12.0 ROADS AND TRAFFIC

12.1 Introduction

The purpose of this report is to address the traffic and transport related issues that arise in relation to the proposal by Bio-Agrigas to construct an Anaerobic Digestion facility. ORS Consulting Engineers has been commissioned to undertake a Traffic and Transport Assessment so as to examine the traffic activity arising from the proposed development.

Recommendations contained within this Traffic and Transport Assessment are based on site observations, recorded traffic survey data, interpretation of collected data and information and consultations with the relevant Authorities and interested parties.

Accordingly, the report will assess:

- The prevailing traffic conditions and programmed road upgrading measures that may influence those conditions.
- The effect on the local road network of the anticipated volume of traffic generated by the proposal.
- The proposed access arrangements associated with the site area.
- The parking and servicing characteristics of the proposed development.
- The relationship with neighbouring developments, if any.
- The level of public transport provision associated with the development, if any.

This report is therefore concerned with the assessment of the accessibility of the development with particular regard to how the traffic generated by the development would be accommodated at the existing access and by the surrounding road network. The report will also comment on the suitability of internal traffic flow operation of the proposed development in relation to the relevant design standards and safety requirements.

The objective of this report is to examine the traffic implications associated with the proposed development in terms of how it can integrate with existing traffic in the area. The report will determine and quantify the extent of additional trips generated by the development, and the impact on the operational performance of such trips on the local road network and junctions.

In so doing, this report will follow the principles set out in the 'Traffic and Transport Assessment Guidelines' by the NRA 2007.

12.2 Structure of Report

The transportation report shall be structured as follows:

- Section 12.3 outlines the methodology taken to produce the reports findings.
- Section 12.4 provides information on the proposed project.
- Section 12.5 and 12.6 provide overviews of the existing traffic conditions and proposals for the local road network, identifying issues related to traffic flow or road infrastructure.
- Section 12.7 sets out the analysis based on the methodology above, so as to report how the proposed traffic generated will impact upon the surrounding road network.
- Section 12.8 addresses the road safety aspects of the proposal.
- Section 12.9 outlines the environmental impact of the scheme.

- Section 12.10 describes the internal road layout and site access of the proposed development.
- Section 12.11 Sustainable Transport, Public Transport Provision for the development.
- Section 12.12 assesses the accessibility and integration of the development.
- Section 13 Sets out the conclusions of the report.

12.3 Methodology

A comprehensive traffic survey for the N4/R156 interchange was carried out by Nationwide Data Collection. This survey was carried out on Friday 4th March 2011 over the period 07:00-19:00 hrs using video surveillance. The counts were taken on a typical day of the week, which was chosen as a Friday. Using the NRA "Traffic Growth Forecast figures" a factored traffic 12 hour count for 2012 was derived. On the same date ORS Consulting Engineers carried out a traffic survey of the junction of the N4 and Thomas Flynn's site access to Flynn Feeds.

A spreadsheet format traffic model was then created using the 2011 base year traffic data so that capacity assessments of relevant or proposed junctions could be undertaken for future year scenarios using recognised capacity analysis programmes.

Inherent in this approach was the application of applicable national growth forecast values to incorporate the perceived growth of traffic on the network and consideration of programmed road infrastructure measures that may influence flow conditions.

The assessment of future traffic volumes arising from the proposal has been undertaken by examining traffic generation characteristics for the types of vehicles expected to visit the facility and any ancillary trips to service the development. The facility will be operational 24 hours a day, 7 days a week so a linear traffic profile is predicted for the facility.

The impact of the change in traffic conditions following the opening of the development has then been determined and the operational performance of the access junction on the adjacent network analysed. This has therefore enabled the parameters of the access junction to be known and to ensure that it can accommodate the resultant flows and movements.

Pre-Planning meetings were held to discuss the scope of the Traffic and Transport Assessment and EIS with Westmeath County Council and the NRA. A meeting was held with Mr Vincent Mulry of Westmeath County Council Mullingar Area Office on 21st February 2011 and with Mr. Ambrose Clarke of the Westmeath NRDO office on 2nd March 2011. A further meeting was held with Ruth Holton of Westmeath County Council, Mullingar Area Office on 30th March 2011.

12.4 The Development Proposal

The applicant's proposal is to construct a Bio Energy plant on their existing lands at 'The Downs', Mullingar, Co.Westmeath.

The plant will consist of an anaerobic digestion facility that will possess up to a maximum of 20,000 tonnes of organic feedstock and produce electricity to use at the existing Tom Flynn Feed's facility and to sell any excess to the national grid.

The organic feedstock will be primarily taken from existing sources, such as the adjacent pig farm and silage produced from the surrounding lands. Approximately less than half the material required will be delivered by vehicles using the public road network.

12.5 Existing Traffic Conditions

12.5.1 Existing Traffic Flows

As part of the Traffic and Transport Assessment, traffic flows have been collected to ascertain current traffic conditions and to define representative traffic levels for a base year scenario. The base year provides the basis for all subsequent assessment and operational testing of the relevant junctions.

As previously stated, a comprehensive traffic count was carried out to determine the traffic levels on the N4 and R156 Killucan Road. Details of these counts are outlined in Section 12.3 of this report.

12.5.2 Existing Road Network

The proposed site is located between the N4 dual carriageway and the R156 Killucan Road on the applicants land. The N4 dual carriageway lies to the south of the proposed site.

The N4 national primary route is the main inter-city route between Dublin to Sligo.

The R156 runs to the north of the site. The R156 and N4 connect at the N4 'The Downs' at grade junction. It is proposed to close off this at-grade junction along with eight others and construct a new grade separated junction to improve the safety and capacity of the junctions along the N4.

It is proposed that the access into the proposed development will access the road network via the new link road between the proposed N4 Grade Separated Junction and the R156. If the proposed N4 scheme is not completed before the bio-gas plant, then an alternative access will be provided via upgrading an existing farm access on the R156. Full details of this access will be outlined in section 12.6 & 12.9 of this report.

12.6 Future Road and Transport Proposals for Public Road Network.

12.6.1 Road and Transport Network Improvements

As part of the Government's National Development Plan and the Transport 21, it is proposed to re-design the N4/R156 junction to a Grade Separated Junction. The N4 'The Downs' grade separation development proposes the closure of the existing N4/R156 Killucan Road junction, the construction of a new grade separated junction located approximately 700m east of the existing N4/R156 unction, the construction of a single carriageway road to connect the new grade separated junction to the existing R156.

The nine existing central reserve openings along the N4 between Clongawny and Newdown will be closed. The existing N4 junctions with local roads L1703 at Clongawny, LS05026 at Newdown, Old N4 at Newdown and LT56031 at Newdown and the combined access to two properties at Clongawny will be closed.

The grade separated junction will be a dumb-bell style grade separated junction comprising two roundabouts at the top of slip roads and an overbridge. A 745m reduced single carriageway connector road will be constructed from the northern roundabout of the grade separated junction to an existing R156/LS05603 junction. A roundabout will be constructed at this junction. The local roads LT56031 at Newdown and the old N4 at Newdown will be re-aligned for 230m and 350m respectively to tie in to the roundabouts at the new grade separated junction. A 480m access road will be constructed from the re-aligned old N4 at Newdown to provide access to three properties. A 350m access road will be constructed at Clongawny to provide local access for two properties to the L1703.

The reconstruction scheme described above is currently at tender stage for a design build contract. Depending on contract arrangements, it is reasonable to assume that the works would be completed by the end of 2012/ early 2013.

Based on the phasing of the proposed Anaerobic Digestion Plant it is proposed that the site access would be via the new link road between the grade separated junction and the roundabout on the R156. If this is not the case then an alternative access is also proposed.

In order to assess the potential transportation impact on the surrounding road network this report examines in detail both access locations for the two scenarios outlined above.

12.7 Trip Generation and Distribution

12.7.1 Traffic Generation

An evaluation of the traffic impact of this new proposal has been undertaken by first using recorded data of existing traffic flows on the existing R156 which include any traffic generated from the land uses currently taking place on the subject site and the adjoining or adjacent lands. Reference has then been made to established database information to ascertain vehicular movements associated with developments similar to that proposed in this case. For the purpose of testing the proposed site access junction, the busiest hours in a typical week have been identified and used.

This assessment makes use of the series of traffic counts as identified in Section 3 of this report since it was necessary to obtain a sufficiently comprehensive set of data to formulate a traffic model of this area. A summary of the recorded information is included in Appendix F.

The passing traffic flows on the R156 were also factored to take account of future traffic growth on the network. The NRA projected traffic growth rates for national routes were used to increase the passing flows for the future assessment scenarios.

The 5th Paragraph of 5.1 “Evaluation of the Assessment” by the ‘Traffic and Transport Assessment Guidelines” by the NRA 2007 states, **“The preferred source of trip generation data using the comparison method would be from local existing developments however there is generally a lack of such data. In order to evaluate adequately the traffic and transports submitted it is necessary for local authorities in Ireland to have access to local trip generation data. The measured existing trip**

generation of a similar development in the same town or nearby will give a generally acceptable estimate of the generated trips from any site."

In this case additional count data information supplied by the applicant will be used to prepare a trip rate profile from the site. The projected trip rates will also be validated against any relevant survey data obtained from the TRICS database to ensure that the level of traffic anticipated by the proposed development is realistic and representative of this nature of business.

The TRICS (Trip Rate Information Computer System) was established in the UK and is a substantial source of validated empirical data which contains information on arrival and departure rates for a range of differing types and sizes of development in a variety of locations. TRICS also contains information specific to an Irish development context and is used increasingly in Ireland as the preferred method of determining traffic generation.

As the proposed development is quite unique, there are no suitable existing profiles of an Anaerobic Digestion facility in the TRICS database. In order to produce a robust set of traffic generation figures suitable for this type of development, the traffic profiles shall be developed over first principles based on data obtained from the applicant.

The nature of the operation of an AD power generation facility is that it produces electricity from the processes of breaking down organic feedstock primarily from food production companies and breweries. The process is not labour intensive and staff operates on a shift basis to operate the plant and processes of the plant.

