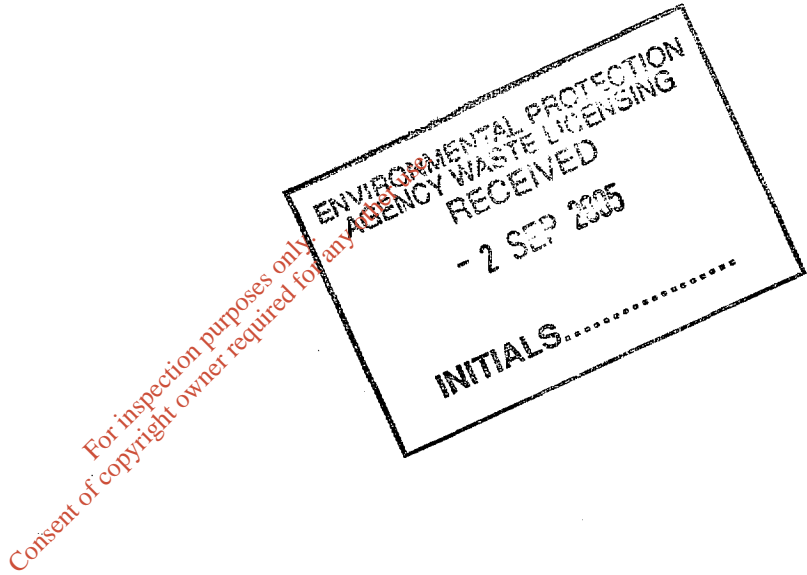


**4. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

**4.1 Climate**

The Greenclean Waste Management Ltd. facility will have no significant impacts on either the global climate or localised microclimate of the area.

Recycling and reusing waste, especially cardboard and paper will remove the need to landfill those wastes and will therefore reduce the volume of greenhouses gases produced in a landfill. This is considered as a minor positive impact.



## 4.2 Air Quality

### 4.2.1 Specific Characteristics of the Proposal

The redeveloped site will act primarily as a recycling centre but residual waste will also be bulked for transport to landfill. The facility will handle commercial, industrial, household, construction and demolition wastes all of which will be solid and non hazardous.

### 4.2.2 Potential Emissions to Air

#### Dust Emissions to Air

##### *Construction Phase*

As the existing building on site will be used for proposed recycling operations, construction works will be minimal. Minor dust emissions may occur during tarmacadam works on the western and eastern sides of the site.

##### *Operational Phase*

Depending on the content of the waste, tipping activities have the potential to generate dust emissions. (e.g. Loose C&D waste Vs plastic waste). All tipping activities will be undertaken indoors and mitigation measures detailed below will minimise dust emissions from handling operations.

There is a potential for fugitive emissions from hardstanding areas, particularly in warm dry windy weather. Fugitive emissions can be wind borne or as a result of vehicular movements into and out of the site. Mitigation measures detailed in section 4.2.3 below will minimise potential dust emissions from hardstanding areas.

#### Decomposition Gas Emissions

As Greenclean Waste Management Ltd. only accepts dry solid non hazardous waste (only 10% of domestic (household) wastes will be processed at the site) and the site retention time for waste is short (less than 48 hours), it is predicted that the generation of decomposition gases will be negligible.

#### Odour Emissions

As with decomposition gases, it is likely that the potential for odour generation at the proposed facility will be negligible as only minor amounts of putrescible waste will be accepted at the site.

#### Aerosol Emissions

It is proposed to install a dust suppression system within the building to control the dust produced. The proposed system is a rotary atomiser system, which produces a fine droplet mist which removes the dust particles from the air. Thus the dust is removed from the air before it can escape from the building. The density of the mist is such that water does not form or collect on surfaces and therefore no methods are required to control water or liquids within the buildings.

### **4.2.3 Mitigation Measures**

#### **4.2.3.1 Dust Control Measures**

A series of dust control measures will be introduced at the facility in order to significantly reduce dust emissions as follows.

The handling of all recycling activities will be carried out inside closed buildings which will restrict dust from migrating from the site. All waste arriving at the site will be in fully covered or enclosed container vehicles allowing for no dust emission from the waste during transport.

The open yard will be power swept and washed on a regular basis. This limits the potential for mud build up on the yard and hence the generation of dust during dry conditions

It is planned to install a wheel wash at the site entrance/exit. This will remove any potential contaminants from the tyres of trucks and prevent it from being carried out onto the main road and producing a potential dust source.

Dust suppression systems will be installed within the main warehouse to keep dust levels at a minimum within the building itself. A fine droplet mist produced from the rotary atomiser system will act as a dampener to keep dust down while not adding any significant water to the waste materials being handled. There are presently five of these rotary atomizers in use at the facility. In addition, dust suppression water spray systems have been installed on specific parts of the recycling plant (e.g. at 'drop' points from conveyors) and the hand picking station operates under a negative pressure system to remove dust from the atmosphere.

#### **4.2.3.2 Odour Control**

All waste types are handled within the main warehouse and all vehicles bringing the materials to site are fully covered. These wastes arrive, are handled and leave the site within a short time-frame (maximum 48 hours). The commercial, industrial and C&D waste streams contain zero biodegradable content therefore odours are not an issue with these wastes. Should odours be noticed on site at any time it will be possible to add industrial perfumes/odour agents to the dust suppression system in order to mask/break down the odours. Given the small amount of putrescible wastes to be processed at the site it is considered that odours will not be generated in any significant way and there will be minimal impact on the local environment.

### **4.2.4 Predicted Impacts**

It is predicted that the proposed development incorporating the mitigation measures as outlined above will have the net effect of keeping potential emissions on site within acceptable limits. No significant adverse effects on the air quality outside the site boundaries are therefore predicted from the development.

#### **4.2.5 Monitoring**

It is proposed that dust monitoring be carried out at the site three times per annum (twice in Summer and once in Winter). Odours will be perceived by the site manager throughout the daily operation of the facility and if considered strong or at nuisance levels measures will be implemented to mitigate the odours. A register of complaints will also be maintained on site and all complaints including those relating to odours will be logged and acted upon immediately they are received. It is not considered necessary to carry out specific or formalized odour monitoring at the facility at this time. This situation will be reviewed on a continuous basis.

All monitoring will be undertaken as per the requirements of the Waste Licence.

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## 4.3 NOISE ENVIRONMENT

### 4.3.1 Present Noise Environment

This report was undertaken to assess the noise aspects arising from the intensification of a waste transfer station at Coldwinters, Blakes Cross, Co Dublin. The receiving environment in the vicinity of the site consists predominately of land used for commercial, light industrial and agricultural use. Agricultural land lies to the west and east of the site. The site, presently 1.12 hectares (ha) in area will be increased to 2.33 Ha is located adjacent to Blake's Cross, on the N1 road. There are a number of residential properties in the vicinity of the site. These are located on the N1, Lusk and Ballyboghil roads.

An assessment of the existing noise environment was carried out at 7 (No.) monitoring locations in the vicinity of the proposed development in March 2003. The results of this assessment are detailed in section 2.3 of this EIS. The existing noise environment is dominated by road traffic noise due to traffic volumes on the N1 and Lusk Roads.

### 4.3.2 Specific Characteristics of the Proposal

The redeveloped site will act primarily as a recycling centre but residual waste will also be bulked for transport to landfill. It is planned that up to 80 per cent of the waste will be recycled, with the remainder going to landfill. The facility will handle commercial, industrial, household, construction and demolition wastes all of which will be solid or non hazardous.

#### 4.3.2.1 Construction Phase

The existing building on site will be used for the waste recycling and transfer centre. The building comprises a 300 mm thick reinforced concrete lower perimeter wall, with asbestos cement coated sheeting on the upper wall sections and roof (Drawing 023045-501). A certain amount of modification will be required to facilitate the operation of waste handling plant, however no major structural/building works are proposed for inside the existing building. The land outside the existing building comprises predominately concrete hardstand which will be suitable for heavy traffic and will also be used for truck and employee car-parking. An existing hardcore area along the western side of the waste recycling building will be resurfaced with asphalt as will parts of the proposed extension area to the east. A bridge will be constructed over the Ballough stream to provide access to the extension area. A truck maintenance workshop will be constructed along the southern boundary of the site. The site layout is presented on Figure 3.1.1.

It is proposed to install a 2.1 m high timber fence line along a section of the northern boundary of the site. This will provide some noise attenuation to the garden centre and residential care centre to the rear of the facility.

Noise emissions during the construction / preparatory stage will be short term and temporary in nature. There are currently no set limits for construction noise in Ireland. However, noise limits set in the Northern Ireland and the UK currently stipulate a  $L(A)_{eq}$  12-hour level of between 70 and 75 dB (A) at the

nearest noise sensitive receptor. As construction noise will be a temporary source, it is normally acceptable to allow average construction noise levels during a typical daytime operating period to exceed the background noise levels by 10 dB (A) to 15dB (A).

#### 4.3.2.2 Operational Phase

Once operational, a number of potential additional noise sources will contribute to the existing noise environment. The additional sources will consist of the following;

- 11 Site Machinery - operation of fixed and mobile waste handling equipment within the waste transfer building.
- 10 Traffic noise - waste haulage trucks travelling to and from the facility, skip movements and employee traffic movements.

It should be noted that all recycling operations will be undertaken indoors. Entrances to the recycling building are located on the south facing facade, which faces away from the nearest noise sensitive receptors. Also, the existing commercial buildings and proposed mitigation measures will provide further attenuation of noise sources from the recycling operations.

#### Noise Emissions from Site Machinery

The proposed operation of the waste handling facility is detailed in section 3.2. In summary, the waste handling equipment will comprise a series of fixed conveyor lines linked into separating and screening plant. Mobile Front shovel loaders and a grab will feed the waste handling plant. In terms of noise emissions the main items of plant are listed below.

#### *Fixed Plant*

- 1 (No.) Trommel (item 1.4)
- 1 (No.) Star Screen (Item 1.5)
- 1 (No.) Wind Shifter (Item 2.4)
- Enclosed Blower System (Item 3.3)
- 1 No. baler
- 1 No. shredder

#### *Mobile Plant*

- 2 (No) Front Shovel Loaders
- 1 (No.) Grab Machine

The intensification of the existing waste transfer facility will not result in any increase of the above listed site machinery.

