|------------|------------|------------|------------|------------|------------|------------|------------|------|
| Lorry (1)  | 3          | 3          | 3          | 4          | 3          | 3          | 3          | 3.1  |
| 4WT (4)    | 13.5       | 12         | 14         | 12.5       | 13.5       | 10         | 4          | 11.4 |
| 2WT (2)    | 6          | 6          | 6          | 5.5        | 5          | 3          | 0          | 4.5  |
| HC (3)     | 8          | 10.5       | 11         | 11         | 11         | 6          | 2          | 8.5  |
| Collection | 21.4       | 20.1       | 22.3       | 21.2       | 21.2       | 15.7       | 7.0        | 18.4 |





A. General Notes

Chilaw UC

1. SWM Staff Salary + allowance costs

| Item     | Salary | Allowance | Total | Adopted |
|----------|--------|-----------|-------|---------|
| Driver   | 3800   | 2200      | 6000  | 6,000   |
| Labourer | 3400   | 2200      | 5600  | 5,600   |

Notes:

- Basic driver salary = 3,765Rs/mth with annual increase of 110Rs/yr (CUC Revenue section)
- Basic labourer salary = 3,400Rs/mth with annual increase of 80Rs/yr (CUC Revenue section)
- PHI said average labourer salary = 131 Rs/d and average driver salary = 145 Rs/d  
Based on 26 work days/mth, this is equiv to 3406 Rs/mth for labourer and for driver = 3770 Rs/mth  
Plus labourers and drivers receive 2200 allowance if they work more than 21 days/mth.
- Collection worker survey gave average salary of 5,279 Rs/mth, including allowances, or 3,079 Rs/mth basic salary
- Adopt labourer salary = 3400 Rs/mth and driver salary = 3800 Rs/mth + 2200 allowance

2. Equipment Costs

| Item             | Cost (Rs) | Lifetime | Notes  |
|------------------|-----------|----------|--|
| Ekel broom       | 35        | 2 mths   |  |
| Basket           | 40        | 2 mths   |  |
| Brush            | 30        | 1 mth    |  |
| Rake             | 75        | 2 mths   |  |
| Fork             | 275       | 1 yr     |  |
| Shovel           | 220       | 6 mths   |  |
| Mamoti           | 350       | 2 yr     | from KMC data  |
| Gumboots         | 825       | 1 yr     | only to drain cleaners                                     |
| Gloves           | 60        | 3 mths   | available on request but no one uses (sweat too much)      |
| Nose guard       | 50        | 3 mths   | For drain cleaning, mosquito control, septic tank cleaning |
| Uniform - male   | 900       | 6 mths   | khaki shirt and shorts                                     |
| Uniform - female | 400       | 6 mths   | white saris  |

3. Equipment Allocation

|  | Zone | Vehicle   | Labrs                        | Equipment   |
|--|------|---|------------------------------|---|
|  |      | 1 Lorry<br>Sweeper<br>Drains                    | 3<br>1<br>1                  | shovel, fork, rake, 2 baskets<br>ekel broom<br>shovel, rake, baskets (1 sm, 1 lg)   |
|  |      | 2 4WT<br>2 x HC<br>Sweeper<br>Drains            | 3<br>3<br>3<br>4             | rake, shovel, fork, 2 sm baskets<br>baskets and 2 rakes<br>x ekel brooms<br>x (2 brushes, shovel, rake)   |
|  |      | 3 4WT<br>2 HCs<br>Sweepers<br>Drains            | 3<br>3<br>3<br>3             | shovel, rake, fork, basket<br>baskets, 2 rakes, 3 ekel brooms<br>x ekel brooms (assumed)<br>x (shovel, rake, brush)   |
|  |      | 4 2 x 2WT<br>1 HC<br>Sweepers<br>Drains         | 2 x 2<br>1<br>3<br>3         | 2 x (mamoti, rake, shovel, 2 sm baskets, ekel broom)<br>rake, 2 sm baskets<br>ekel brooms<br>x (shovel, rake, 2 brushes (big and sm), gloves & boots)   |
|  | 5+6  | 4WT<br>Sweepers<br>Drains                       | 3<br>1<br>1                  | ekel brooms, 2 baskets, 2 brushes, 1 rake, 1 fork, 2 shovels<br>(for 4WT, sweepers and drains)  |
| Special - Fish mkt<br>Vege mkt<br>Retail mkt<br>Bazaar<br>Bus stand<br>Bridge St |      | 4WT<br><br><br>Lorry<br>HC<br>HC                | 7<br>2<br>2<br>5<br>3<br>3   | baskets, 4 ekel, wheelbarrow, shovel, rake<br>baskets, 1 rake, 1 shovel, 2 brushes, 1 HC?<br>baskets, 1 rake, 1 shovel, 1 wheelbarrow<br>rakes, 1 fork, 3 shovels<br>baskets<br>baskets   |
| Overall<br>(+ gloves and uniform)  |      | HC<br>2WT<br>4WT<br>Lorry<br>Sweepers<br>Drains | 1-2<br>2<br>3<br>3<br>1<br>1 | 1-2 baskets, rake, 1-2 brooms (depending if 1-2 labourers per HC)<br>mamoti, rake, shovel, 2 sm baskets, ekel broom per 2WT<br>shovel, rake, fork, 1-2 baskets<br>shovel, fork, rake, 2 baskets<br>ekel broom<br>shovel, rake, 1-2 brushes, boots, baskets? |

