# 3. HUMAN BEINGS

This section examines the potential effects of the proposed extension to the AES facility at Kyletalesha on human beings and the measures proposed to mitigate any potential impacts.

## 3.1. Introduction

The main areas examined with respect to the potential effects of the proposed development on humans are:

- Noise
- Traffic
- Air quality
- Health and safety
- Land use
- Material assets
- Visual impacts

Noise, Traffic and Health and Safety are discussed in this section. Air quality is discussed in Section 4 while visual impacts, land use and material assets are discussed in Sections 9 through 11.



## 3.2. Human Beings in the Existing Environment

There are 10 dwellings within 1 km and two within 500 m of the site boundary. The distances for each of these houses in relation to the proposed site are listed in Table 3.1.

**Table 3.1: List of Nearest Dwellings to the Site**

| House No. | Approximate Distance from Site Boundary |
|---|---|
| 1 | 398 |
| 2 | 338 |
| 3 | 532 |
| 4 | 664 |
| 5 | 696 |
| 6 | 753 |
| 7 | 563 |
| 8 | 820 |
| 9 | 905 |
| 10 | 981 |

The site is located in the townlands of Kyletalesha and Kyleclonhobert, approximately 4 km north of Portlaoise and *c*.5 km south of Mountmellick. The site is located just off the N80 – Portlaoise – Tullamore Road and is accessed by a local road (L-2117-0). Figure 3.1 shows the location of the nearest residences to the proposed site.

A number of small settlements exist in the locality. These include Deeygile (*c.*2.1 km to the north), Larkins Cross (*c.*1 Km to the north-west), Derrydavy (*c*. 1.5 km to the north-east). These settlements are generally ribbon developments.

There are no hospitals, schools or hotels within 1 km of the site. The nearest hospitals are St. Vincent's Hospital, Mountmellick (3.5 km to the north) and Portlaoise General Hospital (4 km to the south of the site). The nearest hotels and schools are those located in Portlaoise and Mountmellick.

There are a number of facilities located in the vicinity of the site. These include two knackeries to the south-west, a non-hazardous landfill (Kyletalesha landfill) to the north with coniferous forestry to the south. The current land use of the proposed extension area is peatland.


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**House Locations**

**Figure 3.1**

## 3.3. Noise

### 3.3.1. Introduction

This section describes the noise impact assessment of the proposed waste management facility. The assessment covers the waste management facility, and includes both development options being proposed, that is aerobic and anaerobic digestion.

This assessment consists of baseline noise measurement, noise prediction model, impact assessment, and recommends mitigation measures. Baseline measurements have been taken at each of the noise sensitive locations near the proposed facility and at the site boundary to determine the existing noise levels.

Each of the major noise sources on the site has been identified and reference sound level data for each source has been identified. This data has been used to develop a noise prediction model of the facility. The noise model methodology is used to calculate contribution of the facility to the noise levels at the noise sensitive locations. In addition to assessing the impact of the facility on baseline noise levels, Environmental Protection Agency noise guidelines have been used as the appropriate noise impact criteria in establishing the significance of impacts.

Noise modelling was carried out without any specific mitigation measures directed at the noise sensitive locations (e.g. noise barriers, earth bunds). The noise assessment predicts noise levels at the noise sensitive locations and in the area in general, in the form of noise contour mapping. Where the model shows the noise levels at a noise sensitive location will exceed a recommended or statutory noise criterion, mitigation measures are proposed. A further iteration of the model is run to demonstrate the efficiency of any mitigation measures.



### 3.3.2. Noise and the Characteristics of Sound

To assist in the understanding of the terms, measurement methods, and assessment criteria used in this report, the following is a brief introduction to the fundamental terms of noise.

Noise is defined as unwanted sound. The impacts of noise are subjective and can vary from person to person. Noise factors such as the frequency, tonal aspects, patterns, existing background noise levels, and the activities being carried out when the person experiences the noise all impact on the impacts of the noise levels experienced by people.

Noise is measured as sound pressure levels; the unit of sound pressure level is the decibel (dB). This is calculated as a logarithm of sound. A change of 10 dB corresponds approximately to halving or doubling the loudness of sound. The use of decibels (A-weighted), dB (A), as the basic unit for general environmental and traffic noise is widely accepted.

Decibels measured on sound level meters incorporating this frequency weighting, differentiates between sounds of different frequency in a manner similar to the human ear. That is measurements in dB (A) broadly agree with human beings assessment of loudness. It has been demonstrated that noise levels in dB (A) from a wide range of sources adequately represent loudness.

Sound pressure levels are not directly added to one another, that is, if a sound level of 30 dB is added to another sound level of 30 dB the combined sound level is not a doubling to 60 dB. Rather, as a result of the logarithmic scale, the combined sound level would be 33 dB. Thus every increase of 3 dB represents a doubling of sound energy levels. Related to this, is the fact that the smallest noise change detectable by the human ear is three decibels.

Another property of the sound decibel scale is that if a sound is more than 10 dB less than another sound, then the total noise level is simply the louder of the two noises. For example, the combined noise level from a source at 30 dB added to another source at 40 dB is 40 dB. As a result, noise assessments are limited to the loudest sources on a site, which determine the sound levels experienced at the noise sensitive locations.

To assist in the understanding of the noise measurement scales, Table 3.2 is presented below. This gives the decibel scale (dB(A)) and some common place activities which would typically give rise to Environmental Noise at these decibel levels.

**Table 3.2: Approximate Representative Noise Levels**



| Situation/Noise Source | Approximate Noise Level dB(A) | Sound Pressure μPa | Subjective Description |
|---|---|---|---|
| 30 metres from a military jet aircraft take-off | 140 | 200,000,000 | Painful, intolerable |
| Rock/ Pop concert | 105 | 3,500,000 | |
| Nightclub | 100 | 2,000,000 | |
| Pop/ Concert at mixer desk | 98 | 1,600,000 | |
| Passing Heavy Goods Vehicle at 7 m | 90 | 630,000 | Very noise |
| Ringing Alarm Clock at 1 m | 80 | 200,000 | |
| Domestic Vacuum cleaner at 3 m | 70 | 63,000 | Noisy |
| Business Office | 60 | 20,000 | |
| Normal Conversation at 1 m | 55 | 11,000 | |
| Reading room of the British National Museum | 35 | 1,100 | |
| Bedroom in a quiet area with the windows shut | 30 | 360 | Very quiet |

**Table 3.2: Approximate representative Noise Levels Cont'd….**

| Situation/Noise Source | Approximate Noise Level dB(A) | Sound Pressure μPa | Subjective Description |
|---|---|---|---|
| Remote location without any identifiable sound | 20 | 200 | |
| Theoretical threshold of hearing | 0 | 20 | Uncanny Silence |

Noise level and frequency varies constantly with time. It cannot be described with a single number. As a result, statistical metrics are commonly used to describe the noise levels.

In order to understand the terms used in this report, some definitions of the terms used are outlined as follows:

**$L_{AF10}$** Refers to those noise levels in the top 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period. It is used to determine the intermittent high noise level features of locally generated noise and usually gives an indicator of the level of traffic.

**$L_{AF90}$** Refers to those noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level.

**$L_{Aeq}$** The average level recorded over the sampling period. The closer the LAeq value is to either the LAF10 or LAF90 value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.



**Impulsive noise:** a noise of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background.

**Tonal noise:** A noise source that is concentrated in a narrow band of the frequency spectrum.

A-weighted sound levels emphasise the middle frequencies of the noise spectrum, while putting less emphasis on the higher and lower frequencies. This emulates the way that the human ear responds to sound. A-weighted sound pressures are designated by 'dB(A)'.

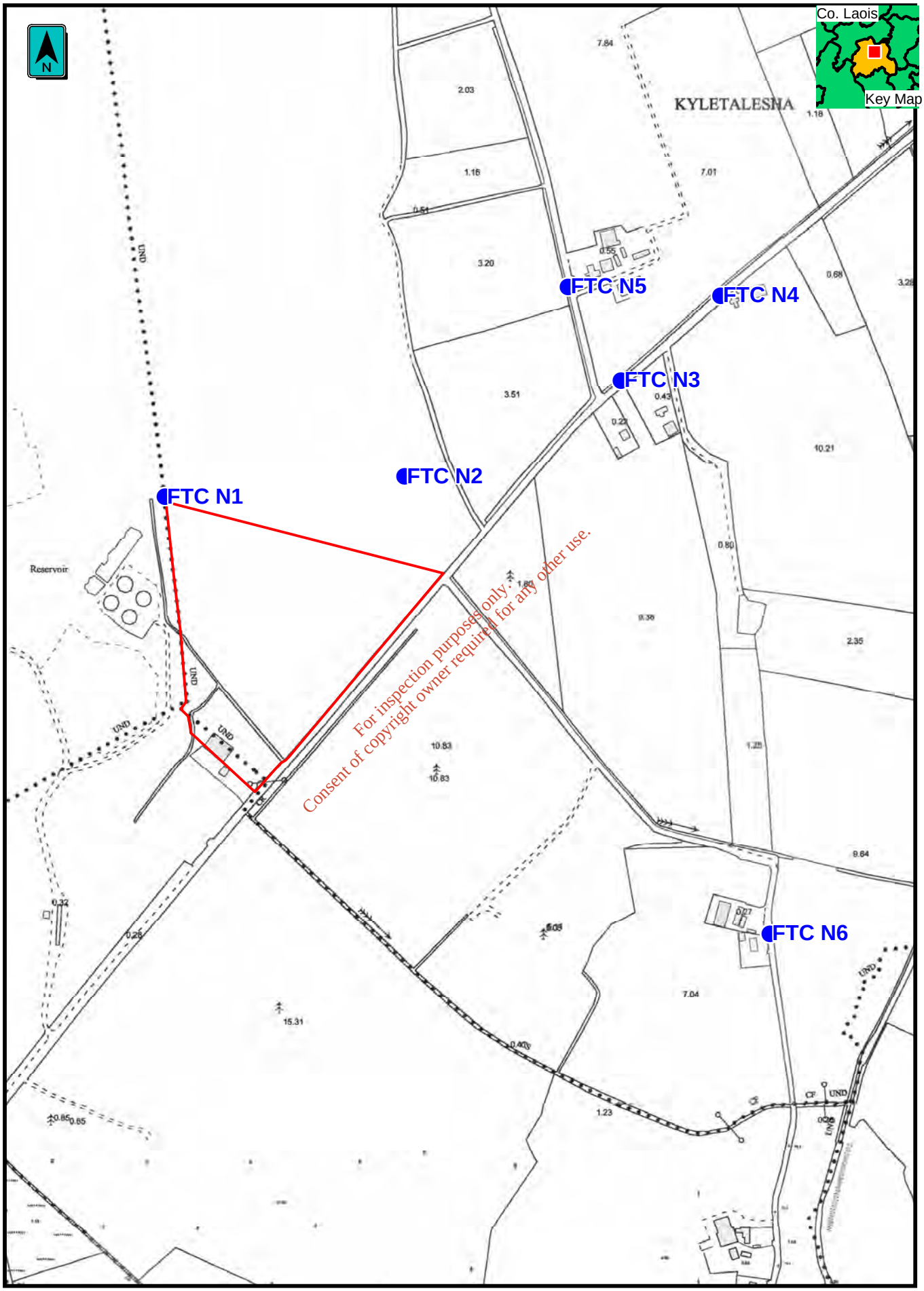
### 3.3.3. Description of the Existing Environment

The site is located c. 300m from the N80 - Portlaoise to Tullamore Road. Ground levels on the site are currently between 80 m and 82 m OD. The land levels in the vicinity are generally flat, varying by as little as 20 m over a 2 km radius around the site. The noise measurements were taken at the boundary (N1 and N2) of the site and at the nearest noise sensitive locations to the proposed site (N3 – N6). In total, six locations were monitored for noise levels. The locations of the noise monitoring locations are shown in Figure 3.2.

Noise surveys were carried out during the daytime and night-time. Both noise surveys were carried out using a Brüel and Kjær 2260 Type 1 Sound Level Meter (SLM). The instrument was calibrated prior to commencing the survey using the recommended calibration procedure and a known pure tone noise source. In addition the SLM is calibrated every two years by an external, independent laboratory; the most recent calibration was carried out by Bruel & Kjaer on the 7th June 2006. Good measurements require calm conditions to avoid spurious effects on the microphone, particularly at low frequencies.

Measurements were taken on the site during two monitoring events. Night-time noise was monitored on 20th April 2006 and daytime noise was measured on the 7th July 2006.

The wind speed was measured between 1.0 – 2.0 m/s during all measurements on both monitoring occasions. All measurements were taken outdoors, and are considered representative of the noise regime in the region. To minimise the influence of reflections all measurements were taken at least 3.5 m from reflecting surfaces, other than the ground. The microphone was located 1.5 m above ground level for all measurements. The noise meter was calibrated prior to and again after monitoring. No drift was recorded for the monitoring event.




# Noise Monitoring Locations

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**Figure 3.2**

### 3.3.4. Results of Baseline Noise Measurements

Existing noise in the vicinity of the site is largely dominated by the landfilling operations at Kyletalesha Landfill and operations at the existing AES facility, with noise sources such as waste handling, machinery working on site and vehicles accessing the facilities. There are also two knackeries immediately south of the existing waste transfer station and activities at these sites include deliveries and machinery operations.

A description of the position of each noise monitoring location is given below.

***N1 (E245425, N202821)*** – N1 was located to the north of the existing waste transfer station along the western boundary of the proposed extension. This location was approximately 360 m northwest of the existing AES facility. Noise from both the landfill and the existing waste transfer station were recorded during this monitoring event. These included vehicles reversing, machinery in operation and the operation of a temporary generator and shredder at the transfer station. Background noise includes those typical of a rural environment e.g. bird song. Distant traffic on the N80 was also audible at this location. A $L_{Aeq}$ of 47.9 dB was recorded at this location.

***N2 (E245729, N202847)*** – N2 was located on the north eastern boundary of the proposed extension approximately 100 m from the local road. The existing AES facility and adjacent landfill were visible from this location. An elevated $L_{Aeq}$ of 48.9 dB was recorded at this location. Operational activities at the waste transfer station were again the dominant noise during this monitoring event e.g. the on-site generator & shredder. Intermittent peaks were recorded from vehicles, particularly HGVs, along the minor road.



***N3 (E246003, N202968)*** – This monitoring location was adjacent to a private residence to the northeast of the proposed extension. The house is located on a minor road approximately 240 m to the boundary of the proposed extension. The noise meter was positioned at the entrance gate to the private dwelling which was approximately 4 m from the minor road. The $L_{Aeq}$ was 61.7 dB, with a $L_{AF10}$ of 57 dB. This shows that the location was subject to elevated noise events associated with the passing road traffic. Background noises included bird song and activities at the waste transfer station. The 90$^{th}$ Percentile background noise level ($L_{AF90}$) was 41 dB.

***N4 (E246129, N203076)*** – N4 was located at the entrance to a private dwelling which is also located along the minor road approximately 400 m from the boundary of the proposed extension. The noise level recorded at this location 66.3 dB, with a LAF10 level of 58.8 dB. Traffic travelling along the minor road was the dominant noise source recorded during the monitoring event.

***N5 (E245936, N203087)*** – A noise level of 53.7 dB(A) was recorded at N5 which was located adjacent to a private house which is approximately 150 m east of the minor road. Background noises at this location included cattle in the adjacent fields and nearby sheds and bird song in surrounding hedgerows and vegetation. The operation of the AES generator & shredder was slight audible at this location. Again the dominant noise source was traffic movements along the minor roads. Tables 3.3 and 3.4 summarise the levels recorded at each location.

**Table 3.3: Results of Baseline Noise Assessment – Daytime Noise**

| Location | $L_{Aeq\ (30\text{-}min)}$ (dB) | $L_{AF10}$ (dB) | $L_{AF90}$ (dB) |
|---|---|---|---|
| N1 | 48 | 50 | 44 |
| N2 | 49 | 51 | 44 |
| N3 | 62 | 57 | 41 |
| N4 | 66 | 59 | 37 |
| N5 | 54 | 50 | 40 |
| N6 | 57 | 58 | 39 |

**Table 3.4: Results of Baseline Noise Assessment – Nighttime Noise**

| Location | $L_{Aeq\ (30\text{-}min)}$ (dB) | $L_{AF10}$ (dB) | $L_{AF90}$ (dB) |
|---|---|---|---|
| N1 | 45 | 48 | 38 |
| N2 | 45 | 46 | 35 |
| N3 | 53 | 46 | 32 |
| N4 | 46 | 48 | 45 |
| N5 | 42 | 44 | 34 |

## 3.3.5. Assessment of Potential Significant Impacts

*Assessment Methodology*

A site wide noise model was used to calculate the noise contribution from the operational phase activities at the site. The noise impacts associated with stationary (or minimal movement) sources at the processing facility and unloading areas were predicted using the ISO 9313-2 module of the Brüel & Kjær Predictor v5.04 environmental noise prediction model.

The model allows for the octave band calculation of noise from multiple sources, includes diffraction and reflection around buildings, terrain effects, and ground region effects. In this manner all significant noise sources and propagation effects are accounted for in the model.

The modelling conservatively assumes that all sources will be operating simultaneously. The reality is that many of the sources will only operate intermittently. This makes the assessment a conservative exercise. The geographical features of the region have been imputed into the model. This includes site structures, existing and proposed structures, neighbouring structures, residential dwellings, and 10 m ground contours. Receptor grid has been located at 1 km around the site, at a reference height of 1.5 at 10 m x 10 m intervals.



*Construction Phase Impacts - Assessment Criteria*

There are no legal or statutory criteria relating to the maximum permissible noise levels which may be generated by construction projects. Normally the local authority controls noise emissions/nuisance by imposing construction time limits on sites. They may also, at their discretion impose noise limits for the construction phase by means of planning permission conditions.

The only published guidelines on construction noise are National Roads Authority indicative noise values. Only daytime values are given, as construction outside of the times below is not proposed on this project:

**Table 3.5: National Roads Authority Construction Phase Noise Guidelines**

| Day & Time | $L_{Aeq(1\ hr)}$ dB | $L_{pA(max)slow}$ dB |
|---|---|---|
| Monday to Friday<br>07:00 to 19:00 hrs | 70 | 80 |
| Saturday<br>08:00 to 16:30 hrs | 65 | 75 |

However, the site will remain a licensed facility under waste licence 194-1. This requires that the noise levels at any noise sensitive location does not exceed 55 dB(A) $L_{Aeq}$ (30-minutes) during daytime.

*Noise Impacts during Construction*

The construction phase of this project will consist of earthworks, piling and building construction. Each phase of the construction will entail the use of different machinery and plant, across various locations on the site. The earthworks phase will include the import of significant quantities of clean fill material. Heavy plant such as excavators, bulldozers and trucks will be used to move and place the imported material. Rollers and compactors will be used to level and compact the material. Depending on the outcome of detailed site investigations, the foundations of the buildings may need to be piled. These investigations will be carried out at the detailed design stage.

Construction noise will be temporary. The likely programme for construction of the site will be scheduled to run for 12 – 18 months. Normal construction working hours will be limited to the daytime, and it is not anticipated that night-time construction works will be necessary on this project. As the exact construction methods and approach are not known at this stage it is not proposed to model the construction noise. The impacts will be limited in duration, and considering the existing high levels of noise (traffic noise), it is not considered that the construction will result in significant impacts at the noise sensitive locations.



During the construction phase of the development, the noise on the site will be managed so as to reduce any impacts on the local noise sensitive locations. The site operations will be conducted using best practice methods (e.g. BS 5228:1997 Noise and Vibration Control on Construction and Open Sites). Control of construction noise will include measures to control noise form construction plant, equipment, and activities at source. Particularly noisy activities will be carefully planned and times to cause the least impact. Noise monitoring will be carried out as necessary during construction phase to ensure the site is operating without undue noise impact.

Construction plant and equipment used during the construction phase will comply with noise regulations on outdoor plant and machinery.

*Operational Phase Impacts*

The results of the noise model are compared with noise criteria. This allows the impact of the predicted noise levels on the receptor(s) to be objectively assessed. The comparison focuses on the noise level predictions at the nearest noise sensitive locations to the facility, since the EPA criteria apply at these receptors.

Schedule C of the current waste licence (ref. 194-1) sets the following noise limits (measured at any noise sensitive location);

**Table 3.6: Noise Emission Limits (Measured at any noise sensitive location)**

| Day dB(A) $L_{Aeq}$ (30 minutes) | Night dB(A) $L_{Aeq}$ (30 minutes) |
|---|---|
| 55 | 45 |

In addition to the waste licence criteria, an assessment of the likelihood of complaints is made by analysing the difference in measured background levels from the predicted environmental concentrations. The greater the difference between the noise levels, is the greater the likelihood of complaints. The following assessment criteria are used;

**Table 3.7: Noise Assessment Criteria**

| Difference over Baseline | Impact |
|---|---|
| +10 dB | Complaints are likely |
| + 5 dB | Marginal Significance |
| < 5 dB | Complaints are unlikely |



## 3.3.6. Noise Scenarios Modelled

A total of four noise scenarios were modelled to assess the impacts of the two proposed alternative site layouts. Firstly, a daytime model and a night-time model of the aerobic configuration of the site were modelled. Secondly, a daytime model and a night-time model of the anaerobic configuration of the site were modelled.

During the daytime models the noise sources included the delivery trucks on the site and the outdoor operation of mobile plant, such as wheeled loaders and screening equipment in the compost storage area. For night-time operations is was assumed that all of the activities at the site were contained indoors and the main sources of noise were the air handling units on the maturation building and the motors and fans associated with the Bedminster Digester.

The noise sound levels for the most significant sources on each of the alternative site layouts have been assessed in the noise model. The noise sources associated with the operation of the various facilities include:

- the deliveries of material to the site for treatment
- loading of waste within the tipping hall
- material handling within the waste transfer facility
- plant and air handling equipment, including motors, fans, and pumps.
- collection of final product from the site

The designers estimate that a delivery vehicle will arrive at the site on an average interval of 15 minutes. Delivery trucks will drive into the tipping area. From here, the material will be inspected and, if acceptable, will be tipped on the tipping floor. The waste is received entirely within the building envelope. The mechanical plant within the hall comprises mainly of conveyors.

Noise impacts within the building are mitigated by the building construction. The insulation of the walls and roof of the hall will mitigate noise impacts from this equipment.

The waste handling noise originates from the wheel loader used to move the waste within the reception area onto the conveyors. The noise emissions are due to engine noise and the reversing siren mounted on vehicles.

The Bedminster Digesters at this site will be continuous feed-systems and will therefore operate on a 24-hour basis. The plant rooms will be located within the building and are insulated to mitigate noise from motors and fans. The digesters themselves are insulated and robustly constructed, and will form an effective barrier to noise propagation. The compost process requires air to be drawn through the digester. The air fans that move the air will be a noise source.

After the Bedminster Digester, the material will be conveyed along a fully enclosed conveyor system to the compost maturation hall or to the anaerobic digester area. If composting, when the composting process is complete, the compost will be moved to the compost storage area. Again, some post-treatment of the compost may be required, such as, sieving and grading etc. The finished compost will then be loaded into trucks within the post-treatment area of the building, prior to being transported from the site. The only significant outdoor activity will be the handling of the waste in the compost storage area. In this case the outdoor activates will occur within the yard area. The yard is surrounded on all sides by 10 m high buildings which will act as sound barriers.



Reference sound level data from each significant source on the site has been collected. The data has been sourced from literature, FTC file measurements from similar sites/equipment, and potential equipment suppliers. The reference sound levels used in the model are shown in Table 3.8 - Table 3.9 overleaf.