In order to assess the predicted noise levels at the Greenclean facility, comparable noise measurements were undertaken at a recycling facility in Twence in Holland. The operation of the Twence facility is similar to Greenclean in that a similar plant layout will be used. The Dutch facility handles a greater capacity of waste material (150% to 200%) than that proposed for the Greenclean facility. Noise measurements undertaken at the facility are listed in Table 4.3.1 below:

Table 4.3.1: Noise Measurement Results - Twence, Recycling Facility, Holland.

Measurement Location	Noise Level dB(A)
10 m from recycling building (Trommel inside)	59
50 m from recycling building (Trommel inside)	52
10 m from entrance door at the reception area	62
10 m from entrance door at the reception area (including a waste haulage truck movement)	72
Trommel	93
Windshifter	93
Inside Sorting Cabin	69

The predominant noise source from the proposed facility will be the trommel. A conveyor line will be used for manual and automatic sorting of dry wastes. From experience on other waste management facilities, noise levels from conveyor lines are generally quite low and therefore it is anticipated that the noise levels from the trommel, screens and front shovel loaders will mask those from the conveyor lines. Measured noise levels from mobile plant are listed in table 4.3.2 below.

Table 4.3.2: Noise Measurements Results - Mobile plant

Item of Plant	L(A)eq at 2 m (dB)
Mobile Grab (FUCHS MHL 340)	82*
Front Shovel Loader (CAT IT18F)	92*

\* It should be noted that these noise levels were measured at a comparable waste recycling centre in Dublin.

#### Traffic Noise

The existing  $L(A)_{10-18}$  hour noise level measured on the proposed site (NP 7) was calculated at 79 dB(A).

A description of the present and predicted future traffic flows as a result of the facility being in operation has been undertaken and is detailed in section 2.9 and 4.9 of this EIS.

The Dublin to Dundalk M1 motorway was opened in 2003. This has resulted in a significant decrease in the volume of traffic along the N1 road (this road has been redesignated as the R132 road) and hence traffic passing the Greenclean Ltd. facility. A review of the Environmental Impact Statement (EIS) for the Northern Motorway – Airport to Balbriggan (1995) prepared by Fingal County Council predicted a reduction in the Annual Average Daily Traffic (AADT) on the N1 after opening of the new motorway of 60% and 95% south and north of Blake's Cross respectively. From an initial AADT of 26,904, this indicates resultant AADT flows of 10,761 and 1,345 south and north of Blake's Cross respectively.

The volume of traffic on the Lusk road will not change significantly due to the new M1 Road as traffic patterns from Lusk, Rush and Skerries will not differ radically from before. A map from the FCC EIS detailing the likely traffic reductions is attached in Appendix 4.3.1

Taking into account the above reductions in traffic flows the existing noise levels at residences located along the Blakes Cross section of the N1 are likely to be reduced by between 4 dB (60 % reduction) and 13 dB(A) (95% reduction).

#### Other Noise Sources

Skip containers will be stored on an asphalt surfaced area on the eastern side of the site. There will be noise from waste trucks picking up and delivering skip containers at the site. Reversing alarms from waste haulage vehicles will also be audible intermittently. Temporary short term noise sources include those from a staff and visitor car park in front of the recycling centre. For comparison purposes, noise measurements undertaken at a similar type waste recycling facility in Dublin were used for predictions. The facility is comparable with the proposed Greenclean facility in that all the recycling plant are housed internally and the external hardstand is used for skip storage and employee traffic movements. Results of a noise measurement undertaken at this facility in July 2001 approximately 20 metres from the recycling building at the site boundary is presented in Table 4.3.3 below. This noise measurement included noise from skip movements, incoming and outgoing waste haulage vehicles and noise from internal recycling operations.

Table 4.3.3: Noise Measurement Results at similar Waste Recycling Facility.

Noise monitoring Location	L(A)eq 30 minute noise level dB(A)
Northern site Boundary	65.7

#### **4.3.3 Potential Noise Impact from Proposed Facility**

Existing noise levels detailed in section 2.3 and comparative noise levels detailed above were used to assess the likely noise levels that will exist at the nearest noise sensitive receptors once the proposed recycling facility is operational. A noise sensitive location is described as *"any dwelling house, hotel, health building, educational establishment, places of worship or entertainment, or any other facility or area of high amenity, which for its proper enjoyment requires the absence of noise at nuisance levels"*. In terms of the subject site, the nearest receptors are residential properties (See Figure 2.3.1).

The EPA recommends that, on sites of an industrial nature or similar, if the total noise level from all sources is taken into account, the noise level at sensitive locations should be kept below the following levels;

Daytime (0800 to 2200)            **L(A)eq value of 55dB(A),**  
 Night-time (2200 to 0800)       **L(A)eq value of 45dB(A).**

For calculation of noise emissions from on site plant and machinery it has been assumed that the significant noise sources will be operational for 100 % of the working day. This is considered to be a



worst-case conservative estimate and not likely to occur on a continual basis. Calculations of the likely noise levels were then extrapolated to the closest noise sensitive receptors. In order to act as a worst case scenario, predictions have been made with plant operating together at the same location. However, in reality this will not occur as equipment will be located at various locations within the recycling building (Drawing 023045-901).

Standard equations for the propagation of noise outdoors were used in the calculation of predicted noise levels. Parts 1 and 2 of BS 5228: "Noise and vibration control on construction and open sites" were used in the prediction of estimated noise levels. It should be noted that at distances greater than 300 metres from the noise source that predictions based on the inverse square law rule (i.e. a 6 dB decrease with doubling of distance from a point source) should be treated with caution due to the increasing importance of meteorological effects. Temperature and wind effects can significantly affect noise levels at receptors. Predicted noise levels from the internal recycling operations, external operations and traffic movements are dealt with separately below.

#### 4.3.3.1 Predicted Noise Emissions from Internal Recycling Operations

As detailed above, all recycling operations will be undertaken indoors and there will be no increase in the number of machinery arising from the intensification of the recycling facility but rather there will be an increase in the amount of time that the plant is operational during the course of a day. The building comprises a concrete and asbestos/cement lined structure. The acoustic performance of similar materials is detailed in Table 4.3.4 below.

Table 4.3.4: Sound Reduction Indices (SRI's) of Recycling Building

Material	SRI @ 500 Hz dB
Solid Breeze or Clinker Blocks, Plastered (12 mm both sides) OR 280mm brick, 56 mm cavity, strip ties outer faces plastered 12 mm	40*
Corrugated Asbestos Sheets stiffened and sealed	33*

\* Source: Woods, Practical Guide to Noise Control, Fifth Edition.

Using the surface areas for the north and west facing facades of the Greenclean building and the appropriate SRI's, the sound pressure level at the nearest Noise sensitive receptors NP4 and NP5 was calculated. The appropriate equation is detailed below:

$$L_{po} = L_{pi} - R + 10 \log S - 20 \log r - 14$$

Where;

$L_{po}$  = Sound Pressure level outside

$L_{pi}$  = Sound Pressure Level inside

R = Sound Reduction Index

S = Surface area of wall

r = Distance to noise sensitive receptor

Predicted noise levels from internal operations are detailed in table 4.3.5 below.

Table 4.3.5: Predicted noise level from Internal recycling operations.

Worst case scenario Internal noise level dB(A)	Average SRI dB	Distance from façade to residence metres	Predicted Noise Level
96	35 (Northern façade)	(NP 4) 55	39
96	34 (Western façade)	(NP 5) 125	36

The predicted noise levels are significantly below the existing noise levels at the nearest Noise Sensitive Receptors (NSRs).

#### 4.3.3.2 Predicted Noise from External Noise sources

The comparative measurement from a similar waste recycling facility was used to extrapolate the predicted noise level from external operations at the nearest noise sensitive receptors.

Table 4.3.6: Predicted noise level from External operations

Comparative External Noise Level dB(A)*	Distance from measurement area to residence metres	Predicted Noise Level dB(A)
65.7	(NP 4) 150	45
65.7	(NP 5) 175	48

\* Measurement was taken at RRR Ltd.

#### 4.3.3.3 Predicted Noise from Traffic

There are no legal limits for road traffic noise in Ireland at present. In the absence of such guidelines, it is typical to use the Control of Road Traffic Noise document as published by the Department of Transport, Welsh office 1998 to predict the likely noise level due to road traffic movements. The relevant noise level in this document is expressed in terms of the  $L_{10}$  hourly or  $L_{10}(18\text{-hour})$  dB(A). The value of the  $L_{10}$  hourly dB(A) is the noise level exceeded for just 10% of the time over a period of one hour. The CRTN guidelines and the traffic flow data detailed in sections 4.3.2.2 and 4.9 were used to calculate a predicted noise level due to traffic movements to and from the site. Typically, a doubling in traffic numbers (100 % increase) would result in a 3 dB(A) increase in noise level.

The predicted increase in traffic volumes on current levels due to the proposed intensification of the Greenclean facility is likely to be 16% and 2% north and south of Blake's Cross respectively. This increase is based on predicted levels on the N1 upon opening of the M1 motorway. These increases are not considered significant considering the predicted 95% and 60% reduction in AADT north and

south of Blake's Cross respectively once the M1 opened. Furthermore, it is contended that the corresponding noise level increase will be imperceptible south and only marginal (less than 1dB(A)) north of Blake's Cross respectively.

#### **4.3.4 Mitigation Measures**

A number of mitigation measures will be employed to attenuate the noise levels from the integrated waste management facility. The nearest residential property is located approximately 55 metres to the north and 125 metres to the North West of the proposed facility.

##### Screening and Landscaping

Large fir trees form the existing northern boundary of the site providing excellent visual screening of the proposed facility and marginal acoustic attenuation.

The eastern boundary will comprise a chainlink fence with a low hedgerow. A hedgerow comprising trees and brambles exists on the western site boundary. It is proposed to plant additional trees/hedges along these boundaries to further improve visual screening of the site.

In general terms vegetation will have minimal effect on noise abatement however, it will have an aesthetic effect for local residents in that part of the site building and activities will be screened. The natural topography of the site acts as a natural screen for both visual purposes and for the attenuation of likely noise sources. Also the structures of the existing warehouses to the south of the site act as barriers to minimise noise breakout from the site.

It is generally accepted that if there is a barrier or other topographic feature between the source and the noise sensitive receptor that an approximate attenuation of 5 dB can be assumed when the top of the plant is just visible to the receptor over the noise barrier. A reduction of 10 dB or greater can be achieved when the noise screen completely hides the noise sources from the receiver.

