Annex D

Energy from Waste Combined Heat and Power Facility, North Yard, Devonport

Trip Generation – Technical Note

March 2011

Prepared for

MVV Environment Devonport Ltd

Revision Schedule

Energy from Waste Combined Heat and Power Facility, North Yard, Devonport: Trip Generation – Technical Note
March 2011

Rev	Date	Details	Prepared by	Reviewed by	Approved by
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1 Introduction

1.1 Purpose

1.1.1 URS Scott Wilson has been commissioned by MVV Umwelt GmbH to produce a Transport Assessment (TA) in support of a planning application for an Energy from Waste Combined Heat and Power (EfW CHP) facility at North Yard, Devonport, in Plymouth.

1.1.2 A Transport Assessment Scoping Report has already been prepared and agreed with Plymouth City Council (PCC), as the local highway authority, and with the Highways Agency (HA). In addition, a significant amount of consultation has been undertaken with the relevant planning and highway officers at PCC, specifically relating to the Transport Assessment methodology.

1.1.3 As a pre cursor to the submission of the Transport Assessment which will form part of the planning application, this Technical Note has been prepared to set out the detailed trip generation and distribution methodologies which are being employed as part of the preparation of the TA.

1.1.4 As such, this Technical Note builds on previous communications which have taken place, but seeks to definitively establish the basis for the traffic movements which will be associated with the EfW facility.

1.1.5 This document has been prepared in consultation with MVV and seeks to provide PCC and the HA with the trip generation information which will be taken forward in the TA. The findings of this Technical Note will be reproduced in the TA and will form the basis of the associated operational and capacity assessments that will be presented therein.

1.1.6 This Technical Note takes account of comments received to date from PCC and the HA relating specifically to the trip generation associated with the EfW.

1.2 Background

1.2.1 The proposed EfW facility will have the capacity to process up to 265,000 tonnes of waste per annum, although it is expected that the actual tonnages will be lower than this, due to calorific values varying with waste composition. Notwithstanding this, the respective trip estimates have been based on the full allocation of 265,000 tonnes, to ensure that a robust assessment is undertaken.

1.2.2 The facility will primarily deal with Municipal Solid Waste (MSW) sourced from the South West Devon Waste Partnership (SWDWP) authorities, according to the SWDWP contract. Some Commercial and Industrial waste will also be processed on site however, and there will also be a need to export some residues from the EfW process.

1.2.3 During the 25 Year life of the SWDWP contract and the 40 Year life of the facility, the relative proportion of Municipal and Commercial & Industrial waste will be likely to change, but the capacity of the facility will remain approximately the same, within the fluctuations arising from the calorific value of the waste.

1.2.4 The EfW process also uses raw materials, for example to treat exhaust gases, and these will be delivered by HGVs. Staff movements will also be associated with the site.

1.2.5 In light of the above, it is recognised that there are a number of different types of trips which will be associated with the operation of the EfW CHP plant. The different types of travel associated with the site have therefore been divided into three principal groups, as summarised in **TABLE 1.1**.

TABLE 1.1 EfW CHP Trip Types

Operational Trips	Staff Trips	Visitor Trips
Municipal Solid Waste delivery Commercial and Industrial (C&I) Waste delivery Raw Material delivery Removal of Arisings (eg. Ash)	Site Staff	Site Visitors Community Centre / Nature Reserve Visitors

1.2.6 Information regarding the number of trips expected at the site has been drawn from a number of sources, most notably from the SWDWP authorities that will use the site.

1.2.7 The majority of the trips to and from the facility will be associated with the EfW CHP plant operation itself, with some associated staff trips. In addition, a small number of visitor trips associated with the facility and the community centre / nature reserve are also expected.

1.2.8 All trips to the community centre / nature reserve will be by prior appointment and supervised. Visitors are most likely to be school trips which will normally arrive and leave by coach or bus. As these trips will occur outside of peak hours and on an ad hoc basis, they have not been considered in this Technical Note, or the Transport Assessment.

1.3 Notes

1.3.1 All calculations presented within this Technical Note have been taken from detailed spreadsheets, either received from MVV and / the SWDWP, or prepared by URS Scott Wilson. These calculations will form the basis of the technical analysis on which the Transport Assessment will be prepared.

1.3.2 For the purposes of this Technical Note however, values have been output from the spreadsheets into a series of summary tables. It is therefore recognised that the column and row totals do not tally with the values presented in the respective table columns and rows in all cases. These are not mistakes, but are due to rounding.

1.3.3 From the perspective of the Transport Assessment, rounding up the hourly values will mean that flow levels are always predicted to be on the higher, rather than lower side, ensuring that the associated assessment(s) will be robust.

Example

*To provide an example, Chapter 3 of this Technical Note presents information regarding the number of Bulked vehicles, associated with Commercial & Industrial waste. Taking the associated trips by hour, indicates that there will be 1 delivery each hour, between 0800-1600 (**TABLE 3.4**). This therefore indicates that there will be 10 deliveries.*

In real terms, the calculations have actually identified that there will be less than one delivery each hour, but that this value has been rounded up. Thus, the total presented in the table is 7.

1.4 Structure

1.4.1 The remainder of this Technical Note is structured into the following sections:

- Municipal Waste Vehicle Deliveries;
- Commercial Waste Vehicle Deliveries;
- Raw Material Inputs & Residual Material Outputs;
- Staff Vehicle Movements;
- Vehicle Generation Summary;
- Distribution of Vehicles;
- Vehicle Generation - Sensitivity Analysis; and
- Seasonal Variation – Sensitivity Analysis.

2 Municipal Waste Vehicle Deliveries

2.1 Municipal Solid Waste (MSW)

2.1.1 Municipal Solid Waste (MSW) trips have been calculated using observed weighbridge data, supplied by the South West Devon Waste Partnership (SWDWP), for September and November 2009, and February, October and December 2010. It should be noted that not all of the waste authorities provided data for all of these months.

2.1.2 The weighbridge data detailed the number of vehicles that were recorded at the various weighbridges serving Plymouth City Council, Torbay Council and Devon County Council. The figures supplied by the SWDWP were derived using the following datasets:

- Movements resulting from the delivery of Plymouth City Council's non-recycled waste;
- Movements resulting from the delivery of Torbay Council's non-recycled waste;
- Movements resulting from the delivery of West Devon, Teignbridge and South Hams non-recycled waste; and,
- Movements resulting from the delivery of Devon County Council's Household Waste Recycling Centres (HWRCs) non-recycled waste.

2.1.3 Only non-recycled waste (also known as residual waste) will be treated at the EfW CHP. Vehicles collecting recyclable materials were therefore not included in the assessment as they will continue to deliver to their current delivery points. Weighbridge data provided by the SWDWP from the current disposal points for those vehicles delivering non-recycled waste has therefore been used as the basis for the trip generation analysis. This MSW data was subsequently interrogated by URS / SW such that the figures could be corroborated.

2.1.4 The SWDWP data has been used as the basis for the forecast of traffic movements for 2014, as the proposed opening year of the EfW operation and the associated assessment year of the Transport Assessment. From analysing the SWDWP data, it is apparent that the predicted peak in waste collection and thus delivery occurs between Monday and Thursday, as shown in **TABLE 2.1** below.