**Table 3.8: Reference Noise Sources for Aerobic Composting Process**

| Source | Lw (dB(A) | Comments |
|---|---|---|
| Trucks | 107 | < 20 km/h @ ~ 13 veh/h |
| Wheeled Loader | 96 | Working externally (compost storage area) |
| AHU Fans | 115 | x2 located on roof of maturation hall |
| Electric Motors | 72 | x2 located on each Bedminster Digester |
| Digester Fans | 61 | x2 located on each Bedminster Digester |

**Table 3.9: Reference Noise Sources for Anaerobic Digestion Process**

| Source | Lw (dB(A) | Comments |
|---|---|---|
| Trucks | 107 | < 20 km/h @ ~ 13 veh/h |
| Anaerobic Digesters | 72 | x4 digestion units |
| Gas Combustion Engine | 122 | Acoustically Housed; 84 dB(A) emission |
| AHU Fans | 115 | x2 located on roof of AD process area |
| Electric Motors | 72 | x2 located on each Bedminster Digester |
| Digester Fans | 61 | x2 located on each Bedminster Digester |



*Model Results*

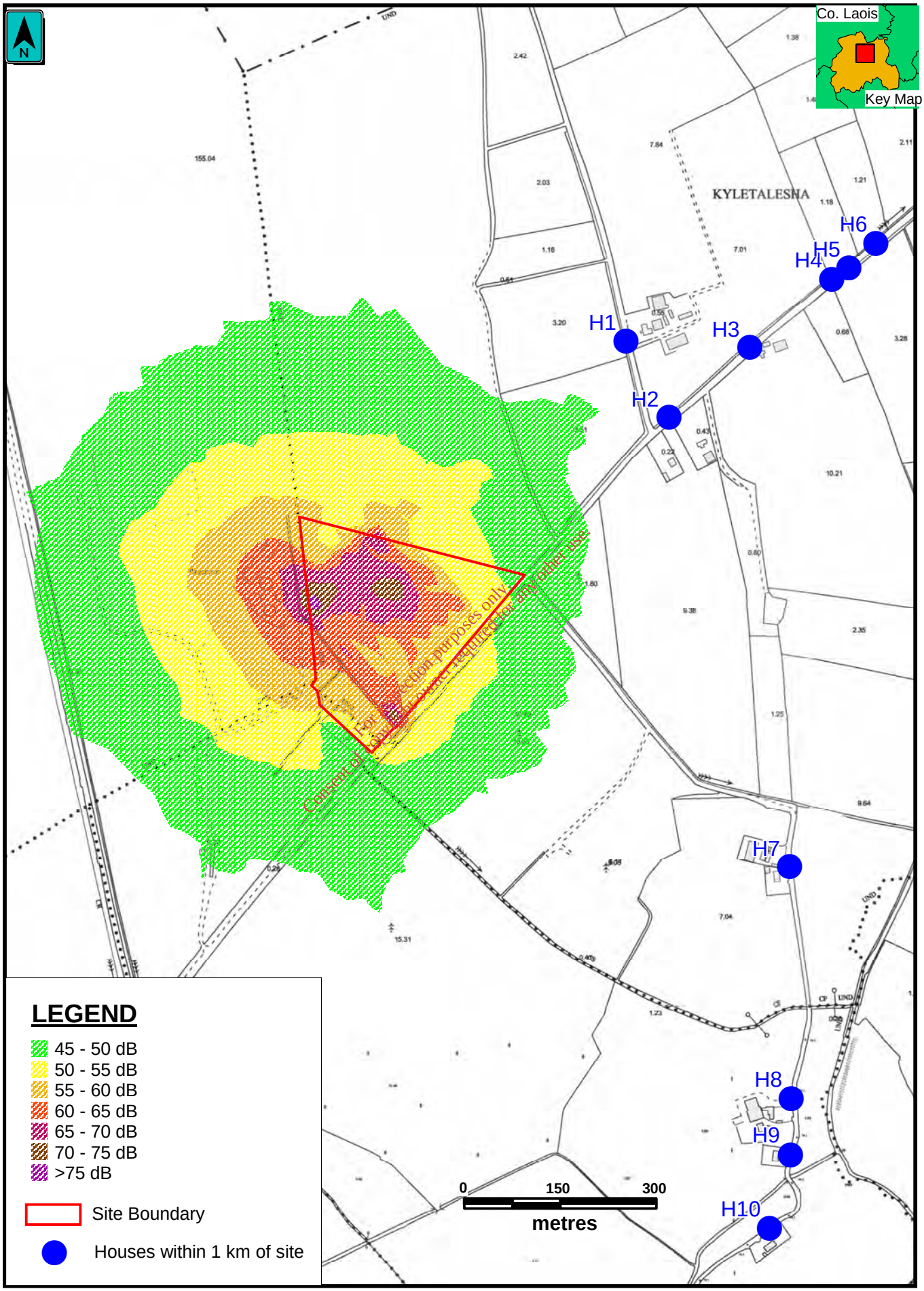
The results of the model are shown in Table 3.10 and 3.11 below. The Figures 3.3 and 3.4 show iso-plots for daytime noise levels predicted contributions for the aerobic and anaerobic site configurations respectively. The noise isopleths plot figures show the predicted noise emissions from the operational facility.

Table 3.10 and Table 3.11 show the baseline noise levels, the contribution of the new facility as calculated in the model, and in the right hand column the predicted environmental noise level (PEL) is calculated from the logarithmic addition of the predicted contribution to the baseline. This model calculates a worst-case scenario.

**Table 3.10: Predicted Noise Levels for the Aerobic Composting Process**

| **Aerobic Daytime ($L_{Aeq, T}$)** | | | |
|---|---|---|---|
| **Location** | **Baseline, dB(A)** | **Contribution, dB(A)** | **PEL, dB(A)** |
| N1 | 48 | 55 | 56 |
| N2 | 49 | 50 | 53 |
| N3 | 62 | 41 | 62 |
| N4 | 66 | 40 | 66 |
| N5 | 54 | 41 | 54 |
| N6 | 57 | 38 | 57 |

| **Night-Time ($L_{Aeq, T}$)** | | | |
|---|---|---|---|
| **Location** | **Baseline, dB(A)** | **Contribution, dB(A)** | **PEL, dB(A)** |
| N1 | 45 | 55 | 55 |
| N2 | 45 | 50 | 51 |
| N3 | 53 | 41 | 53 |
| N4 | 46 | 39 | 47 |
| N5 | 42 | 41 | 45 |




# Daytime Noise (Aerobic)

**Figure 3.3**

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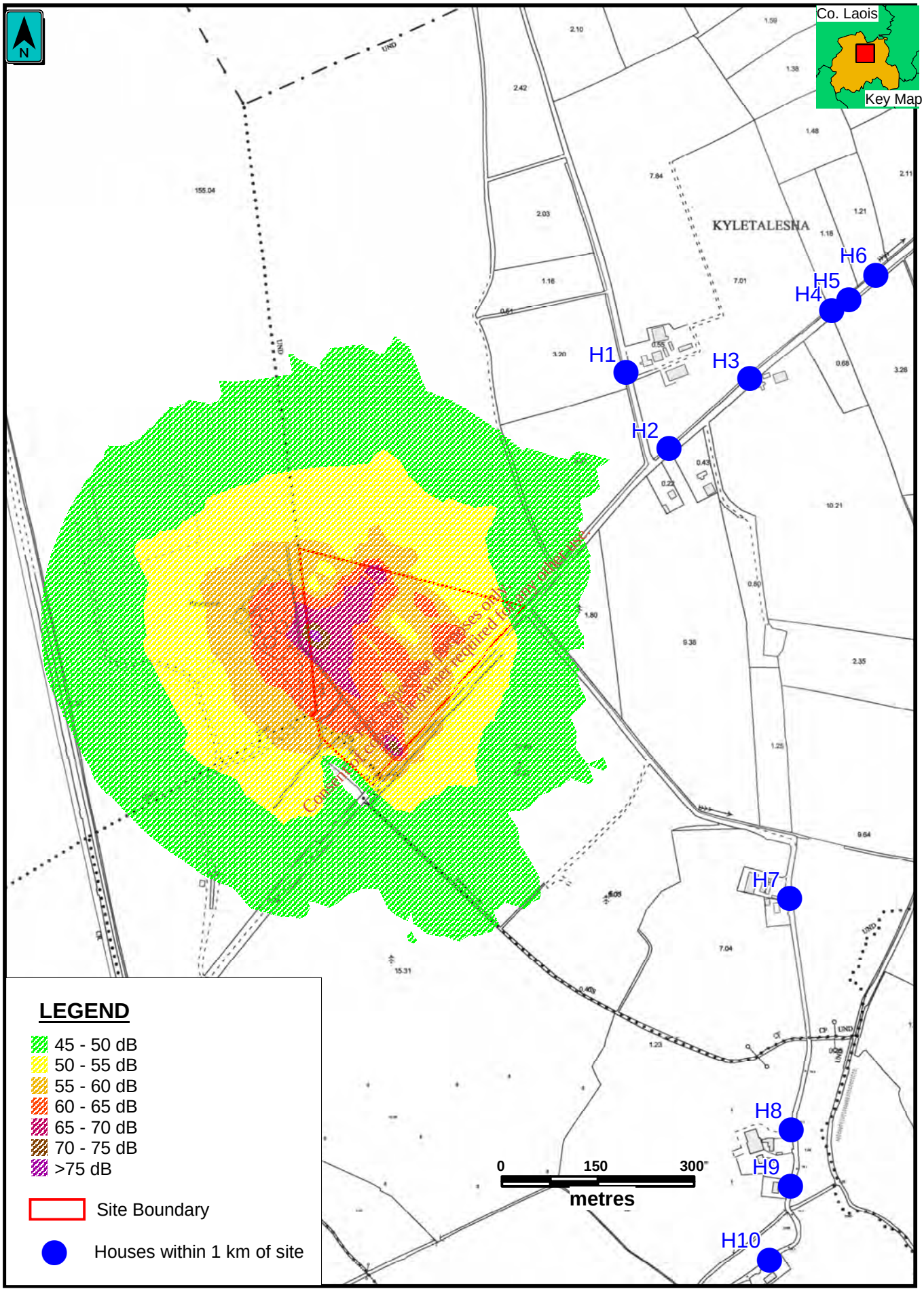
**Table 3.11: Predicted Noise Levels for the Anaerobic Digestion Process**

| **Daytime ($L_{Aeq, T}$)** | | | |
|---|---|---|---|
| **Location** | **Baseline, dB(A)** | **Contribution, dB(A)** | **PEL, dB(A)** |
| N1 | 48 | 54 | 55 |
| N2 | 49 | 50 | 53 |
| N3 | 62 | 42 | 62 |
| N4 | 66 | 41 | 66 |
| N5 | 54 | 40 | 54 |
| N6 | 57 | 39 | 57 |
| **Night-Time ($L_{Aeq, T}$)** | | | |
| **Location** | **Baseline, dB(A)** | **Contribution, dB(A)** | **PEL, dB(A)** |
| N1 | 45 | 54 | 55 |
| N2 | 45 | 50 | 51 |
| N3 | 53 | 42 | 53 |
| N4 | 46 | 41 | 47 |
| N5 | 42 | 40 | 44 |




# Daytime Noise (Anaerobic)

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**Figure 3.4**

*Interpretation of Results*

The predicted noise levels at the site, for both configurations will not result in a significant increase in the noise levels at the nearest noise sensitive locations. Noise levels will not increase greater than 3 dB (A) at any noise sensitive locations. In the majority of cases the increase is less than 1 dB(A). Humans do not perceive changes in noise less of than 3 dB.

The largest impact is at N5 at night, for the aerobic site layout where night-time noise levels would increase from 42 dB(A) to 45 dB(A), which will be just perceptible, and is not considered to be a significant impact. The model is a conservative, worst-case assessment and the actual noise contribution from the site is likely to be less.

*Noise Impact associated with off-site Traffic*

New operations at the site will result in an increase in traffic levels along the N80 – L-2117-0 route (Traffic Impact Assessment, Section 3.4). The existing AADT traffic flow along the L-2117-0 is between 1,300 and 1,900 vehicles per day. 23 % of the vehicles are classified as heavy goods vehicles (HGV). The operations at the site are predicted to result in a net increase of 53 vehicles per day along the route.

The existing peak hour flow for the L-2117-0 is 61 vehicles in the hour 12:00 to 13:00 hrs. In the traffic impact assessment the projected peak flow of vehicles to the site is 15 vehicles per hour, of which nine are heavy goods vehicles and six are light vehicles.

The existing traffic flow in the peak hour is predicted (using CRTN method) to have an basic noise level at a reference distance of 10 m of 64 dB(A). This correlates well with the baseline noise results taken at N3, which is located approximately 10 m from the local road. When the predicted operational traffic peak hour flow is added to the peak hour flow of the existing baseline traffic, the levels are 76 vehicles/hour with a 29 % HGV component. Calculating the basic noise level at a reference distance of 10 m for this traffic flow gives an emission level of 65 dB(A). A change in sound levels from 64 dB(A) to 65 dB(A) is less than a 3 dB difference and as a result is imperceptible to the human ear. An increase in traffic levels, as predicted in the traffic impact assessment, will have an imperceptible impact on the noise emissions from the local road network.



## 3.3.7. Proposed Mitigation Measures

*Construction Phase*

The following noise mitigation measures are recommended for the construction phase of the project:

- A noise management plan should be developed for the construction phase to ensure that best practice in the reduction of noise the construction phase.
- Construction operations should be limited to daytime, and work on Sundays and Bank Holidays should be avoided, save for emergency situations.

*Operational Phase*

The impact assessment of the predicted noise levels from the operation of the facility shows that there is not likely to be any significant impacts on the noise environment from the site. To ensure that the noise levels from the site are minimised a number of features will be incorporated during the detailed design and management of the facility.

- All waste truck delivering waste to the site will unload waste in the indoor waste reception hall. The waste reception hall will have automated roller doors which will open to allow access by trucks then close immediately behind the truck as it enters/exits the building.
- The majority of the waste handling operations at the site will occur indoors. The most significant outdoor activity will be the handling and screening of the compost product in the compost storage area of the aerobic system. This will only occur in the yard area and the surrounding building will act as a sound barrier.
- During the night period (22:00 – 07:00) all waste handling activities will happen indoors. The main vehicle access doors of the facility shall be closed during the night period operations. No waste should be delivered to the site during the night period.
- The speed limit on the site for all vehicles will be a maximum limit of 20 kph.
- The AHU Fans will be surrounded by acoustic housing
- In the anaerobic site configuration, the gas combustion engines will be fully housed in an acoustic housing to reduce noise levels.



## 3.3.8. Conclusions on Noise and Vibration

The impact assessment has shown that the development will not have a significant impact on the noise or vibration environment. A full assessment of the baseline noise conditions was carried out. The existing noise in the region is typical of a rural area, with locations close to roads showing higher noise due to traffic levels.

During **Construction Phase** there may be short-term, temporary noise level increases. To mitigate the impacts of construction noise the site will implement a noise management plan as part of the construction environmental management system. Working hours will be limited to daytime during weekdays and Saturdays. All night-time, Sunday, and bank holiday working will be avoided, except in emergency situations.

**Operational Phase** noise levels will consist of static equipment related noise, truck noise and mobile plant related noise. The impacts are largely imperceptible and all noise levels are within the standard EPA guidelines for daytime and night-time noise levels. The noise associated with the increased heavy goods vehicles and traffic associated with the site will be imperceptible in the context of the exiting traffic levels on the road. The increase in traffic noise over existing traffic noise is too small to be detectable by the human ear.

The facility will be required to meet the waste licence limit requirements at the noise sensitive locations. The mitigation measures proposed should ensure that the noise limits are satisfied and as such there will be no significant environmental impact at the site.

## 3.4. Traffic

### 3.4.1. Introduction

Existing conditions associated on the receiving roads environment are evaluated and assessed in this section. Existing and forecast likely future traffic levels associated with the application site are also estimated. The impact of the proposed development is examined with respect to the likely impacts or influences on the operation of the receiving roads network. Where necessary, mitigation measures are proposed to address identified negative impacts or to improve shortcomings identified with existing conditions on the receiving roads.



### 3.4.2. Existing Conditions

*Road Access*

The site at Kyletalesha enjoys direct vehicular access to the L-2117-0 local country road via a single entrance located on the southern boundary of the site. The L-2117-0 local country road is a single lane road of approximately 6.0m width and is subject to a posted speed limit of 80kph. The road runs north-east from the N80, through the townland of Kyletalesha for a distance of approximately 2.5km, before splitting into three local distributor roads. The existing road surface is in a relative state of disrepair in the immediate vicinity of the site. The current site boundary includes a road frontage of some 370 metres to the L-2117-0 local country road.

From a set-back 'x' distance of 2.4 metres at the existing site access, visibility to the right (towards N80) is good as there is a wide hard standing area adjacent to the existing site boundary. Visibility to the left is impaired by the existing hedgerow which precludes the provision of NRA: Design Manual for Roads and Bridges compatible sight distance for vehicles exiting the site.

*General Location in Relation to Roads Network*

The area in which the existing facility is located is considered well served by public roads infrastructure, with connection to the N80 National Secondary Road at the junction with the L-2117-0 local country road approximately 600 metres south west of the existing site access. The site is also afforded good level of accessibility to the National Primary Roads Network enjoying connections to the M7 and N8 which are located approximately 5.5 kilometres south of the junction of the N80 and L-2117-0 local country road.

The N80 has a posted speed limit of 100kph in the vicinity of the junction. The junction of the N80 with the L-2117-0 local country road is situated approximately 1.2 kilometres north of the 60kph speed limit zone on the outskirts of Portlaoise.

*General Layout of Junction of N80 with L-2117-0 Local Road*

The current width of the N80 at its junction with the L-2117-0 local country road is approximately 6.2 metres, the junction is a simple priority layout incorporating a single ahead lane in each direction with no dedicated right turning lane/deceleration lane. There is however a series of advance right turn arrows painted onto the northbound N80 carriageway on the approach to the local road turning, these road markings highlight to mainline drivers the likelihood of right turning vehicles ahead.

The junction layout, relatively narrow lane widths and the presence of a soft margin precludes vehicles travelling northbound on the N80 from passing inside vehicles that might be waiting to turn right onto the local road. Accordingly, should there be a continuous southbound flow (no acceptable gaps in which to cross), northbound N80 traffic approaching the junction with the L-2117-0 is from time to time required to slow down and potentially come to a halt behind a right turning vehicle.



*Significant Sites Near Waste Transfer Facility*

Laois County Council's Kyletalesha Landfill site is located along the L-2117-0 local country road near the junction with the N80. There are also two knackeries immediately south of the existing waste transfer station located between the AES site and the landfill. All of these commercial sites generate HGV traffic to and from the L-2117-0 and the N80. The landfill site is by far the greatest generator of traffic movements on the local roads network.

*Current Local Authority Policy and Roads Objective*

In summarising current transport policies for County Laois, reference has been made to The National Development Plan 2000-2006 and the Laois County Development Plan 2006-2012. Under Section 6 'Transportation Development Strategy and Policy', roads projects which will enhance movement throughout the county include the following:

*"During the course of this Plan it is the Council's objective to commence construction or complete the following schemes:"*

- *R1 Portlaoise Northern Orbital Relief Road*
- *R2 Portlaoise Western Circular Clonroosk Link*
- *R3 Portlaoise Western Circular Clonminam Link*
- *R4 Portlaoise Southern Circular Link*
- *R5 Mountmellick Inner Relief*
- *R6 N80 Improvement at Park*
- *R7 N80 Improvement at Mountmellick/Portlaoise and Mountmellick/County Bounds*

*R8* *N80 Improvement / By-pass Arles / Ballickmoyler*

*R9* *Improvements on sections of the Strategic Road R4222 Clonaslee to Mountmellick and eastwards to New Inn Cross*

*R10* *N77 – M8 Link at Durrow*

*R11* *Junction improvements on existing N7 / N8. These roads will be reclassified post completion of the M7/M8 Motorways*

*R12* *Provision of speed-cameras on the N7/N8 National Primary Routes*

*R13* *Traffic calming through N7 Mountrath, N8/ N77 Durrow, N78 Ballylynan and R433 Ballacolla*

*R14* *Resurface main streets in Portlaoise, Mountratrh and Durrow*

*R15* *M7/M8 Motorway Portlaoise – Cullahill – Borris in Ossory*

The Minister for Transport published '*Transport 21'*, the Government's €34.4billion transport investment plan in November 2005 which sets out a works programme for roads in Ireland. The stretch of the N80 between Portlaoise and Mountmellick will be targeted for upgrade works.



### 3.4.3. Quantification of Current Traffic Flows

*Data Collection – Available NRA Count Data*

National Roads and Traffic Survey Reports have been used as a source of traffic data on the N80 for the period 2003 and 2004. The Annual Average Daily Traffic (AADT) estimates for 2002 and 2003 are based on a Local Authority short term traffic count.

The closest traffic counter in the vicinity of the proposed development is at the speed limit north of Portlaoise, some 2 km south of the site. Table 3.12 below shows the AADT estimate and the percentage of HGVs recorded at the sites for 2003 and 2004.

**Table 3.12: Traffic Count Data for N22 near the Site**

| Location | 2003 | | 2004 | |
|---|---|---|---|---|
| | AADT | %HGV | AADT | %HGV |
| Portlaoise | 7,100 | 10.0 | 8,852 | 13.7 |

In August 2003 the National Roads Authority published a document entitled 'Future Traffic Forecasts 2002-2040'. This document provides growth indices for National Primary, National Secondary and Non-National roads.

The growth index for factoring 2004 recorded flows to 2006 forecast levels on National Secondary Roads is given as *1.06 x (2004 Flow)*; therefore current flows on the N80 are estimated to be in the region of 9,400 AADT.

*Data Collection – Independent Traffic Surveys*

In establishing the scope of the study, it was thought that the effect of additional traffic manifest on the local roads network was not likely to be significant beyond the immediate vicinity of the existing site and the junction of the L-2117-0 local country road with the N80. As such Abacus Transportation Surveys were commissioned to conduct a classified traffic turning count survey at the said junction on Tuesday 25 April 2006 for the 12 hour period 07:00 to 19:00hrs. The surveys were undertaken using modern non-intrusive video surveillance techniques. A copy of the survey video can be made available to the Local Authority if required.

The survey recorded current traffic volumes and movement patterns along the L-2117-0 local country road and at the junction with the N80. It is recommended practice in the gathering of base traffic data for assessment that traffic surveys are carried out on a 'neutral' day of the week. Tuesday was selected as the traffic flows manifest on this 'neutral' day of the week are normally representative of typical weekday traffic conditions not only on the local roads network but at the existing commercial facilities located on the L-2117-0. The survey results are provided in Appendix 1. The data in shows categorised vehicle turning movements at the intersection of the N80/L-2117-0 for every 15-minute interval of the count period.

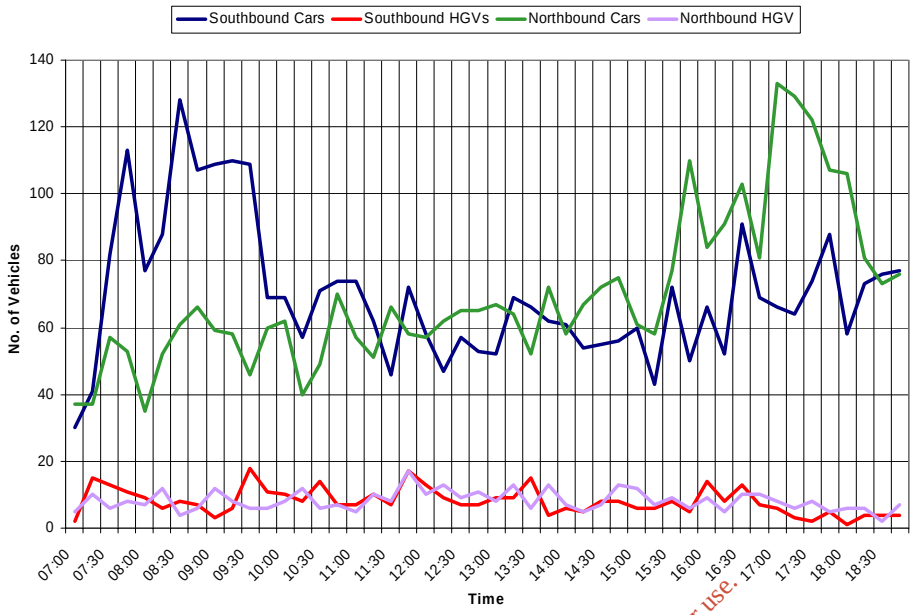
*Survey Results - N80 Mainline Traffic Flows*

The general patterns and characteristics of the traffic flows on the N80 recorded over the 12-hour survey period are shown graphically in Figure 3.5.1 below. Figure 3.5 shows that the busiest times on the N80 recorded in the survey correlates well with the commuter peak periods of 08:30 to 09:30 in the morning and 17:00 to 18:00 in the evening. During the morning and evening peak periods cumulative 2-way traffic flows were recorded as 752 and 826 vehicles respectively. Traffic flows on the N80 are shown to be somewhat tidal since during the morning peak the predominant direction of vehicular flow is southbound whilst in the evening the majority of vehicles are seen to travel northbound.



During off peak periods traffic flows were observed to be relatively constant, and generally under 700 vehicles per hour two-way. Over the entire surveyed period the N80 carried 3742 vehicles southbound, of which 10% were HGVs. Some 3736 vehicles travelled northbound of which 11% were HGVs. Using National Roads Authority document RT201 to convert the recorded traffic levels gives an indicative AADT for the N80 somewhere in the range of 8,000 to 11,800 vehicles (±68% confidence interval). This figure is considered to correlate well with the earlier AADT of 9,400 vehicles forecast from the NRA recorded flows on the N80.

**Figure 3.5: Traffic Turning Count Data for N80**




*Survey Results on Local Country Road L-2117-0*

Recorded traffic movements along the L-2117-0 local country road during the 12 hour survey period are depicted graphically in Figure 3.5.2 below. From this figure, the peak period for all vehicles using the L-2117-0 does not correspond with that of the N80. The peak traffic period on the L-2117-0 was recorded to occur between 12:00hrs and 13:00hrs. As can be seen from Figure 3.5.2 below, traffic volumes increase steadily in the morning before peaking at the busiest time around mid-day. Thereafter volumes slowly decrease during the afternoon and evening.



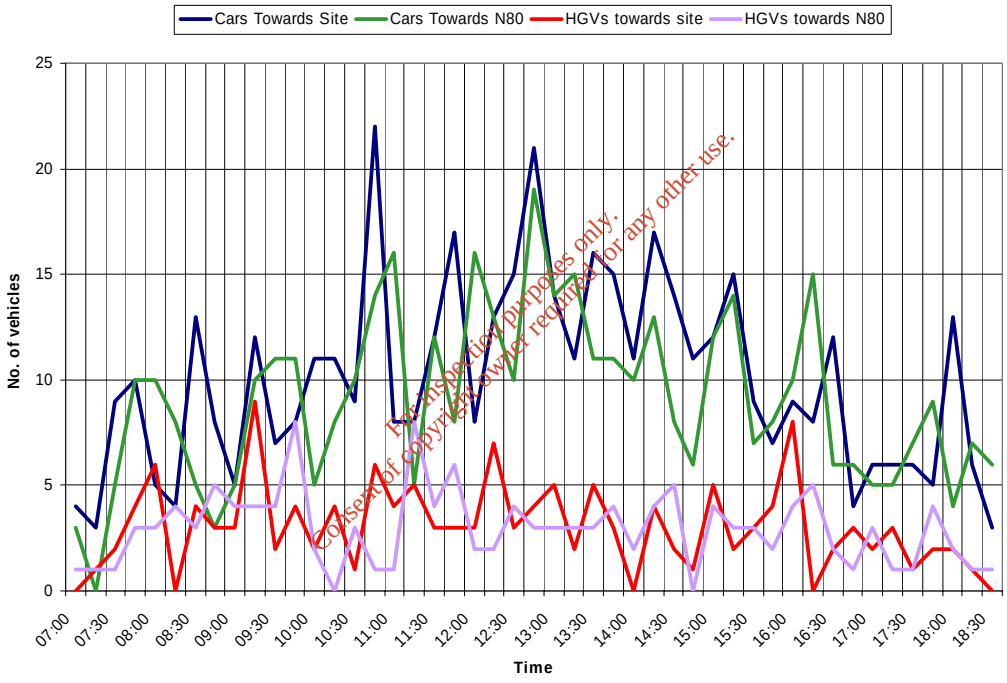
In the peak period (12:00 – 13:00hrs), the two way vehicular flow on the L-2117-0 was recorded as 143 vehicles. Over the entire surveyed period the L-2117-0 carried 568 vehicles towards the N80, of which 24% were HGVs and 617 vehicles from the N80 of which 23% were HGVs. Using National Roads Authority RT201 to convert the recorded traffic levels gives an indicative AADT for the L-2117-0 local country road of somewhere in the range of 1,300 to 1,900 vehicles at the ±68% confidence interval.

