waste to energy

incineration with energy recovery

Meath Waste Management Facility

Environmental Impact Statement 2009
- Amendment to existing permission

Turning your waste into energy

INDAVER

member of DELTA the multi-utility company

wg. PM GROUP

TABLE OF CONTENTS

SECTION 1 – INTRODUCTION

SECTION 2 – BACKGROUND TO THE PROJECT

SECTION 3 – ALTERNATIVES

SECTION 6 – HUMAN BEINGS

SECTION 7 – AIR QUALITY

SECTION 8 – NOISE & VIBRATION

SECTION 9 –SOILS AND GEOLOGY

SECTION 10 – GROUNDWATER/HYDROGEOLOGY

SECTION 11 – SURFACE WATER

SECTION 12 – ECOLOGY

SECTION 13 – TRAFFIC

SECTION 14 – LANDSCAPE AND VISUAL

SECTION 15– CLIMATE

SECTION 16– CULTURAL HERITAGE

SECTION 17 – MATERIAL ASSETS

SECTION 18 – CONSTRUCTION

LIST OF FIGURES

LIST OF TABLES

APPENDICES

Appendix 3.1	IPPC Reference Document on the Best Available Techniques for Waste Incineration, July 2005, Executive Summary and Chapter 5: Best Available Techniques
Appendix 4.1	An Bord Pleanala Letter (July 2009)
Appendix 5.1	Seveso Assessment (Byrne O Cleirigh Report)
Appendix 7.1	Description of the Aermod Model
Appendix 7.2	Cumulative Impact Assessment
Appendix 7.3	Air Quality Impact from Backup Generator
Appendix 7.4	Air Quality Impact from Traffic Sources
Appendix 7.5	Summary of Source Emission Data
Appendix 8.1	Unattended Noise Monitoring Results – Location 4
Appendix 8.2	Unattended Noise Monitoring Results – Construction Monitoring Location N1
Appendix 9.1	Geotechnical Reports
Appendix 9.2	Trial pit Logs 2000
Appendix 9.3	Soil Sampling Results
Appendix 9.4	Site Suitability 2000 Report for Installation of Puraflo System
Appendix 9.5	Puraflo Modular Secondary Treatment Plant Specification
Appendix 10.1	Trial Well Quality Data (2000 – 2008)
Appendix 11.1	EPA SW Quality Data River Nanny
Appendix 11.2	Drainage Calculations
Appendix 12.1	Bat and Vertebrate Faunal Survey
Appendix 12.2	Mitigation Report Bat Fauna
Appendix 14.1	Photomontages
Appendix 15.1	Calculation of facilitys constribution to GHG emissions
Appendix 16.1	ADS Archaeological Monitoring Report
Appendix 16.2	Summary of Air Impacts at Brú na Boinne
Appendix 18.1	Construction Methodology Review

waste to energy

incineration with energy recovery

Meath Waste Management Facility

Environmental Impact Statement Non Technical Summary 2009 - Amendment to existing permission

Turning your waste into energy

INDAVER

member of DELTA the multi-utility company

wg.

PM GROUP

TABLE OF CONTENTS

1. INTRODUCTION

This is the Non technical Summary of the Environmental Impact Statement for proposed amendments to an existing planning permission (File Reference Number SA/600050, & PL 17.219721) granted to Indaver Ireland (referred to as Indaver henceforth) for the development of a 70 MW waste-to-energy facility with a maximum annual capacity of 200,000 tonnes at Carranstown, Duleek, Co. Meath. The site location is shown on Figure 1.1.

Indaver Ireland submits this application for an amendment to the existing planning permission as a result of the detailed design developments which have emerged subsequent to the contract award to the main equipment suppliers. It should be noted that the proposed amendments do not seek to alter the type of waste processed, the annual tonnage currently permitted or the number of staff working at the facility. Because a development such as this must have secured planning permission prior to tendering for the plant in the market, Indaver had to allow a contingency in the building design in advance of the final suppliers being chosen. The allowance of such contingency has meant that, having selected and signed contracts with the suppliers, the building scale can now be reduced.

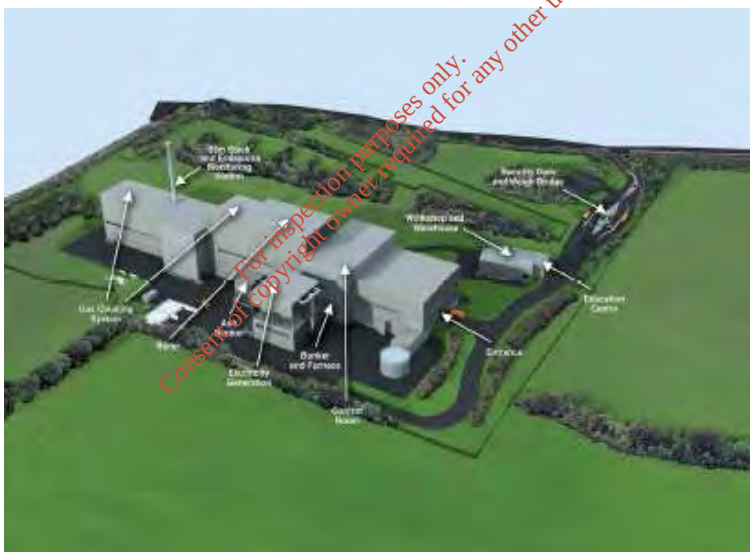


Figure 1 Existing Permitted Site Layout

In terms of all buildings on site, the proposed amendments represent a reduction of approximately 7% in footprint when compared with the existing permission. A synopsis of the amendments proposed is presented in Section 1.1 below.

In February 2006 Indaver lodged a planning application and EIS with Meath County Council (MCC) for the development of the facility. MCC made the decision to grant planning permission on the 25th August 2006. An appeal to amend conditions of the planning decision with An Bord Pleanala (ABP) was submitted in September 2006 and ABP granted approval for the facility in October 2007.

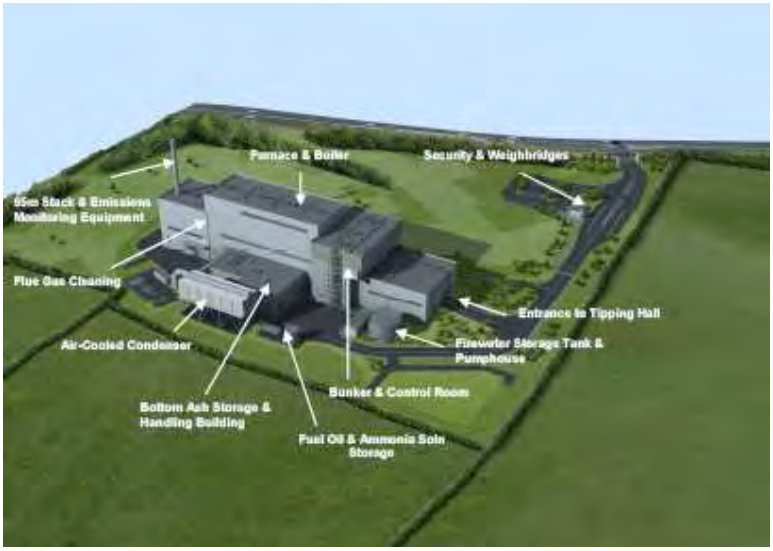


Figure 2 Proposed Site Layout

The facility which will process the same quantities and types of material as previously proposed will be located on the same part of the site albeit with a reduced and re-configured building footprint in comparison to the existing permission. The site occupies an area of approximately 10 hectares (25 acres) which was previously used for agricultural purposes. Existing developments within the vicinity of the facility include a cement factory and quarry located to the north of the site. The area of the site for development will be approximately 2 hectares, with the remaining areas of the site to be utilised for landscaping to minimise the visual impact of the facility.

1.1 Proposed Amendments

The amendments to the main process building are summarised as follows:

- Reduction in overall length of 45m approximately
- Changes to building widths
- Decrease in tipping hall height by 5m approximately
- Increase in bunker roof height by 4m approximately
- Increase of main process building height by 1m to incorporate a parapet wall
- Convert underground bottom ash bunker into an overground bottom ash storage and handling building
- Incorporation of turbine building into main process building.

As planning permission is required for these proposed amendments to the building, Indaver has also taken the opportunity to revise the following elements of the existing permission:

- Redesign of gatehouse and staff/visitor parking for increased safety
- Inclusion of an extra floor in office building to incorporate the education centre

- Incorporation of warehouse and workshop into main process building
- Addition of an external fire escape to office building
- Re-location and modification of the air-cooled condenser
- Re-location of pump house and fire water storage tank
- Re-location of 38kV import/export compound including transformer and associated substation building
- Re-location of fuel oil tank and addition of aqueous ammonia storage tank
- Conversion of underground attenuation tank into an attenuation pond
- Modifications to the internal road network to accommodate the above amendments.

Indaver NV Company Profile

Indaver NV, is the Flemish parent company of Indaver Ireland. Indaver is a waste management company that specialises in integrated waste management for industries and households. Indaver recycles, treats and disposes of both domestic and industrial waste. Advice on the prevention of waste is an integral part of the Indaver service.

Twenty years ago, the Flemish region of Belgium was in a similar situation to that of Ireland today as regards waste management. While it was still beginning to implement an integrated waste management system, the vast majority of waste was still being disposed of to landfill and there was a very low rate of recycling. Hazardous waste was being exported to other countries for disposal. The Flemish Government, in partnership with local industry, formed Indaver NV in 1985 to provide an integrated waste management strategy for Flanders in order to address the waste crisis.

Today, Flanders, with a population of 6 million, has a recycling rate of over 71%, the highest recycling rate of any region in the world and is self sufficient in the disposal of its residual waste. In addition, Flanders has developed an integrated hazardous waste management system which means the Region no longer exports its hazardous waste to other countries for treatment or disposal. Since its establishment, Indaver has been and continues to be an important contributor to the development of this integrated waste management system.

The Dutch multi utility company, Delta is the majority shareholder of Indaver NV with a 75% shareholding. Flemish Environmental Holding is the holding company of the Government of Flanders and it has a 16% stake in Indaver NV. The remaining shares are held by a number of leading private companies in Flanders. The Indaver group plays a leading role in the implementation of the Flemish Government Waste Policy. The company employs over 800 people and has operations in six European countries. In 2008, Indaver managed approximately 2,250,943 tonnes of hazardous and non-hazardous waste at the company's waste recovery and disposal sites.

Figure 3. Municipal waste-to-energy facility, Flanders, Belgium

All the company's facilities are licensed by the regulatory authorities in the region in which they operate. Indaver is striving to have all its facilities accredited to the ISO 9002 Quality Assurance System, the ISO 14001 Environmental Management System and the OHSAS 18001 Health and Safety Standard. Indaver NV was the first waste management company in Flanders (and among the first in Europe), to attain accreditation to the ISO 14001. These certifications are independently audited on a regular basis to ensure company compliance.

An integral part of the above certifications is clear and regular communications with members of the public, customers, suppliers and regulatory authorities. Indaver is committed to permanent and open dialogue regarding environmental matters.

Indaver Ireland

Indaver Ireland, a wholly owned subsidiary of Indaver NV, was established in 1999 to develop waste infrastructure in Ireland. The branch is currently developing two Waste Management Projects – a non-hazardous incineration facility in Carranstown, Duleek, County Meath on which construction commenced in September 2008 and an Industrial waste facility, which includes a hazardous waste incinerator, in Ringaskiddy, County Cork. Information on Indaver's projects can be found on the website www.indaver.ie. Currently, nine staff are employed by Indaver Ireland working directly on the Meath and Cork projects.

Cork Waste Management Facility

In November 2008, Indaver applied for planning permission under the Strategic Infrastructure Act for a hazardous and non-hazardous waste incinerator in Ringaskiddy Co. cork. The facility will process up to 240,000 tonnes per annum of residual waste and produce approximately 22 megawatts of electricity. A hazardous waste transfer station is also part of the development and will have a capacity of 15,000 tonnes per annum. It will accept industrial and household hazardous and non hazardous wastes that require bulking up and safe packaging before treatment on site in the waste-to-energy facility or elsewhere. An oral hearing was held in between April and June 2009 and a decision is expected by year end.

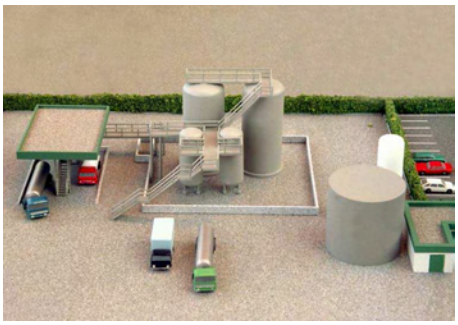
Indaver Ireland Limited

In 1999 Indaver acquired 60% of MinChem Environmental Services Limited, a hazardous waste management company operating in Ireland since 1977. In 2003 Indaver acquired the remaining 40% of MinChem and in 2004 changed the name of the company to Indaver Ireland Limited. Today, Indaver Ireland Limited, with offices in Dun Laoghaire, Dublin Port and Cork, employs approximately 125 people.

Export of Waste

Indaver exports hazardous waste from Ireland to Britain and other European countries for recovery, disposal or treatment as there are limited treatment facilities available in Ireland for these types of waste. Solvents from the pharmaceutical industry, obsolete, or out of specification products, contaminated packaging/clothing and laboratory chemicals are some of the waste streams handled by the company. The company exported over 86,934 tonnes of waste in 2008. Indaver operates an EPA licensed transfer station in Dublin Port for the export of these materials. The facility handled over 27,000 tonnes of material into storage in 2008.

Solvent Blending Facility



Indaver has operated a solvent recovery facility for waste solvents at its Dublin Port Waste Transfer Station since 2006. The facility has the capacity to blend 20,000 tonnes per annum of waste solvents generated by the pharmaceutical and chemical industry. Blended solvents can be used as a fuel in the cement industry.

On-Site Services

Indaver offers a wide range of on-site services to it's customers including, diversion of waste to landfill overseas, export of car-shred for disposal, export of refuse derived fuels to power plants overseas, soil remediation & sludge disposal, site clean-ups, plant decommissioning and other large-scale waste treatment projects.

