11 TRAFFIC

11.1 INTRODUCTION

This Chapter assesses the potential impact that both the construction and operational phases of the proposed Mechanical Biological Treatment (MBT) Facility will have on the surrounding road network. This assessment will calculate the expected volume of traffic that will be generated by the proposed development, outline proposed haul routes that vehicles associated with the MBT Facility will follow and assess the potential impact that the generated traffic flows will have on the road network.

11.1.1 Methodology

In preparing this Chapter, TOBIN Consulting Engineers have made reference to:

- The NRA 'Traffic and Transport Assessment Guidelines';
- The NRA 'Project Appraisal Guidelines';
- The NRA Design Manual for Roads and Bridges (NRA DMRB)
- UK DMRB TA 46/97 Traffic Flow Ranges for Use in the Assessment of New Rural Roads
- Kildare County Development Plan 2011-2017; and
- NRA Traffic Counter Data available on www.nra.ie.

Traffic surveys were carried out at the entrance to the Bord na Móna landholding and at 10 locations on the surrounding road network. These flows were then adjusted to take account of seasonal variation and yearly traffic growth to determine the background traffic flows for each year analysed.

Estimates for the amount of heavy goods vehicle (HGV) traffic to be generated by the construction phase of the proposed development are based on the likely number of deliveries of construction materials to the site. Estimates for the amount of HGV traffic to be generated by the operational phase of the proposed development are based on the quantities of waste and outputs that will be delivered to and from the MBT Facility. The arrival and departure of workers/staff during the construction stage and the operational stage have also been considered in this assessment. The generated traffic was then distributed onto the road network where it was combined with the background traffic flows and subsequently analysed.

As outlined in Section 11.3 herein, three traffic scenarios have been considered, two representing different operational phases of the MBT Facility and one representing the construction phase of the MBT Facility.

The existing entrance from the R403 Regional Road will also provide access to the proposed MBT Facility. This existing entrance is a priority junction and, as such, has been analysed using the Transport Research Laboratory (TRL) computer program PICADY, which is widely used for the analysis of priority junctions.

11.2 EXISTING ENVIRONMENT

11.2.1 Traffic Survey

Traffic surveys were carried out on the surrounding road network in order to determine background traffic flows on the haul routes that will be used by MBT Facility traffic. These counts were carried out by Abacus Transportation Surveys Limited, the type, location and date of which are listed below:

- Manual Classified Traffic Survey, existing site entrance on R403, Tuesday 31st January 2012 between 07:00 and 19:00
- Automated Traffic Counter, R402 East of Carbury, Saturday 28th January to Saturday 4th February 2012
- Automated Traffic Counter, R402 West of Carbury, Saturday 28th January to Saturday 4th February 2012
- Automated Traffic Counter, R403 South of Carbury, Saturday 28th January to Saturday 4th February 2012
- Automated Traffic Counter, R403 North of Canal, Saturday 28th January to Saturday 4th February 2012
- Automated Traffic Counter, R414 West of Canal, Saturday 28th January to Saturday 4th February 2012
- Automated Traffic Counter, R415 South of Allenwood, Saturday 28th January to Saturday 4th February 2012
- Automated Traffic Counter, R403 East of Allenwood, Saturday 28th January to Saturday 4th February 2012
- Automated Traffic Counter, R409 North of Goatstown, Saturday 28th January to Saturday 4th February 2012
- Automated Traffic Counter, R403 East of Prosperous, Saturday 28th January to Saturday 4th February 2012
- Automated Traffic Counter, R407 South of Clane, Saturday 28th January to Saturday 4th February 2012

The surveys distinguished between cars / light goods vehicles, buses and heavy goods vehicles. Details of the results of these surveys are provided in Appendix 11.1 of this Report. The locations of the traffic counts undertaken are shown in Figure 11.1.

In addition to the traffic surveys listed above, further traffic data has been sourced from Kildare County Council and the National Roads Authority.

11.2.2 Road Network

The proposed development is located within the townlands of Coolcorrigan, and Drummond, Carbury, Co. Kildare within an overall landholding which is under the ownership of Bord na Móna. The site is accessible via a network of regional routes which in turn link with the National Primary Road / Motorway network. Access to the site will be provided by an existing entrance on the R403. The R403 lies south, southwest and west of the site and joins the R402 at Carbury to the northwest of the site. The permitted and operational Drehid Waste Management Facility is located within this Bord na Móna landholding approximately 1km north of the proposed site for the MBT Facility.

The haul routes to be followed by traffic associated with the proposed development are presented in Figure 11.1 and it is proposed that traffic will be dispersed over these routes. Each of these routes is via regional roads or a combination of regional roads and national primary routes. All construction contractors, and all contractors delivering waste to the proposed MBT Facility, will be issued with a map of permitted haul routes such that all materials imported into the proposed development or exported from the proposed development are transported via one of the identified haul routes. The significant majority of the roads making up the haul routes are sufficiently wide to accommodate two way HGV movement along them. Where there are narrow sections along a haul route, these sections are short in nature with ample opportunities for vehicles to pass.

Access has been provided into the previously permitted Drehid Waste Management Facility from the R403 via a previously permitted entrance and a dedicated 4.8km private access road. The existing entrance on the R403 is located within an 80km/h speed zone. The R403 has an approximate carriageway width of 6.0m in the vicinity of the site entrance. A ghost island junction with 3m wide through lanes and a 3m wide right turning lane has been provided at the existing entrance with visibility splays of 3.0 x 160m in accordance with NRA DMRB TD41-42.

The site is accessed from the north via the R402 and R403. The R402 is a Regional Road and provides access from the M4 Motorway to the site via the R403, where the existing entrance junction is located. The R402 varies in width from between approximately 5.3m and 8.8m. There are road markings and signage along this route. The junction between the R402 and R403 is a simple priority junction with adequate visibility.

The site is accessed from the south by the R407, R409 or R415/R416, which lead to the R403. The R407 is a Regional Road, which runs from the M7 to the R403 in Clane. The carriageway width of the R407 varies between approximately 6.0m and 7.0m. The junction between the R407 and the R403 is located in Clane. It is a traffic signal controlled junction with adequate visibility.

The R409 Regional Road provides access from the M7 Naas Bypass to the R403. It is a single carriageway and varies in width from approximately 5.2m to 6.4m. The junction between the R409 and the R403 is a priority crossroads with the fourth arm being a local road. Visibility at this location is restricted for cars by the horizontal and vertical geometry of the R403, however visibility is available for HGV traffic.

The R415/R416 Regional Road provides access to the R403 from the M9 Motorway. There are 2 bridges along this route at which the road width is restricted to approximately 5.3m.

11.2.3 Proposed Road Network Improvements

The R402 Enfield to Edenderry Improvement Scheme is currently under construction. A section of the R402 (from Carbury to the M4 Motorway) is currently an approved haul route for the permitted and operational Drehid Waste Management Facility and is a proposed haul route for the proposed MBT Facility. The proposed works will comprise:

- The construction of approximately 10.2 km of a two-way single carriageway road;
- The construction and realignment of affected side roads along with associated junctions;
- The construction of a roundabout junction where the proposed road crosses the existing R402 south of Carbury; and
- Associated earthworks and appropriate landscape works.

11.3 POTENTIAL IMPACTS

Both Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting) will have the same footprint and will accept similar volumes of waste. It is expected that the volume of outputs produced by Configuration B (MBT with Dry Anaerobic Digestion and Composting), that will require an outward destination, will be marginally greater than the volume of outputs produced by Configuration A (MBT with Composting). As such, and as a worst case scenario, the Configuration B traffic volumes are used in this assessment.

11.3.1 Existing and Proposed Development (Scenarios)

The existing Drehid Waste Management Facility located within the Bord na Móna landholding consists of a landfill operation and a composting facility. The landfill is currently permitted to accept 360,000 tonnes of waste per annum until 1st December 2013. Thereafter the existing landfill will be permitted to accept 120,000 tonnes of waste per annum until 2028.

Given that approximately 69,617 tonnes of outputs from the proposed MBT Facility will be accepted at the existing landfill for the remainder of its operational life, there will be a corresponding reduction in the amount of waste accepted directly at the existing landfill from external sources. Following the commencement of operations at the proposed MBT Facility, it is envisaged that the existing landfill will accept approximately 50,383 (i.e. 120,000 – 69,617) tonnes per annum directly from external sources. The operation of the proposed MBT Facility during the remaining life of the existing landfill is referred to in subsequent sections as Scenario 1. This scenario is relevant from 2015 (envisaged year of commencement of operations at the MBT Facility) until 2028 (year that the existing landfill's current planning permission is due to expire).

As the existing landfill's current planning permission to accept waste is due to expire in 2028, a further scenario (Scenario 2) is considered whereby all MBT outputs are exported out of the Bord na Móna landholding to alternative destinations. This scenario is relevant from 2028 onwards.

A planning search of the areas surrounding the proposed development has been carried out. Committed development recorded consists of domestic structures. These are assumed to be accounted for within annual growth factors applied to the traffic survey data.

11.3.2 Traffic Generation

The volume of HGV traffic that is expected to be generated by deliveries of waste to the proposed Drehid MBT Facility, upon commencement of the operational phase of the proposed MBT Facility has been estimated, as presented in Table 11.1. Given that the envisaged year of commencement of the operational phase of the proposed MBT Facility is 2015, it should be noted that the existing landfill will have reverted from a permitted waste acceptance of 360,000 tonnes per annum to a permitted waste acceptance of 120,000 tonnes per annum at that point.