TABLE 2.1 2014 Predicted MSW Vehicle Deliveries

Day	Devon District Bulker	Torbay RTS Bulker	Devon Hookloader CA	South Hams RCV	PCC Hookloader	PCC RCV	Total per Day
Monday	14	6	1	4	17	39	**81**
Tuesday	12	7	1	3	19	38	**80**
Wednesday	14	8	1	3	19	37	**82**
Thursday	12	7	1	6	20	39	**84**
Friday	12	7	1	3	18	7	**47**
Saturday	3	1	1	0	19	1	**24**
Sunday	0	0	2	0	17	0	**19**

Please note there may be some small discrepancies in the 'total' calculations due to rounding (refer to Section 1.3)

2.1.5 Further analysis of the observed Monday, Tuesday, Wednesday and Thursday data has allowed average MSW data to be estimated, for 2014, thereby representing the predicted level of hourly MSW trips that the EfW will generate. These delivery movements, as provided by the SWDWP, are summarised in **TABLE 2.2** below and take into account the change in journey times relating to the redistribution of trips on the highway network.

TABLE 2.2 2014 Predicted Average MSW Vehicle Deliveries, by Hour

Time	Devon District Bulker	Torbay RTS Bulker	Devon Hookloader CA	South Hams RCV	PCC Hookloader (CM & PR)	PCC Hookloader WM CA	PCC RCV	Total MSW Deliveries per hour
08:01-09:00	1	1	0	0	2	0	0	**4**
09:01-10:00	0	1	0	0	1	0	2	**5**
10:01-11:00	0	1	0	0	2	0	8	**12**
11:01-12:00	2	1	0	1	1	0	6	**11**
12:01-13:00	1	1	0	0	2	0	2	**7**
13:01-14:00	1	1	0	1	1	0	6	**10**
14:01-15:00	2	1	0	2	3	0	10	**17**
15:01-16:00	2	1	0	0	3	1	3	**9**
16:01-17:00	1	1	0	0	1	0	0	**3**
17:00-18:00	2	0	0	0	0	0	0	**2**
18:01-19:00	1	0	0	0	0	0	0	**1**
Total	**13**	**6**	**1**	**4**	**16**	**3**	**38**	**81**

Please note there may be some small discrepancies in the 'total' calculations due to rounding (refer to Section 1.3)

2.1.6 The analysis has therefore identified that the EfW CHP is predicted to generate 81 MSW deliveries on average, on a daily basis. During the morning peak hour (0800-0900), on average four vehicle deliveries will be generated and in the evening peak hour (1600-1700) on average three vehicle deliveries will be generated.

2.2 Satellite Vehicles

2.2.1 As part of previous correspondence, PCC have requested further clarification concerning the exclusion of satellite vehicles from the MSW delivery movement calculations.

2.2.2 URS / SW have consulted with the South West Devon Waste Partnership regarding the use of satellite vehicles. It is subsequently understood that these vehicles were introduced when the Council re-zoned the collection rounds in 2008. They were designed to collect both recyclable material and residual waste from narrow access and back lanes.

2.2.3 The vehicles are very small however and have a correspondingly small payload. As a result, they proved not to be suitable for the purpose and have since been replaced with larger Bantam vehicles. The satellite vehicles have been re-deployed and no longer collect recyclables or waste and hence, have not been included within the above calculations, whilst bantam vehicles have.

3 Commercial Waste Vehicle Deliveries

3.1 Commercial and Industrial Waste (C&I)

3.1.1 To estimate the number of vehicle deliveries associated with Commercial and Industrial waste on an average weekday, the following methodology has been employed:

- The year of opening of the EfW plant (and the assessment year of the Transport Assessment) is 2014;
- Daily trips are based on a 50 hour week, during facility opening times (Monday to Friday);
- The site will accept contract waste for 10 hours each day;
- There will be 2450 operating hours a year, based on the site being operational for 49 weeks a year;
- Bulked trips will have a payload of 22.5 tonnes; and
- RCV trips will have a payload of 8 tonnes.

3.1.2 The maximum quantum of waste that can be processed at the EfW (per year) has been provided by MVV and is 265,000 tonnes. This total volume has subsequently been divided between MSW and C&I waste, as summarised in **TABLE 3.1**, based on information provided by the SWDWP.

TABLE 3.1 2014 Waste Processing Volumes at the EfW (in Tonnes)

Waste Processing Volumes	
Municipal Solid Waste (MSW)	168429
Commercial & Industrial (C&I)	96571
Total	265000

3.1.3 URS / SW have been informed by MVV that they anticipate that approximately 60% of the C&I waste will be transported by 8 tonne vehicles (RCVs) and that the remaining 40% will travel by 22.5 tonne vehicles (Bulked). The corresponding tonnage carried by these vehicles is shown below in **TABLE 3.2**.

TABLE 3.2 2014 Approximate C&I Waste at the EfW, by Vehicle Type (in Tonnes)

C&I Waste	
Total Commercial & Industrial	96571
60% of waste will travel by 8 tonne vehicles	57943
40% of waste will travel by 22.5 tonne vehicles	38628

3.1.4 In order to quantify the number of commercial vehicles which will be generated by the EfW site it is necessary to define the average payload of the vehicles.

3.1.5 For bulked vehicles, the SWDWP provided URS / SW with data from Chelson Meadow that stated that an average payload of 23.3 tonnes is appropriate; this is qualified by a commercial

operator who states that their average payload for an arctic delivering residual waste (either C&I or municipal) would be 22-23 tonnes per load. 22.5 tonnes for bulked vehicles has therefore been assumed.

3.1.6 Smaller RCV type vehicles will have a payload of between 7 and 9 tonnes depending on the operator. The assumed payload has therefore been taken as being 8 tonnes.

3.1.7 Applying these payloads subsequently allows the average daily number of delivery loads to be estimated, as shown below in **TABLE 3.3**.

TABLE 3.3 2014 Average Daily C&I Deliveries

	Based upon 8 ton loads	Based upon 22.5 ton loads	Total movements
Annual Tonnage	57943	38628	-
Average Annual Loads	7243	1717	-
Average Weekly Loads (49 operational weeks)	148	35	-
Average Daily Loads (5 operational days)	30	7	**37**

3.1.8 In terms of delivery profiles for C&I waste, loading times are generally managed to suit individual site and customer / contract requirements. Feedback from waste management companies has suggested however, that they tend to profile delivery times to avoid peak traffic times, to maximise the efficiency of their fleet and manage their impact on the transport network.

3.1.9 However, in order to inform the trip generation and traffic modelling calculations and to consider a worst case scenario, a profile of arrivals and departures for Commercial and Industrial waste traffic has been calculated by applying the inverse profile of the observed municipal waste deliveries.

3.1.10 This is to say that when there are less municipal waste deliveries, there will be a corresponding increase in the number of C&I waste deliveries. Additionally, it has been assumed that no C&I waste traffic will be accepted into the site either before 8am, or after 6pm. In reality, it may also be the case that no C&I deliveries will be made during the peak hours, although this assumption has not been included within this analysis, to ensure a robust assessment is undertaken.

3.1.11 **TABLE 3.4** presents the average delivery profile for Commercial and Industrial Waste, for 2014.

TABLE 3.4 2014 Predicted Average C&I Vehicle Deliveries, by Hour

Time	RCV	Bulked	Total
08:01-09:00	3	1	**4**
09:01-10:00	3	1	**4**
10:01-11:00	3	1	**3**
11:01-12:00	3	1	**4**
12:01-13:00	3	1	**4**
13:01-14:00	3	1	**4**
14:01-15:00	3	1	**3**
15:01-16:00	3	1	**4**
16:01-17:00	3	1	**4**
17:00-18:00	3	1	**4**
18:01-19:00	0	0	**0**
Total	**30**	**7**	**37**

Please note there may be some small discrepancies in the 'total' calculations due to rounding (refer to Section 1.3)

3.1.12 The analysis identifies that the EfW is predicted to generate 37 C&I deliveries on average, on a daily basis. During both the morning and evening peak hours (0800-0900 and 1600-1700), on average four vehicle deliveries are expected to be generated.