In order to prepare the traffic generation for the development, a number of assumptions were made based on the information supplied by the applicant.

In order to produce the amount of electricity contracted to be supplied to the national grid a maximum of 20,000 tonnes of organic feedstock is required per annum. Table 12.1 illustrates the initial base assumptions made:

Traffic Generation Data for Anerobic Digestion Power Generation Facility
Maximum 20,000 Tonnes of Non Hazardous Food Waste Material required per Annum
Assumptions based on information from Applicant Delivery of Material Via 20 tonne Roll on Roll off Skip trucks. Deliveries over a period of 5.5 days a week, 50 weeks a year (Maximum). Operation of Facility to be over 24 hours a day, 365 days a year. Facility to be operated by approximate 10 staff over three shifts. (10,000 Tonnes to be sourced locally. This material to be pumped overland.)
Above information implies the following:
Facility to take deliveries 275 days over the year. 3 Staff over three shifts (08:00-18:00 - 18:00-02:00- 02:00-10:00)

Table 12.1- Traffic Generated Data- Initial Base Assumptions.

The facility shall be operated over three shifts with the waste material delivered throughout the day shift. Table 12.2 details the number of daily deliveries of organic feedstock from 20 tonne trucks.

Assuming Baseline Data obtained by applicant	Arrivals	Departures
Truck Deliveries		
Maximum demand (10,000 tonnes) delivered with 20 tonne trucks 500 truck Deliveries per annum	500	500
Deliveries Per Day (Assuming 275 days of deliveries)	1.18 say 2	1.18 say 2
including 10% sensitivity loading on deliveries (Per Day) (All data rounded up)	3	3

Table 12.2- Delivery of non-hazardous waste to AD facility.

The second type of traffic that will be generated by the development will be the staff traffic profile. As the electricity generating process is an automated process a minimum staff profile will be required. Table 12.3 outlines the staff trip profile element. Table 7.3 also contains additional trip rates associated with the site based on ancillary trips to and from the site.

Assuming Baseline Data obtained by applicant Staff Traffic Generation	Arrivals (Per Shift)	Departures (Per Shift)
Maximum 10 staff 3 staff per shift(1 staff per private vehicle)	3	3
Assuming additional traffic movements (Errands, Lunch, Etc)	3	3
Total Staff Movements per Shift	6	6

Ancillary Trips to and From the Site	Arrivals (Per Shift)	Departures (Per Shift)
Include Post, Visitors, Maintenance, etc	5	5

Table 12.3- Associated staff traffic levels generated by the proposed development.

From the above data, the total daily trip rates are calculated in table 7.4. In order to find a reasonable daily trip profile for the development, the peak shift time (i.e during the day shift) was multiplied by a factor of two to take account of the traffic on the other shifts. This is a reasonable assumption given that it is projected that all the delivery of the organic feedstock will take place during normal day time hours.

Total Traffic Generation for AD Facility as from first principles	Arrivals (Per Shift)	Departures (Per Shift)
Assume Maximum traffic during (08:00-18:00 shift) NB: No deliveries of waste materials anticipated during night time shifts.		
Delivery of Waste Material	3	3
Staff	6	6
Ancillary Trips	5	5
Total Traffic Generation per Shift	14	14
Total traffic generation per shift multiplied by a factor of 2 for total traffic generation over 24 hours.		
Total Traffic Generation per Day	24	24

Table 12.4- Proposed total daily traffic generated by the development.

In order to compare the daily trip rates with the peak times on the public road network (R156), an AM and PM peak profile rate is required. As the trip profile rates illustrated by the above table indicate that the daily trip rates associated with this development is low, a % of the daily trip rates can be applied to get a robust AM and PM peak rate. 30% of the total daily traffic profile has been estimated to illustrate a potential worst case scenario for the AM and PM peak periods. Table 12.5 illustrate the AM and PM peak traffic generation periods associated with the proposed development.

As can be noted from the traffic generation profile carried out above, there is no particular peak of traffic generated by the development, save for the times when staff arrive and depart from work at the beginning and end of the shift work. In this case, it is reasonable to assume that this would coincide with the peak times on the public road network.

Peak Times on Proposed R156 is between the hours of (08:00-09:00) and (17:00-18:00)	Arrivals	Departures
Deliveries shall be evenly distributed throughout the day Worst Case Scenario is to assume: 30% of trip rates between morning AM Peak 40% of trip rates througout the remainder of the day 30% of trip rates between Evening PM Peak		
AM Peak Flow (@30% Daily total)	7.2 say 8 8	7.2 say 8 8
PM Peak Flow (@30% Daily total)	7.2 say 8 8	7.2 say 8 8
Of the total hourly trip rates 30% of total is large 20 Tonne Delivery Vehicles	3	3

Table 12.5- Assumptions based to calculate AM and PM Peak flows from development.

Traffic Generation Data Summary		Arrivals	Departures
AM Peak	(08:00-09:00)		
Cars and LGV's		5	5
HGV's		3	3
PM Peak	(17:00-18:00)		
Cars and LGV's		5	5
HGV's		3	3

Table 12.6- Break down of vehicular types for peak hour traffic.

The tables above indicate that the proposed traffic generated by the development will average 48 two-way movements per day. This figure is based on the maximum amount of waste the facility can take and the predicted level of staff required to operate the facility. The facility has a very specific use and as such it is reasonable to assume that the above method of analysis is accurate. Even with a 50% loading on the two-way figures above would give approximate 72 vehicles accessing the site per day, which is well below accepted indicators for new developments which would trigger analysis for potential impact on the road network.

As part of the Anaerobic Digestion process, the by-product or digestate also has to be removed from the site. This material will be used as a fertilizer in the agricultural industry. This will be taken away under contract to companies that distribute the fertilizer. This material will be stored on site and removed over a 7 month period throughout the year, as it is prohibited to spread the fertilizer over the winter months. It is proposed to remove this material via 10 tonne tanker trucks evenly over the 7 months. Table 12.7 outlines the traffic generated by the removal of this material.

Traffic Generation Data for Anerobic Digestion Power Generation Facility		
20,000 Tonnes of Digestate Material to be removed from site (Removal of material over a period of 7 months)		
Assumptions based on information from Applicant Removal of material via 10 tonne liquid tank trucks. Removed over a period of 5.5 days a week, approximately 30 weeks a year (over 7 month period).		
Above information implies the following: Removal of liquid material over 165 days per annum 20,000/10 tonnes= 2000 movements 2000/165 days= 13 daily removal trips 13x2= 26 two-way trips movements a day		

Peak Hour Trips for Digestate Material		
Assume 30% AM and PM traffic distribution as previously assumed for worst case scenario.		
8 vehicles two-way movements per AM and PM Peak hour	Arrivals	Departures
AM Peak Hour	4	4
PM Peak Hour	4	4

Table 12.7- Trip rate for Traffic removing waste material from facility.

In terms of a worst case scenario, the total AM and PM peak figures, including the digestate material are outlined in table 12.8.

Total Generated Traffic Summary		
Traffic Summary assuming 'Worst Case Scenario' including 7 month removal period.		
	Arrivals	Departures
Total Daily Trip Rate	37	37
AM Peak (08:00-09:00)		
Cars and LGV's	5	5
HGV's/ 20 Tonne/ 10 tonne trucks	7	7
PM Peak (17:00-18:00)		
Cars and LGV's	5	5
HGV's/ 20 Tonne/ 10 tonne trucks	7	7

Table 12.8- Total 'Worst Case Scenario' traffic generated from proposed development.

In summary, the trip rate profile for the proposed development has been interpreted from first principles and has been sufficiently loaded to reflect a 'worst case scenario'. The trip rates are relevant given the type of development and the type of use. The trips found indicate that the level of traffic activity associated with this type of development is extremely small and when compared to the passing traffic levels on the R156, is negligible. The figures derived from the above first principles analysis are very robust and assume all material required by the development other than the pumped piggery waste will come by road. In fact a significant proportion of the organic feedstock will also come from within the applicants land holding which surrounds the proposed development. Internal roads and access ways through fields will reduce the requirement to use the public road at all. As a 'worst case scenario', the total daily 2-way trips expected from the development is 74.

12.7.2 Traffic Impact

The next step in the process of assessing the impact of the proposal is to apply the various characteristics and values to the flow conditions prevailing when the development is operational. To do this it is first necessary to consider how the network will change as a consequence of traffic growth and other local factors that would influence flow conditions on this part of the network. With the benefit of recorded and representative traffic data for the immediate road network and a justifiable appraisal of the anticipated level of traffic generation that will affect that network, it is possible to assess the resultant impact.

The well established method of calculating capacity using TRL capacity software, illustrates results as expressed in terms of a ratio of flow to capacity (RFC) on each approach and the maximum queue length on that approach during the period tested. If the RFC value approaches 1.0 then queuing and delay can be expected to increase. It is normal practice to ensure that the RFC is below 0.85 to achieve a theoretical reserve capacity of greater than 15%, although a value of 0.85 can be marginally exceeded in a future design year situation without any detrimental effect on the satisfactory and safe operation of the junction. Clearly if this level of reserve cannot be achieved it is normal practice to investigate ways of modifying the junction layout, such as, for example, widening the approaches so as to improve capacity and accordingly reduce the RFC values.

In accordance with the NRA "Traffic and Transport Assessment" guidelines, it is normal practice to test the access junction and other junctions susceptible to capacity problems at the year of opening, 5 years in the in the future and a future design horizon of 15 years. In the case of this development, the design years for testing purposes are 2013, 2018 & 2028.

As outlined in the previous chapters, it is proposed and preferred by the applicant that the site access will link onto the public road network, via the proposed N4 Grade separated junction and associated link roads. However if it is the case that this road improvement scheme has not been constructed, an alternative access on the R156 is proposed to serve the Anaerobic Digestion facility.

For the purposes of testing the various junctions and scenarios, the capacity tests have been carried out as follows:

Scenario no.1 of the report tests the proposed direct access off the existing R156 for all design horizons for the AM and PM peak times. The proposed access onto the R156 is an existing access lane. In order to facilitate the type of development, this laneway will be upgraded to provide direct two-way movement. Full design drawings and details are submitted as part of the application. Table 12.9 shows the results of the RFC values for the proposed access.