Table 11.1 below provides a breakdown of the estimated HGV traffic generated by waste deliveries to the proposed MBT Facility for both Scenario 1 (where certain MBT outputs are accepted at the existing landfill) and Scenario 2 (where all MBT outputs (excluding biogas) are transported out of the Bord na Móna landholding on to the surrounding road network). Due to the acceptance of certain MBT outputs at the existing landfill, the volume of HGV traffic delivering material directly to the existing landfill from external sources will be reduced. To account for this reduction, the landfill HGV traffic generation has been considered in Scenario 1.

Table 11-1 Estimated Deliveries to the existing landfill and the MBT Facility from 2015

Estimated Deliveries to the existing Landfill and the proposed MBT Facility from 2015				
Facility	**Volume (tonnes per annum)**	**Deliveries per year[1]**	**Deliveries per day[2]**	**Deliveries per hour[3]**
Scenario 1:				
Deliveries to Landfill				
Direct to Landfill	50,383	2,520	8	1
Deliveries to Proposed MBT Facility:				
MBT Plant	250,000	12,500	40	4
Scenario 1 Total	300,383	15,020	48	5
Scenario 2:				
Deliveries to Proposed MBT Facility:				
MBT Plant	250,000	12,500	40	4
Scenario 2 Total	250,000	12,500	40	4

Notes
(1) Bulk Haulage Vehicles – 20 tonne payloads assumed
(2) 312 working days assumed based on 52 weeks per year and 6 days per week
(3) 10 hour working day assumed
(4) Numbers of trips have been rounded up to nearest whole number. In the hourly figures presented, this may result in some overestimating of the number of vehicles

As previously outlined, the proposed MBT Facility will produce outputs that require an onward destination. Table 11.2 below provides an estimate of the volume of HGV traffic that will be generated by the departure of outputs from the proposed MBT Facility, on to the surrounding road network, upon commencement of operations at the proposed MBT Facility during both Scenario 1 and Scenario 2. As with the deliveries in Table 11.1, the existing landfill is considered in Scenario 1.

Table 11-2 Estimated HGV Traffic Departing the existing landfill and the MBT Facility from 2015

Estimated HGV Traffic Departing the existing Landfill and the proposed MBT Facility from 2015				
Facility	**Volume (tonnes per annum)**	**Total Departures per year[1]**	**Departures per day[2]**	**Departures per hour[3]**
Scenario 1:				
Departures from Landfill				
Landfill Leachate[6]	10,768	469	2	1
Departures from Proposed MBT Facility:				
Recovered Recyclables	37,397	1,870	6	1
SRF Produced	78,159	3,908	13	2
Waste Water[5]	3,285	329	1	1
Sub – Total	118,841	6,107	20	4
Scenario 1 Total	129,609	6,576	22	5
Scenario 2:				
Departures from Proposed MBT Facility:				
Recovered Recyclables	37,397	1,870	6	1
SRF Produced	78,159	3,908	13	2
Biostabilised Waste	50,084	2505	8	1
Rejects	19,533	977	4	1
Waste Water[5]	3,285	329	1	1
Scenario 2 Total	188,458	9,588	32	6

Notes
(1) Bulk Haulage Vehicles - 20 tonne payloads assumed
(2) 312 working days assumed based on 52 weeks per year and 6 days per week
(3) 10 hour working day assumed
(4) Numbers of trips have been rounded up to nearest whole number. In the hourly figures presented, this may result in some overestimating of the number of vehicles
(5) Waste water will be produced by Configuration B (MBT with Dry Anaerobic Digestion and Composting) only. .It is assumed the tanker used to transport this waste water off site will be capable of carrying $10m^3$
(6) Landfill leachate is transported off site using $23m^3$ tankers and collected on 5 days per week

When the baseline traffic counts were undertaken in early 2012, the traffic generated by the existing landfill was on the basis of a permitted waste acceptance of 360,000 tonnes of material per annum. Due to the interaction between the proposed MBT Facility and the existing landfill in Scenario 1, this Chapter has taken into consideration the HGV traffic associated with the existing landfill in addition to the proposed MBT Facility traffic. The net increase in HGV traffic due to the proposed MBT Facility during Scenario 1 will, therefore, be the volumes of HGV traffic presented in Tables 11.1 and 11.2 above, less the existing HGV traffic generated by the operation of the landfill.

As the existing landfill will have ceased to operate during Scenario 2, the net increase in HGV traffic for this scenario will be the volumes of traffic presented in Tables 11.1 and 11.2 above, less the existing HGV traffic generated by the operation of the landfill.

The volumes of HGV traffic generated by the existing landfill operating at a waste acceptance of 360,000 tonnes per annum are shown in Table 11.3 below.

Table 11-3 Estimated HGV Traffic Generated by the existing landfill operating at 360,000 tonnes per annum

Estimated HGV Traffic Generated by the existing Landfill Operating at 360,000 tonnes per Annum				
Facility	**Volume (tonnes per annum)**	**Total Trips per year[1]**	**Trips per day[2]**	**Trips per hour[3]**
Landfill	360,000	18,000	58	6
Landfill Leachate[5]	10,768	469	2	1
Total	370,768	18,469	60	7

Notes
(1) Bulk Haulage Vehicles - 20 tonne payloads assumed
(2) 312 working days assumed based on 52 weeks per year and 6 days per week
(3) 10 hour working day assumed
(4) Numbers of trips have been rounded up to nearest whole number. In the hourly figures presented, this may result in some overestimating of the number of vehicles
(5) Landfill leachate is transported off site using 23m^3 tankers and collected on 5 days per week

A summary of the increase in daily HGV traffic as a result of the proposed MBT Facility is shown in Table 11.4 below for both Scenario 1 and Scenario 2:

Table 11-4 Estimated Net Increase in Daily HGV Traffic Due to Proposed MBT Facility

Estimated Net Increase in Daily HGV Traffic Due to Proposed MBT Facility		
Facility	**Combined Daily Deliveries and Departures**	**Total Daily Increase[5] (HGV Movements)**
Scenario 1:		
Drehid MBT Facility[1]	60	120
Net Change in Landfill Operations[2]	(50)	(100)
Scenario 1 Total	10	20
Scenario 2:		
Drehid MBT Facility[3]	72	144
Net Change in Landfill Operations[4]	(60)	(120)
Scenario 2 Total	12	24

Notes

(1) Combined deliveries and departures for the proposed MBT during Scenario 1. Values taken from tables 11.1 and 11.2 (i.e. 40 deliveries + 20 departures daily)

(2) Net change in landfill HGV traffic resulting from interaction between the proposed MBT Facility and the existing landfill during Scenario 1. Values taken from tables 11.1, 11.2 and 11.3 (i.e. 8 deliveries + 2 departures – 60 (daily HGV traffic generated by the existing landfill operating at 360,000 tonnes per annum))

(3) Combined deliveries and departures for the proposed MBT in Scenario 2. Values taken from tables 11.1 and 11.2 (i.e. 40 deliveries + 32 departures daily)

(4) Net change in landfill HGV traffic resulting from cessation of landfill operations during Scenario 2. Values taken from tables 11.3 only as the existing landfill will have ceased to operate in Scenario 2 (daily HGV traffic will reduce by the HGV traffic generated by the existing landfill operating at 360,000 tonnes per annum)

(5) It is assumed that each delivery to and departure from the Bord na Móna Landholding will result in a corresponding empty vehicle departing or arriving at the site respectively. This is considered a worst case scenario.

The MBT is expected to employ a total of 74 operational staff. The mechanical treatment process at the Drehid MBT Facility will operate 6 days per week (Monday to Saturday inclusive) and for 16 hours per day (on a two shift basis). The SRF drying process and the biological treatment process will operate on a continuous basis (24 hours per day and 7 days per week) and will be fully automated. It is envisaged that there will be two operators required at the MBT Facility, between the hours of 02.00 and 08.00, to supervise the SRF drying process.

Staff numbers will be broken down per shift as follows:

- 40 staff in the day (includes 8 admin staff) (08.00 to 17.00)
- 32 staff in the evening (17.00 to 02.00)
- 2 staff during the night (02.00 to 08.00)

A summary of the hourly traffic (HGV and LGV) that will be arriving at and departing from the proposed MBT Facility upon commencement of operations of the MBT Facility is shown in Table 11.5 below for both Scenario 1 and Scenario 2. Due to the interaction of the proposed MBT Facility and the existing landfill during Scenario 1, the traffic associated with the landfill is included for this scenario.