It is recommended that the asbestos/cement sheet side walls and roof are fully inspected. Any damaged areas should be repaired and sealed to minimise noise breakout from the recycling building.

##### Best Practice and Plant Operation

The best practicable means will be used to minimise noise produced by operations associated with the site and the facility shall comply with the recommendations in British Standard 5228, Noise Control on Construction and Open Sites - 1997. The following parts of this British Standard are applicable;

Part 1: Code of practice for basic information and procedures for noise and vibration control.

Part 2: Guide to noise and vibration control legislation for construction and demolition, including road construction and maintenance.

The site operator shall comply in particular with the following requirements for control of noise from plant;

- ◆ All vehicles and mechanical plant used for the purpose of works shall be fitted with effective exhaust silencers and shall be maintained in good and efficient order as per EC regulations. Also, all plant used during excavation and remediation must comply with the noise levels set down in SI No 320 of 1988 European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations, 1988.
- Machines in intermittent use shall be shut down in the intervening period between work or throttled down to a minimum.
- All pumps and compressors shall be sound reduced models fitted with properly lined and sealed acoustic covers and shall be kept closed whenever the machines are in use. Such items shall be maintained in good and efficient working order.
- Reversing alarms from mobile plant in particular can be audible at significant distances from sites of an industrial nature. However it is proposed that either "Back Alarms" or "Smart Alarms" will be used for plant such as compactors which will be operational for the majority of the working day. The Back Alarms replaces the "beep beep" of a typical reversing alarm with a lower level broadband noise source which is emitted directly behind the vehicle. The noise source is barely audible at the front or sides of the vehicle. The smart alarm is a tonal alarm however; the alarm is emitted at a sound pressure level which will depend on the ambient noise level at the time. Typically the smart alarm will emit a noise level which is 10 dBA higher than the ambient noise level so that it is audible above other noise sources working in the vicinity. It is likely that such alarms will become standard practice in the future on large industrial sites near residential receptors in order to minimise ambient noise levels.

#### 4.3.5 Likely Significant Effects

Table 4.3.7 below presents the likely effects associated with increases in general noise levels.

Table 4.3.7 Likely effects of increase in noise levels

Change in Sound Level dB(A)	Level of Significance	EPA Impacts	Subjective reaction to Sound Level Increase
< 3	Not Significant	Imperceptible or slight impact	Barely perceptible
3 – 5	Minor	Significant impact:	Perceptible
6 – 10	Moderate	Positive or Negative	Up to a doubling of loudness
11 – 15	Major		Over a doubling of loudness

Taking into account the existing noise levels at the nearest noise sensitive receptors and the predicted noise levels from internal and external operations, it is likely that there will be no significant impact due to the intensification of the existing waste recycling facility. This is predominately due to the existing noise levels due to traffic on the N1 in addition to distant traffic noise on the newly opened M1.

Table 4.3.8: Predicted Impacts from Greenclean Facility.

Noise Sensitive Receptor Location	Existing L(A)eq 30 min Noise level dB(A)	Predicted L(A)eq Noise level due on opening of M1 dB(A)	Predicted Noise Level increase Due to Greenclean
NP 4	53.9	51	Not significant
NP 5	82	69	Not Significant
NP 6	79.8	75	Not Significant

\* NP 4 was located on the eastern side of the residential care building which is already significantly screened from road traffic noise from the N1. The western side of this building will experience a greater decrease in noise levels due to its orientation relative to the N1. See Figure 2.3.1.

Monitoring will be undertaken at the proposed facility as part of its Waste Licence requirements. If noise monitoring at the facility indicates that actual measured noise levels arising from on-site activities are above the guideline limits, then further mitigation measures such as temporary acoustic barriers will be employed to maintain noise levels within the EPA guidance limits.

#### References:

EPA(1995) - Integrated Pollution Control Licensing - Guidance Note for Noise in relation to Scheduled activities

Fingal County Council (1995) - Northern Motorway, Airport to Balbriggan Bypass, Environmental Impact Statement.

Fingal County Council (1995) - Northern Motorway, Airport to Balbriggan Bypass, Summary of Environmental Impact Statement.

ISO 1996 (1999) - Description and Measurement of Environmental Noise

Sharland, I (1972) Woods, Practical Guide to Noise Control

#### **4.4 SOILS & GEOLOGY**

There are no known geological sites of scientific interest in the area and therefore no significant impacts on geology are predicted.

##### **4.4.1 Overburden Geology**

The overburden beneath the site is described in Section 2.4.1 and is composed of glacial tills ranging in thickness from a minimum 1.8m to 10m (one trial pit was excavated to 1.8m without encountering bedrock). This geological material is stable by nature and no effects on its structure or stability are predicted as a result of the redevelopment and any construction involved as part of the redevelopment of the site. The concrete floors and drainage system in the buildings and open yard areas will prevent any contaminants from the waste materials migrating into the underlying clay and therefore no impact on soil quality is predicted.

##### **4.4.2 Bedrock Geology**

The overburden deposits provide a barrier between the development and the bedrock. The underlying Calp Limestone Formation is an impure limestone and not prone to karstification. The rock type is known to be stable in this part of the country and no impacts from the development are predicted.

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## 4.5 Groundwater / Hydrogeology

The proposed development site is underlain by mid to fine sands and low permeability clays of glacial origin and Calp limestone which is classified as a Poor aquifer by the Geological Survey of Ireland. It is reported that all dwellings and businesses within 500m of the site are served by mains public water supply.

### 4.5.1 Sources of Contamination/Mitigation Measures

Potential sources of groundwater contamination on the proposed site are as follows:

- ◆ Leachate
- ◆ Spills from the oil and fuel storage tanks,
- ◆ Washdown from the yard,
- ◆ Contaminated firewater.
- ◆ Sewage Management

All waste processed at the site will consist of solid, dry, non-hazardous waste and will be handled inside the main waste processing warehouse. The warehouse is fully contained with reinforced concrete floors, pre-cast concrete walls up to 3.5 m and clad upper walls and roof. Low concrete ramps will be constructed at every entrance/exit to the warehouse. As the waste is dry there is little or no leachate brought on site. Treating the waste indoors eliminates the potential generation of leachate from rainfall and in this case there is little or no leachate generation on site. A contained drainage system exists within the warehouse which is connected to four contained concrete underground sumps located just outside of the warehouse. Therefore, in the unlikely event of any leachate generation within the warehouse or if soiled water is generated from occasional floor washdown all liquids will be collected in the drainage system and contained in the underground sumps. Any such liquid will be pumped to a road tanker and exported off site to an authorised waste water treatment plant for treatment and disposal. This indicates that there will be no impact on groundwater from leachate generation at the site.

The main diesel storage tank (c. 50,000 Litres capacity) located in the southern part of the site will be removed. Two new double contained oil storage tanks will be located in this area to store road diesel and on site plant diesel. A new waste oil storage tank will be constructed along the outer side of the northern wall of the proposed truck maintenance workshop. This will be used to store waste oil from truck maintenance and any waste oil inadvertently received at the site in skips or trucks.

Loading and unloading of diesel is carried out adjacent to the relevant tank in an area where there are falls to an acco drain surrounding the tank. Therefore any leaks occurring during the loading/unloading of diesel/oils will be collected into the acco drain which drains to the klargester oil interceptor. Oil absorbent mats and oil booms are kept on site. In the unlikely event of any oil spills the mats and booms will be employed to contain and soak up the oil. Staff will be trained in the use of this equipment.

This indicates that there will be no impact on groundwater from the storage and usage of diesel or oils at the proposed development.

Any batteries, gas canisters, fluorescent tubes or electrical goods received at the facility will be stored in individual containment structures on the outer side of the eastern wall of the main warehouse. These materials will be exported to appropriately licensed facilities (e.g. batteries will be sent to Returnbatt Ltd. in Co. Kildare).

The waste inspection area will be located on the outer side (eastern end) of the northern wall of the main warehouse. This will consist of a concrete floor and concrete walls to a height of 1,200 mm with a low concrete ramp at the entrance and will be fully contained.

The open yard will be power swept and washed as and when required. All surface water run-off from the yard is collected by falls to a series of silt trap gullies and contained drainage pipes. All yard drainage will be directed through an oilinterceptor prior to its discharge to the Ballough stream.

In the unlikely event of a fire in the main processing buildings the water used to put out the fire will be deemed to be contaminated and will have the potential to impact on groundwater. It is planned that the bulk of the fire fighting water will be contained inside the building by the reinforced concrete floor, lower precast concrete walls and by the installation of low concrete ramps at every entrance/exit to the building. This water can be analytically tested and exported off site by road tanker to an authorised waste water treatment plant.

There may be up to 50 employees working on site with washroom and canteen facilities. At a maximum estimated usage of 80 litres per employee per day this indicates that the maximum volume of sewage generated each day amounts to some 4,000 litres. A Biocycle waste water treatment plant was installed on site and the treated effluent is discharged to ground via a percolation area. The biocycle system operates under an Agreement certificate from the National Standards Authority of Ireland (NSAI). The percolation area is located in the northwestern corner of the site and was designed and constructed in accordance with the Agreement requirements and the EPA guidance notes for small treatment plants. Initial tests on the soils have shown that they are suitable for the proposed percolation area. The relatively low volume of sewage treated in the Biocycle plant and discharged to a percolation area designed in accordance with the aforementioned standards will ensure that there will be no significant impact on groundwater from sewage generated on site.



The fully contained nature of the facility is engineered to eliminate the potential for leachate generation and for its escape into the ground and therefore it is predicted that there will be no significant impact on groundwater from the proposed development.

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## 4.6 Surface Water

### 4.6.1 Surface Water Receptors

The storm water drainage system on site will be designed to deal with any precipitation falling on site, even during flood events. Surface water runoff currently drains to the small stream running through the site (Ballough stream). This stream drains a large hinterland surrounding the site and wider region and discharges to Rogerstown Estuary approximately 2 km east of the site.

