Monopower Ltd.
Killycarran
Emyvale
Co. Monaghan

Waste Licence Application

No W0226-01

ARTICLE 12 COMPLIANCE REQUIREMENTS

March 2007

5th March 2007

1. Introduction

Monopower Ltd, Killycarran, Emyvale, Co. Monaghan has applied to the EPA for a Waste Licence in December 2005. A notice in accordance with Article 14(2)(b)(ii) of the Waste Management (Licensing) Regulations was forwarded by the EPA to the company on 19th June 2006, requesting further information. A reply was made to this request on 18th September 2006, but two sections of the information were not available at this time;

- Non Technical Summary
- Article 12(f) – Class of Activity

A second notice in accordance with Article 14(2)(b)(ii) of the Waste Management (Licensing) Regulations was forwarded by the EPA to the company on 19th January 2007, requesting that the above outstanding information be submitted. This submission is in response to that letter and a revised non technical summary and a response in relation to Article 12(f) – Class of Activity is provided. Updated information for Environmental Impact Statement; February 2007 is provided in a separate document.

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Revised Non-Technical Summary: March 2007

A revised non-technical summary (March 2007) to comply with Article 12(1) (u) of the Waste Management Licensing Regulations S.I. 395 of 2004 is provided in this attachment.

(a) Monopower Ltd, Killycarran, Emyvale, Co. Monaghan, Tel: 047 86726, Fax: 047 86724 applied to the Environmental Protection Agency (EPA) for a Waste Licence to operate at the above address in December 2005. Following legal consultation on the classification of the activity (disposal and/or recovery of waste) it was deemed that the proposed biomass combined heat and power plant is a recovery operation. However legal advice also deemed that the site is within the remit of IPPC licensing and not waste licensing.

(b) The site is located in the functional area of Monaghan County Council.

(c) The site is located in a rural area, so no public sewerage facilities are provided to the site, therefore this site is not under the functional area of any sanitary authority.

(d) The site will operate at Killycarran, Emyvale, Co. Monaghan; National Grid Reference E263859, N343991

(e) The site will be a Biomass Combined Heat and Power (CHP) plant, designed for the recovery of biomass waste by converting it into electricity. Biomass materials to be utilised include Spent Mushroom Compost (SMC), Poultry Litter (PL) and Wood Chips (WC). The site will have a rated thermal input of 78MW and a capacity to utilise 325,000 tons of biomass waste to generate 22.5MW of electricity per annum. Initially this will be broken down into usage of 50,000 tons of spent mushroom compost, 200,000 tons of poultry litter and 75,000 tonnes of wood chips per annum. These figures may vary, depending fuel availability, but the total capacity of biomass waste will be 325,000 tons per annum. The site will operate 24 hours per day, 8,200 hours per year and is expected to have an on-line availability of 92%. The plant is to be staffed and operated by 20-25 personnel. This will consist of both technical and administrative staff. The plant will operate continuously on a 3-shift system. Each shift will be covered by a minimum of 2 persons. The proposed hours of fuel (waste) acceptance/handling are 8.00am – 6.00pm, Monday to Saturday. Lorries will carry an average of 20 tonnes each, resulting in approximately 5-6 lorries per hour.

(f) In the December 2005 application, the activity was deemed to fall under Class 9 of the Fourth Schedule of the Waste Management acts 1996 to 2003 “use of any waste principally as a fuel or other means to generate energy”. However, as outlined in (a) above, the most recent legal advice is that the activity is not principally a waste activity, so falls under the IPPC licensing regime under the following sections (as per Schedule 1 of EPA Acts 1992 & 2003);

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2.1 The operation of combustion installations with a rated thermal input equal to or greater than 50 MW.

11.1 The recovery or disposal of waste in a facility, within the meaning of the Waste Management Act, 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required.

(g) The biomass materials to be utilised at the site include

Material	**European Waste Catalogue Code (EWC)**	**Quantity**
Spent Mushroom Compost (SMC)	02 01 99	50,000
Poultry Litter (PL)	02 01 06	200,000
Wood Chips (WC)	20 01 38	75,000

If supplies of one of the above fuels decrease over time, due to changes in the market, there may be a corresponding increase in the other. However, the overall biomass capacity of the site (325,000 tonnes per annum) will remain constant for each year of the site operation, as this is the capacity the site will be designed for.

(h) The raw and ancillary materials, substances, preparations, fuels and energy which will be utilised in or produced by the activity includes;

Material/ Substance	**Nature of Use**	**Annual Usage**
Spend Mushroom Compost	Raw material for biomass CHP plant	50,000 tons
Poultry Litter	Raw material for biomass CHP plant	200,000 tons
Wood Chips	Raw material for biomass CHP plant (when available)	75,000 tons
Light Fuel Oil	Raw material / fuel for process	300m^3
Lime	For flue gas cleaning process	3,000 tons
Fly Ash/Bottom Ash	By-product of combustion and from flue gas cleaning process	38,500 tons
Sodium Chloride	Raw water treatment	<300 kg
Citric Acid	Raw water treatment	Approx. 12 kg
EDTA	Raw water treatment	< 0.3 kg
Sodium Hydroxide (25% solution)	Raw water treatment/Boiler water treatment	Approx. 50 kg
Ammonia (25% sol.)	Feedwater treatment	Approx. 60 kg
Maintenance Oils	Maintenance	To be determined
Energy (electricity)	In house consumption power plant – produced on site	20,500 MWh

(i) The biomass plant will contain the following main components

- Fuel Handling area containing the following;
    - Fuel reception (Administration Building) and weighbridge
    - Fuel handling (unloading) and fuel screening
    - Fuel storage systems
    - Fuel drying equipment
    - Fuel feeding
- Combustion system / Boiler
- Air cooled condenser (Condensing economiser)
- Steam turbine generator
- Flue gas cleaning system
- Water Treatment Plant
- Ash removal plant

The site operation is summarised as follows;

1. Delivery of raw materials (fuel/biomass) to site via lorries i.e. poultry litter, spent mushroom compost and wood chips.
2. Disposal of raw materials in the unloading building (each raw material kept separate until combustion)
3. Feeding of raw materials via conveyors to a screening area to remove metal, plastic etc.
4. Storage of raw materials in silos; (1 x 1,250m^3 silos for SMC, 2 x 1,250m^3 silo for PL and 1 x 1,250m^3 silo for WC).
5. Drying of SMC from 70% moisture to 15% moisture in a steam-heated fuel drier. PL and WC will not require drying.
6. Feeding of raw materials to the combustion plant (boiler). SMC and PL will be fed together and WC will have a separate fuel feeding system. An oil burner will also be installed for start-up of the plant.
7. Combustion of the raw materials in the boiler to produce steam/heat. By-products of this process are ash and combustion gases.
8. Steam produced in the boiler is passed to a steam turbine generator, where electricity is produced. This is the final end-product of the production process.
9. A condenser unit is also located on the site to condense steam prior to returning it to the boiler.
10. Process ash generated on combustion of the fuel will be conveyed to and stored in a silo. This by-product will be transported off-site for use either as a fertilizer or in the cement industry.
11. Combustion gases from the boiler will pass through a flue-gas cleaning system, based on lime. Solids from this process will be conveyed to the fly-ash silo and gases will be emitted to atmosphere via a 50m stack.

(j) The site will comply with Section 40(4)[(a) to (i) of the Waste Management Acts 1996 to 2003;

- All emissions from the site will be within all specified legal limits.

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- All activities will be carried out in conformance with licence conditions and will not cause pollution.
- The company will employ Best Available Techniques (BAT) in the design and operation of the plant.
- The operation of the plant will comply with relevant provisions of the Waste Management Plan for the North East Region.
- Monopower Ltd is a fit and proper person to hold a waste licence.
- Monopower can meet the financial provisions required for compliance with the conditions of a waste licence.
- Monopower biomass CHP plant will ensure that energy will be used efficiently in the carrying on of the activity concerned.
- Excess environmental noise will not be caused by the operation of the activity
- All measure to prevent accidents will be taken at the site.
- The site will be left in a clean state in the event of cessation of the activity.

The measures required to achieve the items above have been detailed throughout this Waste Licence Application Form and Attachment and are also detailed in the accompanying EIS for this development.

(k) Emissions from the activity will include
- Stack A1-1 Emission from Boiler
- Bio-filter A1-2 Emissions
- Surface Water Emission Point SW-1 from site drainage

A1-1 (Stack) Predicted Air Emission Details

Parameter	Description of Treatment	Avg Emission Rate mg/Nm3	Avg Discharge Rate kg/yr
Particulates	Bag filter	<3	4,182
Nitrogen Oxides	Careful control of temperature and oxygen in furnace, flue gas recirculation. SNCR De-NO_x to be installed only if needed to ensure compliance with limits.	150	205,000
Carbon Monoxide	Good combustion practice and adequate residence time in the furnace	45	63,000
Volatile Organic Carbon	As for carbon monoxide	2	2,800
Sulphur Oxides – SO_x	Lime injection (semi-wet system)	45	63,000
Hydrogen Chloride (as HCL)	As for sulphur oxides	2	2,800
Hydrogen Fluoride (as HF)	As for sulphur oxides	0.3	420
Dioxins & Furans	Good combustion practice and adequate residence time in the furnace, bag filter	0.002 ng/Nm^3	$2.8x10^{-6}$
Metals Cd & Ti	Bag filter	<0.001	<1.4
Metal Hg	Bag filter	<0.001	<1.4
Metals Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V	Bag filter	<0.5	<700

A1-2 (Biofilter) Predicted Air Emission Details

Parameter	Description of Treatment	Avg Emission Rate ppm
Ammonia	Biofilter	<50
Amines	Biofilter	<5
Hydrogen Sulphide & Mercaptans	Biofilter	<5

SW-1 Predicted Surface Water Emission Details

Parameter	Max. Hourly Average Mg/l	Predicted Discharge Rate
Total Suspended Solids	30 (95% of the time) 45 (100% of the time)	$8m^3$/day 2,800 m^3/yr
Mercury and its compounds	0.03	
Cadmium and its compounds	0.05	
Thallium and its compounds	0.05	
Arsenic and its compounds	0.15	
Lead and its compounds	0.2	
Chromium and its compounds	0.5	
Copper and its compounds	0.5	
Nickel and its compounds	0.5	
Zinc and its compounds	1.5	
Dioxins and furans	0.3	
pH	6-9	
BOD	<15	
Ammonia	<1	
Nitrate	11	
Mineral oil	<0.3	

Fugitive Emission will include dust and odours.
A domestic wastewater treatment system will treat sewerage waste from the site and discharge via a percolation area to groundwater.

(I) All potential emission from the site have been analysed and best available techniques have been proposed to eliminate any impacts. Therefore emissions from the site are not expected to have any adverse affect on the environment.

(m) Proposed monitoring and sampling points include

Ref. No	Details	Monitoring Arrangement
A1-1	Air emission from stack	Continuously/ Quarterly all air emission parameters
A1-2	Biofilter	Daily/Biannually for important biofilter parameters
SW-1	Surface water discharge from site	Continuously/Weekly/Quarterly, as deemed necessary by licence
GW1 & GW2	Groundwater wells on site	Bi-annually
NSL1 – NSL6	6 Noise Sensitive Locations	Annually
Meteorological	To be determined	Daily/Continuously as deemed necessary by licence

(n) The site is designed to generate electricity by the recovery of waste and the methods of doing so are detailed in section (i) of this non-technical summary.