Table 11-5 Estimated Increase in Hourly Traffic Generation Operational Phase

Estimated Increase in Hourly Traffic Generated by the Proposed MBT Facility Operational Phase				
	HGVs		Cars/LGVs	
Facility	Vehicles In	Vehicles Out	Vehicles In	Vehicles Out
Scenario 1:				
AM Peak:				
Drehid MBT Facility[6]	8	8	40	2
Net Change in Landfill Operations[4,5,7]	(5)	(5)	0	0
Sub - Total	3	3	40	2
PM Peak:				
Drehid MBT Facility[6]	8	8	32	40
Net Change in Landfill Operations[4,5,7]	(5)	(5)	0	0
Sub - Total	3	3	32	40
Scenario 2:				
AM Peak:				
Drehid MBT Facility[8]	10	10	40	2
Net Change in Landfill Operations[4,9,10]	(7)	(7)	(20)	(3)
Sub - Total	3	3	20	(1)
PM Peak:				
Drehid MBT Facility[8]	10	10	32	40
Net Change in Landfill Operations[4,9,10]	(7)	(7)	(1)	(20)
Sub - Total	3	3	31	20

Notes
(1) 10 hour working day assumed
(2) Numbers of trips have been rounded up to nearest whole number
(3) For the operational phase, as a worst case scenario, it is assumed that vehicles delivering waste to the proposed MBT facility will subsequently depart empty and vehicles departing with outputs will have previously arrived empty. This is considered a worst case scenario. As such, numbers taken from Tables 11.1 & 11.2 have been included in both incoming and outgoing figures
(4) Light vehicles associated with the existing landfill have been taken from traffic count data.
(5) Light vehicles volumes associated with the landfill will not change during Scenario 1
(6) Combined deliveries and departures for the proposed MBT during Scenario 1. Values taken from tables 11.1 and 11.2 (i.e. 4 deliveries + 4 departures hourly)

(7) Net change in traffic resulting from interaction between the proposed MBT and the existing landfill during Scenario 1 .Values taken from tables 11.1, 11.2 and 11.3 (i.e. 1 deliveries + 1 departures – 7 (hourly traffic generated by the existing landfill operating at 360,000 tonnes per annum))
(8) Combined deliveries and departures for the proposed MBT in Scenario 2. Values taken from tables 11.1 and 11.2 (i.e. 4 deliveries + 6 departures hourly)
(9) Net change in traffic resulting from cessation of landfill operations during Scenario 2. Values taken from tables 11.3 only as the existing landfill will have ceased to operate in Scenario 2 (i.e. hourly traffic will reduce by the traffic generated by the existing landfill operating at 360,000 tonnes per annum)
(10) As the existing landfill will cease to operate in Scenario 2, light vehicles volumes associated with the existing landfill will not be generated during Scenario 2

The primary source of construction HGV traffic for the MBT Facility will be generated in the first year of construction. This will predominantly be related to earthworks as areas of peat will have to be removed and subsequently replaced with suitable fill. The peat will be reused for landscaping within the site so the main HGV traffic impact will be due to the importing of granular fill material. This is estimated to be approximately 184,000 tonnes of material. Assuming that this material is imported over 1 year (i.e. 286 working days based on a 5.5 day working week over 52 weeks) and in 20 tonne truck loads, this will result in approximately 33 trucks arriving at the site per day. Allowing for 10% additional trucks for other building materials that may be imported over this period results in approximately 37 trucks arriving at the site daily. Trucks that arrive will subsequently depart so there will be a total of 74 HGV movements (i.e. 37 vehicles arriving and 37 vehicles departing) generated by the construction of the proposed MBT Facility.

In addition to the HGV movements generated, it is estimated that 175 construction site staff will be required. It is assumed these will arrive during the AM peak and depart during the PM peak. A summary of the volumes of traffic that will be generated by the construction phase of the proposed MBT Facility during the AM and PM peak hours is shown in Table 11.6 below.

Table 11-6 Estimated Hourly Traffic Generation Construction Phase

Estimated Hourly Traffic Generation - MBT Facility Construction Phase				
Facility	HGVs		Cars/LGVs	
	Vehicles In	Vehicles Out	Vehicles In	Vehicles Out
AM Peak:				
MBT Construction	4	4	175	0
Sub - Total	4	4	175	0
PM Peak:				
MBT Construction	4	4	0	175
Sub - Total	4	4	0	175

Notes
(1) 10 hour working day assumed
(2) Numbers of trips have been rounded up to nearest whole number

11.3.3 Seasonal Adjustment

In order to undertake an analysis of any road network, it may be necessary to apply a correction factor to convert the surveyed traffic flows (as described in Section 11.2) into seasonally adjusted traffic flows to take account of the seasonal variation that is experienced with traffic surveys. This seasonally adjusted conversion factor was calculated using data taken from a fixed automatic traffic counter located on a regional road, R148, at Clonard, Co. Meath over two 12-month periods in 2009 and 2010. It was found that traffic volumes in January are approximately 26% lower than average. This would be accounted for by the holiday period. When compared to the average, flows in February vary, being slightly higher in 2010 and approximately 10% lower in 2009. As the counts have been undertaken across the divide of both months the 10% lower than average value is considered to be appropriate. Therefore a seasonal adjustment factor of 1.1 has been applied to the surveyed traffic volumes.

11.3.4 Traffic Growth

In respect of the proposed MBT Facility, this traffic assessment assumes an opening year of 2015 and a design year of 2035 (opening year + 20 years). The background traffic growths used in the analysis in this Chapter are those provided in the NRA document, Project Appraisal Document – Unit 5.5 Link-Based Traffic Growth Forecasting (Published January 2011). The growth factors used are the low growth factors for region 3. Low growth rates were chosen to reflect the fact that traffic counts undertaken in 2008 indicate that traffic flows on these roads have not increased significantly in the period between then and 2012 when the more recent counts were undertaken. As traffic count data was obtained in differing years, several growth factors have been used. Factors applied are as follows:

- Cars: 1.065 growth factor from 2007 to 2014
  1.074 growth factor from 2007 to 2015
  1.205 growth factor from 2007 to 2028
  1.214 growth factor from 2007 to 2029
  1.273 growth factor from 2007 to 2035
  1.055 growth factor from 2008 to 2014
  1.064 growth factor from 2008 to 2015
  1.194 growth factor from 2008 to 2028
  1.214 growth factor from 2008 to 2029
  1.262 growth factor from 2008 to 2035
  1.036 growth factor from 2010 to 2014
  1.046 growth factor from 2010 to 2015
  1.173 growth factor from 2010 to 2028
  1.214 growth factor from 2010 to 2029
  1.240 growth factor from 2010 to 2035
  1.018 growth factor from 2008 to 2014
  1.027 growth factor from 2012 to 2015
  1.152 growth factor from 2012 to 2028
  1.161 growth factor from 2012 to 2029
  1.218 growth factor from 2012 to 2035

- HGVs: 1.036 growth factor from 2007 to 2014

1.041 growth factor from 2007 to 2015
1.103 growth factor from 2007 to 2028
1.214 growth factor from 2007 to 2029
1.109 growth factor from 2007 to 2035
1.030 growth factor from 2008 to 2014
1.036 growth factor from 2008 to 2015
1.096 growth factor from 2008 to 2028
1.097 growth factor from 2008 to 2029
1.104 growth factor from 2008 to 2035
1.020 growth factor from 2010 to 2014
1.025 growth factor from 2010 to 2015
1.085 growth factor from 2010 to 2028
1.086 growth factor from 2010 to 2029
1.093 growth factor from 2010 to 2035
1.010 growth factor from 2012 to 2014
1.015 growth factor from 2012 to 2015
1.074 growth factor from 2012 to 2028
1.076 growth factor from 2012 to 2029
1.082 growth factor from 2012 to 2035

11.3.5 Trip Distribution

In order to analyse the effect that the proposed MBT Facility will have on the surrounding road network, a number of different distribution scenarios were tested. These were used in order to observe the expected percentage increase in traffic on the R403 and surrounding road network.

The haul routes to be followed are presented in Figure No. 11.1 and it is proposed that traffic will be spread over these routes. The exact distribution pattern of traffic generated by the MBT Facility is not known so a series of stress tests have been applied to the haul routes using differing distribution patterns in an attempt to illustrate both the highly unlikely scenario, where all traffic travels to and from the development in the same direction, and the more likely scenarios where generated traffic is split in some proportion. The stress tests considered in this Report are as follows:

- Stress Test 1 – 100% north & 0% south
- Stress Test 2 – 67% north & 33% south
- Stress Test 3 – 50% north & 50% south
- Stress Test 4 – 33% north & 67% south
- Stress Test 5 – 0% north and 100% south

The results of the stress tests are presented in Tables 11.7 – 11.11. These tables show the percentage increases in both total traffic and HGV traffic for operational Scenario 1 (years 2015 and 2028 considered), operational Scenario 2 (2029 and 2035

considered) and the construction phase (2014 considered) for each road forming part of the proposed haul routes.

The percentage increases in total traffic along each road forming part of the haul routes are below 10% for all operational scenarios. The NRA Traffic and Transport Assessment Guidelines uses a 10% increase in traffic resulting from a development as a threshold for undertaking a capacity assessment of non-congested roads and a threshold of a 5% increase in traffic from a development in locations with the potential to become congested. The roads forming the haul routes are not considered to be congested and as the net percentage increase in traffic during the operational scenarios is significantly below the 10% threshold (with the maximum net percentage increase recorded as 4.51%), the impact vehicles associated with the MBT Facility will have in terms of traffic flows and potential congestion will be minor. The maximum percentage increases in total traffic along each road forming part of the haul routes are below 12% for the construction phase, the majority of which is made up of LGV traffic. This impact will be greater than that of the operational phase but this is only a temporary impact. It is worth noting that, in actuality, the percentage increase in total vehicles will be less than 12% on the basis that traffic arriving from or departing to the south will be dispersed over the R415, R409 and R407. All the stress tests, involving traffic arriving from or departing to the south, consider the highly unlikely scenario of all traffic travelling along the R415, R409 and R407.