Junction Capacity for T-Junction on R156 to Proposed Development (Scenario 1)			
2013 Year of Opening AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.014	98.6	OK
to Proposed Development	0.021	97.9	OK
to N4 (R156)	0.014	98.6	OK
2013 Year of Opening PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.014	98.6	OK
to Proposed Development	0.021	97.9	OK
to N4 (R156)	0.014	98.6	OK
2018 Mid-Term Year AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.014	98.6	OK
to Proposed Development	0.021	97.9	OK
to N4 (R156)	0.014	98.6	OK
2018 Mid-Term Year PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.014	98.6	OK
to Proposed Development	0.021	97.9	OK
to N4 (R156)	0.014	98.6	OK
2028 Future Year AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.014	98.6	OK
to Proposed Development	0.022	97.8	OK
to N4 (R156)	0.014	98.6	OK
2028 Future Year PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.014	98.6	OK
to Proposed Development	0.021	97.9	OK
to N4 (R156)	0.014	98.6	OK

Table 12.9- Capacity Test Results for Scenario 1.

As can be noted from the above analysis, as the RFC values are so low, the resultant normal increase in passing traffic on the R156 does not have any impact on the available capacity on the network and the minor road junction access (Proposed Site Access). The results indicate that the traffic levels generated by the development are extremely low and do not pose any impact on the surrounding road network.

The preferred access option (direct access onto the proposed link road between the N4 Grade separated junction and R156 roundabout) for the proposed development has also been tested as scenario 2. In order to fully assess the proposed developments potential impact on the road network, the roundabout off the R156 and the roundabout as part of the grade separated junction were also tested for all times and future design horizons.

Table 12.10 outlines the RFC test results from the PICADY analysis. As can be noted, the traffic generation levels are so low compared to the passing traffic levels, the RFC values indicate that the capacity on the network is over 97% for all tests. These test results are consistent with the previous scenario and show negligible impact on the existing and future public road network.

Junction Capacity for Proposed New Roundabount on R156 with Proposed Development (Scenario 2)			
2013 Year of Opening AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.132	86.8	OK
to Proposed Development and N4	0.084	91.6	OK
R156	0.027	97.3	OK
L5603	0.006	99.4	OK
2013 Year of Opening PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.079	92.1	OK
to Proposed Development and N4	0.136	86.4	OK
R156	0.017	98.3	OK
L5603	0.004	99.6	OK
2018 Mid-Term Year AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.140	86	OK
to Proposed Development and N4	0.089	91.1	OK
R156	0.029	97.1	OK
L5603	0.007	99.3	OK
2018 Mid-Term Year PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.084	91.6	OK
to Proposed Development and N4	0.144	85.6	OK
R156	0.018	98.2	OK
L5603	0.004	99.6	OK
2028 Future Year AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.152	84.8	OK
to Proposed Development and N4	0.098	90.2	OK
R156	0.031	96.9	OK
L5603	0.008	99.2	OK
2028 Future Year PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.092	90.8	OK
to Proposed Development and N4	0.157	84.3	OK
R156	0.020	98.0	OK
L5603	0.004	99.6	OK

Table 12.10- Capacity test results for proposed junctions, Scenario 2.

In addition to the tests outlined in table 12.10, additional ARCADY tests were carried out for the proposed roundabouts that will form part of the N4 “The Downs” upgrade scheme. The results of these tests which include the proposed development traffic are outlined in table 12.11 & 12.12.

Junction Capacity for Proposed T-Junction from Proposed Development to New N4 Grade Separate (Scenario 2)			
2013 Year of Opening AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Proposed New Roundabout (R156)	0.013	98.7	OK
to Proposed Development	0.021	97.9	OK
to N4	0.013	98.7	OK
2013 Year of Opening PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Proposed New Roundabout (R156)	0.013	98.7	OK
to Proposed Development	0.021	97.9	OK
to N4	0.013	98.7	OK
2018 Mid-Term Year AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Proposed New Roundabout (R156)	0.013	98.7	OK
to Proposed Development	0.021	97.9	OK
to N4	0.013	98.7	OK
2018 Mid-Term Year PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Proposed New Roundabout (R156)	0.013	98.7	OK
to Proposed Development	0.021	97.9	OK
to N4	0.013	98.7	OK
2028 Future Year AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Proposed New Roundabout (R156)	0.013	98.7	OK
to Proposed Development	0.022	97.8	OK
to N4	0.013	98.7	OK
2028 Future Year PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Proposed New Roundabout (R156)	0.013	98.7	OK
to Proposed Development	0.021	97.9	OK
to N4	0.013	98.7	OK

Table 12.11- Capacity test results for proposed junctions, Scenario 2.

Junction Capacity for Roundabout on New N4 Grade Separate with Proposed Development (Scenario 2)			
2013 Year of Opening AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Flynn Feeds	0.012	98.8	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.012	98.8	OK
N4 Off Ramp	0.072	92.8	OK
to R156/Proposed Development	0.114	88.6	OK
2013 Year of Opening PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Flynn Feeds	0.018	98.2	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.011	98.9	OK
N4 Off Ramp	0.124	87.6	OK
to R156/Proposed Development	0.069	93.1	OK
2018 Mid-Term Year AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Flynn Feeds	0.009	99.1	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.012	98.8	OK
N4 Off Ramp	0.076	92.4	OK
to R156/Proposed Development	0.120	88	OK
2018 Mid-Term Year PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Flynn Feeds	0.018	98.2	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.012	98.8	OK
N4 Off Ramp	0.131	86.9	OK
to R156/Proposed Development	0.073	92.7	OK
2028 Future Year AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Flynn Feeds	0.010	99	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.013	98.7	OK
N4 Off Ramp	0.082	91.8	OK
to R156/Proposed Development	0.131	86.9	OK
2028 Future Year PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Flynn Feeds	0.018	98.2	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.013	98.7	OK
N4 Off Ramp	0.142	85.8	OK
to R156/Proposed Development	0.080	92	OK

Table 12.12- Capacity test results for proposed junctions, Scenario 2.

The above results indicate that the proposed development has no effect on the operational efficiency of the proposed junctions associated with the N4 “The Downs” grade separated junction.

In order to compare the operational efficiency of the proposed N4 “The Downs” scheme without the proposed development traffic added, a ‘Do Nothing’ scenario was introduced. The results of these tests are summarised in table 12.13 & 12.14. As can be noted the test results show that by incorporating the proposed development traffic on the network there is no reduction in capacity for every scenario tested.

Junction Capacity for Proposed New Roundabout on R156 with No Development (Scenario 3)			
2013 Year of Opening AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.128	87.2	OK
to Proposed Development and N4	0.080	92.0	OK
R156	0.027	97.3	OK
L5603	0.006	99.4	OK
2013 Year of Opening PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.076	92.4	OK
to Proposed Development and N4	0.132	86.8	OK
R156	0.016	98.4	OK
L5603	0.004	99.6	OK
2018 Mid-Term Year AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.136	86.4	OK
to Proposed Development and N4	0.085	91.5	OK
R156	0.028	97.2	OK
L5603	0.007	99.3	OK
2018 Mid-Term Year PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.080	92.0	OK
to Proposed Development and N4	0.140	86.0	OK
R156	0.017	98.3	OK
L5603	0.004	99.6	OK
2028 Future Year AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.148	85.2	OK
to Proposed Development and N4	0.094	90.6	OK
R156	0.030	97.0	OK
L5603	0.008	99.2	OK
2028 Future Year PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Killucan (R156)	0.088	91.2	OK
to Proposed Development and N4	0.153	84.7	OK
R156	0.018	98.2	OK
L5603	0.004	99.6	OK

Table 12.13- Capacity test results for proposed junctions, Scenario 3 (Do Nothing).

Junction Capacity for Roundabout on New N4 Grade Separate with No Development (Scenario 3)			
2013 Year of Opening AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Flynn Feeds	0.009	99.1	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.010	99	OK
N4 Off Ramp	0.070	93	OK
to R156/Proposed Development	0.110	89	OK
2013 Year of Opening PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Flynn Feeds	0.018	98.2	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.010	99	OK
N4 Off Ramp	0.122	87.8	OK
to R156/Proposed Development	0.066	93.4	OK
2018 Mid-Term Year AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Flynn Feeds	0.009	99.1	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.011	98.9	OK
N4 Off Ramp	0.074	92.6	OK
to R156/Proposed Development	0.117	88.3	OK
2018 Mid-Term Year PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Flynn Feeds	0.018	98.2	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.010	99	OK
N4 Off Ramp	0.129	87.1	OK
to R156/Proposed Development	0.069	93.1	OK
2028 Future Year AM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Flynn Feeds	0.010	99	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.012	98.8	OK
N4 Off Ramp	0.080	92	OK
to R156/Proposed Development	0.128	87.2	OK
2028 Future Year PM Peak	**Maximum RFC Value**	**Reserve Capacity (%)**	**Status**
to Flynn Feeds	0.018	98.2	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.011	98.9	OK
N4 Off Ramp	0.140	86	OK
to R156/Proposed Development	0.077	92.3	OK

Table 12.14- Capacity test results for proposed junctions, scenario 3 (Do Nothing Scenario)

From assessing the total trip rates during the peak times against the AM and PM peak times on the road network, the proposed traffic generated by the development will account for 1-2% of the total traffic on the network. This figure is comfortably under the accepted thresholds to assess whether a traffic and transport assessment is required as identified in the **DoT "Traffic Management Guidelines"** and the NRA **"Traffic and Transport Assessment Guidelines 2007".**

To summarise, the traffic generated data calculated for the proposed development is significantly below recognised capacity thresholds and as such indicates that the proposed maintenance facility will have negligible impact in transportation terms on the surrounding road network. All the tests carried out conclude that the proposed

traffic generated by the development will be minimal and not impact on the existing and proposed operational capacity on the public road network.