Notes:

- Gloves: Z5-6 Supervisor said gloves are provided but no one wears due to them being made of plastic and too sweaty. Z4 supervisor said gloves are provided & replaced every 3 mths. The PHI also said gloves are provided.
- Uniforms are also provided to labourers.
- For handcarts, if only one labourer, generally this is male, while if two labourers, generally both are female (Z2 supervisor notes)

#### 4. Other Cost Items

- Chilaw CUC provided cost data for maintenance and diesel for HCs, 2WTs, 4WTs + trailers and lorry. Maint cost data is relatively high but this is mainly because it includes the costs of tyres and tubes which were specified separately for most other towns.
- Additional CUC data was obtained for oil = 23,000Rs/yr in total - this was split between vehicles based on oil data for other towns/cities giving 2WT oil cost = 1615 Rs/yr, 4WT oil cost = 3295 Rs/yr = lorry oil cost
- Additional CUC data was obtained for insurance, which gave a range of values, which were then assigned to different vehicles assuming that insurance costs are related to vehicle capital costs, so that highest capital cost = highest insurance cost, etc. Resulting insurance amounts were compared with data obtained for other towns/cities, with the following values adopted:  
4WT = lorry = 6955 Rs/yr; 2WT = 2160 Rs/yr
- Additional CUC vehicle licence data gave all licence fees = 150 Rs/yr (2WT & 4WTs) except for one at 2800 Rs  
This was applied to the lorry.

#### B. SWM Vehicles - Current Costs

| Handcart - 1 labourer           | Rate | Unit    | No     | Amt (Rs) | Notes                          |
|---------------------------------|------|---------|--------|----------|--------------------------------|
| Labourers                       | 5600 | Rs/mth  | 12     | 67200    | Labrs = 1                      |
| Protective gear/equipment       | 2940 | Rs/yr   | 1      | 2940     |                                |
| Oil                             | 0    | Rs/mth  | 12     | 0        |                                |
| Maintenance                     | 2500 | Rs/yr   | 1      | 2500     | Incl. wheel repair/replacement |
| Insurance                       | 0    | Rs/yr   | 1      | 0        |                                |
| Rev Licence                     | 0    | Rs/yr   | 1      | 0        |                                |
| Depreciation                    | 1125 | Rs/yr   | 1      | 1125     |                                |
| Total                           |      |         |        | 73765    |                                |
|                                 |      |         | Case A |          | Case B                         |
| Avg no of trips per day         |      | trips/d | 2.8    |          | 5                              |
| Avg amt collected per mth       |      | T/mth   | 8.9    |          | 15.7                           |
| Average amount collected per yr |      | T/yr    | 107    |          | 189                            |
| Unit cost                       |      | Rs/T    | 689    | Rs/T     | 391                            |