Table 11.7 - Stress Test 1 - Percentage Traffic Increase (100% traffic travels to/from the north)

														Scenario 1						Scenario 2						Construction			
														Trip Generation		Net %Total Increase		Net %HGV Increase		Trip Generation		Net %Total Increase		Net %HGV Increase		Trip Generation		% Total Increase	%HGV Increase
Location	Counted AADT	Seasonally Adjusted AADT	%HGV	2014 AADT	2014 %HGV	2015 AADT	2015 %HGV	2028 AADT	2028 %HGV	2029 AADT	2029 %HGV	2035 AADT	2035 %HGV	Light Vehicles	Heavy Vehicles	2015	2028	2015	2028	Light Vehicles	Heavy Vehicles	2029	2035	2029	2035	Light Vehicles	Heavy Vehicles	2014	2014
M04-33	22616	22616	8.8	23357	8.69	23562	8.66	26155	8.25	26339	8.20	27509	8.11	148	20	0.71	0.64	0.98	0.93	103	24	0.48	0.46	1.11	1.08	350	74	1.82	3.65
M04-34	39367	39367	6.9	40685	6.74	41050	6.78	45668	6.45	45995	6.41	48085	6.33	148	20	0.41	0.37	0.72	0.68	103	24	0.28	0.26	0.81	0.79	350	74	1.04	2.70
ATC1	3354	3689	4.4	3752	4.37	3784	4.33	4223	4.12	4255	4.09	4455	3.97	148	20	4.44	3.98	12.21	11.50	103	24	2.98	2.85	13.79	13.57	350	74	11.30	45.13
ATC3	5017	5519	4.7	5614	4.67	5661	4.65	6316	4.40	6363	4.38	6660	4.28	148	20	2.97	2.66	7.60	7.20	103	24	2.00	1.91	8.61	8.42	350	74	7.55	28.23
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	148	20	3.40	3.07	4.75	4.48	103	24	2.30	2.20	5.37	5.26	350	74	8.66	17.66
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC4	4171	4588	7.6	4664	7.55	4702	7.53	5228	7.17	5266	7.14	5505	6.96	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC6	1539	3539	4	3600	3.97	3631	3.97	4054	3.77	4084	3.75	4276	3.65	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC7	3217	6860	5.1	6977	5.07	7036	5.05	7846	4.79	7904	4.77	8272	4.64	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC8	6236	3628	4.3	3690	4.28	3722	4.25	4154	4.04	4185	4.01	4382	3.90	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC9	3298	9120	2.9	9279	2.88	9359	2.86	10463	2.71	10543	2.69	11045	2.63	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC10	8291	13644	3.9	13880	3.87	13998	3.86	15631	3.65	15749	3.63	16491	3.54	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
KCC4	12404	6832	4.65	7190	4.56	7248	4.54	8090	4.31	8148	4.28	8527	4.26	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
KCC2	6832	6377	9.2	6752	9	6804	8.98	7552	8.57	7603	8.51	7933	8.55	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
M07-35	6377	58172	8.8	60078	8.69	60607	8.66	67275	8.26	67748	8.21	70757	8.11	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
M07-36	58172	54805	8.4	56609	8.3	57109	8.26	63422	7.88	63870	7.83	66720	7.73	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00

Notes:
Traffic counts ATC1, ATC3, ATC4, ATC6, ATC7, ATC8, ATC9 and ATC10 were carried out in Jan/Feb 2012
Traffic countsM04-33, M04-34, M07-35 and M07-36 are taken from the NRA National Roads and Traffic Flows, 2010
Traffic count KCC2 (undertaken in 2007) were sourced from Kildare Co. Co.
Traffic count KCC4 (undertaken in 2008) were sourced from Kildare Co. Co.

Table 11.8 - Stress Test 2 - Percentage Traffic Increase (67% traffic travels to/from the north, 33% traffic travels to/from the south)

														Scenario 1						Scenario 2						Construction			
														Trip Generation		Net %Total Increase		Net %HGV Increase		Trip Generation		Net %Total Increase		Net %HGV Increase		Trip Generation		%Total Increase	%HGV Increase
Location	Counted AADT	Seasonally Adjusted AADT	%HGV	2014 AADT	2014 %HGV	2015 AADT	2015 %HGV	2028 AADT	2028 %HGV	2029 AADT	2029 %HGV	2035 AADT	2035 %HGV	Light Vehicles	Heavy Vehicles	2015	2028	2015	2028	Light Vehicles	Heavy Vehicles	2029	2035	2029	2035	Light Vehicles	Heavy Vehicles	2014	2015
M04-33	22616	22616	8.8	23357	8.69	23562	8.66	26155	8.25	26339	8.20	27509	8.11	99	13	0.48	0.43	0.66	0.62	69	16	0.32	0.31	0.74	0.72	235	50	1.22	2.44
M04-34	39367	39367	6.9	40685	6.74	41050	6.78	45668	6.45	45995	6.41	48085	6.33	99	13	0.27	0.25	0.48	0.45	69	16	0.18	0.18	0.55	0.53	235	50	0.70	1.81
ATC1	3354	3689	4.4	3752	4.37	3784	4.33	4223	4.12	4255	4.09	4455	3.97	99	13	2.97	2.67	8.18	7.70	69	16	2.00	1.91	9.24	9.09	235	50	7.57	30.24
ATC3	5017	5519	4.7	5614	4.67	5661	4.65	6316	4.40	6363	4.38	6660	4.28	99	13	1.99	1.78	5.09	4.82	69	16	1.34	1.28	5.77	5.64	235	50	5.06	18.91
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	99	13	2.28	2.05	3.18	3.00	69	16	1.54	1.48	3.60	3.53	235	50	5.80	11.83
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	49	7	1.12	1.01	1.57	1.48	34	8	0.76	0.73	1.77	1.74	116	24	2.86	5.83
ATC4	4171	4588	7.6	4664	7.55	4702	7.53	5228	7.17	5266	7.14	5505	6.96	49	7	1.18	1.06	1.86	1.76	34	8	0.80	0.76	2.11	2.07	116	24	3.00	6.93
ATC6	1539	3539	4	3600	3.97	3631	3.97	4054	3.77	4084	3.75	4276	3.65	49	7	1.53	1.37	4.58	4.32	34	8	1.03	0.98	5.17	5.07	116	24	3.89	17.09
ATC7	3217	6860	5.1	6977	5.07	7036	5.05	7846	4.79	7904	4.77	8272	4.64	49	7	0.79	0.71	1.86	1.76	34	8	0.53	0.51	2.10	2.06	116	24	2.01	6.90
ATC8	6236	3628	4.3	3690	4.28	3722	4.25	4154	4.04	4185	4.01	4382	3.90	49	7	1.49	1.33	4.17	3.93	34	8	1.00	0.96	4.72	4.63	116	24	3.79	15.46
ATC9	3298	9120	2.9	9279	2.88	9359	2.86	10463	2.71	10543	2.69	11045	2.63	49	7	0.59	0.53	2.47	2.33	34	8	0.40	0.38	2.79	2.73	116	24	1.51	9.14
ATC10	8291	13644	3.9	13880	3.87	13998	3.86	15631	3.65	15749	3.63	16491	3.54	49	7	0.40	0.35	1.22	1.16	34	8	0.27	0.25	1.39	1.36	116	24	1.01	4.55
KCC4	12404	6832	4.65	7190	4.56	7248	4.54	8090	4.31	8148	4.28	8527	4.26	49	7	0.76	0.69	2.01	1.89	34	8	0.51	0.49	2.27	2.18	116	24	1.95	7.45
KCC2	6832	6377	9.2	6752	9	6804	8.98	7552	8.57	7603	8.51	7933	8.55	49	7	0.81	0.73	1.08	1.02	34	8	0.55	0.53	1.22	1.17	116	24	2.07	4.02
M07-35	6377	58172	8.8	60078	8.69	60607	8.66	67275	8.26	67748	8.21	70757	8.11	49	7	0.09	0.08	0.13	0.12	34	8	0.06	0.06	0.14	0.14	116	24	0.23	0.47
M07-36	58172	54805	8.4	56609	8.3	57109	8.26	63422	7.88	63870	7.83	66720	7.73	49	7	0.10	0.09	0.14	0.13	34	8	0.07	0.06	0.16	0.15	116	24	0.25	0.52

Notes:
Traffic counts ATC1, ATC3, ATC4, ATC6, ATC7, ATC8, ATC9 and ATC10 were carried out in Jan/Feb 2012
Traffic countsM04-33, M04-34, M07-35 and M07-36 are taken from the NRA National Roads and Traffic Flows, 2010
Traffic count KCC2 (undertaken in 2007) were sourced from Kildare Co. Co.
Traffic count KCC4 (undertaken in 2008) were sourced from Kildare Co. Co.