Over the 12-hour period, a total of 494 vehicles turned right from the N80 into the L-2117-0 whilst a total of 123 vehicles turned left from the N80. At present the busiest time for traffic turning right from the N80 into the L-2117-0 occurs during the peak period for the local road (12:00 – 13:00hrs), when 61 vehicles were recorded to make this turning movement. Of these 61 vehicles, 13 were HGVs. Accordingly it can be appreciated that the heaviest turning movements occur during the off peak for the N80 mainline.

The survey results indicate that the volume of HGVs using the L-2117-0 local road is relatively consistent throughout the period 08:00 to 18:00hrs, with an average of 26 HGVs per hour. During the busiest period for HGVs, identified in the surveys as between 09:00 and 10:00hrs, a total of 38 HGVs were recorded on the L-2117-0 local country road. Of these 38 HGV, 18 were observed to travel from the N80 towards the site whilst the remaining 20 travelled in the opposite direction.

It can be seen from Figure 3.6 below that, the traffic manifest on the L-2117-0 local country road is likely to be at its lowest during the recognised commuter peak hours of the N80 mainline. Nevertheless, in the interest of a sufficiently robust scenario, the assessments herein are based on the theoretical 'worst case' in which the local road peak hour traffic flows (12:00-13:00hrs) are considered to coincide with the identified N80 network peak period (17:00-18:00hrs).

**Figure 3.6: Traffic Turning Count Data for L-2117-0**





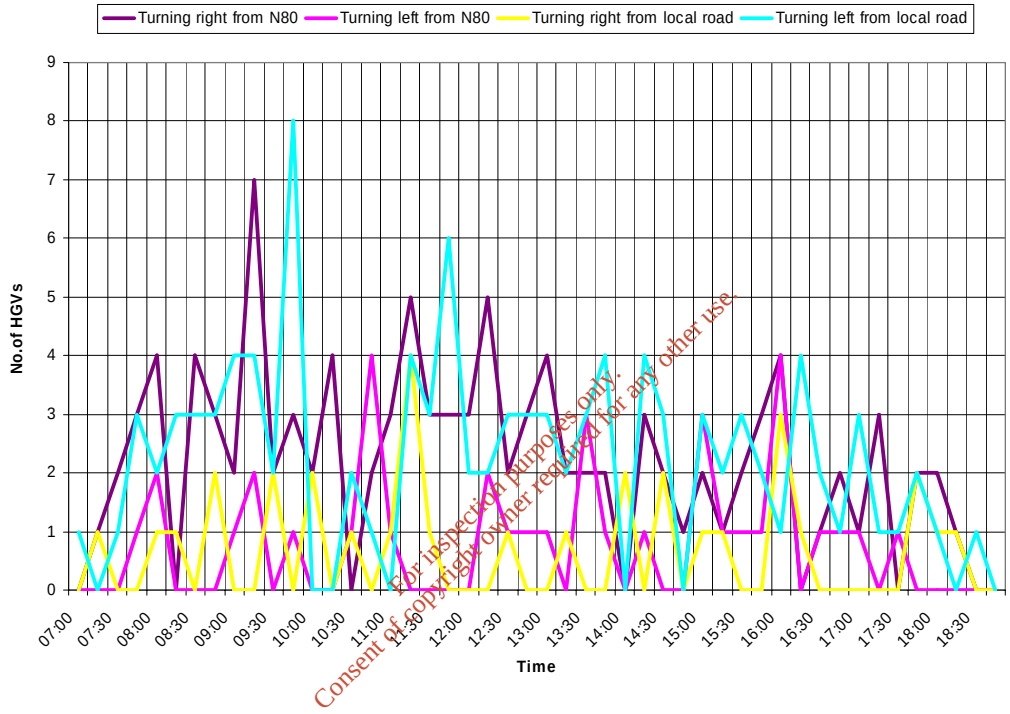
*Traffic Distribution*

In order to establish likely origins and destinations of HGV traffic to the L-2117-0 local country road, **Traffic***wise* Ltd. has depicted HGV turning movements at the junction of the N80 and the L-2117-0 over the 12-hour survey period in the following Figure 3.7. Over the 12-hour period 106 HGVs turned right from the N80 into the L-2117-0 local country road whilst 37 HGVs turned left from the N80 at the junction (Refer to Figure 3.5.3). Correspondingly 106 HGVs turned left onto the N80 from the local road, with 32 HGVs turning right.

These figures suggest that of the total number of HGVs using the local road, 65% come from the Portlaoise direction and 35% comes from the Mountmellick direction. Similarly 70% of HGVs travel from the L-2117-0 local road towards Portlaoise with the remaining 30% heading towards Mountmellick.

The AES waste transfer facility is not the sole contributor to HGV traffic on the L-2117-0 local country road. The Kyletalesha Landfill site and the two knackeries south of the waste transfer facility also generate a mixture of both car and HGV movements.

**Figure 3.7: HGV Turning Movements at Junction of N80 and L-2177-0**






## 3.4.4. Types of Waste Processed at the Existing Facility

Table 3.13 sets out the maximum annual tonnages which can be accepted at the facility under the existing waste licence.

**Table 3.13: Type and Quantities of Waste under Current Waste Licence**

| Waste Stream Type | Maximum Tonnage per Annum |
|---|---|
| Household, Commercial & Construction and Demolition | 38,990 |
| Non-Hazardous Industrial Sludges | 1,000 |
| Hazardous Waste | 10 |
| **Total** | **40,000** |

The various payloads, recorded tonnages and trip rates associated with each waste type within the main waste streams have been provided in Table 3.14.

Insofar as it may pertain to the generation of works traffic the following paragraphs provide a brief description of the different waste types, average payloads and processing procedures for the main waste streams:

*Construction and Demolition Waste*

This type of waste is predominantly delivered in covered skips. Types of waste processed include: mixed construction and demolition waste (C & D); wood from C & D; steel; construction metal; pipes; and plasterboard.



All waste delivered to the facility is inspected to determine if it is suitable for recycling activities. Acceptable wastes are sorted for recycling or disposal. Any waste loads, which upon inspection are found to contain large amounts of unsuitable wastes, are not accepted at the site and vehicles are accordingly diverted to the nearby Kyletalesha Landfill.

Wood is separated and subsequently shredded before being removed off site for further processing. The heavy fraction of C & D waste containing concrete, brick etc. is removed off-site in articulated trucks for recycling.

Based upon the operation of similar facilities, mixed construction and demolition waste could be expected to arrive in larger commercial loads (20 tonnes), but on average the weighbridge data indicates that the payloads are typically expected to be between 5.5 and 8.0 tonnes per vehicle. From recent empirical data gathered at the AES waste facility at Kyletalesha in County Laois, it has been established that the average incoming payload per skip is 6.3 tonnes.

It is in the financial interest of the operator to ensure that outbound payloads are optimised. Modern articulated vehicles are typically capable of 24 tonne payloads. Upon examination of typical outbound payloads as recorded in the weighbridge database, it has been found that actual outbound payloads are lower than 24 tonnes. The lowest average payload was 6 tonnes per vehicle, whilst the highest was 16 tonnes. The average outbound payload as recorded by the weighbridge was 11.9 tonnes and this has been used in the assessment.

The above figures are derived from the weighbridge database of the Kyletalesha facility are thus expected to be representative of current activities.

*Commercial and Industrial Waste*

The commercial and industrial wastes accepted at the facility generally include the following waste streams: baled and loose cardboard and plastic, cans, mixed wastes, glass, packaging, paper and wood which are delivered to the facility in a range of vehicles from vans, skips, roll-on/roll-off vehicles and rigid trucks.

When mixed waste is delivered to the facility it is initially sorted using a mechanical grab to remove large items such as timber and metal. Such items are removed to the appropriate storage/handling areas. The remaining waste is then separated both manually and mechanically into the different waste streams (paper, cardboard, plastic, glass, metal, and organics).

Based upon the operation of similar sites, and from the weighbridge data kept at the Kyletalesha site, it is estimated that the typical incoming payloads for the above vehicles range from 0.2 to 6.5 tonnes. Similarly typical outgoing payloads range from 1.0 to 27.0 tonnes. The variance in payloads is due to the individual waste type being transported. In the assessments which follow, an average incoming payload of 2.8 tonnes and an average outgoing payload of 16.1 tonnes have been assumed for municipal waste. These average values have been determined through reference to the weighbridge database.



*Household Waste*

Household Wastes comprising mixed and pre-segregated materials are typically delivered to the facility in eight-wheeler refuse collection vehicles. This waste type is generally classified as domestic or dry recyclable (blue bin) waste. Although the tonnages carried by refuse vehicles can vary widely, from a review of the recent weighbridge data at the facility it has been established that the current average inbound payload of vehicles transporting domestic waste to the site is 11.7 tonnes and the average outbound payload is 21.0 tonnes.

Upon review of the weighbridge data, 5.9 tonnes is the average inbound vehicle payload for dry recyclable waste with 14 tonnes the average outbound payload.

Although licensed to accept non-hazardous sludges, no loads of this nature have ever been accepted at the facility. As such traffic associated with this waste type has been omitted from the analysis.

## 3.4.5. Traffic Generation of the Existing Site

The estimation of current levels of daily traffic generation at the site is based on weighbridge data provided by AES. The weighbridge data provides information relating to quantities and description of waste for each vehicle logged entering and exiting the site.

**Traffic***wise* Ltd. has rationalised the supplied traffic data against the allowable maximum quantities of waste to be processed annually under the current waste license and average payloads for different types of waste. The following information has been used to estimate current daily traffic generation at the existing waste transfer facility:

- The Applicant has generated a six-monthly report from the weighbridge database system at the site. The base data includes all vehicles crossing the weighbridge for the period 1 January 2006 to 24 June 2006. Allowing for a 6 day working week and factoring in 6 no. bank holidays during this period, the data provided by the applicant includes for a total of 144 working days.
- Current hours of operation for the waste transfer facility are 08:00 to 20:00hrs Monday to Saturday. As such the facility operates on a 6 day working week. Accounting for public holidays this equates to the facility operating for a total of 300 days annually.
- Currently there is 15 No. staff working at the site. The Applicant has estimated that there are approximately 60 movements per day associated with all staff members i.e. two trips per staff member per day. A trip incorporates two separate vehicle movements i.e. in and out of the site. The Applicant has also stated that on average six representatives (sales reps, visitors, postman etc.) visit the site each day, which equates to 12 No. additional car movements or six car trips per day.
- There are currently 25 vehicles in the Applicant's fleet of HGVs. These vehicles are used primarily to export waste off site to other facilities.
- Approximately one delivery of diesel is received at the facility every week.

Table 3.14 below, outlines for each waste type processed at, or exported from the site during the specified period, the total tonnage, average weight per load and the number of loads per day. This information has been used to estimate current assessment traffic generation associated with the transport of waste at the facility. The Applicant's own fleet of 25 rigid vehicles is generally used to export sorted/processed waste to other sites.



**Table 3.14: Estimated Existing Daily Traffic Generation – Waste Handling**

| Waste Type | Total Tonnage for 6 month period | | Average Payload (tonnes) | | Existing Traffic Generation (No. Veh Trips/Day) | | |
|---|---|---|---|---|---|---|---|
| | Import | Export | Import | Export | Import | Export | Total |
| Commercial and Industrial | 11,042 | 15,987 | 2.8 | 16.1 | 27.4 | 6.9 | 34.3 |
| Household (Domestic) | 2,860 | 2,412 | 11.7 | 21 | 1.7 | 0.8 | 2.5 |
| Household (Dry Recyclables) | 1,749 | 2,079 | 5.9 | 14 | 2.1 | 1.1 | 3.2 |
| Construction and Demolition | 5,917 | 3,926 | 6.3 | 11.9 | 6.6 | 2.3 | 8.9 |
| Export Direct to Kyletalesha Landfill | - | 7,701 | - | 14 | - | 3.8 | 3.8 |
| Fuel | - | - | - | - | 0.2 | - | 0.2 |
| **Total** | **21,568** | **32,105** | | | **38.0** | **14.9** | **52.9** |

Table 3.15 below categorises the total daily traffic generation of the existing facility into HGVs and private vehicles and includes trips from staff and representatives.

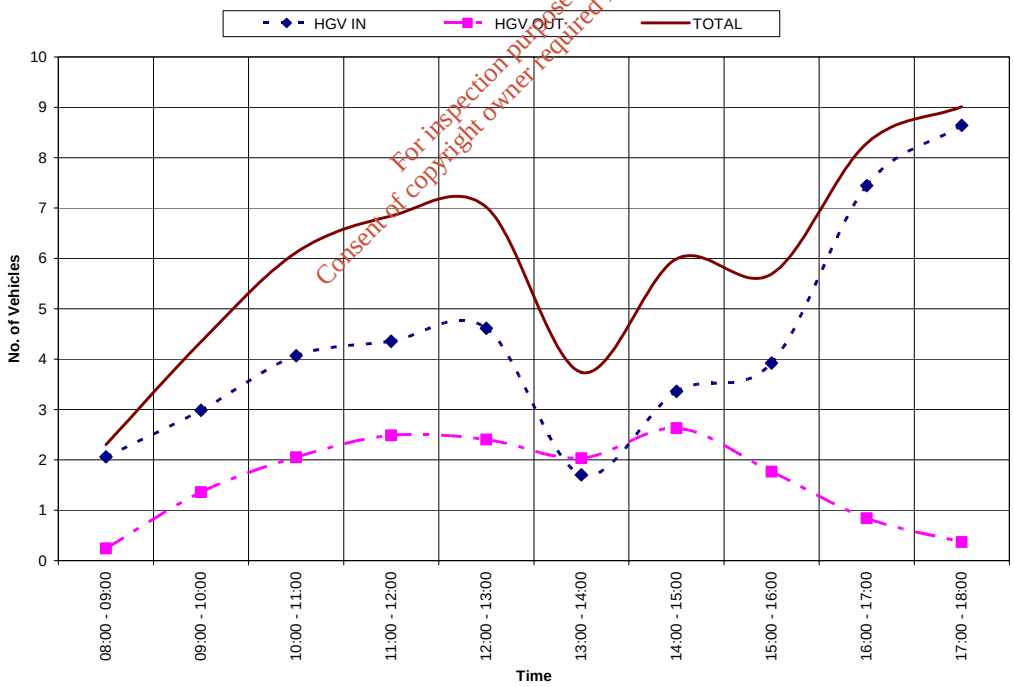
**Table 3.15: Estimated Existing Daily Traffic Generation – All Vehicles**

| Vehicle Type | Incoming Trips | Outgoing Trips | Total Trips |
|---|---|---|---|
| HGVs | 38.0 | 14.9 | 52.9 |
| Cars/Private vehicles | 18 | 18 | 36 |
| **Total** | **56.0** | **32.9** | **88.9** |

From Table 3.15, it is estimated that the existing site generates approximately 89 vehicular trips or 178 vehicle movements per day.

In order to establish peak periods of HGV traffic generation arising from the existing facility and to show the normal daily profile of traffic to and from the site, Figure 3.8 below shows graphically average HGV movements over the weighbridge during a typical weekday (Monday to Friday) for the entire six month period of recorded weighbridge data.

**Figure 3.8: Daily Traffic Patterns from Weighbridge Data**



From Figure 3.8 above typically HGV trips at the existing AES facility increase steadily from early morning through to mid-day when there is a localised peak in trips. This peak corresponds to the L-2117-0 local country road network peak, as identified from the traffic surveys. After mid-day there is a drop in HGV trips, most likely corresponding to lunchtime, after which movements increase to a maximum of nine trips during the period 17:00 to 18:00hrs.

From Figure 3.8 the daily traffic generation of HGVs is recorded as typically 60 trips or 120 movements. This confirms the results presented in the preceding Tables 3.14 and 3.15.

In the context of observed vehicular movements during the 12-hour traffic survey, it is estimated that the existing waste transfer facility generates approximately 178 vehicular movements per day. As calculated from the traffic survey, the local road has an estimated AADT of 1,600 vehicles. **Therefore it follows that the waste transfer facility generates approximately 11 percent of ALL traffic using the L-2117-0 local road.**

The existing waste transfer facility generates approximately 106 HGV movements per day. The traffic survey shows a total of some 281 HGV movements on the local road. Therefore it is estimated that **the existing AES Waste Transfer Facility generates approximately 38 percent of existing HGV movements on the L-2117-0 local road.**



### 3.4.6. Traffic Generation of Kyletalesha Landfill

Laois County Council has provided traffic figures for the Kyletalesha Landfill site for 2005. Approximately 58,000 vehicles were recorded entering the site during 2005, of which 4,000 were large commercial vehicles. Assuming the landfill site is operational, for 272 days per year, on average this equates to a daily trip rate of 213 vehicles or 426 vehicle movements. Of these 426 vehicle movements, 30 are estimated to be HGVs.

In the context of the figures recorded on the L-2117-0 in the 12 - hour traffic survey **the existing landfill site generates approximately 25 percent of ALL traffic using the local road.**

The survey recorded 218 HGV movements during the 12-hour period, therefore it is estimated that the **landfill generates approximately 14 percent of current HGV movements on the local road.**

The data listed above is an indication of the proportions of vehicles using the local road to access the landfill site on a typical weekday. However from the information provided to us by Laois County Council, it is evident that the landfill site is at its busiest on Saturdays. On a typical Saturday approximately 350 - 400 vehicle movements can be expected at the landfill access. During the week the corresponding figure is estimated to be approximately 150 - 200 vehicles. Given the nature of the proposed commercial development the assessment herein focus on flows manifest on a typical weekday as this is likely to correspond with the busiest times for all roads and other industries in the locality, and is thus likely to represent the period of greatest traffic impact resulting from the current proposal.

## 3.4.7. Traffic Generation of the Proposed Development

*Brief description of Proposed Facility*

It is currently proposed to expand existing operations at the Waste Transfer and Recycling Facility at Kyletalesha, Co. Laois. A new facility for treatment of biodegradable waste is also proposed as part of the development.

When fully operational it is intended that the proposed facility will accept and process 99,000 tonnes of waste materials per annum. The breakdown of this 99,000 tonnes of waste into the different waste streams as outlined in the review waste licence is shown in Table 3.16 below.

**Table 3.16: Type and Quantities of Waste under Proposed Waste Licence**

| Waste Stream Type | Maximum Tonnes per Annum |
|---|---|
| Municipal (Household, Commercial and Industrial) | 80,000 |
| Non-Hazardous Industrial Sludge | 3,000 |
| Hazardous Waste | 5,000 |
| Construction and Demolition | 5,000 |
| Sewage Sludge | 6,000 |
| **Total** | **99,000** |



*Methodology for Estimating Traffic Generation of Proposed Facility*

The following provides an estimate of the number of vehicles which could potentially be generated by the waste transfer and recycling facility when it is fully operational. The methodology used to achieve this, takes into account the average incoming and outgoing payload data for each waste type as determined from the weighbridge data. In the estimates these weighbridge derived figures are applied to the proposed ultimate quantities of waste for each waste stream as shown in Table 3.16 above. The estimates are based upon the proposed facility operating at ultimate capacity, which in reality should take some time to achieve.

Adopting the above methodology it is possible to estimate likely traffic generation and patterns at the proposed development over the course of a typical working day. Derivation of traffic generation by this methodology is endorsed in the Institution of Highways and Transportation 'Guidelines for Traffic Impact Assessment (Sept 1994).

*Estimates of Quantity of Waste at Upgraded Facility*

Table 3.16 above shows that of the estimated quantities of waste to be accepted at the upgraded facility, the Municipal waste stream is expected to be the predominant type of waste processed. Municipal waste consists of the household and commercial and industrial waste types.

The estimated quantity of 80,000 tonnes per annum of Municipal waste is approximately double existing tonnages currently accepted at the facility for the waste streams involved.

Through discussions with the Applicant, **Traffic***wise* Ltd. has established that Household waste will form the majority of the Municipal waste that will be processed at the proposed upgraded facility. Currently the facility accepts Household waste in the form of domestic waste and clean dry recyclables (blue bin) from the midlands jurisdiction and from Carlow and Kildare. However once the facility has been upgraded and the composting process is fully operational, the facility will also accept source separated organic waste (brown bin). Such organic waste will be used primarily for composting.

It has estimated that the proposed upgraded facility will accept approximately 45,000 tonnes of Household waste per annum, of which 10,000 tonnes will be domestic waste, 5,000 tonnes will be dry recyclables and 30,000 tonnes will be organic waste.

Commercial and industrial waste will represent approximately 35,000 tonnes of the total quantity of Municipal waste accepted at the facility. This figure of 35,000 tonnes has been divided into similar proportions of weight (annual tonnage) for each waste type, as per the indications of the recorded weighbridge data.

Other waste to be accepted at the proposed facility includes non-hazardous industrial sludge and sewage sludge. These wastes will be mixed with either the residual waste or source separated organic waste during the composting process. These waste streams are generally transported in tankers with an average payload of 20 tonnes.



*Biodegradable Waste Treatment Facility*

The proposed biodegradable waste treatment facility will have an affect on traffic patterns at the site. As outlined above the facility is expected to accept source separated organic waste to be used for feedstock composting. When the compost has been fully processed at the facility; it will then be exported. In the calculations of the likely quantities of compost to be exported, it has been assumed that the final compost product would weigh 30 percent less than the organic material used at the beginning of the process. It has been assumed that 70 percent of the future domestic waste and 100 percent of the organic waste, non-hazardous industrial sludge and sewage sludge will be used for composting. It has been assumed that there will be an average compost export payload of 23 tonnes.

*Other Assumptions in Assessment of Traffic Generation of Proposed Facility*

- It has been assumed that the quantity of fuel deliveries will double due to proposed composting operations at the upgraded facility.
- Operational hours of the upgraded facility will be from 07:00 to 20:00hrs Monday to Friday and 07:00 to 18:00hrs on Saturday. As such the facility operates on a 6 day working week. Accounting for public holidays this equates to the facility operating for a total of 300 days annually.
- There are currently no plans to increase the existing fleet of 25 rigid vehicles.
- It has been assumed that there will be a 50% increase in staff and visitors which will result in an estimated 23 staff working on site and 9 visitors per day. This corresponds to 46 light vehicle trips per day for staff and 9 light vehicle trips per day for visitors tot eh site.
- It is appreciated that there are continual advances in the machinery and vehicles used at modern waste transfer facilities. Newly developed machinery can process greater quantities and newer vehicles are more efficient (in situ compaction units). Ignoring any possible advances and efficiencies which may develop in the industry between now and the opening date of the upgraded facility, it is thought that the empirical data derived from the analysis of existing operations should give the most reliable basis from which to forecast future operations in terms of traffic generation on the road network.
- In the assessment of future traffic generation no consideration has been given to the likely additional sorting and storage space that will be available when the waste processing/transfer building is constructed. Any additional storage space could improve the Applicant's ability to export waste from the facility in more economically feasible quantities, thereby reducing overall traffic generation.



Taking all of the above into consideration and using the recent weighbridge data, the estimated likely future traffic generation at the proposed development is outlined in Table 3.17 below.

**Table 3.17: Estimated Future Daily Traffic Generation – Waste Operations**

| Waste Type | Estimated Annual Tonnage | Average Payload (tonnes) | | Estimated Future Traffic Generation (No. Trips/Day) | | |
|---|---|---|---|---|---|---|
| | | Import | Export | Import | Export | Total |
| Municipal | 40,000 | 2.8 | 16.1 | 47.6 | 8.3 | 55.9 |
| Household (Domestic and Organic) | 40,000 | 11.7 | - | 11.4 | - | 11.4 |
| Household (Dry Recyclables) | 5,000 | 5.9 | 14.0 | 2.8 | 1.2 | 4.0 |
| Construction and Demolition | 5,050 | 6.3 | 11.9 | 2.7 | 1.4 | 4.1 |
| Non-hazardous Industrial Sludge | 3,000 | 20 | | 0.5 | | 0.5 |
| Sewage Sludge | 6,000 | 20 | | 1.0 | | 1.0 |

**Table 3.17: Estimated Future Daily Traffic Generation – Waste Operations**

| Waste Type | Estimated Annual Tonnage | Average Payload (tonnes) | | Estimated Future Traffic Generation (No. Trips/Day) | | |
|---|---|---|---|---|---|---|
| | | Import | Export | Import | Export | Total |
| Export Compost | 32,200 | | 23 | | 4.7 | 4.7 |
| Fuel | | | | 0.4 | | 0.4 |
| | | | | | | |
| **Total** | | | | **66.4** | **15.6** | **82.0** |

Table 3.17 summarises likely future daily traffic generation for HGVs and private vehicles when the facility is fully operational, and includes trips from staff and representatives.