Total Waste Management

Indaver provides customer with a management service for all their waste generated on-site, including recycling of dry recyclables, disposal of residual waste, recovery / disposal solutions for waste electrical and electronic equipment, sludges and hazardous and non-hazardous industrial waste.

Recycling Centres

Indaver operates Community Recycling Centres in Newcastle West, Mungret and Killmallock on behalf of Limerick County Council. Indaver supports Limerick County Council's aim to promote reuse as a more sustainable way of dealing with some household wastes. An innovative Reuse Centre has recently been launched at the Mungret Recycling Centre. Items brought to the Reuse Centre are placed in an appropriate area from where they may be taken away by others for reuse.

Waste Education

As part of the company's communications programme, Indaver provides a waste education service to industry, other businesses and householders. The company produces guidelines on: waste prevention and minimisation programmes; recycling programmes in the work place and in the home; current waste legislation; and packaging and transportation of hazardous waste.

Pre-Planning Communications Programme

Indaver Ireland believes in a policy of openness and dialogue between the company and the local community. Indaver has undertaken a consultation campaign on the proposed amendments to the existing permission.

Residents in the local community were met by an Indaver representative and a Newsletter was given to them. The newsletter was also distributed within the local area

Further details outlining the principle changes to the waste-to-energy facility are available on www.indaver.ie/meath1.htm or by calling FreeFone 1800 200646 or writing to Indaver Ireland.

Indaver will make themselves available to meet up with any parties throughout the planning process.

On-going Communications Programme

Indaver Ireland believes in a policy of openness and dialogue between the company and the local community. This openness and dialogue has started and Indaver Ireland will maintain this policy of openness throughout the construction phase and the lifetime of the facility. Through Indaver Ireland's website (www.indaver.ie) interested parties can register with Indaver Ireland to obtain regular updates on further developments of the project.

Community Liaison Committee

The community liaison committee as set out in condition 5 of our planning conditions has been initiated and consists of eight members and include representation from Meath County Council, Indaver Ireland, local residents and elected members of Meath County Council. The committee convenes at quarterly intervals and to date three meetings have been held.

The facility will operate under a Waste Licence issued by the Environmental Protection Agency (EPA). The facility will be operated to relevant international standards for Environment, Safety and Quality Management Systems, namely ISO 14001 or EMAS for Environment, OHSAS 18001 for Safety and ISO 9002 for Quality. The facility will be subject to inspection by an independent body to verify compliance with these standards. The results of accreditation audits and inspections will be made available to the community liaison committee for discussion at the following scheduled quarterly meeting. In addition the results of independent monitoring inspections and audits carried out by the EPA will also be made available and discussed at the quarterly meetings.

Waste Education Centre

There will be a Waste Education Centre incorporated into the main building of this facility. The Education centre will include a display area outlining household and commercial waste prevention and recycling programmes; updates on the Region's Waste Management Plan, such as current recycling,

waste-to-energy and landfill targets; and how the waste-to-energy facility will operate. The centre will include a meeting room which will be made available to the community liaison committee.

Information Available to the General Public

Indaver Ireland has an 'open door' policy, and it is envisaged that groups, such as local residents and students, may request a tour of the facility when operations commence. Indaver Ireland will be happy to accommodate such groups that may wish to visit the facility.

Access to information regarding the operation of the facility will not be restricted to members of the community liaison committee. It is standard practice for the Environmental Protection Agency to require a licence holder to institute a Communications Programme 'to ensure that members of the public can obtain information concerning the environmental performance of the facility at all reasonable times'.

Correspondence between the company and the EPA and information regarding the environmental performance of the facility will also be accessible at the EPA's offices at Johnstown Castle, Co. Wexford. Indaver's annual environmental report will be distributed locally and will be available on the company website.

Quarterly Newsletter

Indaver publishes a Newsletter on a quarterly basis which provides an update on the development of the project. This Newsletter is posted out to people within the local community and will be distributed also within the local area.

Visitor Centre

During the construction phase of this project there will be a visitor centre located within the contractors' construction village where the public can come to meet the team and obtain information on the development of the project.

2. BACKGROUND TO THE PROJECT

Need for the Scheme

The need for the scheme was established in the planning permission PL17.219721 granted for the facility in October 2007. The reasons and considerations given in the final permission referred to:

- the national waste management policy framework and strategy as set out in Government Policy Statement Taking Stock and Moving Forward (2004)
- the National Development Plan (2007-2013) provisions in regard to waste management
- the National Strategies on Biodegradable Waste (2006) and Climate Change (2007-2012)
- the Waste Management Strategy for the North-East region as set out in the current North-East Regional Waste Management Plan (2007).

At a European level, the position of waste-to-energy in the waste hierarchy has been strengthened since planning permission was granted. This will have to be reflected in the future national policy framework. Existing policy has not otherwise changed. The National Development Plan and Strategies on Biodegradable Waste and Climate Change are still relevant and are the most up to date policies for their relevant areas. In order to assess the need for the facility, the non-hazardous waste arisings at both National and Regional levels were investigated.

The Waste Management Strategy for the North-East region (2006), which forecasts waste arisings in the region and uses this to determine the need for thermal treatment, has not been modified since permission was previously granted and calls for a facility with a maximum capacity of 200,000 tonnes per annum. The proposed amendments to onsite infrastructure do not impact on plant throughput or the type of waste to be processed and therefore do not alter the need for the scheme in the context of this Strategy. The existing permitted capacity is in line with the Waste Management Strategy for the North-East.

For these reasons, the need for the scheme as established in the existing planning permission is still valid at the current and approved capacity of 200,000 tonnes per annum.

Site Selection

An assessment of alternative locations for the Waste to Energy facility was undertaken as part of the EIS prepared in 2006. The assessment comprised the consideration of a number of site selection criteria, both environmental and technical to determine whether the application site or a number of alternative sites were suitable sites for the development of the facility.

The main steps involved in the process were;

1. Preparation of a centre of gravity model to identify suitable locations to ensure "waste is treated as closely as possible to where it is generated". A centre of gravity is an analytical model of the volumes of waste arising and the distances of the waste centres to the other centres in the region. The assessment found that the centre of gravity of waste production in the North East Region was within the geographical area around Drogheda, Ardee and Duleek.

2. Detailed consideration of the highest ranked locations from the Centre of Gravity Model for technical and environmental criteria including factors that the applicant company identified as essential to the project. Criteria considered included;

- Central Location close to the Waste Production centre of gravity
- Proximity to energy uses, ideally users of heat
- Proximity to reasonable road access
- Appropriate development zoning
- Availability of cooling water and provision for its disposal
- Availability of sites.

Possible sites at Ardee, Drogheda, Duleek and Carranstown were identified in the original site selection for the facility in 2000 (Reg. Ref. No. 01/5006). As these sites were located within the centre of gravity, they were considered still valid. The previous assessments undertaken were updated in the 2006 EIS to ensure no material changes in the underlying circumstances at each site.

3. The candidate site from Step 2 was considered having regard to criteria for siting Waste to Energy Facilities set out in the World Health Organisation, the Waste Management Plan for the North East Region 1999, the North East Waste Management Plan 2005-2010. The findings from the site selection assessment concluded that the site at Carranstown was a suitable site for the Waste-to-Energy facility.

For the purposes of this application it is considered, given the existing planning permission for the development, that the site location is established. In 2006 it was submitted that the site was a suitable location to operate a waste to energy facility and was the best available site to Indaver. In granting planning permission both Meath County Council (in 2006) and the Bord (in 2007) obviously agreed with the concept of waste to energy and that the chosen site was a suitable location to operate such a facility. Because this application is concerned with minor amendments to the existing permission which do not change the type and amount of waste processed or the amount of traffic associated with the existing permission, it is considered that the suitability of the site for this type of facility is unchanged from the final permission granted in October 2007.

3. ALTERNATIVES

As part of the Environmental Impact Assessment (EIA) process alternatives are typically considered on the following levels;

- Alternative Locations
- Alternative Thermal Treatment Technologies
- Alternative Waste Management Strategies
- Alternative Energy Recovery and Gas Cleaning Systems
- Alternative Designs

Alternative Locations

Alternative locations for the facility were considered in the 2006 planning application and EIS. In granting planning permission both Meath County Council (in 2006) and the Bord (in 2007) obviously agreed with the concept of waste to energy and that the chosen site was a suitable location to operate such a facility. Because this application is concerned with minor amendments to the existing permission which do not change the type and amount of waste processed or the amount of traffic associated with the existing permission, it is considered that the suitability of the site for this type of facility is unchanged from the final permission granted in October 2007.

Alternative locations for the development on the site were also considered as part of the 2006 application. The amendments proposed do not seek to alter the location of the main process building on the site.

Alternative Thermal Treatment Technologies

Indaver has planning permission to build a Municipal Solid Waste incinerator on the site with a capacity of 200,000 tonnes per annum. Since the granting of permission in October 2007, Indaver has tendered on the European market for a moving grate furnace and has awarded a contract to a supplier providing exactly this technology. In the context of the proposed amendments contained in this application, which do not propose to change the type of thermal treatment technology, it would not be logical to re-consider alternative thermal treatment technologies.

Alternative Energy Recovery & Gas Cleaning

Heat Recovery; A number of heat recovery alternatives were considered when selecting the technology presented in the 2006 application and EIS. Options including no heat recovery, hot water generation and a steam boiler were considered. Incineration without heat recovery and hot water generation were discounted in the previous EIS and a steam boiler is still the preferred alternative. Changes to the flue gas cleaning system have enabled a lower boiler exit temperature and thus more energy can be extracted from the flue gases and this process is considered BAT.

Dust Removal System; Whilst there are alternatives including cyclone and electrofilter systems, the selection of a baghouse filter has not altered since the previous application and remains the preferred technology.

De-Nox; DeNOx can be achieved by either Selective Catalytic Reduction (SCR) or Selective Non Catalytic Reduction (SNCR). Both technologies are considered BAT.

It is still proposed to use SNCR with ammonia solution injection as it is safer, more flexible and consumes less energy and therefore does not have a negative effect on the overall energy balance of the plant. It has been decided to use a <25% solution of Ammonia in water as this is what has been recommended by the furnace and boiler supplier as the preferred solution.

Dry or Semi Wet Flue Gas Cleaning; The Evaporating Spray Reactor can use a semi-dry or semi-wet absorber. Both are considered BAT. Flue gases are cooled to approximately 140℃ by the evaporation of injected water and lime. Lime will be added either as a suspension of lime in water (semi-wet system).

The lime reacts with the acids in the flue gas. The spray reactor, with a significant over-stoichiometric use of lime, will ensure acid emissions are within EU emission limits. The spray reactor alone can abate the hydrochloric acid and sulphur dioxide to some 70 % of the EU emission limits; however it is not as efficient in the abatement of peaks of these acids. Therefore, it is proposed that the spray reactor for the facility be operated together with a dry lime injection system to ensure that emissions are well within EU limits. The dry lime injection system replaces the wet scrubbing stage that was identified in the 2006 application. The BREF Notes on waste incineration recommend a recirculation of the partly reacted lime from the baghouse filter, located after the reactor, back to the reactor. This has been incorporated into the design and the residues are recirculated into the flue gas duct prior to the baghouse filter to reduce the amount of fresh lime required and to minimise the residues produced per tonne of waste.

An alternative to semi-wet or semi-dry flue gas cleaning is dry flue gas cleaning (with lime or sodium bicarbonate). Fully dry systems are generally considered more suitable for smaller plants. BAT guidelines also suggest that very high stoichiometric rates of lime should be avoided.

First stage removal of dioxins, trace organics and heavy metals;

A number of options for first stage dioxin removal were considered including;

- the injection of a premix of activated carbon and lime before the spray reactor
- injection of activated carbon before the spray reactor
- injection of expanded clay before the spray reactor
- SCR reactor.

Expanded clay can be used and is very effective and efficient for dioxin/furan removal. It has the added advantage over the alternatives in that it is a mineral based product and hence is unaffected by higher

flue gas temperatures and cannot form hot spots in the flue gas duct. Hence the injection of expanded clay was chosen as the most suitable option.

Wet flue gas cleaning; Wet systems are more efficient than semi wet or dry systems in the abatement of peaks of acids in flue gases but have the disadvantage that they create a scrubber effluent which must be treated & discharged (process effluent) or evaporated in a semi-wet stage (reducing energy efficiency). The combination of a semi-wet spray absorber and dry lime injection system has been chosen to improve the energy efficiency of the plant, whilst at the same time guaranteeing that any peaks in acid gas concentration can be dealt with.

Second stage removal of dioxins, trace organics and heavy metals; While expanded clay injection is efficient for dioxin/furan removal it is not as effective as activated carbon in the removal of heavy metals. Hence it was not chosen for the second stage removal also.

Activated carbon injection before the baghouse filter is an efficient dioxin removal system and is considered BAT. It is the most favourable option due to its operational simplicity and the fact that a baghouse filter has also been proposed for dust removal from the facility. Activated carbon has also been chosen in preference to lignite cokes, due to better product availability.

Alternative Waste Management Strategies

Section 4, Planning & Policy outlines how the existing permitted facility is still in line with all current National, Regional and European policies, strategies and Directives on Waste Management. The Waste Directive published in December 2008 has identified that Waste-to Energy Facilities are now higher up the waste hierarchy and are preferable to landfill.

Alternative Designs

Three alternative designs were considered for the visual aspect of the facility which included the color scheme for the facility that has already received permission applied to the proposed building layout. In considering the three options the least preferred option among the design team was the color scheme for the permitted facility. The inclusion of grey colors in the two alternative options were considered to give a more neutral setting and blended in better with the background including the Irish cement facility.

Other minor alternatives have been considered as part of the proposed amendments and these are summarised as follows;

Conversion of Bottom Ash Bunker to a Bottom Ash Storage and Handling Building; This alternative was considered to provide more flexibility in the future processing of the bottom ash into a re-usable product, if market conditions are favourable for investment in such an operation.

Incorporation of Warehouse and Education Centre into Main Process Building; This alternative design was considered to consolidate activities on the site. The warehouse was a distance from the main process building and meant that staff here were disconnected from their colleagues.