Table 11.9 - Stress Test 3 - Percentage Traffic Increase (50% traffic travels to/from the north, 50% traffic travels to/from the south)

														Scenario 1						Scenario 2						Construction			
														Trip Generation		Net %Total Increase		Net %HGV Increase		Trip Generation		Net %Total Increase		Net %HGV Increase		Trip Generation		%Total Increase	%HGV Increase
Location	Counted AADT	Seasonally Adjusted AADT	%HGV	2014 AADT	2014 %HGV	2015 AADT	2015 %HGV	2028 AADT	2028 %HGV	2029 AADT	2029 %HGV	2035 AADT	2035 %HGV	Light Vehicles	Heavy Vehicles	2015	2028	2015	2028	Light Vehicles	Heavy Vehicles	2029	2035	2029	2035	Light Vehicles	Heavy Vehicles	2014	2014
M04-33	22616	22616	8.8	23357	8.69	23562	8.66	26155	8.25	26339	8.20	27509	8.11	74	10	0.36	0.32	0.49	0.46	52	12	0.24	0.23	0.56	0.54	175	37	0.91	1.82
M04-34	39367	39367	6.9	40685	6.74	41050	6.78	45668	6.45	45995	6.41	48085	6.33	74	10	0.20	0.18	0.36	0.34	52	12	0.14	0.13	0.41	0.39	175	37	0.52	1.35
ATC1	3354	3689	4.4	3752	4.37	3784	4.33	4223	4.12	4255	4.09	4455	3.97	74	10	2.22	1.99	6.10	5.75	52	12	1.49	1.43	6.90	6.78	175	37	5.65	22.57
ATC3	5017	5519	4.7	5614	4.67	5661	4.65	6316	4.40	6363	4.38	6660	4.28	74	10	1.48	1.33	3.80	3.60	52	12	1.00	0.95	4.31	4.21	175	37	3.78	14.11
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	74	10	1.70	1.53	2.38	2.24	52	12	1.15	1.10	2.68	2.63	175	37	4.33	8.83
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	74	10	1.70	1.53	2.38	2.24	52	12	1.15	1.10	2.68	2.63	175	37	4.33	8.83
ATC4	4171	4588	7.6	4664	7.55	4702	7.53	5228	7.17	5266	7.14	5505	6.96	74	10	1.79	1.61	2.82	2.67	52	12	1.21	1.15	3.19	3.13	175	37	4.55	10.51
ATC6	1539	3539	4	3600	3.97	3631	3.97	4054	3.77	4084	3.75	4276	3.65	74	10	2.31	2.07	6.94	6.54	52	12	1.55	1.49	7.84	7.69	175	37	5.89	25.89
ATC7	3217	6860	5.1	6977	5.07	7036	5.05	7846	4.79	7904	4.77	8272	4.64	74	10	1.19	1.07	2.81	2.66	52	12	0.80	0.77	3.18	3.13	175	37	3.04	10.46
ATC8	6236	3628	4.3	3690	4.28	3722	4.25	4154	4.04	4185	4.01	4382	3.90	74	10	2.26	2.02	6.32	5.96	52	12	1.52	1.45	7.15	7.02	175	37	5.75	23.43
ATC9	3298	9120	2.9	9279	2.88	9359	2.86	10463	2.71	10543	2.69	11045	2.63	74	10	0.90	0.80	3.74	3.53	52	12	0.60	0.57	4.23	4.13	175	37	2.28	13.85
ATC10	8291	13644	3.9	13880	3.87	13998	3.86	15631	3.65	15749	3.63	16491	3.54	74	10	0.60	0.54	1.85	1.75	52	12	0.40	0.39	2.10	2.06	175	37	1.53	6.89
KCC4	12404	6832	4.65	7190	4.56	7248	4.54	8090	4.31	8148	4.28	8527	4.26	74	10	1.16	1.04	3.04	2.87	52	12	0.78	0.74	3.44	3.30	175	37	2.95	11.29
KCC2	6832	6377	9.2	6752	9	6804	8.98	7552	8.57	7603	8.51	7933	8.55	74	10	1.23	1.11	1.64	1.55	52	12	0.84	0.80	1.85	1.77	175	37	3.14	6.09
M07-35	6377	58172	8.8	60078	8.69	60607	8.66	67275	8.26	67748	8.21	70757	8.11	74	10	0.14	0.12	0.19	0.18	52	12	0.09	0.09	0.22	0.21	175	37	0.35	0.71
M07-36	58172	54805	8.4	56609	8.3	57109	8.26	63422	7.88	63870	7.83	66720	7.73	74	10	0.15	0.13	0.21	0.20	52	12	0.10	0.10	0.24	0.23	175	37	0.37	0.79

Notes:
Traffic counts ATC1, ATC3, ATC4, ATC6, ATC7, ATC8, ATC9 and ATC10 were carried out in Jan/Feb 2012
Traffic countsM04-33, M04-34, M07-35 and M07-36 are taken from the NRA National Roads and Traffic Flows, 2010
Traffic count KCC2 (undertaken in 2007) were sourced from Kildare Co. Co.
Traffic count KCC4 (undertaken in 2008) were sourced from Kildare Co. Co.

Table 11.10 - Stress Test 4 - Percentage Traffic Increase (33% traffic travels to/from the north, 67% traffic travels to/from the south)

														Scenario 1						Scenario 2						Construction			
														Trip Generation		Net %Total Increase		Net %HGV Increase		Trip Generation		Net %Total Increase		Net %HGV Increase		Trip Generation		%Total Increase	%HGV Increase
Location	Counted AADT	Seasonally Adjusted AADT	%HGV	2014 AADT	2014 %HGV	2015 AADT	2015 %HGV	2028 AADT	2028 %HGV	2029 AADT	2029 %HGV	2035 AADT	2035 %HGV	Light Vehicles	Heavy Vehicles	2015	2028	2015	2028	Light Vehicles	Heavy Vehicles	2029	2035	2029	2035	Light Vehicles	Heavy Vehicles	2015	2015
M04-33	22616	22616	8.8	23357	8.69	23562	8.66	26155	8.25	26339	8.20	27509	8.11	49	7	0.24	0.21	0.32	0.31	34	8	0.16	0.15	0.37	0.36	116	24	0.60	1.20
M04-34	39367	39367	6.9	40685	6.74	41050	6.78	45668	6.45	45995	6.41	48085	6.33	49	7	0.14	0.12	0.24	0.22	34	8	0.09	0.09	0.27	0.26	116	24	0.34	0.89
ATC1	3354	3689	4.4	3752	4.37	3784	4.33	4223	4.12	4255	4.09	4455	3.97	49	7	1.47	1.31	4.03	3.79	34	8	0.98	0.94	4.55	4.48	116	24	3.73	14.89
ATC3	5017	5519	4.7	5614	4.67	5661	4.65	6316	4.40	6363	4.38	6660	4.28	49	7	0.98	0.88	2.51	2.37	34	8	0.66	0.63	2.84	2.78	116	24	2.49	9.31
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	49	7	1.12	1.01	1.57	1.48	34	8	0.76	0.73	1.77	1.74	116	24	2.86	5.83
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	99	13	2.28	2.05	3.18	3.00	69	16	1.54	1.48	3.60	3.53	235	50	5.80	11.83
ATC4	4171	4588	7.6	4664	7.55	4702	7.53	5228	7.17	5266	7.14	5505	6.96	99	13	2.39	2.15	3.78	3.57	69	16	1.62	1.55	4.28	4.20	235	50	6.09	14.08
ATC6	1539	3539	4	3600	3.97	3631	3.97	4054	3.77	4084	3.75	4276	3.65	99	13	3.10	2.78	9.30	8.77	69	16	2.08	1.99	10.50	10.30	235	50	7.89	34.69
ATC7	3217	6860	5.1	6977	5.07	7036	5.05	7846	4.79	7904	4.77	8272	4.64	99	13	1.60	1.43	3.77	3.57	69	16	1.08	1.03	4.27	4.19	235	50	4.07	14.02
ATC8	6236	3628	4.3	3690	4.28	3722	4.25	4154	4.04	4185	4.01	4382	3.90	99	13	3.02	2.71	8.47	7.98	69	16	2.03	1.94	9.58	9.41	235	50	7.70	31.39
ATC9	3298	9120	2.9	9279	2.88	9359	2.86	10463	2.71	10543	2.69	11045	2.63	99	13	1.20	1.08	5.01	4.73	69	16	0.81	0.77	5.67	5.54	235	50	3.06	18.55
ATC10	8291	13644	3.9	13880	3.87	13998	3.86	15631	3.65	15749	3.63	16491	3.54	99	13	0.80	0.72	2.48	2.35	69	16	0.54	0.52	2.81	2.75	235	50	2.05	9.23
KCC4	12404	6832	4.65	7190	4.56	7248	4.54	8090	4.31	8148	4.28	8527	4.26	99	13	1.55	1.39	4.07	3.84	69	16	1.04	1.00	4.61	4.43	235	50	3.95	15.12
KCC2	6832	6377	9.2	6752	9	6804	8.98	7552	8.57	7603	8.51	7933	8.55	99	13	1.65	1.49	2.19	2.07	69	16	1.12	1.07	2.49	2.37	235	50	4.21	8.16
M07-35	6377	58172	8.8	60078	8.69	60607	8.66	67275	8.26	67748	8.21	70757	8.11	99	13	0.19	0.17	0.26	0.24	69	16	0.13	0.12	0.29	0.28	235	50	0.47	0.95
M07-36	58172	54805	8.4	56609	8.3	57109	8.26	63422	7.88	63870	7.83	66720	7.73	99	13	0.20	0.18	0.28	0.27	69	16	0.13	0.13	0.32	0.31	235	50	0.50	1.06

Notes:
Traffic counts ATC1, ATC3, ATC4, ATC6, ATC7, ATC8, ATC9 and ATC10 were carried out in Jan/Feb 2012
Traffic countsM04-33, M04-34, M07-35 and M07-36 are taken from the NRA National Roads and Traffic Flows, 2010
Traffic count KCC2 (undertaken in 2007) were sourced from Kildare Co. Co.
Traffic count KCC4 (undertaken in 2008) were sourced from Kildare Co. Co.