A surface water drainage collection system was installed on site and it is proposed to construct attenuation tanks in order to regulate flow to the Ballough stream and reduce the potential for flooding. Roof drainage will be diverted to the attenuation tanks when constructed. Yard drainage is collected by a series of gullies which are designed to act as individual silt traps. The storm water drainage system is directed through a Class 1 Klargest oil interceptor prior to its discharge to the Ballough stream. This drainage system will also be directed to the attenuation tanks when constructed. The attenuation tanks are to be constructed below ground level on the western side of and adjacent to the stream. They will be designed to cater for the run-off from the site and will incorporate a hydrobrake to provide buffering capacity during high rainfall events. The discharge from the tanks to the stream will be regulated to ensure that rapid run-off from the redeveloped site will not cause flooding in the Ballough stream.

### 4.6.2 Sources of Contamination

The potential sources of surface water contamination include the following:

- ◆ Leachate
- ◆ Litter
- ◆ Spills from the oil and fuel storage tanks,
- ◆ Washdown from the yard,
- ◆ Contaminated firewater.
- ◆ Sewage Management
- ◆ Surface Water Flows

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### 4.6.3 Mitigation Measures

All waste is transported to the site in covered vehicles. The waste processed at the site consists of solid, non-hazardous waste and is handled inside the main waste processing warehouse. This prevents any litter contamination of the area and the adjacent stream.

The warehouse is fully contained with reinforced concrete floors, pre-cast concrete walls up to 3.5 m and cladded upper walls and roof. Low concrete ramps will be constructed at every entrance/exit to the warehouse. As the waste is predominantly dry there will be little or no leachate brought on site. Treating the waste indoors eliminates the potential generation of leachate from rainfall. In this case there is little or no leachate generation on site. A contained drainage system was installed within the warehouse which is connected to contained concrete underground sumps located just outside the warehouse. Therefore, in the unlikely event of any leachate generation within the warehouse or if soiled water is generated from floor washdown all liquids will be collected in the internal drainage system and contained in the underground sumps. Any such liquid will be pumped to a road tanker and exported off site to an authorised waste water treatment plant for treatment and disposal. This indicates that there will be no impact on surface water from leachate generation at the site.

The main diesel storage tank (c. 50,000 Litres capacity) located in the southern part of the site will be removed. Two new double contained oil storage tanks will be located in this area to store road diesel and on-site plant diesel. A new waste oil storage tank will be constructed along the outer side of the northern wall of the proposed truck maintenance workshop. This will be used to store waste oil from truck maintenance and any waste oil inadvertently received at the site in skips or trucks.

Loading and unloading of diesel is carried out adjacent to the relevant tank in an area where there are falls to an acco drain surrounding the tank. Therefore any leaks occurring during the loading/unloading of diesel/oils will be collected into the acco drain which drains to the klargester oil interceptor. Oil absorbent mats and oil booms are kept on site. In the unlikely event of any oil spills the mats and booms will be employed to contain and soak up the oil. Staff will be trained in the use of this equipment.

This indicates that there will be no impact on surface waters from the storage and usage of diesel or oils at the proposed development.

All roof drainage from the warehouse is collected by gutters and down pipes. This rainwater is deemed as clean water and is drained directly to the stream (via the proposed attenuation tanks).

The open yard is power swept and washed as and when required. All surface water run-off from the yard is collected by falls to a series of silt trap gullies and contained drainage pipes. All yard drainage is directed through the oil interceptor prior to its discharge to the Ballough stream (via the proposed attenuation tanks).

In the unlikely event of a fire in the main processing buildings the water used to put out the fire will be deemed to be contaminated and will have the potential to impact on surface water. It is planned that the

bulk of the fire fighting water will be contained inside the building by the reinforced concrete floor, lower precast concrete walls and by the installation of low concrete ramps at every entrance/exit to the building. This water can be analytically tested and exported off site by road tanker to an authorised waste water treatment plant.

It is planned that there will be a maximum of 50 employees working on site with washroom and canteen facilities. At a maximum estimated usage of 80 litres per employee per day this indicates that the maximum volume of sewage generated each day will amount to 4,000 litres. A Biocycle waste water treatment plant has been installed on site and discharges the treated effluent to ground via a percolation area located in the northwestern corner of the site. The biocycle system operates under an Agreement certificate from the National Standards Authority of Ireland (NSAI). The percolation area is located in the northwestern corner of the site and was designed and constructed in accordance with the Agreement requirements and the EPA guidance notes for small treatment plants. The relatively low volume of sewage treated in the Biocycle plant and discharged to a percolation area designed in accordance with the aforementioned standards will ensure that there will be no significant impact on surface water from sewage generated on site.

The fully contained nature of the facility is engineered to eliminate the potential for leachate generation and for its uncontrolled escape and therefore it is predicted that there will be no significant impact on surface water from the proposed development.

The main construction works will consist of the paving of parts of the eastern extension area of the site, the construction of a bridge over the Ballough stream and the construction of the new truck maintenance workshop along with the installation of oil tanks with acco drainage systems, fencing, lighting and other minor works.

All of these works will be carried out with due care and attention in order to prevent any potential to cause impact on the local stream.

The paving of the eastern side of the site and the construction of the new workshop will be carried out with temporary bunds and drains installed in order that there will be no negative impacts on the stream in terms of silt or any other potentially polluting material. The construction of the bridge will necessarily entail some temporary impacts on stream quality. This will in the main comprise an increase in the silt loading to the stream due to disturbance of the stream bed and banks during construction. However, this will be temporary in nature and it is considered that it will not have a major impact on the overall quality of the stream. All efforts will be made to prevent and reduce any potential impacts insofar as is practicable.

#### **4.6.4 Likely Significant Effects**

In light of the above processes, procedures and mitigation measures it is likely that the proposed development will not have any significant effect on local surface waters.

## **4.7 Flora and Fauna**

### **4.7.1 Potential Impacts & Mitigation Measures**

The proposed development involves the extension of the existing 1.12ha recycling facility for dry, solid, non-hazardous industrial waste to a 2.33ha site to provide additional car and truck parking and skip storage. It is also proposed to process 95,000 tonnes of waste at the expanded site. The development will result in minimal physical changes to the existing site with the addition of a hard standing car parking area on the newly acquired lands to the east of the Ballough stream. All the recycling takes place undercover and no water is added to the procedure, therefore leachate production is not a potential impact of the process.

The Rogerstown Estuary candidate Special Area of Conservation (NHA/SAC) is located approximately 100m south of the proposed site. The Ballough stream flows past the adjacent industrial areas immediately south of the site and under the R127 road before running into the northern tip of the NHA/SAC. The surface water run-off from the yards is directed through silt trap gullies and a Klargesteer oil interceptor prior to discharge into the stream. It is proposed to direct this discharge along with roof drainage through storm water attenuation tanks incorporating a hydrobrake prior to outfall to the stream. This will reduce the possibility of flooding in the stream caused by rapid run-off from the paved surfaces at the site.

The development will not have a significant negative impact on the terrestrial habitats on the site. Recommended planting of native tree species on the eastern and western boundaries and along the stream (See Section 4.7.2) will have a positive impact on the ecology of the site.

It is not anticipated that the development will have a significant negative impact on the ecology of the adjacent habitats.

No vermin were recorded at the site. However, it is likely, given the habitats on site that vermin are present. The development only accepts solid, non-hazardous industrial, household and C&D waste and therefore, has little potential to attract and increase the numbers of vermin, e.g. rats, in the vicinity of the site.

### **4.7.2 General Mitigation Measures**

A number of mitigation measures will be put in place to prevent/reduce negative impacts on water quality in the adjacent stream and to improve the overall ecology of the site. These include:

- All waste materials will be handled indoors.
- Storm water run-off from roofs is classed as clean run-off and will be directed into storm water attenuation tanks incorporating a hydrobrake and from there to the stream.

- The open yard area will be comprised of hardstand, either concrete or asphalt. Runoff from the open yard will be collected via silt trap gullies and diverted to a Class 1 Klargest oil interceptor and directed from there to the storm water attenuation tanks prior to discharge to the stream.
- The proposed wheel wash will recycle water. Any discharges from this system will be diverted through the Class 1 oil interceptor prior to discharge to the stream.
- All oil tanks on site will be constructed to meet the requirements of double containment.
- It is recommended that the area bounding the stream and the eastern boundary of the site be planted with native small tree species such as alder (*Alnus glutinosa*) and willow (*Salix* spp.) to augment the existing streamside vegetation.
- It is recommended that the western boundary hedgerow be retained and improved by planting with more native small tree species such as blackthorn (*Prunus spinosa*), elder (*Sambucus nigra*) and hawthorn (*Crataegus monogyna*)
- Vermin control should be done by exclusion rather than poisoning. This is to minimise the effect of rodenticides on birds of prey that may feed in the locality.

### 4.7.3 Freshwater Ecology

#### 4.7.3.1 Potential impacts

The potential impacts of the proposed development on adjacent freshwater systems can be divided into those that may occur during construction, and those that may occur during the operational phase.

##### 4.7.3.1.1 Construction phase

(i) Siltation: During hardstanding of the proposed extension and construction of the bridge there is a potential for suspended solids to escape into nearby waters. This could result in the siltation of habitats such as riffles, the alteration of stream hydrology, and the eroding of stream banks and vegetation. Effects on aquatic invertebrates would include clogging of habitats, such as riffles and increased turbidity in the water column, resulting in a reduction in the amount of light available for photosynthesis by aquatic plants (Haslam, 1994). Physical damage could also be caused to fish and invertebrates, and ultimately such effects could lead to a change in species composition in the streams.

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The Ballough stream presently supports a degraded biological community and is already subject to siltation as well as enrichment probably from discharges upstream. Further sediment loads over time would be likely to reduce water quality in the stream even further with detrimental effects to macroinvertebrate population. While currently scarce, the less tolerant species could disappear entirely and tolerant and very tolerant organisms (Groups C and D) could increase.

(ii) Pollution: Pollutants used during the construction phase could have toxic impacts on the fauna and flora in the adjacent stream. Sources of such pollution could include neglected spillages, the storage, handling and transfer of oil and refuelling of vehicles. Accidental leakage or discharge of pollutants could cause changes in the pH of the stream and could have a direct impact on the fauna and flora in the stream and further downstream. Sewage produced on-site could also be a source of pollution. An increase in nutrients and organic matter from sewage could also impact the stream which is already undergoing significant enrichment. The impacts of this are likely to be exacerbated from any increase in organic inputs.