12.8 Road Safety

Road safety and the integration of the development into the public road network is of primary importance to the success of the scheme. It is proposed that the development will access the public road network via the proposed new link road between the M4 'The Downs" grade separated junction and the R156. If the proposed development is constructed before the completion of the upgraded N4 scheme, then an alternative access directly off the R156 will be provided.

The alternative access proposed will access the development off the R156 via an existing access lane. This lane will require upgrading to ensure that it is as safe as possible for vehicles expected to arrive and depart the site. This laneway is currently marked via a public road sign on the R156. The lane way is along a straight stretch of road and sightlines in the order of 2.4m x 160m are achievable.

In order to improve safety at the access, two-way vehicle movements will be facilitated by increasing the width of the minor road access and the gradient into the site will also be revised.

The future redevelopment of the M4 'The Downs' interchange junction is scheduled to be constructed by the end of 2012 or early 2013. This will significantly increase the general road safety in the area. A future link road between the national road N4 interchange and the R156 will be constructed through the applicants land holding. It is the applicant's intention to re-configure the site access and connect to the proposed link road when it is suitable to do so.
As the anaerobic digestion development and the N4 road scheme are separate projects with different phasing and timelines for completion it is the intention of the applicant to ensure a suitable access can be provided for the scheme off the R156 which is independent from the M4 scheme. When the M4 scheme is operational, a re-configured site access will link to the proposed link road. If the N4 scheme is constructed before the Bio-Gas plant it is the applicant's preference to connect onto the link road directly.

It is the applicant's intention whichever access is proposed, that it will meet the latest safety standards and requirements and will adhere to any planning authorities requirements for the suitability of the access.

Both site access options have been detailed and submitted as part of the planning application for the proposed development.

In the case of the proposed site access off the R156, the access is an upgrading of an existing and established access. There is numerous access points along the R156 in the vicinity of the proposed access location, so in road safety terms motorists along the R156 are generally familiar with vehicles entering and leaving the road along this area.

12.9 Environmental Impact

As part of the overall planning application for the development, an EIS (Environmental Impact Statement) has been carried out. In transportation terms, the level of traffic projected to visit the site is extremely low and no evidence of potential adverse environmental impact on the area has been established.

12.10 Internal Road Layout and Site Access

The main functions of the internal road layout are to provide a safe and efficient circulatory system that reduces the potential for conflicting movements, which accommodates the anticipated volume of arrivals and departures without detriment to the operation of the public highway to which the site connects. The intention of the internal layout is to facilitate a logical system of delivery and exit serving the service yard and staff area.

The applicant intends to generate electricity from the digestion processes of organic feedstock primarily from the agricultural industry. This will involve some of the material being delivered on the public road network in 20 tonne skip type lorries. The internal layout of the development will allow for full movement of delivery vehicles unloading, turning, parking etc and will be segregated from the staff parking at all times. All traffic projected to visit the site will be able to enter and leave the site in forward gear. The site compound area is situated a comfortable distance from the existing and future road network and as such will not pose any impact on the general public.

Full plans of the proposed internal site layout, Autotrack movements, signage and road lining details has been indicated on submitted as part of this planning application.

The designer of the scheme will provide adequate signage to provide information and warning to the customer and to ensure that they park in the designated area. All internal traffic movements will be kept a significant distance from the public road network. Please refer to site layout drawings indicating the circulation areas and the main areas for delivery and staff/ visitor traffic.

Accordingly, this assessment has not reviewed the detailed assignment of parking provision or assessed the parking demand arising from the specific development plots within the site. Nonetheless, the assessment has identified a likely level of traffic arrival and departure during peak hours from the traffic generated from the site. It is reasonable to conclude that the internal layout is designed to effectively accommodate these levels of flow and accumulation within the site area and hence without detriment to the operation of the internal layout.

As the proposed development will be constructed in the vicinity of the proposed N4 “The Downs” grade separated junction, the public road network will be changed over the medium term. The proposed junction scheme and link roads will improve the traffic capacity and safety of the overall network in the area.

It is the intention off the applicant to connect to the proposed link road between the N4 grade separated junction and the R156 when it is constructed. The site will access this road approximately half way between the interchange access and the roundabout on the R156. The access road junction will be constructed in accordance with the DoE ‘Recommendations for Site Development works’ document. The access way will ensure that the two-way traffic can safely be accommodated and all sightline provisions will be in accordance with the Westmeath development control standards outlined in the current Westmeath County Development Plan.

This access location has been discussed with both Westmeath County Council and the NRA and agreed in principle as the future permanent access for the development.

It has been highlighted by the NRA that the proposed link road will not be their responsibility once completed. However, as it is part of the overall N4 ‘The Downs’ scheme, the road may

not be constructed before the completion of the Anaerobic Digestion facility, thereby leaving no access to the proposed development.

While the proposed timeline for the construction of the Anerobic Digestion facility, its licensing obligations and the time taken to bring the facility to operational functionality is likely to push the completion of the plant beyond the completion date of the road scheme. However, at this stage of the application process, a definite date for completion of the N4 'The Downs' separation has not been determined by the NRA.

In order to facilitate an access to the proposed development in the case that the N4 'The Downs' is not completed, an alternative access onto the R156 has been proposed.

The alternative access proposal includes the upgrading of the existing access lane onto the R156. Consent has been sought from the applicant to the landowner to allow all upgrading measures necessary to provide an access capable of accommodating the projected type and quantity of vehicles to the proposed development. All consent letters are included in the planning submission.

The proposed access onto the R156 will be widened and include works to increase the access road level to allow at grade connection to the R156 and to allow vehicles to wait to enter the R156 at an acceptable gradient. Sightlines will be improved at the existing access to ensure compliance with the standards set down in the Westmeath County Council's current county development plan. Existing signage indicating the access will be replaced with new signs to highlight the access.

When the opportunity to develop the site access off the proposed link road exists, the intention of the applicant is to re-direct its traffic onto the new access. The upgraded access off the R156 will be left for the existing traffic already using the access lane for the bog and access to surrounding farm lands.

Full detailed access drawings of both site access points proposed have been provided as part of this application. Only one access will be used by the proposed development at all times.

It is proposed that a priority 'simple T-junction' type access will be proposed for both access locations. It is determined that a priority access will be suitable for the proposed access to the following development based on the following points:

- The total daily traffic anticipated for the development as a 'worst case scenario' is 74 two way trips. This figure when compared to the passing AADT of the R156 is negligible. The 12 hour traffic counts give a two-way traffic volume on the R156 of 3293. When this is converted to AADT, this increases to approximately 4500. The total traffic generated by the development is approximately 1.64% of the passing traffic.

- According to the NRA DMRB TD 41-42/09 "Geometric Design of Major/Minor Priority Junctions and Vehicular Access to National Roads", chapter 2.23 states "*Simple junctions are appropriate for most minor junctions on single carriageway roads, on dual carriageways simple junctions must be restricted to left in/ left out only. For new rural junctions they shall be used when the design flow in the minor road is not expected to exceed about 300 vehicles 2-way AADT, and that on the major road is not expected to exceed 13,000 vehicles 2-way AADT.*" As can be noted from the analysis to date, the figures proposed on the minor road and the actual figures on the R156 (major road) are significantly less than the accepted thresholds outlined in the NRA

DMRB. In fact, the total two-way trips projected by the development is approximately less than 4 times the accepted level of traffic permitted on the minor road. The level of traffic on the R156 is approximately 3 times less than the 13,000 AADT permitted on the major road.

- The figures quoted above will be even less on the new link road, as this will only bring traffic currently on the R156 to the N4. There is a level of traffic on the R156 that does not continue onto the N4 which passes the proposed direct alternative access on the R156. This includes traffic using the local shop and school for example.

- There are a number of existing direct accesses onto the R156 in relative close proximity to the alternative access on the R156 which the passing traffic are familiar with. It is recognised internationally as best practice in terms of road safety that accesses along a particular road should be similar in composition and form.

- The proposal for the access point on the R156 is to improve an existing established access. There is no potential further development proposed in the area that would require provision for increase measures at the access point.

- The R156 is a regional road with the speed limit of 80kph. Simple T-junctions are the most common type of access onto these types of roads. The parameters laid out in the NRA DMRB TD41-42/09 are intended to assist designers to consider alternative junction types on national secondary and primary roads. Speed limits on these types of roads are usually 100kph in rural locations. In this regard, it is reasonable to assume given the level of traffic proposed by the development and the traffic volumes on the R156 that a simple-T-Junction is the most suitable and practical junction at this location.

- In relation to the future proposed access onto the proposed link road, the same design parameters quoted above can be used to assess the type of access suitable there. When the analysis is taken into account, a simple T-junction is the most suitable access.

- The PICADY analysis carried out for the above future year scenarios all indicate that a direct simple T-junction access is comfortably within acceptable capacity test limits. Please refer to Section 12.7 and Appendix F for full test details and results.

12.11 Sustainable Transport, Public Transport Provision

While there is some public transport provision in the area, the type of development proposed does not require public transport provision to be operational. All vehicles intended to visit the proposed development will be via private vehicle.

As the facility will be operated on a shift basis by minimal staff, the public transportation provision for the town of Mullingar may not be suitable.

All staff vehicles and visitors to the facility will be comfortably accommodated by the car park within the site and thus the provision of public transport will not be needed.

In terms of sustainable transport, approximately half of the material required by the Anaerobic Digestion facility will be from the adjoining land. This reduces the transportation requirements

for the development by approximately half and as such is a significant factor in the overall sustainability of the development.

12.12 Conclusions

This traffic and transport assessment has been prepared to assess the proposal by Bio-Agrigas to develop an anaerobic digestion power generation facility at 'The Downs', Co.Westmeath. The proposed development will be served by an access off the future link road between the N4 'The Downs' interchange and the R156.

An alternative access has been proposed onto the R156 in the event of the primary proposed access cannot be provided in time for the opening of the AD facility.

ORS Consulting Engineers have undertaken detailed traffic analysis and investigation into the likely impact the proposed development may have. Current and future traffic flows were established on the surrounding road network.