Table 11.11 - Stress Test 5 - Percentage Traffic Increase (100% traffic travels to/from the south)

														Scenario 1						Scenario 2						Construction			
														Trip Generation		Net %Total Increase		Net %HGV Increase		Trip Generation		Net %Total Increase		Net %HGV Increase		Trip Generation		%Total Increase	%HGV Increase
Location	Counted AADT	Seasonally Adjusted AADT	%HGV	2014 AADT	2014 %HGV	2015 AADT	2015 %HGV	2028 AADT	2028 %HGV	2029 AADT	2029 %HGV	2035 AADT	2035 %HGV	Light Vehicles	Heavy Vehicles	2015	2028	2015	2028	Light Vehicles	Heavy Vehicles	2029	2035	2029	2035	Light Vehicles	Heavy Vehicles	2014	2014
M04-33	22616	22616	8.8	23357	8.69	23562	8.66	26155	8.25	26339	8.20	27509	8.11	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
M04-34	39367	39367	6.9	40685	6.74	41050	6.78	45668	6.45	45995	6.41	48085	6.33	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC1	3354	3689	4.4	3752	4.37	3784	4.33	4223	4.12	4255	4.09	4455	3.97	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
ATC3	5017	5519	4.7	5614	4.67	5661	4.65	6316	4.40	6363	4.38	6660	4.28	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
Site Entrance	4378	4816	9.5	4895	8.56	4935	8.53	5480	8.14	5519	8.10	5766	7.91	148	20	3.40	3.07	4.75	4.48	103	24	2.30	2.20	5.37	5.26	350	74	8.66	17.66
ATC4	4171	4588	7.6	4664	7.55	4702	7.53	5228	7.17	5266	7.14	5505	6.96	148	20	3.57	3.21	5.65	5.34	103	24	2.41	2.31	6.38	6.26	350	74	9.09	21.01
ATC6	1539	3539	4	3600	3.97	3631	3.97	4054	3.77	4084	3.75	4276	3.65	148	20	4.63	4.14	13.87	13.09	103	24	3.11	2.97	15.67	15.38	350	74	11.78	51.78
ATC7	3217	6860	5.1	6977	5.07	7036	5.05	7846	4.79	7904	4.77	8272	4.64	148	20	2.39	2.14	5.63	5.32	103	24	1.61	1.54	6.37	6.25	350	74	6.08	20.92
ATC8	6236	3628	4.3	3690	4.28	3722	4.25	4154	4.04	4185	4.01	4382	3.90	148	20	4.51	4.04	12.64	11.92	103	24	3.03	2.90	14.30	14.04	350	74	11.49	46.86
ATC9	3298	9120	2.9	9279	2.88	9359	2.86	10463	2.71	10543	2.69	11045	2.63	148	20	1.80	1.61	7.47	7.05	103	24	1.20	1.15	8.46	8.26	350	74	4.57	27.69
ATC10	8291	13644	3.9	13880	3.87	13998	3.86	15631	3.65	15749	3.63	16491	3.54	148	20	1.20	1.07	3.70	3.51	103	24	0.81	0.77	4.20	4.11	350	74	3.05	13.78
KCC4	12404	6832	4.65	7190	4.56	7248	4.54	8090	4.31	8148	4.28	8527	4.26	148	20	2.32	2.08	6.08	5.74	103	24	1.56	1.49	6.88	6.61	350	74	5.90	22.57
KCC2	6832	6377	9.2	6752	9	6804	8.98	7552	8.57	7603	8.51	7933	8.55	148	20	2.47	2.22	3.27	3.09	103	24	1.67	1.60	3.71	3.54	350	74	6.28	12.18
M07-35	6377	58172	8.8	60078	8.69	60607	8.66	67275	8.26	67748	8.21	70757	8.11	148	20	0.28	0.25	0.38	0.36	103	24	0.19	0.18	0.43	0.42	350	74	0.71	1.42
M07-36	58172	54805	8.4	56609	8.3	57109	8.26	63422	7.88	63870	7.83	66720	7.73	148	20	0.29	0.26	0.42	0.40	103	24	0.20	0.19	0.48	0.47	350	74	0.75	1.57

Notes:
Traffic counts ATC1, ATC3, ATC4, ATC6, ATC7, ATC8, ATC9 and ATC10 were carried out in Jan/Feb 2012
Traffic countsM04-33, M04-34, M07-35 and M07-36 are taken from the NRA National Roads and Traffic Flows, 2010
Traffic count KCC2 (undertaken in 2007) were sourced from Kildare Co. Co.
Traffic count KCC4 (undertaken in 2008) were sourced from Kildare Co. Co.

11.3.6 Junction Analysis

As described in Section 11.1, the analysis of the existing site entrance has been carried out using PICADY. The key parameters examined in the results of the analysis are the Ratio of Flow to Capacity Value (RFC value – desirable value should be no greater than 0.85 for junctions assessed using PICADY, values over 1.00 indicate the approach arm is over capacity), the maximum queue length on any approach to the junction and the average delay for each vehicle passing through the junction during the modelled period.

PICADY requires the following input data:

- Basic modelling parameters (usually peak hour traffic counts synthesised over a 90 minute model period)
- Geometric parameters (including lane numbers & widths, visibility, storage provision etc)
- Traffic demand data (usually peak hour origin/destination table with composition of heavy goods vehicles input).

Junction analysis of the site entrance has been carried out for the critical AM and PM peak hours (the hours of peak flow experienced at the site entrance junction during the baseline traffic survey at the junction) which were identified as 07:45 to 08:45 in the AM and 16:45 to 17:45 in the PM. The analysis has been undertaken for the opening year and design year for each scenario considered in the operational phase. Junction analysis of the site entrance has also been carried out for the AM and PM peaks for 2014 with the addition of the MBT Facility construction phase traffic.

The analysis results for the existing site access junction on the R403 for the AM and PM peak hours during the operational phase Traffic Scenario 1 are summarised below in Table 11.12. The origin/destination traffic demand tables for all the different distribution scenarios tested for the analysed junction are provided in Appendix 11.2. Full outputs are provided in Appendix 11.3.

Table 11-12 Analysis Results: Existing Site Entrance AM & PM Peak Hours operational Phase Traffic Scenario 1

ANALYSIS RESULTS: Existing Site Entrance AM & PM Peak Hours Operational Phase Traffic Scenario 1							
Year & Time	Arm A – R403 North (unrestricted)		Arm B – Existing Access Junction		Arm C - R403 South		Delay
	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	
Stress Test 1 2015 AM	-	-	0.056	0.06	0.066	0.07	0.01
Stress Test 1 2015 PM	-	-	0.125	0.14	0.006	0.01	0.01
Stress Test 1 2028 AM	-	-	0.063	0.07	0.076	0.08	0.01
Stress Test 1 2028 PM	-	-	0.134	0.15	0.006	0.01	0.01
Stress Test 2 2015 AM	-	-	0.055	0.06	0.090	0.10	0.02
Stress Test 2 2015 PM	-	-	0.120	0.14	0.026	0.03	0.02
Stress Test 2 2028 AM	-	-	0.062	0.07	0.100	0.11	0.02
Stress Test 2 2028 PM	-	-	0.129	0.15	0.026	0.03	0.02
Stress Test 3 2015 AM	-	-	0.055	0.06	0.101	0.11	0.02
Stress Test 3 2015 PM	-	-	0.117	0.13	0.034	0.03	0.02

ANALYSIS RESULTS: Existing Site Entrance AM & PM Peak Hours Operational Phase Traffic Scenario 1							
Year & Time	Arm A – R403 North (unrestricted)		Arm B – Existing Access Junction		Arm C - R403 South		Delay
	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	
Stress Test 3 2028 AM	-	-	0.062	0.07	0.111	0.12	0.02
Stress Test 3 2028 PM	-	-	0.126	0.14	0.034	0.04	0.02
Stress Test 4 2015 AM	-	-	0.054	0.06	0.116	0.13	0.02
Stress Test 4 2015 PM	-	-	0.114	0.13	0.044	0.05	0.02
Stress Test 4 2028 AM	-	-	0.061	0.06	0.126	0.14	0.02
Stress Test 4 2028 PM	-	-	0.122	0.14	0.045	0.05	0.02
Stress Test 5 2015 AM	-	-	0.052	0.06	0.139	0.16	0.02
Stress Test 5 2015 PM	-	-	0.109	0.12	0.064	0.07	0.02
Stress Test 5 2028 AM	-	-	0.060	0.06	0.150	0.18	0.02
Stress Test 5 2028 PM	-	-	0.116	0.13	0.065	0.07	0.02

The above results indicate that the existing site access junction will operate below the desired 0.85 RFC for all years of operation with the inclusion of development-generated traffic expected for Scenario 1. The maximum queue expected at the site access junction is less than 1 vehicle. There is a ghost island with right turning lane junction at the existing site access junction which will be able to accommodate any vehicles queuing on the R403 when arriving from the South.

The analysis results for the existing site access junction on the R403 for the AM and PM peak hours during the operational phase Traffic Scenario 2 are summarised below in Table 11.13. The origin/destination traffic demand tables for all the different scenarios tested for the analysed junction are provided in Appendix 11.2. Full outputs are provided in Appendix 11.3.