##### Notes:

- Staff protective equipment based on CUC equipment data and current prices:
 

|   |                  |             |             |            |                              |
|---|------------------|-------------|-------------|------------|------------------------------|
| a. Gloves                                   | 1 labourers/Hc x | 4 sets/yr @ | 60 Rs ea =  | 240 Rs/yr  |                              |
| b. Uniforms                                 | 1 labourers/Hc x | 2 sets/yr @ | 900 Rs/yr = | 1800 Rs/yr | If 1 Labr only, will be male |
| c. Rake                                     | 1 rake/Hc        | 6 sets/yr @ | 75 Rs ea =  | 450 Rs/yr  |                              |
| d. Ekel broom                               | 1 broom/Hc x     | 6 sets/yr @ | 35 Rs ea =  | 210 Rs/yr  |                              |
| e. Baskets                                  | 1 basket/Hc x    | 6 sets/yr @ | 40 Rs ea =  | 240 Rs/yr  |                              |
| Total labourer protective equipment costs = |                  |             |             | 2940 Rs/yr |                              |
- Handcarts have metal rim wheels with wooden spokes.
- Consider two cases for average no of HC trips/d, based on CUC trips data for handcarts to disposal and transfer @ 0.12 T/load
 

|                          |     |                                |                |                          |                     |
|--------------------------|-----|--------------------------------|----------------|--------------------------|---------------------|
| Case A - No of trips/d = | 2.8 | Average tonnage per HC per d = | 0.34 T/Hc.d or | 8.92 T/Hc.mth, based on  | 26 working days/mth |
| Case B - No of trips/d = | 5   | Average tonnage per HC per d = | 0.61 T/Hc.d or | 15.74 T/Hc.mth, based on | 26 working days/mth |
- Capital cost = 4,500 Rs with estimated lifetime of 4 yrs (capital cost of HCs in use now, bought 5-6yrs ago at this price)
- Depreciation = 1125 Rs/yr (straight line method)

| Handcart - 2 labourers          | Rate | Unit    | No     | Amt (Rs) | Notes                          |
|---------------------------------|------|---------|--------|----------|--------------------------------|
| Labourers                       | 5600 | Rs/mth  | 24     | 134400   | Labrs = 2                      |
| Protective gear/equipment       | 3430 | Rs/yr   | 1      | 3430     |                                |
| Oil                             | 0    | Rs/mth  | 12     | 0        |                                |
| Maintenance                     | 2500 | Rs/yr   | 1      | 2500     | Incl. wheel repair/replacement |
| Insurance                       | 0    | Rs/yr   | 1      | 0        |                                |
| Rev Licence                     | 0    | Rs/yr   | 1      | 0        |                                |
| Depreciation                    | 1125 | Rs/yr   | 1      | 1125     |                                |
| Total                           |      |         |        | 141455   |                                |
|                                 |      |         | Case A |          | Case B                         |
| Avg no of trips per day         |      | trips/d | 2.8    |          | 5                              |
| Avg amt collected per mth       |      | T/mth   | 8.9    |          | 15.7                           |
| Average amount collected per yr |      | T/yr    | 107    |          | 189                            |
| Unit cost                       |      | Rs/T    | 1322   | Rs/T     | 749                            |

##### Notes:

- Staff protective equipment based on CUC equipment data and current prices:
 

|   |                  |             |             |            |                          |
|---|------------------|-------------|-------------|------------|--------------------------|
| a. Gloves                                   | 2 labourers/Hc x | 4 sets/yr @ | 60 Rs ea =  | 480 Rs/yr  |                          |
| b. Uniforms                                 | 2 labourers/Hc x | 2 sets/yr @ | 400 Rs/yr = | 1600 Rs/yr | Assume both female labrs |
| c. Rake                                     | 1 rake/Hc        | 6 sets/yr @ | 75 Rs ea =  | 450 Rs/yr  |                          |
| d. Ekel broom                               | 2 broom/Hc x     | 6 sets/yr @ | 35 Rs ea =  | 420 Rs/yr  |                          |
| e. Baskets                                  | 2 basket/Hc x    | 6 sets/yr @ | 40 Rs ea =  | 480 Rs/yr  |                          |
| Total labourer protective equipment costs = |                  |             |             | 3430 Rs/yr |                          |
- Consider two case for average no of HC trips/d, based on CUC trips data for handcarts to disposal and transfer @ 0.12 T/load
 