Changes to main process building layout; Alternatives equipment layouts were considered as part of the detailed design phase to provide the best use of space within the building, for ease of maintenance of equipment and to provide a safe route for visitors through the plant. The proposed amendment to the building shape and size are the result of that exercise and has resulted in the following positive effects;

- Reduction in overall building length of 45m
- Clear passageway on Eastern side of building for visitor tours of the plant
- Viewing platform at 25m above ground level in the plant to view all process equipment

4. PLANNING & POLICY

This development was examined in the context of the policies and objectives of waste management policy guidance at European Union, national, regional and local levels as follows:

EU Directives and Policy Guidance

- The Sixth Environmental Action Programme 'Environment 2010: Our Future, Our Choice'
- EU Directive 1999/31/EC – Landfill of Waste
- EU Directive 2000/76/EC – Incineration of Waste
- EU Directive 2001/77/EC – Renewable Energy
- Kyoto Protocol To The United Nations Framework Convention On Climate Change (1997)

National Policy Guidance

- Sustainable Development – A Strategy for Ireland (1997)
- National Development Plan 2000 – 2006
- National Climate Change Strategy Ireland (2000)
- Waste Management: Changing our Ways (1998)
- Waste Management: Preventing and Recycling Waste Delivering Change (2001)
- Waste Management: Taking Stock & Moving Forward (2004)
- Policy Guidance Circular WIR: 04/05
- National Strategy for Biodegradable Waste (2006)

Regional & Local Policy Guidance

- Waste Management Plan for North East Region (1999)
- Replacement North East Region Waste Management Plan 2005-2010
- Meath County Development Plan (2001)

This facility will conform to the EU Policy objectives as follows:

- The waste to energy facility will promote the objectives of the EU Sixth Environmental Action Programme. The facility will operate to the highest standards and will deal with wastes that are not suitable for recycling.
- The facility will promote the objectives of the EU directive on the landfill of waste.
- The facility will promote the objectives of the EU incineration of waste directive. The waste to energy plant will operate significantly below the emission limit values stipulated in the Directive and there will be continuous sampling for dioxins, although this is not a requirement of the EU Directive.
- A considerable portion of the electricity generated within the waste to energy development is based upon a biomass energy source and it therefore accords with the EU Directive and with National Policy in relation to renewable energy sources. The plant is also likely to be classified as a recovery activity due to its energy efficiency.
- This waste-to-energy plant will assist in Ireland's effort towards meeting the national emissions target in the Kyoto Protocol because it would reduce emissions from biodegradable municipal waste and generate energy from a non-fossil fuel source.

The facility will conform to the National Policy objectives as follows:

- The waste management facility accords with the objectives of the Changing Our Ways policy statement and subsequent policy statements. It will form part of an integrated waste management infrastructure for the North East Region and will embrace the 'polluter pays' principle.
- The waste to energy plant will form a major part of the waste management infrastructure for the North East Region and Ireland as a whole and it therefore accords with the objectives of the National Development Plan in relation to the development of this infrastructure.
- The waste to energy facility will promote the objectives of the National Climate Change Strategy as it will have the capacity to treat biodegradable waste currently disposed of to landfill
- The waste to energy facility lies within the North East Region and it is intended to primarily serve the needs of that waste management region. In accordance with the policy in Circular WIR 04/05, it is anticipated that the facility will not be strictly restricted to waste arising within the North East Region.

The facility will conform to the Local Policy objectives as follows:

- The waste to energy facility accords with the objectives in the Waste Management Plan for the North East Region, which identifies the need for a 150,000-200,000 tonnes per annum facility to help meet the Region's policy target of 39% energy recovery, and will form an essential part of an effective waste management infrastructure in the North East Region, which the Plan regards as central to the sustainable development of the Region.

- The development of new waste to energy infrastructure within County Meath can reasonably be considered to accord with the industrial development objectives and policies in the County Meath Development Plan and make a useful contribution towards the achievement of those objectives and policies.

5. SITE AND SCHEME DESCRIPTION

The main reception/process building will house the waste reception area, waste bunker, furnace, steam boiler, evaporating spray reactor, ash bunker, baghouse filter wet scrubber and stack. The tallest features of the development will be a 65m stack.

The heat produced from the combustion of the waste will be used to generate steam, which will be used to drive a steam turbine and electricity generator. The plant will produce approximately 18MW of electricity, of which approximately 3MW will be used to meet on-site energy requirements. The remaining 15MW of electricity will be available for export to the national grid. Enough electricity will be exported to power 22,000 homes annually.

The facility will accept up to a maximum of 200,000 tonnes waste annually between the hours of 0800 and 1830 Monday to Friday and between 0800 and 1400 on Saturdays. The Waste-to-Energy plant will operate 24 hours a day for, on average, 7,500 hours/annum.

The types of waste to be burned at the plant are also unchanged by the proposed amendments and non hazardous household, commercial, industrial and other suitable waste will be accepted. In doing so it will produce energy in the form of electricity, of which, that produced from the biodegradable waste fraction of the waste will be renewable energy, thereby contributing to a reduction in the consumption of fossil fuels. The types and quantities of waste produced also remain unchanged by the proposed amendments. Bottom ash will be produced, much of which may be suitable for use as fill for road construction or for daily cover of landfill sites.

The main processes and items remain unchanged and are as follows:

- Waste Reception
- Moving Grate Incinerator
- NOx Reduction – Ammonia Solution Injection
- Waste Heat Boiler
- Turbine
- Expanded Clay Injection
- Evaporating Spray Reactor
- Activated carbon, dry lime and residue injection into LAB loop reaction duct
- Baghouse Filter
- Recirculation of flue gas cleaning residues
- Ash Handling

- Emissions Monitoring Station

Figure 5 outlines the process of the waste-to-energy facility.

Waste Reception

All waste delivery trucks will be weighed and recorded on arrival at the facility. Waste trucks containing residual waste will check in at a security gate and pass over a weighbridge before driving into the waste acceptance hall. The majority of residual waste (e.g. waste containing putrescible material or a high proportion of water) will be discharged directly into the bunker. Any bulky residual waste will be shredded in a shredder located in the acceptance hall before being discharged to the bunker via discharge chutes. To prevent the egress of odours from the waste acceptance hall it will be maintained under negative pressure, (i.e. air will be drawn in through any opening rather than escaping out) which ensures that there will be no windblown waste or odours emanating from the facility

The waste reception hall will be supervised to ensure that the waste arriving at the facility is in accordance with Indaver's waste acceptance procedures. Operators located in the control room over looking the bunker will use travelling grab cranes positioned over the bunker to blend the waste in the bunker pit, so that despite the variety within the waste loads delivered, the feed to the furnace is relatively uniform. The grab cranes are also used for feeding the mixed waste material to the furnace via a hopper to the highest point of the furnace. The feeding hopper and feeding ram provide the seal between the high temperature furnace and the bunker.

The only potential for unexpected emissions in the bunker would be due to a fire in the waste. In practice, the grab operator would remove this burning waste and place it into the furnace hopper where it will then enter the furnace.

In the event of the fire becoming larger the operator would direct either one of two water cannons at the source. These cannons will have a flow rate of 300 cubic metres per hour which would be sufficient to extinguish a fire. In the event of large quantities of water being used, the bunker would contain this water prior to it being transported off-site for treatment at an appropriately licensed facility.

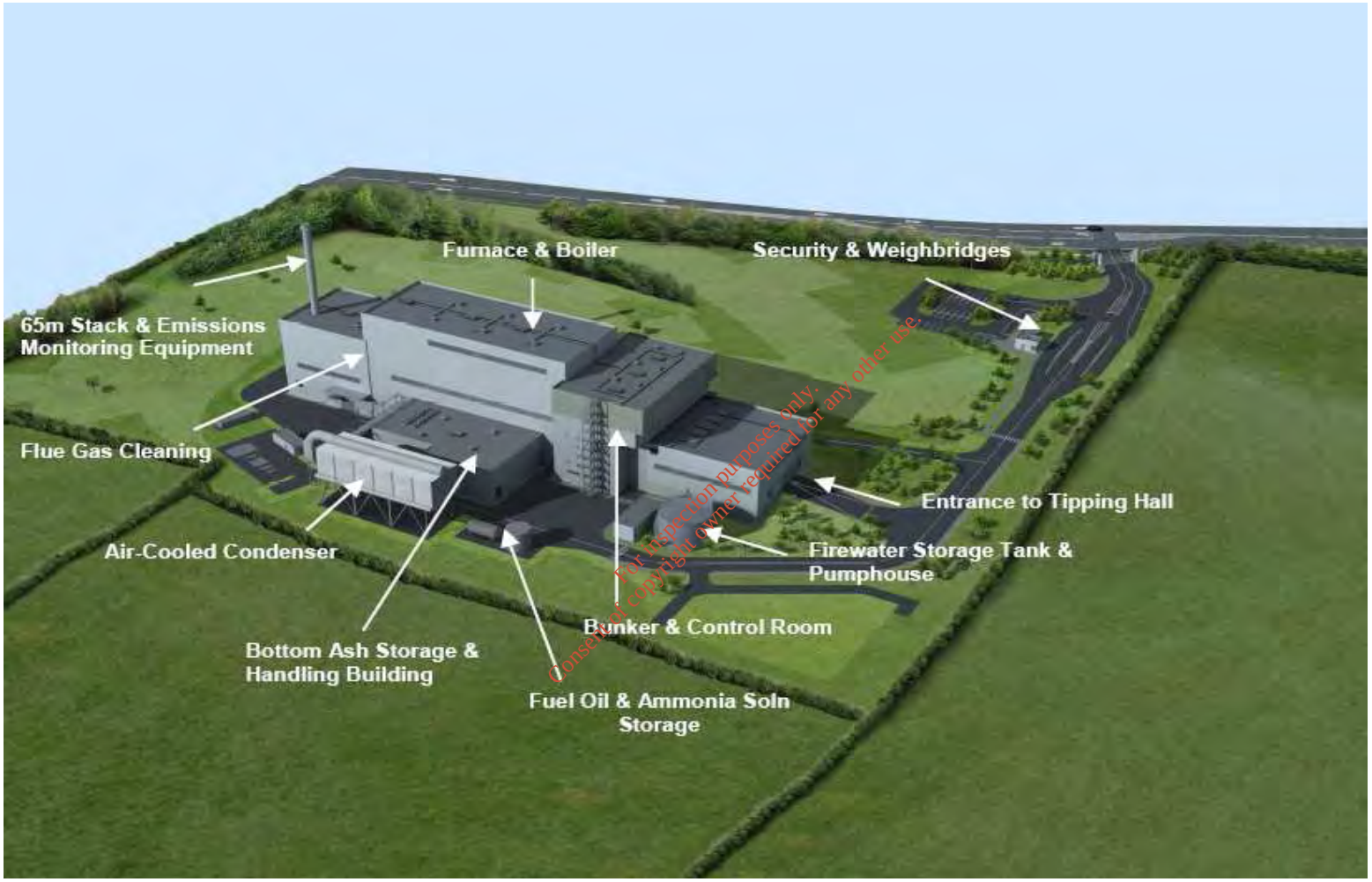


Figure 4 Detailed Layout of the Amended Waste to Energy Facility

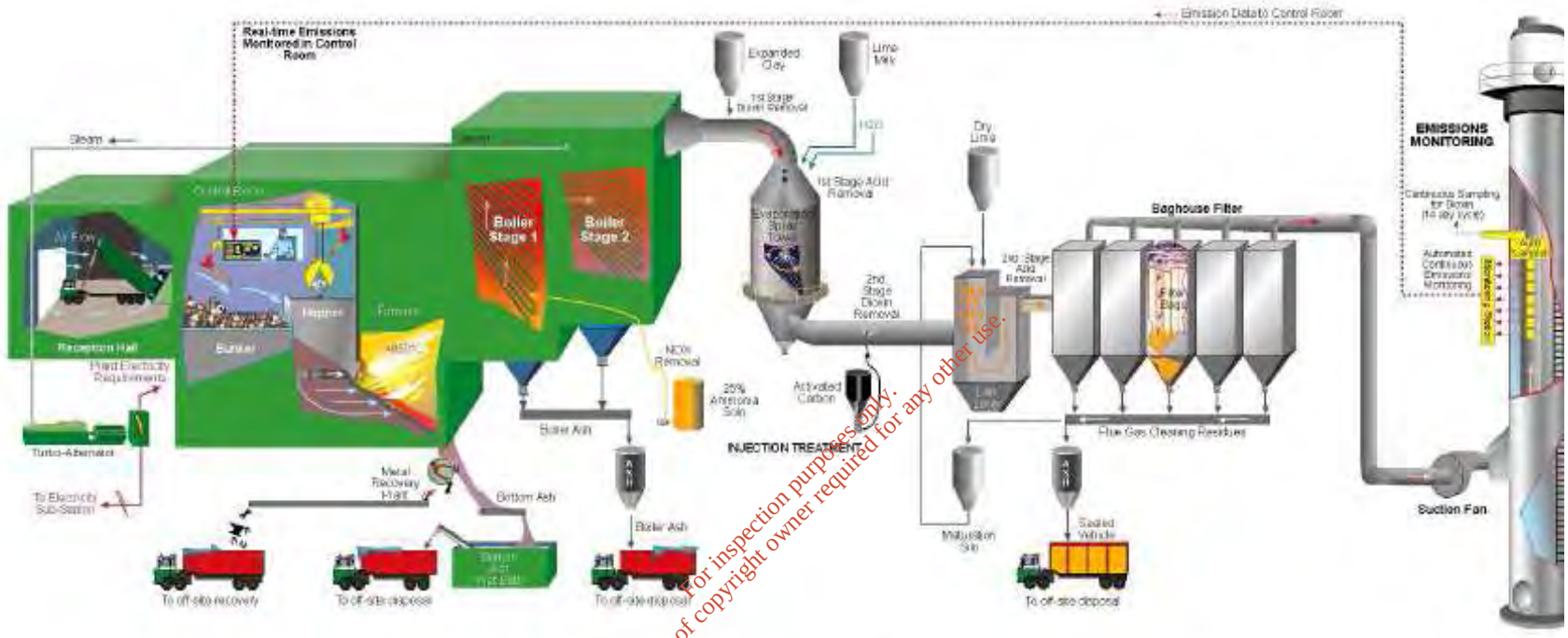


Figure 5.6 Process Overview

Figure 5 Proposed Process Schematic

Figure 6. Grab in Bunker

Figure 7. Control Room

Combustion

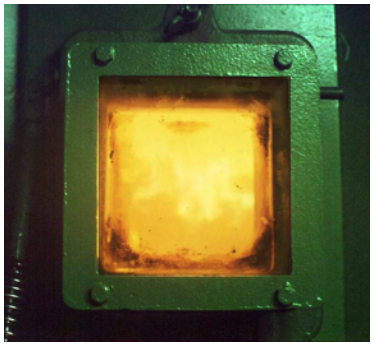


Figure 8. Furnace

A moving grate furnace will be used to treat the non-hazardous waste. Waste from the bunker will be fed to a hopper, which will feed the moving grate furnace. The moving grate system will transport the waste slowly from the feed point to the ash discharge. The waste will stay in the furnace for approximately one hour, which will ensure that the waste is completely burned. Air will be drawn in through the reception hall and used to assist combustion in the furnace. In addition parameters such as temperature and oxygen levels will be measured continuously in the furnace. The operating capacity of the furnace will be determined by the calorific value (CV) of the waste. The capacity of the furnace will be a maximum of 200,000 tonnes per annum.