(o) Wastes generated on site will be disposed as follows

Waste Material	Source	Off-site recovery, reuse or recycling or disposal
Fly ash	Flue gas cleaning process	Use in cement industry or as a fertiliser or disposal to landfill
Bottom ash	Boiler Combustion	Use in cement industry or as a fertiliser or disposal to landfill
Plastic	Screening of fuel/ packaging waste	Recycled at suitable facility
Metal	Screening of fuel/ packaging waste	Recycled at suitable facility
Paper/Cardboard	Office waste/ Packaging waste	Recycled at suitable facility
General Mixed waste	Office/canteen/ general site waste	Landfill

(p) A fire water retention pond will be provided at the site. Procedures will be put in place to cover all emergency events that have the potential to arise at the site, once constructed.

(q) A residuals management plan will be devised for the site, once constructed.

(s) Monopower biomass CHP plant does not fall under the SEVESO II Directive.

(t) Monopower biomass CHP plant will not give rise to any harmful emissions to aquifer.

The following maps are provided in the original Waste Licence Application Form, in the relevant attachment detailed. Maps can be examined in conjunction with this non-technical summary to assist in the identification and description of the Monopower Biomass CHP plant.

Attachment	**Map No**	**Title**
B.1	Map B.1	Ownership Plan
B.2	Map B2(a)	Site Plan
B.2	Map B2(b)	Site Location Plan
B.6	Map B.6	Location of Site Notice
D.1	Map D.1(a)	Site Layout Plan
D.1	Map D.1(b)	Administration Building
D.1	Map D.1(c)	Fuel unloading building & shredding & screening building
D.1	Map D.1(d)	Fuel unloading building & shredding & screening building
D.1	Map D.1(e)	Boiler, Turbine & Services Building
D.1	Map D.1(f)	Boiler, Turbine & Services Building, Ground Floor
D.1	Map D.1(g)	Boiler, Turbine & Services Building, Second Floor
D.1	Map D.1(h)	Boiler, Turbine & Services Building, Top Floor
D.1	Map D.1(i)	Proposed Drainage Routes from New Site
E.1	Map E.1	Main Emission Point to Atmosphere; A1-1
E.2	Map E.2	Proposed Drainage Routes from Site, with Surface Water Emission Point SW-1
F.5	Map F.5	Location of Groundwater Wells on Site
F.6	Map F.6	Location of Nearest Noise Sensitive Locations to site
I.6	Map I.6	Location of Ambient Noise Monitoring Locations

In addition, the following maps/drawings are provided in the Article 12 Compliance Document, submitted on 18th September 2006.

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Attachment	Map No	Title
Article 12 (g & h)	No. 40366 CJA40 001 A	Heat Balance for Monopower Plant
Article 12 (g & h)	N/A	Sankey Diagram
Article 12 (i)	40366 CJA01 008 A	Process Diagram - PL & WC Fuel Line
Article 12 (i)	40366 CJA01 007 A	Process Diagram - SMC Fuel Line
Article 12 (i)	40366 CJA01 009 A	Process Diagram - SMC Drying
Article 12 (i)	40366 CJA01 005 A	Process Diagram - Boiler Plant
Article 12 (i)	40366 CJA01 006 A	Process Diagram - Water & Steam
Article 12 (k)	40366 GCF10 003 B	Effluent Water Handling
Article 12 (l)	SK-101	Drainage Layout

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Article 12(f) Compliance

- ***Further details in attachment B7 as to the identification of the activity as Class 9 of the Fourth Schedule and not Class 8 of the Third Schedule. Make reference to any relevant European Court Decisions or other interpretations in relation to the determination of the disposal or recovery of waste by incineration.***

Details of the legal advice provided on the determination of the class of activity of Monopower CHP plant are included in this section;

- Letter from Barry Healy & Company Solicitors dated 5th March 2007 with accompanying Letter from Barrister Nap Keeling dated 1st March 2007.

Conclusions from Legal Interpretation of Monopower CHP Activity;

1. The materials in question (SMC, PL & WC) in the context in question constitute waste.
2. In the process of generating electricity Monopower are involved (as a secondary activity) in the "recovery" of waste rather than disposing of same.
3. Monopower's primary motivation is the generation of electricity.
4. Monopower will use waste as a regular fuel in the generation of electricity, so the process is "co-incineration".

Accordingly and as a direct result of the primary motivation for the process, the activity falls to be regulated under the EPA Acts (IPPC Licence) rather than the Waste Management Acts 1996-2003 (Waste Licence) in the following sections (as per Schedule 1 of EPA Acts 1992 & 2003);

2.1 The operation of combustion installations with a rated thermal input equal to or greater than 50 MW.

11.1 The recovery or disposal of waste in a facility, within the meaning of the Waste Management Act, 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required.

5th March 2007

Barry Healy
Company
SOLICITORS

"Laurel Lodge" · Hillside · Monaghan
Tel (047) 71556 Fax (047) 71557
Email info@healylaw.ie
D.X. 34 006 Monaghan

Our Ref:1253/EH

5th March 2007

Ms Patricia Murtagh
QED Engineering Limited
11 Market Street
Monaghan

RE: Our Mutual Client: Monopower Limited, Killycarron, Emyvale, Co Monaghan

Dear Ms Murtagh

I refer to the above and recent correspondence and have pleasure in enclosing opinion of Mr Nap Keeling BL to be forwarded to the EPA.

Thanking you.

Yours sincerely

Emer Holohan
Barry Healy & Company
Solicitors

PARTNERS
Barry Healy
B.A. Solicitor
barry@healy

Emer Holoh
B.C.L. Solicitor
emer@healy

ASSOCIATI

Law Library,
145-151 Church Street,
Dublin 7.

1st March, 2007.

Emer Holohan,
Barry Healy & Company,
Solicitors,
"Laurel Lodge",
Hillside,
Monaghan.

DX: 34 006 Monaghan.

Re: Monopower Limited

Dear Emer,

I refer to the above matter and the papers you sent me (dated 8th February). I have had an opportunity to read the papers and have set out my advices below.

Background

It appears that Monopower Limited ("Monopower") are proposing to construct a biomass combined heat and power plant. To do so statutory consents are required. While I am aware that the planning process is underway I am not asked to advise in relation to same. It is with the other statutory consent that I am concerned. There has, it appears, been some confusion as to what "environmental licence" should be sought. I have read a letter from the EPA to Mr. McCarron of Monopower (dated 9th September, 2005) responding to Monopower's request for clarification pursuant to s.39A(7) Waste Management Acts 1996-2003 ("WMA 1996") as to which class of activity under which Monopower should apply to the EPA. In other words, the question was whether an application should be made under the WMA or the Environmental Protection Acts 1992 and 2003 ("EPA Acts"). The letter confirmed the statutory position that where there are related activities taking place in the manner described, only a single licence under either of the above mentioned acts is required. The EPA concluded that that primary activity was a waste based activity and the energy creation aspect to the proposal was a secondary activity. This finding is disputed. In this connection, Monopower suggest the relegation of the energy generation element of the proposal into second place does not reflect the reality of their proposal. Monopower are of the view that the central purpose of the installation is energy production. I will return to this determination at a later stage.

The biomass plant will be capable (at full capacity) of handling 325,000 tonnes of biomass. Importantly, it is estimated that the biomass will be made up of 50,000 tonnes of spent mushroom compost ("SMC"), 200,000 tonnes of poultry litter ("PL") and 75,000

tonnes of Wood Chips (WC). There has some movement in those figures since the application was first made. That said, there is apparently no shortage of these biomass materials in the area. 22.5MW of electricity per annum will be created. This power will be both used internally and (the majority) being sold to the national grid.

Having reviewed EPA correspondence (including their recent reopening of the issue of the licence issue) and the extracts of the Fehily Timoney report (March 2006) a number of matters arise. Perhaps fundamentally the definition of waste surfaces: are the biomass materials waste or a fuel product. A finding that they are not waste will have obvious knock on effects for the discussion. This issue seems to have arisen as a result of advice received from Dr. Scannell in a different case. The next question (assuming for the moment that the materials are waste) is whether or not the activity is recovery or disposal of waste. The schedules in the Waste Framework Directive ("WFD") and the WMA 1996 allow for the possibility of either (Incineration on land or at sea or use of any waste principally as a fuel or other means to generate energy). It is in relation this part of the matter that the EPA's finding that the predominant activity is waste treatment rather than power generation is pertinent.

As indicated above I am writing these advices based on the above facts as gleaned from the below documentation (or extracts of same):

- EPA letter to Monopower of 9th September re: Declaration pursuant to Section 39A of the Waste Management Act (Amended) in respect of Monopower Ltd in respect of a proposed facility at Killycarran, Emyvale, Co. Monaghan;
- Attachment B7 of Monopower Waste Licence Application, December 2005;
- Monaghan County Council, Submission to An Bord Pleanala under Section 129 of the Planning and Development Act: The Killycarran Biomass Combined Heat and Power Plant, Prepared for Monaghan Council by Fehily Timoney & Company, Core House, Pouladuff Road, Cork, March 2006;
- Information from Q.E.D. Engineering Ltd dated 11th October 2006 with details of Waste Licence versus IPPC licence issue;
- Letter from Department of Environment to EPA dated 26th September 2006 regarding Munster Proteins Meat and Bone waste/fuel issue.

Important Definitions

Professor Scannell notes in her Book Environmental and Land Use Law 'that few other definitions have caused such problems and as much litigation in EC law'.

S. 4(1)(a) of the WMA 1996 defines waste as follows:

'In this Act, "waste" means any substance or object belonging to a category of waste specified in the First Schedule or for the time being included in the European Waste Catalogue which the holder discards or intends or is required to discard, and anything which is discarded or otherwise dealt with as if it were waste shall be presumed to be waste until the contrary is proved.'

The above definition is considered in detail below.

Other important and related definitions are the following: under the act "*holder*" means, in relation to waste, the owner, person in charge, or any other person having, for the time being, possession or control, of the waste; the "*producer*" means, in relation to waste, any person whose activities produce waste or who carries out pre-processing, mixing or other operations resulting in a change in the nature or composition of waste; a "product" includes any naturally occurring or manufactured thing.

There appears in the Schedules to the Acts a list of disposal and recovery activities and the definition of disposal and recovery is understood by reference to those Schedules.

The definition of recovery was considered in ***Commission v Germany [2003] ECR.*** At paragraph 45 the Court stated: "it follows from the Article 3(1)(b) and the fourth recital of the directive that the essential characteristic of a waste recovery operation is that its principal objective is that the waste serve a useful purpose in replacing other materials which would have had to be used for that purpose, thereby conserving natural resources. (***Case C-6/00 Abfall***).