The prepared site access was subjected to analysis to examine the potential traffic levels generating from the site and the existing road network. The proposed site access and alternative access were tested for AM and PM peak conditions for baseline, potential year of opening and future design horizons. All tests revealed that the existing site access will operate comfortably under accepted capacity limits.

Both site accesses assessed would operate efficiently and within capacity limit for all design scenarios and future design years.

The proposed development is comfortably under the accepted thresholds to assess whether a traffic and transport assessment is required as identified in the DoT "Traffic Management Guidelines" and the NRA "Traffic and Transport Assessment" guidelines.

The internal road network has been designed to provide a safe and efficient circulatory system that reduces the potential for conflicting movements within the site. The internal layout will ensure that employee traffic and delivery traffic must be segregated as much as possible. All signage and safety measures possible will be implemented to ensure maximum safety in the site.

Therefore in transportation terms, the proposed development does not provide any negative impact on the existing local road network and will not affect any future transport proposals in the area.

13.0 ALTERNATIVES

13.1 Introduction

The following chapter assesses the Alternatives considered by the Applicant during the initial stages of the selection process. The consideration of alternative processes, location and designs, was the single most effective means of avoiding environmental impacts. It is important, from the outset, to acknowledge the existence of difficulties and limitations when considering alternatives.

Many projects, particularly with a project in the area of infrastructure, arise on account of plans, strategies and policies which have previously been decided upon. It is important to acknowledge that in some instances neither the applicant nor the competent authority can be realistically expected to examine options which have already been previously determined by a higher authority such as a national plan or regional programme for infrastructure.

The EIS is confined to the environmental effects which influence the consideration of alternatives. It is important to acknowledge that other non environmental factors may have equal or overriding importance to the development, e.g. project economics, land availability, engineering feasibility, planning considerations, etc.

The consideration of alternatives also needs to be set within the parameters of the availability of land as it may be the only suitable land available or the need for the project to accommodate demands or opportunities which are site specific as in this case, the production of electricity and heat from the CHP. Such considerations should be on the basis of alternatives within a site e.g. design, layout.

The principal criteria for assessing the viability, including the scoping stage of the EIS for the proposed development were;

- Alternative processes
- Alternative locations
- Alternative designs

There are a number of criteria which apply that must be assessed when investigating and selecting the location of an Anaerobic Digester Facility.

An outline of the main alternatives examined throughout the design and consultation processes are described below. This serves to indicate the main reasons for choosing the development proposed, taking into account the environmental effects.

13.2 Alternatives Examined

Alternatives can be described at three levels indicating the main reasons for choosing the proposed development. These consider alternative processes, locations and designs.

13.2.1 Alternative Processes

Within each design solution there can be a number of different options as to how the processes or activities of the development can be carried out. These can include management of emissions, residues, traffic and the use of natural resources. Consideration of environmental factors can influence the selection of processes which avoid adverse impacts.

In terms of alternative processes, the applicant has considered composting, bio fuel made from cold-pressed rapeseed oil production and Anaerobic Digestion.

- **Composting**
  Composting is plant matter that has been decomposed and recycled as a fertilizer and soil amendment. Compost is a key ingredient in organic farming. At its most essential, the process of composting requires simply piling up waste and waiting a year or more. Modern, methodical composting is a multi-step, closely monitored process with measured inputs of water, air and carbon- and nitrogen-rich materials. Aerobic bacteria manage the chemical process by converting the inputs into heat, carbon dioxide and ammonium. The ammonium is further converted by bacteria into plant-nourishing nitrites and nitrates through the process of nitrification.
  Compost can be rich in nutrients. The compost itself is beneficial for the land in many ways, including as a soil conditioner, a fertilizer, addition of vital humus or humic acids, and as a natural pesticide for soil. In ecosystems, compost is useful for erosion control, land and stream reclamation, wetland construction, and as landfill cover. One of the disadvantages of composting is time involved, cost of equipment, Land required, Marketing required for sales. With the composting infrastructure, it provides no opportunity for energy recovery from the capturing of the gas and using the gas as a fuel to generate electricity.

- **Biofuel from cold-pressed rapeseed oil**
  Pure Plant Oil (PPO) is a biofuel made from cold-pressed rapeseed oil. It has been the main driver of indigenous biofuel production in Ireland, proving particularly popular in the haulage sector. Rapeseed oil is used in the manufacture of biodiesel for powering motor vehicles. Biodiesel may be used in pure form in newer engines without engine damage, and is frequently combined with fossil-fuel diesel in ratios varying from 2% to 20% biodiesel. The costs of growing, crushing, and refining rapeseed biodiesel, rapeseed derived biodiesel cost more to produce than standard diesel fuel. Rapeseed oil is the preferred oil stock for biodiesel production in most of Europe, accounting for about 80% of the feedstock, partly because rapeseed produces more oil per unit of land area compared to other oil sources, such as soy beans.
  Other biofuels, especially those likely to see greater use over the next decade, performed better than fossil fuels but the study raises serious questions about some of the most commonly produced varieties.

Rapeseed and maize biodiesels were calculated to produce up to 70 per cent and 50 per cent more greenhouse gases respectively than fossil fuels. The concerns were raised over the levels of emissions of nitrous oxide, which is 296 times more powerful as a greenhouse gas than carbon dioxide. It has been found that the use of biofuels released twice as much as nitrous oxide as previously realised. The research team found that 3 to 5 per cent of the nitrogen in fertiliser was converted and emitted.
Disadvantages of using biodiesel produced from agricultural crops involve additional land use, as land area is taken up and various agricultural inputs with their environmental effects are inevitable. Switching to biodiesel on a large scale requires considerable use of our arable area. Even modest usages of biodiesel would consume almost all cropland in some countries in Europe. It could so happen that most lands on the planet are deployed to produce food for cars, not people.

Transportation & storage of biodiesel require special management. Some properties of biodiesel make it undesirable for use at high concentrations. For example, pure biodiesel doesn't flow well at low temperatures, which can cause problems for customers with outdoor storage tanks in colder climates. A related disadvantage is that biodiesel, because of its nature, can't be transported in pipelines. It has to be transported by truck or rail, which increases the cost. The "cloud point" is the temperature at which a sample of the fuel starts to appear cloudy, indicating that wax crystals have begun to form. At even lower temperatures, the fuel becomes a gel that cannot be pumped. The "pour point" is the temperature below which the fuel will not flow. As the cloud and pour points for biodiesel are higher than those for petroleum diesel, the performance of biodiesel in cold conditions is markedly worse than that of petroleum diesel. At low temperatures, diesel fuel forms wax crystals, which can clog fuel lines and filters in a vehicle's fuel system. Vehicles running on biodiesel blends may therefore exhibit more drivability problems at less severe winter temperatures than do vehicles running on petroleum diesel, thus there have been a few concerns regarding biodiesel's impact on engine durability.

- **Anaerobic Digestion**

Whilst Anaerobic Digestion is more expensive economically, it was felt that this site with its advantageous infrastructure is better suited to a digestion plant than composting. Even though there are many reasons listed in the literature as to why Anaerobic Digestion may be better than composting, it is clear that composting infrastructure provides no opportunity for energy recovery. Other methods of treatment such as vermi-composting were ruled out due to the lack of process control.

As outlined in the EPA Discussion Document 'Anaerobic Digestion: Benefits for Waste Management, Agriculture, Energy and the Environment', 2005, 'The characteristics and composition of the waste determine the infrastructure and processes used with an Anaerobic Digestion plant'. The Applicant has visited and studied other anaerobic facilities in Europe including those located Belgium, a country which has many AD facilities and in excess of 20 year history of Anaerobic Digestion plants. The applicant has insisted that the design engineers employ Best Available Techniques (BAT) to ensure that a high general level of protection of the environment as a whole is achieved.

The advantages of Anaerobic Digestion plants cannot be overlooked as outlined in EPA findings, which include:

- Anaerobic Digestion is a proven technology that takes energy in the form of biogas from organic waste. The process provides several environmental benefits.
- Digestion of agricultural slurries yields a substance that has a lower pollution potential and is more suitable than raw slurries for plant uptake.
- Global warming dividends arise because electricity generated from biogas displaces fossil fuel generated electricity and there by reduces dioxide emissions to the environment.
- The Anaerobic Digestion process can be used to turn residues from livestock farming and food processing industries among other organic wastes into biogas.
- The biogas can be used to generate heat and electricity and fibrous liquid, which can be used as a soil conditioner.
- Anaerobic Digestion has the potential to deliver multiple environmental benefits, including reduced water pollution, lower greenhouse gas emissions, and reduced odours from agricultural slurries.
- Anaerobic Digestion is also unique among policy instruments as it can deliver positive outcomes for multiple policy objectives with respect to global warming, renewable energy, water pollution, nitrates directive, landfill directives and waste management.

13.2.2 Alternative Locations

The objective of the Applicant was to locate on a suitable site that had capacity to host an Anaerobic Digestion Facility in close proximity to Mullingar – Grid Connection Point to produce a 1MW electricity supply. The basis for such an objective resulted from the capacity that is available in the Midland Grid.

The location was further reinforced by the future demand estimated by Eirgrid as set out in their GRID25 Strategy (published in Oct 2008) which states that by

2025, the demand in the Midlands region is expected to grow by over 40% and a key development of the Strategy is the reinforcement to cater for continued demand growth in the gateway towns of Athlone, Mullingar and Tullamore. The Strategy illustrates at page 14 the expected regional distribution of the percentage renewable generation capacity for the Country. It is expected that the Midland Region will host 3% of this renewable generation capacity. One of the key developments by Eirgrid in the midland region is an additional investment of approximately €310m through upgrading 225km of transmission network and new circuit build.

A number of alternative locations (see drawing 111-001-212-D1) have been considered for the proposed Bio energy Facility. The options are described below and assessed on the basis of Land Use, Proximity to electricity grid, Outlet for heat from electricity production, Landscape and visual capacity, Transport Infrastructure and Residential Amenity.