|                          |     |                                |                |                          |                     |
|--------------------------|-----|--------------------------------|----------------|--------------------------|---------------------|
| Case A - No of trips/d = | 2.8 | Average tonnage per HC per d = | 0.34 T/Hc.d or | 8.92 T/Hc.mth, based on  | 26 working days/mth |
| Case B - No of trips/d = | 5   | Average tonnage per HC per d = | 0.61 T/Hc.d or | 15.74 T/Hc.mth, based on | 26 working days/mth |
- Capital cost = 4,500 Rs with estimated lifetime of 4 yrs (capital cost based on HCs in use, bought 5-6yrs ago at this price)
- Depreciation = 1125 Rs/yr (straight line method)

| Two Wheel Tractor                | No      | Rate  | Unit   | Total  | Notes                                    |
|----------------------------------|---------|-------|--------|--------|--|
| Driver                           | 12      | 6,000 | Rs/mth | 72000  | No of labourers = 2                      |
| Labourers                        | 24      | 5,600 | Rs/mth | 134400 |  |
| Protective gear/equipment        | LS      | 4835  | Rs/yr  | 4835   | Diesel cost = 15,000-20,000Rs/yr per 2WT |
| Diesel                           | 1       | 17500 | Rs/yr  | 17500  |  |
| Oil                              | 1       | 1615  | Rs/yr  | 1615   | Includes tyres and tubes                 |
| Tractor Maintenance              | 1       | 40000 | Rs/yr  | 40000  |  |
| Insurance                        | LS      | 2160  | Rs/yr  | 2160   | Licence                                  |
| Licence                          | LS      | 150   | Rs/yr  | 150    |  |
| Depreciation                     | LS      | 8643  | Rs/yr  | 8643   |  |
| Total                            |         |       |        | 281303 |  |
| Avg no of trips/d (12-18 Aug 02) | trips/d |       |        | 2.25   |  |
| Avg amt collected 12-18Aug 02    | T/d     |       |        | 1.3    | T/d (avg T/d)/2 2WT                      |
| Average amount collected per yr  | T/yr    |       |        | 403    |  |
| Unit cost                        | Rs/T    |       |        | 698    | Rs/T                                     |

**Notes:**

1. Staff protective equipment based on CUC equipment data and current prices:

|   |                    |               |             |                                   |
|---|--------------------|---------------|-------------|-----------------------------------|
| a. Gloves                                   | 2 labourers/2WT x  | 4 sets/yr @   | 60 Rs ea =  | 480 Rs/yr                         |
| b. Uniforms                                 | 2 labourers/2WT x  | 2 sets/yr @   | 650 Rs ea = | 2600 Rs/yr, assuming 1M & 1F labr |
| c. Rake                                     | 1 rake/2WT         | 6 sets/yr @   | 75 Rs ea =  | 450 Rs/yr                         |
| d. Shovel                                   | 1 shovel/2WT x     | 2 sets/yr @   | 220 Rs ea = | 440 Rs/yr                         |
| e. Ekel broom                               | 1 ekel broom/2WT x | 6 sets/yr @   | 35 Rs ea =  | 210 Rs/yr                         |
| f. Baskets                                  | 2 baskets/2WT x    | 6 sets/yr @   | 40 Rs ea =  | 480 Rs/yr                         |
| g. Mamoti (hoe)                             | 1 mamoti/2WT x     | 0.5 sets/yr @ | 350 Rs ea = | 175 Rs/yr                         |
| Total labourer protective equipment costs = |                    |               |             | 4835 Rs/yr                        |

2. Capital cost data: tractor = 151250 with estimated lifetime of 17.5 yrs (15-20yrs as per KMC)

Straight line deprec'n = 8643 Rs/yr

(For tractor, capital cost based on average cost of both units currently in use for SWM)