That case concerned the use of waste in a cement kiln and given the reason for use of waste was the replacement of a primary fuel it was considered a recovery operation. To come within "a means to generate energy" and be defined as "use principally as a fuel or other means to generate energy" four conditions must be satisfied:

i. The amount of energy generated by the combustion process must be greater than the amount consumed in combusting;

ii. The surplus energy must be used immediately in the from of heat or, after processing to generate electricity;

iii. The greater part of the waste must be consumed during the operation;

iv. The greater part of the energy generated must be recovered and used.

Further assistance is provided by ***Commission v Luxembourg [Case C-458/00].*** In that case municipal waste was sent to a "waste to energy" incinerator the main function of which was thermal processing of the waste with a view to mineralization (i.e. waste disposal) and where the use of heat generated by combustion was only a secondary effect of that operation. The ECJ considered the incineration to be waste disposal. There are indications that if the operator would have had to use primary fuel in the place of the

waste should there have been no waste available and/or if the waste was paid for that it might have come under recovery.

My own view on this approach is that is that it does not reflect the more modern approach to the commercial attitude of construction of these installations. Some of these are fully locked into the combustion of waste. In other words, there was never the intention to burn primary fuel. It is difficult to see in those circumstances whether the primary intention is energy creation or waste recovery/disposal. There is a joint intention. The business model can include the receipt of payment for the waste which to date has indicated a waste based primary motive but more recently can represent good commercial thinking.

It seems to me that the above conditions are ones that can be of use to Monopower in making their decision. I am not qualified to deal with the question of the amount of energy creation and use of energy aspects of the conditions outlined in the ECJ cases above. However, they appear to me to be objective criteria and therefore capable of measure by engineers. I understand that Monopower can display "compliance" with these criteria thereby displaying that their operation is recovery rather than disposal.

Incineration versus Co-incineration

Whether or not the proposed activity will take place in an incineration plant or co-incineration plant is the next matter to be considered. The relevant definitions are as follows:

> 'Incineration plant' means any stationary or mobile technical unit and equipment dedicated to the thermal treatment of wastes with or without recovery of the combustion heat generated. This includes the incineration by oxidation of waste as well as other thermal treatment processes such as pyrolysis, gasification or plasma processes in so far as the substances resulting from the treatment are subsequently incinerated.
>
> 'Co-incineration plant' means any stationary or mobile plant whose main purpose is the generation of energy or production of material products and: which uses wastes as a regular or additional fuel; or in which waste is thermally treated for the purpose of disposal.

If co-incineration takes place in such a way that the main purpose of the plant is not the generation of energy or production of material products but rather the thermal treatment of waste, the plant shall be regarded as an incineration plant within the meaning of point 4.

It seems to me that the question of motivation or intention is crucial to deciding between these two approaches. I note from the extract from the Fehily Timoney report that, in their opinion, what is actually proposed is the provision of a "disposal" route for the SMC and PL. That opinion is not consistent with Monopower's primary motivation (as indicated by the title given to the proposed activity). It is furthermore and perhaps more

importantly, not even consistent with the "recovery" of waste by the generation of electricity as proposed by Monopower.

It seems the Fehily Timoney report focuses on the question of additional fuel. On their understanding of the definition it would appear that they only consider it possible that waste would be an additional fuel. It is unusual to see such a black and white approach to any waste-law related matter. The tenor of the ECJ case-law would certainly appear to contrast with this approach. Moreover, I cannot see how the definition of "co-incineration" can be read to exclude the possibility of waste being a "regular" fuel. The premise to that line of thought seems to place fossil fuels as the heart of the energy creation business model. In other words, they ask the question: in the absence of the waste would Monopower burn coal? This is taken from an ECJ line of authority dealing with the above discussed definitions of "recovery" versus "disposal" rather than "incineration" versus "co-incineration". Of course, even in the context of that discussion this would only be one criterion to be applied, the others being analysed above. However, we are not dealing with that issue here. The Fehily Timoney report seems to ignore the practical reality that certain gas power plants for example would not use coal in the absence of gas. I further understand that this refusal to switch fuels even applies to some peat powered stations. With respect, the report's approach in this regard appears dated.

In effect it appears to me that the Fehily Timoney report presumes the pre-existence of a coal based combustion plant that commences the introduction of waste as an additional fuel (for whatever reason). However, in my opinion, the definition is wider than that and allows for the construction of a new installation that on the first day of activity utilises waste as a fuel. To say otherwise is to give an artificial meaning to the definition of "co-incinerator".

Definitions - discussion

The difficulties with the above definitions are well documented. (To some extent I have already dealt with the question of recovery). That said, I think there are a number of general observations that can be made. These observations have been taken from ECJ decisions over the last number of years.

The first relates to the nature of the definition of "waste" itself. Any material it seems from the definition of waste is capable of constituting "waste" in the event that it is discarded. Therefore whether it constitutes waste depends not on the nature of the material itself but on whether it is "discarded" within the meaning of that provision (see ***Tombesi & Others***). "Discard", therefore in this context, has a pre-eminent and special meaning. It must encompass such uses of waste as are mentioned in the schedules and in particular, the use of waste as a means of generating electricity. It also includes the recycling of waste. It is well accepted that waste may be of economic value, and that its holder may be said to "discard" it notwithstanding that he puts it to some commercially valuable use (see ***Inter-Environnement Wallonnie***). Economic reutilisation is not therefore exclude the possibility of the material being waste. Perhaps counter intuitively, waste may also include substances capable of recovery in an environmentally friendly fashion.

Neither the WFD nor domestic legislation provides any decisive criteria for determining whether the holder of a substance intends to "discard" it within the meaning of the directive. In ***Scottish Power Generation Limited v Scottish Environment Agency [2005] CSOH 67*** Lord Reed having analysed the jurisprudence had the following to say on this issue:

> "Decisions must be taken on the basis of the circumstances of individual cases, and in the light of the aims of the directive, foremost among which is the protection of human health and the environment. The Court has indicated in its case law a number of factors from which it may be possible to infer whether the holder intends to "discard" the material in question. Most of these factors have been identified in cases concerned with the distinction between a production residue and a by-product, and have reflected that context: for example, whether the material is produced intentionally; whether further processing is required before the material can be used; and whether the material is certain to be used. Other factors which have been mentioned are of a more general nature: for example, whether the material is commonly regarded as waste; and whether, if it is used as fuel, its use as fuel is a common method of recovering waste. Since the status of a material has to be assessed on the basis of a comprehensive assessment of the circumstances of the particular case, it follows that none of the factors mentioned is conclusive in itself. The fact, for example, that a material is produced intentionally, requires no further processing before it can be used, and is certain to be used, cannot be taken in isolation as determinative of its status."

The question that also arises is whether or not the substance is a production residue or by-product. In *Palin Granit Oy* a case which concerned the question as to whether or not stone left over from quarrying, which was stored on site might be used for certain purposes, was waste. Since the leftover stone was not the product primarily sought by the operator of the quarry, the Court considered that it fell in principle into the category "Residues from raw materials extraction and processing" under head Q11 of Annex I to Directive 75/442 (WFD). The Court accepted however that such a substance might be regarded not as a residue but as a by-product, which the undertaking did not wish to "discard" but rather exploit in the market. In that regard, the Court stated:

> "Such an interpretation would not be incompatible with the aims of the Directive 75/442. There is no reason to hold that the provisions of Directive 75/442 which are intended to regulate the disposal or recovery of waste apply to goods, materials or raw materials which have an economic value as products regardless of any form of processing and which, as such, are subject to the legislation applicable to those products.
>
> Having regard to the obligation, recalled at paragraph 23 of this judgment, to interpret the concept of waste widely in order to limit its inherent risks and pollution, the reasoning applicable to by-products should be confined to situations in which the reuse of the goods or raw materials is not a mere possibility but a

certainty, without any further processing prior to reuse and as an integral part of the production process.

It therefore seems that, in addition to the criterion of whether a substance constitutes a production residue, a second relevant criterion for determining whether or not that substance is waste for the purposes of Directive 75/442 is the degree of likelihood that the substance will be reused, without any further processing prior to its reuse. If, in addition to the simple possibility or reusing the substance, there is also a financial advantage to the holder in so doing, the likelihood of reuse is high. In such circumstances the substance in question must no longer be regarded as a burden which its holder seeks to 'discard', but as a genuine product."

Ultimately it seems to me that the substance will cease to be regarded as a waste when the waste controls laid down in legislation cease to lose their rationale. To put the matter another way: does the material possess the same characteristics as a primary material and can it be used in the same conditions of environmental protection?

Turning now to deal with the argument made by Professor Scannell in relation to Meat and Bone Meal (MBM). I should say that I have not seen the opinion but I suspect I know the line of reasoning she is following. Firstly, I think she would have referred to a number of matters above namely, the certainty of reuse, the conservation of other materials, the intention behind the production of the product and its ability to be used in the same conditions of environmental protection. Furthermore, is the question is the pre-treatment of the original material.

Coupled with those arguments will probably have been the fact that animal by-products are regulated by different legislation and in particular Directive 1774/02. That would seem to be an independent regime for those products. That this is so is supported by the fact that animal by-products are exempt from the WFD and excluded from the requirement of a licence under WMA 1996. That is not to say that they are not regulated but rather that they are regulated under a different regime.

Applying all of the above to the current case, it is not difficult to see that arguments can be made on both sides. In this connection, reference is made again to Lord Reed's words of advice:

"Decisions must be taken on the basis of the circumstances of individual cases, and in the light of the aims of the directive, foremost among which is the protection of human health and the environment".

In ***Scottish Power Generation*** waste derived fuel ("WDF") was produced intentionally as the result of complex industrial process and was designed for a particular purpose. It was produced specifically with a view to replacing coal and it was alleged had earned a place in the normal commercial cycle or chain of utility. In short it could be used as a natural raw material. The product was paid for and played a commercial role in the business. In

response to these arguments the Scottish Environmental Protection Agency ("SEPA") argued successfully that the intention on the holder in question to discard could be inferred from the (i) the material was to undergo a disposal activities set out in Annex IIA of Directive 75/442 or a recovery operation set out in Annex IIB; (ii) the use of the substance as fuel was a common method of recovering waste; (iii) the substance was commonly regarded as waste. Considerable emphasis was put on the possibility of contaminants in the sludge which would not have been detected until burnt. It is of course to late at that stage to prevent harmful effects on the environment. Lord Reed in the course of concluding the materials were waste asked and answered the following questions:

> "If one asks what is recovered from the sludge, the answer is, energy: and if one asks how it is recovered, the answer is, by burning."

On balance it seems to me that the materials in question in this case come within what I understand to be waste. I accept that arguments can be made to the contrary but the quotation immediately seems apposite.

IPPC Licence

Clearly if the activity in question falls outside the WMA 1996 it will be regulated by the EPA Acts. As will be seen from the below listed activities to be found in the schedules to the EPA Acts there is considerable overlap between the respective regimes. As indicated above, where confusion arises as to whether or not an activity should be regulated by the WMA 1996 or the EPA Acts a determination mechanism by way of s39A of the WPA1996 can be triggered. In this case, the EPA was initially of the view that the primary activity was a waste based one.