**Table 3.18: Estimated Future Daily Traffic Generation – Waste Operations**

| Vehicle Type | Incoming Trips | Outgoing Trips | Total Trips |
|---|---|---|---|
| HGVs | 66.4 | 15.6 | 82.0 |
| Cars/Private vehicles | 27.5 | 27.5 | 55.0 |
| **TOTAL** | **93.9** | **43.1** | **137.0** |



From the above, it is estimated that the upgraded facility will have the potential to generate approximately 137 vehicle trips or 274 vehicular movements per day. Considering that the existing facility generates approximately 89 vehicle trips or 178 vehicular movements per day, it follows that it is likely that the proposed development extension would represent an increase in traffic of some 48 vehicular trips per day, comprised of an estimated 29 No. HGV trips and 19 No. light vehicle trips. In the context of the greater roads network this forecast increase is considered modest.

On the basis of a peak hour factor of 10%, the upgraded facility could reasonably be expected to generate typical peak hour volumes of about 14 No. vehicle trips, consisting of 8 No. HGV trips and 6 No. light vehicle trips. Through the off-peak periods (07:00 to 17:00hrs and 18:00 to 20:00hrs) trips are expected to be relatively well distributed. The calculations herein indicate total typical hourly traffic volumes of approximately 11 No. vehicle trips, consisting of 7 No. HGV trips and 4 No. trips by private car.

## 3.4.8. Construction Related Traffic

The construction phase of the development will generate traffic on the local road network. It is considered that the primary generators of traffic will be deliveries of construction materials and construction staff. Bearing in mind the above estimates of traffic generation to the proposed development, construction related traffic activities are not expected to outnumber those generated by the development upon opening. Accordingly, traffic generation and therefore impact on capacity during the construction period is likely to be considerably lower than forecast above.

Notwithstanding the above, prior to the construction of additional facilities on site, it is proposed to import 100,000$m^3$ of inert fill material to be used as a suitable base layer to facilitate these works. It is estimated that this material would be transported to the site in 20$m^3$ volume tippers. Therefore 5,000 HGV trips to the site would be required for the import of this fill material. It is suggested that these trips should be spread out evenly over an 8-month period or 184 working days and assuming that each load delivered is in the most commercially viable volume of 20$m^3$, this would equate to 27 trips per day. These trips would be additional to the already estimated existing daily HGV trips at the facility, which was found to be approximately 53 HGV trips from Table 3.5.3. Therefore during this phase of the construction works, it is estimated that 80 HGV trips per day would be generated by the site.

Considering the lower levels of traffic attraction during the construction period it has been deemed unnecessary to carry out an assessment of the 'short term' impact on the capacity or load carrying capacity of the local roads network in the vicinity of the development during construction.

It should be noted that the indicative timescale for the importation of fill material has been derived so that HGV trips during this phase of the construction works would not exceed the estimated HGV trips generated by the site when the facility is fully operational. This approach should ensure the preservation of the integrity of the L-2217-0 local road.



## 3.4.9. Threshold for Traffic and Transport Assessment

In Ireland, a **Traffic and Transport Statement (TTS)** must accompany all planning applications for developments that could potentially act as traffic generators. A Traffic and Transport Statement is a brief outline of the transport requirements for the development and is used as a first step to identifying the likely impact of any development. The Traffic and Transport Statement is also used to determine if further, more detailed traffic analysis is required. An in depth analysis of the impact of a development in terms of traffic is carried out through a **Traffic and Transport Assessment (TTA**).

The NRA Traffic and Transport Assessment Guidelines recommend the following thresholds for undertaking a TTA:

> *"Applications that exceed **any** of the following thresholds will be required to produce full TTAs, in addition to completing a TTS. The TTS should summarise the findings of the TTA and briefly outline the mitigating measures proposed by the developer or agent:*
> - ***Industry GFA in excess of 5,000 sq.m***
> - *Distribution and Warehousing GFA in excess of 10,000 sq.m*
> - ***100 trips (in/out combined) in the peak hour***
> - ***Development traffic exceeds 10% of two-way traffic flow on adjoining road***
> - *Development traffic exceeds 5% of two-way traffic flow on adjoining road if congestive or sensitive*
> - *100 on-site parking spaces"*
>
> *(Reference-NRA Traffic and Transport Assessment Guidelines: Table 2.2; page 4)*

The thresholds considered as most pertinent in relation to whether the proposed development requires a Traffic and Transport Assessment are highlighted and include: 'Industry GFA in excess of 5,000 square metres', 'developments generating 100 trips in/out combined in the peak hour' and 'development traffic exceeds 10 percent of two-way flow on adjoining road'.

With reference to the proposed increase in gross floor area, the total area of the proposed extension to the waste transfer facility is approximately 16,180 square metres. Therefore the additional gross floor area associated with industrial use represents approximately 300 percent of the TTA threshold size. It follows that in this instance a TTA is warranted.



Another of the TTA thresholds relating to the development is the additional volume of trips generated in the peak hour. From the preceding calculations the proposed development is estimated to generate a maximum trip rate of approximately 14 No. trips in the peak hour. If the existing traffic generated by the facility is taken into consideration, the forecast 'incremental' impact of the proposed development would be less than 14 No. trips. Therefore the development proposal falls short of this specific threshold.

The final relevant threshold for the preparation of a TTA requires the development traffic to exceed 10 percent of the two way traffic flow on the adjoining road. It has been estimated that the AADT for the L-2117-0 local country road is between 1,300 and 1,900 vehicles. It has been calculated that an additional 48 trips or 96 vehicle movements per day are likely to be generated by the upgraded facility. By reference to the lower bound predicted AADT of 1,300 vehicles, it is estimated that the 96 vehicular movements associated with the new development represent approximately 7% of existing traffic on the road.

Notwithstanding the above, only one of the stated thresholds need be attained in order to warrant a TTA, in accordance with the NRA requirements, therefore it is considered that a TTA is required. One of the key components of a TTA is the undertaking of a capacity assessment of any junctions likely to be affected by the development on the local roads network. In the following section, computer-modelling programs have been used to carry out such an assessment.

## 3.4.10. Assessment Year(s) and Estimation of Traffic Growth

*Development Traffic*

The levels of traffic generation assumed at the proposed development site are outlined in Section 3.4.6. Nonetheless it is expected that it will take some time for business to develop and thus for such tonnages to be realised at the site.

Considering that the development site will receive a finite or capped amount of material every year during the lifetime of the facility it is assumed that the waste facility will have a relatively finite or consistent level of traffic attraction (maximum potential as used in the traffic assessments) over its life span.

The levels of traffic to and from the development are not expected to fluctuate appreciably and therefore it is expected that forecast levels of traffic at the site will not experience significant growth over time.

In terms of the distribution of development traffic on the local roads network, it is established practice and recommended by the Institution of Highways & Transportation that development traffic can be assumed to distribute to the local roads network in the proportions yielded in the survey of existing traffic.



*Assessment Years*

It is expected that the proposed development could reasonably be opened for trade in 2008. Accordingly 2008 has been selected as the 'base' year or 'opening' year for the assessment of development traffic impact on the local roads network. It is assumed that the 'design' year for the development will be 15 years after the year of opening i.e. 2023.

A series of traffic scenarios have been assessed both with and without the proposed development in place. These are referred to respectively as the 'do nothing' and 'do something' scenarios and are normally provided so that the incremental impact of development traffic can be evaluated against a baseline or existing scenario. A series of comparative analyses have been undertaken for the following scenarios.

- Scenario 1: Base Year 2008 – 'do nothing'
- Scenario 2: Base Year 2008 – 'do something'
- Scenario 3: Design Year 2023 – 'do nothing'
- Scenario 4: Design Year 2023 – 'do something'

*Estimation of Network Growth*

In August 2003 the National Roads Authority published a document entitled 'Future Traffic Forecasts 2002-2040'. This document provides growth indices for National Primary, National Secondary and Non-national roads. The growth factors used in the derivation of the base year 2008 and future design year 2023 network traffic flows from the surveyed 2006 flows are as follows.

- National Secondary Roads: 2006-2008 1.08
- National Secondary Roads: 2006-2023 1.46
- Non-National Roads: 2006-2008 1.04
- Non-National Roads: 2006-2023 1.24

It must be appreciated that in the analysis of the roads network, the above traffic growth rates have been applied to the peak hour period. However as outlined in Section 3.4.4, the peak hours of traffic flow for the N80 and L-2117-0 local road were recorded to occur at different time intervals in the traffic survey. The local road peak occurred around midday whilst the N80 peak occurred in the evening commuter peak period.

Nonetheless in the interest of a robust assessment the peak traffic flows for both roads have been combined, thus simulating a hypothetical 'worst case' peak hour traffic flow scenario for the evening peak hour on the N80. This robust scenario, however unlikely, has been adopted in this report in order to provide the Local Authority with sufficiently robust traffic data upon which to determine the traffic implications of the proposed development with a high degree of surety or confidence.



In practice it is generally accepted by traffic engineers that the peak hour, instead of increasing or intensifying as a peak, tends to spread over a longer period. Therefore applying growth rates to peak hour flows is likely to yield a very conservative estimate of likely traffic levels.

Furthermore the traffic generated by the proposed facility could be considered to contribute to the overall growth rate on the network, nonetheless the development generated traffic has been added to the factored network figures, thus compounding the total percentage growth on the network.

From the above, it is considered that the assessment of future traffic growth on the local roads network in the vicinity of the proposed development will yield an extremely robust basis for a 'comparative' assessment of the traffic situation forecast to prevail in future years before and after implementation of the proposed development.

## 3.4.11. Capacity Assessment

*Computer-modelling Programs used in Capacity Assessments*

As recommended by the NRA: Design Manual for Roads and Bridges (DMRB) and the Institution of Highways & Transportation, the Transport Research Laboratory (TRL), the computer modelling program PICADY (Priority Intersection CApacity and DelaY) has been used for the assessment of major/minor priority junctions on the local road network.

In general terms this program operates on the gap acceptance theory. The output of PICADY provides information for roads designers and planners with regards to capacity, queuing and delay.

The program is intended primarily as a means of assessing junction performance and can also be used as an aid in junction design. Generally a level of saturation of 85-90% corresponding to a Ratio of Flow to Capacity (RFC) of 0.850-0.900 is accepted at priority junctions in urban areas, however as with the other programs this figure should not be considered in isolation during the peak hour period and should be viewed together with queuing and delay information.



*Capacity Assessment of Junction of N80 with L-2117-0 Local Road*

In the capacity assessments outlined in this section, a detailed modelling approach has been adopted, whereby traffic data has been input directly for each time interval as per the actual demand recorded in the surveys (i.e. not a synthesized flow).

The following geometric values were used as input data into the PICADY program:

- N80 carriageway width of 6.2 metres
- 200 metre visibility for right turning vehicles from N80
- On N80 right turning vehicles will block northbound vehicles
- Approach lane of local road modelled as one lane plus flare (10m width at give way and 4.2m at five metres from give way)
- Local road visibility 215m in both directions

Table 3.19 shows a summary of the PICADY assessments carried out for the priority intersection of the N80 and L2117-0 local road. The assessments include for the 2008 base year and 2023 future year forecast operation of the junction both with and without the forecast traffic generation of the proposed development. The output figures provide a basis for comparison of the future peak hour operation of the existing junction together with an evaluation of the likely incremental impact of the proposed development.

**Table 3.19: Summary of Capacity Assessments – Proposed Access**

*Note: Arm A – N80 (Mountmellick Side); Arm B – L-2117-0 Local Road; Arm C –N80 (Portlaoise Side)*

| Traffic Stream | Total Demand | | Queuing Delay | | Max Queue Veh | Max RFC | Reserve Capacity |
|---|---|---|---|---|---|---|---|
| | Veh | Veh/Hr | Min | Min/Veh | | | |
| **2008 Base Year – Scenario 1A – Do Nothing** | | | | | | | |
| B-C | 56.9 | 56.9 | 5.6 | 0.10 | 0.1 | 0.114 | 88.6% |
| B-A | 14.9 | 14.9 | 2.1 | 0.14 | 0.0 | 0.045 | 95.5% |
| C-AB | 161.8 | 161.8 | 27.3 | 0.17 | 0.5 | 0.185 | 81.5% |
| C-A | 463.5 | 463.5 | - | - | - | - | - |
| ALL | 1043.8 | 1043.8 | 35.0 | 0.03 | **Max 0.5** | **Max 0.185** | **Min 81.5%** |
| **2008 Base Year – Scenario 2A – Do Something** | | | | | | | |
| B-C | 62.7 | 62.7 | 6.3 | 0.10 | 0.1 | 0.123 | 87.7% |
| B-A | 16.1 | 16.1 | 2.3 | 0.14 | 0.0 | 0.047 | 95.3% |
| C-AB | 178.4 | 178.4 | 30.2 | 0.17 | 0.5 | 0.204 | 79.6% |
| C-A | 453.0 | 453.0 | - | - | - | - | - |
| ALL | 1058.9 | 1058.9 | 38.7 | 0.04 | **Max 0.5** | **Max 0.204** | **Min 79.6%** |
| **2023 Design Year – Scenario 3A – Do Nothing** | | | | | | | |
| B-C | 67.4 | 67.4 | 7.3 | 0.11 | 0.2 | 0.147 | 85.3% |
| B-A | 18.2 | 18.2 | 3.4 | 0.18 | 0.1 | 0.072 | 92.8% |
| C-AB | 317.8 | 317.8 | 62.0 | 0.20 | 1.1 | 0.325 | 67.5% |
| C-A | 527.6 | 527.6 | | | | | |
| ALL | 1399.7 | 1399.7 | 72.7 | 0.05 | **Max 1.1** | **Max 0.325** | **Min 67.5%** |
| **2023 Design Year – Scenario 3A – Do Something** | | | | | | | |
| B-C | 73.2 | 73.2 | 8.4 | 0.11 | 0.2 | 0.157 | 84.3% |
| B-A | 19.4 | 19.4 | 3.6 | 0.19 | 0.1 | 0.076 | 92.8% |
| C-AB | 344.4 | 344.4 | 68.5 | 0.20 | 1.2 | 0.356 | 64.4% |
| C-A | 507.0 | 507.0 | | | | | |
| ALL | 1414.7 | 1414.7 | 80.2 | 0.06 | **Max 1.2** | **Max 0.356** | **Min 64.4%** |



Under the 2008 assessment scenarios there is no excessive queuing on the entry or exit and vehicle delays are considered unremarkable. The average delay for vehicles turning right off the N80 onto the local road is shown to be approximately 10 seconds regardless of whether the development is in place or not. Delays to right turns from the local road onto the N80 are approximately 8 seconds under the same assessment conditions.

The 2023 design year assessment of the proposed development access shows likely RFC values of 0.325 without the development and 0.356 with the development in place. These values are well within the bounds of accepted capacity thresholds. And highlight the likely minimal impact that the proposed development would have on the functionality of the intersection.

Under the future year assessment scenarios there is no excessive queuing and vehicle delays are not considered significant. Regardless of whether the development proceeds, average delay for vehicles turning right off the N80 onto the local road is shown to be approximately 12 seconds, which is an increase of some 4 seconds over the 2008 assessments.

As highlighted in the assessment of the existing receiving road network geometric layout of the N80 junction prevents northbound traffic from passing on the inside those vehicles waiting to turn right into the local road L-2117-0. This means that northbound traffic will from time to time be delayed by having to slow down or come to a stop behind right turning vehicles. At present, a proportion of northbound traffic approaching the junction would have an average delay of 8 seconds or less when a vehicle is sitting at the junction waiting to turn right. In 2023 the delay experienced by northbound traffic is forecast by the model as likely to rise to an average of 12 seconds or less. This delay is forecast to occur regardless of whether the waste transfer facility is upgraded or not. The principle factor increasing delay in the future will be the normal growth experienced on the network, typically resulting from economic growth both locally and countrywide.

From the forecasts of traffic generation at the proposed facility, it is estimated that an additional 5 trips could be manifest during the peak hour. Distributing 65% of development traffic as arriving and departing from the Portlaoise direction, as the traffic surveys indicate is the current situation, this would result in a potential maximum of three extra vehicles arriving at the junction to turn right, during the peak hour. Assuming the arrival of all 3 vehicles is evenly distributed in the peak hour, this equates to one extra vehicle arriving to turn right at the junction every twenty minutes.

Clearly the proposed development would not significantly affect the degree of conflicts between right turning traffic and mainline N80 traffic.



*Right Turn Capacity Assessment using NRA: Design Manual for Roads and Bridges*

From Section 3.4.4 it was identified that the current AADT on the N80 is in the region of 9,400 vehicles. The AADT on the L-2117-0 local road is currently estimated to fall within the range 1,300 and 1,900 vehicles.

The NRA: Design Manual for Roads and Bridges TD42 paragraph 2.16 advises the following, with respect to the provision of a ghost island right turn lane:

> *"At existing rural and at urban junctions the cost of upgrading a simple junction to provide a right turning facility will vary from site to site. However, upgrading should always be considered where the minor road flow exceeds 500 vehicles 2-way AADT, a right turning accident problem is evident, or where vehicles waiting on the major road to turn right inhibit the through flow and create a hazard."*

The current 2-way AADT of 1,600 for the local road is more than three times the threshold specified by the NRA: Design Manual for Roads and Bridges. Therefore without considering the potential traffic implications of the proposed development, the NRA: Design Manual for Roads and Bridges requirements indicate that current volumes of traffic using the junction meet the thresholds set for the consideration of a ghost island right turn lane.

These threshold figures should not be viewed in total isolation, and the decision to provide a right turn facility should also take cognisance of other local factors such as accident problems, local road geometry, land ownership and economic and financial factors.

It should however be noted that the threshold of the local road which warrants consideration of a ghost island right turn is 500 AADT. You will recall from the earlier description of the receiving roads environment that the existing Kyletalesha Landfill site currently exceeds 400 AADT as a standalone traffic generator.

However consideration should be given to the fact that that the NRA: Design Manual for Roads and Bridges is used principally in the design of National Primary Roads. The introduction to the document states the following with respect to non-national roads.

> *"The DMRB sets a standard of good practice that has been developed principally for trunk roads in the UK. Similarly the NRA DMRB sets a standard of good practice intended principally for national roads in Ireland. Both documents may also be applicable in part to other roads with similar characteristics. Where they are used for local road schemes, it is for the Local Road Authority to decide on the extent to which the documents in the manual are appropriate in any particular situation." (Reference NRA DMRB: Volume 1 Section 0 Paragraph 1.5)*



*Ghost Island Right Turn Lane (Potential Remedial/Reductive Works)*

In planning the Kyletalesha Landfill site development clearly the Local Authority will have had cognisance of the above NRA: Design Manual for Roads and Bridges thresholds. Ultimately the decision as to whether to upgrade this junction rests with the Local Authority.

It has been observed that a review waste licence was recently granted for the expansion of the Kyletalesha Landfill. Currently generating an AADT in excess of 400 this landfill development may have an impact upon existing traffic using the junction and it is reasonable to assume that the volume of traffic turning right from the N80 onto the local road could increase as a direct result of current landfill development.

During the planning process for the landfill, it is presumed that a Traffic and Transport Study or similar, should have been prepared to examine how the landfill development might impact upon traffic on the local roads network. Given the fundamental nature of warrants provided in the NRA: Design Manual for Roads and Bridges with respect to the selection of junction layout it is expected that any such assessment should have highlighted that the junction of the N80 and the local road meets the NRA: Design Manual for Roads and Bridges requirements for upgrade through the provision of a ghost island right turn lane.

In Section 3.4.6 of this report, it was established that the waste transfer facility currently generates 12 percent of all traffic using the local road. In comparison it was estimated that the Kyletalesha Landfill generates approximately 25 percent of the total traffic.

Although it is acknowledged that the waste transfer facility is a relatively significant generator of HGVs on the local road, the current traffic turning count data indicates that the NRA: Design Manual for Roads and Bridges thresholds for the provision of a right turn ghost island are currently met even if the existing AES facility were to generate no traffic whatsoever.

The right turn facility is warranted only due to the cumulative traffic generation of the various local commercial and landfill operation together with general commuter traffic. The most significant local traffic generator is nonetheless acknowledged to be the Kyletalesha Landfill Site.

### 3.4.12. Visibility Assessments (Proposed Remedial/Reductive Measure)

The roads design standard by which the visibility sightlines have been evaluated is the NRA: Design Manual for Roads and Bridges.

*Forward Visibility on Mainline Approaches to N80/ L-2117-0 Junction*

The junction of the N80 with the L-2117-0 Local Country Road is relatively straight. Accordingly 'forward visibility' along the mainline carriageway is considered good. This ensures that drivers in the northbound lane can see sufficiently far ahead, so as to see any vehicles which may be waiting in the carriageway to turn right into the L-2117-0 local country road, and slow down or stop safely, should the need arise.



*Appraisal of Visibility Sightlines at N80/L-2117-0 Junction*

The N80 is subject to a speed limit of 100kph in the vicinity of its junction with the L-2117-0 local country road. Street lighting is provided on all approaches to the intersection.

Table 2 of TD9 'Highway Link Design', states that the appropriate stopping sight distance or 'y' distance for a design speed of 100kph is 215m.

Paragraph 2.21 of NRA TD41 'Vehicular Access to All-Purpose Roads' and paragraph 7.8 of TD42: 'Geometric Design of Major Minor Priority Junctions' provide advice on the required 'x' distance, or carriageway set-back from which visibility sightlines are measured. For stop control, an 'x' distance of 4.5m is normally used as advised by TD41, however at lesser trafficked 'junctions' on the National Primary Road network an 'x' distance of 2.4m is often considered an acceptable relaxation.

For a sightline assessment of vehicles accessing the N80 from the L-2117-0 local country road an 'x' distance of 2.4m has been adopted, due to the likely extensive verge widening/re-aligning of existing hedgerow works associated with using an 'x' distance of 4.5m. This relaxation can also be justified due to the forecast low incremental increase in traffic using the junction as a result of the proposed development.

The proposed improvement to visibility sightlines at the junction is shown in **Traffic***wise* Ltd. Drawing No. 02731/01/01/PL02 (Appendix 2) and Figure 2.3, which is based on a recent detailed topographical survey of the junction of the N80 with the L-2117-0 local country road. The drawing illustrates that with a set back or 'x' distance of 2.4m the required sightline or 'y' distance of 215m is easily achievable looking to the left.

Adopting similar visibility criteria looking to the right, shows that in order to achieve a 215m sightline small trees and overgrown hedgerow located on lands in the verge adjacent to the southbound lane would need to be removed. It is understood that these lands form part of the Kyletalesha Landfill site and therefore the Local Authority would be in a position to remove this vegetation in order to improve visibility to NRA: Design Manual for Roads and Bridges standards and thus reduce existing traffic hazard for all road users passing and using the junction.

This simple measure, requiring only verge maintenance, is highly recommended in the interest of general road safety irrespective of the determination of this application.

Increasing visibility sightlines to the appropriate standard will not only reduce traffic hazard but should also have a positive effect on the capacity of the junction (principally increase safety for L-2117-0 traffic whilst increasing capacity to enter the N80).

*Appraisal of Visibility Sightlines at Proposed Site Access*

It is proposed to upgrade the existing access to the waste transfer and recycling facility in accordance with NRA: Design Manual for Roads and Bridges requirements. The new access is proposed to be located directly adjacent to the existing one. It is intended that the existing and proposed accesses will be operational during the construction phase of the development, a newly constructed access will facilitate all vehicle movements to and from the facility.



An assessment of the proposed access arrangements and visibility criteria is provided on **Traffic***wise* Ltd. Drawing No. 02731/01/01/PL02 (Appendix 2) and Figure 2.3). Visibility sightlines and verge area required to serve the access point are shown in 'cyan'.

The drawing shows that with suitable boundary treatment, the required visibility envelope measuring 'x' = 4.5m by 'y' = 160m, corresponding to a design speed of 85kph, is achievable at the proposed access point. No third party lands will be required to achieve visibility sightlines, nonetheless some remedial measures will be required along the existing site frontage. Remedial measures include the relocation of the existing boundary hedge and some trees to the north of the access adjacent to or forming the proposed buffer area.

In the vicinity of the site access the L-2117-0 Local Country Road is relatively straight. Accordingly 'forward visibility' along the road is considered satisfactory.

### 3.4.13. Assessment of Condition of L-2117-0 Local Country Road (Proposed Remedial/Reductive Measures)

During a site visit it was observed that the surface condition of the local country road begins to show signs of distress just north of the entrance to the Kyletalesha Landfill.

Between the Kyletalesha Landfill and the AES Waste Transfer Facility several potholes or potholes-to-be and an undulating road profile were observed. It is considered that this section of the local country road, whilst relatively satisfactory for light vehicles, is not sustainable for regular HGV movements. HGV trafficking of a poor running surface is likely only to accelerate deterioration.

Therefore it is recommended that the Applicant contributes to the provision of suitable reparation works, including a minimum of a regulating course and overlay or wearing course along this section of road. The number of standard axles generated over the life of the scheme should not require significant civil works to the sub-structure of the carriageway. The suggested overlay type improvement works are considered likely to be satisfactory and commensurate with the current and future volumes of HGV generated on this section of the local road.



### 3.4.14. Conclusions of Traffic Assessment

- This section has assessed existing and future traffic conditions on the local roads network in the vicinity of the proposed upgraded waste transfer and recycling facility. The traffic generation figures used in the assessment of the development are considered robust.
- The results of the analyses carried out show that the likely increase in traffic and the likely impact of such traffic on the capacity and operation of the receiving roads network would not be significant.
- Through reference to the NRA: Design Manual for Roads and Bridges it has been determined that traffic turning volumes currently observed at the simple priority intersection of the N80 with the L-2117-0 local country road warrants consideration of the provision of a ghost island right turn lane on the N80. It has subsequently been shown that the incremental increase in traffic likely to result from the proposed development will not significantly increase the current volume of traffic turning right. Accordingly the traffic generation associated with the current proposal are not considered likely to compromise the existing level of service at the N80 priority junction.
- The incorporation of several mitigation proposals has been recommedned, the principle of which is to effect an improvement in road safety on the receiving roads environment. The proposed remedial measures will benefit not only the proposed development but all local road users. Proposed remedial measures include resurfacing a portion of the local country road between the Kyletalesha Landfill access and the AES Waste Transfer Facility access together with improving visibility sightline criteria at both the proposed site entrance and the existing public road junction of the L-2117-0 and the N80.