#### **4.7.3.1.2 Operational phase**

(i) Siltation: Run-off from the waste recycling site during its operational phase could have impacts on nearby surface waters. Precipitation falling on buildings, roads and hardstanding areas could rapidly run-off to surface water. Such run-off could contain silt or contaminants that could have impacts on receiving surface waters. In addition, large volumes of waste would pass through the proposed waste recycling centre and would be separated and sorted for recycling on-site. Potentially, waste materials and dust could be transported by wind and run-off to the stream, affecting instream habitats, increasing suspended solids or causing contamination.

(ii) Pollution: Fuels etc. used in the proposed development could be potential sources of pollution to the adjacent stream. Sources of such pollution could include neglected spillages, the storage, handling and transfer of oil and refuelling of vehicles. Pollutants could cause changes in the pH of the stream and could have a direct toxic impact on the fauna and flora in the stream and further downstream. Pollution of the adjacent freshwaters from sewage could have an impact on the fauna and flora at the point of discharge and further downstream. An increase in nutrients and organic matter could result in a decline in water quality and a loss of species from that area.

#### **4.7.3.2 Mitigation measures relating to Ballough Stream**

(i) Siltation: To prevent loss of suspended solids during construction, all exposed clay/sand surfaces should be stabilised immediately, using covers such as grass, mulches or plastic sheeting to eliminate run-off. Handling of soil should be carried out in dry conditions and ideally soils should be vegetated before winter months (Environmental Protection Agency, 1999). It is expected that there may be minor impacts on the stream due to stream bed and bank disturbance during the construction of the bridge. However, this will be temporary in nature and will be minimized in so far as is practicable.

To prevent escape of dust and waste to the nearby stream during the operational phase of the development, materials transported through the site should be managed with care. Waste materials carried by truck should be well secured and covered. Measures to reduce dust including spraying surfaces with water, dust suppression mist/spray systems and wheel wash facilities for trucks, should be employed. It is recommended that a reasonable buffer zone between the stream and the development be maintained. This should be vegetated to provide further protection to the stream.

To prevent siltation of surrounding watercourses during both the construction and operational phases, all run-off water from paved surfaces should be intercepted before reaching any watercourse. Suspended solids should be removed using silt traps, allowing finer materials to settle out of suspension. Other measures such as oil interceptors should be used to remove potential contaminants from surface water.

(iii) Pollution: To prevent pollution during operational phases, all potential contaminants kept on site should be stored in bunded or double containment structures. All refuelling should be carried out in controlled areas. Equipment should be regularly maintained and leaks repaired immediately. Accidental spillages should be contained and cleaned up immediately. Remediation measures should be carried out in the unlikely event of pollution of adjacent watercourses in accordance with consultant's recommendations.

During the operational phase, sewage produced from any permanent buildings on site should be diverted through the biocycle unit, treated and discharged to the percolation area.

#### **4.7.3.3 Likely Significant Effects**

There is a potential for siltation or pollution to occur in the Ballough stream flowing through the site. However appropriate mitigation measures, such as those outlined above, will avoid the discharge of pollutants and silt and other materials during the construction of the extension and operation of the proposed recycling facility, thereby avoiding any potential environmental impacts on the stream.

#### **4.7.3.4 Further Recommendations**

Long term monitoring of the stream for macroinvertebrates is recommended. This will reveal any impacts (beneficial or detrimental) of the proposed development on the local ecology and indicate if further changes need to be implemented in the future.



## **4.8 Human Beings/ Local Population**

### **4.8.1 Potential Impact and Mitigation Measures**

#### **4.8.1.1 Construction Impacts**

Construction works will be carried out as part of this proposed development. These will in the main include the construction of the new workshop, the bridge over the stream and paving parts of the eastern side of the site. These construction works are not very significant in scale and will be temporary in nature and would not have a significant impact on the surrounding community.

#### **4.8.1.2 Operational Phase**

There are some 33 No. dwellings and 10 No. businesses located within 1 km of the site. There are a number of industrial/commercial units located in the industrial area south of the subject site. The nearest residential dwelling comprises the Eastern Health Board care centre located north of the site behind the garden centre (approximately 55 m from the main warehouse).

The proposed extension to the development has the potential to impact negatively on the local community in terms of traffic, noise, dust, vermin, litter, groundwater and surface water contamination and visual amenity.

All of these issues are dealt with individually elsewhere in this EIS. In summary, all waste processing activities will be carried out indoors inside the warehouse. This will mitigate the potential impact in relation to noise, dust, litter and visual amenity. In addition, substantial screen planting with shrubs and trees will be carried out along the site boundaries to further mitigate against visual intrusion.

The warehouse is fully contained with concrete floors and walls and therefore there will be no impact on groundwater or surface water from leachate.

Only solid waste and relatively small amounts of domestic waste will be treated on site therefore there will be little potential for odours to be generated at the site or for vermin to be attracted to the site. In addition, vermin control specialists will be employed under contract in order to monitor and control vermin numbers at the site such as rodents or insects.

All waste will be transported to the site in contained trucks and skips each of which will be covered with a tarpaulin or net and all waste will be handled inside the warehouse. Therefore, there will be no impact from litter on the neighbouring community. In addition, litter patrols will be carried out at the site and environs on a daily basis and any litter found will be removed and brought to the facility for treatment.

The scale of traffic, existing and proposed, is small compared with the large volume of through traffic flow along the N1 and Lusk roads. The surplus capacity of this road is adequate for predicted traffic so

road users will not be delayed or endangered, therefore no mitigation measures are necessary. The opening of the M1 motorway has eased considerably the volumes of traffic along the N1 road and resulted in significant improvements to the local populace in terms of access, road usage, road noise, health and safety etc.

The plant will employ up to 50 staff and also requires other support services on a continuous basis. Therefore, the development will continue to provide a positive impact to the locality in terms of employment.

#### **4.8.2 Likely Significant Effects**

The mitigation and control measures outlined above and detailed elsewhere in the EIS indicate that the proposed extension to the Recycling Centre will not have any significant impact on the local community.

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## **4.9 ROADS AND TRAFFIC**

### **4.9.1 General Operation**

Greenclean Waste Management Ltd. currently operate a Recycling Centre under Waste Permit at Coldwinters, Blakes Cross, Lusk, Co. Dublin. The existing facility is located north of Blakes Cross in an industrial estate on the eastern side of the R132 Regional Road (formerly the N1) and comprises an area of 1.12 ha. It is proposed to extend the existing facility to the east. The proposed site measures approximately 2.33 ha. The proposed new facility will process up to 95,000 tonnes of non-hazardous commercial, industrial, household, construction and demolition waste per annum.

The general operation of the existing site is outlined in Section 3 (and section 2.9.3.2) and it is assumed for the purposes of the traffic assessments that similar work practices will be employed at the proposed facility albeit at a larger scale. It is expected that growth in the volume of materials handled will be dependent upon various commercial factors, nonetheless for the purposes of the assessments provided in this report it is assumed that the proposed tonnage will be reached within 5 years.

When fully operational it is intended to accept and process a total of 95,000 tonnes of potentially recyclable materials per annum. The proposed capacity is designed to allow for the progressive expansion of the recycling activities that can be processed and thus facilitate Greenclean Waste Management in tendering for local authority contracts in relation to the collection and recycling of wastes.

### **4.9.2 Hours of Operation**

The opening hours of the site are 08:00-18:00hrs Monday to Friday and 08:00-14:00hrs Saturday. The site does not operate on Sundays or Bank Holidays. This constitutes approximately 272 working days per annum. However due to the nature of the waste recycling business on rare occasions it may be necessary for vehicles delivering wastes and removing recycled materials to operate outside these hours, for example to meet customer demands in relation to the collection of wastes and the delivery of recycled construction materials.

### **4.9.3 General Waste Processing**

#### Inbound Construction and Demolition Waste

The waste will be delivered in covered skips. All waste delivered to the facility will be inspected to determine if it is suitable for recycling activities. Any waste loads, which upon inspection are found to contain large amounts of unsuitable wastes, will not be accepted at the site but diverted to a licensed waste facility. The accepted wastes will be off loaded inside the transfer building.

From our experience of the operation of similar facilities, mixed construction and demolition waste can be expected to arrive in larger loads (20 tonnes), but on average the payload is typically expected to be between 5.5 and 8.0 tonnes per vehicle. Notwithstanding these empirically derived rule of thumb estimates, in the traffic assessments the average payload of various vehicles importing construction and demolition waste is based on recorded weighbridge data at the existing facility for the month of June 2005.

Wood and metal will be separated mechanically/manually and subsequently removed off-site to approved recovery/recycling facilities. The residual material will be shredded and screened to remove the fine fraction containing subsoil and topsoil, which will be removed off site in articulated trucks. The heavy fraction containing concrete, brick etc. may be crushed to produce an inert aggregate which is removed off-site in articulated trucks.

#### Inbound Commercial & Industrial Waste

The Commercial and Industrial wastes will include pre-segregated and mixed wastes which will be delivered to the facility in compactors, rear end loaders and skips.

From our experience of the operation of similar sites, it is estimated that the typical average load delivered to facilities in the above vehicle types is 6 to 8 tonnes. As above, in the traffic assessments the average payload of various vehicles importing commercial and industrial waste is based on recorded weighbridge data at the existing facility for the month of June 2005.

On the tipping floor the waste will be inspected for unsuitable wastes and such materials will be immediately removed to a designated internal waste quarantine area. The pre segregated material will be moved to the baling units or loading bays where, depending on its nature, it will be baled, or compacted before being loaded for removal off-site.

The mixed waste will initially be sorted to remove large items such as timber and metal. Such items will be removed to the appropriate storage/handling areas inside the building. The remaining waste will be separated manually and mechanically into the different waste streams (paper, cardboard, plastic, glass, metal, organics).

The organic waste will be removed to an off-site composting facility in articulated trucks, while the inert materials will be stored on-site pending removal off-site recovery facilities.

#### Inbound Municipal Solid Wastes

Municipal Solid Wastes comprising mixed and pre segregated materials will be delivered to the facility in refuse collection vehicles. Although the tonnages carried by refuse vehicles can vary widely (max payloads are in excess of 10 tonnes). The proposed facility will employ modern refuse vehicles which at a similar site **Traffic** Ltd. has recently recorded an average payload of 8.0 tonnes per vehicle. Considering that similar types of vehicles will be used at the proposed facility it is thought reasonable to adopt an average inbound payload of 8.0 tonnes for the purposes of this assessment.