4 Raw Material Inputs & Residual Material Outputs

4.1 Background

4.1.1 In addition to the waste deliveries that will be associated with the EfW CHP facility, there are a number of inputs required to keep the plant in operation and a number of outputs from the plant that will generate traffic.

4.1.2 Inputs include chemical deliveries and outputs include Incinerator Bottom Ash (IBA) and Air Pollution Control Residue (APCR). It is also predicted that there will be a small amount of rejected waste (ie. waste delivered to the EfW CHP that cannot be processed in the plant).

4.2 IBA & APCR

4.2.1 It is assumed that the plant will operate approximately 8000 hours per year, burning waste. Of the waste burnt, MVV have indicated that 24% by weight will form IBA and 3.5% by weight will form APCR.

4.2.2 **TABLE 4.1** outlines the annual output of IBA and APCR, hourly tonnage, weekly tonnage and the corresponding tonnage per day.

TABLE 4.1 IBA and APCR Average Outputs

Output	Annual Tonnage	Hourly Tonnage	Daily Tonnage	Weekly Tonnage
IBA output	63,600	7.95	190.80	1335.60
APCR output	9,275	1.16	27.83	194.78

4.2.3 Whilst IBA and APCR outputs will be generated by the EfW 24 hours per day, seven days a week, due to the continual operation of the EfW CHP, collection of the materials will only take place during normal operating hours. **TABLE 4.2** below therefore summarises the tonnage of these outputs, per day, that will be available for collection and removal from site.

TABLE 4.2 IBA and APCR Average Collections (Daily), in Tonnes

Output	Days / Week	Tonnes / Day
IBA output	5	267
APCR output	5	39

4.2.4 **TABLE 4.3** shows the resultant number of HGVs associated with the export of IBA and APCR from the site.

TABLE 4.3 IBA and APCR Average Collections per Day

Output	Load in Tonnes	Loads / Day	Loads / Hour
IBA output	20	13.36	1.67
APCR output	20	1.95	0.19

4.2.5 These output residues will be exported from the site in 20 tonne HGVs. It is anticipated that the IBA will be transported along Weston Mill Drive and the A38 to Whitecleave Quarry in Buckfastleigh. It is noted however, that this site is subject to its own planning application and should this site not therefore be available, an alternative, appropriate facility would be used in its place, should this be necessary. APCR will be transported along the A38, bound for Leeds.

4.2.6 It is expected that vehicles delivering at the EfW could be 'back-loaded' at the site, meaning that an empty vehicle will not arrive at the site to remove these residual outputs, but that a delivery vehicle will be utilised once it has been unloaded. To ensure a robust assessment however, no account of the potential for back-loading has been included.

4.2.7 It has been assumed however, that IBA vehicles will always be full. This is because the ash will be produced on the site and vehicles will only leave when they full. The timing of the trips can be controlled by the operator.

4.2.8 For the IBA, the departure profile has been based on the predicted municipal waste delivery profile, and has assumed an 8 hour day (0800-1600). With respect to the two daily APCR departures it has been assumed that these will occur in the two peak hours, to ensure a robust assessment, although it is most likely that these trips will occur outside of these times.

4.2.9 The resultant IBA and APCR collection trips are summarised below in **TABLE 4.4**.

TABLE 4.4 2014 Predicted Average IBA and APCR Vehicle Collections, by Hour

Time	IBA	APCR	Total
08:01-09:00	1	1	**2**
09:01-10:00	1	0	**1**
10:01-11:00	2	0	**2**
11:01-12:00	2	0	**2**
12:01-13:00	1	0	**1**
13:01-14:00	2	0	**2**
14:01-15:00	3	0	**3**
15:01-16:00	2	0	**2**
16:01-17:00	0	1	**1**
17:00-18:00	0	0	**0**
18:01-19:00	0	0	**0**
Total	**13**	**2**	**15**

Please note there may be some small discrepancies in the 'total' calculations due to rounding (refer to Section 1.3)

4.2.10 The analysis identifies that the EfW CHP is predicted to generate 15 vehicle collections on average, on a daily basis. During the morning peak hour (0800-0900), on average two vehicle collections will be generated and in the evening peak hour (1600-1700) on average one vehicle collection will be generated.

4.3 Rejected Waste

4.3.1 It is likely that some of the waste that is delivered to the facility will not be accepted because it is not treatable in the facility. MVV has estimated that approximately 1,700 tonnes of waste will be rejected every year, on this basis.

4.3.2 If the waste is transported by HGV (capacity of 9 tonnes), this would equate to approximately 189 trips a year, providing that each of the vehicles are full. Assuming a 51 week working year, 3.7 trips will be generated per week, with 0.6 one way trips a day (assuming a 6 day week).

4.3.3 Subsequently, this quantum of trips has not been deemed to be significant in transport terms and has therefore not been included within this assessment, bearing in mind that these trips are unlikely to occur during the peak hours and the other assumptions that have already been made to ensure that the assessment is robust.

4.4 Material Deliveries

4.4.1 In addition to the waste volumes delivered to the EfW facility and the removal of 'arisings' (as discussed above), there will be some deliveries of materials needed to maintain the facility, for example sodium bicarbonate, activated carbon and urea.

4.4.2 MVV has estimated that the materials delivered will be in the region of 4600 tonnes per year. Further information is provided in **TABLE 4.5** below.

TABLE 4.5 Approximate Material Deliveries

Material Input	Tonnage Used				Deliveries	
	Annual	**hourly**	**weekly**	**Per day**	**Vehicle Capacity (Tonnes)**	**loads/wk**
Bicarbonate	4084	0.51	85.77	12.25	25	**3.43**
Activated Carbon	199	0.02	4.18	0.59	20	**0.21**
Urea	304	0.04	6.38	0.91	20	**0.32**
HCl	30	0.01	0.64	0.09	10	**0.06**
NaOH	11	0.01	0.24	0.03	10	**0.02**
Total	**4628**					**4.04**

4.4.3 These inputs will be delivered in vehicles with between a 10 and 25 tonne capacity (as shown above). There will therefore be approximately 4 deliveries a week. This equates to approximately 0.58 one way trips a day, over 7 days. Subsequently, this quantum of trips has not been deemed to be significant in transport terms and has therefore not been included within this assessment bearing in mind that these trips are unlikely to occur during the peak hours and the other assumptions that have already been made to ensure that the assessment is robust.

5 Staff Vehicle Movements

5.1.1 In addition to the inputs and outputs that will be associated with the processing of waste at the proposed EfW CHP, a number of staff will also be based at the site. As such, these staff members will need to travel to and from the site, in order to undertake their tasks and the associated movements have therefore been estimated, for inclusion within the Transport Assessment.

5.1.2 The staffing level of the site has been estimated by MVV as being 31.5 full time equivalent staff (35 actual staff), made up of:

- Management / Admin / Maintenance Staff – 13 full time
- Tipping Hall Supervisors / Weighbridge Operators – 7 part time (3.5 full time equivalent)
- Waste Plant Operators – 15 full time (covering 3 shifts (06:00-14:00, 14:00-22:00 and 22:00-06:00))

5.1.3 A number of the Tipping Hall Supervisors / Weighbridge Operators will need to be on site prior to the opening time of 08:00. As such, it has been assumed that half of these staff (3) will arrive between 07:00-08:00 with the other staff (4) arriving between 08:00-09:00. This assumption therefore ensures that staff movements are included within the peak hour, which will be used for assessment purposes in the TA.