Energy Recovery

Figure 9. Electricity generation

The hot combustion gases leaving the furnace will enter a boiler which will recover the heat generated from burning the waste by converting water into steam. The steam will drive a turbine, which will in turn drive an electricity generator. The plant will produce approximately 18MW of electricity, of which approximately 3MW will be used to meet on-site energy requirements. The remaining 15 MW of electricity will be available for export to the national grid. Enough electricity will be exported to power 22,000 homes annually.

Flue Gas Cleaning

The flue gases from the boiler will be cooled in the evaporating spray reactor. Lime milk and water is injected into the spray reactor to neutralize acids (1st stage acid removal system). All water produced in the various processes will be used in the spray reactor therefore there will be no process effluent emissions from the process.

Figure 10. Baghouse Filter

Expanded clay will be injected into the flue gases leaving the spray reactor. Dioxins, furans, heavy metals and other particulates will be adsorbed onto the clay. The flue gases will then pass through a baghouse filter which will remove the activated clay with adsorbed dioxins, heavy metals etc., and other particulates from the gases.

Dry lime will be injected as the preferred method of 2nd stage acid gas removal in preference to the wet system proposed in the 2006 application. Any dioxins, furans or heavy metals remaining in the gases will be removed by injection of activated carbon before the baghouse filter (2nd stage dioxin removal system). This final removal system will ensure that dioxin and furan emissions will be well within the EU emission limit values.

The exhaust gases will then be discharged via the 65m stack.

Ash and Solid Residues

The solid residues from the facility will be as follows

Bottom Ash:	approximately 50,000 tonnes/annum
Boiler Ash:	approximately 3,000 tonnes/annum
Flue Gas Cleaning Residue:	approximately 10,000 tonnes/annum

The bottom ash will be non-hazardous and disposed of to a suitable, EPA licensed non-hazardous landfill. Boiler ash will be analysed to determine whether it is hazardous or non-hazardous for disposal. Experience in Europe has shown that this ash is non-hazardous and disposed to non-hazardous landfill. The flue gas cleaning residue will be classified as hazardous for disposal and exported to a hazardous waste landfill, such as Indaver's hazardous waste landfill in Antwerp, as there is currently no such facility available in Ireland.

Regulatory Control

In order to operate the waste management facility, Indaver will require a licence from the EPA. Under the 1996 Waste Management Act, as amended, facilities such as that proposed for Meath require a waste licence. In parallel with the preparation of this application, Indaver are responding to an Article 12&13 compliance request as part of the review process.

Health and Safety

The facility has been designed in accordance with the Safety Health and Welfare at Work Act, 2005, the Safety, Health and Welfare at Work (General Application) Regulations, SI No. 299 of 2007 and

associated Regulations. The plant has been designed by skilled personnel and in accordance with internationally recognised standards, design codes, legislation, good practice and experience. Potential health and safety impacts have been assessed and mitigation measures proposed for the operation of the facility.

6. HUMAN BEINGS

The human beings assessment has been conducted by: reviewing world policy and research papers on the impact of waste-to-energy facilities on human health; baseline monitoring of dioxins and predicting any possible impact from the facility: completion of an odour assessment; and reviewing the current and future socio-economic status of the area.

Health and Safety

Independent dioxin uptake, human health and odour studies were completed.

Health

An independent health assessment was conducted to assess the potential effect on human health of the waste-to-energy facility. The assessment included a review of evidence available in literature and in particular the publication by the Health Research Board on *Health and Environmental Effects of Landfilling and Incineration of Waste* and the recent publication *A review of the environmental and Health effects of Waste Management* published in May 2004 by the UK Department of the Environment, Food and Rural affairs.

The Department of the Environment, Heritage and Local Government in its website Race against Waste states:

Even if we incinerated 1 million tonnes of municipal waste in Ireland, this would contribute less than 2% of the dioxins emitted to air (EPA, 2001). Most dioxins will continue to come from uncontrolled burning of waste in back gardens, bonfires and accidental fires."

The 2004 UK Government report states:

"-the published epidemiological studies of the health of communities living in the vicinity of incinerators have failed to establish any convincing links between incinerator emissions and adverse effects on public health; specifically no impact was demonstrated on the incidence of cancer, respiratory health symptoms or reproductive outcomes. Consequently, the epidemiology specific to incinerators gives no basis for developing quantitative health impact functions and no attempt is made to use it in this way.

In a statement on incineration the World Health Organisation said:

"The incineration of waste is an hygienic method of reducing its volume and weight which also reduces its potential to pollute. Not all wastes are suitable for combustion. Residues from incineration processes must still be landfilled, as must the non-combustible portion of the waste stream, so incineration alone cannot provide a disposal solution.

Generating electricity or producing hot water or steam as a by-product of the incineration process has the dual advantages of displacing energy generated from finite fossil fuels and improving the economics of waste incineration, which is the most capital-intensive waste disposal option."

The health outcomes which were examined in the various published studies include respiratory symptoms and illness, reproductive effects and the development of cancer.

Despite reports of cancer clusters, no consistent or convincing evidence of a link between cancer and incineration has been published. In the UK, the large epidemiological studies by Elliott and colleagues of the Small Area Health Statistics Unit (SAHSU) examined an aggregate population of 14 million people living with 7.5 km of 72 municipal solid waste incinerators. This included essentially all incineration plants irrespective of age up to 1987. Despite the consequent inclusion of incinerators with emissions of potential carcinogens much higher than would occur from modern incinerators, both studies were unable to convincingly demonstrate an excess of cancers once socio-economic confounding was taken into account (Elliott et al., 1992; 1996; 2000).

As a result of these, the UK Department of Health's Committee on Carcinogenicity published a statement in March 2000 evaluating the evidence linking cancer with proximity to municipal solid waste incinerators in the UK (Committee on Carcinogenicity, 2000). The Committee specifically examined the results of these studies and concluded that, "any potential risk of cancer due to residency (for periods in excess of ten years) near to municipal solid waste incinerators was exceedingly low and probably not measurable by the most modern techniques". The Committee agreed that, at the present time, there was no need for any further epidemiological investigations of cancer incidence near municipal solid waste incinerators.

It has been hypothesised that exposure to dioxins and furans (either directly via inhalation or indirectly via the food-chain) is responsible for some cancers in communities around incinerators. However, epidemiological studies on the older generation of incinerators that emitted significantly greater amounts of dioxins than newer facilities have failed to identify an effect. Given that the emissions of dioxins and furans from modern incinerators are of orders of magnitude lower than from older incinerators, it can be said with some confidence that any impacts of dioxin and furan on cancer rates in local people are small or non-existent and unlikely to be quantified through epidemiology. This is confirmed by no less a body than the W.H.O. which stated regarding dioxins that;-" *there is a level of exposure below which cancer risk would be negligible"*

Available studies have typically examined respiratory health around the older generation of incinerators. Most are based upon self-reported symptoms and therefore may be subject to bias. Overall, there is little evidence to suggest that waste incinerators are associated with increased prevalence of respiratory symptoms in the surrounding population.

Any studies which are often cited to demonstrate effect are either not scientifically reliable because of: the design of the study; confounders; they deal with open and/or hazardous combustion; or they deal with facilities with limited or no gas cleaning not operating to the current EU emission limits. Therefore such studies are of no real relevance to the facility. Reports of reproductive effects such as increased twinning have not been reproducible and are again of limited value anyway because of the marked drop in emission levels.

The fact that this incinerator will have to be operated in accordance with the strict terms of the EU incineration directive means emissions will be lower than from practically all studied incinerators reducing even further any possible risk.

All information on the municipal waste incinerator suggest that there will be no deleterious effect on human health either in the immediate vicinity or further away in the short term or in the longer term.

Dioxins

Soil sampling and ambient air monitoring data, was used to establish a baseline for PCDD/F (hereafter referred to as 'dioxins and furans') intake for a theoretical Maximum At Risk Individual (MARI) in the Carranstown area. The MARI was assumed to live at the point of maximum dioxin and furan deposition from the development and to be a subsistence farmer, who obtained all their meat, milk and vegetables from a 100m diameter site, upon which the maximum deposition of dioxins impacted. The baseline dioxin and furan intake for the MARI was modelled following US EPA Methodology and using the Dutch Government approved Model RISC Human 3.2.

In order to conduct a conservative assessment of the potential impact of dioxin and furan emissions on a theoretical individual, the following assumptions were made for the MARI (these assumptions are based on the MARI as used by the US EPA for hazardous waste facility assessment).

- The MARI lives at the point where the dioxin and furan deposition rate predicted to be generated by the facility when operating at a maximum capacity of 200,000 tonnes per annum impacts on the ground
- The MARI is a subsistence farmer, who spends 16 hours per day, 7 days per week, 50 weeks per year outside in the field where the deposition occurs
- The MARI spends 6 years as a child and 60 years as an adult living on the site
- The MARI only eats vegetables grown on this soil, milk from a cow grazing on the site and meat from cattle raised on the site

The annual average dioxin and furan emissions under maximum operating conditions (worst case emissions) from the waste-to-energy facility were then used to model soil dioxin and furan concentrations over the operating life of the facility.

This was a very conservative assumption as it assumed the plant operated 24 hours per day, 365 days per year at the maximum emission concentration and flue gas flow rate.

The predicted dioxins and furans were therefore estimated to increase by only 0.0371 pg/body weight/day (as WHO-TEQ), for the theoretical MARI, from 0.8519 pg/kg bodyweight/day to 0.8890 pg/body weight/day (6.22 pg/kg bw/wk).

The predicted dioxin and furan intake for the MARI was therefore determined to be low and to be well below the EC Tolerable Weekly Intake (TWI) of 14 pg WHO-TEQ /kg body weight/per week. The TWI was set by the EU in order to protect human health and was based on applying a safety factor to the LOAEL (Lowest Observed Abnormal Effect Levels) for dioxin and furans.

A potential accident scenario (exceedence of dioxin emissions for a period of five weeks) was modelled and it was found that the predicted dioxin and furan intake for the annual occurrence of such an accident scenario was also well below relevant EU limit values.

It can therefore be concluded that the waste-to-energy facility will have no significant impact on dioxin and furan intake for even the theoretical MARI and that, with respect to dioxin and furan intake, the facility will have no impact on human health or the environment.

Odour

As part of the EIS completed in 2006, Odour Monitoring Ireland completed an odour impact assessment of the waste-to-energy facility. It is considered having rerun the AERMOD Prime odour model allowing for the proposed amendments including updated building dimensions, there will be no increase in predicted ground level concentrations (GLC) of odour. All predicted GLCs will be below the EPA and UK Environment Agency odour impact criterion for high risk odours.

Once a year, the plant will be shut down for maintenance. During this scheduled period (about 7 to 21 days) the waste will remain within the bunker. This has the potential to cause odour emissions from the facility. In order to ascertain the potential for odour emissions, odour emission measurements were performed at a similar plant in Beveren (Belgium) by Project Research Ghent and used in the model.

Three scenarios were assessed:

1. Maintenance of negative air pressure during shutdown and exhaust through the existing 65-metre stack,

2. Maintenance of negative air pressure during shutdown and treatment in a fixed bed biofiltration system,
3. Maintenance of negative air pressure during shutdown and treatment in an annular bed carbon filtration system,

Odour dispersion modelling was performed using the recommended Environmental Protection Agency (EPA) dispersion model ISC ST3 and the more advanced US and UK EPA recommended Aermod Prime. A worst-case meteorological year (Dublin Airport 2002) was used to ascertain the worst-case ground level concentrations (GLC's) of odour in the vicinity of the site.

Following dispersion modelling of odours for all three scenarios, it was concluded that there will be no significant ground level impact of odours from the exhaust stack, with all predicted concentrations lower than the EPA recommended odour concentration of 3.0 Ou_E m^{-3} at the 98th percentile of hourly averages.

During periods of shutdown odour emissions from the facility will be insignificant and therefore will not impact on the local community or the environment.

Social Activities

The current socio economic status in the areas close to the development was reviewed. In the case of Indaver Ireland this is the District Electoral Division (DED) of Duleek in Co. Meath.

Identification of principal potential receptors and analysis of recent trends in population, employment economic performance and land use including local amenities was reviewed and the impact of the development was assessed against this background.

Residential development in Carranstown is predominantly ribbon development along the main roads. These vary from one off housing to garages and two-storey farmhouses with associated sheds (see Figure 11).The closest population centres are Duleek village to the south west and Drogheda town to the north east.

On the basis of the most recent Census, 2006, the population in the study area increased by 10% during the period 2002-2006. This is below growth at county level at 21.5% though above the national growth rates of 8.2%.