It seems to me that the relevant EPA activities in question (schedule 1) are the following:

> "2.1 The operation of combustion installations with a rated thermal input equal to or greater than 50 MW.
>
> "11.1 The recovery or disposal of waste in a facility, within the meaning of the Waste Management Act, 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required.".

It would appear from the papers I have and my communication with QED that the Monopower installation meets the thermal input requirements outlined in 2.1 Schedule 1 EPA Acts.

Conclusion

I have reached a number of interrelated conclusions, the first of which is that the materials in question in the context in question constitute waste. The second is that in the process of generating electricity Monopower are involved (as a secondary activity) in the "recovery" of waste. This latter conclusion is based on the technical compliance with those conditions set (energy output etc). Thirdly as hinted and in conflict with the EPA initial finding, Monopower's primary motivation is the generation of electricity. Finally, as a result of the above and the facts underlying those findings (Monopower are using waste as a regular fuel in the generation of electricity) the process is "co-incineration".

Accordingly and as a direct result of the primary motivation for the process, the activity falls to be regulated under the EPA Acts rather than the WMA 1996 and within that regime in the above mentioned categories. That said Ultimately, it is my understanding that regardless of what regime the activity comes under the licence requirements should be similar if not identical. However, it worth emphasising that in the process of generating electricity Monopower are recovering waste rather than disposing of same.

Thank you for briefing me in this matter.

Kind Regards,

Nap Keeling B.L.

Updated Information for Environmental Impact Statement

for

Monopower Biomass CHP Plant
Killycarran
Co. Monaghan

By

Q.E.D. Engineering Ltd
11 Market Street
Monaghan
Co. Monaghan
Tel: 047 72060
Fax: 047 72061

February 2007

TABLE OF CONTENTS

1. Introduction

An Environmental Impact Statement was drawn up for Monopower Ltd as part of their planning requirements. The EIS consists of 4 separate folders

- EIS Non-Technical Summary, Volume 1 of 3, December 2001
- EIS Main Report, Volume 2 of 3, December 2001
- EIS Appendices, Volume 3 of 3, December 2001
- Further Additional Information requested for P03/446, April 2005

A Waste Licence Application was submitted by Monopower Ltd to the Environmental Protection Agency in December 2005. A Notice in accordance with Article 14(2)(4b)(ii) of the Waste Management (Licensing) Regulations was received by the EPA on 19th January 2007 requesting that the company *"Provide an update of your EIS to reflect the data in your waste licence application and in accordance with the requirements of Article 13"* (of the Waste Management (Licensing) Regulations.

This report provides updated details on the Environmental Impact Statement information submitted to date, in accordance with the EPA request.

This report provides the following details;

- Section 2 - Non technical summary
- Section 3 - Capacity of Plant, Fuel and Waste Quantities
- Section 4 - Disposal of Fly Ash and Bottom Ash
- Section 5 - Emissions of Process Effluent
- Section 6 - Surface Water Quality
- Section 7 - Treatment of Air from Fuel Reception and Storage Areas
- Section 8 - Air Quality - Predicted Stack Emissions
- Section 9 – Air Quality - Atmospheric Dispersion Modelling

2. Revised Non-Technical Summary

1.0 Introduction

Concern over current environmentally unsustainable disposal methods for spent mushroom compost (SMC) and poultry litter (PL) in County Monaghan and the border counties in recent years has resulted in the publication of a number of studies examining the problems associated with the industries. These industries have expanded rapidly in the last decade and recently have come under increasing pressure to adopt a more environmentally acceptable disposal route for their waste material. It was determined that a waste management solution for SMC and PL is of critical importance to the continued development of the industries in the region, as environmental restrictions with regard to their waste disposal are now a limiting factor on further growth of the industries.

The developers, Monopower Limited, have applied for planning permission for a biomass Combined Heat and Power (CHP) plant located in the town-land of Killycarran, Emyvale, Co. Monaghan. (Planning Application Reference Number P03/446).

The proposed development will utilise spent mushroom compost, poultry litter and waste wood chips as its primary fuels. Ash from the plant can be sold as a fertilizer, cement additive or for other end markets. Poultry litter, spent mushroom compost and wood chips (WC) are all recognised as biomass fuels by the European Commission. The facility will be licensed by the EPA and will generate electricity for export to the national grid from these renewable energy sources.

The plant will provide the mushroom and poultry industries with a reliable, year-round alternative to current disposal methods for their waste material, help provide a cost effective and sustainable supply of energy, and aid Ireland in meeting its current greenhouse gas reduction targets.

The proposed development site is a 7 acre green field site as outlined in Figure 1.2. As part of the site selection process, several siting criteria were considered. These included; proximity to fuel resources and the electricity grid; the availability of water and proximity to road infrastructure, thus ensuring minimal human and environmental impacts. The facility design, construction and operation must be such that no significant human or environmental impacts would be created.

On receipt of full planning permission, a 25-month construction period would commence. It is anticipated that the plant when operational would generate 20 Megawatts (MW) of electricity for export to the local grid. The plant will utilise widely recognised technology for Combined Heat and Power generation, including the use of as a spreader stoker boiler and steam generator. The plant

will be capable of handling 325,000 tonnes of biomass (a combination of PL, SMC and WC) per year.

Monopower Ltd, the developers of the biomass project are a wholly owned Irish company based in County Monaghan. Monopower are committed to an open and positive dialogue with their neighbours regarding the development.

Licensing and Operation of the proposed facility

The proposed development will fall under the Environmental Protection Agency (EPA) licensing system. All aspects of the site activities with potential impact on the environment will be examined and determined under the relevant EPA licence, including emissions to air and water, energy and resource use efficiency, environmental management systems and waste and residuals management.

Figure 1.1a Map of Monaghan at its surrounding counties

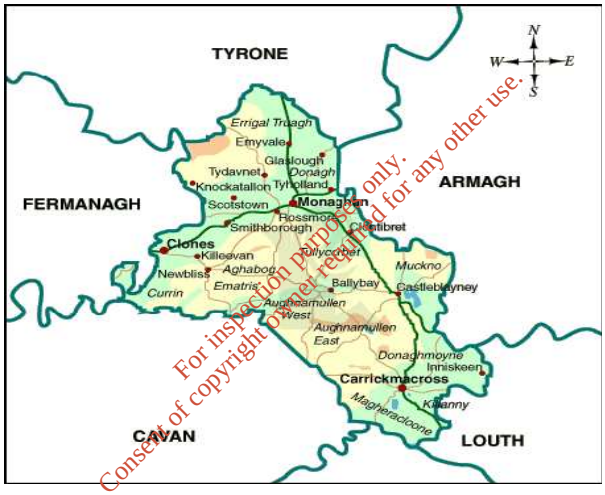
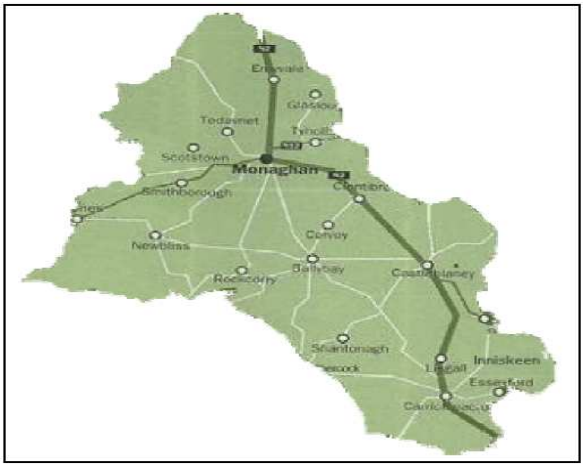


Figure 1.1b Site location in relation to its broader surrounding environs



1.1 Format of the Environmental Impact Assessment

An Environmental Impact Assessment (EIA) is the process whereby the environmental impacts of new or expanding developments are predicted; their significance assessed and proposed mitigation measures outlined.

The Environmental Impact Statement (EIS) provides the public, government and non- government bodies and other interested parties with a detailed review of the proposed development and the existing environment. It assesses the predicted impacts of the development on the existing environment and outlines proposed mitigation measures where necessary.

The EIS was prepared by South Western Environmental Services in December 2001 on behalf Monopower Ltd., the developers, in accordance with the requirements of Council Directive 97/11/EC on the assessment of the effects of certain public and private projects on the environment and in compliance with the draft guidelines prepared by the Environmental Protection Agency (EPA) 2001. Specialist subcontractors were employed for the completion of specific sections of the EIS and are referenced accordingly in Volume 2, the main volume of the EIS.

By their nature, combustion processes produce atmospheric emissions. Particular attention has therefore been placed on atmospheric emissions associated with the development and their potential impacts.

1.2 Report Structure

The original EIS report is divided into three volumes as follows:

Volume 1: Non-Technical Summary
Volume 2: Main Report describing the existing environment and the potential impact of the development on this, including any necessary mitigation measures.
Volume 3: Appendices additional technical references to the main report.

1.2.1 Additional Documentation relating to the EIS

• Additional Information requested for P03/446 Monopower Ltd., Killycarran, Emyvale, Co Monaghan (Document Ref 2003_142)

This report was prepared by SWS Environmental Services in 2003 and was submitted to Monaghan County Council on behalf of Monopower Ltd in November 2003.

• Submission of Further Additional Information requested for P03/446 Monopower Ltd, Killycarran, Emyvale, Co Monaghan (Document Ref 2005_105)

This document has been prepared by SWS Environmental Services and is comprised of 13 Sections, including a re-drafted Non Technical Summary. Specialist subcontractors were employed for the completion of specific sections of the report and are referenced accordingly in the Report Authors and Associate Consultants section of the overall report.

• Revised Non-Technical Summary & Updated EIS
This revised Non-Technical Summary and updated information for EIS was submitted to the EPA as part of the Licensing Requirements, following a letter of request from the EPA on19th January 2007.

1.3 Consultation Process

(i) Public Consultation
Community involvement was considered to be a key feature of this development. An extensive consultation and information programme, involving the public and also public representatives, was carried out during the preparation of the EIS including:

- Meetings with households within the area of the proposed development.
- Provision and distribution of information packages outlining the scope of the project to the community and to interest groups throughout Ireland.
- Holding information meetings for members of the local community in the local community hall in Carrickroe on 16th and 17th October 2001. The purpose of these meetings was to provide general information in relation to biomass developments, to answer questions and receive input in relation to the development, as well as providing site specific information regarding the development and its goals to individual householders. Follow-up information was provided to all individuals who requested additional information.
- Organising a visit to a similar facility in Westfield, Scotland for local representatives of the community.

- Provision of a project hotline and email address for any receipt of any queries.

(ii) Interest Bodies

In addition to the above, information packages were sent to Local TD's and Councillors, Government and Non Government bodies and interest groups. Meetings were also held with these parties. Information booklets describing the development were provided. A summary of the information packages distributed is included in Appendix 2 of Volume 3 of the EIS.

1.4 Need for the Development

Water Quality: There are significant environmental pressures resulting from the mushroom and poultry industries. Land spreading is currently the main disposal route for wastes arising from these industries, and there is insufficient associated acreage to safely absorb these materials. As a result, groundwater and surface water in the county is becoming contaminated with excess nutrients, particularly phosphorous. Current legislation including the EC Directive on Drinking Water Quality and the 1998 Phosphorous Regulations will place limitations on current disposal practices and an alternative disposal method must be sought to facilitate the continued development of the industries in the region.