Table 11-13 Analysis Results: Existing Site Entrance AM & PM Peak Hours operational Phase Traffic Scenario 2

ANALYSIS RESULTS: Existing Site Entrance AM & PM Peak Hours Operational Phase Traffic Scenario 2							
Year & Time	Arm A – R403 North (unrestricted)		Arm B – Existing Access Junction		Arm C - R403 South		Delay
	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	
Stress Test 1 2029 AM	-	-	0.057	0.06	0.075	0.08	0.01
Stress Test 1 2029 PM	-	-	0.098	0.11	0.006	0.01	0.01
Stress Test 1 2035 AM	-	-	0.058	0.06	0.077	0.08	0.02
Stress Test 1 2035 PM	-	-	0.100	0.11	0.006	0.01	0.01
Stress Test 2 2029 AM	-	-	0.056	0.06	0.090	0.10	0.02
Stress Test 2 2029 PM	-	-	0.095	0.10	0.025	0.03	0.01
Stress Test 2 2035 AM	-	-	0.057	0.06	0.092	0.10	0.02
Stress Test 2 2035 PM	-	-	0.097	0.11	0.025	0.03	0.01
Stress Test 3 2029 AM	-	-	0.056	0.06	0.094	0.10	0.02
Stress Test 3 2029 PM	-	-	0.093	0.10	0.033	0.03	0.01

ANALYSIS RESULTS: Existing Site Entrance AM & PM Peak Hours Operational Phase Traffic Scenario 2							
Year & Time	Arm A – R403 North (unrestricted)		Arm B – Existing Access Junction		Arm C - R403 South		Delay
	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	
Stress Test 3 2035 AM	-	-	0.057	0.06	0.097	0.11	0.02
Stress Test 3 2035 PM	-	-	0.096	0.11	0.033	0.03	0.01
Stress Test 4 2029 AM	-	-	0.056	0.06	0.102	0.11	0.02
Stress Test 4 2029 PM	-	-	0.092	0.10	0.045	0.05	0.01
Stress Test 4 2035 AM	-	-	0.056	0.06	0.105	0.12	0.02
Stress Test 4 2035 PM	-	-	0.094	0.10	0.045	0.05	0.01
Stress Test 5 2029 AM	-	-	0.055	0.06	0.117	0.13	0.02
Stress Test 5 2029 PM	-	-	0.088	0.10	0.063	0.07	0.01
Stress Test 5 2035 AM	-	-	0.055	0.06	0.119	0.13	0.02
Stress Test 5 2035 PM	-	-	0.090	0.10	0.063	0.07	0.01

The above results indicate that the existing site access junction will operate below the desired 0.85 RFC for all years of operation with the inclusion of development-generated traffic expected for Scenario 2. The maximum queue expected at the site access junction is less than 1 vehicle. There is a ghost island with right turning lane junction at the existing site access junction which will be able to accommodate any vehicles queuing on the R403 when arriving from the South.

The analysis results for the existing site access junction on the R403 for the AM and PM peak hours during the construction phase of the proposed MBT Facility are summarised below in Table 11.14. The origin/destination traffic demand tables for all the different scenarios tested for the analysed junctions are provided in Appendix 11.2. Full outputs are provided in Appendix 11.3.

Table 11-14 Analysis Results: Existing Access Junction AM & PM Peak Hours Existing Traffic and MBT Construction Phase

ANALYSIS RESULTS: Existing Access AM & PM Peak Hours Existing Traffic and MBT Construction Traffic							
Year & Time	Arm A – R403 North (unrestricted)		Arm B – Existing Access Junction		Arm C - R403 South		Delay
	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	RFC Value	Max Queue Length (vehicles)	
Stress Test 1 2014 AM	-	-	0.057	0.06	0.071	0.08	0.01
Stress Test 1 2014 PM	-	-	0.363	0.57	0.006	0.01	0.04
Stress Test 2 2014 AM	-	-	0.057	0.06	0.172	0.21	0.02
Stress Test 2 2014 PM	-	-	0.342	0.52	0.009	0.01	0.04
Stress Test 3 2014 AM	-	-	0.056	0.06	0.222	0.28	0.03
Stress Test 3 2014 PM	-	-	0.331	0.49	0.012	0.01	0.04
Stress Test 4 2014 AM	-	-	0.055	0.0.6	0.271	0.37	0.03
Stress Test 4 2014 PM	-	-	0.319	0.47	0.015	0.02	0.04
Stress Test 5 2014 AM	-	-	0.053	0.06	0.360	0.56	0.05
Stress Test 5 2014 PM	-	-	0.297	0.42	0.018	0.02	0.03

The above results indicate that the existing site access junction will operate below the desired 0.85 RFC during the construction phase. The maximum queue expected at the site access junction is less than 1 vehicle. There is a ghost island with right turning lane junction at the existing site access junction which will be able to accommodate any vehicles queuing on the R403 when arriving from the South.

11.3.7 Link Capacity

A link capacity assessment was undertaken with reference to the UK DMRB TA 46/97. Using this document, the two way hourly capacities of the regional roads identified as haul routes were calculated.

In order to undertake an investigation into link capacity of the haul routes, it was necessary first to convert the raw traffic survey data, which consisted of cars and heavy vehicles, into a common index known as passenger car units (PCU's). This was undertaken by applying a factor to all surveyed traffic movements to take account of the composition of the different types of vehicle. This factoring calculation assumes 1 car / light vehicle = 1 PCU, 1 heavy vehicle = 2.3 PCU's and 1 bus = 2 PCU's.

The link capacities were calculated for 2035. Due to the growth of background traffic, and the higher volumes of traffic generated by operational Scenario 2, 2035 represents the year that will experience maximum traffic flows. These tables also assume that 100% of trips relating to the operations of the proposed MBT Facility travel along each road considered. This is a worst case scenario as, in actuality, these trips would distribute across the network. The link capacities are outlined below in Table 11.15

Table 11-15 Link Capacity of Regional Road Network 2035

Link Capacity 2035			
Regional Road Number	Available Capacity (pcu/hr)	Max Peak Hour Flow (pcu/hr)	Spare Capacity
R402	1790	757	58%
R403	1616	1049	35%
R407	1873	1438	23%
R409	1074	533	50%
R415	1482	464	69%

As can be seen from the table above, the regional roads in the vicinity of the proposed development will operate within capacity in 2035, the year considered that will experience the maximum traffic flows.

11.3.8 Road Safety

The speed limit on the R403 at the site entrance junction is 80 km/h. The entrance is a ghost island junction constructed to the standards set out in NRA DMRB TD41/95 which was the

current standard when it was being constructed. NRA DMRB TD41/95 has now been superseded by NRA DMRB TD41-42 which sets out a requirement for visibility splays of 3.0 x 160 metres. This is a less onerous standard than the previous standard and as such the existing junction remains fully compliant.

A ghost island junction has been provided at the existing site entrance with a right turning lane. The through lanes on either side are 3.0m wide and the right turning lane is 3.0m wide. The length of the ghost island junction for the Drehid Waste Management Facility provides adequate deceleration length and turning length for a design speed of 85 kph in accordance with DMRB TD 42/95. Queuing length of 5m is also provided. As indicated in tables 11.10 to 11.12, the maximum queue length at this junction is predicted to be below 1 vehicle meaning queuing will not be an issue.

There will be some adverse impact on the pavements of the regional roads to the extent that any weak sections of the existing pavement will be subject to increased loading and may require strengthening. This will arise from the net increase in HGVs, as pavement deterioration is linked to axle loading.

In some of the more extreme stress tests considered in Section 11.3.5, some sections of the haul routes during the operational scenarios would experience a net percentage increase in HGV traffic of approximately 16% compared to predicted background HGV traffic volumes. In actuality it is more likely that one of the more balanced distributions will prevail and would result in a maximum net percentage increase in HGVs during the operational scenarios of approximately 10.5% compared to predicted background HGV traffic volumes. It is again worth noting that, in actuality, the percentage increase in HGVs will be less than 10.5% on the basis that traffic arriving from or departing to the south will be dispersed over the R415, R409 and R407. All the stress tests, involving traffic arriving from or departing to the south, consider the highly unlikely scenario of all traffic travelling along the R415, R409 and R407.

Compared with predicted background HGV traffic flows on the haul routes, the net increase resulting from the MBT Facility may have a minimal impact on the pavement condition of the haul routes.

During a site visit, it was found that, for the most part the pavements of the haul routes appear to be in good condition. Some localised pavement deterioration was noted however, but the scale of this is such that it can be dealt with by the Roads Authority under normal road maintenance programs.

A 7.5m access road has been provided with junction radii of 20m off the R403 to the development. A recessed gate has been provided at a setback of 80m from the existing entrance. The access road narrows to 6m wide on the approach to the facility. This is adequate width to allow two HGVs to pass one another with a clearance of 1.0m.

Warning signs and advance direction signs indicating the presence of the entrance to the Bord na Móna landholding and road markings are provided in the vicinity of the site entrance junction.

As part of the construction of the initial stage of the permitted Drehid Waste Management Facility, a road safety audit has been carried out in accordance with the relevant sections of the National Roads Authority standard (HD 19/04 and HA42/04) on the constructed site

entrance. The road safety audit was subsequently submitted to Kildare County Council who approved the existing site entrance.

11.3.9 Pedestrians and Cyclists

Due to the location and nature of the development, pedestrians and cyclists are not expected to be frequent users of the facility and as such no provision has been made to accommodate either.