13.2.2.1 Option 1 – Access from Killucan Road Newdown, The Downs, Mullingar

Proximity to electricity grid

The objective of the Applicant is to locate on a suitable site that has capacity to host in close proximity to Mullingar – Grid Connection Point to produce a 1MW electricity supply. In this option there is an existing 20kVA line available on the site to connect to the national grid.

Outlet for heat from electricity production

In this option for the location of the Bio energy facility has the Downs GAA club, Piggery and Flynn Feeds and Machinery located within 500m of the proposed facility. Although the location of the GAA club is within a viable distance for the transportation of heat to heat the buildings the infrequent use of the building would not make the financial cost viable.

Landscape and visual capacity

In relation to landscape and visual capacity this option is locates the proposed facility adjacent to the Killucan Road R156 will be very visual open nature and located adjacent to existing established residential area. Due to the scale of the proposed development the location of the proposed facility at this location will substantially reduce the quality of the view as compared to the existing situation.

Transport Infrastructure

The main Traffic rational to locate the biomass installation in an area which is served by public road with sufficient capacity to absorb increased traffic flows. The existing Killucan road has the capacity to absorb the increased traffic flow from the proposed development as indicated in the roads and traffic chapter.

Residential Amenity
In this option to locate the biomass installation at this location there is approximately 31 dwellings located with 500m of the proposed boundary. The locating of the facility in this location would have an impact of the residential amenity of these properties due to the close proximately of the facility.

13.2.2.2 Option 2 – Access from the proposed new Killucan/ N4 Grade Separation, Newdown, The Downs, Mullingar

Proximity to electricity grid
The objective of the Applicant is to locate on a suitable site that has capacity to host in close proximity to Mullingar – Grid Connection Point to produce a 1MW electricity supply. In this option there is an existing 20kVA line available on the site to connect to the national grid.

Outlet for heat from electricity production
In this option for the location of the Bio energy facility has community buildings and Flynn Feeds & Machinery located within 300m of the proposed facility. Due to the closeness of these facilities and the heat demand required by the buildings for heating and drying grain Flynn Feeds would make the financial cost viable.

Landscape and visual capacity
In relation to landscape and visual capacity this option locates the proposed facility adjacent to the proposed new Killucan/ N4 Grade Separation, Newdown, The Downs, Mullingar will be very visual enclosed due to the existing commercial buildings to the south of the proposed site. Due to the scale of the proposed development this location of the proposed facility will slight reduce the quality of the view as compared to the existing situation, but only from limited locations along the existing Killucan R156 road. Due to the fact the proposed new Killucan/ N4 Grade Separation is not in existence there is no reduction in quality of the view as compared to the existing situation.

Transport Infrastructure
This option proposes to use the new Killucan/ N4 Grade Separation which was granted planning in early 2011. This will allow for the use of the N4 Dublin-Sligo Road and the Killucan Road R156. for the transportation of materials in and out of the proposed development by the use of the two roads. Although the road has not been construction the applicant will use a temporary access road to the North from the proposed facility to the existing R156 Killucan Road.

Residential Amenity
In this option to locate the biomass installation at this location there is approximately 10 dwellings located with 500m of the proposed

boundary. This proposed location has the least impact on the residential Amenity as there is only 1 dwelling within 350m of the proposed site boundaries. The 1 house is located to the south of the proposed site and is screened from the proposed site by the existing storage sheds on the Flynn Feed site.

13.2.2.3 Option 3- Access from N4, Newdown, The Downs, Mullingar

Proximity to electricity grid

The closest connection point in this option is an existing 20kVA line approximately 950m to the northwest of the site adjoining the existing Genesis retail unit. Due to the distance and the location beside the Royal Canal, which is a Natural Heritage Area, this location would have a substantial reduce the quality of the amenity by the erection of power lines to this connection point.

Outlet for heat from electricity production

In this option for the location of the Bio energy facility has the Piggery and Flynn Feeds & Machinery located the far side of the existing N4 Dual Carriageway. The cost of crossing the existing N4 and the distance to the required building would not make the financial cost viable. On the southwest side of the existing N4 road the main heat demand would be the existing Genesis retail unit. This building is located approximately 950m away from the heat source, coupled with the low heat demand for this building would not make the financial cost viable.

Landscape and visual capacity

In relation to landscape and visual capacity this option is locates the proposed facility adjacent to the existing N 4 will be very visual open nature and located adjacent to Royal Canal which is a Natural Heritage Area. Due to the scale of the proposed development the location of the proposed facility at this location will substantially reduce the quality of the view as compared to the existing situation particularly due to the Royal Canal.

Transport Infrastructure

In this option the access and entry point to the proposed development would be via the N4 national route. As this route is an existing national route controlled by the NRA access from the proposed facility on to the N4 would be against the NRA policies.

Residential Amenity

In this option to locate the biomass installation at this location there is approximately 8 dwellings located with 500m of the proposed boundary. The locating of the facility in this location would have a medium impact of the residential amenity of these properties due to the close proximately of the existing N4 Dual Carriage way.

13.2.3 Alternative Designs

Most problems will be capable of a number of design solutions by varying the site layout, building massing or location of facilities. As the designers were briefed at an early stage about environmental factors, these have been incorporated along with other design parameters in the design of the proposed Anaerobic Digesters.

13.2.3.1 Temperature

Anaerobic digestion is a biochemical process through which biomass or other organic matter is consumed by bacteria and subsequently released in a gaseous state. This process occurs in the absence of oxygen. Different types of bacteria can be used for this process: mesophilic or thermophilic processes, depending on bacterial affinity for intermediate or warm temperatures, respectively. (Temperature – Mesophilic: 38 – 42 °C – Thermophilic: 55 – 65 °C)

Mesophilic Digestion

Mesophilic digestion is the most commonly used process for anaerobic digestion, in particular waste sludge treatment. Decomposition of the volatile suspended solids (VSS) is around 40% over a retention time of 15 to 40 days at a temperature of 30 to 40°C, which requires larger digestion tanks. It is usually the biogas production tends to be less, and additional sanitisation is usually required.

Thermophilic Digestion

Thermophilic digestion is less common than mesophilic digestion. The digester is heated to 55°C and held for a period of a shorter period than Mesophilic Digestion. Thermophilic digestion systems provides higher biogas production, faster throughput and an improved pathogen and virus 'kill', but the technology is more expensive, more energy is needed and it is necessary to have more sophisticated control & instrumentation

13.2.3.2 System

Anaerobic digestion systems can be designed to operate in a number of different configurations Batch or continuous.

Batch

Batch-type digesters are the simplest to build. Their operation consists of loading the digester with organic materials and allowing it to digest. The retention time depends on temperature and other factors. Once the digestion is complete, the effluent is removed and the process is repeated.

Continuous

In a continuous digester, organic material is constantly and regularly fed into the digester. The material moves through the digester either mechanically or by the force of the new feed pushing out digested material. Unlike batch-type digesters, continuous digesters produce biogas without the interruption of loading material and unloading effluent.

Proper design, operation, and maintenance of continuous digesters produce a steady and predictable supply of usable biogas. They may be better suited for large-scale operations.

13.2.3.3 Feedstock

Anaerobic digestion systems can be designed to operate on a number of different configurations for feedstock, Mono-digestion or Co-digestion.

Mono-digestion

In mono-digestion, the substrates can be difficult to digest. Grass for example, having high-fiber content, could cause technical problems being used in continuously stirred tank reactors. Hence, for the mono-digestion of fiber-containing energy crops, a process without agitation is favorable.

Co–digestion

This is the simultaneous digestion of a homogenous mixture of two or more substrates. The most common situation is when a major amount of a main basic substrate (e.g. slurry) is mixed and digested together with minor amounts of a single, or a variety of additional substrates. The expression co–digestion is applied independently to the ratio of the respective substrates used simultaneously. Until quite recently anaerobic digestion was a single substrate, single purpose treatment. For example slurry was digested to produce energy. Nowadays, the limits and the possibilities of Anaerobic Digestion are better known and co-digestion has therefore become a standard technology.

13.2.4 Preferred Process, Location and Design

When the three design options have been exposed and developed. The following conclusions have been reached based on the assessment of the options:

13.2.4.1 Process

Anaerobic Digestion was chosen as the process for the proposed facility due mainly to the following findings, which include:

- Anaerobic Digestion is a proven technology
- The process provides several environmental benefits.
- Digestion of agricultural slurries yields a substance that has a lower pollution

- Electricity generated from biogas displaces fossil fuel generated electricity.
- The process can be used to turn residues from farming and food processing into biogas.
- The process can provide environmental benefits, including reduced water pollution and reduced odours from slurries.

13.2.4.2 Location

The best option in terms of location is Option 2 – Access from the proposed new Killucan/ N4 Grade Separation, Newdown, The Downs, Mullingar. This option meets the requirements for;

- Proximity to electricity grid
- Outlet for heat from electricity production
- Landscape and visual capacity
- Transport Infrastructure
- Residential Amenity

13.2.4.3 Design

Due to the type and the different materials being processed in the digesters, the continuous supply and feeding of the digesters the following has been selected for the Anaerobic Digestion process;

- Thermophilic Digestion
- Continuous
- Co–digestion

14.0 INTERACTION OF THE FOREGOING

14.1 Introduction

Each of the specific natural and environmental parameters has been discussed in detail in their particular section of this Environmental Impact Statement. It is, however, important to consider and identify the interaction of these environmental parameters, as a change to one may affect others. The criteria for the assessment follows that presented in the "*Guidelines on the information to be contained in Environmental Impact Statements*" (EPA 2002)

Impact Quality	**Description**
Negative	A change which reduces the quality of the environment
Positive	A change which improves the quality of the environment
Neutral	A change which does not affect the quality of the environment
Duration of Impact	**Description**
Temporary	Impact lasting for one year or less
Short-Term	Impact lasting one to seven years
Medium Term	Impact lasting seven to twenty years
Long Term	Impact lasting twenty to fifty years
Permanent	Impact lasting over fifty years
Significance of Impact	**Description**
Slight	An impact which causes changes in the character of the environment which are not significant of profound
Moderate	An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends
Significant	An impact which by its magnitude, duration or intensity alters an important aspect of the environment

Table 14.1 EPA Classification Criteria (Source: EPA 2002)

14.2 Significance of Potential Impacts

The potential impacts of the upgrade have been discussed in detail with respect to all aspects of the environment. This section summarises these likely significant effects together with their consequent interaction. Schedule 2 of the EIA 1999 requires consideration of the interactions between the various environmental factors:

> "a description of the aspects of the environment likely to be significantly affected by the proposed development, including in particular;
>
> - human beings, fauna, flora,
> - soil, water, air, climatic factors and the landscape,
> - material assets, including the architectural; archaeological, and cultural heritage

Table 14.2 summarises the environmental impacts and outlines measures that will be used in their mitigation.