- From the calculations and assessments carried out, it is considered that the development related traffic is not likely to have an adverse impact on the operation of the local roads network in the vicinity of the AES Waste Transfer and Recycling Facility. Given the modest increases in traffic associated with the current proposal, the proposed remedial measures are on balance considered likely to result in a net improvement in general road conditions on the local road network in the vicinity of the site. In addition the measures proposed are considered likely to effect a significant reduction in potential traffic hazard at the existing junction of the L-2117-0 and the N80.

## 3.5. Health and Safety

### 3.5.1. Potential Impacts on Health and Safety

The facility will be designed, constructed and operated in accordance with the:

- Safety, Health & Welfare at Work (Construction) Regulations 2001
- Safety, Health & Welfare at Work Act 1989
- Safety, Health & Welfare at Work (General Application) Regulations 1993
- best practice guidelines

Aspects of the development will present health and safety issues. These are discussed as follows:



a) Potential Impact on Construction Health and Safety

- traffic safety during the transport of building material loads to the site
- lifting of heavy prefabricated loads using cranes
- earthworks on site
- General construction site safety (e.g., slip/trip, moving vehicles etc.)

A health and safety plan covering all aspects of the construction process will be a pre-requisite of the construction phase and will deal more fully with these and other related issues.

b) Potential Impact on Operational Health and Safety

It is not anticipated that the operation of the facility will present any danger to the public. Access to the site will be restricted to employees, hauliers and pre-arranged visitors. Procedures will be put in place to ensure the health and safety of all persons entering the site. Site safety signs will be posted to direct all visitors to the site manager's office/reception on arrival at the site. All visitors will be required to sign in/sign out. Control and security measures will be implemented to safeguard all persons entering the site.

## 3.5.2. Mitigation Measures for Health and Safety

A health and safety plan will be devised for the site along with operational procedures. All staff working at the site as well as drivers delivering waste to the facility will be Safe Pass accredited and familiar with the contents of the Health & Safety Plan for the site.

Health and Safety Practices will be reviewed on an annual basis to ensure that they are in line with best practice in this industrial sector.

All contractors or visitors to the site will not be allowed access unless they are fully equipped with the appropriate Personal Protective Equipment (PPE). At a minimum this includes:

- Hard hat
- Safety shoes/boots
- High visibility vest

### c) Construction Health and Safety Mitigation Measures

Site specific health & safety plans for the construction phase of the project will be prepared in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2001. These will address all safety aspects of the construction project including, but not limited to:

- site access and general induction training
- general site safety
- earthworks
- compressed air
- transport, earthmoving and material handling machinery
- lifting appliances
- chains, ropes and lifting gear
- special provisions for hoists
- protective clothing and footwear required
- lockout/tag-out procedures for safe electrical work
- miscellaneous



FÁS Safe passes are required for all construction, delivery, and security staff.

The site manager will be responsible for the implementation of procedures outlined in the safety statement. Public safety will be addressed by restricting site access during construction and operation. Appropriate warning signs will be posted, directing all visitors to the site manager's office/reception area.

### d) Operational Health and Safety Mitigation Measures

Safety procedures will be developed specific to the site. These procedures will apply to the entire site area. The safety procedures will be constantly reviewed by a safety officer and the operators of the facility. The facility will be operated in full accordance with documented procedures, including operational procedures, emergency procedures, corrective action procedures etc.

All processes will be continuously monitored and recorded. Regular safety audits will be carried out on site to ensure the safety of all personnel working on or visiting the waste management facility.

All processes will be carried out within the dedicated buildings. Vehicular traffic movements within the site will be restricted and monitored and all traffic movements will be subject to strict procedures, in full accordance with health and safety requirements.

Other operational health and safety aspects, such as noise, air quality, bioaerosols, etc are discussed in other sections of this EIS. Measures will be taken in the design of the facility to minimise the impact of these aspects on health and safety.

The facility will operate under a review waste licence issued by the EPA. The review waste licence will, when issued, require the licensee to *inter alia* update the following procedures/systemsto incorporate the waste activities in the proposed extension to the facility:

- full training for all employees
- Environmental Management System (EMS) including setting objectives and targets for environmental control at the site and updating documented procedures for operations and environmental controls at the site.
- Emergency Response Procedures: - setting out all procedures that, in the event of an emergency, will be undertaken by personnel at the facility. The document will contain a list of contact names and numbers for emergency personnel.
- Corrective Action Procedure –outlining the process which will be taken in the event of an accident of environmental incident at the site. A form will need to filled out for each incident outlining what procedural changes need to be carried out in order to prevent such an incident re-occurring.



## 3.6. Conclusions on Human Beings

The nearest residence to the proposed extension area is some 340 m to the northwest. The predictive noise assessment indicates that the proposed development will not have a significant impact on existing noise levels.

There will be an increase in local traffic both during the construction phase and operational phase of the development. The likely increase in traffic and the likely impact of such traffic on the capacity and operation of the receiving roads network would not be significant.

The traffic assessment proposes a number of remedial measures that will benefit not only the proposed development but all local road users. Proposed remedial measures include resurfacing a portion of the local country road between the Kyletalesha Landfill access and the AES Waste Transfer Facility access together with improving visibility sightline criteria at both the proposed site entrance and the existing public road junction of the L-2117-0 and the N80.

Mitigation measures will be put in place to minimise health and safety impacts. These are not considered to be significant other than for normal construction risks.

# 4. CLIMATE AND AIR

This section presents details on air quality and climate within the existing environment in the vicinity of the proposed site. Potential impacts and mitigation measures are also described in this section.

A detailed air quality assessment was carried out by Odour Monitoring Ireland (OMI). The full report has been included in Appendix 3 of EIS. The main points of this report are summarised in the sections below.

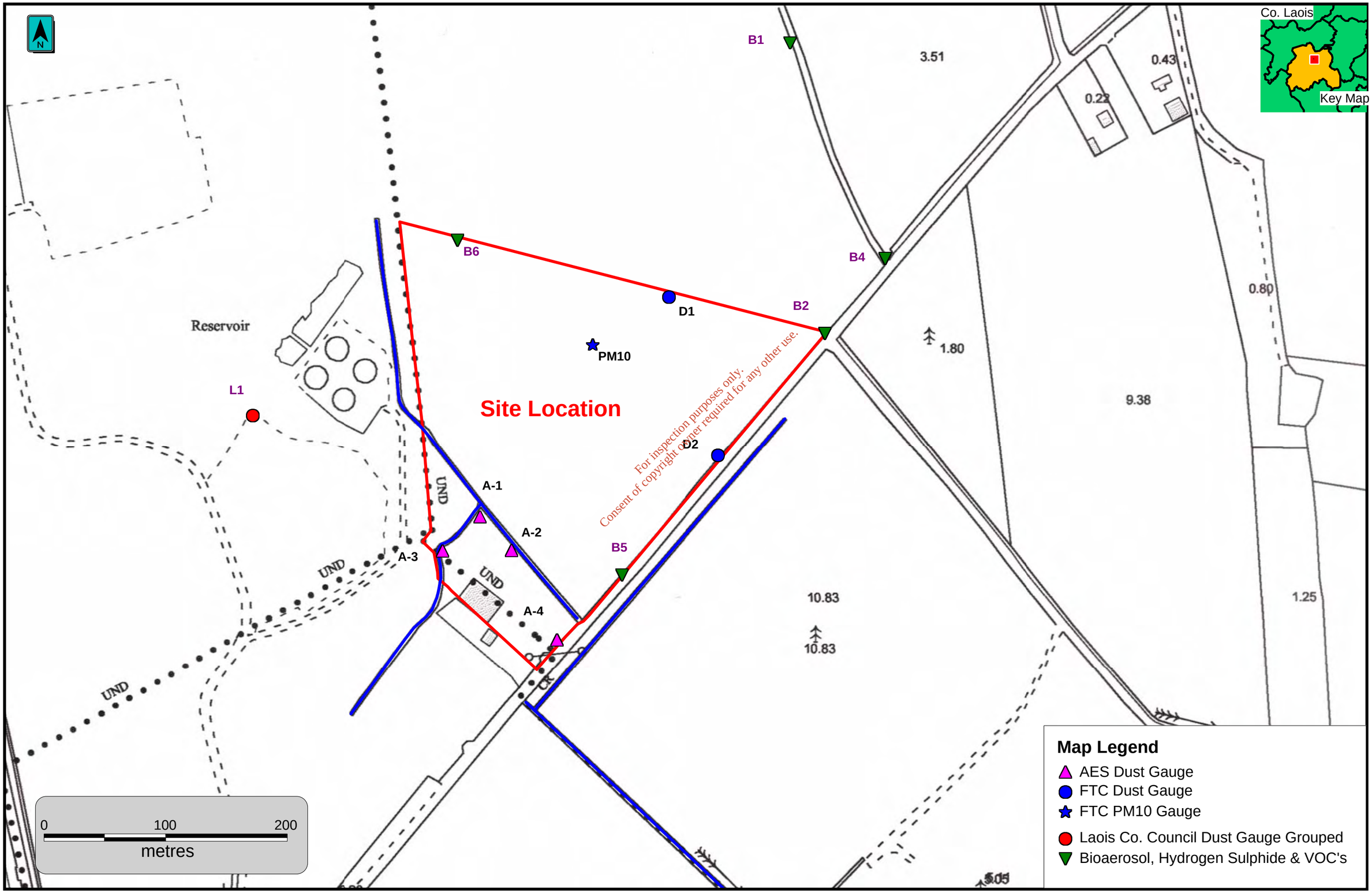
## 4.1. Air Quality in the Existing Environment

To assess the ambient air quality at the site, a comprehensive air quality monitoring programme was conducted. The following parameters were investigated:

- Total Dust Deposition
- $PM_{10}$
- VOCs
- Hydrogen Sulphide
- Bioaerosols
- Odour



Baseline monitoring survey was carried out at the site of the proposed development during the time periods 19th April 2006 to 18th May 2006 and 7th June 2006 using a range of air monitoring techniques. The locations of each of the parameters monitored are presented in Table 4.1 and Figure 4.1.




**Fehily Timoney & Company**

**Air Monitoring Locations**

**Figure 4.1**

**Table 4.1: Description of Air Monitoring Locations**

| Reference | Monitoring parameters | Description and monitoring location |
|---|---|---|
| D1 & D2 | Total depositional dust | Monitored using Bergerhoff gauges in accordance with VDI 2119. Located in the north east and east of proposed extension to the site. |
| PM1 | Particulate matter 10 μm | Monitored using Partisol PM sampler and gravimetric analysis. Located in centre of proposed extension to the site. |
| B1, B2 & B3 | Speciated Volatile organic compounds, Hydrogen sulphide and Bioaerosols (Aspergillus *fumigatus* and Total mesophillic bacteria) | Monitored using active pumped tubes using methodology BSEN13649, Jerome 631 X analyser and Biostage Anderson equivalent impactor. Located in north, east and centre of proposed extension to the site. |
| B4, B5 & B6 | Hydrogen sulphide | Monitored using active pumped tubes using Jerome 631 X analyser. Located in southeast, north and south of proposed extension to the facility. |
| A-1, A-2, A-3 & A-4 | Existing WRF Total depositional dust. Existing $NO_2$ and $SO_2$ monitoring data from EIS application in 2003. | Monitored using Bergerhoff gauges in accordance with VDI2119, Passive diffusion tubes and analysis by spectrometry. Located on boundary of existing Facility to the west and south west of proposed extension to the facility. |
| L1 | Existing Laois Co Co. total depositional dust monitoring grouped locations within landfill boundary | Monitored using Bergerhoff gauges in accordance with VDI2119. Located on boundary of existing landfill. Locations are grouped as exact locations are not known. Located to the northwest and south west of proposed extension to the facility. |



The results of each assessment are described in the following sections

*Total Dust Deposition (TDD)*

Total dust deposition was measured at the site using Bergerhoff gauges specified in the German Engineering Institute VDI 2119 entitled "*Measurement of Dustfall Using the Bergerhoff Instrument (Standard Method)*." Samples were exposed for a period of 29 days from the 19th April to 18th May 2006 at two locations (i.e. D1 and D2), as shown in Table 4.2 and Figure 4.1.

Additionally, compliance monitoring is performed at eight locations by Laois County council and AES (i.e. at four Monitoring locations D1 to D4 by Laois County Council as per Waste licence 26-2 grouped as Location L1 in this report and at four Monitoring locations A-1 to A-4 by AES Ltd as per Waste licence 194-1). The results are presented in Table 4.2.

**Table 4.2: Total depositional dust monitoring results in the vicinity of the AES facility**

| Date of monitoring | Sample reference | Total depositional dust Conc. (mg/m$^2$/day) | Notes |
|---|---|---|---|
| 19th April to 17th May 2006 | D1 | 92 | Baseline data for the proposed facility extension |
| | D1 | 216 | |
| 8th December 2005 to 4th January 2006 | A1 | 18 | Compliance monitoring performed by AES Ltd in accordance with Waste licence 194-1 |
| | A2 | 48 | |
| | A3 | -- | |
| | A4 | 54 | |
| 22nd June 2005 | D1 | 111 | Compliance monitoring performed by Laois Co. Co. in accordance with Waste licence 26-2. Grouped as Monitoring location L1 within this report. |
| | D2 | 84 | |
| | D3 | 1,192 | |
| | D4 | 176 | |
| 21st July 2005 | D1 | 168 | Compliance monitoring performed by Laois Co. Co. in accordance with Waste licence 26-2. Grouped as Monitoring location L1 within this report. |
| | D2 | 48 | |
| | D3 | 22 | |
| | D4 | 158 | |
| 9th December 2005 | D1 | 75 | Compliance monitoring performed by Laois Co. Co. in accordance with Waste licence 26-2. Grouped as Monitoring location L1 within this report. |
| | D2 | 74 | |
| | D3 | 107 | |
| | D4 | 75 | |
| **Limit value** | **-** | **350** | **-** |



Currently in Ireland there are no statutory limits for dust deposition, however, guidance suggest, "*a soiling of 10mg/m$^2$/hour is generally considered to pose a soiling nuisance*" (TA Luft 2002). This equates to 240mg/m$^2$/day of Total Depositional Dust. The EPA recommend a maximum level of 350mg/m$^2$day of dust deposition when measured according to TA Luft standard, which includes both soluble and insoluble matter (i.e. EPA compliance monitoring is based on the TA Luft Method).

This value was not exceeded at sample location D1 and D2 with all measured values at least 38% lower than the maximum recommended limit value.

Total depositional dust monitoring at the existing AES Ltd facility from 8th December to 17th May 2006 indicate that the dust depositional levels are generally well below the TA Luft limit of 350 mg/m$^2$/day with all measured values at least 85% below the recommended TA Luft limit value of 350 mg/m$^2$/day.

Total Dust Deposition monitoring at Kyletalesha landfill from June 2005 to December 2005 indicate that the dust emissions are generally well below the TA Luft limit of 350 mg/m$^2$/day. An exceedance (1,192 mg/m$^2$/day) was recorded at D3 during the June monitoring event. The high levels of dust were attributed to "*a sudden and significant increase in traffic delivering to the cell face*".

*Particulates*

Particulates can be in the form of smoke, grit, dust, fume or an aerosol. In the case of the proposed development it is the dust formed particulate that needs to be quantified. The Air Quality Standards Regulations (S.I. No. 271 of 2002) sets a 24-hour percentile (90.4%) limit for particulate matter ($PM_{10}$) of 50µg/m$^3$. This means that the limit of 50µg/m$^3$ can not be exceed more than 35 times in a calendar year. This limit will be further reduced in 2010 where the limit of 50µg/m$^3$ can not be exceeded more than 7 times in a calendar year.

Baseline $PM_{10}$ monitoring was conducted at the proposed site at one locations upwind facility of the facility on the 19th and 20th of April 2006. Monitoring was conducted using a Mini Partisol Model 2100 Air Sampler. Ambient air was sampled at a flow rate of 5 litres per minute. Samples were collected over 24-hour monitoring periods. The wind direction of the day of monitoring was from the south-west.



Figure 4.1 details the locations of these monitoring points. The results of monitoring are given in Table 4.3.

**Table 4.3: Results of $PM_{10}$ monitoring**

| Monitoring ID | Concentration (µg/m$^3$) |
|---|---|
| $PM_{10}$-1 | 31.9 |

Results of the baseline monitoring indicate that the background levels of particulates in the area are below the relevant limits. The monitoring point was located within the area of the proposed extension which is currently a bog. Parts of this bog are extremely dry and windblown dust is associated with this land type.

*VOC's in the Existing Environment*

Active sampling for the monitoring of priority trace VOC's was performed by means of pre-calibrated SKC vacuum pumps at three locations (B1 to B3) on the 7th June 2006.

A comprehensive screen was performed of the study area for VOC's in order to assess ambient air quality. This allowed for the assessment of any significant odour precursors in the vicinity of the proposed site and also allowed for the establishment of total VOC concentration levels. A full list of compounds monitored is contained in Appendix 3.

Monitoring results indicate that VOC concentrations in the vicinity of the site are low.

*Hydrogen Sulphide ($H_2S$) in the Existing Environment*

An ambient baseline $H_2S$ profile monitoring exercise was carried out in the vicinity of the proposed recycling site using a pre-calibrated Jerome 631 X $H_2S$ gold leaf continuous analyser with data logging capabilities. Samples were taken approximately 1.0 meter above ground level.

The results of the baseline study (refer to Appendix 3) indicted that the ambient $H_2S$ concentrations are below the recommended WHO guideline values at monitoring locations B2, B3, B4 and B5 on Figure 4.1. Hydrogen sulphide concentration levels of 6, and 7 ppb were detected at monitoring locations B1 and B6, respectively.



Ambient recorded levels of $H_2S$ are used to calculate a range of odour detection thresholds for $H_2S$. This is the level at which an odour can be detected but not necessarily cause a nuisance. The minimum and maximum formulated odour detection threshold is then used to calculate the contributory factor in Ou $m^{-3}$ which allows us to determine the concentration of the odour.

A range from 2 to 52 $Ou_E$ $m^3$ existed as $H_2S$ odour at all monitoring locations. A noticeable landfill odour was detected at monitoring location B1 and B6 while a noticeable rancid odour from the nearby knackery was detected at Monitoring location A-4 and B5 (refer to Figure 4.1).

*Bioaerosols in the Existing Environment*

Bioaerosols is a blanket term used to describe a whole range of airborne microbiological contaminants, including live bacteria and fungi, and their spores. Many different activities generate and release these organic contaminants into the ambient air including: handling cereal grains, wood, hay, cotton, wool and compost.

Odour Monitoring Ireland was retained by FTC to carry out baseline bioaerosol monitoring of the proposed site and the surrounding environment on the 7th June 2006.

Monitoring was performed in strict accordance with available information and advice including the sources:

1. Standardised Protocol for the Sampling and Enumeration of Airborne Micro-organisms at Composting Facilities. (1999). The UK Composting Association.
2. Macher, J. (1999). Bioaerosol assessment and control. American Conference of Government Industrial Hygienists, Kemper Woods Centre, 1330 Kemper Meadow Drive, Cincinnati, OH.
3. Direct Laboratories, (formerly ADAS), Woodthorne, Wergs Road, Wolverhampton, WV6 8QT.
4. SKC Inc, 863 Valley View Road, Eighty-four, PA, 15330.

Impactor plate sampling was carried out in accordance with the document "*Sampling Protocol for the Sampling and Enumeration of Airborne Micro-organisms at Composting facilities*", The Composting Association, UK.

Table 4.4 lists the results of the baseline bioaerosol air quality monitoring. Both background Aspergillus *fumigatus* and Total mesophillic bacteria were assessed

**Table 4.4: Baseline bioaerosols concentrations on 7th June 2006**

| Location ID | Average Aspergillus *fumigatus* concentration (CFU $m^{-3}$)[1] | Average Total Mesophillic bacteria concentration (CFU $m^{-3}$)[1] | Sample count |
|---|---|---|---|
| B1 | 21 | 17 | 3 |
| B2 | <7 | 22 | 3 |
| B3 | <7 | <7 | 2 |
| **Assessment criterion** | **<500** | **<1000** | **EA, 2002** |

Note: [1] denotes a total of 4 blanks (2 plate and impactor blanks for each monitored bioaerosol) were incorporated into the sampling exercise. All blanks were negative CFU $m^{-3}$.



Results indicate that *Aspergillus fumigatus* concentrations are low and at expected ambient concentration levels for this time of year. Total mesophillic bacteria concentration levels at monitored locations were also at ambient concentration levels.

*Odour in the Existing Environment*

Due to the fact that point source sampling and analysis via a laboratory based olfactometer is not a realistic, sensitive or accurate in methodology for the assessment of ambient baseline odours, sniff assessment in accordance with international recognised methodologies was use (adapted VDI-Guideline 3940-Determination of Odour in Ambient Air by field Inspectors).

Since the function of sniff assessment is to ascertain nuisance and plume location no emissions were calculated. This qualitative and semi-quantitative survey tentatively determines the odour character and the likely hood of impact for the perceived odour concentration. During the survey on the 7th June 2006, landfill gas and falling animal unit odours were detected at monitoring locations B1, B5, B6 and A-4.

The plume radiated from west to east in the predominantly wind direction on the day of monitoring. The n-butanol detection threshed of the sniffer was 28 ppb, which is within the 20 to 80 ppb range specified within the PrEN13725:2003.

*Review of Additional Monitoring*

Baseline air quality monitoring performed for the original EIS for the waste transfer station was interpreted. Air quality monitoring data generated by the EPA was also interpreted for baseline data assessment. The results of these are summarised below:

**Nitrogen dioxide (NO2)** - Baseline NO2 levels were monitored at four locations (A-1 to A-4) as part of the original planning application for the AES facility. The results are presented in Table

**Table 4.5: Average $NO_2$ Concentrations at (August 2003)**

| Location | Sampling Period | Average $NO_2$ conc. ($\mu g/m^3$) [2] |
|---|---|---|
| A-1 | 18th July to 09th August 2003 | 3.50 |
| A-2 | 18th July to 09th August 2003 | 5.40 |
| A-3 | 18th July to 09th August 2003 | 2.40 |
| A-4 | 18th July to 09th August 2003 | 5.60 |
| EPA measured conc.- Askeaton hourly average[3] | 2003 | 3.0 |
| EPA measured conc. – Kilkitt hourly average[3] | 2003 | 3.0 |
| EPA measured conc.- Mountrath hourly average[3] | 2004 | 13 |
| EPA measured conc. – Kilkitt hourly average[3] | 2004 | 3.0 |
| **Hourly limit value** | **-** | **200[1, 2]** |
| **Annual limit value** | **-** | **40** |



**Notes**
[1] denotes Irish and EU Ambient Air Standard (SI 271 of 2002 and 1999/30/EC)
[2] denotes ambient concentration of $NO_2$ not to be exceeded more than 18 hourly exceedence in a year.
[3] denotes Air quality Monitoring Report, 2003 and 2004. EPA, Johnston Castle, Wexford.

The dominant source of $NO_2$ in the area appears to be from motor vehicle exhausts, the burners/boiler heating local residences and the close-by industrial processes. The measured concentrations of $NO_2$ at all monitoring locations are within the Irish and EU Ambient Air Standards. The baseline monitoring data presented from Askeaton, Mountrath and Kilkitt for years 2003 and 2004 are 93% lower than the ambient air limit value of 200 $\mu g/m^3$. Previously generated baseline data from the existing AES facility are a minimum of 86% lower than the annual mean limit value of 40 $\mu g/m^3$.

**Sulphur Dioxide ($SO_2$)** - levels of $SO_2$ were measured using diffusion tubes at locations A1 – A4. The results are presented in Table 4.6. EPA monitoring data is included for comparison.

**Table 4.6: Average $SO_2$ concentrations in the vicinity of the site (August 2003)**

| Location | Sampling Period | Average $NO_2$ conc. ($\mu g/m^3$) [2] |
|---|---|---|
| A-1 | 18th July to 09th August 2003 | 3.60 |
| A-2 | 18th July to 09th August 2003 | - |
| A-3 | 18th July to 09th August 2003 | 5.80 |
| A-4 | 18th July to 09th August 2003 | 3.20 |
| EPA measured conc.- Askeaton hourly average[3] | 2003 | 7.0 |
| EPA measured conc. – Kilkitt hourly average[3] | 2003 | 7.0 |
| EPA measured conc.- Mountrath hourly average[3] | 2004 | 4.0 |
| EPA measured conc. – Kilkitt hourly average[3] | 2004 | 3.0 |
| **Hourly limit value** | **-** | **350[1, 2]** |
| **Annual limit value** | **-** | **20** |

[1] denotes Irish and EU Ambient Air Standard (SI 271 of 2002 and 1999/30/EC)
[2] denotes ambient concentration of $NO_2$ not to be exceeded more than 24 hourly exceedence in a year.
[3] denotes Air quality Monitoring Report, 2003 and 2004. EPA, Johnston Castle, Wexford.



The dominant source of $SO_2$ in the area appears to be from motor vehicle exhausts, the burners/boiler/solid fuel heating local single residences and industry process contributions. The measured concentrations of $SO_2$ at all monitoring locations are within the Irish and EU Ambient Air Standards. The baseline monitoring data presented from Askeaton, Mountrath and Kilkitt for years 2003 and 2004 are 99% lower than the ambient air limit value of 350 $\mu g/m^3$. Previously generated baseline data from the existing AES facility are a minimum of 74% lower than the annual mean limit value of 20 $\mu g/m^3$.

**BTEX** – Monitoring of BTEX was conducted at four monitoring locations (A-1 to A-4), over a 21-day period during the date period 18th July to 09th August 2003, using BTEX diffusion tubes.