11.3.10 Car Parking

Car parking at the MBT is provided for 101 cars, 2 delivery vans and 2 coaches adjacent to the Administration and Welfare Building. Specific guidelines for car parking at facilities such as the proposed MBT Facility are not set out in the Kildare County Council Development Plan, but considering the number of employees, the volume of parking provided is sufficient to provide adequate parking for both staff and visitors.

In addition to car parking spaces, there are 18 spaces provided for HGV parking. This is considered sufficient to cater for the number of large vehicles that will be accessing the facility at any given time.

11.3.11 Public Transport

There is no regular public transport service in operation in the immediate vicinity of the Facility; however there are public bus services that run from Allenwood to Dublin, Edenderry and Birr. Allenwood is located approximately 3.5 km from the MBT Facility. It is not expected that the number of users of this bus service will be increased by the development.

11.4 MITIGATION MEASURES

As the potential traffic impacts for both Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting) are almost equivalent, the mitigation measures for Configuration A and Configuration B will be the same. The following are measures that will be implemented to mitigate the impact associated with the development:

- Photographic survey of haul roads prior to commencement of construction;
- Continuous monitoring of haul roads throughout both the construction and operational phase;
- All contractors, delivering waste to the facility and removing outputs from the facility, and all construction contractors will be issued with a map of the permitted haul routes such that all materials imported into the site and exported out of the site are transported via one of the identified haul routes. A penalty system will be operated by Bord na Móna to ensure haulage operators comply with these requirements;
- Wheel wash facilities at the MBT Facility during both the construction and operational phase;
- Maintenance of warning signage on the approach to the entrance;

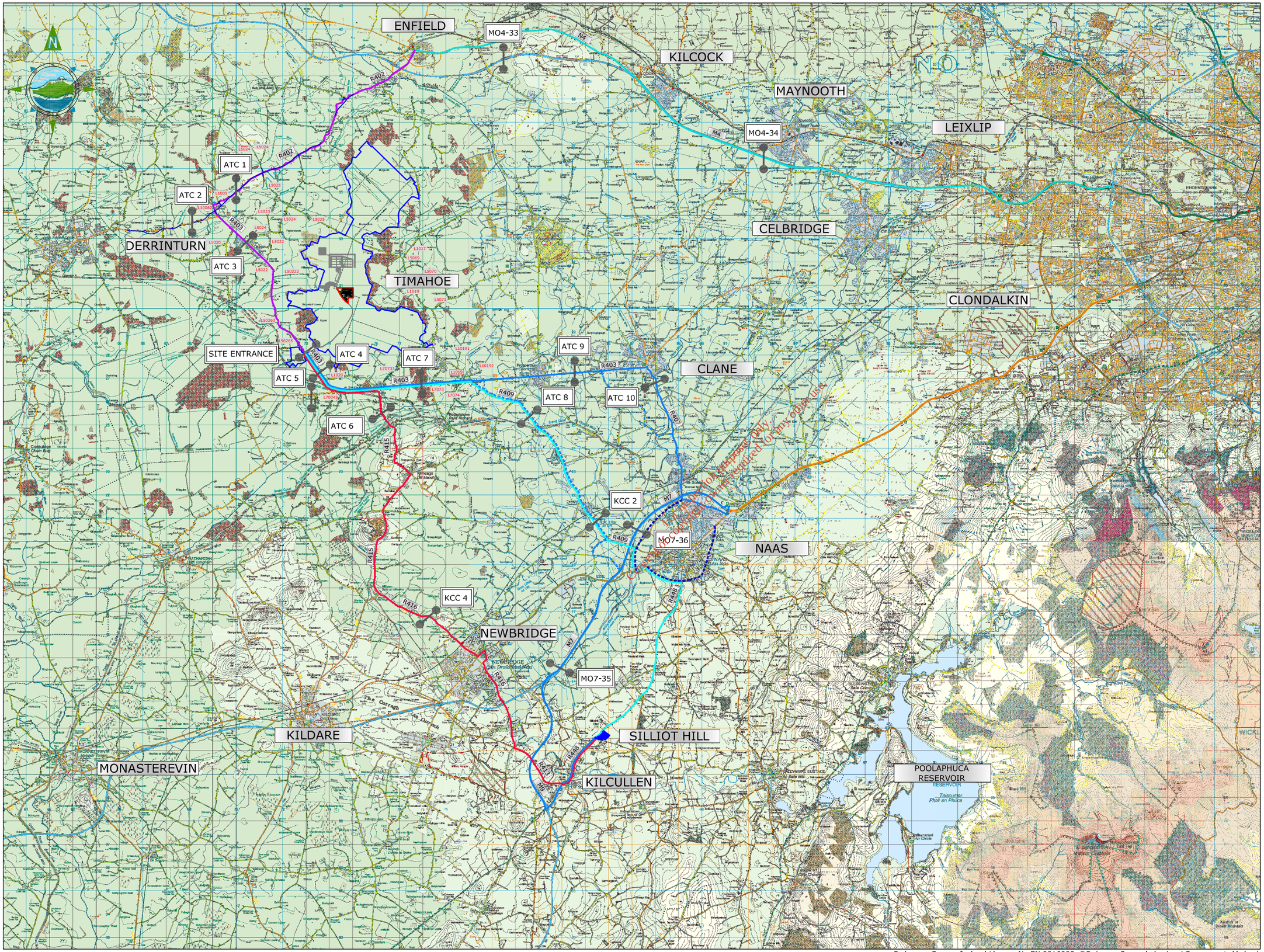
- Monitoring of car parking requirements during the operational phase with additional spaces to be provided if required;
- Maintenance of site entrance ensuring visibility splays remain intact; and,
- Monitoring of haul routes for problems such as congestion and refining the routes where required.

11.5 CONCLUSION

The conclusions of this assessment are as follows:

- The volumes of traffic that will be generated by the proposed Drehid MBT Facility will have no significant impact on traffic flows on the haul routes with reference to the terms outlined in the NRA "Traffic and Transport Assessment Guidelines";
- Stress tests carried out at junctions on the R403 and adjoining road network indicate that the proposed MBT Facility will generate a maximum additional 4.5% traffic on the proposed Haul Routes during the operational scenarios, even in the most unlikely event that all the traffic comes from either the south or north;
- The impact of development traffic on the haulage road network both in terms of link and junction capacity will be slight with reference to the terms outlined in the NRA "Traffic and Transport Assessment Guidelines";
- All contractors, delivering waste to the facility and removing outputs from the facility, and all construction contractors will be issued with a map of the permitted haul routes such that all materials imported into the site and exported out of the site are transported via one of the identified haul routes. A penalty system will be operated by Bord na Móna to ensure haulage operators comply with these requirements;
- The maximum percentage increases in total traffic along each road forming part of the haul routes are below 12% for the construction phase, the majority of which is made up of LGV traffic. While this impact will be greater than that of the operational phase it is only a temporary impact;
- For the purpose of robustness, the traffic analysis for both the operational and construction phases assumes that all of the generated traffic is confined to each of the haul routes running from the M7 to the facility. In reality, the dispersion of the facility generated traffic between the route options (from M7 to the facility) will also proportionally reduce the traffic loading on any one route;

- It is considered that the existing road network is capable of accommodating the net increase in generated traffic associated with the proposed MBT Facility;
- The R402 Road Improvement Scheme will further improve the haul route for vehicles accessing the proposed MBT Facility from the north;
- The existing site entrance will operate below the desired 0.85 RFC up to and including the design year of 2035, with the inclusion of MBT Facility generated traffic;
- The regional road network comprising the haul routes will operate below capacity up to and including the design year of 2035;
- There will be a negligible net increase in HGV traffic as a result of the proposed MBT Facility which may have minimal impact on the pavement condition along the haul routes;
- Adequate visibility splays of 3.0 x 160m have been provided at the existing site entrance junction in accordance with NRA DMRB TD 41-42/11; and,
- A ghost island junction with a right turning lane has been provided at the existing site entrance which is capable of accommodating the increased traffic associated with the proposed MBT Facility.



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GENERAL LEGEND

BORD NA MONA OWNERSHIP BOUNDARY

SITE ACTIVITY BOUNDARY

- HAUL ROUTE No.1
- HAUL ROUTE No.1.1
- HAUL ROUTE No.1.2
- HAUL ROUTE No.2
- HAUL ROUTE No.3
- HAUL ROUTE No.4
- COMPLETED NAAS ROAD IMPROVEMENTS
- HAUL ROUTE FROM M50 TO REGIONAL ROAD NETWORK VIA M7/N7
- HAUL ROUTE FROM M50 TO REGIONAL ROAD NETWORK VIA M4/N4
- L7074 LOCAL ROAD
- COUNT LOCATIONS

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD
5. 6" OS SHEET NO'S: KILDARE 3, 4, 8, 9 & 13

1.5km 0 1.5km 3km 4.5km

Issue	Date	Description	By	Chkd.
A	27.06.12	ISSUED FOR WASTE LICENCE	MN	BW

Client: BORD NA MÓNA

Project: DREHID MECHANICAL BIOLOGICAL TREATMENT (MBT) FACILITY

Title: HAUL ROUTES AND TRAFFIC COUNT LOCATIONS

Scale @ A3: 1:75,000

Prepared by:	Checked:	Date:
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Project Director: D. Grehan

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Drawing No.: Figure 11.1

Issue: A