Soil Protection: Due to the high nutrient content in both PL and SMC, suitable receiving land would have to be identified to safely land spread waste. In Monaghan the need for land outstrips supply and as a result there is a surplus of phosphorous, which can leach to groundwater. Other environmental concerns associated with land spreading include the spread of pathogenic bacteria and possible residues resulting from PL and SMC and the high nutrient, pH and salt content which can impact negatively on soil quality.

The EU landfill Directive (99/31/EC): places limitations on the quantity of biodegradable waste going to landfill. This is in line with government policy to reduce dependence on land filling of waste as a disposal option. Currently, more than 60,000 tonnes per annum of waste SMC is disposed of via landfill in County Monaghan. This practice is not sustainable and a renewable energy process providing heat and electricity is a more environmentally friendly option.

Odour Nuisances: are associated with land spreading of waste, particularly with poultry manure. Removal of excess PL will reduce the need to land spread PL on already over saturated land.

COM (2000) 247: Action Plan to improve Energy Efficiency: The Commission refers to the target of doubling CHP electricity in the EU by 2010 to 18% and recognises the contribution that Combined Heat and Power can make to the target of reducing CO2 emissions.

Global Warming: Carbon dioxide is the main gas associated with global warming and is primarily associated with burning of fossil fuels. Biomass is CO2 neutral (i.e. it does not contribute any additional CO2 to the atmosphere) and the Government is strongly supportive of the development of renewable alternatives to fossil fuel based energy. Under the Kyoto Agreement, Ireland has agreed to limit the increase of greenhouse gases to 13% above 1990 levels by the period 2008-2012. However, Ireland is already in breach of its 1998 target greenhouse gas emission limits, due primarily to increases in CO2. The development of a biomass CHP Plant will help contribute to the National Climate Change Abatement Strategy.

Industry Sustainability: The mushroom and poultry industries in Monaghan account for approximately 47% and 12% of the country's Gross Annual Output respectively. Further expansion and current sustainability of the industries are in question due to restrictions imposed by Monaghan County Council on land spreading and the move to reduce the amount of organic waste sent to landfill. If these industries, which have tight profit margins, are to continue to develop then an environmentally sustainable and economic manner then an alternative disposal method must be found to deal with the current waste problems.

Energy Importation: With increases in energy demands, Ireland is expected to increase its reliance on imported energy from 86% in 1989 to 94% in 2010. Fossil fuels are not sustainable, and oil and gas may well become scarce within the next 50 years. With biomass, Ireland has a sustainable indigenous energy supply that will reduce reliance on imported fuels and strengthen the local grid.

2.0 Project Description

2.1 General

The proposed biomass CHP power plant will generate electricity using widely recognized combustion and heat recovery technology. The biomass power plant will generate 20 Megawatts of electricity for export to the local grid. The biomass power plant will operate 24 hours per day, 8,200 hours per year. The biomass power plant when operating at full capacity will be capable of handling 325,000 tonnes of biomass per year. It is estimated that this will comprise 50,000 tonnes of Spent Mushroom Compost, 200,000 tonnes of Poultry Litter and 75,000 tonnes of wood chips. The fuel tonnages may vary from year to year, depending on availability/quality, among other things.

2.2 Site Description

The 7 acre site is located approximately 2km from Carrickroe village to the northwest and approximately 4km from Emyvale to the east. The biomass power station will be located beside a third class road on rough grazing ground. The site

can be accessed via a number of minor roads from the N2 at Emyvale in the east and from the R186 in the west, as shown in Figure 1.2.

2.3 Management and Staffing Levels

The plant is to be staffed and operated by 20-25 personnel. This will consist of both technical and administrative staff. The plant will be operated continuously on a 3-shift system. Each shift will be covered by a minimum of 2 persons.

2.4 Operations and Maintenance

Full written instruction manuals with all of the information required for operation and maintenance of the plant will be supplied by the plant's design company, prior to the commissioning phase.

2.5 Description of the Plant

The biomass plant will contain the following main components:

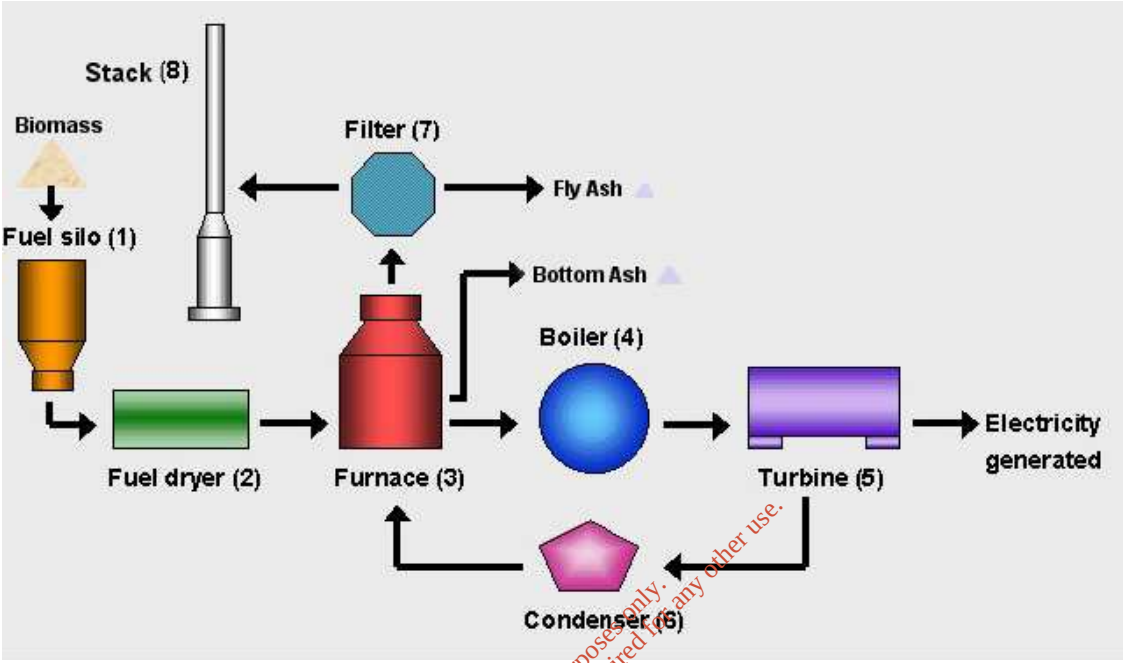
- **Fuel handling Area containing the following:**
    - Fuel Reception (Administration Building) and Weighbridge,
    - Fuel Handling and Fuel Screening
    - Fuel Storage Systems
    - Fuel Drying Equipment
    - Fuel Feeding system
- **Combustion System**
- **Boiler**
- **Air Cooled Condenser (Condensing Economiser)**
- **Steam Turbine Generator**
- **Flue Gas Cleaning System**
- **Water Treatment Plant**
- **Ash Removal Plant**

Figure 2.1 illustrates what the proposed plant will look like

The proposed biomass CHP power plant is designed to accept three biomass fuels namely; Spent Mushroom Compost (SMC), Poultry Litter (PL) and Wood Chips (WC). The three fuels are handled separately, and remain in a separate system from unloading in the reception bay until they are fed into the combustion chamber. The SMC fuel must pass through a drying process before it passes to the combustion chamber.

The combustion system is capable of operating on any or all of the fuels at one time. In the furnace, the biomass fuels are converted into heat, ash and combustion gases.

Figure 2.2 Simple Diagram demonstrating how electricity is produced from Biomass Combustion



The heat produced by the combustion of the fuels in the furnace will be used to generate steam, which will be used to drive a multi-stage steam turbine generator for the production of electricity for export to the electricity network. The plant will produce 20 Megawatts of electricity for export to the grid. Approximately 2.5 Megawatts will be generated for internal use in the plant. Process steam will be used in the fuel drying process. Bleed steam from the turbine will be condensed using an air cooled condenser and utilised to pre-heat feed water for the boiler.

A filter system will be used to minimise pollutants in the flue gas exiting the stack. Good combustion techniques will also minimise pollutants in the flue gas exiting the stack. Bottom Ash will be produced by the furnace as a by-product of the combustion process. Fly Ash will be produced as a by-product of flue gas filtration and treatment.

2.6 Balance of the Plant

The effluent from staff toilets, sinks etc, along with wash water from non-process drains will pass through a “Bioclear” Sewage Treatment Plant. Surface water and drainage water will be discharged to the existing small stream at the low end of the site. Surface water from the paved areas is passed through an oil separator prior to discharge to the stream.

Materials separated from the SMC and PL during the screening process will be disposed of in accordance with applicable regulations.

The site is equipped with 30 outdoor lights along roads and traffic areas. The lamps will be closed at the upper side so that light can only be seen from below.

The entire plant will be fenced with a 2.1m galvanised chain link fence and the site will be landscaped. The fence will be placed inside the screening vegetation around the site boundary. Screening Berms (earth mounds/banks with vegetation planted on top) will also be used for landscaping.

The fire detection system for the plant will include detectors and break glass points in the Fuel Unloading building, Boiler House, Turbine Hall and Service building with acoustic and visual alarms. An alarm panel with 10 fire zones will be located in the Control Room in the Service Building.

Fire extinguishing systems include:

- 4 no. external fire hydrants;
- Hose reels & dry powder extinguishers in Boiler and Turbine building, Service building, Office building & Fuel Unloading building.

In March 2005 QED Engineering Ltd prepared a Risk assessment Report and Risk Management programme for Firewater retention at the proposed facility. A firewater retention pond of 707m^3 capacity will be provided on site

The plant will fulfill all local and national safety requirements.

2.7 Grid connection

The electricity produced by the facility will be carried through a dedicated overhead pole-mounted transmission line to the either the 38kV station located close to the site or a 110kV substation located approximately 12km to the south of the site. Connection to the transmission network will be subject to a separate planning application.

2.8 Construction Schedule

Construction of the facility will commence when full planning permission is received and will last approximately 20 – 25 months. Construction activities include design and engineering, procurement of equipment, site preparation, building construction and equipment installation, and plant start-up and testing.

2.9 Commissioning

On completion of the plant construction, a comprehensive commissioning and testing programme will be undertaken to ensure that the plant will operate in accordance with the technical specifications and standards set for the plant.

2.10 Health and Safety and Environmental Considerations

The plant will operate with both a health and safety policy and an environmental policy developed to define specific company aims. Appropriate training instruction and resources will be provided to ensure that training appropriate to roles and responsibilities is provided and that the company is in compliance with relevant legislation.

The plant will be licensed by the Environmental Protection Agency who will monitor plant operations to ensure compliance with licence requirements.