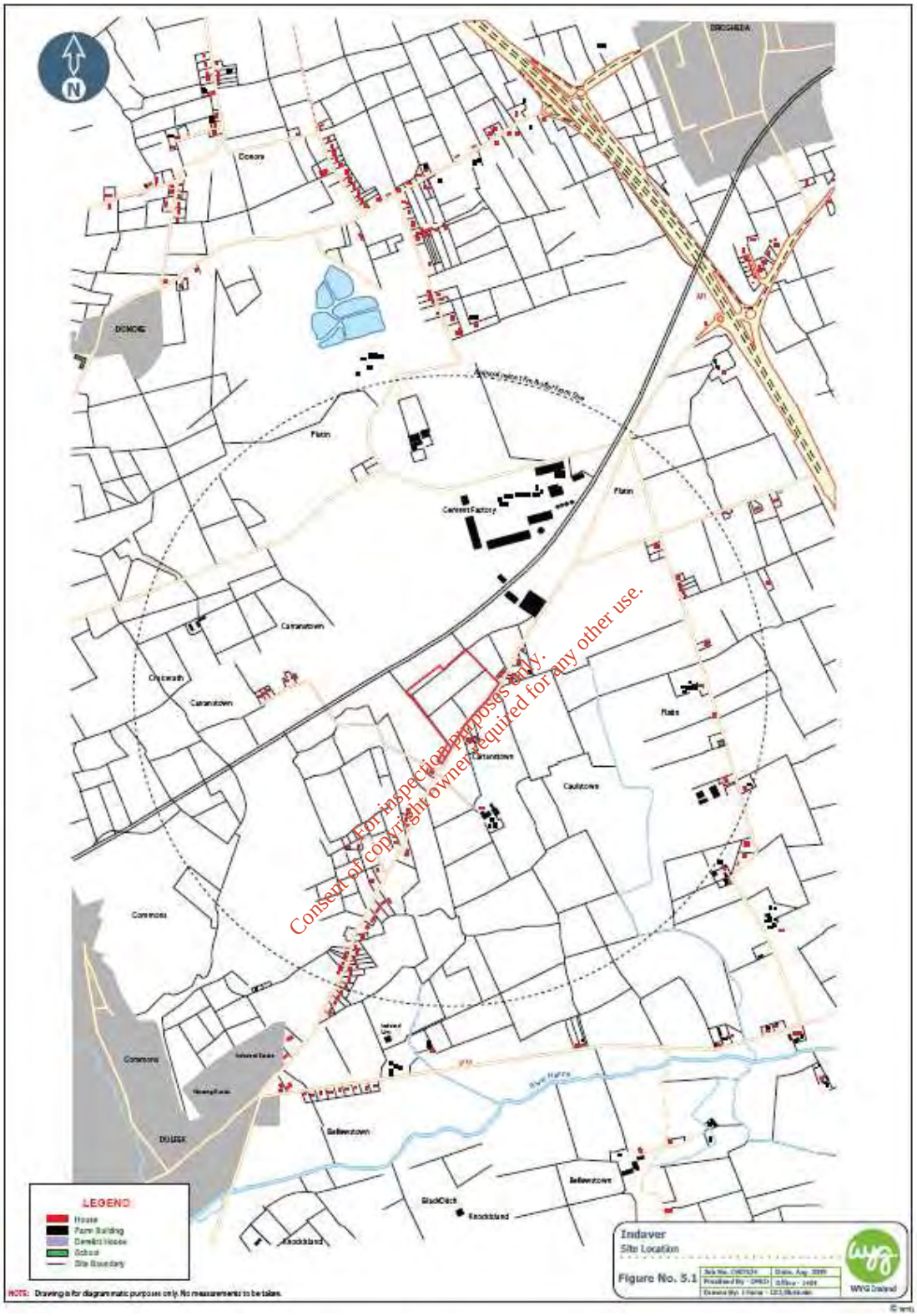


Figure 11.

Table 1. 2002 and 2006 Population of the Study Area

	2002	2006	% Increase
State	3,917,203	4,239,848	8.2
County Meath	134,005	162,831	21.5
Duleek DED	2941	3236	10.0

Tourism

Many of the 450-500 European municipal waste-to-energy facilities are located in the vicinity of major tourist attractions. Incinerators are currently operating in European cities such as Paris, Monaco, Vienna and Lisbon and on islands such as Madeira and Majorca, all popular holiday destinations and where tourism makes a significant contribution to the national economy. From research to date there is no evidence to suggest that a waste-to-energy plant has a significant impact on tourism in its vicinity.

Waste-to-energy facility on Island of Madeira

Economic Activity

It is expected that during peak construction activities, approximately 300 people will be working directly on the construction site. The staff will comprise of managerial, technical, skilled and unskilled workers. It is anticipated that this development will increase the numbers of employees in this sector. Additional employment associated with the support services sector will also be generated in the locality which will include areas such as goods deliveries, cleaning and catering contracts.

Community Gain

As a condition of the planning permission granted to Indaver Ireland an annual financial contribution is made to Meath County Council for the provision of environmental improvement and recreational/community facility projects in the vicinity of the facility. The identification of environmental/recreational/ community facility projects will be decided by Meath County Council and the Community Liaison Committee.

Social Considerations

Ireland is in urgent need of alternatives to Landfill due to pressures from the EU and Irish legislation. While waste to energy is not the *definitive* solution to the waste issue in this country, its necessity is paramount to the success of sustainable integrated waste management system in Ireland. While the facility will be an end of cycle process for waste, the re-use of the waste as energy is in line with the principles of the waste hierarchy and sustainable development. Impacts upon society as a result of this development have been considered in detail in the individual subsections of the EIS.

Landuse

There will be no severance of land as a result of the development. There will also be no loss of rights of ways, amenities or rezoning of land required. The operation of the development is not predicted to have any significant impact on the land-use of the surrounding areas and is not predicted to have any significant impact on the housing in the surrounding areas.

7. AIR

The current air modelling study has been undertaken to assess the impacts of the proposed amendments to the existing planning permission solely relating to some minor changes relative to the position of the stack and associated buildings. The height and position of the stack remains unchanged from the previous application.

An additional scenario has also been added to modelling scenarios. This additional scenario was undertaken to assess the impact of maximum emission limit values at nominal flue gas flow rates. This scenario is in addition to the modelling exercise carried out at 110% of the flue gas flow rate at maximum emission limit values.

Air dispersion modelling was carried out using the United States Environmental Protection Agency's (USEPA) regulatory model AERMOD. The aim of the study was to assess the impact in the ambient environment of emissions from the facility at the maximum emission limits outlined in Council Directive 2000/76/EC and also at a maximum stack emission flowrate. Modelling was also conducted under abnormal operating conditions to assess any short-term impact due to these infrequent events and also under expected or average operating conditions. The study demonstrates that all substances which will be emitted from the facility will be at levels that are well below even the most stringent ambient air quality standards and guidelines. The dispersion model study consisted of the following components:

- Review of design emission levels and other relevant information needed for the modelling study
- Identification of the significant substances which are released from the site
- Review of background ambient air quality in the vicinity of the facility
- Air dispersion modelling of significant substances released from the site
- Particulate deposition modelling of Dioxins, Polycyclic Aromatic Hydrocarbons (PAHs) and heavy metals released from the site
- Identification of predicted ground level concentrations of released substances beyond the site boundary and at sensitive receptors in the immediate environment
- A full cumulative assessment of significant releases from the site taking into account the releases from all other significant industry in the area based on the USEPA's Prevention of Significant Deterioration (PSD) approach

- Evaluation of the significance of these predicted concentrations, including consideration of whether these ground level concentrations are likely to exceed the most stringent ambient air quality standards and guidelines which have been set for the protection of human health
- Impact on public health and the environment in the unlikely event of "abnormal" operating conditions

Modelling and a subsequent impact assessment was undertaken for the following substances released from the site:

- Nitrogen dioxide (NO_2)
- Sulphur Dioxide (SO_2)
- Total Dust (as PM_{10} and $PM_{2.5}$)
- Gaseous and vaporous organic substances expressed as total organic carbon (TOC)
- Hydrogen Chloride (HCl)
- Hydrogen Fluoride (HF)
- Polycyclic Aromatic Hydrocarbons (PAHs)
- PCDD/PCDFs (Dioxins/Furans)
- Mercury (Hg)
- Cadmium (Cd) and Thallium (Tl)
- And the sum of Antimony (Sb), Arsenic (As), Lead (Pb), Chromium (Cr), Cobalt (Co), Copper (Cu), Manganese (Mn), Nickel (Ni) and Vanadium (V).

This air dispersion modelling assessment represents an update to that performed for the Indaver Ireland planning application and EIS submitted to Meath County Council in February 2006. The updates to the dispersion model include the revised building layout and process conditions, the use of a more advanced version of the AERMOD dispersion model, the use of updated USEPA guidance on meteorological data pre-processing and also revised UK guidance on the addition of background concentrations to 1-hour and 24-hour NO_2, SO_2 and PM_{10} concentrations.

Assessment Approach

Emissions from the site have been assessed firstly under maximum operating conditions, secondly under average operating conditions and thirdly under abnormal operating conditions. Maximum operations are based on the facility operating at 200,000 tonnes per annum and with emission levels at the limits defined in EU Directive 2000/76/EC and at maximum volume flow. Average operations are based on the facility operating at 200,000 tonnes per annum and with emission levels at the limits defined in EU Directive 2000/76/EC but with average volume flows. Abnormal operating conditions refer to short-term periods in which the limits detailed in EU Directive 2000/76/EC are exceeded at maximum volume flow.

This is a conservative approach as the facility will typically operate to emission values well within emission limits defined in the EU Directive.

Predicted ambient air concentrations have also been identified at the most sensitive residential receptors in Carranstown and the surrounding geographical area as far away as Duleek, Drogheda and Newgrange.

Modelling Under Maximum, Average & Abnormal Operating Conditions

In order to assess the possible impact from the facility under maximum, average and abnormal operations, a conservative approach was adopted, that is designed to over-predict ground level concentrations. This cautious approach will ensure that an over-estimation of impacts will occur and that the resultant emission standards adopted are protective of ambient air quality. The approach incorporated several conservative assumptions regarding operating conditions at the facility. This approach incorporated the following features:

- For the maximum operating scenario, it has been assumed that the emission point is continuously operating at its maximum operating volume flow. This will over-estimate the actual mass emissions from the site.

- For maximum and average operating scenario, it has been assumed that the emission point is operating for 24-hrs/day over the course of the full year. This will over-estimate the actual mass emissions.

- Abnormal operating emissions were pessimistically assumed to occur every Monday of the year with the exception of metals (2 days every month) and dioxins/PAHs (5 weeks/annum):
  - NO_X - 400 mg/m^3 for 2 hours every Monday for a full year
  - Total Dust - 30 mg/m^3 for 8 hours every Monday for a full year
  - TOC - 30 mg/m^3 for 8 hours every Monday for a full year
  - HCl - 60 mg/m^3 for 4 hours every Monday for a full year
  - SO_2 - 200 mg/m^3 for 6 hours every Monday for a full year
  - HF - 4 mg/m^3 for 6 hours every Monday for a full year
  - CO - 200 mg/m^3 for 24 hours every Monday for a full year
  - Dioxins - 0.5 ng/m^3 for 5 weeks per year & 0.5 ng/m^3 for 2 days per month
  - PAHs - 0.015 mg/m^3 for 5 weeks per year
  - Heavy Metals - 30 mg/m^3 for 2 days every month
  - Cd - 1 mg/m^3 for 2 days every month
  - Hg - 1 mg/m^3 for 2 days every month.

- The worst-case meteorological conditions for Dublin Airport over the five year period 2001-2005 have been used for each individual pollutant and averaging period. The worst-case year with regard to annual average concentrations was 2004, with annual average concentrations 18% higher than the five-year average. With regard to the 1-hour averaging period and limit values (i.e. maximum 1-hour, 99.8th%ile, 99th%ile & 98th%ile), the worst-case year (2005) ranges from 10-11% higher than the five-year average. For the 8-hour period and 24-hour averaging period and limit values (i.e. 90.4th%ile, 99.2nd%ile), the worst-case year is 8% and12% higher respectively than the five year average.

As a result of these conservative assumptions, there will be an over-estimation of the emissions from the site and the impact of the facility on human health and the surrounding environment.

Modelled Locations

In relation to the spatial assessment of emissions from the site, modelling has been carried out to cover locations at the boundary of the site and beyond, regardless of whether any sensitive receptors are located in the area. Ambient air quality legislation designed to protect human health (i.e. by setting ambient limit values for a range of pollutants) is generally based on assessing ambient air quality at locations where the exposure of the population is significant relevant to the averaging time of the pollutant. However, in the current assessment, ambient air quality legislation has been applied to all locations regardless of whether any sensitive receptors (such as residential locations) are present for significant periods of time. Thus, again, this represents a worst-case approach an examination of the corresponding concentrations at the nearest sensitive receptors relative to the actual quoted maximum concentration indicates that these receptors generally experience ambient concentrations significantly lower than that reported for the maximum value.

Cumulative Assessment

As the region around Carranstown is partly industrialised and thus has several other potentially significant sources of pollutants, a detailed cumulative assessment has been carried out using the methodology outlined by the USEPA. A cumulative assessment of all significant releases from nearby sites was carried out based on an analysis of their IPPC Licences. The modelling results from the cumulative assessment were incorporated into the background concentrations for these pollutants (i.e. NO_2, SO_2, PM_{10} and $PM_{2.5}$). Hence the cumulative impact of all significant releases from nearby sites was included when background concentrations were added to the ambient pollutant concentrations under maximum and abnormal operating conditions.

Baseline Air Quality Assessment

An extensive baseline survey was carried out in the region of the site between June and December 2005. This survey compliments and updates the baseline survey carried out previously on-site in Years 2000 and 2001. The survey focused on the significant pollutants likely to be emitted from the facility and which have been regulated in Council Directive 2000/76/EC. The rationale for the updated 2005 survey was based on those pollutants which have a significant existing local source and thus may be subjected to some change over the period 2001 - 2005. The main significant local source is road traffic and thus the relevant pollutants associated with road traffic are NO_2, PM_{10} and benzene. Platin Cement would also be considered a significant local source although the emissions from this facility are best captured by air dispersion modelling as part of a detailed cumulative air dispersion modelling assessment. Since 2005, there has been the potential for some changes in traffic levels in the area. In addition, recent years have also seen a significant improvement in the national vehicle fleet in terms of air emissions as older more polluting vehicles are replaced with cleaner vehicles. Thus, although traffic levels may have increased somewhat over the period 2005 - 2009, overall vehicle emissions are unlikely to have increased to any significant degree. Hence the 2005 study is considered to be valid for the purposes of this assessment.