Mixed and pre-segregated dry recyclables will be unloaded in a designated area inside the recycle building, where it will be inspected to ensure it is suitable for processing i.e. it does not contain any hazardous or other unsuitable material.

It is proposed to mechanically separate the mixed waste to remove recyclable materials including metals, paper, plastics, compostable materials and materials that are suitable for energy recovery. The recovered metals, paper and plastic will be stored on-site pending removal to off-site recovery/recycling facilities by articulated vehicles. The compostable materials will be removed off-site for composting at a licensed facility.

#### Outbound Payloads

As is the typical operation and indeed function of such facilities in transportation terms, all outbound movements of processed materials will be in the most commercially viable payloads.

It is in the interest of the operator to ensure that outbound payloads are maximised. Modern articulated vehicles are typically capable of 24 tonne payloads. The average outbound payload recorded at the existing facility over the month of June 2005 was 8.834 tonnes per vehicle.

In the forecast of traffic generation at the site we propose to adopt the current outbound average payload of 8.8 tonnes, nonetheless it is expected that this figure will increase in parallel with increases in efficiency at the site brought about through the economy of scale associated with the current proposals. Clearly any increase in the payloads will have a direct influence on the number of vehicle movements generated at the development.

#### **4.9.4 Waste Types and Volumes**

As outlined in Section 2.9.3 the existing site currently accepts materials in various streams or categories. The future likely breakdown in the relative volumes of material received in each waste stream will be dictated primarily by market forces and demands. Given the dynamic and complex nature of the development of trade at the site in the interest of simplifying the traffic assessment calculations it is assumed that the current tonnages handled in the various waste streams will increase on a pro-rata basis until the permitted threshold of 95,000 tonnes is achieved.

The base quantities of materials, expressed as a percentage of the total annual volumes handled are shown in Table 2.9.1.

It is assumed for the purpose of the traffic assessments that the nature of the waste accepted and the manner in which it is transported and treated on site will essentially remain unchanged. It is assumed therefore that the site will enjoy none of the likely benefits of emerging and future related technology and procedures designed to increase the efficiency of such facilities. Such advances are seen as likely to arise primarily as a result of developing waste industry related on-site machinery and vehicles. As indicated above, the employ of this forecasting methodology will take no account of the economy of scale factor and the likely increases in the efficiency of the site due to the larger quantities handled

Based on the figures presented in Table 2.9.1, the following Table 4.9.1 outlines the proposed waste types and quantities to be processed by Greenclean Waste Management Ltd. at the Coldwinters facility in the future when the site is eventually receiving the proposed 95,000 tonnes of material. Municipal Waste is categorised separately as this is considered to be a 'new' waste stream.

<b>Waste Stream</b>	<b>Annual Quantity (tonnes)</b>	<b>Percentage of Total Tonnage (ex Domestic)</b>
Domestic Skip Waste	3,656.1	4.3
Commercial Skip Waste	14,530.1	17.0
Commercial Roll On/Off	19,920.5	23.3
Commercial Rear End Loader	14,904.5	17.4
Construction Skip	15,404.1	18.0
Construction Roll on/off	7,795.6	9.1
Cardboard	2,424.4	2.8
Steel	142.5	0.2
Plastic	133	0.2
Paper	665	0.8
Timber	3,296.5	3.9
Earth	2,052	2.4
Other	575.7	0.7
Domestic (municipal type)	9,500	
<b>Total</b>	<b>95,000</b>	

**Table 4.9.1** Breakdown in Proposed Quantity of Waste Processed

#### 4.9.5 MODAL CHOICE/TRIP ATTRACTION

##### 4.9.5.1 Waste Transportation – Forecast Peak Hour Traffic Generation

When operating at full capacity it is proposed that the facility will handle 95,000 tonnes of potentially recyclable material. In calculating the estimates of the likely traffic generation from the proposed development, reference is made to the breakdown of waste quantities as shown in Table 4.9.1 above. The estimate of future traffic generation is based on the quantities forecast in each waste stream and the current typical average payloads of the various vehicles delivering in those waste streams. The average payloads are based upon weighbridge data at the existing site recorded over the month of June 2005. In the following Table 4.9.2 we show the data of Table 4.9.1 together with the average payload of vehicles transporting in each waste stream and the forecast annual traffic generation arising from that waste stream.

Waste Stream	Vehicle Type	Annual Quantity (tonnes)	Average Payload (tonnes)	Annual Trip Generation
Domestic Skip Waste	Skip	1,279.6	1.083	1,182
	Mini Midi	2376.5	0.641	3,707
Commercial Skip Waste	Skip	14,316.3	1.331	10,756
	Mini Midi	213.8	0.413	518
Construction Skip	Skip	13,570.4	2.646	5,129
	Mini Midi	1,833.7	1.120	1,637
Commercial Roll On/Off	Roll-on-off	19,920.5	4.368	4,561
Commercial Rear End Loader	Rear-Loader	14,904.5	5.923	2,516
Construction Roll-on-off	Roll-on-off	7,795.6	9.684	805
Cardboard	Rigid Body	2,424.4	1.053	2,302
Steel	Skip/Rigid	142.5	3.760	38
Plastic	Rigid Body	133	1.493	89
Paper	Rigid Body	665	1.212	549
Timber	Roll-on-off	3,296.5	2.590	1,273
Earth	Skip	2,052	5.654	363
Other	Varies	575.7	1.000	576
Domestic (municipal type)	Rear Loader	9,500	8.000	1,188
<b>Total Trips Importing</b>	Various	<b>95,000</b>	-	<b>37,187</b>
<b>Total Trips Exporting</b>	Articulated	<b>95,000</b>	<b>8.834</b>	<b>10,754</b>

**Table 4.9.2** Forecast Waste Transportation Traffic Generation

The opening hours of the site are 08:00-18:00hrs Monday to Friday and 08:00-14:00hrs Saturday. The site does not operate on Sundays or Bank Holidays. This constitutes approximately 272 working days per annum. Based on the figures shown in Table 4.9.2 above it is likely that the facility when handling 95,000 tonnes per annum would be likely to generate a total flow of approximately 136 trips by smaller rigid body vehicles such as skip lorries and rear end loaders and 40 trips by large articulated vehicles transporting materials from the site.

As calculated in Section 2.7 above approximately 6% of inbound daily HGV traffic and 10% of outbound is likely to be manifest in the morning peak hour period. In the evening peak hour the equivalent value recorded was 2% for both inbound and outbound movements.

Based on the above values it is expected that when handling 95,000 tonnes of waste the facility is likely to generate 8 inbound movements by skips/rigid HGV and 4 articulated HGV outbound movements. Although some portion of the outbound articulated vehicles are likely to have entered the site in the preceding hour it is assumed for the purposes of the assessment that all vehicles importing and exporting waste will undertake a trip in the peak hour. A trip is defined by two separate vehicle movements, one into the site and one out on the return journey.

The total morning peak hour waste transportation generated traffic is forecast to be 12 HGV both entering and exiting the site.

In the evening peak hour period when handling 95,000 tonnes of waste the facility is likely to generate 3 inbound movements by skips/rigid HGV and 1 articulated HGV outbound movement.

Based on each vehicle completing a trip, the total evening peak hour waste transportation generated traffic is forecast to be 4 HGV both entering and exiting the site.

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#### 4.9.5.2 Staff and Sundry Vehicles – Forecast Peak Hour Traffic Generation

In addition to the above waste transportation vehicles, clearly there will be other sources of traffic generation at the site. This traffic will arise primarily from staff, sundry visitors etc.

As calculated in Section 2.9.3.7 above approximately 19% of inbound daily car traffic and 6% of the equivalent outbound traffic movements are likely to be manifest in the morning peak hour period. In the evening peak hour the equivalent values are 4% for inbound and 32% for outbound movements.

During the surveys in total there was a total accumulation of 47 car movements to and from the existing site. It is not expected that staff numbers at the site will necessarily increase in direct proportion to the volume of waste handled. For the purposes of this report, and based on our experience at other similar developments, it is assumed that the movements of staff and sundry visitors to the site will double over those currently recorded. It is assumed therefore that there would be a daily car generation of 100 movements in and 100 movements out.

Given the likely increases in efficiencies likely to be derived at the site as a direct result of the 'economy of scale' we consider the estimate with respect to staff and sundry cars is likely to be representative.

Based on the above and the earlier calculations presented in Section 2.9.3.7 the proposed development is forecast to generate 19 inbound car movements and 6 outbound in the morning peak. In the evening 4 cars are forecast to enter the site whilst 32 depart.

#### 4.9.5.3 Forecast Peak Hour 'Assessment' Traffic Generation

From the above the following Table 4.9.3 shows the total forecast peak hour and off-peak traffic generation at the proposed facility when handling the proposed 95,000 tonnes of material per annum.

Time Period	Assessment Trip Generation					
	Rigid Body		Articulated		Private Cars	
	In	Out	In	Out	In	Out
Morning 08:00-09:00hrs	8	8	4	4	19	6
Off Peak Times	4	4	1	1	2	2
Evening 17:00-18:00hrs	3	3	1	1	4	32

**Table 4.9.3** Morning and Evening Assessment Traffic Flows (95,000 t)

#### 4.9.5.4 Distribution of Development Traffic

As recommended by the Institution of Highways and Transportation, the forecast traffic at the site has been assigned to the local road network in the same proportions as recorded during the traffic surveys.

From a review of the traffic data there are some movements which are not manifest in the peak hours and therefore the peak hour data is not considered statistically representative, accordingly we have based the peak hour distribution patterns on those recorded over the course of the 12 hour surveys.

It has been established that approximately 35% of HGV enter the site from the north whilst 27% depart by travelling north. The respective percentages of car movements to and from the north are 53% and 76%.

Given the above distribution of development related traffic in the following Table 4.9.4 we provide the peak and off peak 'directional' flows of traffic likely to be generated at the existing site access when the site is operating at the proposed capacity of 95,000 tonnes per annum. In the interest of simplifying the calculations the smaller skip and rigid body trucks and articulated vehicles have been summed.