2.11 Site Selection

A screening exercise was carried out to find a suitable location for the development of the proposed biomass plant. The preliminary criteria used in the selection of the site were:

Site Selection Criteria:

- **Fuel Supply**:
  - Availability, supply reliability and transport costs
    - i. Proximity to Mushroom Producers
    - ii. Proximity to Poultry farms
    - iii. Availability of wood waste as an alternative fuel

- **Access by National Primary and Secondary Routes and A Class Routes**
- **Proximity to Electrical Transmission Network**
- **Environmental Impact on Site and Surrounding Area**
  - Visual, noise, dust, traffic, ecological & hydro-geological constraints.
- **Availability of Sites**
- **Planning Policies**

The site selection process was undertaken using a Geographical Information System (GIS), which identified potential suitable areas for the development of a biomass plant based on the criteria listed above.

Alternative Locations
Alternative locations were also considered for this plant. Utilising the results of the site selection process, a number of potential sites were investigated.

Suitability of the Killycarran site
The site in Killycarran near Emyvale was found to be the most suitable based on the following:

- Killycarran is located in the “centre of gravity” for mushroom and poultry industries.

- The site is within an acceptable distance from National Primary, the N2 and Regional routes, the R186, and A-Class routes.
- The Nearest 38kV station is located within 1km of the proposed development and the nearest 110kV station is within 13.5 km south east of the site near Monaghan Town.
- Lack of designation as a National Heritage Area, Special Area of Conservation or Scenic Area, etc.
- Topography of the site (shape of the landscape) allows the large building structures to be built in a depression, thus reducing the visual impact.

The proposed site was found to be the most suitable based on a detailed site selection procedure.

3.0 The Human Environment

3.1 Introduction

A house survey was carried out by SWS Environmental Services as part of the Environmental Impact assessment in 2001. At this time the number of houses located within 1km of the development was 32. An up to date house survey was carried out in 2005 to determine the current number of houses. There are currently 35 houses located within 1km of the proposed development. Demographic information on population centres and information on land use in proximity to the development was also examined to assess the existing human environment.

3.2 Existing Environment

The site comprises of c7 acres and is located in the town-land of Killycarran 4km west of the village of Emyvale and 2km from the village of Carrickroe. The site and surrounding land is rural and agricultural with no specific zoning under the 1999 Monaghan County Development Plan. There are no amenity areas within the immediate vicinity of the development and the closest SAC is located 5km from the nearest recreational area. Housing is scattered and typical in distribution to settlement in rural Ireland.

(i) Population and Employment

The closest population centres to the development site are Carrickroe village and Emyvale town, both of which have shown an increase in population between 1996 and 2002. Agriculture is the predominant activity in the county accounting for two-fifths of the labour force and 60% of all employment either directly or indirectly dependant upon it. Almost 50% of the total national poultry flock is located in Monaghan county and 24% of the mushroom industries. Production from both industries accounts for approximately 47% and 12% respectively of the countries gross agricultural output.

3.3 Construction Impacts and Mitigation Measures

On receipt of full planning permission, construction will take place over a 25-month period. Site clearance will result in the loss of 7 acres of land that was previously used for agricultural purposes. Adjacent land use will not be impacted by the development.

i) Noise

Noise associated with the construction period will be temporary and minimised through the following noise measures

- Noisy construction activity will be confined to daytime hours where possible
- During the initial construction period BAT (best available techniques) shall be employed by the developer to minimise noise from the construction operations and shall have regard to British Standard BS 5228: 1997 "Noise Control on Construction and Open Sites".
- The construction period itself will be of limited duration.
- Advanced notification will be provided to minimise any impacts associated with particularly noisy episodes.

ii) Traffic

During the construction period, peak construction traffic is expected to be approximately 50 passenger cars with the majority of construction employees working from 8.00 am to 6.00 pm. The predicted two-way peak traffic flows generated by construction employees will occur before the morning and after the evening peak hour.

Construction Heavy Commercial Vehicles (HCVs) travelling to and from the site are expected to be in the order 15 HCV's per day. A traffic management plan will be implemented to minimise any impacts associated with construction traffic this will include the provision of buses from the population centres to the site as well as providing a temporary car park.

The developer would intend that the road be improved to a 5.5 m carriageway width during the construction phase of the development to facilitate construction activities to take place at the site. In the longer term, it is goal of the developer to improve the road surface quality and carriageway width to the standard as proposed in Section 4.0 of the overall Submission of Further Additional Information requested for P03/446. The developer would envisage that this standard would be achieved through dialogue and close consultation with the Roads Authority at Monaghan County Council, who will ultimately dictate the final road design standard acceptable for the section of road in question.

iii) Air Quality
Earthworks and other construction activities associated with the development may result in some dust blow. This will be mitigated through good housekeeping measures such as damping down of earth prior to excavation during dry weather and control of speed limits for construction vehicles on site.

iv) Amenities and Tourism
The development site and surrounding area does not possess any significant amenity value or noteworthy scenic value. It is not located on or close to any scenic route, National Heritage Area (NHA) or Special Area of Conservation (SAC). There are no expected impacts on tourism in the region resulting from the construction period. The closest Scenic Amenity Area is the Slieve Beagh / Bragan Upland Area approximately 6km west of the proposed site

v) Economic Benefits and Employment
During the construction period up to 50 workers both skilled and unskilled will be employed on site. Where possible, services and staff shall be sourced locally resulting in a significant temporary positive impact on employment and expenditure within the local community.

3.4 Operation Impacts and Mitigation Measures

i) Land Use Zoning and Housing
As with the construction phase, the development will change the use of some land that was previously used for agricultural purposes. The development is not expected to have a long term significant impact on the land use or property prices of the surrounding area, be it for agricultural, commercial or residential purposes. No land other than the site itself comprising of 7 acres will be taken out of its current use. There are 35 houses located within 1km of the development.

ii) Noise
Noise modelling was carried out in order to determine the impacts of noise from the operational phase of the proposed development. Careful plant design and good operational practices will ensure that noise will not impact significantly on the local residences.

iii) Air Quality
Emissions from the plant will comprise of atmospheric emissions from the plant stack (50m high). All discharges will comply with relevant regulatory limits for the protection of human health and the environment. Maximum atmospheric emissions from the discharge stack were modelled and found to be insignificant based on comparison with applicable air quality standards.

iv) Traffic

The road network to the development site comprises of minor roads, which are in close proximity to national and regional routes. In order to accommodate the traffic increases predicted, approximately 7.8 km of minor roads would need to be upgraded. Upgrading of this route would have a positive long-term impact on the surrounding area. Improvements in infrastructure will lead to improved access to farms and businesses in the surrounding area as well as improvements in road safety.

v) Economic Benefits and Employment

The facility will employ a permanent staff of 25 people comprising of managerial, technical skilled and unskilled workers. The plant will also result in indirect jobs in the form of local support services such as fuel transport. The plant will have a positive impact on agricultural development in the region through facilitating the expansion of the mushroom and poultry industries.

vi) Environmental

By utilising locally generated biomass and providing a year-round option for the management of PL and SMC, the facility will:

- Have a positive impact on the reducing the problem of greenhouse gas emissions
- Help improve water and soil quality associated with improper stockpiling and land application
- Reduce the volumes of problematic waste material applied to land
- Reduce complaints associated with stockpiling or land spreading PL
- Help fulfill Ireland's Kyoto agreement and associated targets

vii) Amenities and Tourism

As the site is not on any scenic route and it does possess significant amenity value, no significant impact on amenity value is predicted. The low visual impact of the plant will not significantly impact tourism in the surrounding area and may in fact have a positive impact on local tourism through its showcasing as the first development of its kind in Ireland with associated positive impacts on the local economy.

3.5 Conclusion

The development will not impact negatively on the local human environment. Although there will be traffic, noise and atmospheric emissions associated with the development these will not impact significantly on the local community and there will be positive economic and environmental advantages associated with the development.

4.0 Air Quality

4.1 Introduction

This section of the report examines air quality and assesses the impact the development will have on the existing environment. The plant will have an atmospheric emission source – a 50m stack, through which cleaned flue gases resulting from the combustion process will be emitted to atmosphere. In addition, the site will have an air emission point from a Biofilter unit (used to treat odour from the fuel reception and storage areas). An air dispersion model was used in order to determine what impacts, if any, the resulting emissions would have on air quality at ground level. These emissions were compared with current and future air quality standards and guidelines.

4.2 Existing Environment

Extensive ambient air quality monitoring was carried out in order to determine existing air quality at the site. This included monitoring for the following parameters:

- Nitrogen Oxides
- Oxides of Sulphur
- Carbon Monoxide
- Hydrogen Chloride
- Total Particulates and PM10 emissions
- Heavy Metals
- Dioxans and Furans

All ambient air results were compared with relevant Air Quality Standards (AQS's) and Guidelines and Results of monitoring showed that the current existing air quality is good and typical of a rural environment.

To address potential impacts or air emissions on plants and soils, baseline studies, including visual assessment of herbage, and heavy metal and nutrient concentrations of soil and herbage within a 5km radius of the site were carried out to determine existing environmental baseline conditions. These can be used a reference against any future monitoring requirements.

4.3 Construction Impacts and Mitigation Measures

Earthworks associated with the development may result in some dust blow. Good housekeeping to provide proper containment of loose materials where necessary will help minimise any impacts resulting from dust blow.

4.4 Operation Impacts and Mitigation measures

The proposed development will be licensed by the Environmental Protection Agency (EPA).

Combustion of PL, SMC and WC will result in the generation of combustion related air pollutants. These pollutants will be subject to air pollution control measures and the remaining flue gases will be released from the plant's 50m stack. These emissions will be regulated by EU and Irish Legislation, which specify emission limits below which there will not be a significant impact on human health or the environment. All emissions will comply with the relevant guidelines and standards as part of the plants EPA licence requirements.

The plant will generate emissions during fuel combustion to produce energy. *Oxides of Nitrogen* are formed primarily as a result of the reaction of nitrogen and oxygen. *Volatile Organics* are products of incomplete combustion of fuel. *Acid Gases* such as *Hydrogen Chloride* and *Sulphur dioxide* which is formed by the reaction of sulphur in the fuel with oxygen from the combustion air. Emissions of *Particulate Matter* result from trace quantities of non-combustibles in the fuel and *Carbon Monoxide* is formed as a product of incomplete combustion. In addition there will also be emissions of *Dioxins and Furans*, and *Heavy Metals* at very low levels.

The Biofilter will be used to treat emissions from the fuel reception and storage areas, such as dust, odours and airborne pathogens. The Biofilter will have minimal emissions of ammonia, amines, hydrogen sulphide and mercaptans.

(ii) Air Dispersion Modelling

An air dispersion model was run to determine the optimum stack height requirements to give adequate dispersion of the flue gas plume. It was determined that the concentrations from the 50m stack complied with all air quality standards and above this the benefits of further height increases were not significant. Consequently a 50m stack was selected.

Air dispersion modeling of maximum emission limit values from the proposed boiler stack showed that the predicted level of level of Total Dust, Total Organic Carbon (TOC), Hydrogen Chloride (as HCL), Hydrogen Fluoride (as HF), Sulphur Dioxide (SO_2), Nitrogen Oxides (as NO_2), Metals and Carbon Monoxide (CO) from the proposed site are very low compared to ambient air quality standards. Therefore no adverse impact on public health or the environment is envisaged to occur under maximum operating site conditions in the vicinity of this site.