5.1.4 In terms of departures from the site, the part time shift (Tipping hall supervisors) is understood to finish at 15:30, meaning that the part time staff are assumed to leave the site between 15:00-16:00. The remaining Weighbridge operators are assumed to leave the site between 16:00-17:00.

5.1.5 The full time staff (Management / Admin / Maintenance) have also been assumed to arrive either between 07:00-08:00 or 08:00-09:00, based on the same assumptions presented above. Meaning that 6 arrivals are expected between 07:00-08:00 and 7 between 08:00-09:00. These staff are expected to leave the site between 16:00-17:00 and 17:00-18:00 respectively.

5.1.6 Waste Plant Operators have been assumed to arrive to site the hour prior to their shift commencing (and conversely depart the site the hour following their shift ending).

5.1.7 A full summary of the estimated staff movements is provided below at **TABLE 5.1**.

TABLE 5.1 Estimated Staff Arrival and Departure Movements

Time	Arrivals	Departures
05:01-06:00	5	
06:01-07:00		5
07:01-08:00	(6+3) = 9	
08:01-09:00	(7+4) = 11	
09:01-10:00		
10:01-11:00		
11:01-12:00		
12:01-13:00		
13:01-14:00	5	
14:01-15:00		5
15:01-16:00		4
16:01-17:00		(6+3) = 9
17:00-18:00		7
18:01-19:00		
19:01-20:00		
20:01-21:00		
21:01-22:00	5	
22:01-23:00		5
Total	**35**	**35**

5.1.8 Of the 31.5 full time equivalent staff (35 actual members of staff), it has thus been assumed that all staff will arrive on site during the course of the day, and then leave again (taking into account shift patterns), resulting in the total movement of 70 trips, to and from the site. A final summary of predicted staff trips is therefore provided in **TABLE 5.2** below.

5.1.9 It should be noted that no adjustment to staff trips has been made to take into account the possibility of car sharing or the use of sustainable modes to access the site, thereby implying that all staff will be assessed as entering and exiting the site by sole-occupancy car trips. It has also been assumed that all staff will be present on site, at some point during the same day.

TABLE 5.2 Summary of Staff Movements

Time	Total
05:01-06:00	5
06:01-07:00	5
07:01-08:00	9
08:01-09:00	11
09:01-10:00	0
10:01-11:00	0
11:01-12:00	0
12:01-13:00	0
13:01-14:00	5
14:01-15:00	5
15:01-16:00	4
16:01-17:00	9
17:00-18:00	7
18:01-19:00	0
19:01-20:00	0
20:01-21:00	0
21:01-22:00	5
22:01-23:00	5
Total	**70**

5.1.10 Therefore, the maximum number of employees commuting during the morning peak hour has been estimated to be 11, with 9 employees leaving the site during the afternoon peak hour.

6 Vehicle Generation Summary

6.1 Background

6.1.1 This Technical Note has presented the predicted inputs and outputs that will be associated with the typical daily operation of the proposed EfW CHP facility, in terms of vehicle trips. As such, combining each of the trips identified in the summary tables at the end of Chapters 2 (MSW – **TABLE 2.2**), 3 (C&I – **TABLE 3.4**), 4 (IBA & APCR – **TABLE 4.4**) and 5 (Staff – **TABLE 5.2**) allows the combined trip generation estimates to be established.

6.1.2 It should be noted however, that a distinction has been made between the types of trips that will be associated with the EfW CHP, for the purposes of the preparation of this Technical Note:

6.2 Vehicle Generation

6.2.1 All HGV trips referred to within this Technical Note have related to deliveries (or collections). As such, for every delivery (or collection) trip that arrives at the EfW CHP, a corresponding departure trip will take place. For assessment purposes, it has been assumed that the associated arrival and departure trips will always occur in the same hour.

6.2.2 In all cases in this Technical Note, only the arrival trip (delivery or collection) has been reported. The combined average hourly HGV trips are therefore summarised below at **TABLE 6.1** (at the end of this chapter). In the first instance, HGV trips have been based on the information presented in Chapter 2-6 of this Technical Note and therefore indicate the average predicted number of arrival trips which will occur at the EfW CHP. Two-way movements are also presented in this summary table however, for clarity.

6.2.3 Staff vehicle movements have been presented in this document however, by arrival and departure as the two constituent parts of each of these trips will not be expected to occur during the same hour. These trip estimates are replicated in the table below.

6.2.4 Finally, the combined total number of hourly trips expected to be associated with the EfW CHP is summarised in the table.

6.2.5 As indicated, on average the EfW CHP facility will be expected to generate 11 staff movements and 9 waste deliveries / collections (18 two-way movements) in the AM Peak. Thus the total trip generation of the EfW CHP in the AM peak is predicted to be 29 trips.

6.2.6 On average the EfW CHP facility will be expected to generate 9 staff movements and 8 waste deliveries / collections (16 two-way movements) in the PM Peak. Thus the total trip generation of the EfW CHP in the PM peak is predicted to be 25 trips.

TABLE 6.1 2014 Combined Average Hourly Trip Generation Predictions

Time	HGV Based on Chapters 2-6	HGV (Two-Way Movements)	Staff	Combined Total Based on Two-Way HGV Movements)
05:01-06:00	0	0	5	5
06:01-07:00	0	0	5	5
07:01-08:00	0	0	9	9
08:01-09:00	9	18	11	29
09:01-10:00	10	20	0	20
10:01-11:00	17	34	0	34
11:01-12:00	16	32	0	32
12:01-13:00	12	24	0	24
13:01-14:00	15	30	5	35
14:01-15:00	23	46	5	51
15:01-16:00	15	30	4	34
16:01-17:00	8	16	9	25
17:00-18:00	6	12	7	19
18:01-19:00	1	2	0	2
19:01-20:00	0	0	0	0
20:01-21:00	0	0	0	0
21:01-22:00	0	0	5	5
22:01-23:00	0	0	5	5
Total	**132**	**264**	**70**	**334**

Please note there may be some small discrepancies in the ‘total’ calculations due to rounding (refer to Section 1.3)

7 Distribution of Vehicles

7.1 Background

7.1.1 In order to assess the implications of the traffic movements that are predicted to be associated with the proposed EfW CHP facility, it is necessary to estimate the distribution of the vehicle trips, across the local highway network.

7.1.2 Based on the type of vehicle trips that have been identified as being associated with the EfW CHP (Chapters 2-6), distributions have therefore been calculated and are presented in this chapter:

7.1.3 It should ne noted that in all cases, the same routes for arriving and departing vehicles has been assumed.

7.2 Municipal Waste

7.2.1 Information provided by the SWDWP has been used to establish the distribution of municipal waste traffic arriving from each waste authority, on both a vehicle by vehicle and day by day basis. As such, the distribution has been based on the same information used to derive the average trip generation of the facility, as discussed in Chapter 2 of this document.

7.2.2 In establishing the distribution of municipal waste, the SWDWP has made the following assumptions:

- Apart from PCC RCVs and PCC Hookloaders from Weston Mill, all other vehicles will approach the EfW from the A38 and A3064 St. Budeaux by-pass.
    - Of the vehicles approaching the site from the A38, given the relative location of the EfW site, it is assumed that all A38 vehicles will be travelling to and from the east.
- The PCC RCV vehicles have been distributed according to crew and daily routes, accessing the proposed facility either from Wolseley Road west, B3396 Saltash Road, A3064 Wolseley Road east, or the A3064 St. Budeaux by-pass.
- PCC Hookloaders from Weston Mill are assumed to travel along Carlton Drive, turning onto the A3064 St. Budeaux by-pass.