	HGV Movements				Car Movements			
	Inbound		Outbound		Inbound		Outbound	
	Right ↑ ↖	Left ↓ ↗	Right ↑ ↖	Left ↓ ↗	Right ↑ ↖	Left ↓ ↗	Right ↑ ↖	Left ↓ ↗
Distribution	65%	35%	27%	73%	53%	47%	14%	76%
Morning 08:00- 09:00hrs	8	4	3	9	10	9	1	5
Off Peak Hours	3	2	1	4	1	1	0	2
Evening 17:00- 18:00hrs	3	1	1	3	2	2	8	24

**Table 4.9.4.** Forecast Peak and Off-peak Development Traffic Movements

#### 4.9.5.5 Construction Related Traffic Attraction

The construction phases of the project will generate traffic on the local road network. We consider that the primary generators of traffic will be deliveries of construction materials and construction staff. Bearing in mind the above estimates of traffic attraction to the proposed development site, from our experience in the implementation of similar projects it is not expected that the traffic generation associated with construction will 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.

Considering the lower levels of traffic attraction during the construction period we do not believe it necessary 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.

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## 4.9.6 THRESHOLD APPROACH AND NEED FOR TRAFFIC IMPACT ASSESSMENT

### 4.9.6.1 General

You will recall the threshold approach of the Institution of Highways & Transportation outlined in 2.4.1 above. In the following we will determine the need for a detailed assessment (computer modelling analysis of road link and junction performance) of traffic impact arising from the proposed development.

In the interest of a worst case assessment of the likely impact of the development on the operation of the local roads network, and in the interest of simplifying the calculations, the following calculations are based on the total traffic generation of the proposed 95,000 tonne development and take no account of the current levels of traffic generated by the existing facility. It will of course be appreciated that the true measure of impact from the proposal would be the incremental increases in traffic between the existing and proposed developments

### 4.9.6.2 Forecast Peak Hour Traffic – R132 Past Site Access

To the north of Blakes Cross the peak hour accumulative two-way traffic flow on the R132 passing the site entrance in the morning shows 634 two-way movements, 483 of which are cars, 99 light vans, 47 HGV and 5 are buses. The predominant flow of traffic past the site in the morning is toward Dublin with practically 70% of traffic travelling southbound. From Table 4.3 it can be seen that the proposed development is likely to generate in the region of 12 HGV movements and 25 cars during the morning peak hour.

In terms of the total two-way traffic flow on the adjoining R132 the forecast morning peak hour traffic movements generated by the proposed development shows 7 HGV and 10 car movements on the R132 to the north of the existing access and 17 HGV and 13 car movements to the south. Accordingly the proposed development is likely to constitute 2.6% of R132 traffic to the north of the access whilst to the south the equivalent percentage is 4.7%. These percentages are based on the total traffic generation of the proposed site and do not account for the existing traffic movements currently generated by the facility.

In the evening peak period traffic flow on the R132 passing the site entrance shows 720 two-way movements 604 of which are cars, 61 light vans, 49 HGV and 6 are buses. The predominant flow of traffic past the site in the evening shows a reversal from the morning with approximately 60% of traffic travelling northbound.

In terms of the total two-way traffic flow on the adjoining R132 the forecast evening peak hour traffic movements generated by the proposed development shows 2 HGV and 10 car movements on the R132 to the north of the existing access and 6 HGV and 26 car movements to the south. Accordingly the proposed development is likely to constitute 1.6% of R132 traffic to the north of the access whilst to the south the equivalent percentage is 4.4%. These percentages are based on the total traffic generation of the proposed site and do not account for the existing traffic movements currently generated by the facility, furthermore these calculations are based on recorded 2005 network traffic. There is likely to be some element of growth on the network traffic over the coming years, clearly the percentage of development traffic based on 2005 network flows would be less significant if compared against say 2008 growthed traffic flows on the network when the 95,000 tonnes is likely to be realised at the proposed development.

#### **4.9.6.3 Forecast Peak Hour Traffic –Throughput of Blakes Cross**

The total throughput of vehicles undertaking all traffic movements at Blakes Cross was recorded in the 12 hour traffic counts to be 2,063 in the morning peak hour and 2,107 in the evening. In the morning the breakdown in vehicle type shows 1,676 cars and 387 HGV, in the evening the equivalent figures are 1,845 cars and 262 HGV.

The total number of movements generated to the south of the development, and therefore through the existing Blakes Cross junction are forecast to be 17 HGV and 15 car movements in the morning peak hour, and 6 HGV and 26 car movements in the evening.

Based on the above total throughput of vehicles recorded over the 12 hour period of the traffic counts the forecast increase in traffic through the existing Blakes Cross junction are likely to be in the region of 1.5% in both the morning and evening peak hour periods.

#### **4.9.6.4 Forecast Peak Hour Traffic – R132 South of Blakes Cross**

To the south of Blakes Cross the peak hour accumulative two-way traffic flow on the R132 in the morning shows 2,058 two-way movements, 1,676 of which are cars, 204 light vans, 164 HGV and 14 are buses. As above, the predominant flow of traffic past the site in the morning is toward Dublin with practically 70% of traffic travelling southbound. In the evening peak period traffic flow on the R132 south of Blakes Cross shows 2,089 two-way movements 1,837 of which are cars, 152 light vans, 91 HGV and 9 are buses. The predominant flow of traffic past the site in the evening shows reversal from the morning with approximately 70% of traffic travelling northbound.

As above, the total number of movements generated to the south of the development, and therefore through the existing Blakes Cross junction are forecast to be 17 HGV and 15 cars in the morning peak hour, and 6 HGV and 26 cars in the evening.

Based upon these figures it is estimated that the proposed development would have the potential to account for some 1.5% of traffic on the R132 adjoining highway to the south of Blakes Cross during both the morning and evening peak hour periods.

#### **4.9.6.5 Forecast Traffic Impact of Proposed Development**

If the existing operation were ignored and it were assumed that the proposed 95,000 tonne site were a greenfield development the forecast percentage increase in traffic on the adjoining highway (R132) as a result of the proposed waste facility development would be significantly lower than the 10% threshold normally applied under the recommendations of the Institution of Highways and Transportation. Clearly if the existing traffic generated by the facility is taken into consideration the forecast 'incremental' impact of the proposed development on local traffic volumes would be less than calculated above.

Clearly the impact of the proposed development on the surrounding roads network is likely to be insignificant.

In accordance with the general advice of the Institution of Highways and Transportation capacity assessments using computer modelling programs are not considered necessary. It can be appreciated that the very low traffic volumes associated (incremental increases in the order of 1%) with the proposed development would be highly unlikely to have a detectable impact on the operation of the nearby Blakes Cross junction and indeed the general roads network serving the general area.

#### **4.9.6.6 Proposed Development Access**

The existing access to the site is a ghost island priority junction, permission for which was granted by the Local Authority under the particulars of a previous application. Under the current application it is proposed to maintain unaltered the current access to the site.

Based on the general rule of thumb that the peak hours typically represent between 10 and 12% of the Annual Average Daily Traffic (AADT), the current AADT on the R132 past the site entrance (north of Blakes Cross) is estimated from the surveys to be in the region of 7,000 to 8,000 vehicles. The forecast total daily traffic generation to the proposed facility is estimated to be approximately 100 cars and 176 HGV.

Through reference to the NRA:Design Manual for Roads and Bridges TD42 Figure 2/2 'Approximate Level of Provision of T-junctions on New Single Carriageway Roads for Various Major and Minor Road Design Year Traffic Flows' it can be seen that for a Major Road (R132) AADT of 8,000 vehicles, a ghost island layout should in theory be capable of accommodating approximately 5,000 AADT on the Minor Road (Site Access Road). The daily traffic generation of the site is approximately 10% of the NRA:Design Manual for Roads and Bridges advice on the theoretical capacity of the access. Clearly the existing junction is not likely to experience any operational difficulties due to the implementation of the proposed development.

In respect to the provision of ghost island right turn lanes the paragraph 2.16 of TD42 states the following.

*"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 development site generates significantly less than the 500 vehicle threshold advised by the Institution of Highways and Transportation, and a right turn lane had been included under previous applications primarily in the interest of traffic safety. Under the current proposed development, daily two-way traffic volumes (combined in and out) at the access are in the general region of the threshold recommended.

The existing access has been designed to NRA:Design Manual for Roads and Bridges standards for 'Junctions' on the National Primary Roads network. This is a private development access and not a public junction, and peak hour traffic flows have been shown as likely to be very low with an average of less than 24 HGVs and 25 cars per hour in both the morning and evening peak hour periods.

From the above we consider it clear that the existing development site access is the appropriate junction layout and has sufficient capacity to cater for the demands of the facility when handling 95,000 tonnes of material per annum.

#### 4.9.7 CONCLUSION

The daily and hourly traffic generation likely at the proposed facility are significantly lower than the threshold percentages recommended by the Institution of Highways and Transportation as requiring detailed capacity assessments.

The existing site clearly generates traffic on the local road network and the true measure of the impact of the proposed development on the road network would be the incremental impact of the proposed development over the existing position. Nonetheless, in the interest of a worst case or robust appraisal of the development, in the preparation of this report we have assessed the proposed 95,000 tonne development as a stand-alone new development. Considered as a new development, the total influence of development traffic on the operation of the local roads network has been assessed as likely to be insignificant. The likely increase in traffic on the R132 and through Blakes Cross are considered likely to be imperceptible to existing road users.

The existing form of access to the proposed development is compliant with the recommendations of the NRA:Design Manual for Roads and Bridges in respect of both geometric layout and traffic capacity.

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## **4.10 Landscape and Visual Impacts**

### **4.10.1 Specific Characteristics of the proposal**

The proposed development involves the extension of the site to incorporate additional truck and car parking and skip storage in the eastern part of the site, the construction of a bridge over the Ballough stream and the construction of a truck maintenance workshop in the southern part of the site. The following features are relevant to landscape and visual impacts:

The existing infrastructure on site includes the weigh bridge office, low level concrete wall, the warehouse (main processing building), weigh bridge, diesel storage tanks and concrete bund wall, single storey offices and ESB substation.

It is proposed to construct a bridge over the Ballough stream more or less centrally in the site and to construct a truck maintenance workshop along the southern boundary of the site.

The existing security fence reinforcing the western boundary of the site is Teflon covered green chainlink fences. This fencing type will also be placed along the boundary of the extension.

It is proposed to construct a clay bund 1m high along the western boundary inside the chainlink fence. This will be planted with a variety of native hedgerow trees and shrubs. The existing hedgerow roadside of the fence will be retained.