Based on the proposed development's rural location and distance from other significant sources of air impacts, cumulative air quality impacts due to emission from the facility and any other existing emission source in the area can be characterised as insignificant.

(iii) Plant Operation Control Technology

The plant will operate with a number of controls in order to ensure low emissions. Good combustion control will help ensure low emissions.

The combustion process will be carefully controlled by the following methods:

- Continuous fuel supply with fuel in small pieces with a large surface area. This ensures good mixing conditions of air and fuel and good control of mixing conditions.
- Combustion conditions will be continuously monitored for oxygen and temperature.
- Suitable temperature and visual alarms will be fitted,
- Control of oxygen content by means of a change in air flow supplied at various conditions.
- The furnace is high and slim, with good turbulence and high residence time.
- An oil burner in the furnace wall will be used for start up and can also be used as a support burner during abnormal conditions.

Further Measures for pollutant abatement will be utilised in line with Best Available Technology (BAT). These measures will include:

- Control of *Particulate Matter* and *Metals* using a fabric filter located downstream of the furnace (as illustrated in figure 2.2),

- Control of *Carbon Monoxide* by ensuring good combustion control and adequate mixing and residence time of the fuel in the furnace,

- Control of *Acid Gases* (Sulphur Dioxide and Hydrogen Chloride) by the natural presence of lime in the fuel and also by addition of lime to the flue gas,

- Control of *Oxides of Nitrogen* (NO, NO_2 and NOx) by careful maintenance of combustion temperature and oxygen concentration of the furnace,

- Control of *Dioxins and Furans* by ensuring that complete combustion takes place above 850^{o}C and minimising the fuel residence time in the 200-450^{o}C range (dioxins and furans are formed at this temperature range). Maintaining the surface of the boiler and condenser surfaces and collection of particulates also minimises release of dioxins. Air dispersion modeling showed that emission levels for dioxins are within the limits set by EU legislation and standards.

(iv) Fugitive Emissions

There is also the potential for fugitive emissions of dust from the storage, handling and trucking of the biomass fuels and ash by-product. Emission controls include transport of fuel and ash in covered trucks, keeping the fuel hall and

storage area enclosed (as shown in Figure 2.1) and maintaining it under negative pressure. Ventilation air from these areas will be drawn into the Biofilter, to eliminate dust, odours and air borne pathogens. Lime is another potential source of fugitive emissions. It will arrive to the site in enclosed containers, which will be emptied by fluidisation, and lime will be blown pneumatically into a silo. To avoid dust emissions this system will also be maintained under negative pressure. Waste ash from the process will be comprised of fly ash collected from the flue gas filter and bottom ash. Bottom ash will be wet and will not be a source of fugitive emissions. Fly ash dust will be prevented by maintaining consistent negative pressure in the system. Possible end uses for waste ash include sale as an organic fertiliser or use as a raw material in the cement industry.

(v) Odour

Potential odour emissions can occur as a result of the transport, unloading storage and processing of PL, SMC and WC fuels at the proposed facility. In March 2005 QED Engineering Ltd carried out an "Odour Impact Modelling Study" to examine these potential impacts in detail. Poultry litter is the only raw material to be utilised on the Monopower site which has the potential to cause odour nuisance. Spent mushroom compost is not odorous.

Odour from the poultry litter will be controlled by:

- ensuring that all lorries that transporting waste are covered
- ensuring that the fuel unloading building (shown in figure 2.1) is kept under negative pressure at all times to collect odorous air and discharge it to the Biofilter
- continuous management and maintenance of the measures outlined will ensure that the odour nuisance is not problematic on the site.

4.5 Conclusion

Potential emissions and predicted concentrations of pollutants generated by the combustion process at the proposed site have been assessed and utilised in an air dispersion model to determine the impacts of the proposed facility on the air quality of the surrounding environmental. Combustion control along with pollutant abatement and odour abatement measures will be utilised at the site in order to comply with EU Legislation on air emissions and also to comply with the licence requirements set by the EPA for the proposed facility.

5.0 Noise

5.1 Introduction

As part of the Environmental Impact Assessment carried out in 2001, a noise survey was conducted out to determine existing background noise levels. Noise monitoring for both day and night time noise levels were established. The results of this monitoring were used to evaluate the noise impact of the development.

Operational noise from the proposed development was assessed based on the principal noise sources associated with the development.

5.2 Existing Environment

The existing noise environment was found to be typical of a rural agricultural environment with the main environmental noise sources related to traffic and mechanised agricultural activity.

5.3 Construction Impacts and Mitigation Measures

Noise impacts during construction will be unavoidable as a result of increased traffic from construction vehicles and site activity, but will be temporary in nature. The impact of construction activities was assessed in relation to the nearest residences. A number of noise abatement measures will be implemented:

- Limiting noisy construction activity to daylight hours where possible
- Limiting the duration of the construction period
- Plant commissioning activity will be confined to daytime
- Noise activities will be required to comply with BS 5228: *Noise Control on*
- *Construction and Open Sites.*

With these measures in place, construction noise will remain below typical noise limits appropriate to such activities.

5.4 Operation Impacts and Mitigation Measures

Noise sources during plant operation will include traffic associated with fuel delivery, ash haulage and also plant process operations. The major components of the site that will generate noise during plant operation include noise emitted from the boiler house, turbine hall, dryers, fans, pumps, fuel screening machinery etc. The proposed plant is located in a moderately sparsely populated rural area with a total of 35 residential houses within 1km of the site.

The following mitigation measures will be utilised to minimise noise emissions from the operation of the plant

- Noisier plant components are located to the rear of the facility away from nearest dwellings to provide adequate separation distances from nearest dwellings;
- Site layout to provide natural screening from buildings to prevent noise propagation;
- Good process design -utilising “low noise options” and equipment choice;
- Good operational and management practice backed up by an environmental management system. This will include regular maintenance of equipment to prevent generation of noise and turning off equipment and fans when not in use;
- Screening banks (berms) will be constructed at boundaries near the main plant area to minimise the transmission of noise off site;

- Restriction of noisier operations to day-time hours including truck deliveries confined to between 8:00 and 18:00 will minimise disturbance at sensitive times.

5.5 Conclusion

It was determined that good site construction and operational practices as well as careful plant design will ensure that the plant noise emissions would comply with noise limits set by the Environmental Protection Agency as well those set by European Legislation and thus will not impact significantly on the surrounding environment.

6.0 Landscape and Visual Impact

6.1 Introduction

This section examines the landscape and visual character of the site and assesses the potential impact the proposed development would have on the road network, residential buildings and designated views and amenity areas outlined in the Monaghan County Development Plan 1999.

Cunnane Stratton Reynolds Ltd. carried out an additional Landscape and Visual Impact Assessment of the proposed development in March 2005. The assessment was based on a detailed site survey. It is in accordance with the *EPA's Guidelines on the information to be contained in Environmental Impact Statements* 2002 and also the Landscape Institute (UK) *Guidelines for Landscape and Visual Impact Assessment,* Second Edition 2002.

6.2 Existing Environment

The site of some 7 acres is located in a rural setting 3.5 km west of Emyvale and is accessible off a small third class road joining third class roads connecting to the N2 in the East at Emyvale and the R186 in the southwest. The site, which is used for rough cattle grazing, contains typical agricultural vegetation. The proposed site is located in a valley. Land cover in the surrounding area is also dominated by grassland interspersed with reclaimed and marginal fields, which in some cases are enclosed by hedgerows. The lands in the region are used for small-scale dairy and dry stock farming and intensive poultry and mushroom farming and these influence the existing landscape. There are a number of operational and disused quarries in the area. Settlement patterns in the area consist of one-off houses and farmsteads. Carrickroe is the nearest village at 2.5km northwest of the proposed development.

Designated areas of primary amenity value are Slieve Beagh and Bragan Mountains located approximately 5-6kms west of the site. The Mountain Water River, Emy Lough and environs are classified as secondary value. There are no environmentally designated areas (Special Areas of Conservation, Special Protection Areas and Natural Heritage Areas) within 5kms of the development, as detailed in Chapter 11 of the Original EIS, on Flora and Fauna.

6.3 Construction Impacts and Mitigation Measures

Potential visual impacts will occur as a result of the following development works at the site

- Clear felling of certain trees and temporary removal of hedgerow vegetation
- The removal of topsoil and excavation and stockpiling of overburden
- Construction of foundations, hardstanding and site structures The following mitigation measures will be employed to minimise visual impact during site construction
- Vegetation should be removed and covered in discreet sections and not all at once
- Temporary landscaping should be considered for other uses (noise barriers, visual screening)
- Shrouding larger and long-term stockpiles by capping, grassing over or covering securely with tarpaulins
- Use wind barriers of similar height and size to the stockpiles
- The landscaping stage will involve construction of permanent screening berms (earth mounds/banks with vegetation planted on top), improvement of existing hedgerows, and maintenance of existing tree belts along with proposed new-planted areas will be carried out at the site to ameliorate visual impact.
- Site construction activities will give rise to a short term neutral to slightly negative visual impact on the surrounding landscape. Design, construction and landscaping measures for the proposed development however are geared toward providing appropriate screening of the development and improvement of the overall appearance of the site boundary in the long term.

6.4 Operation Impacts and Mitigation Measures

The development will consist of a number of buildings and a discharge stack, as illustrated in Figure 2.1. Visual impacts of concern are related to the post construction site. The Buildings would be of industrial appearance and scale. The highest structure will be the plant stack at 50m high. Excepting the stack, the highest structure is the boiler building at 40m high. The impact of the development on the surrounding landscape is influenced by the degree of sensitivity of the existing landscape and its ability to accommodate change. The significance of this change was assessed utilising Geographical *Information System* (GIS) technology to plot a *Zone of Visual Influence* (ZVI) and also by creating photomontages of the proposed development. Photomontages are prepared by creating a digital image of the proposed development and superimposing it onto photographs of the proposed site, taken from a number of points at varying distances, to predict what the plant would look like in reality. A full set of photomontages (12 in total) and a ZVI are included in Section 9.0, Landscape assessment, of the Submission of Further Additional Information requested for P03/446.

i) General Visibility

The development is sited in valley, making optimal use of the screening effect of the surrounding topography. The various elements of the development would be located specifically to minimise the perception of dominance of the development on the surrounding landscape. However, the imposition of a development incorporating buildings of the scale proposed (the boiler building and stack in particular) would inevitably result in a change in the visual character of the surrounding landscape. The plant proposed development will have a red aeronautical safety light which will be visible at night and site lighting will also be discernible from certain viewpoints at night. While some of the existing vegetation would be lost as a result of the development, the most valuable features (hedgerows) and specimen plants would be retained. These would be supplemented with additional tree and shrub species for structural improvement, visual screening and habitat enhancement. Substantial planting would be introduced to the internal landscape areas of the site, resulting in a significant net gain in vegetation cover on the site.

ii) Visibility from roads

The major roads within 5km of the site are the N2 National Primary Route and the R186 Regional Route as shown in Figure 1.2. Sample viewpoints taken along the R186 Regional Route west of the site have shown that the due to the effect of the landform and roadside vegetation, combined with the presence of buildings located along the route the visibility of the proposed development from the R186 would be limited to intermittent views. The significance of the predicted visual impact along this route is considered low and neutral.

iii) Views from Towns and Villages

The stack and boiler building will be visible in the distance from certain viewpoints in Carrickroe village. The rest of the development will be largely screened from view by the landform and also by land cover. Being a village setting the viewers attention will be largely focused on urban activities and elements in the immediate environment. The proposed development will not be visible from any location within Emyvale. Visibility of the stack is afforded from a short section of the regional road approaching Emyvale from the east. The proposed development will not be visible from Tydavnet.

iv) Views from Residential Dwellings

The proposed development will be visible from some residential dwellings in the vicinity of the development. Sample viewpoints, taken from a number of houses located in the vicinity of the site at varying distances, demonstrated varying levels of visibility and visual impact. The sensitivity of the landscape from viewpoints at rural residential locations is always classified as high. However, depending on the distance of the viewpoint from the site and the degree of screening by topography and vegetation and also the presence of manmade elements on the landscape such as agri-industrial buildings, the overall level of visual impact

assessed for viewpoints taken from 5 different houses ranged from high and adverse to low and neutral.