NO_2 concentrations measured over the monitoring period were significantly less than the EU limit value. Similarly, levels of SO_2 and benzene were both significantly below the respective limit values. $PM_{2.5}$ concentrations measured over a three-week monitoring period were significantly less than the proposed EU limit value. Levels of metals were also significantly below the ambient air quality standards ranging from < 0.01 to 10% of the respective limit values over the monitoring period.

Background levels of PCDD/PCDFs (Dioxins/Furans) cannot be compared to ambient air quality concentration or deposition standards. However, levels of dioxins and furans can be compared to existing levels measured sporadically in Ireland and continuously in the UK as part of the TOMPS network. Existing levels in Carranstown are typical of the range of values encountered in rural locations in the UK and Continental Europe and significantly lower than urban locations in the UK and Europe.

Summary

Modelling results indicate that the ambient ground level concentrations are below the relevant air quality standards or guidelines for the protection of human health for all compounds under maximum, average and abnormal operation of the site. The modelling results indicate that this maximum occurs near the site's northern and eastern boundaries. Maximum operations are based on the emission concentrations outlined in EU Directive 2000/76/EC.

An appropriate stack height has been selected to ensure that ambient air quality standards for the protection of human health will not be approached even under worst-case operating scenarios. The stack height determined by air dispersion modelling which will lead to adequate dispersion was 65 metres.

Concentrations fall off rapidly away from this maximum and the short-term limit values at the nearest residential receptor (not including background concentrations) will be less than 5% of the short-term limit values. The annual average concentration has an even more dramatic decrease in maximum concentration away from the site with concentrations from emissions at the facility accounting for less than 1.4% of the limit value (not including background concentrations) at worst case sensitive receptors near the site. Thus, the results indicate that the impact from the facility is minor and limited to the immediate environs of the site.

In the surrounding main population centres, Duleek and Drogheda, levels are significantly lower than background sources with the concentrations from emissions at the facility accounting for less than 0.1% of the annual limit values for the protection of human health for all pollutants.

A comparison of the modelling results from this assessment with those from February 2006 shows that predicted pollutant concentrations are slightly increased as a result of the revisions to the air dispersion model. However, the increased concentrations are low relative to the limit values for each pollutant, ranging from unchanged (annual mean PM_{10}, $PM_{2.5}$) to 9% (1-hour HF) of the limit value. The highest predicted increases are for the 1-hour NO_2, SO_2 and HF concentrations and reflect the more conservative maximum 1-hour emission concentrations used in this assessment.

8. NOISE

An assessment was conducted of the impact of the anticipated noise and vibration associated with the development at nearby sensitive locations on human health and the environment. The noise sources associated with the proposed amendments are identical to those originally assessed in the application of 2006. The changes to the locations of the noise sources included in the proposed amendments required that the levels of noise and vibration be reassessed.

This methodology for the assessment comprised the following elements:

- Characterisation of the receiving environment
- Characterisation of the development
- Prediction of the noise and vibration impact associated with the development
- Evaluation of noise and vibration impacts

Environmental noise surveys were conducted in accordance with ISO 1996: Acoustics – Description and measurement of environmental noise: 1982. A total of six measurement locations were selected including four baseline for the purposes of the EIS. The remaining two locations were long term monitoring locations established to assess impact from construction works and these locations will remain in place for the duration of the works. Three locations were used for the short-term attended

noise surveys. The fourth EIS location was used for the installation of the long-term unattended noise monitoring equipment. Both day and night time noise measurements were conducted.

Construction

During the construction phase of the project, there is a potential for impact on nearby residential properties due to noise emissions from site traffic and other construction activities. The development site is in a semi-rural location with moderately high daytime ambient noise levels due to existing traffic. It is considered that the various noise sources will not be excessively intrusive on the local community.

It is predicted that construction noise related impacts would be short-term and not significant. Furthermore, the anticipated application of limits for hours of operation and the implementation of appropriate noise and vibration control measures (such as temporary 2.4 metre high timber hoarding to block line-of-sight between earthmoving equipment and the residential properties), will ensure that noise and vibration impact is kept to a minimum.

Operation

The primary sources of noise during the operational phase of the development will be process and building service plant; car parking on site; vehicle movements on site and additional vehicular traffic on public roads. A noise modeling analysis was carried out based on the anticipated noise emissions from the facility. The anticipated noise sources are based on data from an existing facility in Belgium.

Mitigation Measures

Mitigation measures will be employed to ensure that activities on site will not give rise to noise levels off site which exceed the Environmental Protection Agency recommended limits of 55dB and 45dB for daytime and night time periods respectively. The resultant noise impact from the development will therefore be not significant.

With regard to piling operations, the Contractor will be obliged to take abatement measures complying with the recommendations of BS 5228 (*Noise control on construction and open sites*). This may include the selection of suitable piling methods to minimise vibration emissions such as “auger” type piling that has significantly lower vibration emissions when compared to traditional “impactive” type piling.

In order to sufficiently ameliorate the likely noise impact on the local community, a schedule of noise control measures has been formulated for both construction and operational phases associated with the development.

Predicted Impact

The predicted noise level associated with car parking facilities and vehicle movements is within the recommended criteria; therefore the impact is not significant. The increase in the level of road traffic noise adjacent to the majority of existing roads will be less than 1dB. The resultant noise impact is not significant.

9. GEOLOGY AND SOILS

The soils beneath the site consist predominantly of brown silty clays generically known as boulder clays. These consist of medium dense brown silty clays with pebbles, cobbles and occasional boulders. The boulder clay varies in thickness across the site, ranging from four metres towards the west of the site, to greater than 10 metres towards the centre. The boulder clay is underlain by the Platin limestones. The Platin limestones display karst features in and around the nearby Platin quarry.

Baseline Assessment

Representative soil samples were collected from seven trial pits across the site. Samples were analysed for priority pollutants including Volatile Organic Compounds, Polycyclic Aromatic Hydrocarbons (PAHs), Metals, Total phenols, Pesticides and Polychlorinated Biphenyls (PCBs). The results of this investigation showed that there is no significant soil contamination at the site. However some traces of metal contaminants were identified. The levels identified would commonly reflect agricultural activity within the area.

A test was conducted in December 2000 to assess the suitability of the site for the installation of a Puraflo™ system. In addition PM group in February 2009 conducted additional percolation tests. The test results indicated that while the site failed percolation test for a traditional percolation area an engineered percolation area could be constructed to comply with national guidelines. Engineered percolation areas are proposed for both percolation areas – one area close to the security gatehouse and one area for the main process building facilities.

The development site is underlain by karst limestone which by its nature can pose difficulties for building foundations due to the unpredictable occurrence, extent and depth of underground cavities. The facility is located in a wide expanse of limestone strata. The development of this facility will not materially impact on the available reserves of limestone in the east Meath area.

Construction Phase

Potential impacts during construction phase of the development would be associated with accidental spillage of potentially polluting substances including oils, paints and liquid wastes and other substances associated with the construction and operational activities.

Potential impacts of the excavations were also assessed. The excavations will vary in depth across the development site will vary in depth with the greatest level of impact at the waste bunker. The base of the waste bunker will be below the surface of bedrock. Elsewhere overburden will be excavated to relatively shallow depths along the site roads and infrastructure. It is anticipated that all spoil generated will be reused on site.

Operational Phase

Potential impacts during the operational phase of the development would be limited to accidental spillage of potentially polluting substances including oils, paints, liquid wastes or raw materials such as lime caustic soda or ammonia.

Potential vibration issues relating to blasting at Platin have been assessed. Upon consideration of vibration data it is concluded that blasting will not result in cosmetic or structural damage to the Indaver building.

Mitigation Measures

All substances that would have the potential to cause a negative impact on the soils and geology (e.g. chemicals and ash residues) will be stored in appropriate containers/silos and/or placed within bunded areas. All waste entering the facility will be stored in fully contained structures therefore there will be no potential for leakage to soils. All storage facilities (for waste, raw materials and water) will be rendered impervious to the materials stored therein.

All domestic effluent will be treated by an appropriate system prior to discharge to the percolation area. Therefore the facility, during construction and operation, will not have a negative impact on the soils or geology of the site.

10. GROUNDWATER AND HYDROGEOLOGY

An assessment of the hydrogeological environment was completed based on investigations completed at the site in 2000 and 2001, geotechnical reports based on assessments completed in 2007 and 2008, a desk study and information from the Geological Survey of Ireland database. A revised assessment has been completed for this EIS which supplements the previous assessment with updated information where available.

Baseline Assessment

The development site is underlain by a thick deposit of low permeability brown silty clays. The vulnerability of the site has been classified by the Geological Survey of Ireland (GSI) as Moderate (see Figure 12). The Platin Formation which underlies the site has been classified by the GSI as; *regionally important, diffuse karst aquifer, with good development potential (Rkd)*. This classification was determined by the GSI in 2004.This regionally important aquifer displays both karst and fracture flow features (see Figure 13).

The development site lies within the groundwater regime now established by the Platin dewatering programme. The quarry abstracts sufficient groundwater to maintain the water table just below the working quarry floor. This operation has resulted in a cone of depression in the water table therefore groundwater flow beneath the development site is now determined by the cone of depression centered on the Platin excavation.

Construction

The main potential impacts during construction relate to spillages of potentially polluting substances including oils, paints and liquid wastes and any additional substances. Waste water generated during the construction phase also represents a potential impact but will be removed from the development site for disposal in an approved waste water treatment plant.

Operation

The potential impacts during operation phase will include;

- Impact on Groundwater Levels
- Impact on Regional Groundwater quality

Groundwater flow beneath the site is determined by a cone of depression centred on Platin Excavation. Prior to the quarry development, the groundwater flow beneath the development site would have been towards the River Nanny and in a general South Easterly direction. Current water levels are at approximately 10-15mOD, well below the level of any excavations for the development.

Mitigation Measures Construction

All potentially polluting chemicals will be securely stored during the construction phase and refueling of earth moving machinery will be carried out in accordance with a method statement. All domestic effluent will be removed for appropriate disposal at an approved waste water treatment plant.

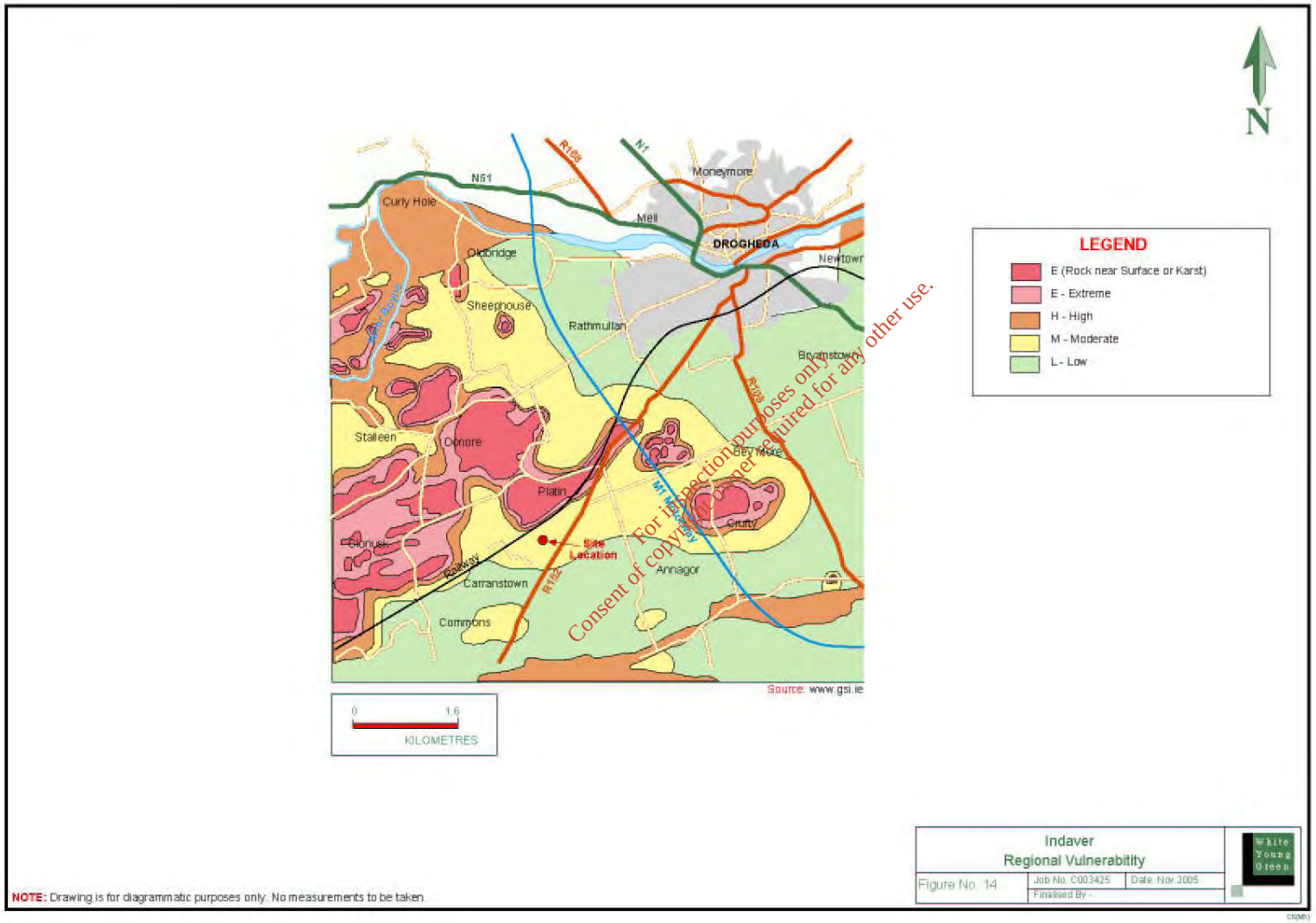


Figure 12.