The existing conifer trees and security fence at the northern site boundary will be retained.

### **4.10.2 Potential Impacts**

#### **4.10.2.1 Landscape Character**

The development is located within a commercial/industrial complex, in an area designated as Zone B in Fingal County Development Plan 1999. Zone B designation has the following objective: "To protect and provide for the development of agriculture and rural amenity. A small area directly adjacent to the industrial/commercial complex in which the site is located, is zoned as Zone E which has the following objective: "To facilitate opportunities for general industrial employment and related uses in established industrial areas." A Local Objective is associated with this area "For food processing/packaging use". Given, that the area immediately adjacent to the site is built up and comprises commercial/ light industrial units, and a small area directly beside this commercial/light industrial complex is zoned for industry, it is not likely that there will be any significant impact on the landscape character in the area.

The proposed developments and extension for parking and skip storage will not have any impact on the protected view at Corduff Common.

Since the removal of the conveyor housing at the southern side of the warehouse the existing site is less visually obtrusive than the previous facility (grain store) located at the site and is less negatively distracting.

#### **4.10.2.2 Visual Impacts**

The development will not obstruct or impinge on the protected view at Corduff Common, as identified in the Fingal County Development Plan 1999.

The main processing building, at a height of approximately 15m is visible from a number of locations on the Lusk road, the minor road connecting the Lusk road and the N1 road, southbound.

There will be no visual impacts from the hardstanding of the extended car parking area or the installation of a security fence around the new site boundary.

It is considered that the construction of the new truck maintenance workshop will not impact significantly on the visual landscape. The size of the building measures some 24m by 12m by less than 6.5m high and is proposed to be finished in Goose Wing Grey Kingspan cladding. It is considered that this building is not particularly large or high and will blend into the industrialized area and other warehousing/buildings in the locality.

#### **4.10.3 Mitigation Measures**

It is recommended that the area bounding the stream and the eastern boundary of the site be planted with small native tree species such as alder (*Alnus glutinosa*) and willow (*Salix* spp.).

The constructed low clay bund along the western boundary and associated planting will serve to screen the facility from the N1. It is recommended that the western boundary hedgerow be retained and improved by planting with more native small tree species such as blackthorn (*Prunus spinosa*), elder (*Sambucus nigra*) and hawthorn (*Crataegus monogyna*)

#### **4.10.4 Likely Significant Effects**

There will be no significant negative visual impacts resulting from the extension and developments at the facility. Remedial measures including boundary planting will be undertaken to improve the landscape and visual amenity value of the site.

## 4.11 Cultural Heritage

### 4.11.1 The Proposed Development

The area where the site is located, measures c. 2200m<sup>2</sup> in total and is zoned as light industrial land. It is proposed to develop a Waste Transfer Station, which will include the installation of associated facilities including a wheel wash.

An existing facility is currently in use on the western side of the Ballough River. It is proposed to extend the hardstanding area across the river into two fields. Both these fields are currently in agricultural use, and are under crop.

The development will see the Ballough River bridged to allow vehicular traffic across, as well as the creation of a hardstanding area for related traffic.

### 4.11.2 Potential Impact on Archaeology

A considerable number of burials were uncovered in 1957 in a field to the south of the proposed development (RMP DU008:023). The burials were discovered through deep ploughing and were substantially destroyed. It is not known how old these burials were. The potential for archaeology in the area therefore exists.

The site at Blake's Cross can be divided up into two distinct areas, the land west of Ballough River and the land east of it. West of the river is the site of the existing recycling centre, and has been subjected to development over the years (it was formerly an industrial fertilizer/grain store plant). Given the history of usage of the site it is unlikely that archaeological deposits survive intact in that area. Across the river the land is under agricultural usage and has never been developed. There is a potential for the discovery of archaeological remains underneath the ploughzone.

### 4.11.3 Recommended Mitigation Measures

Standard Archaeological Mitigation involves Geophysical Investigation, followed by test trenching and finally monitoring. This type of mitigation strategy is common for infrastructure projects such as roads and pipelines, especially where they traverse undeveloped agricultural land. Guidelines, such as the code of practice drawn up between the National Roads Authority (2000) and Bord Gáis (2001) with the Department of Arts, Heritage, Gaeltacht & The Islands for the treatment of archaeology recommend this type of mitigation.

It is proposed that the following mitigation measures outlined below be undertaken prior to development:

- **Geophysical Investigation**

Geophysical Investigation of the undeveloped lands (east of the river). This will give a good indication as to the presence of significant archaeological deposits surviving under the plough zone. Geophysical

investigation embraces non-invasive methods of investigating the subsurface for monumental and artefactual remains. The use of archaeogeophysical prospection is effective at detecting a wide variety of archaeological features, thereby affording the opportunity to adapt plans at a pre-construction phase. It is normally used to identify areas of archaeological potential which can then be target tested.

#### • **Targeted Archaeological Test Trenching**

Should any anomalies appear in the results of the Geophysical Investigation then test trenching under archaeological supervision should be undertaken. Targeted test excavation takes place where there is an indication that archaeological remains are likely to occur. Evidence from cartographic, historical or photographic sources may point to areas of archaeological significance. Targeted testing then allows an assessment to be made on the extent of any surviving archaeology before any further mitigation is decided upon.

#### • **Archaeological Monitoring**

Archaeological monitoring often only involves the removal of soils to natural undisturbed subsoil, and in most cases this can be achieved during construction.

#### • **Archaeological Wade Survey**

The riverine environment is always considered to be one of high archaeological potential. Riverbank occupation sites have been favoured from prehistoric times for their proximity to rich food sources and are often represented by habitation sites or middens. Rivers were also important areas of activity serving as route ways, boundaries, defences and ritual sites. River banks and riverbeds are also considered to be areas of high archaeological potential, containing features such as fulachta fiadh, fords, ancient bridging sites, mills, longphorts and other habitation sites, and also producing archaeological artefacts such as log boats, organic material or votive offerings of swords, axe heads and other archaeological finds. It is possible that waterlogged archaeological material such as bridge foundation piles may remain *in situ* in the riverine area. A visual non disturbance survey is carried out by suitably qualified underwater archaeologists. A metal detection survey is also carried out. All metal detection hits are identified when possible and retrieved to the surface where they are inspected to see if they are of archaeological significance. Other information including water depth, in-water visibility, bottom composition, seasonality, impediments to survey and evidence of drainage or dredging is also recorded.

Should any archaeological features be discovered during the course of the above mitigation measures then the following measure would be required:

#### • **Archaeological Excavation**

Archaeological excavation is the preservation by record of any surviving archaeology. It would normally be undertaken following the discovery of archaeological material that cannot be preserved by being left in-situ in the ground. Excavation should be scheduled from the start and as a result a significant time period should be factored in to facilitate these excavations being completed well ahead of the construction phase of the project.

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**4.12 Material Assets**

The proposed extension of the existing facility will have no significant impact on material assets within the vicinity of the site or the broader region.

The main possible impacts on local infrastructure include impacts on roads and traffic and are discussed in section 4.9 of this document and are deemed to be negligible. There will be no significant impacts on agriculture or tourism within the region. The loss of the fields on the eastern side of the Ballough stream to agriculture is not considered significant given the abundance of similar type agricultural land in the vicinity and in the wider region.

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#### **4.13 INTERACTIONS**

The European Communities Environmental Impact Assessment (Amendment) Regulations, 1998, require that an EIS describes the impacts and likely significant effects on the interaction between any of the following environmental media :

- human beings
- flora
- fauna
- soil
- water
- air
- climate
- the landscape

Table 4.13.1 highlights impacts and effects on interactions between these media and identifies the sections of the EIS where the interactions are addressed. It should be noted that in certain cases there are obvious interactions between environmental media, e.g. climate and flora, however, if the facility does not have the potential to impact or affect the interaction, then that interaction is not highlighted in Table 4.13.1. The identified interactions are as follows:

##### **Human Beings / Water**

Contamination of surface water or shallow groundwater at the site has the potential to impact on the water quality in the site stream. This impact could potentially affect the amenity value of the stream and ultimately human beings. Mitigation measures to ameliorate this potential impact are proposed in Sections 4.5 and 4.6, after which the effects are expected to be insignificant.

##### **Human Beings / Air**

Dust, noise and odour emissions from the facility have the potential to impact on human beings in the vicinity of the site. These impacts are considered low in the context of the site location. Some measures are proposed in Sections 4.2 and 4.3 to mitigate against dust soiling and noise, while mitigation of odours are not considered necessary due to the reasons given in Sections 4.2.

##### **Water / Flora**

Contamination of surface water or shallow groundwater at the site has the potential to impact on the water quality within the region. This impact could potentially affect the flora living in and around the site. Mitigation measures to ameliorate this potential impact are proposed in Sections 4.5, 4.6 and 4.7, after which the effects are expected to be insignificant.

##### **Water / Fauna**

Contamination of surface water or shallow groundwater at the site has the potential to impact on the water quality in the site stream. This impact could potentially affect the fauna living in and around the

site. Mitigation measures to ameliorate this potential impact are proposed in Sections 4.5, 4.6 and 4.7, after which the effects are expected to be insignificant.

**Water / Soil**

Soil beneath the site can act as a pathway for contaminants reaching either the shallow groundwater and surface water at the site stream. Contamination of the soil can therefore lead to contamination of the water environment. Mitigation measures to ameliorate this potential impact are proposed in Sections 4.4, 4.5 and 4.6, after which the effects are expected to be insignificant.

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**Table 4.13.1 : Impacts and Effects on Interactions between Environmental Media**

	Human Beings	Flora	Fauna	Soil	Water	Air	Climate	The Landscape
<b>Human Beings</b>								
<b>Flora</b>	none							
<b>Fauna</b>	none	none						
<b>Soil</b>	none	none	none					
<b>Water</b>	Sections 4.5 & 4.6	Sections 4.5, 4.6 & 4.7	Sections 4.5, 4.6 & 4.7	Sections 4.4, 4.5 & 4.6				
<b>Air</b>	Sections 4.2 & 4.3	none	none	none	none			
<b>Climate</b>	none	none	none	none	none	none		
<b>The Landscape</b>	none	none	none	none	none	none	none	

Note : This Table identifies the Section of the EIS where impacts or effects on interactions between environmental media are discussed.

Any interactions which will not be impacted upon or affected by the facility are not described in the EIS.