	POTENTIAL ENVIRONMENTAL EFFECTS	IMPACT QUALITY	DURATION OF IMPACT	SIGNIFICANCE OF IMPACT
HUMAN BEINGS	**Construction Stage**			
	Alteration of existing land use.	Negative	Temporary	Moderate
	Temporary generation of employment	Positive	Temporary	Moderate
	Temporary increase in existing noise levels for local residents	Negative	Temporary	Slight
	Potential generation of dust close to site boundaries.	Negative	Temporary	Slight
	Slight increase in traffic	Negative	Temporary	Slight
	Operational Stage			
	Direct and indirect generation of employment	Positive	Long Term	Significant
	Sustainable growth of local economy	Positive	Long Term	Significant
AIR QUALITY	**Construction Stage**			
	Generation of dust close to site boundaries	Negative	Temporary	Slight

	Operational Stage			
	Reduction in odour emissions from land spreading	Positive	Long Term	Significant
	It is not anticipated that there will be no negative impact to air quality at the operational stage as long as mitigation measures are implemented.	N/A	N/A	N/A
NOISE	**Construction Stage**			
	Risk of elevated noise and vibration disturbance	Negative	Temporary	Slight
	Operational Stage			
	No impacts identified	Neutral	Long Term	N/A
SOILS, GEOLOGY and HYDROGEOLOGY	**Construction Stage**			
	The removal of surface soils and subsoils could impact the vulnerability of groundwater.	Negative	Temporary	Moderate
	Operational Stage			
	It is not anticipated that there will be no negative impact to soils and groundwater at the operational stage as long as mitigation measures are implemented.	N/A	N/A	N/A
WATER	**Construction Stage**			
	Runoff of suspended solids and other pollutants (oils, lubricants etc.) that could enter local drains resulting in deterioration of water quality.	Negative	Temporary	Moderate
	Operational Stage			
	Surrounding drainage network will benefit from not having to accomohdate runoff from untreated slurries spread on land	Positive	Long Term	Significant
CULTURAL HERITAGE	**Construction Stage**			
	No impacts identified	Neutral	Temporary	N/A

	Operational Stage			
	No impacts identified	Neutral	Long Term	N/A
ECOLOGY	**Construction Stage**			
	Risk of elevated noise and vibration disturbance to fauna	Negative	Temporary	Slight
	Operational Stage			
	Surrounding lands will benefit from the production of organic fertiliser	Positive	Long Term	Significant
LANDSCAPE AND VISUAL IMPACT	**Construction Stage**			
	Possibility that construction traffic and equipment will be visible	Negative	Temporary	Slight
	Operational Stage			
	Facility will be visible from some aspects	Negative	Long Term	Slight
ROADS AND TRAFFIC	**Construction Stage**			
	Increase in construction related traffic	Negative	Temporary	Slight
	Operational Stage			
	Increase in operational related traffic	Negative	Long Term	Slight

Table 14.2 Significance of Potential Impacts

PLATES

Site Location
Supplier / Receiver Locations
Bio energy Process
Trial Pit 1
Trial Pit 2
Trial Pit 3
Field 1, facing north
Field 1, clearance cairn, facing northeast
Field 2, facing north
Field 2, slight rise in the ground (APP 1) facing northeast
Track way located within proposed development area, facing northwest

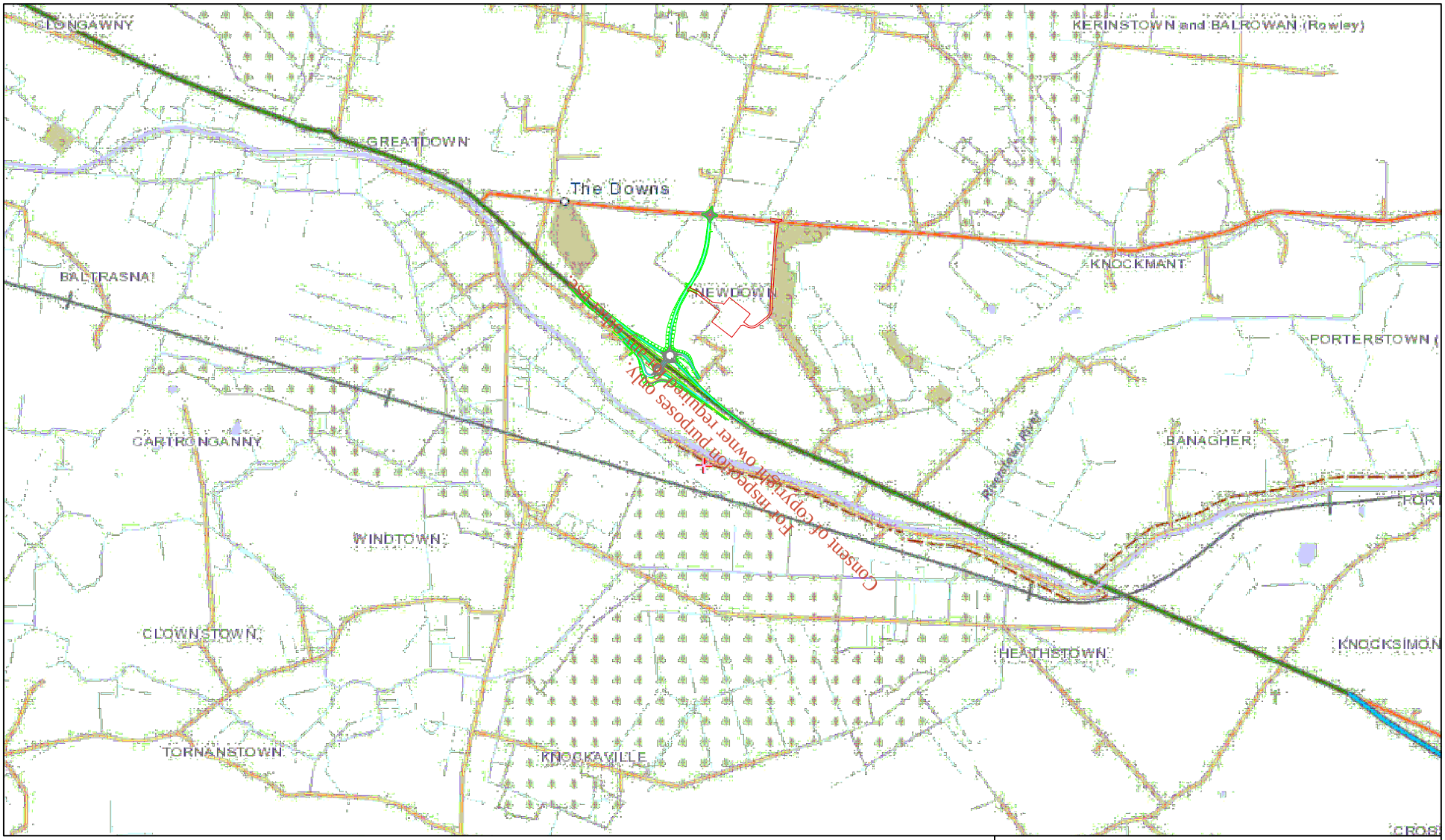
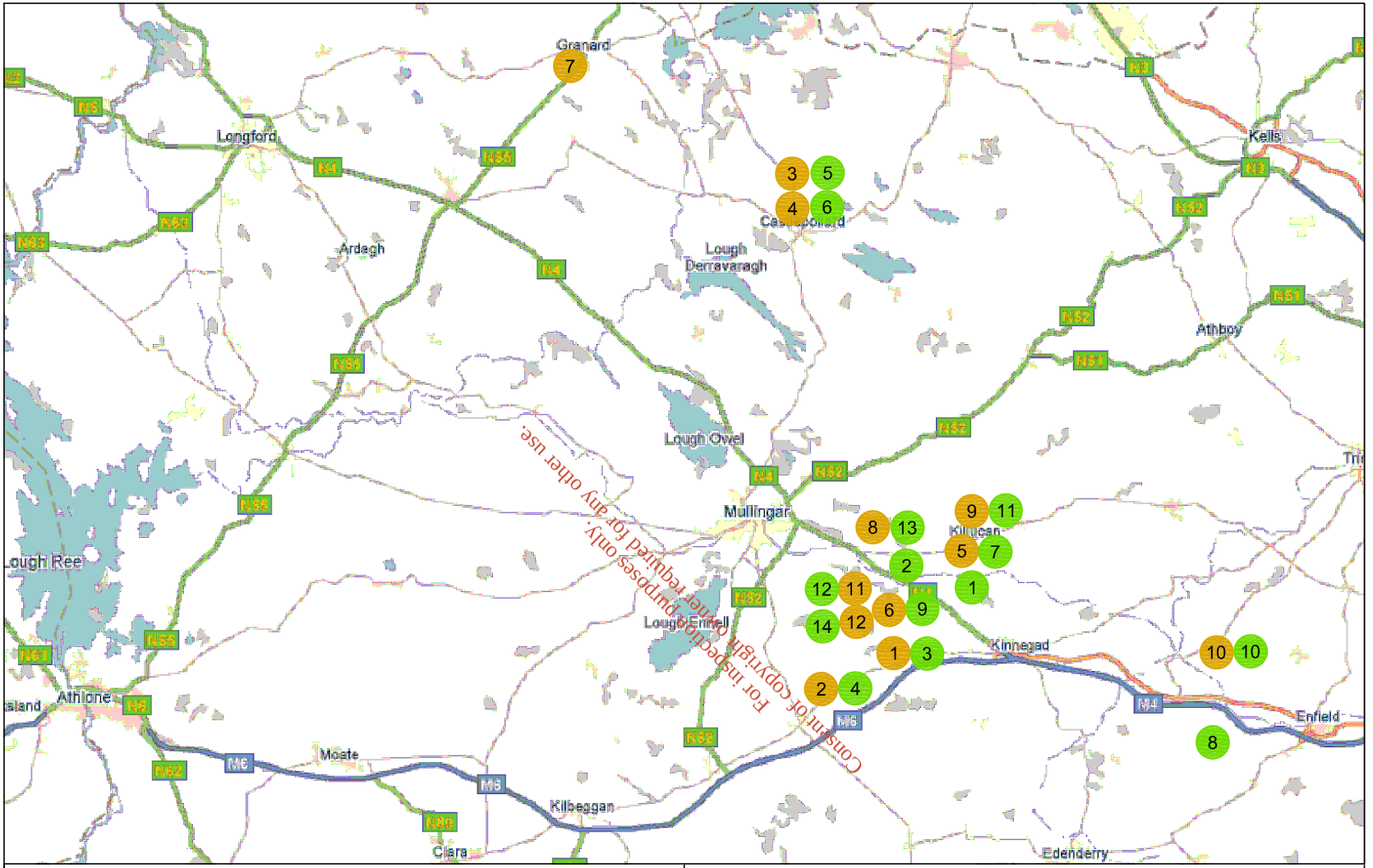