The results of the monitoring of BTEX at A-1 to A-4 indicate that background levels were in compliance with Irish and EU limit values (i.e. SI 271 of 2002 and EU Directive 2000/69/EC) for Benzene.

Ambient air benzene concentrations at the four reported EPA monitoring stations are also low and within Irish and EU limit values. Average Benzene concentrations were from 80 to 94% below the Irish and EU directive limit values.

## 4.1.1. Potential Impacts of the Development on Air

The principal potential sources of air emissions from the proposed development include:

- Odour from the composting or anaerobic digestion processes
- Bioaerosol production within the building
- Dust emissions from the construction of the facility and movement of vehicles to and from the site

*Odours*

Odours from composting arise mainly from the uncontrolled anaerobic biodegradation of proteins and carbohydrates to produce unstable intermediates such as sulphur containing organics and volatile fatty acids. Odours are generated by a number of different components, the most significant being the sulphur containing compounds (thiols, mercaptans, hydrogen sulphide), volatile fatty acids (butyric acid, valeric acid), amines (methylamine, Dimethylamine), phenols (4-methylphenol), chlorinated hydrocarbons (trichloroethylene, tetrachloride), etc. (Dawson *et al*. 1997). Most of these compounds have very low odour threshold concentrations (i.e. at the level they can be detected) as illustrated in Table 4.7.



**Table 4.7: Odour detection thresholds of waste water odour precursors**

| Chemical component | Threshold Concentration (mg $m^{-3}$) |
|---|---|
| Ammonia | 0.03-37.8 |
| Methylamine | 0.0012-6.1 |
| Trimethylamine | 0.00026-2.1 |
| Indole | 0.0006-0.0071 |
| Scatole | 0.00035-0.00078 |
| Hydrogen Sulphide | 0.001-0.27 |
| Methyl mercaptan | 0.0000003-0.038 |
| Ethyl mercaptan | 0.000043-0.00033 |
| Butyric acid | 0.0004—42 |
| Valeric acid | 0.0008-0.12 |

O'Neill & Phillips et al. (1992)

Odours from waste recycling, aerobic composting and anaerobic digestion operations arise mainly from the volatilisation of odourous gases from:

- The surface of exposed odourous materials
- Uncontrolled anaerobic decay of accepted organic materials
- Sludge handling operations including dewatering, thickening, digestion, storage and transport of processed sludge's offsite
- Anaerobic digestion processes and emissions of sour gas
- Inefficient odour control/abatement equipment operation and design including loose fitting covers, inefficient extraction and odour control unit failure

Raw materials for aerobic and anaerobic facilities can be odourous due to the development of anaerobic zones within the waste. When this raw material is disturbed through tipping, mixing and shredding operations, pockets of odourous air are released. Inappropriate storage of raw material such as wet environments can lead to the rapid development of anaerobic material resulting in odourous release.

Predictive Assessment

Three models were conducted to assess predictive emissions for:

1. odour
2. Bioaersols
3. ambnbient emissions from the anaerobic flare and gas compression engine

The air dispersion modelling analysis conducted follows the procedures and requirements contained in the US EPA's (United States Environmental Protection Agency) guidance on air quality models (EPA/450/2-78-27R). The model type is the Industrial Source Complex Short-Term model (ISCST3), approved by the Irish EPA.

Two odour emission scenarios were developed to take account of the proposed design with odour abatement.



**Model 1 - Odour**

A worst-case odour emission scenario was modelled using the atmospheric dispersion model ISC Prime with 3 years worth of hourly sequential meteorology data representative of the study area. A worst-case meteorological year and worst-case odour emission data was used to predict any potential odour impact in the vicinity of the proposed facility for the following scenarios:

**Scenario 1:** Biological composting system incorporating indoor aerobic composting processes, and operation of the existing facility. Two sub scenarios were run for this proposed operation to take account of the varying design odour emission rates from the biofiltration system treating the odours from the biological waste treatment composting facility and existing waste transfer and recovery station.

**Scenario 2:** Biological composting system incorporating indoor anaerobic digestion (AD) technology, a gas utilisation plant, a biofilter treating the odours from the waste preparation hall, Post processing and dewatering, aerobic composting of product from the AD process, and operation of an existing facility. Two sub scenarios were run for this proposed operation to take account of the varying design odour emission rates from the biofiltration system treating the odours from the anaerobic biotreatment facility and waste transfer and recovery station.

From the results of the model it can be concluded that:

- During operation of the proposed facility, regardless of which process is selected to be undertaken i.e. the compost process or anaerobic digestion process, with considered abatement protocols implemented, no odour impact should be registered by residents living in the vicinity of the facility.

- All residents currently located in the vicinity of the proposed facility will perceive on odour concentration less than 1.5 $Ou_E$ $m^{-3}$ at the 98$^{th}$ percentile in a worst-case meteorological year.
- All residents currently located in the vicinity of the proposed facility will perceive on odour concentration less than 3.0 $Ou_E$ $m^{-3}$ at the 99.5$^{th}$ percentile in a worst-case meteorological year.
- Following investigation of individual odour impacts from individual processes to be operated within the facility, it was concluded that:
    - The existing Waste transfer station will contribute most to odour plume spread from the overall proposed facility
    - The Compost Storage Area will contribute second most to odour plume spread from the overall proposed facility
    - The biofilter and gas utilisation exhaust stacks will contribute least to overall odour plume spread from the overall proposed facility. This is due to source characteristics.
- The proposed facility operation should not exceed the odour emission rate of 77,122 $Ou_E$ $s^{-1}$ assuming identical source characteristics and no fugitive odour emissions from ground level sources. The biofilter exhaust stack should account for at least 64% of overall odour emission rate and have a hedonic tone rating of –2 or more in accordance with the VDI Guideline hedonic tone standard.



**Model 2 - Bioaersols**

A second modelling assessment was carried out for bioaerosol emission for both Scenario1 and Scenario 2 using ISC3. The following conclusions are drawn from the desktop study:

- All air produced by the proposed facility will be treated using a biofiltration system.
- The maximum predicted 1 hour concentration range of bioaerosols for the three classes for Scenario 1 and 2 is:
    - 9 to 12 CFU $m^{-3}$ for Aspergillus *f* for Scenarios 1 and 2 (
    - 36 to 47 CFU $m^{-3}$ for Total Mesophillic bacteria for Scenarios 1 and 2
    - 72 to 94 CFU $m^{-3}$ for Total fungi for Scenarios 1 and 2
- The maximum predicted bioaerosol concentration at ground level at resident locations is:
    - 4 to 6 CFU $m^{-3}$ for Aspergillus *f* for a 1-hour maximum concentration level Scenarios 1 and 2,
    - 17 to 23 CFU $m^{-3}$ for Total Mesophillic bacteria for a 1-hour maximum concentration level for Scenarios 1 and 2,
    - 35 to 46 CFU $m^{-3}$ for Total fungi for a 1-hour maximum concentration level for Scenario 1 and 2,
- These maximum impact concentration levels are near background levels and from 11 to 250 times lower than the proposed bioaerosol impact criterions
- The proposed composting facility is outside the recommended setback distance proposed by the Irish EPA, CRE (Irish composting Council) and the UK Environment Agency. This setback distance is to provide safety for residential locations in the vicinity of the composting facility. All composting processes will be carried out indoors and all air passed through a biofiltration system, which will even further reduce any risks associated with the facility.

**Model 3 - Air Quality Impact Assessment - Anaerobic Digestion Process**

This section assesses the potential impacts of the emissions associated with the gas utilisation/flaring plant to be located within the anaerobic digestion plant design.

All data used in the dispersion modelling exercise was obtained from library and emission limit values established by the Environmental Protection Agency for such processes. Table 4.8 illustrates the emission limit values (ELV) established by regulatory bodies for the processes to be operated within the anaerobic facility. This would be considered worst case scenario and typically, emission concentrations would be less during operation.

**Table 4.8: Emission limit values (ELV) for the Flare and Gas Compression Engine**

| Parameter | Flare ELV (mg $m^{-3}$)[1, 3] | Gas Compression Engine ELV referenced to 5% $O_2$ (mg $Nm^{-3}$)[1, 3] |
|---|---|---|
| CO | 100 | 650 |
| $NO_X$ ($NO_2$ and NO) | 200 | 500 |
| $SO_2$ | - | - |
| TOC | 10 | 20 |
| THC | - | 1000 |
| HF | 5 (at mass flows >0.05 kg/hr) | 5 (at mass flows > 0.05 kg/hr) |
| HCL | 30 (at mass flows >0.30 kg/hr) | 30 (at mass flows >0.30 kg/hr) |
| Formaldehyde | 60 | 60 |
| Total Particulates ($PM_{10}$)[2] | - | 80 |



**Notes:** [1] denotes BAT guidance for the waste sector: Waste treatment activities, Draft, Nov 2003. EPA, Johnston Castle, Wexford, Co. Wexford. Also taken from existing waste licences published by the EPA.

[2] denote that assumed Total particulates are $PM_{10}$ to allow comparison with SI 271 of 2002. This will facilitate the assessment of a worst-case scenario.

[3] denotes emission limit values are expressed at standard conditions of 273 Kelvin and 101.3 kPa. Oxygen reference for flare is 3%, for gas compression engine is 5%.

A worst-case air quality impact assessment was analysed to estimate the worst case air quality impact in the vicinity of the proposed anaerobic design. The model results indicate that the maximum GLC for $NO_X$ as $NO_2$, $SO_2$, CO, TOC, THC, HF, HCL, Total particulates as $PM_{10}$, and Formaldehyde are within their respective assessment criterions and therefore is concluded that negligible air quality impacts will be experienced outside the boundary of the facility.

*Potential Dust Emissions*

Dust emissions arise when an operation causes particulate matter to become airborne. This airborne dust is then available to be carried downwind from the source. The amount of dust generated and emitted from a working site and the potential impact on surrounding areas varies according to the following:

- The type and quantity of material and working method
- Climate/local meteorology and topography

The clearing of the site for construction will cause dust emissions. The dust arisings will be predominantly large sized fractions and will deposit close to the working area with minimal dispersion from the site. The potential impact will be short-term i.e. during construction. All areas will be seeded immediately following construction in order to establish a vegetated cover to prevent windblown erosion and associated dust emissions.

## 4.1.2. Mitigation/Enhancement Measures for Air

All processes will be conducted within the building. The buildings will operate under negative pressure. Air inside the buildings will be passed through wet scrubbers to take out dust and bioaerosols and reduce air temperature, before discharging to biofilters. Flow diagrams of the proposed air management systems for the aerobic composting process and anaerobic digestion process are outline overleaf.

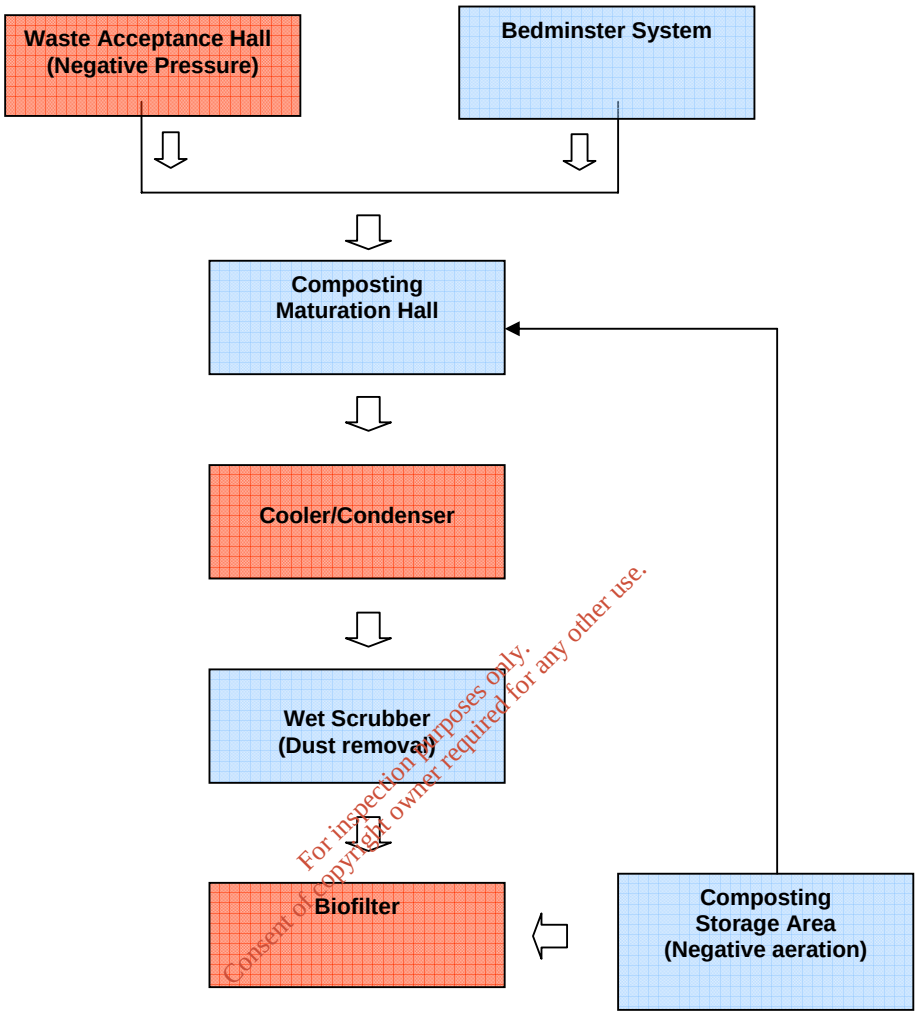


In addition the following mitigation measures will be deployed in the facility:

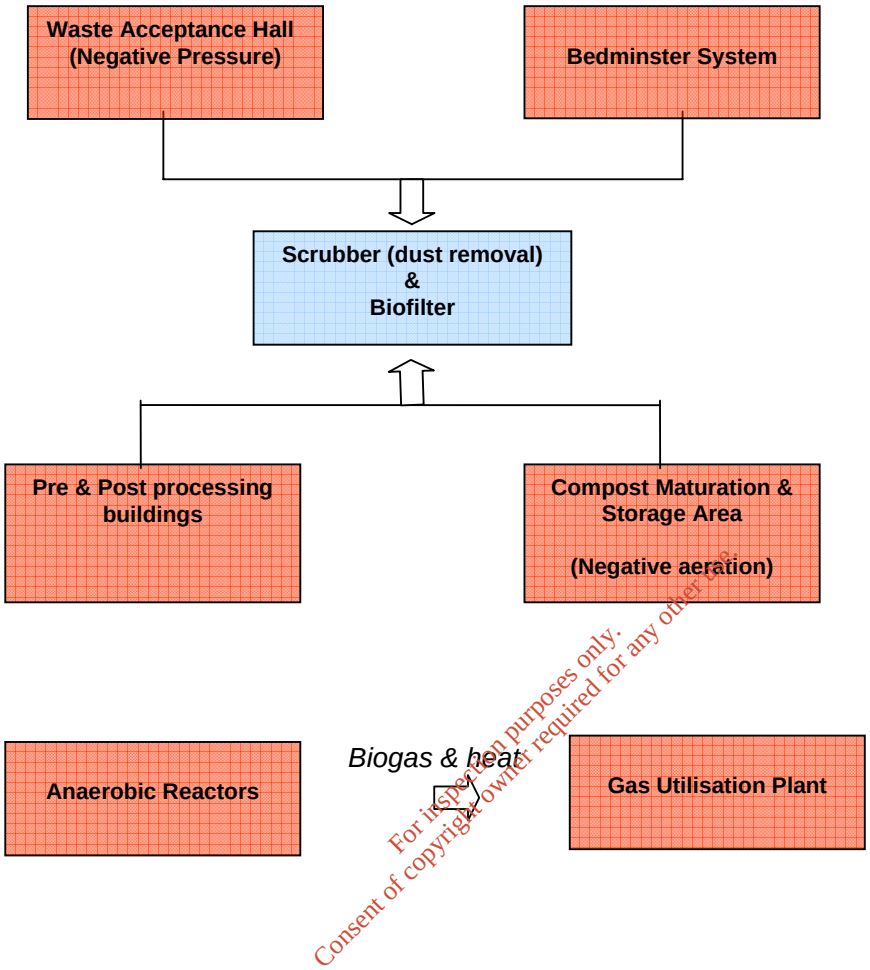
*Odours*

- Good housekeeping techniques will be maintained within the facility as contaminated surfaces/equipment radiate odour and increase perceived odour concentration i.e. any spillages or leakages of waste water/raw material will be cleaned up immediately
- A closed-door management strategy will be enforced with the doors only opening for a short period of time during the delivery of waste. Rapid response roller shutter doors are to be installed at vehicle entry and exit points
- For the composting process - air for the waste reception building, the Bedminster digesters will be extracted to maintain negative ventilation within the building
- The compost storage area will be operated under forced or pulled extraction
- All odorous air produced by the composting process will be treated through a biofiltration system
- An odour management plan will be produced for the facility in accordance with the waste licence requirements.

## Proposed Air Management System – Aerobic Composting Process



## Proposed Air Management System - Anaerobic Digestion Process



*Bioaerosols*

The British Occupational Health Society has reported that dust may be a good indicator of exposure to micro-organisms, with good correlations between dust levels and total micro-organisms. As dust levels will be carefully controlled on site, the risk will be significantly reduced, both for on-site operatives and nearby communities.

In addition, as all processes are to be located under cover, within buildings, the risk of aerosol formation via wind activation etc, is reduced. The use of biofilters will also help to contain and filter out bioaerosols, thus further limiting potential releases to the wider environment.

Research has also shown that concentration levels of spores of fungus are likely to be reduced to background levels within a distance of 250 m from the source. As the nearest residence to the facility is at a distance of some 340 m from the boundary, the risk to nearby residents is not considered significant.

No further mitigation measures are required. Occupational monitoring will be conducted on an annual basis to assess impact, if any, on workers within the facility.

*Dust*

- Stockpiles (during construction phase only) will be sprayed during periods of dry weather in order to suppress dust migration from the site
- All areas will be vegetated in order to prevent windblown erosion
- All internal roads and all hardstandings will be constructed in tarmac or asphalt suppressing dust
- The access roads and internal site roads will be sprayed during periods of dry weather in order to suppress dust migration from the site
- All loads leaving the site will be required to pass through the wheel wash.
- A monitoring programme at the site will be implemented to measure dust and $PM_{10}$ in accordance with the waste licence for the facility.
- A wet scrubber will remove dust emissions from inside the building and therefore preventing any release of dust to the atmosphere.

## 4.2. Climate in the Existing Environment

The nearest synoptic meteorological station to the AES site is Birr which is located approximately 40 km north west of the site. The national grid co-ordinates for the meteorological station are N074044. It is situated at an elevation of 73 mOD, which is approximately 7 m lower than the Kyletalesha site.

The 30-year averages recorded at Birr Station during the period 1961 -1990 are presented in Table 4.4.

*Air Temperatures in the Existing Environment*

From Table 4.3 it can be seen that the mean air temperature is approximately 9.3°C with a mean of 4.6°C in January and 14.9°C in July.

*Wind Speeds in the Existing Environment*

The prevailing wind direction in Ireland is from the south west. Data on the average windspeed and direction, as measured at Birr Synoptic Station, indicate that the prevailing winds are south-westerly and the mean windspeed is 7 knots (3.6 m/s).

*Precipitation in the Existing Environment*

The mean annual rainfall data recorded at Birr is shown in Table 4.3 preceding tables along with the monthly averages. A mean average rainfall of 804.2 mm was recorded at the Birr Station.

The rainfall averages shown are what would be expected for much of the eastern half of the country where typical rainfalls range from 750 to 1,000 mm. By contrast western parts of the country experience between 1000 to 1250 mm of rainfall per annum with rainfall in many mountainous regions exceeding 2000 mm per annum.



### 4.2.1. Potential Impacts of the Development on Climate

The current practice of landfilling the majority of the country's Municipal Solid Waste (MSW) results in the production of significant quantities of greenhouse gases, in particular methane ($CH_4$). The 2001 National Climate Change Strategy estimated that in 1998 greenhouse gas emissions from waste made up 2.5% of Ireland's total emissions. The production of methane from landfill sites is due to the activities of anaerobic bacteria feeding on the organic material within the waste. While improvements have been made in recent years in both the design and management of landfills in order to reduce methane emissions to the atmosphere the best option for mitigation is to remove the organic fraction of the waste before it enters the landfill. The 2001 Strategy called for a 40 % reduction in waste related emissions which was to be achieved through the diversion of biodegradable waste away from landfill as well as the improvement of landfill gas capture and utilisation systems.

The European commission published a Study in 2001 entitled Waste Management Option and Climate Change. This document accessed emissions from waste management facilities in terms of impacts on climate change. The EU study showed that, in overall terms, waste management techniques such has source segregation of municipal solid waste, followed by recycling and composting/anaerobic digestion, gave the lowest net generation of greenhouse gases.

The proposed development at Kyletalesha will be capable of handling 80,000 tonnes per annum of biodegradable material. This will have significant benefits in terms of reduced greenhouse gas emissions. Although composting processes tend to result in the production of carbon dioxide instead of methane, methane has a greenhouse potential 21 times greater than carbon dioxide.

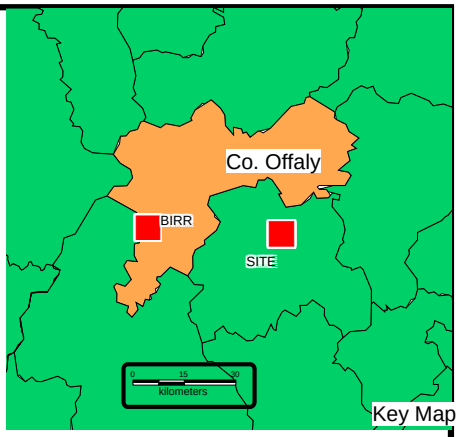
### 4.2.2. Mitigation/Enhancement Measures for Climate

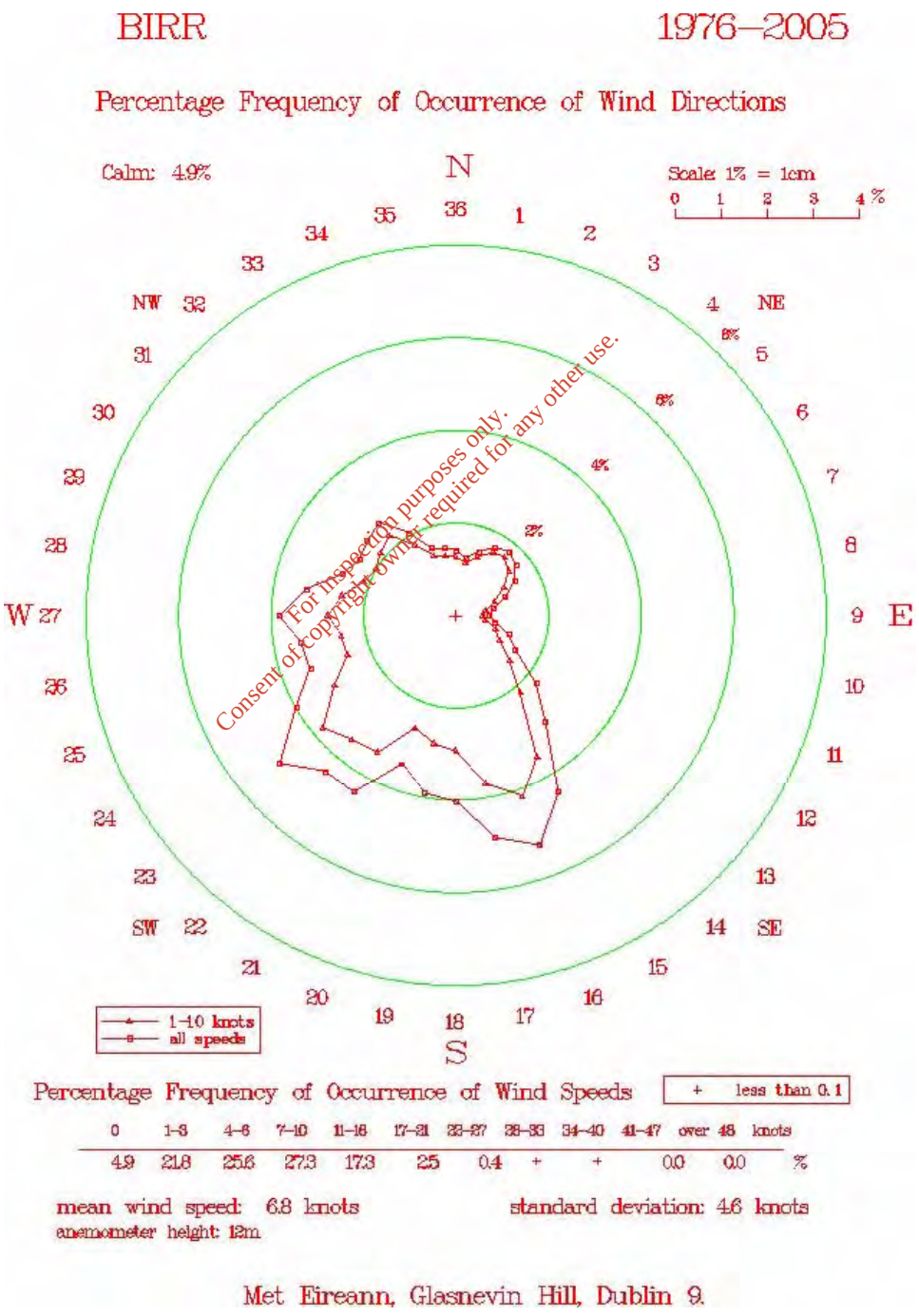
As the proposed development will greatly reduce the volume of organic waste being landfilled and in so doing, will help to reduce the volumes of methane formed within the landfills, the development will have a direct positive impact on the climate. Therefore, no mitigation measures are required.