3. Annual tonnage based on avg T/d x 26 working days/mth x 12 mth/yr

| Four Wheel Tractor               | No      | Rate   | Unit   | Total  | Notes                                    |
|----------------------------------|---------|--------|--------|--------|--|
| Driver                           | 12      | 6,000  | Rs/mth | 72000  | No of labourers = 3                      |
| Labourers                        | 36      | 5,600  | Rs/mth | 201600 |  |
| Protective gear/equipment        | LS      | 6265   | Rs/yr  | 6265   | Diesel cost = 15,000-20,000Rs/yr per 4WT |
| Diesel                           | 1       | 110000 | Rs/yr  | 110000 |  |
| Oil                              | 1       | 3295   | Rs/yr  | 3295   | Includes tyres and tubes                 |
| Tractor Maintenance              | 1       | 140000 | Rs/yr  | 140000 |  |
| Trailer Maintenance              | 1       | 10000  | Rs/yr  | 10000  | Licence                                  |
| Insurance                        | LS      | 6955   | Rs/yr  | 6955   |  |
| Licence                          | LS      | 150    | Rs/yr  | 150    |  |
| Depreciation                     | LS      | 51091  | Rs/yr  | 51091  |  |
| Total                            |         |        |        | 601356 |  |
| Avg no of trips/d (12-18 Aug 02) | trips/d |        |        | 2.84   |  |
| Avg amt collected 12-18Aug 02    | T/d     |        |        | 3.1    | T/d (avg T/d)/4 4WT                      |
| Average amount collected per yr  | T/yr    |        |        | 955    |  |
| Unit cost                        | Rs/T    |        |        | 629    | Rs/T                                     |

**Notes:**

1. Staff protective equipment based on CUC equipment data and current prices:

|   |                   |             |             |   |
|---|-------------------|-------------|-------------|---|
| a. Gloves                                   | 3 labourers/4WT x | 4 sets/yr @ | 60 Rs ea =  | 720 Rs/yr                                 |
| b. Uniforms                                 | 3 labourers/4WT x | 2 sets/yr @ | 650 Rs ea = | 3900 Rs/yr, based on average uniform cost |
| c. Rake                                     | 1 rake/4WT        | 6 sets/yr @ | 75 Rs ea =  | 450 Rs/yr                                 |
| d. Shovel                                   | 1 shovel/4WT x    | 2 sets/yr @ | 220 Rs ea = | 440 Rs/yr                                 |
| e. Fork                                     | 1 fork/4WT x      | 1 sets/yr @ | 275 Rs ea = | 275 Rs/yr                                 |
| f. Baskets                                  | 2 baskets/4WT x   | 6 sets/yr @ | 40 Rs ea =  | 480 Rs/yr, assuming 2 baskets             |
| Total labourer protective equipment costs = |                   |             |             | 6265 Rs/yr                                |

2. Capital cost data: tractor = 703700 with estimated lifetime of 17.5 yrs (15-20yrs as per KMC)

Straight line deprec'n = 40211 Rs/yr

3. Capital cost data: trailer = 97,917 with estimate lifetime of 9 yrs (8-10yrs)

Straight line deprec'n = 10880 Rs/yr

(For both tractor and trailer, capital cost based on average cost of all units currently in use)

4. Annual tonnage based on avg T/d x 26 working days/mth x 12 mth/yr

| Lorry                            | No | Rate    | Unit   | Total         | Notes                    |
|----------------------------------|----|---------|--------|---------------|--------------------------|
| Driver                           | 12 | 6,000   | Rs/mth | 72000         |                          |
| Labourers                        | 36 | 5,600   | Rs/mth | 201600        | No of labourers = 3      |
| Protective gear/equipment        | LS | 6265    | Rs/yr  | 6265          |                          |
| Diesel                           | 1  | 120000  | Rs/yr  | 120000        |                          |
| Oil                              | 1  | 3295    | Rs/yr  | 3295          |                          |
| Lorry maintenance                | 1  | 150000  | Rs/yr  | 150000        | Includes tyres and tubes |
| Insurance                        | LS | 6955    | Rs/yr  | 6955          |                          |
| Licence                          | LS | 2800    | Rs/yr  | 2800          |                          |
| Depreciation                     | LS | 52336   | Rs/yr  | 52336         |                          |
| <b>Total</b>                     |    |         |        | <b>615251</b> |                          |
| Avg no of trips/d (12-18 Aug 02) |    | trips/d |        | 3.14          |                          |
| Avg amt collected 12-18 Aug 02   |    | T/d     |        | 2.6           | T/d                      |
| Average amount collected per yr  |    | T/yr    |        | 797           | T/yr                     |
| Unit cost                        |    | Rs/T    |        | <b>772</b>    | Rs/T                     |