7.2.3 As the information provided by the SWDWP provided distribution on a day-by day basis, an average distribution of the Monday to Thursday municipal waste traffic was calculated and used to inform the distribution of the average trips, presented earlier in this note, as these were the busiest days. As such, **TABLE 7.1** presents the resulting percentage distribution, on a vehicle by vehicle basis.

TABLE 7.1 Municipal Waste Average Distribution

Route	Devon District Bulker	Torbay RTS Bulker	Devon Hookloader CA	South Hams RCV	PCC Hookloader (CM & PR)	PCC Hookloader WM CA	PCC RCV
A386, A3064, Wolseley Road E	0%	0%	0%	0%	0%	0%	35%
B3396, A3064, Wolseley Road E	0%	0%	0%	0%	0%	0%	8%
A38, A3064, Weston Mill Drive	100%	100%	100%	100%	100%	0%	40%
Carlton Terrace, Weston Mill Drive	0%	0%	0%	0%	0%	100%	0%
Wolseley Road W	0%	0%	0%	0%	0%	0%	6%
A3064, Wolseley Road E	0%	0%	0%	0%	0%	0%	11%

7.3 Commercial and Industrial Waste

7.3.1 As discussed in Chapter 3, 60% of the Commercial and Industrial waste is expected to be transported in RCV's and 40% by bulk.

7.3.2 The Commercial and Industrial waste distribution has subsequently been calculated according to the municipal waste distribution, according to the following assumptions:

- Commercial and Industrial RCVs will follow the same distribution as PCC RCVs
- Commercial and Industrial bulk vehicles will travel along the A38 and St Budeaux by-pass
    - Based on the population locations in the south-west, it has been assumed that 90% of the A38 related traffic will travel to and from the east, with the remaining 10% travelling to and from the west

7.4 Residual Waste

7.4.1 It has been assumed that all the residual waste vehicles (e.g. IBA and APCR) will follow the same distribution pattern as the Commercial and Industrial bulk vehicles.

7.4.2 Of those vehicles which travel along the A38 however, it is anticipated that they will all travel to and from the east.

7.5 Staff

7.5.1 The distribution of staff trips has been established using 2001 Census journey-to-work data for those people travelling to the Devonport Ward for work. The data indicates that there are approximately 6357 car driver trips to the Devonport ward, from a total of 62 surrounding wards.

7.5.2 The anticipated route of these car trips to the Devonport ward was established using an internet based route finder, coupled with local knowledge. As such, **TABLE 7.2** presents the anticipated distribution of staff trips, based on the Census 2001 journey-to-work data.

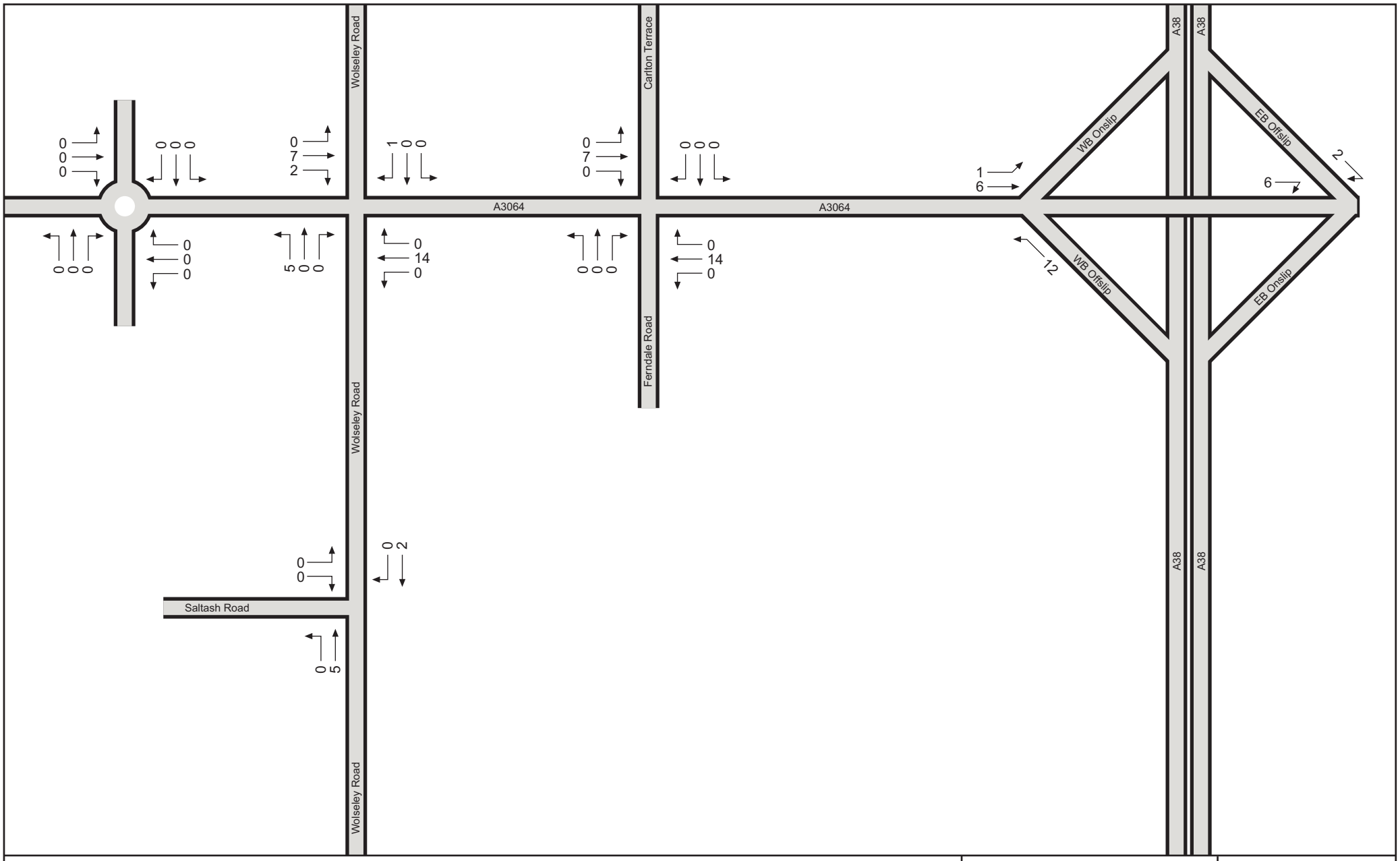
TABLE 7.2 Staff Distribution – Census Data

Direction	Journey-to-work Data (Car Drover Trips)	Proportional Distribution
A38 W	696	11%
A38 E	3361	53%
A3064 W	234	4%
A3064 E	2066	32%
TOTAL	**6357**	**100%**

7.6 Application

7.6.1 As a result of the above analysis, the distribution(s) have been applied to the total estimated trip generation data presented in Chapter 6, such that the estimated vehicle movements can be considered in relation to the local highway network.

7.6.2 Turning Movement diagrams have therefore been prepared, illustrating the proposed traffic movements for the AM and PM peak hours. These diagrams are shown at **FIGURES 7.1** and **7.2** and will be taken forward as part of the Transport Assessment analysis.