**Table 4.9: Birr's Monthly and Annual Mean and Extreme Values (1961-1990)**

| Temperature (° C) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean daily max. | 7.5 | 7.9 | 9.8 | 12.2 | 14.9 | 17.7 | 19.2 | 18.8 | 16.6 | 13.6 | 9.7 | 8.2 | **13** |
| Mean daily min. | 1.8 | 1.8 | 2.5 | 3.5 | 5.9 | 8.7 | 10.7 | 10.3 | 8.5 | 6.7 | 3.1 | 2.5 | **5.5** |
| Mean | 4.6 | 4.8 | 6.1 | 7.9 | 10.4 | 13.2 | 14.9 | 14.6 | 12.6 | 10.1 | 6.4 | 5.4 | **9.3** |
| Absolute max. | 13.8 | 15 | 19.7 | 23.7 | 25.7 | 31.2 | 30.8 | 29.3 | 24.5 | 22.3 | 17.5 | 15.3 | **31.2** |
| Absolute min. | -14.6 | -10.5 | -10.5 | -4.6 | -2.2 | -0.3 | 3.1 | 1.2 | -1 | -3.4 | -7.2 | -9.4 | **-14.6** |
| Mean no. of days with air frost | 9 | 7.7 | 7 | 4.2 | 1 | 0.1 | 0 | 0 | 0.3 | 1.5 | 7.1 | 7.8 | **45.7** |
| Mean no. of days with ground frost | 17 | 15.1 | 13.6 | 11.8 | 6.1 | 1.2 | 0.1 | 0.2 | 2 | 4.9 | 13 | 15 | **99.9** |
| **Relative Humidity (%)** | | | | | | | | | | | | | |
| Mean at 0900UTC | 90 | 89 | 87 | 82 | 77 | 78 | 80 | 84 | 86 | 89 | 90 | 90 | **85** |
| Mean at 1500UTC | 83 | 76 | 71 | 65 | 64 | 66 | 67 | 68 | 71 | 76 | 80 | 84 | **73** |
| **Sunshine (hours)** | | | | | | | | | | | | | |
| Mean daily duration | 1.6 | 2.31 | 3.18 | 4.64 | 5.32 | 4.8 | 4.24 | 4.16 | 3.58 | 2.67 | 2.03 | 1.41 | **3.33** |
| Greatest daily duration | 7.2 | 9.2 | 11.7 | 13.6 | 15.2 | 15.6 | 15.2 | 13.8 | 11.3 | 9.7 | 8.1 | 6.7 | **15.6** |
| Mean no. of days with no sun | 11 | 7 | 5 | 3 | 2 | 2 | 3 | 2 | 4 | 6 | 9 | 12 | **66** |
| **Rainfall (mm)** | | | | | | | | | | | | | |
| Mean monthly total | 75.9 | 54 | 61.3 | 52.5 | 61.7 | 55.2 | 59.1 | 77.6 | 70.6 | 83.5 | 74.1 | 78.6 | **804.2** |
| Greatest daily total | 28.6 | 35.3 | 25.9 | 30.9 | 26.3 | 27.5 | 39.5 | 42.2 | 25.6 | 40.3 | 25.9 | 47.1 | **47.1** |
| Mean no. of days with - 0.2 mm | 19 | 15 | 18 | 15 | 17 | 16 | 15 | 17 | 17 | 18 | 18 | 19 | **204** |
| Mean no. of days with - 1.0 mm | 14 | 11 | 13 | 11 | 13 | 11 | 10 | 13 | 12 | 14 | 13 | 14 | **148** |
| Mean no. of days with - 5.0 mm | 6 | 4 | 4 | 4 | 5 | 3 | 4 | 5 | 5 | 6 | 5 | 6 | **57** |
| **Wind (knots)** | | | | | | | | | | | | | |
| Mean monthly speed | 8 | 8.1 | 8.1 | 7 | 6.7 | 6.1 | 5.8 | 6 | 6.6 | 7.2 | 7.1 | 7.9 | **7** |
| Max. gust | 85 | 77 | 62 | 58 | 55 | 49 | 49 | 58 | 81 | 65 | 60 | 69 | **85** |
| Max. mean 10 minute speed | 51 | 40 | 36 | 34 | 31 | 28 | 27 | 35 | 39 | 40 | 34 | 43 | **51** |
| Mean no. of days with gales | 0.4 | 0.4 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0.2 | **1.2** |
| **Weather (mean no. of days with…)** | | | | | | | | | | | | | |
| Snow or sleet | 4.9 | 3.8 | 2.7 | 1.1 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2.6 | **15.9** |
| Snow lying at 0900UTC | 3.1 | 1.9 | 0.8 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | **6.6** |
| Hail | 0.6 | 0.9 | 2.6 | 1.8 | 1.1 | 0.3 | 0 | 0.2 | 0.2 | 0.2 | 0.5 | 0.3 | **8.7** |
| Thunder | 0.1 | 0.1 | 0.3 | 0.3 | 0.6 | 1.1 | 1 | 0.7 | 0.5 | 0.2 | 0.2 | 0.1 | **5.2** |
| Fog | 3.2 | 1.8 | 1.7 | 2.4 | 1.2 | 1.4 | 1.9 | 3.2 | 3.3 | 3.6 | 2.8 | 3.4 | **29.9** |

Source (Met Eireann – www.meteireann.ie






# Prevailing Wind Conditions

**Fehily Timoney & Company**

**Figure 4.2**

## 4.3. Conclusion on Air and Climate

The proposed development will greatly reduce the volume of biodegradable waste being landfilled and in so doing, will help to reduce the volumes of methane formed within the landfills, the development will have a direct positive impact on the climate.

A baseline air quality survey was conducted to assess the existing quality within and adjacent to the proposed facility. An assessment of background levels of odour, hydrogen sulphide, volatile organic compounds, dust and particulate matter was conducted. The results of the survey indicated that the air quality in the existing environment is good.

An air dispersion model was conducted to assess the potential impacts of odour emanating from the facility on the surrounding environment. The model was a worst case scenario. The results of the model indicated that the proposed facility will not cause an odour impact.

A number of mitigation measures will be employed at the facility in accordance with best practice. These include:

- Operating the facility under negative pressure
- Installation of a wet scrubber (for dust and bioaerosols) and a biofiltration system (for odour)
- Paved roads and hardstandings

# 5. GEOLOGY AND HYDROGEOLOGY

This section of the EIS addresses geology and hydrogeology in the existing environment, identifies potential impacts of the proposed development and outlines measures to avoid, reduce and mitigate potential impacts. Residual impacts that can not be avoided are also identified and discussed.

## 5.1. Methodology

This section was prepared having regard to 'Geology in Environmental Impact Statements – A Guide', Institute of Geologists of Ireland, September 2002. It was prepared using available published literature and following a walkover survey of the site and a windscreen survey of the surrounding area. Intrusive investigations were also carried out as part of this assessment. The Geological Survey of Ireland (GSI) website was accessed for information such as depth to bedrock and aquifer vulnerability.

The literature reviewed included:

1. Bedrock Geology Map of the Carboniferous of Central Ireland, GSI 1992 (Chevron Series).
2. Groundwater Protection Scheme for County Laois (on GSI website).
3. Annual Environmental Report for Kyletalesha Landfill, Laois County Council January 2006.
4. Portlaoise Water Supply Improvement Scheme (PWSIS) – Environmental Impact Statement, Nicholas O'Dwyer, Ltd December 2001.
5. Laois: An Environmental History, John Feehan, 1983.
6. Groundwater Report – Appendix 4.5.1 of M7/M8 Motorway EIS, Eugene Daly & Associates, 2003.
7. Memoir of Localities of Minerals of Economic Importance and Metalliferous Mines in Ireland, The Mining Heritage Society of Ireland, 1998.

A walk over survey of the site was carried out on 02 June 2006. Geological and hydrogeological features were noted on the site and in the surrounding area.

Following the compilation of data and information on the existing environment, the details of the proposed development were reviewed with the project engineers to identify potential impacts on geology and hydrogeology. Where potential impacts were identified, changes were made to the design in consultation with the project engineers to avoid, reduce and mitigate these potential impacts.

## 5.2. Existing Geology

The existing geology is described in terms of the bedrock geology, overburden geology and hydrogeology

### 5.2.1. Overburden Geology

The overburden geology is described from the vulnerability mapping for County Laois available from the GSI website and the site investigation data available from the adjacent landfill and the site specific intrusive investigations carried out as part of the assessment.

While there is a soils map, there is no overburden mapping available for County Laois. The vulnerability map from the GSI website shows the site to have a low vulnerability rating. This indicates that the overburden thickness is greater than 10 m. To the east, approaching the minor junction, the vulnerability increases to high, indicating an overburden thickness between 3 m and 5 m.

In general the overburden in this area of County Laois consists of boulder clay and/or gravel deposited during the last ice age. Subsequent to these deposits, blanket bogs developed across extensive areas of the county with thick peat deposits.

There is a gravel deposit, up to 1.5 km wide which extends from Mountmellick to approximately 4 km south of Portlaoise. The deposit is located approximately 500 m to the east of the site. It forms part of the Maryborough Esker. It follows closely the valley of the Triogue River, a tributary of the River Barrow. This is an outwash deposit laid down by retreating ice sheets.



As part of an intrusive site investigation, the following works were carried out:-

1. Seven dynamic probes.
2. Four shell & auger boreholes.
3. Geotechnical analysis of soil samples – particle size distribution (PSD) analysis.

Borehole and dynamic probe logs are provided in Appendix 4. Borehole and probe locations are shown on Figure 5.1. The findings of the site investigation are summarised in Table 5.1.

**Table 5.1: Summary of Ground Investigation Probes & Boreholes**

| Borehole /Probe ID | Total Depth (m bgl) | Comments |
|---|---|---|
| DP1 | 4.34 | Low blow counts to 0.8 m (probably peat) |
| DP2 | 5.45 | Low blow counts to 2.3 m (probably peat) |
| DP3 | 6.55 | Low blow counts to 1.7 m (probably peat) |
| DP5 | 5.88 | Low blow counts to 2.6 m (probably peat) |
| DP6 | 6.78 | Low blow counts to 0.8 m (probably peat) |
| DP7 | 6.63 | Low blow counts to 1.7 m (probably peat) |
| DP8 | 6.33 | Low blow counts to 3.8 m (probably peat) |
| BH1 | 6.20 | Soft sandy gravely clay becoming stiff to very stiff with depth. No water ingress observed. |
| BH2 | 4.60 | 1 m of peat over soft sandy gravely clay becoming stiff to very stiff with depth. Water strike at 4.3 m. |
| BH3 | 7.30 | 200 mm of peaty topsoil over soft sandy gravely silt/clay becoming stiff to very stiff clay with depth. Water strike at 5.8 m. |
| BH4 | 6.80 | 200 mm of peaty topsoil over soft sandy gravely silt/clay becoming stiff to very stiff clay with depth. No water ingress observed. |



The overburden geology was found to consist of peat (up to 1 m encountered in boreholes and up to 3.8 m at dynamic probe locations) over sandy gravely clay with boulders. The clay was found to be soft directly beneath the peat but became stiff to very stiff within 1 m to 2 m from top of clay. Cobbles consist of limestone fragments. The logs do not indicate that bedrock was encountered, indicating a depth to bedrock across the site of at least 6 to 7m.

Geotechnical analysis of the soil sample indicates that is generally a slight sandy, slight gravely clay with cobbles. It generally has a fine content of 25 – 35 %.

According to the AER for Kyletalesha landfill, a site investigation on lands adjacent to, and north of the proposed development site was undertaken in 2000. This revealed a peat thickness of 3 m to 7 m across the landfill and a boulder clay thickness beneath the peat of 7.5 m to 10 m. Depth to bedrock could therefore range from 10.5 m to 17 m. The permeability of the peat is reported to range from $1.9 \times 10^{-9}$ m/sec to $9.8 \times 10^{-10}$ m/sec. The permeability of the clay till is reported to range from $2.41 \times 10^{-8}$ m/sec to $4.78 \times 10^{-10}$ m/sec, with lower value of $1 \times 10^{-4}$ m/sec estimated for the sand/gravel zones encountered.

## 5.2.2. Bedrock Geology

The regional bedrock geology is shown on Figure 5.2. This is a part copy of the 1:100,000 scale bedrock geological map of the Carboniferous of Central Ireland, GSI 1992. The bedrock underlying the site and in the general area belongs to Courceyan-aged argillaceous bioclastic limestone. These are medium to dark grey fossiliferous argillaceous calcarenites interbedded with thin calcareous shales, locally containing oolitic beds. It is locally dolomitised to the east near the Leinster massif.

According to the GSI karst database, there are no karst features in the immediate vicinity of the site. The nearest recorded karst features are located to the east of the site. These are karst features recorded in boreholes 3 to 5 km to the east of the site. Other recorded karst features present in the area 5 km east of the site include caves, springs and a swallow hole.

There are no recorded mineral deposits in the immediate area. According to the County Development Plan, there are no sites of geological interest near the site. Special Areas of Conservation (SACs) and Natural Heritage Areas (NHAs) in County Laois with an associated geological aspect include:-

1. Clonaslee Esker and Derry Bog (SAC/NHA site code 000859)
2. Lisbigney Bog (SAC/NHA site code 000869)
3. Slieve Bloom Mountains (SAC/NHA site code 000412)
4. Coolrain Bog (SAC site code 002332 & NHA site code 000415)
5. Knockacollier Bog (SAC site code 002333 & NHA site code 000419)
6. Clonreher Bog (NHA site code 002357)
7. Ridge of Portlaoise (NHA site code 000976)
8. Rock of Dunamaise (NHA site code 000878)
9. Timohoe Esker (NHA site code 000421)



The closest SAC/NHA to the site is Clonreher Bog, located 500 m to the west, across from the N80.

## 5.2.3. Hydrogeology

The overburden deposits beneath the site and in the immediate vicinity have low permeability and are not aquifers. The gravel deposits located to the east of the site are classified as a locally important sand/gravel aquifer (Lg). A 51 feet–deep well installed in these gravels is reported to have a yield of 982 $m^3$/day (PWSIS –EIS). These gravels form part of the Maryborough Esker, which have an outcrop area of 19.2 $km^2$ in Laois.

The area is not identified in the South Eastern River Basin District Management System - Characterisation Report as being 'at risk' or 'probably at risk' from over abstraction. The overall risk assessment, taking account of abstraction and pollution sources, indicates that the groundwater in the area is 'not at significant risk' - the best rating given.

The bedrock aquifer beneath the site is classified as locally important, generally moderately productive in local zones (Ll). The vulnerability of this aquifer is rated at low, giving a resource protection rating of Ll/L.

The water supply scheme for the Portlaoise and Mountmellick areas is sourced from a number of wells and springs. Studies are currently ongoing for the upgrade of this scheme using groundwater sources. The existing well fields are located 4 km to 5 km to the east of the site, between Straboe and Aghnahily, within the Portlaoise Limestone aquifer. The Portlaoise Limestone aquifer comprises the Allenwood Formation, the Ballyadams Formation and the dolomitised Waulsortian Reef Limestone. These formations do not extend beneath the proposed development site. Regional groundwater flow direction is shown to be in a generally northerly direction. There are a number of wells used locally for domestic / farm supply. These are monitored by Laois County Council.

The local groundwater regime is assessed based on information available from the adjacent Kyletalesha landfill. Groundwater quality, level and flow direction are monitored by the County Council in accordance with the EPA waste licence for the landfill. Six groundwater wells (G1, G2, G3, G8, G12 and G13) and three off-site wells (G9 and two private supply wells) are used to monitor groundwater.

The AER indicates that the most recent data available for a complete round of groundwater levels is July 2005. These are summarised in Table 5.2.



**Table 5.2: Summary of Groundwater Elevation Data**

| Well ID | Groundwater Elevation (mOD) |
|---|---|
| G1 | 80.79 |
| G2 | 82.41 |
| G8 | 81.17 |
| G12 | 81.77 |
| G13 | 79.71 |

This data, along with the information gathered during the site investigation of 2000 indicates that the bedrock aquifer is confined by the overlying peat and clay till. The monitoring indicates that there is a groundwater divide trending east-west through the landfill. Groundwater flow in the bedrock north of the divide is in a north-westerly direction and flow direction south of the divide is in a south-easterly direction. The proposed development site is therefore downgradient from the landfill with respect to groundwater flow direction. Flow beneath the site is therefore interpreted to discharge to the Triogue River.

Groundwater quality monitoring is also carried out by Laois County Council and the EPA at the landfill site and in surrounding wells. One of the wells (Council well G2) monitored is located within the proposed development site. According to the landfill AER, the groundwater quality is generally good. There was only one exceedance of criteria in the groundwater samples; that was at G2 for ammoniacal nitrogen (0.08 mg/l) in January 2005. Groundwater data for the landfill is provided in Appendix 5.

## 5.3. Impacts Geology & Hydrogeology

A detailed description of the proposed development is provided in Section 2. The aspects of the proposed development that could impact on geology and hydrogeology are:-

1. The filling of the site to formation level during the construction phase. It is intended to import clean fill material to raise the ground level of the site by 1.5 to 2.5 m (generally less than 2 m). It is not intended to excavate the peat prior to filling. This will surcharge the soft compressible soils (peat and soft clays) prior to construction. It is estimated that approximately 108,000 $m^3$ of subsoil/fill will be required. This estimate is based on a worse-case scenario of raising the site levels by an average of 2.2 m (above existing ground levels) to formation level and assuming a consolidation of the peat/soft clays of 0.5 m (i.e. 2.7 m of fill). The site will be brought to finished levels with an additional 0.3 m of regulating layer and concrete slab. Pile foundations will be used to avoid settlement of the buildings. This will be a long-term / permanent impact.
2. The generation of leachate at a number of locations across the site, the leakage of which to the subsurface could impact on soil and groundwater quality. The sources of leachate include the wheelwash, waste reception area and maturation area. Leachate generation will be minimised with waste activities being carried on within buildings and the use of leachate generated in the process. It is estimated that the annual average volume of leachate generated will be 3,000 $m^3$.
3. The storage of hydrocarbons on the site, the leakage of which to the subsurface could impact on soil and groundwater quality. At present there is one 50,000 litre-capacity aboveground fuel storage tank at the site. This tank is bunded in accordance with BS 8007-1987. Refuelling is done on a contained concrete pad which drains to an oil interceptor. An additional tank will be installed inside the waste reception area. There will also be temporary storage tanks used during the construction phase.
4. The use of on-site waste water treatment systems, with discharge of treated effluent to a percolation area. At present there is a Puraflo wastewater treatment system on the site with discharge to a percolation on-site area. A second, similar system will be installed just south of the administration / car park area.
5. The proposed development will place additional demand on the water supply in the area. Based on the metered water usage at the existing transfer station, it is estimated that the proposed development will place an additional demand of 30 $m^3$/day. The water supply to the site is from a mains water supply
6. The development of the site will require products from local quarries (aggregate, concrete products and ready mix). This will have an indirect impact on those quarries.

## 5.4. Mitigation Measures

The measures proposed include avoidance, reduction and mitigation and include:

1. The use of clean fill for the raising of formation levels across the site. This material will be imported from other development sites with a surplus of subsoil. The material will be monitored under the conditions of a waste permit for the recovery of the soil. The use of surplus material from other sites will avoid the indirect impact on the use of quarried rockfill. It will also avoid the unnecessary disposal of soil in landfill.
2. The generation of leachate will be kept to a minimum. The areas where waste will be unloaded, stored and processed will be covered so rainwater will not result in leachate generation. Leachate will only be generated from the seepage of moisture from the waste, condensate from the process and the wheel-wash. Leachate generated will, where possible be used in the process, any excess will be tankered offsite to an appropriate wastewater treatment facility.
3. The working areas of the site will be hard standing consisting of a concrete slab. Any spillages/leakages will be directed through an oil interceptor thereby avoiding direct discharge to the subsoil/environment. The contents of the interceptor will be monitored for water quality parameters. In the event that water quality falls outside acceptable criteria, it will be treated as leachate.
4. The storage of all fuels will be in tanks of good integrity and bunded in accordance with industry practice. Refuelling of plant will be carried out on concrete pads which drain to a full retention interceptor. Should the pipes leak, the leakage will be contained. Monitoring of oil usage and water quality in the interceptors will alert site management of leaks. This practice will be implemented for both the construction and operational phases.
5. The oil interceptors will be inspected periodically and cleaned as per manufacturer's recommendations.
6. According to the GSI website, the site is located in an area where the suitability of an on-site wastewater treatment system is rated as R1 (i.e. acceptable subject to normal good practices – system selection, construction, operation and maintenance in accordance with EPA 2000). This is the most suitable in terms of aquifer vulnerability. As the soils have a low permeability, it would be necessary to construct a raised percolation area for the new wastewater treatment.
7. At present Laois County Council monitors groundwater at a number of locations within the vicinity of the site which includes a monitoring well within the proposed extension area. This well will be lost during the construction of the biodegradable waste treatment buildings. AES will, if required, install a groundwater well at a location to be agreed by the Agency.

With these mitigation measures, there will be residual impacts that can't be avoided. These include the demand for water during the operational period of the site (minimal). The demand on local quarries is not avoidable. Again, while the demand will be lessened by the use of surplus soil as fill, rather than rockfill, concrete products and aggregates will be required during construction.

With the containment of leachate and the bunding of hydrocarbon storage tanks, the risk to groundwater quality is negligible.

SITE BOUNDARY

LW 3
LW 2
LW 1
LW 4
LW 5

DP2
BH 2
DP1
BH 4
BH 3
DP 8
DP 3
BH 1
DP 7
DP 5
DP 4
DP 6
DP 9
DP 10

Reservoir

UND
CF

18.91
0.30
0.32
0.28
3.20
0.55
0.68
3.51
0.43
0.22
10.21
0.80
1.80
9.38
2.35
10.83
10.83
1.25
9.64
5.05
7.04
15.31
0.40S
1.23
0.85
0.85

LEGEND

BH 1 BOREHOLE
DP1 DYNAMIC PROBE
LW1 LANDFILL WELL



| Rev. | Drawn | Chk'd | App'd | Date | Description |
|---|---|---|---|---|---|
| A | KL | ME | DOS | 28.07.06 | ISSUE FOR PLANNING |

Name of Client
AES

Name of Job
EXTENSION TO KYLETALESHA SITE

Title of Drawing
SITE INVESTIGATION LAYOUT PLAN

Scales Used
1:2500

Dwg. No. 2006-081-01-Figure 5.1
Rev. A

Scale 1:750

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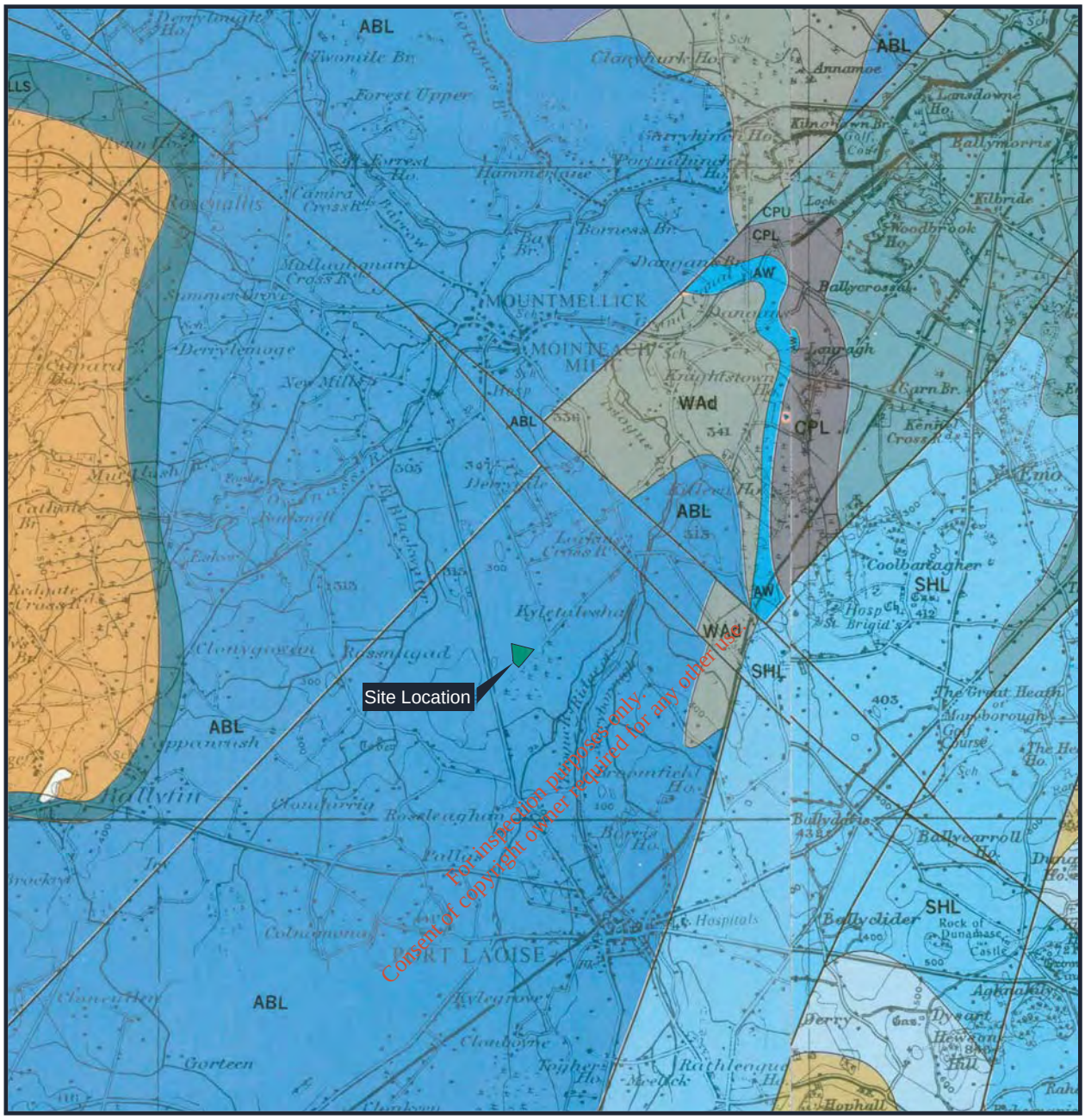


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**W Coal Measures : Namurian**
Shallow marine and terrestrial sediments. Sandstones, siltstones and shales with thin coal seams.