**Notes:**

1. Staff protective equipment based on CUC equipment data and current prices:

|  |                     |             |             |                                       |
|--|---------------------|-------------|-------------|---------------------------------------|
| a. Gloves  | 3 labourers/lorry x | 4 sets/yr @ | 60 Rs ea =  | 720 Rs/yr                             |
| b. Uniforms  | 3 labourers/lorry x | 2 sets/yr @ | 650 Rs ea = | 3900 Rs/yr, based on avg uniform cost |
| c. Rake  | 1 rake/lorry        | 6 sets/yr @ | 75 Rs ea =  | 450 Rs/yr                             |
| d. Shovel  | 1 shovel/lorry x    | 2 sets/yr @ | 220 Rs ea = | 440 Rs/yr                             |
| e. Fork  | 1 fork/lorry x      | 1 sets/yr @ | 275 Rs ea = | 275 Rs/yr                             |
| f. Baskets   | 2 baskets/lorry x   | 6 sets/yr @ | 40 Rs ea =  | 480 Rs/yr, assuming 2 baskets         |
| <b>Total labourer protective equipment costs =</b> |                     |             |             | <b>6265 Rs/yr</b>                     |

2. Capital cost data: lorry = 575700 with estimated lifetime of 11 yrs (10-12yrs)

Straight line deprec'n = 52336 Rs/yr

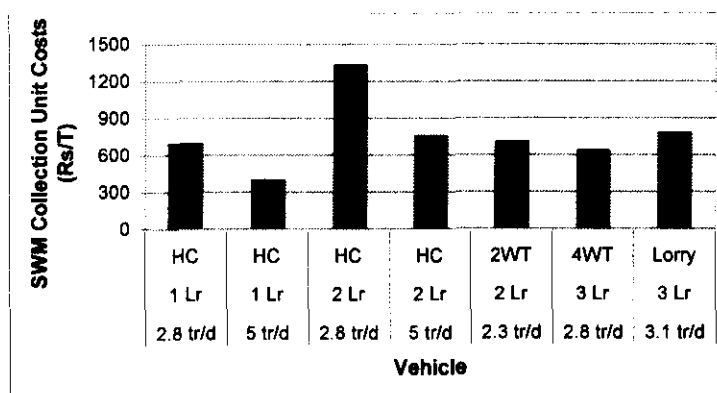
3. Annual tonnage based on avg T/d x 26 working days/mth x 12 mth/yr

**Summary**

|                          | Item                   | SW Amt (T/yr) | Cost (Rs/yr)  | Unit cost (Rs/T) |
|--------------------------|------------------------|---------------|---------------|------------------|
| <b>Current</b>           |                        |               |               |                  |
| 2WT                      | 2WT (2Lr, 2.3 trips/d) | 403           | 281303        | 698              |
| 4WT                      | 4WT (3Lr, 2.8 trips/d) | 955           | 601356        | 629              |
| 4WT + Stationary trailer | HC (1 Lr, 5 trips/d)   | 189           | 73765         | 391              |
|                          | HC2 (2 Lr, 5 trips/d)  | 189           | 141455        | 749              |
|                          | 4WT (3Lr, 2.8 trips/d) | 955           | 601356        | 629              |
|                          | <b>Total</b>           | <b>955</b>    | <b>816576</b> | <b>855</b>       |

**C. Graphical Data**

| Trips/d  | No of Labrs | Vehicle | Unit costs (Rs/T) |
|----------|-------------|---------|-------------------|
| 2.8 tr/d | 1 Lr        | HC      | 689               |
| 5 tr/d   | 1 Lr        | HC      | 391               |
| 2.8 tr/d | 2 Lr        | HC      | 1322              |
| 5 tr/d   | 2 Lr        | HC      | 749               |
| 2.3 tr/d | 2 Lr        | 2WT     | 698               |
| 2.8 tr/d | 3 Lr        | 4WT     | 629               |
| 3.1 tr/d | 3 Lr        | Lorry   | 772               |