Development Flows Peak Vehicle Movements (Average) AM 0800 - 0900

Figure 7.1

URS Scott Wilson

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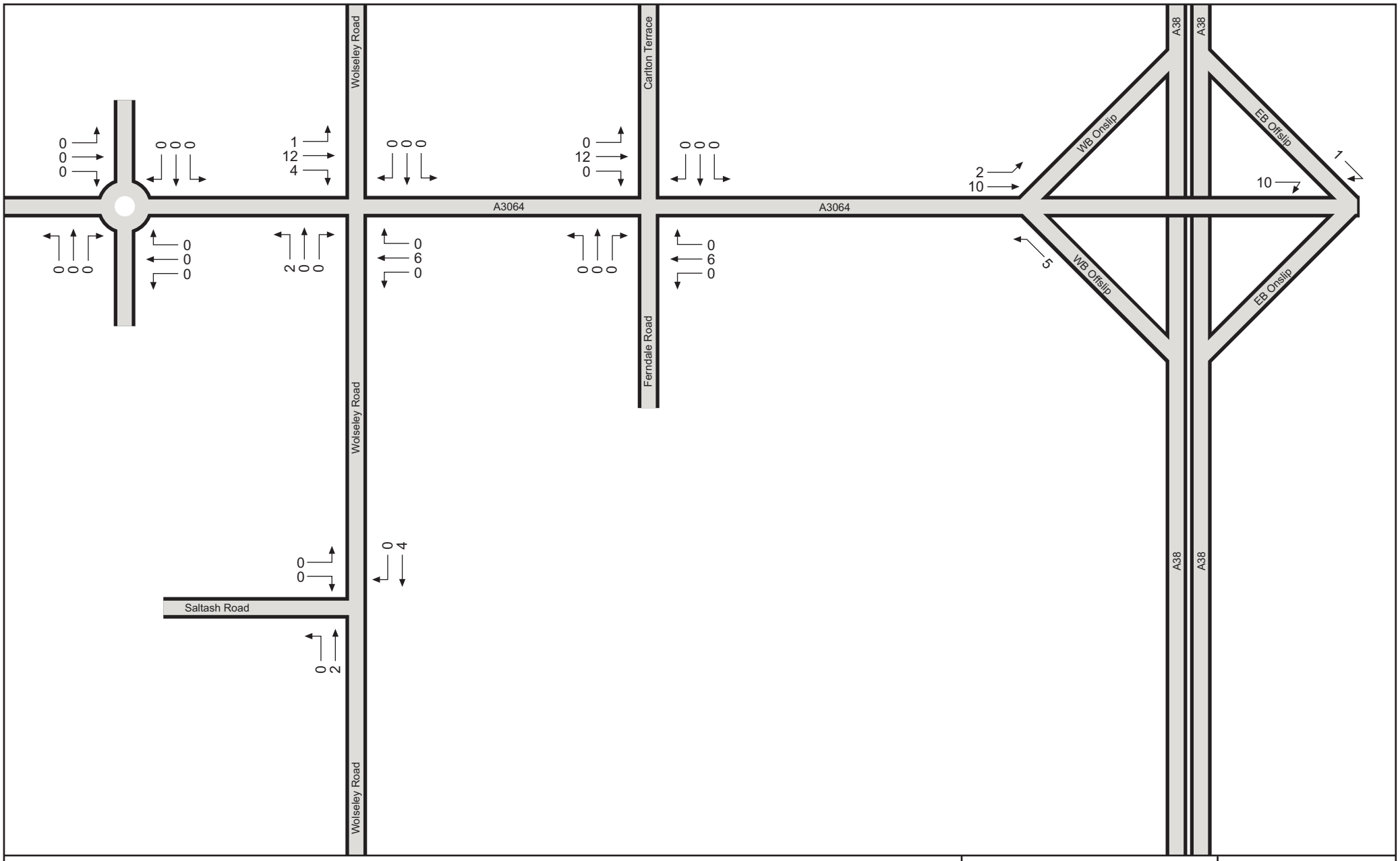

Development Flows Peak Vehicle Movements (Average) PM
1600 - 1700

Figure 7.2

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8 Vehicle Generation – Sensitivity Analysis

8.1 Background

8.1.1 The analysis presented thus far in this Technical Note has been based around the estimation of the 'typical' average daily situation which is expected to occur at the EfW CHP facility, following its proposed opening in 2014.

8.1.2 From the perspective of the Transport Assessment, this approach accords with relevant best practice guidance, such that the real-world implications of the proposed development can be assessed. This approach has been discussed with PCC and whilst this has generally been accepted, it is understood that officers would also like to consider further information relating to the possible 'maximum' situation, that may occur at the site.

8.1.3 It is thus proposed that a sensitivity analysis will be undertaken in addition to the Transport Assessment, and that this will be included as an Appendix to the TA, when it is submitted as part of the planning application.

8.1.4 The remainder of this chapter therefore summarises how the sensitivity analysis of the 'maximum' situation will be undertaken.

8.2 Maximum Scenario

8.2.1 The same Municipal Waste data as presented in Chapter 2 has been interrogated to consider the maximum number of waste vehicles that could be associated with the EfW site. As an absolute worst-case scenario, the maximum number of deliveries has been considered by vehicle type, by hour and day of the week.

8.2.2 As before, data has been considered for the four busiest weekdays only (Monday – Thursday) but in this case, the busiest hours have been considered, irrespective of which month they were observed.

8.2.3 It is considered that this represents an unrealistic worst-case but nonetheless has allowed the maximum observed number of waste vehicle deliveries to be estimated.

8.2.4 The analysis, presented in **TABLE 8.1**, indicates that the busiest observed hour occurred between 14:00-15:00, when 36 combined deliveries took place. These deliveries were for municipal waste only, and do not include C&I waste or Residual waste.

TABLE 8.1 Maximum MSW Vehicle Deliveries, by Hour

Time	Devon District Bulker	Torbay RTS Bulker	Devon Hookloader CA	South Hams RCV	PCC Hookloader	PCC RCV	Total MSW per hour
08:01-09:00	6	7	1	1	6	2	**23**
09:01-10:00	3	9	1	2	8	4	**27**
10:01-11:00	4	6	1	2	5	13	**31**
11:01-12:00	3	4	1	3	6	13	**30**
12:01-13:00	6	6	1	4	7	6	**30**
13:01-14:00	4	5	1	3	4	11	**28**
14:01-15:00	3	4	1	6	8	14	**36**
15:01-16:00	5	2	1	2	5	11	**26**
16:01-17:00	3	0	1	2	3	1	**10**
17:00-18:00	1	6	0	0	0	0	**7**
Total	**40**	**49**	**9**	**25**	**52**	**75**	**250**

8.2.5 It should be noted that this situation is extremely unlikely to occur, as the observed data used to develop the table has combined different maximum hours, from different days and different months.