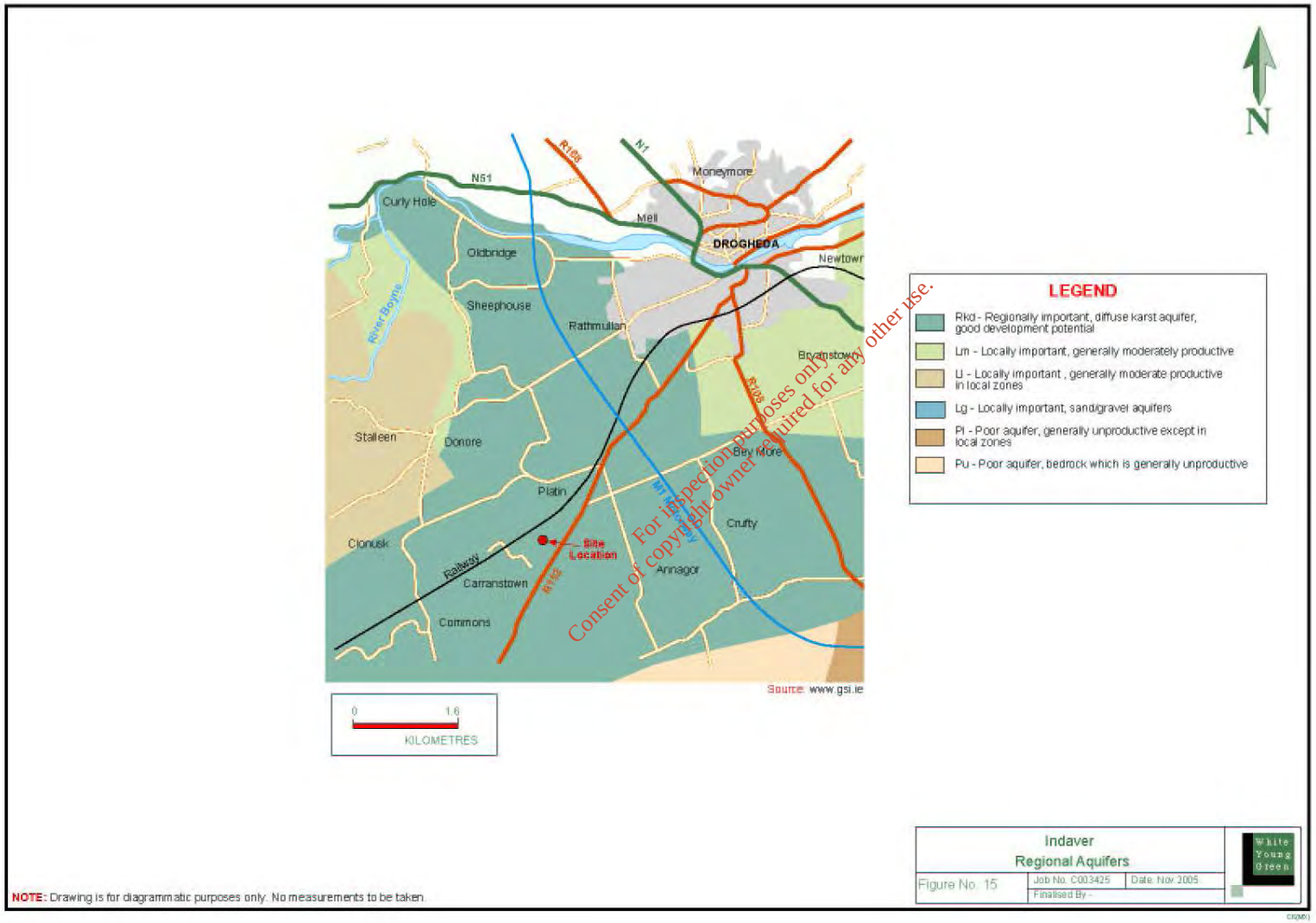


Figure 13.

Mitigation Measures Operation

Monitoring wells will be located around the perimeter of the facility which will be sampled to ensure continuation of the base line conditions.

All substances that would have the potential to cause a negative impact on the soils and geology (e.g. chemicals and ash residues) will be stored in appropriate containers/silos and/or placed within bunded areas. All waste entering the facility will be stored in fully contained structures therefore there will be no potential for leakage to soils.

All waste storage facilities will be rendered impervious to the materials stored therein. All concrete underground storage structures whether for waste or liquid (as there is a possibility that firewater run-off may enter any of the tanks) will be constructed as watertight structures in accordance with the requirements of relevant Codes of Practice such as BS 8007 British Standard for design and Construction of Aqueous Liquid Retaining Structures. Typically these structures will be reinforced concrete with minimum wall and base thicknesses of 250 mm or greater depending on the structural requirements. The waste bunker will be constructed with a base thickness of 1.1m and a wall thickness underground of 800mm. Details for the construction of these tanks will follow good building practice, the guidelines in the Code of Practice and details used successfully in other similar structure.

The structures will be integrity tested in accordance with the guidelines given in the Code of Practice for leakage to confirm that they are watertight. This will be demonstrated to the satisfaction of the Local Authority following installation and prior to use for storage. Similarly in the instance of the storm water attenuation system (which can also contain fire-water run-off) it is proposed that this will be constructed with welded HDPE membrane which is commonly used for forming secondary containment liners in effluent tanks. The attenuation tank will be tested and demonstrated to be watertight to the satisfaction of the local Authority.

All underground piping will be maintained and regularly inspected for integrity.

All domestic effluent will be treated by an appropriate system prior to its discharge to the percolation area. The puraflo treatment system will achieve an effluent treatment standard of Biochemical Oxygen Demand (B.O.D.) 20 mg/l and Total Suspended Solids (T.S.S.) 30 mg/l.

It was concluded that the amendments to the facility will not have a significant impact on the hydrogeology of the development site or beneath the surrounding lands.

11. SURFACE WATER

An assessment of the surface water environment of the site was completed in 2005 and submitted with the planning application in 2006. A revised assessment has been completed for this EIS which supplements the previous assessment with updated information where available.

Surface water on and in the vicinity of the site drains, through land drains and ditches, towards the local stream that flows to the River Nanny. The drainage ditches are mostly dry in the summer months.

Construction Phase

During the construction phase, domestic effluent generated on the site will discharge to temporary sewage containment facilities prior to its transport and treatment off site.

Run off during construction will be directed towards temporary settlement tanks prior to discharge to the local drainage ditch. A wheelwash has been installed.

Operation Phase

The storm water drainage system which has been designed in general accordance with Sustainable Drainage Systems will collect rainwater from all roofs, hardstands, roads and grassed areas which fall naturally towards these areas. This area will amount to approximately 6.8Ha. A portion of the site, approximately 3.6Ha will continue to drain naturally to the existing drainage ditches and have not been catered for under the proposed storm water drainage system. The design has altered slightly since the 2006 application as a result of a detailed review of hardstanding/roof areas and in consultation with the drainage division of Meath County Council.

Attenuation for a 1 in 30 year storm will be provided by means of an attenuation pond which discharges via a pump to an external drainage ditch. Attenuation of 1 in 100 year storms will also be contained with the attenuation pond. In the event of a greater than 1:100 year storm occurrence, the paving will be designed to slope away from the building meaning any flooding that may occur will flow away from the building towards the drainage system and land drains. The design will prevent downstream flooding due to “flash flooding” from the site and will serve to add water to the ditch system in a similar manner as currently exists under agricultural usage.

The drainage design allows for the monitoring of the storm water discharge at two locations in order to prevent any uncontrolled water discharges from oil leakages, spillages etc entering the watercourses.

Domestic effluent will be treated by a Puraflo treatment system and discharged to the percolation area. There will be two such areas on site serving the main process building and gatehouse. Raw materials or other potentially polluting substances will be stored in containers/silos within the main process/warehouse building. Residues will be stored in a bunker or silos within the main process building.

Fire suppression is provided by an on site water storage tank with an effective fire fighting volume of 1,800m^3 which is supported by two diesel fire pumps connected to a fire main and hydrant system throughout both the site and buildings. The greatest potential for fire at the facility arises within the waste bunker where localised heating can occur due to decomposition of organic material. Localised fires within the waste bunker will be lifted using the grab crane, into the hoppers which transfer the waste directly to the furnace. The bunker has a firewater retention capacity of 3,300m^3, even when full with waste. This will comfortably hold all the available fire water even in the most extreme fire event.

With respect to fire occurring elsewhere in the process building or other buildings on site the run-off will be contained either in a 100m^3 spilled water tank or contained in the surface water drainage system. This in turn will drain to both the diverted water tank (300m^3 capacity) located to the north east of the retention pond and in turn by overflow (if the volumes exceed 300 m^3) to the attenuation pond (1,600m^3). This will be achieved by the provision of an actuated shut-off valve, controlled by the fire alarm/detection system, at the outfall to the attenuation tank. This water will be stored for reuse in the flue gas cleaning process or removed from site for treatment or disposal to a licensed facility.

The firewater retention tank capacity of 300m^3 and the overall site retention capacity for firewater (2,000 m^3) have been designed with reference to the German LÖRÜRL Methodology and the EPA Guidance note on the Requirements for Fire Water Retention Facilities. As part of the final design and in consultation with the EPA, a full Fire water retention study will be carried out.

A schematic of the effluent streams and their management is presented in Figure 14.

Therefore it was concluded that the facility, during construction and operation, will not have a negative impact on the surface water on, and in the vicinity of the site.

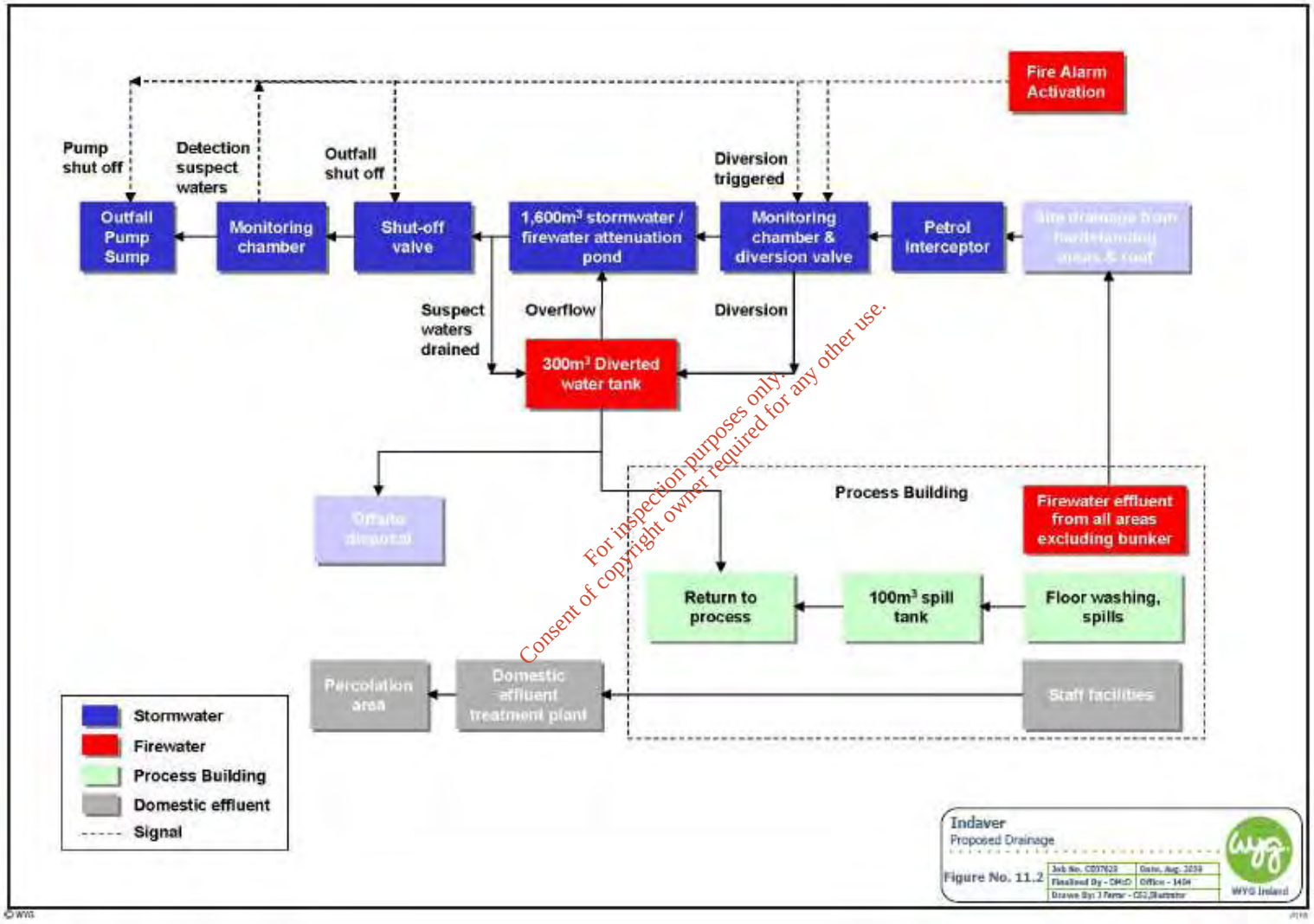


Figure 14 Proposed Drainage system for Waste to Energy Facility

12. ECOLOGY

Flora, mammal and bird surveys were conducted at the development site. No designated habitats of international or national value were recorded on or adjacent to the site. All the habitats recorded on site are widespread within the landscape and of moderate to low species-richness.

Since the assessment was completed, a Bat and Badger survey has been conducted by Ecological Solutions Limited as well as the implementation of appropriate mitigation measures for these species.

Flora

No designated habitats of international or national value were recorded on or adjacent to the site. All the habitats recorded on site are widespread within the landscape and of moderate to low species-richness. The dominant habitats on site are arable crops and improved agricultural grassland, which are highly modified habitats. They are of low scientific interest and represent a low contribution to local biodiversity.

Existing treelines and hedgerows have been maintained where possible and will ultimately be enhanced to improve the biodiversity value of these features. The development provides good potential to increase the biodiversity value of the site if appropriate landscaping is implemented. Best practices methods should ensure that there is no impact on surrounding watercourses and subsequently the River Nanny. If these measures are undertaken, it is envisaged that there will be no negative impact on the ecology of the area and there may be a net gain in the biodiversity value of the site.