## UCC Supervisor Interview Survey Results

| Area   | Basic SWM Data  | Problems  | Ideas for Improvement  |
|--------|---|---|--|
| Zone 1 | <ul style="list-style-type: none"> <li>Vehicles: Lorry</li> <li>Labrs: 3 lorry, 1 SW, 1 DC</li> <li>CPs: 4 perm, 9 temp</li> <li>LWG: None</li> <li>L/d: 2 lorry loads/d (c.f. 5 generated)</li> </ul>  | <ul style="list-style-type: none"> <li>Unavailability of lorry on ~3-4 days/mth. The lorry belongs to UCC Electrical section who mainly use it for street lighting work. It is also used for other purposes, especially garbage collection, but is sometimes assigned special tasks, meaning Zone 1 may have no collection vehicle on some days.</li> <li>In addition, the lorry is shared with the Special Zone, where it works until around 9:30am. Hence, the Zone 1 lorry labourers do nothing until this time.</li> <li>Some densely populated areas.</li> <li>Some roads are not easily accessible by lorry.</li> <li>Only one drain cleaner to cover the nine drains in the zone, with them working in zone 1 ~19-20 days/mth and being assigned to other areas ~6-7 times/mth.</li> </ul> | <ul style="list-style-type: none"> <li>Melpura is a densely populated area, which should be provided with its own 2WT.</li> <li>Use handcarts in areas with access problems.</li> <li>Employ more labourers for drain cleaning and road sweeping.</li> </ul> |
| Zone 2 | <ul style="list-style-type: none"> <li>Vehicles: 1 4WT, 2 HC, 1 stationary trailer (for special zone)</li> <li>Labrs: 3 Tr, 3 HC, 3 SW, 4 DC</li> <li>CPs: 6 perm, 9 temp</li> <li>LWG: Vijaya College, Base hospital, retail market</li> <li>L/d: 2.5-3 Tr/d (incl 9 HC loads/d to stationary trailer)</li> </ul>      | <ul style="list-style-type: none"> <li>Shortage of labourers for drain cleaning – although four drain cleaners, they are only assigned to this zone during the morning.</li> <li>Poor public cooperation, especially in Lanciya Watta and Corea Rd – people discharge their garbage anywhere and don't use the bins provided.</li> <li>Labourer absenteeism (normally ~10 absent).</li> <li>Labourer health problems.</li> <li>Biggest problem is cleaning of the "Malaria" drain.</li> </ul>   | <ul style="list-style-type: none"> <li>Provide dumpsite in close proximity to zone.</li> <li>Allocate four drain cleaners to zone for entire day.</li> <li>Provide more labourers.</li> </ul>  |
| Zone 3 | <ul style="list-style-type: none"> <li>Vehicles: 1 4WT, 2 HCs</li> <li>Labrs: 3 Tr, 3 HC, 3 SW, 3 DC</li> <li>CPs: 1 perm, 12 temp</li> <li>LWG: Six schools (see note 3), Keels supermarket, Bata Shoe Co</li> <li>L/d: 3 x 4WT/d + 8 HC/d</li> </ul>  | <ul style="list-style-type: none"> <li>High garden waste generation, with garden waste being discharged at roadside.</li> <li>Drains are blocked and in poor condition.</li> <li>Poor workforce management: high labourer absenteeism, labourers go home early, lack of punctuality by drivers.</li> </ul>  | <ul style="list-style-type: none"> <li>Public education.</li> <li>Proper maintenance of drains.</li> <li>Improve SWM system.</li> </ul>  |
| Zone 4 | <ul style="list-style-type: none"> <li>Vehicles: 2 x 2WT, 1 HC</li> <li>Labrs: 4 Tr, 1 HC, 3 SW, 3 DC</li> <li>CPs: 1 perm, 15 temp</li> <li>LWG: Silva, Nisamiya, Muththu, Mannar and Siripala hotels; St Mary's Nursing Home, Dr Titus dispensary, Telecom, Master Motors</li> <li>L/d: 9 x 2WT/d + 6 HC/d</li> </ul> | <ul style="list-style-type: none"> <li>Insufficient vehicles and labourers.</li> <li>No Overseer for this area.</li> <li>No proper dumping site inside zone (have to travel out of zone which takes a lot of time).</li> </ul>  | <ul style="list-style-type: none"> <li>More vehicles and labourers.</li> </ul>   |