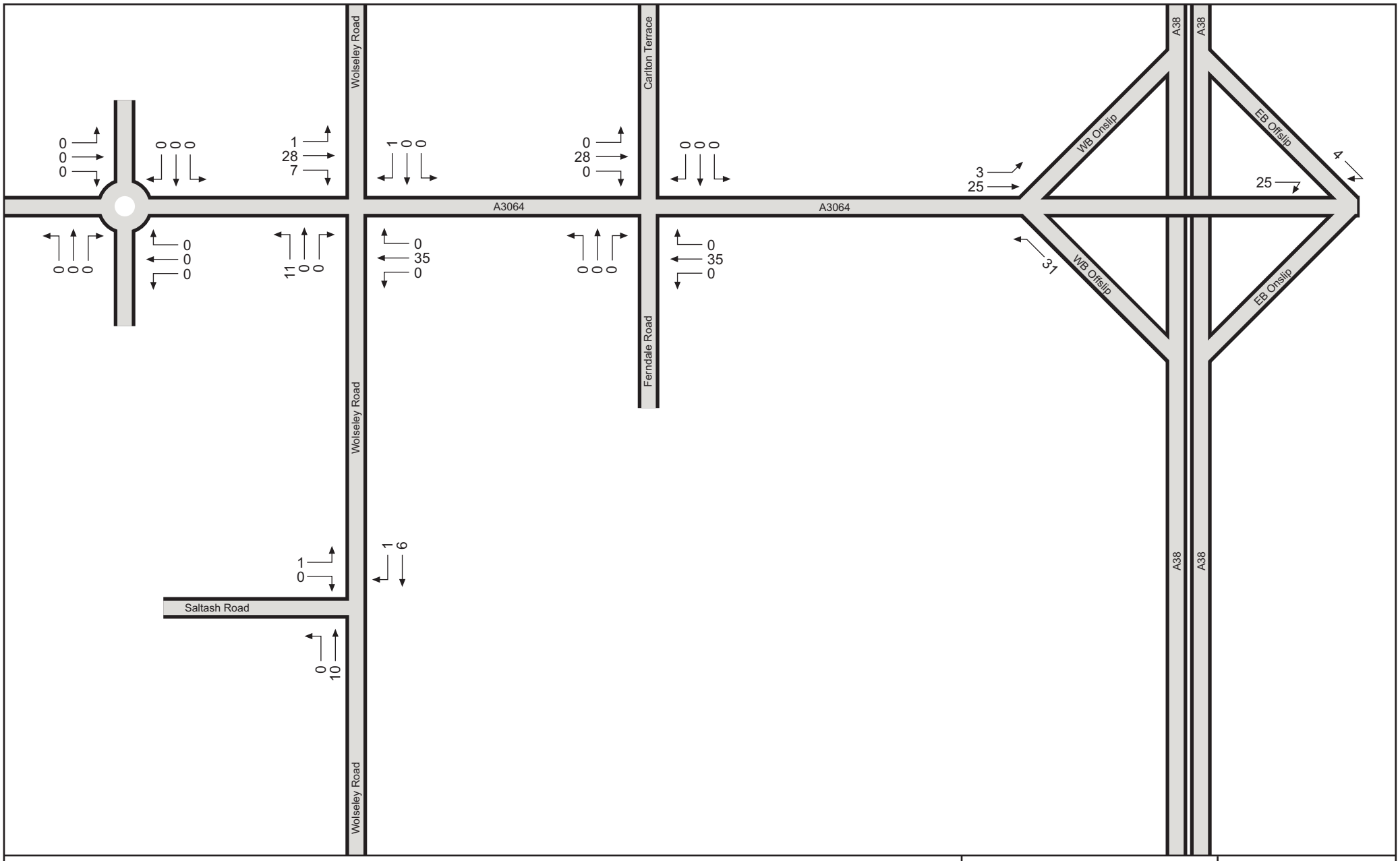
8.2.6 MVV have confirmed that it would be extremely unlikely that the EfW would ever process more than 36 waste vehicle movements within a single hour period, even when MSW, C&I and IBA & APCR deliveries would be combined.

8.3 Sensitivity Assessment

8.3.1 As such, advice from MVV has indicated that for the purpose of undertaking a 'maximum' sensitivity assessment, that 36 waste deliveries (plus staff movements) should be considered for both the AM and PM peak hours.

8.3.2 When combined with the staff movements (which would be expected to be consistent with the analysis previously presented), the 'maximum' scenario is expected to generate 11 staff movements and 36 waste movements in the AM Peak and 9 staff movements and 36 waste movements in the PM Peak.

8.3.3 As a result, the distribution(s) presented in Chapter 7 have been applied to the total estimated trip generation data presented above, such that the estimated vehicle movements can be considered in relation to the local highway network. Turning Movement diagrams have therefore been prepared, illustrating the 'maximum' traffic movements for the AM and PM peak hours. These diagrams are shown at **FIGURES 8.1** and **8.2** and will be taken forward as part of a sensitivity assessment, which will be presented as an appendix to the Transport Assessment.



Development Flows Peak Vehicle Movements (Maximum) AM 0800 - 0900

Figure 8.1

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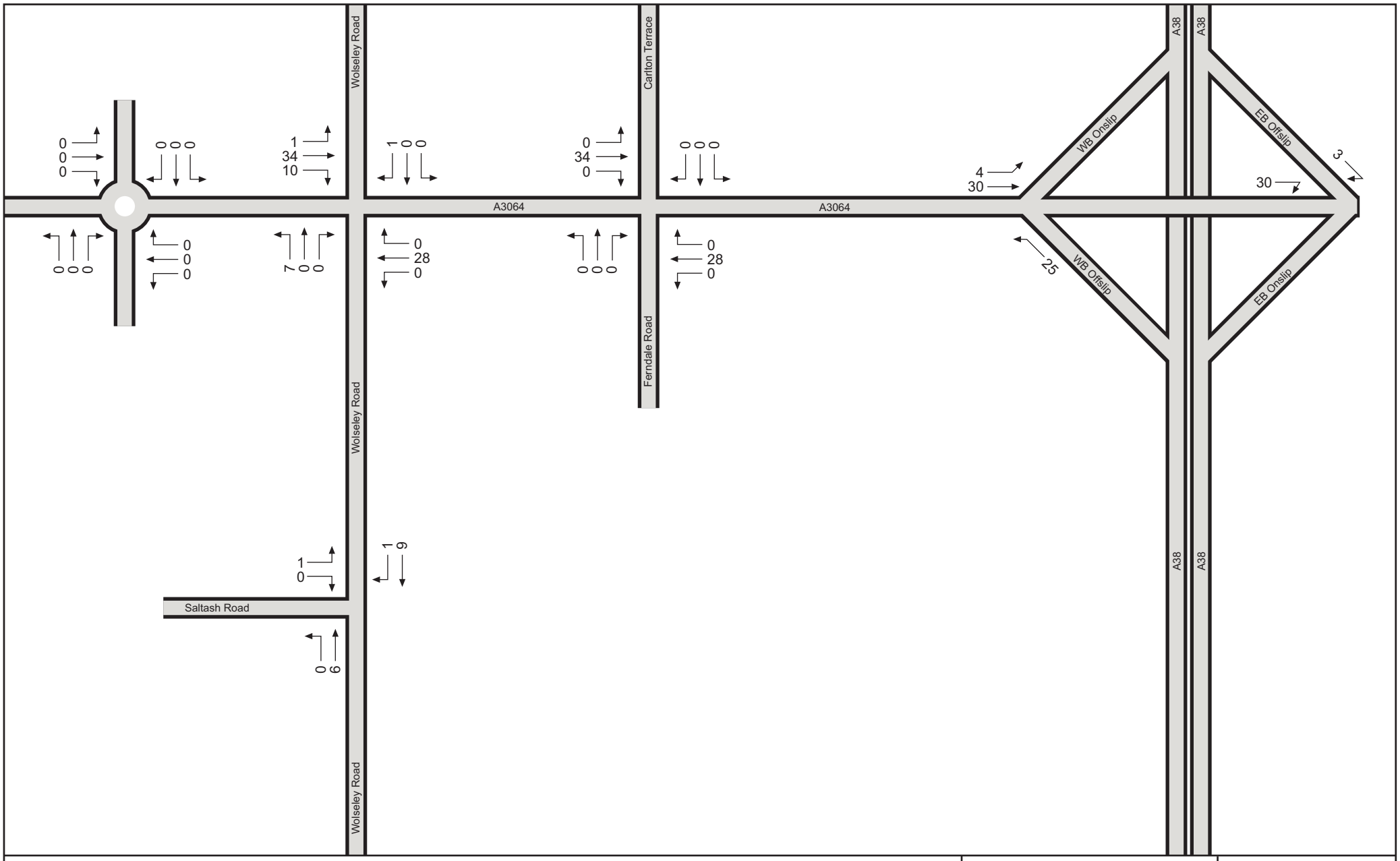

Development Flows Peak Vehicle Movements (Maximum) PM 1600 - 1700

Figure 8.2

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9 Seasonal Variations – Sensitivity Analysis

9.1 Background

9.1.1 In addition to the 'maximum' sensitivity analysis that has been summarised in Chapter 8, discussions with the HA, as well as PCC, have indicated that the seasonal variability of traffic conditions should be considered as part of the EfW Transport Assessment.