PLATE 1 SITE LOCATION

OSI MAP LICENCE NO. EN0045811



SUPPLIERS OF FEED STOCK	
1 PATRICK A DARDIS- CLONFAD, KINNEGAD	8 PAUL FLYNN- NEWDOWN, THE DOWNS
2 LEO WRIGHT- GORTUAMON MILLTOWNPASS	9 PAUL CONNOR- BALROWAN, KILLUCAN
3 MICHAEL FAY- FREIGHMORE, CASTLEPOLLARD	10 W. BUTTIMER & SONS- DALYSTOWN, LONGWOOD
4 WILLIAM FAY- FREIGHMORE, CASTLEPOLLARD	11 FRANCES FLYNN- LOWTOWN, CORALSTOWN
5 PAT LYNAM- PORTERSTOWN, KILLUCAN	12 MATTHEW GLENNON- HIGHTOWN CORALSTOWN
6 JOHN FLYNN- LOWTOWN, CORALSTOWN	
7 BAKERY WASTE	

RECEIVERS OF PRODUCT	
1 THOMAS CLEARY- BALLINLA, KILLUCAN	8 JOHN SOLLEY- CADAMSTOWN, BROADFORD
2 THOMAS FLYNN- WOODFORT, THE DOWNS	9 JOHN FLYNN- LOWTOWN, CORALSTOWN
3 PATRICK A DARDIS- CLONFAD, KINNEGAD	10 W. BUTTIMER & SONS- DALYSTOWN, LONGWOOD
4 LEO WRIGHT- GORTUAMON MILLTOWNPASS	11 PAUL CONNOR- BALROWAN, KILLUCAN
5 MICHAEL FAY- FREIGHMORE, CASTLEPOLLARD	12 FRANCES FLYNN- LOWTOWN, CORALSTOWN
6 WILLIAM FAY- FREIGHMORE, CASTLEPOLLARD	13 PAUL FLYNN- NEWDOWN, THE DOWNS
7 PAT LYNAM- PORTERSTOWN, KILLUCAN	14 MATTHEW GLENNON- HIGHTOWN CORALSTOWN

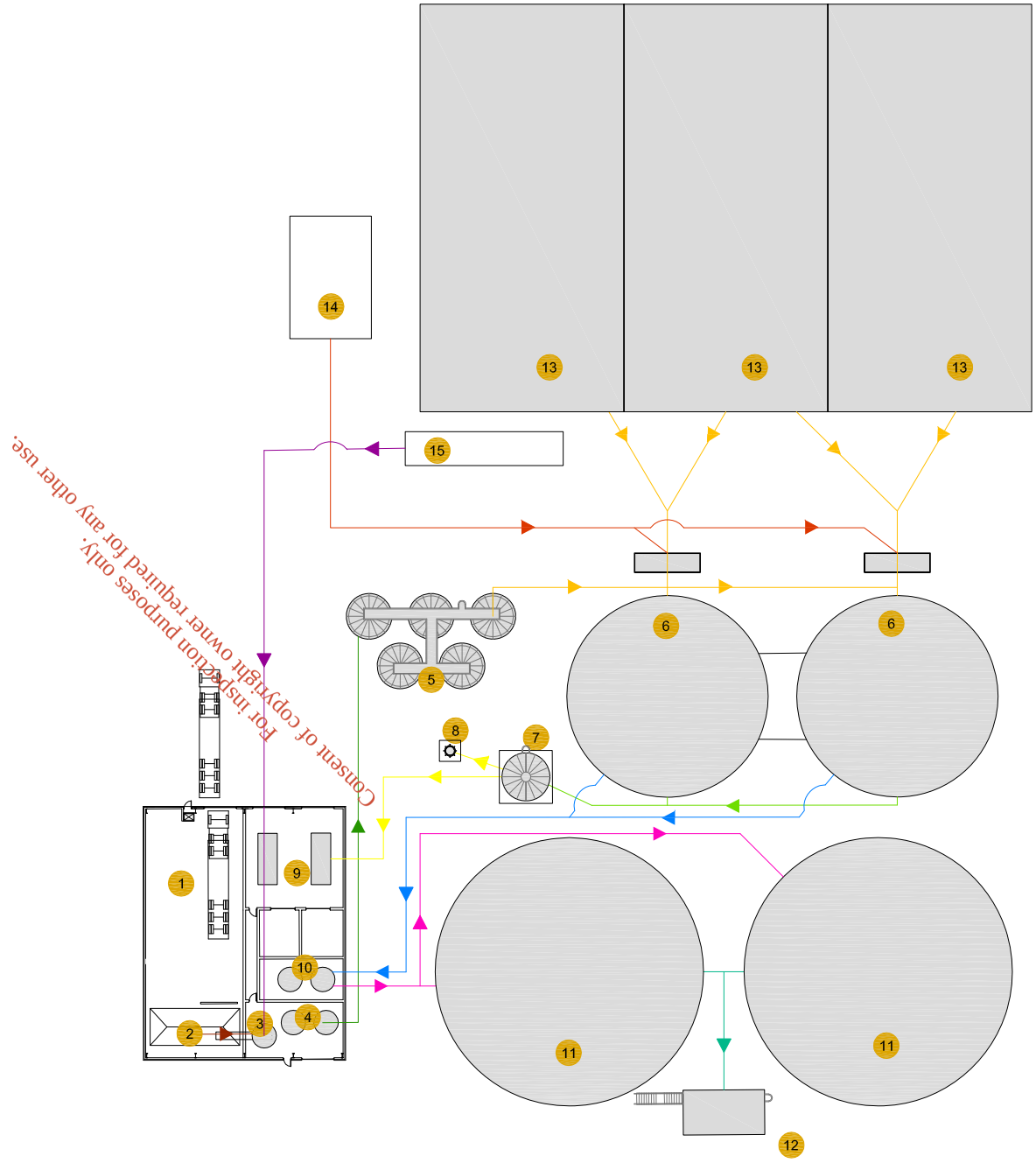
PLATE 2 FEEDSTOCK SUPPLIER / PRODUCT RECEIVER

BIO ENERGY PROCESS

1. DELIVERY AREA
2. WASTE RECEPTION AREA
3. MIXING TANK
4. HYDROLISYS
5. PRE STORAGE TANKS
6. ANAEROBIC DIGESTERS
7. GAS CLEANING VESSEL
8. FLARE
9. ENGINES
10. HYGIENISATION AREA
11. POST DIGESTION STORAGE
12. POST DIGESTION LOADING AREA
13. STORAGE PITS
14. SLURRY TANKS
15. LEACHATE TANK

FLOW OF MATERIAL

2 → 3	DELIVERED WASTE MATERIAL
3 → 4 5	MIXED & HYDROLISYS MATERIAL
5 → 6	PRE DIGESTION MATERIAL
13 → 6	PRE DIGESTION MATERIAL
6 → 7	UNCLEANED GAS
7 → 8 9	CLEANED GAS
6 → 10	POST DIGESTOR MATERIAL
10 → 11	HYGIENISED MATERIAL
14 → 6	HYGIENISED POST DIGESTOR MATERIAL
15 → 3	LEACHATE MATERIAL



REV	INIT	DESCRIPTION
D1	CB	ISSUED FOR PLANNING

marlin architects
DESIGN • ARCHITECTURE • PLANNING • PROJECT MANAGEMENT

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PROJECT TITLE: PROPOSED BIOENERGY FACILITY AT NEWDOWNS, THE DOWNS, MULLINGAR, CO. WESTMEATH

CLIENT:

DRAWING TITLE: PROPOSED PROCESS MAP

DRAWING NO.: 111/001/210
REV.:
AMENDMENT DATE:
PAPER SIZE: A1

DRAWN: CB
CHECKED:
APPD:
SCALE: NTS
DATE: 02/03/2011
STATUS: PLANNING

IS EN ISO 9001:2000 Cert. no. 3324

PLATE 3 BIOENERGY PROCESS

FORM NO FRM-010 REVISION 1 REVISION DATE 27/06/08

PLATE 7.1 TRIAL PIT 1

PLATE 7.2 TRIAL PIT 2

PLATE 7.3 TRIAL PIT 3

Plates

Plate 8.1: Field 1, facing north

Plate 8.2: Field 1, clearance cairn, facing northeast

Plate 8.3: Field 2, facing north

Plate 8.4: Field 2, slight rise in the ground (AAP 1), facing northeast

Plate 8.5: Trackway located within proposed development area, facing northwest

FIGURES