**N Deltaic and marine sandstones, siltstones and mudstones with minor marls : Brigantian to Namurian**

**SHU Shallow water limestones : Holkerian to Brigantian**
Shelf and ramp carbonate sediments. Dominantly pale thick-bedded, bioclastic calcarenites with minor shale; some small bioclastic mudmounds (RF).

**CPU Basinal limestones : Holkerian to Brigantian**
Predominantly dark laminated, argillaceous calcisiltites and calcareous shales, some limestone turbidites; locally sandy in the Upper Asbian and Brigantian. Cherty calcisiltites near Lough Derravaragh are starved basin facies (DV). Olistostromes (slumps) are present near Balbriggan (SLU).

**SHL Shallow water limestones : late Chadian to Arundian**
Predominantly pale calcarenites with dark grey micrites; locally oolitic. Dolomitized zones (SHd) appear to be dominantly structurally controlled.

**CPL Basinal limestones : Chadian to Arundian**
Calcareous submarine fan sediments. Proximal fan sediments consist of limestone turbidites with bioclastic calcarenites and calcareous mudstones; distal fan sediments consist of laminated, highly argillaceous calcisiltite and calcareous shales with abundant diagenetic iron sulphide.

**SLL Olistostromes : Arundian**
Slump deposits.

**Facies Mosaic : Chadian**
Shallow marine, pale grey, massive limestones (AW) (Allenwood Beds in the Kildare area). Shelf margin oolite banks (ED) near Edenderry and Thurles. Poorly fossiliferous, commonly bioturbated, black mudstones of lower ramp or basinal facies (TC) within the Dublin Basin (Tobercolleen Formation).

**WA Waulsortian limestones : Courceyan to Chadian**
Massive, pale grey biomicrites with spar-filled cavities and minor crinoidal calcarenites; formed as mudmounds in shallow to moderate water depths. Locally dolomitized (WAd) adjacent to the Leinster massif.

**ABL Argillaceous Bioclastic Limestone : Courceyan**
Medium to dark grey fossiliferous, argillaceous calcarenites interbedded with thin calcareous shales, locally containing oolitic beds in the southern portion of the map. Locally dolomitized (ABLd) adjacent to the Leinster massif. Termed the Ballysteen Limestone in the SW portion of the map.

**Basal Carboniferous transgression : Courceyan**
Calcareous shales and thin dark, argillaceous limestones in the south and western portions of the map area (LLS), termed the "Lower Limestone Shales" or Ringmoylon Formation. In the north Midlands the sequence consists of open marine to peritidal or locally supratidal carbonates with minor shales and locally calcareous sandstones and is termed the Navan Group (NAV).

**ORS Old Red Sandstone : Devonian**
Sandstones, conglomerates and siltstones deposited as alluvial fanglomerates and terrestrial sediments.

**V Carboniferous volcanic rocks : Chadian and Asbian**
Chadian basaltic volcanic rocks, dominantly as sills and maar deposits. Asbian bimodal volcanic and shallow intrusive rocks.

**LP Pre-Carboniferous metasedimentary and metavolcanic rocks.**

**INT Pre-Carboniferous felsic to intermediate intrusive rocks.**

**Tectonic, volcanic pulses**

REGIONAL BEDROCK GEOLOGY MAP FIGURE 5.2

# 6. HYDROLOGY

This section addresses hydrology and surface water runoff in the existing environment, identifies potential impacts of the proposed development and outlines measures to avoid, reduce and mitigate potential impacts. Residual impacts that can not be avoided are also identified and discussed.

## 6.1. Methodology

This section was prepared using available published literature and following a walkover survey of the site and a windscreen survey of the surrounding area. The literature reviewed included:

8. Annual Environmental Report for Kyletalesha Landfill, Laois County Council January 2006.
9. Southeast River Basin Management Project.
10. Laois: An Environmental History, John Feehan, 1983.
11. Portlaoise Water Supply Improvement Scheme (PWSIS) – Environmental Impact Statement, Nicholas O'Dwyer, Ltd December 2001.
12. Michael MacCarthaigh (2002). Parameters of Low Flow and Data on Low Flow in Selected Irish Rivers. Paper presented in the National Hydrology Seminar 2002, Tullamore, Ireland
13. Dublin City Council's Stormwater Management Guidelines, 1998
14. Greater Dublin Strategic Drainage Study Report, 2005



A walk over survey of the site was carried out on 02 June 2006. Hydrological features were noted on the site and in the surrounding area.

Following the compilation of data and information on the existing environment, the details of the proposed development were reviewed with the project engineers to identify potential impacts on hydrology. Where potential impacts were identified, changes were made to the design in consultation with the project engineers to avoid, reduce and mitigate these potential impacts.

## 6.2. Existing Hydrology and Drainage

### 6.2.1. General Hydrology and Flow Quality of the Stream

The proposed development site is located in the Southeast River Basin Management region. This covers 12 counties, in whole or in part, including most of County Laois. It includes hydrometric areas 11 to 17. The proposed development site is located in hydrometric area 14.

Nearly all of County Laois is drained by one of two river systems; the Nore and the Barrow. The proposed development site is located within the Barrow catchment. The site is located in the catchment of the Triogue River, a tributary of the River Barrow. Drainage in the area flows in a general northerly direction.

There are two known abstraction points on the Barrow River, downstream of the proposed development site. These are summarised in Table 6.1.

**Table 6.1: Summary of Surface Water Abstractions Points on Barrow River**

| Location | River | Grid Co-ordinates | Authority | Abstraction Rate |
|---|---|---|---|---|
| New Ross | Barrow | N272 127 | New Ross UDC | 2,700m$^3$/day |
| Athy | Barrow | proposed abstraction | Kildare Co. Co. | --- |



The EPA monitors water quality on the Triogue River and River Barrow. The biological index (Q-value) for the Triogue River and the first two points on the River Barrow immediately downstream of its confluence with the Triogue are summarised in Table 6.2.

**Table 6.2: Summary of Surface Water Quality Data**

| River | Location | Q-Value | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1971 | 1974 | 1978 | 1980 | 1981 | 1984 | 1986 | 1989 | 1993 | 1997 | 2000 |
| Triogue | Kyle Bridge | 1 | 1-2 | 1 | 1 | 1 | 2 | 2 | 2-3 | 3 | 2 | 2 |
| | Bridge @ Eyne | 3 | 2-3 | 2-3 | 3-4 | 1-2 | 2 | 2-3 | 2-3 | 3 | 2 | 2-3 |
| | Bridge u/s of Barrow | -- | -- | -- | -- | -- | -- | -- | 3 | 3-4 | 3 | 3 |
| Barrow | Bridge @ Garryhinch House | 4 | 3-4 | 3-4 | 4 | -- | -- | 4 | 4 | -- | 4 | 3-4 |
| | Kilnahown Bridge | 4 | 4 | 4 | 4 | -- | -- | 4-5 | 4-5 | -- | 4 | 4 |

The results indicate that the Triogue River is seriously polluted, with a slight improvement moving downstream. The River Barrow has good water quality.

Chemical analysis of water quality on the River Triogue by the EPA indicates exceedances of criteria for a range of parameters indicating pollution of the river. These include ammonia, BOD, phosphate, chloride and nitrogen at Kyle Bridge upstream of the site, at the bridge near Eyne near the site and Triogue Bridge downstream of the site. The chemical data concurs with the biological rating for the sampling points.

There are two streams flowing through the site. One rises in the landfill to the north and flows in a southerly direction through the site, forming the eastern boundary of the existing transfer station. A second stream rises to the west of the site, flows in an easterly direction and joins the other stream at the northeast corner of the transfer station. The stream is culverted beneath the public road, flows to the southwest for a short distance, then turns to the southeast joining the River Triogue 0.8km to the southeast of the site. The surface water features in the vicinity of the site are shown in Figure 6.1.

Surface water runoff from hardstanding within the transfer station is collected by drains, directed to an oil interceptor and discharged to the stream flowing along its eastern boundary.

These streams are monitored by the County Council and AES as part of the waste licences for their respective facilities. Monitoring locations are shown on Figure 6.1.



The Council monitors surface water quality at 12 locations in accordance with conditions of Waste Licence 26-02 for the landfill. This includes monitoring to assess the discharge of treated leachate to the River Triogue. The monitoring indicates exceedances of ammoniacal nitrogen at S002, S003 and S007, and suspended solids at S003, S004 and S007. S002 is located downstream of the landfill and within the proposed development site. S003 and S007 are downstream of both the landfill and proposed development site. S004 is located to the west of the proposed development site and in a different sub-catchment.

AES retains Bord na Mona to carry out surface water monitoring in accordance with Waste Licence 194-1 for the waste transfer station. Monitoring of surface water quality is carried out at four monitoring points – SW1, SW2, SW4 and SW6. Monitoring locations are shown on Figure 6.1. Sampling points upgradient of the transfer station are SW1, SW6 and SW2; while SW4 is the downgradient sample. SW6 is located upstream of the AES transfer station (behind the knackery), SW1 is located between the knackery and the transfer station, SW4 is located downstream of the transfer station and SW2. The surface water monitoring points for the landfill coincide or are in proximity to the AES locations.

The most recent monitoring by AES (December 2005) indicates that the quality of the surface water entering the site is poor. There are high levels of conductivity, ammonia, COD, BOD and nitrogen recorded. Data for December 2005 is summarised in Table 6.3. The data suggests that the impact on surface water quality originates at points upstream of the proposed development site.

**Table 6.3: Surface Water Quality Results 7th December 2005 – AES Transfer Station**

| Parameter | Results of Chemical Analysis of Surface Water Samples | | | | SW Quality Criteria (Salmonid) |
|---|---|---|---|---|---|
| | SW-1 | SW-2 | SW-4 | SW-6 | |
| **Date** | **07/12/05** | **07/12/05** | **07/12/05** | **07/12/05** | |
| Visual Inspection | Yellow colour, few suspended solids | Yellow colour, no suspended solids | Yellow colour, no suspended solids | Green colour, few suspended solids | --- |
| Odour | Slight Odour | None | Strong | Strong | --- |
| Ph (pH units) | 7.6 | 7.6 | 7.5 | 7.5 | 6 – 9 |
| Ammonia-N | 4.32 | 10 | 13 | 4.13 | 0.02 $NH_3$ |
| $BOD_5$ – TCMP mg/l | 8 | <2 | <2 | 7.5 | <5 |
| COD mg/l | 105 | 122 | 119 | 130 | --- |
| Conductivity (Us/cm) | 2,623 | 598 | 738 | 3,080 | --- |
| Suspended Solids mg/l | 23 | <5 | <5 | 117 | 25 |
| Total Nitrogen mg/l | 69.07 | 16.57 | 19.06 | 65.32 | --- |
| Total Phosphorus mg/l | 0.4 | 0.18 | 0.2 | 0.97 | 0.062 |
| TKN mg/l | 67 | 13 | 16 | 65 | --- |
| Oils, Fats and Greases | 36 | <1 | 6 | <1 | --- |



## 6.2.2. Assessment of Low Flow and Assimilative Capacity of the Stream

There are two gauging stations (Station Nos. 14014 and 14032) on the River Triogue. Station No. 14032 is located at Kyle (co-ordinates 246350/200250) approximately 2 km south of the proposed development site, and has a catchment area of 31.3 $km^2$. According to the EPA website, the River Triogue has an average flow of 0.61 $m^3$/sec, a dry weather flow of 0.05 $m^3$/sec and a 95-percentile flow of 0.11 $m^3$/sec at Station No. 14032. The other station (Station No. 14014) is near Portlaoise (co-ordinates 246800 / 199100) and its catchment area is 29.44 $km^2$. According to the EPA website, the dry weather flow and the 95-percentile flow at this station are 0.04 $m^3$/sec and 0.09 $m^3$/sec respectively.

The catchment area of the stream near the southern corner of the site is approximately 1.46 $km^2$. Preliminary assessment of low flow in the stream shows that the 95-percentile flow in the stream at the southern corner of the site is approximately 4.5 litres/sec.

There will be approximately 25 employees in the proposed facility with at most ten visitors, giving a PE (population equivalent) during the operational phase of 35. Taking an average daily water consumption rate of 180 litres/head, the dry weather flow (DWF) can be estimated as follows:

DWF = 35 x 180 = 6300 litres/day = 0.073 litres/sec

In general, treatment plants are designed for a flow-through of 3 times Dry Weather Flow (3 DWF). In the case of the proposed development, this equates to

3 DWF = 0.073 x 3 = 0.22 litres/sec

Not considering the other water quality data, it is possible to estimate the assimilative capacity in terms of dilution only, which is approximately 4.5/0.22 = 20:1. The Royal Commission Standard recommends a minimum dilution of 8:1 for any treated effluent discharge to receiving waters.

As the dilution ratio available is 20:1, it would appear therefore, that the stream is adequate to receive the treated effluent (of 35 PE) from the proposed site, in terms of dilution only. Design calculations are provided in Appendix 6.

However, as mentioned in Section 6.2.1 and shown in Table 6.3, the most recent monitoring by AES (December 2005) indicates that the quality of the surface water entering the site is poor. Therefore, it is not recommended to discharge the treated effluent directly to the stream, but instead, to discharge it to a constructed percolation area in keeping with EPA Guidance Wastewater Treatment Manuals – treatment System for Small Communities, Businesses, Leisure Centres and Hotels.



### 6.2.3. Potential Impact on Surface Water

A detailed description of the proposed development is provided in Section 2. The activities and processes to be conducted or likely to occur, at the site that could potentially impact upon surface water are as follows:

1. Storm water run-off from exposed soils with subsequent sediment loading of the site stream during construction activities, in particular the filling of the site with subsoil. This presents a relatively short-term impact.
2. Increased surface water runoff from roof and hardstanding areas. The total hardstanding area is approximately 4.07 ha, which consists of clean water contribution area (roofs and others) of approximately 1.48ha, leachate area of approximately 0.54 ha and road and other trafficable hardstanding area of approximately 2.05 ha.
3. Culverting of the on-site stream.
4. Generation of leachate on site, as discussed in Section 5.
5. Storage of hydrocarbons as discussed in Section 5.
6. Installation of a wastewater treatment plant on site, which may discharge the treated effluent to a constructed percolation area surface water.

## 6.2.4. Mitigation Measures

The measures proposed include avoidance, reduction and mitigation and include:

1. The culverting of the stream will be carried out first, prior to the importation of subsoil. In this way, the filling can be completed without exposure of the stream bank to fill material. Normal surface water control measures will be implemented at the site during construction.
2. The generation of leachate will be kept to a minimum. This is discussed in Section 5.
3. Hydrocarbons will be stored in bunded areas as discussed in Section 5. All runoff from trafficable hardstanding area will be passed through a full retention oil interceptor, which will be monitored prior to discharge as discussed in Section 5.
4. The runoff from the site during the operation period will be collected in storage areas to attenuate flows. With a controlled outflow discharge rate of 18.6 litres/sec, the required storage volume would be approximately 1,200 $m^3$. Using Aqua Cell type units (which has storage capacity of 95% of their volume), the size of such units will be approximately 1,270 $m^3$.

   The surface water drainage system essentially consists of 3-networks. The first network collects clean water (from roofs and other clean water contributing areas) and conveys it directly to the attenuation via an inlet manhole. The second network collects surface water from all trafficable area (except the wheel wash area), and passes it through one of two petrol interceptors, before flowing into the attenuation via inlet manhole. The third network collects leachate water contribution from the compost storage area and from the wheel wash area, which will be tankered to an appropriate wastewater treatment facility.

   The surface water attenuation units (aquacell type units) consist of an inlet manhole, an outlet manhole and the unit itself. The inlet manhole will be fitted with an overflow (bypass) pipe, which will be capable of overflowing surface water contribution from higher return period (more than 30-years) storms directly to the stream. The outlet manhole is fitted with hydrobrake to restrict the outflow from the unit at the permissible discharge rate. The outflow pipe and the overflow pipe discharge to the stream through an outfall structure.

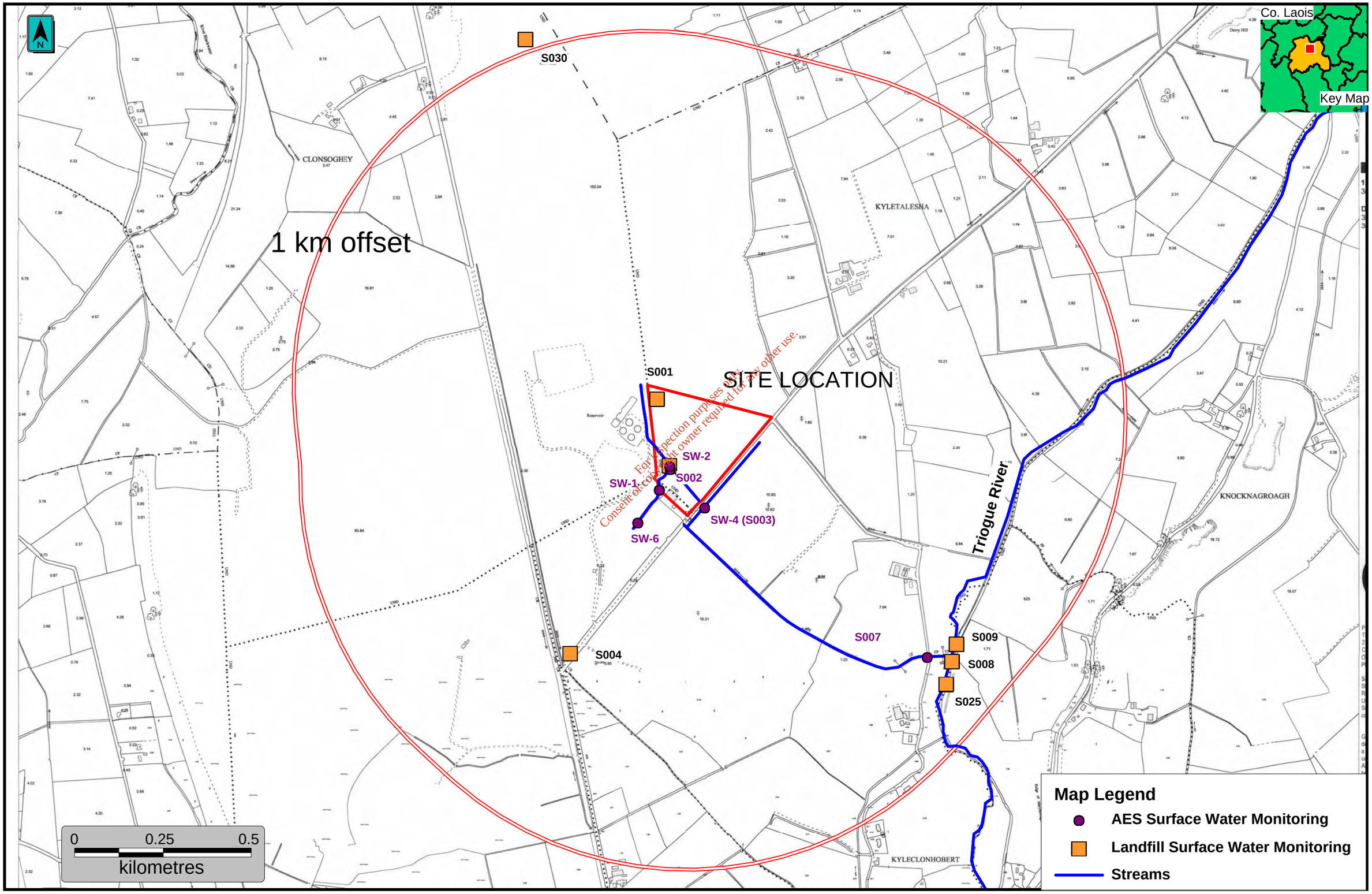
   In addition to the above three surface water networks, there is also a foul sewer network which collects sewage from the administration building to the WWTP located in the Buffer Zone. The treated effluent will be discharged to a constructed percolation area.

   The general layout of the storm and foul sewer networks and the 'aquacell' units is presented in Fig. 6.2.

5. As indicated in Section 5, a Puroflo (or similar) wastewater treatment system will be installed, which will discharge from that plant is to a reused percolation area.

6. Surface water quality will be monitored in accordance with any conditions of the waste licence required for the site's activities.

Leachate will continually be generated at the site and hydrocarbons will be stored at the site. These present a risk to surface water quality. However with the storage and handling precautions and the monitoring of water quality, the risk to surface water quality is negligible.

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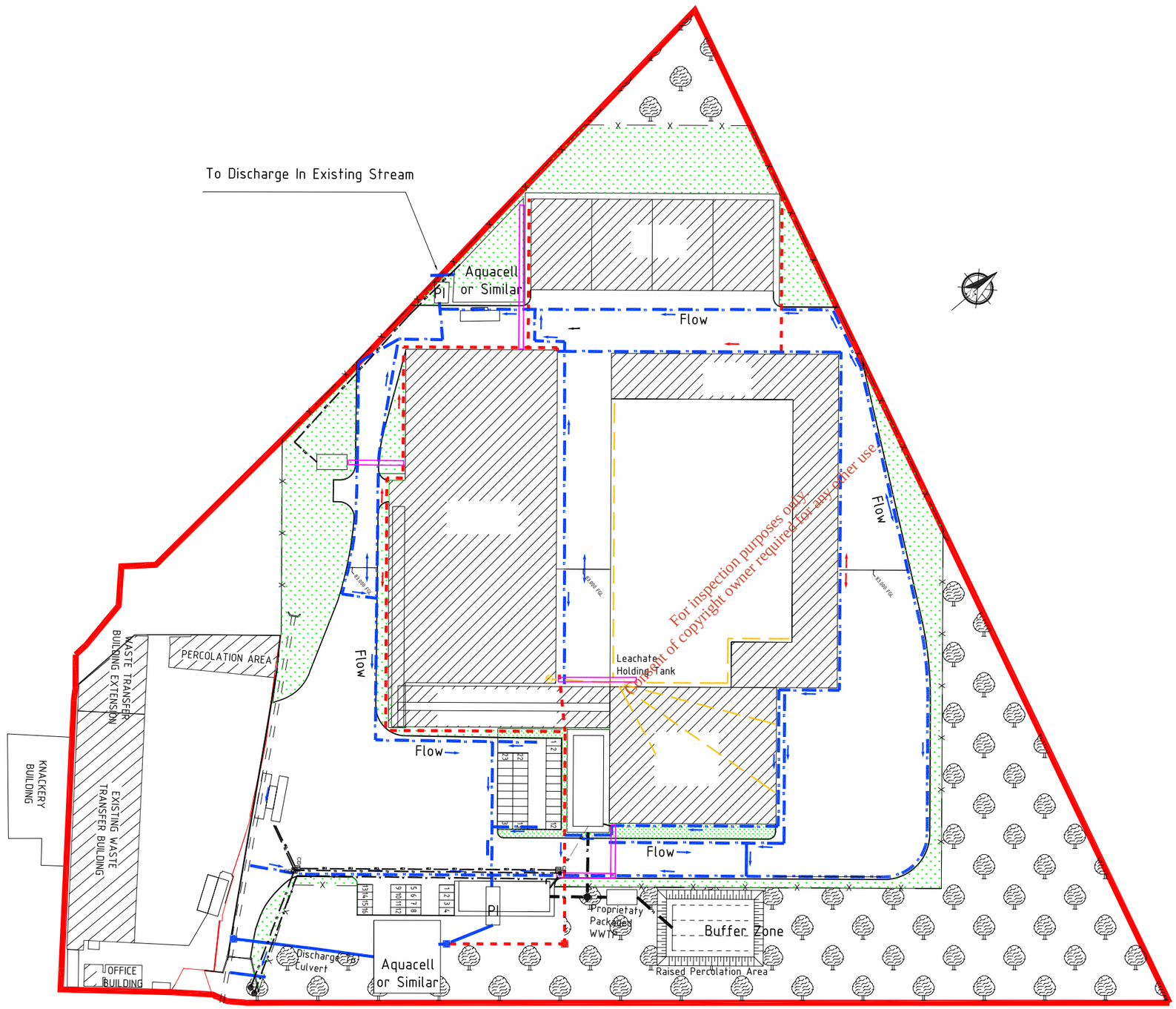
**Surface Water Features & Monitoring Points**

Figure 6.1




## Legend

- Storm Water Roof Drainage
- Foul Sewer Drainage — 150 PVC @ 1:150
- Storm Water Slab Drainage — 150 PVC @ 1:150
- Teleducts — Duct Chamber CD, 150 PVC
- Electrical Ducting — Duct Chamber CD, 150 PVC
- Watersupply — Valve SI.V., 50 HDPE
- Leachate Drainage — 150 PVC, Leachate Chamber 1
- Pipe Arbour

Scale 1:750

| Rev. | Drawn | Chkd | Appd | Date | Description |
|---|---|---|---|---|---|
| A | KL | ME | DOS | 28.07.06 | ISSUE FOR PLANNING |

**Name of Client**
AES

**Name of Job**
EXTENSION TO KYLETALESHA SITE

**Title of Drawing**
SITE SERVICES LAYOUT PLAN

**Scales Used**
1:750 A1 1:1500 A3

**Dwg. No.** 2006-081-01-FIG 6.2 — **Rev.** A
O:\ACAD\2006\081\01\b-mbt_FIG 6.2 — Cork

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