| Area         | Basic SWM Data   | Problems   | Ideas for Improvement   |
|--------------|--|--|---|
| Zone 5-6     | <ul style="list-style-type: none"> <li>Vehicles: 1 4WT</li> <li>Labrs: 3 Tr, 1 SW, 1 DC</li> <li>CPs: 2 perm, 1 temp</li> <li>LWG: Neil Marine Boatyard, Police</li> <li>4WT L/d: 2-3</li> </ul>   | <ul style="list-style-type: none"> <li>Insufficient resources: 1 4WT and 5 labourers are not enough to cover the two zones.</li> <li>High waste generation, particularly in the Rediwella area (densely populated, low income area) and due to many houses (~200) near the beach having coconut palm roofs which people dispose of periodically.</li> <li>Open dumping of waste into the lagoon and/or sea.</li> <li>Long, narrow zone, being 5km from one end to the other.</li> <li>Bottom of trailer not properly constructed, leaving gaps through which waste falls to the ground during travel.</li> </ul> | <ul style="list-style-type: none"> <li>Need another tractor -this would enable them to cover both zones completely each day.</li> <li>Ask residents to discharge their garbage in bags for easier collection.</li> <li>Stop open dumping using “command and control” approach (i.e. rules and enforcement).</li> <li>Promote plastic/polythene/paper recycling.</li> <li>Improve trailer design, eliminating gaps and possibly adding an extra metal panel at back to increase capacity.</li> </ul> |
| Special Zone | <ul style="list-style-type: none"> <li>Vehicles: lorry (bazaar, am); 4WT (pm); 2 HCs (Bazaar, bus stand)</li> <li>Labrs: 11 markets, 5 bazaar, 3 bus stand, 3 Bridge St (5-9am+4-7pm) + additional 5 from 4-7pm.</li> <li>CPs: 1 perm, 1 temp</li> <li>LWG: Suhadha Pharmacy</li> <li>L/d: 1 4WT/d from market, 1 lorry/d from bazaar, 6 HC/d from bus stand, 3 HC/d from Bridge St</li> </ul> | <ul style="list-style-type: none"> <li>Difficult for one person to supervise this zone, due to its dispersed nature.</li> <li>Some commercial enterprises throw their garbage into the drains. 6-7 court cases have been filed against some of these people.</li> <li>Difficult to clean drains due to concrete slab cover.</li> <li>Labourer absenteeism – normally 10 labourers are absent.</li> <li>Time consuming transferring waste from CPs to collection vehicle.</li> <li>No pipeborne water supply at the fish market – market traders have to collect water from the lagoon for washing.</li> </ul>    | <ul style="list-style-type: none"> <li>Public education, mainly to encourage people to use individual bins.</li> <li>Improvement of market CP so as to improve the loading efficiency.</li> <li>Provision of water supply for market.</li> </ul>  |

**Notes:**

- CP = collection point, DC = drain cleaner, HC = handcart, LWG = large waste generators, L/d = loads/day, SW = sweeper, Tr = tractor, 2WT = two wheel tractor, 4WT = four wheel tractor; M = Monday, Tu = Tuesday, W = Wednesday, Th = Thursday, F = Friday, Sa = Saturday, Su = Sunday.
- Special zone = fish/vegetable markets, bazaar, bus stand and Bridge St (parts of zones 2, 4 and 6).
- Six schools in zone 3 = St Marys Boys College, St Marys Primary School, St Bernadette Tamil College, Bishop Edmund Pieris College, Nassriya Muslim College and Carmel Girls Central College.
- Total number of vehicle trips amounts to 3 lorry loads/d + 8.5-10 x 4WT L/d + 9 x 2WT L/d + 14 HC loads/d, only counting handcart loads that are taken directly for disposal.