Fauna

The site has a very low representation of Irish fauna, due to the intensive agricultural practice (most of the site is composed of arable land) and limited range of habitats on site. The vegetated boundaries are of low species diversity and poor structure. There is an almost total lack of ponds, and there are no rivers or streams on the site. There are very limited areas of scrub or other habitat types. No active badger setts were recorded in site.

The scheme will entail loss of arable lands, improved pasture and boundaries of low ecological interest. This could potentially lead to the loss of bat foraging and roosting areas. Six bat boxes have now been erected at the site and will be monitored for a period of 2 years to ensure best placement. Felling of one potential bat roost (PBR) trees has been carried out under the supervision of the bat specialist. Three other PBR trees have been retained. No further mitigation measures are proposed at this stage. These mitigation measures should ensure that impacts on fauna in the locality are Negligible.

Birds

The bird species recorded breeding in the survey area are typical of agricultural habitats in eastern Ireland. The presence of a nesting pair of peregrines in the locality is of note as this species is listed in Annex I of the EU Birds Directive. However, the peregrine is not a species of high conservation concern

in Ireland, and a national survey in 2002 indicated a stable population with significant increases in the use of artificial sites, such as quarries and buildings.

The maturing trees and shrubs within the site will support all of those species which already occur and it is likely that a higher diversity of species will occur than at present due to the diversity of trees and shrubs that will be planted

The facility, during construction and operation, will not have a negative impact on the ecology of the site and surrounding area.

13. TRAFFIC

The site of the development is located on the R152 Regional Road linking Drogheda and Duleek. Access to the subject site is via the existing R152 Drogheda to Duleek Road. As required by the planning conditions of the permission granted in 2006, the R152 has been widened to allow for a right turning lane and a deceleration lane on the approach to the site access. In 2006, a Traffic Impact Assessment was conducted for the facility based on a maximum annual capacity of 200,000 tonnes per annum (worst case scenario). The proposed amendments to the existing permission will have no impact on traffic as there are no changes to the type and quantity of construction traffic, the number of staff during the operation of the facility and traffic generated as a result of processing 200,000 tonnes per annum of Municipal Solid Waste.

The traffic data used in the assessment is the predicted 2005 traffic flows, based on traffic counts carried out in November 2005 and January 2006. The traffic counts show that the peak hour traffic period is 7:45 to 8:45. The counts show that during the morning peak, the two-way flow is 1,108 vehicles.

The traffic assessment has concluded that the development will generate an average daily total of 58 truck movements, or 13 truck movements during the peak period (7:45 – 8:45). The directional split is roughly even from the R152/ M1 junction and the R152/R150 junction.

Indaver are prohibiting traffic from using the R150 between Kentstown and the N2. Instead, trucks serving the facility will be required to stay on the R153 to the N2/R153 junction then travel up the N2 to the N2/R152 junction.

The development will give rise to an additional truck flow of 8 vehicles per hour through Duleek which will increase the existing flows by the following: Western (16%), Centre (11%) and Eastern (8%). The Meath County Development plan provides an objective for an east-west bypass of Duleek village. When this is provided all traffic associated with the facility will be diverted from Duleek Main Street.

Construction Traffic

It is expected that three types of construction traffic will be generated; HGV, Workforce and General Site Traffic. The peak period for construction traffic will be 06:00-07:00, with 242 vehicle movements. Construction traffic will be similar to operational traffic during the Peak Hour. The R152 has sufficient capacity to cater for the anticipated construction traffic.

The proposed amendments will not result in any additional traffic impacts above those of the existing permission. No additional mitigation measures are required.

14. LANDSCAPE & VISUAL IMPACT

An assessment of landscape and visual impacts of the Waste to Energy facility on the land and surrounding areas to the site was undertaken in 2005 and was included in the EIS submitted with the planning application in February 2006. The proposed amendments pertain to the size and shape of the main process building and hence a revised assessment of the potential impacts on both the landscape and visual aspects was required.

The immediate hinterland is visually dominated by the industrial complex at Platin Cement works, which consists of an array of tall silos and associated industrial buildings. The extensive area of extractive industry to the west, while not overly visually intrusive is a major change-agent in the overall agricultural landscape, with local visual impacts on the surrounding roads and boundaries.

There is already visual intrusion on the site in the form of an 110kV power line traversing in a north to south direction.

The building fabric proposed is similar to that of the development with the existing planning permission, being generally industrial in character, i.e. proprietary profiled metal cladding panels in a selected color. A new colour scheme has been proposed using grey shades in stead of green shades to improve the visual aspect.

The proposed Landscape Master Plan will allow for provision of extensive visual buffering of the complex through berming and landscaping, which will assist in visually tying-in the development to the surrounding landscape.

The site presents as an unremarkable piece of former agricultural landscape typical of the region and now undergoing change with development works for the facility. There are no elements of high visual amenity within the site or in its immediate hinterland. In fact the general landscape amenity of the area has been impacted upon by the presence of the visually dominant Platin cement plant, and the extensive area of quarrying, both adjacent to the site.

The proposed amendments to the existing permission will result in the reduction of the overall bulk of

the main process building. The visual impact of the development will therefore be less than the impact of the development with the existing permission.

15. CLIMATE

A climatic assessment was completed which assessed the impact of the facility in terms of its impact on climate. Attention was focused both on Ireland's obligations under the Kyoto Protocol and the effect of the facility on the total national emissions of carbon dioxide and other greenhouse gases and also in the context of overall climatic impact with and without the development.

The contribution of the Waste-to-Energy Facility to total greenhouse gas emissions in Ireland is equivalent to only 0.041% of total emissions in 2010, when energy recovery is taken into account.

The contribution to the total greenhouse gas emissions from landfilling 200,000 tonnes of waste, including the generation of power, is equivalent to 0.046% of the total greenhouse gas emissions in Ireland in 2010.

Thus, the overall annual impact of the Waste-to-Energy Facility on climate is to produce a net benefit of approximately 0.005% of the total greenhouse gas emissions in Ireland in 2010 and thus will be imperceptible in terms of Ireland's obligations under the Kyoto Protocol.

16. CULTURAL HERITAGE

An Archaeological Impact Assessment of the site was conducted in 2005 which included field walking and desk-based research. The study addressed the potential archaeological impact of the industrial development. During 2008-2009, topsoil stripping associated with the construction of the development was carried out and further information has become available from archaeological monitoring. Although nothing of archaeological interest was noted during the field visit in 2005, three commonly occurring archaeological features including two possible burnt mounds and a possible refuse pit have been encountered. These features have been assessed, recorded and documented by ADS. Topsoil stripping is now largely complete. It is therefore unlikely that construction of the development will have any impact on any further archaeological features which may survive below ground at the development site.

Any further topsoil stripping works at the site will be monitored by a suitably qualified archaeologist as required by planning condition 10 of the existing planning permission.

The physical impact of the development due to its proximity to the World Heritage Site was considered as part of the assessment and it was concluded that the World Heritage Site was sufficiently distant so as to render any archaeological impacts not significant. The UNESCO-ICOMOS monitoring mission

which reported on the site in 2004, also considered the direct impacts and found that *there were no grounds for believing that the construction of the proposed incinerator itself would have a direct impact on the outstanding universal value of the World heritage site.*

Visual impacts of the development on the World Heritage Site of the Bend of the Boyne were also considered. The mass of Redmountain will mask the development from almost all of the core area of the World Heritage Site.

The stack however will be visible from Dowth but not from Newgrange or Knowth. Therefore while there will be some visual impact on the World Heritage Site this impact will be minimum particularly compared to the nearby cement factory. The facility will not be visible from the Battle of the Boyne site.

Potential impacts from all additional views assessed concluded impacts would be negligible.

A study carried out to assess the impact of emissions from the facility on the stonework of the Bend of the Boyne concluded that impacts would be negligible.

17. MATERIAL ASSETS

Material assets are defined as '*resources that are valued and that are intrinsic to specific places, they may be either human or natural origin and the value may arise for either economic or cultural reasons*'.

Property Prices

There are 450-500 municipal waste incinerators operating in Europe. In line with the proximity principle, many are located in cities, suburbs and other areas close to the main source of waste generation. The findings of research to-date to determine whether a waste-to-energy facility will have a significant long-term effect on property prices within the area of the facility have been inconclusive or shown no significant impact.

Waste-to-energy facility located in the centre of Vienna

With mitigation measures specified in place, neither the construction nor operational phases of the development will result in any significant negative impacts on the existing economic assets.

Electricity and Water Supply

As a result of the proposed amendments, the 70 MW Waste to Energy Plant will now generate approximately 18MW of electrical output. It will require 3MW to meet the electrical demands of the facility itself leaving 15MW to be diverted to the National Grid. Power will be exported to the local distribution system via a 38kV line. The line will be installed as an underground cable and hence will not have any visual impact. Due to the layout of the facility and its location to the northerly end of the site, there will be no requirement to divert the existing 110 kV lines traversing the site.

As the plant uses an effluent free flue gas cleaning process and an air cooled condenser rather than cooling towers it has a significantly lower water requirement than would otherwise be the case. The water requirement has been reduced from 11.6 m^3 per hour to 8.5 m^3 per hour. Process water (for the steam cycle), domestic potable water and water for cleaning account for the rest of the demand (see Table 2). Approximately 1m3/hr will be required from Meath County Councils water main on the R152 for potable supplies.

Table 2. Water Requirements

Use	Quality	Quantity (m^3/hr)
Flue gas cleaning	Well water	3.3
Process (steam cycle)	Well water	1.0
Drinking water	Potable water	1.0
Cleaning & Domestic Supplies	Well water	1.0
Fire fighting	Well water	0.2
Total		**8.5**

Agriculture

Considerable research has been undertaken to study the impact of air emissions from waste-to-energy facilities on food produce. Some research papers have established a link between the operation of facilities in exceedence of old emission limits and elevated levels of pollutants in food produce. Many of these studies were on incinerators without gas cleaning systems or energy recovery. The findings of such studies are not directly comparable with this waste-to-energy facility.

To date, there is no evidence to suggest that waste-to-energy facilities operating within the stringent emission limits set down in EC Directive 2000/76 on the Incineration of Waste will impact on food produce. These stringent emission limits have been developed, in accordance with the World Health Organisation and the International Agency Research in Cancer, to prevent any impact on public health or the environment, including agriculture. Operating well within these standards will ensure that there will be no negative impacts on agricultural practices.

The Food Safety Authority of Ireland (FSAI) has assessed the potential impact of dioxins from the incineration of waste on Food produced. The report of this assessment states that:

"FSAI considers that such incineration facilities, if properly managed, will not contribute to dioxin levels in the food supply to any significant extent and will not affect food quality or safety. The risks to health and sustainable development presented by the continued dependency on landfill as a method of waste disposal far outweigh any possible effects on food safety and quality."

(Source: Report on waste incineration and possible contamination of the food supply with dioxins, 2003)

As part of the EPA licence for operation of this facility, the Agency will carry out a programme of monitoring in the areas around the waste-to-energy facility. It is expected that the programme will include monitoring of food produce in the vicinity in conjunction with the Food Safety Authority of Ireland.

Due to the strict emissions controls and regulatory compliance that the plant will be working under, no significant negative impacts to adjacent agricultural lands are expected.

18. CONSTRUCTION

Construction works based on the current permission commenced in September 2008 and comprised a site clearance and enabling works contract to prepare the site for the main works. In June 2009, works began on the main building and the estimated work programme has a duration of 25 months.

Construction Phases and Schedule

The works to be conducted will be broadly developed in three phases as follows.

Phase 1 will comprise construction of foundations for buildings and structures within the confines of the existing permission, including the construction of the waste bunker. This phase will take approximately seven months to complete. Phase 2 will comprise the installation of large mechanical equipment and the building shell. Roads drainage and other infrastructural works will also be completed. It is anticipated that these works will be undertaken over an eleven month period. Phase 3 will comprise the ongoing installation and testing of mechanical and electrical equipment. It is anticipated that the duration for the installation and testing works will be approximately seven months. During this phase the final completion and finishing works will be carried out in anticipation of handover of the project to the client.

Commissioning of the facility will begin approximately 12 weeks prior to start up operations. The commissioning activity will involve a number of groups certifying the various components of the facility. Indavers operating team will join the commissioning crew for the final eight weeks and from this point continual shift works will begin i.e. 24 hrs/day, 7 days/week

It should be noted that the above is indicative only and may be subject to variations on consent from Meath County Council and also to final schedule agreement with the Contractor.

Construction Hours

The site construction working hours will be confined to between 0700 and 1900 hours Monday to Saturday, inclusive (excluding public holidays and Sundays)

Working hours may vary slightly depending on weather conditions and daylight hours during winter months. Heavy construction activities will be avoided where possible outside the normal working hours.

Construction Impacts and Mitigation

During the construction phase a number of mitigation measures will be implemented to minimise potentials impacts and nuisance. A number have already been implemented. These include:

- A temporary wheel wash has been installed along the access road
- Screening berms proposed for the facility have been constructed and will be planted at the earliest opportunity to limit off site migration of air borne dust
- Water suppressants will be used during dry weather conditions to minimize the generation of dust
- Temporary settlement ponds and interceptors will be constructed as necessary during the early stages of construction mitigating against silt laden run off to the existing drainage network
- During the construction phase all domestic effluent generated on site will discharge to temporary sewage containment facilities prior to transport and treatment off site

Good housekeeping and facility management during the construction period will ensure that there will be no negative environmental impacts from the construction of the facility. Local residents and other members of the local community will have an opportunity to raise any specific issues, concerns or complaints they may have during the construction phase through the Community Liaison Committee which will meet regularly.

19. INTERACTIONS

Interactions between various environmental factors were completed as part of the environmental impact assessment. The impacts and likely significant effects on the interaction between the following environmental media were assessed: human beings; flora and fauna; soils and groundwater; surface water; air; noise; climate; material assets; and the landscape. The interaction matrix is based on the potential interrelationships of the environmental media both during the construction and operation phases of the development.

Table 3. Interactions between environmental media

	Human Beings	Air	Noise	Landscape	Flora & Fauna	Surface Water	Soils & Groundwater	Climate	Material Assets
Human Beings									
Air									
Noise									
Landscape									
Flora & Fauna									
Surface Water									
Soils & Groundwater									
Climate									
Material Assets