9.2 Variation in Waste

9.2.1 The SWDWP have informed URS / SW that the impact of tourism has a relatively minor impact on the waste collected by the local authority.

9.2.2 Notwithstanding this, it was noted that there may be an increase in street cleansing and litter collection and that authority collections of commercial waste may also vary to some extent, over the course of a year.

9.2.3 In this context, the waste arising from tourism is usually classified as commercial waste when it arises from hotels, camp sites and commercial holiday accommodation. The same is true for places of entertainment, bars, cafes and restaurants.

9.2.4 In addition, residents in the area will also be taking holidays so there will be a flow of local people leaving the area as tourists are visiting. Tourism also tends to be less seasonal than it used to be as people visit the area for weekends and short breaks throughout the year, as opposed to more traditional summer holidays.

9.2.5 SWDWP has advised that these trends therefore have the effect of reducing the seasonal variability of waste generation and thus, the associated vehicle movements.

9.2.6 In addition, it should be borne in mind that commercial waste (which in this context includes 'tourist waste'), can only be accepted into the plant as a secondary input to contracted municipal waste. In reality therefore, the SWDWP have indicated that the commercial waste will have a relatively flat yearly profile and there is therefore a very limited scope to assessing the 'seasonal' waste processing of the EfW, which as a commercial operation, will generally be optimised as much as possible.

9.2.7 Furthermore, the vehicle trips associated with the waste processing of the EfW has been based on a number of different months worth of data, as supplied by the SWDWP and discussed earlier in this Technical Note, to ensure that data anomalies can be avoided as much as possible.

9.3 Variation in Traffic Conditions

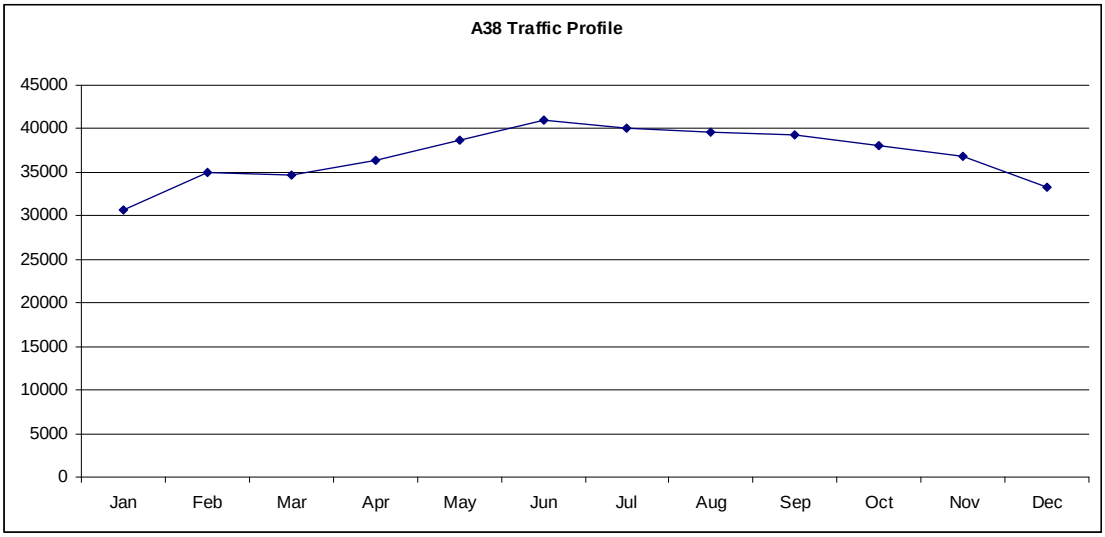
9.3.1 Notwithstanding the above, it is recognised that seasonal variations in traffic flows on the highway network in the vicinity of the proposed EfW site, including the Highways Agency's A38, will be likely to vary over the course of the year.

9.3.2 In order to take seasonal variations in traffic flow into consideration, the Highways Agency's TRADs database has been interrogated. Using the Yearly Flow reporting function, Average Daily Traffic (ADT) data has been collected for each month of 2010 for the A38 in the following locations:

- WB, A38, T/01/911, West of Forder Valley Main Carriageway before On slip
- EB, A38, T/01/909, West of Forder Valley Main Carriageway after Off slip

9.3.3 It should be noted that data was not available for January (EB) and April (WB). This data has therefore been calculated using directional percentage values. The seasonal two-way profile on the A38 is subsequently summarised in **FIGURE 9.1** below.

FIGURE 9.1 Profile of Two-Way Traffic on the A38 (2010), by Month



9.3.4 The data has also been summarised below in **TABLE 9.1** which confirms that the busiest observed month in 2010 was June, with the quietest months occurring in the winter.

TABLE 9.1 Two-Way Traffic Data on the A38 (2010), by Month

Month	Two-Way Flow (2010)
Jan	30595
Feb	35000
Mar	34733
Apr	36375
May	38642
Jun	41067
Jul	40059
Aug	39579
Sep	39312
Oct	38031
Nov	36827
Dec	33271
Mean Average	**36958**

9.3.5 The mean average two way traffic flow for the A38 in 2010 was 36,958. In June 2010, the observed two-way flow was 41,067; 11% higher than the mean average.

9.4 Sensitivity Assessment

9.4.1 To understand the impact of the proposed EfW on the A38 at the peak AM and PM assessment times, mean average peak hour traffic flows have been abstracted from the TRADs database for Monday to Thursday for June 2010 (**TABLE 9.2**). Data for Monday – Thursday has been specifically isolated as this conforms with the data employed as part of the EfW assessment, when observed municipal waste trips have been observed to be at their greatest.

TABLE 9.2 Peak Hour Flows on the A38, June 2010

Peak	Monday – Thursday Average
0800-0900	3712
1600-1700	3097

9.4.2 With the above, maximum background flows in mind, the proposed EfW trips for the AM and PM peak hours have been distributed (based on the analysis presented in Chapter 7) to / from the site, to consider the number of EfW trips which will occur on the A38, at these times.

9.4.3 A summary of this information and the calculated percentage impact of the related development traffic on the HA network is presented in **TABLE 9.3** below.

TABLE 9.3 Peak Hour Development Flows on the A38, and Percentage Impact

Peak	Monday – Thursday Average	Development Traffic	Percentage Impact
0800-0900	3712	21	0.57%
1600-1700	3097	18	0.58%

9.4.4 As a worst-case assessment, the development traffic has been factored up by 11% to reflect the observed seasonal nature of traffic on the A38 at its busiest time of the year, in June. The results of this analysis are presented in **TABLE 9.4** below.

TABLE 9.4 Peak Hour Factored Development Flows on the A38, and Percentage Impact

Peak	Monday – Thursday Average	Factored Development Traffic (by 11%)	Percentage Impact
0800-0900	3712	23	0.63%
1600-1700	3097	20	0.65%

9.4.5 When the seasonal variations in traffic are taken into consideration, the proportional impact of the EfW is predicted to increase slightly, to a maximum 0.65% in the PM peak. This level of impact is therefore not considered to be significant, bearing in mind furthermore, that a number of these trips will already be occurring on the highway network.