V) Views from Recreation/Amenity areas

A sample viewpoint taken at the Slieve Beagh/Bragan amenity area, showed that due to the elevation of the viewpoint the proposed development in its entirety would be discernible. This viewpoint from this area is located 6.25 km from the proposed development. Due to the distance of the viewpoint from the site and its environs and the prevailing weather conditions the detail of the distant lowland landscape was imperceptible. The significance of the predicted visual impact from this location is thus medium and neutral.

6.5 Conclusion

The development is in keeping with an existing trend of land use/ agricultural transition. In a predominantly rural region a vital combined waste management and energy production facility which serves the community and existing land-uses is an appropriate landscape change. The proposed development makes optimal use of the existing landform and vegetation cover. Effective screening as well as careful plant design will minimise the visual impact on the receiving environment. The landscape and visual impact assessment concludes that despite the inevitable visual impact which would arise from a development of the nature and scale proposed, the predicted landscape and visual changes are ultimately appropriate and acceptable.

7.0 Traffic

7.1 Introduction

SWS Environmental Services carried out a traffic impact assessment to identify the potential impact of construction and operational generated traffic on traffic levels on the surrounding road network. The traffic impact assessment of the proposed biomass plant involved a desktop study, traffic counts and meetings with the Monaghan County Engineer, Roads Engineer and Area Engineer for the Emyvale Region.

In March/April 2005 QED Engineering Ltd and Malone O'Regan Consulting Engineers prepared a report which details additional information on the impacts of the proposed development in relation to traffic and proposals for improvements in surface quality and carriageway widening to enhance the traffic capacity and overall safety of the route. This report is included in Section 4.0 of the Submission of Further Additional Information requested for P03/446.

In examining the impact of the development on road infrastructure and traffic management it is important to note that it is generally regarded that the road network in Monaghan County is of very poor quality. This is noted by the Monaghan County Development Board's Economic Infrastructure Working Group "swap analysis" and in the County Development Plan, Section 4, Infrastructure, where it is stated that "Monaghan, in common with other Border counties has a

deficient infrastructure. The county road network, which is the only mode of transport, requires upgrading at all levels." The development will facilitate improvements in road infrastructure in the environs of the proposed development.

7.2 Existing Environment

The development site is located on a minor third class road. As shown in Figure 1.2. The road network around the site consists of narrow third class roads which are already used by a considerable amount of heavy goods vehicles (HGVs). The nearest main route is the R186 at a distance of approximately 3 km, the N2 is located approximately 4 km east of the site.

(i) Existing Traffic

SWS Environmental Services carried out traffic surveys at the proposed site and at the R186 to assess the existing traffic in the area. Volumes of traffic are described in terms of the *Passenger Car Unit* (PCU). 1 PCU is the unit of road traffic equivalent to one normal private car or light private goods vehicle for capacity purposes. *Heavy Goods Vehicles* (HGVs) and *Heavy Commercial Vehicles* (HCV's) are taken to be equivalent to 3 PCU's.

The two-way peak hour traffic on the third class road at the proposed site was 29 PCU's per hour, comprising of 20% heavy commercial vehicles (HCV's). The two-way peak hour traffic on the R186 was 108 PCU's per hour, comprising of 27% Heavy Commercial Vehicles (HCV's).

The Annual Average Daily Traffic (AADT) for the N2 at Emyvale was 5,423 *Mechanically Propelled Vehicles* (MPV's). According to the 1999 National Roads Authority survey, 23% of the AADT on the N2 consisted of HGVs.

(ii) Existing Traffic Capacity

The existing traffic flows on both the R186 and the N2 are within the design capacities for these roads and a moderate increase in the numbers of HCVs and other traffic will not have a significant effect on the capacities of both roads. However the third class roads linking the plant with the R186 and the N2 are regarded has having poor surface quality and narrow carriageway width, which ranges from 3-5m.

7.3 Construction Impacts and Mitigation Measures

Based on the number of workers envisaged to be employed on site during the construction of the site, peak construction traffic is expected to be approximately 50 passenger cars. Construction HCVs are expected to be in the order 15 HCVs per day, or 45 PCU's, with a total two-way peak of 12 PCU's.

The primary mitigation measures will be the implementation of a traffic management measures that will support the provision of integrated shared travel and where feasible a dedicated bus route from population centres (Monaghan

and Emyvale) for site workers. A temporary car park facility will be provided in the construction site or neighbouring lands for the duration of the construction period.

Development Strategy for the Construction Phase
The developer would intend that the access road to the site be improved to a 5.5m carriageway width during the construction phase of the development to facilitate construction activities to take place at the site. In the longer term, it is goal of the developer to improve the road surface quality and carriageway width to the standard as proposed in the Section 4.0 of the Submission of Further Additional Information. The developer would envisage that this standard would be achieved through dialogue and close consultation with the Roads Authority at Monaghan County Council, who will ultimately dictate the final road design standard acceptable for the section of road in question.

7.4 Operation Impacts and Mitigation Measures

In their present condition, the third class roads connecting the site to the R186 in the west and the N2 in the east are generally regarded as narrow, with poor surface quality evident in areas. The volume of traffic generated by the development would result in a 110 – 120% increase of existing traffic levels on these roads at peak hour.

Further to discussions with the head of roads at Monaghan County Council in 2001, it was envisaged that these roads would have to be upgraded. This upgrade will involve the widening of the carriageway width to a uniform width suitable for two-way HCV traffic. There will be a single access point to the site from the third class road beside the site. Traffic generated by the development will have a negligible impact on traffic levels in the N2 primary route. The peak hour traffic on the R186 will result in a maximum of a 15% increase in traffic volume due to the development of the biomass plant and will not be significant. The primary mitigation measure will be the upgrade of the minor roads connecting the site to the N2 and R186 to a standard that will prevent disruption of the existing traffic flow and damage to current road infrastructure.

In March/April 2005 Malone O'Regan Consulting Engineers and QED Engineering Ltd were commissioned to prepare a report which examines in detail the proposals for upgrading of the third class roads linking the site to the R186 and to the N2. This report is included in Section 4.0 Traffic Impacts, of the Submission of Further Additional Information requested for P03/446.

Other mitigation measures will include the restriction of SMC and poultry litter delivery to 10 hours per day, 6 days a week and the implementation of a traffic management plan for employees travelling to and from the site.

7.5 Conclusion

As established in the County Development Plan "the county road network, which is the only mode of transport, requires upgrading at all levels." The development

will facilitate improvements in road infrastructure in the environs of the proposed development. Having examined the likely impact of the proposed development on the road network in the area it is concluded that upgrade of the existing third class roads connecting the site to the N2 and R186 will be required to enhance traffic capacity and overall road safety. The level of upgrade will be determined in conjunction with Monaghan County Council. The construction of a properly designed access junction will also be determined in conjunction with the Council.

8.0 Geology, Soils and Hydrogeology (Groundwater)

8.1 Introduction

K.T. Cullen and Co. Ltd. carried out a baseline geological assessment of the proposed site in order to determine the existing environmental conditions and groundwater potential of the area. As water requirements for the plant will be provided by a groundwater abstraction well, a trial well was installed in order to determine the potential for groundwater development. Groundwater quality at and around the site was determined to establish baseline environmental conditions. Soil and herbage characteristics at the site and within the surrounding environment were also established. These can be used as baseline references for future monitoring.

In March 2005, QED Engineering Ltd was commissioned to prepare a report in detailing additional information on the impacts of the proposed development on groundwater and surface water. This report is included in Section 6.0, Aquatic Emissions, of the Submission of Further Additional Information requested for P03/446.

8.2 Existing Environment

The overburden consists predominantly of thick drumlin boulder clays and can be classified as having a low vulnerability rating with greater than 10m of low permeability clays overlying the site. The site is located on a regionally important aquifer. Pump testing on the trial well located at the site indicates that it can easily accommodate the 4.8 m^3/hr normal water requirements for the plant, with initial trial well yields estimated of greater than 27m^3/hr.

8.3 Construction and Operation Impacts and Mitigation measures

i) Abstraction from groundwater

The required groundwater yield at the site was established from field examination to be on average, 90m^3 per day (sustainable yield of 650 m^3 per day). The plant has been designed so as to minimise water usage, with the primary water saving measure being an air-cooled as opposed to water-cooled condenser. It has been determined that there is sufficient capacity to easily supply the required amount of water for potable and process needs without significantly impacting local

groundwater levels. All other residences in the area are supplied by a group water scheme with a surface water source and will not be negatively impacted.

ii) Removal of overburden cover and bedrock

It is not proposed that any significant volume of overburden or bedrock will be removed from the site. During the construction phase, exposed soil can be dampened to avoid erosion of soil and generation of dust. Topsoil and overburden excavated on site will be used for levelling and landscaping on the site.

iii) Natural Heritage Areas and Special Areas of Conservation

There are no Natural Heritage Areas (NHA's) or Special Areas of Conservation (SAC's) within 5 km of the site. No mitigation measures are therefore considered necessary.

iv) Accidental spills

The main potential impact to groundwater would be from accidental spillages of fuels, oils or chemicals resulting in groundwater contamination. Fuel supplies will be handled and stored within enclosed buildings constructed with an impervious concrete floor. Oil and chemicals used on site will be stored within appropriate bunded containment areas.

8.4 Conclusion

The development of a permanent groundwater abstraction well to provide plant water requirements will not have any significant impact on the regional groundwater resource. Good housekeeping in conjunction with correct storage and use of materials on site will prevent any spillage to groundwater that could cause contamination.

9.0 Surface Water

9.1 Introduction

As part of the Environmental Impact Assessment in 2001 SWS Environmental Services carried out sampling of surface water sampling and biological monitoring at the River Mountain Water Catchment area to determine existing surface water conditions. A small stream is located approximately 38m from the site boundary. Water sampling was carried out upstream of the site area and downstream of the site area. Sampling was also carried out upstream and downstream of the River Mountain Water.

In March 2005 QED Engineering Ltd prepared a report detailing additional information on the impacts of the proposed development in relation to surface water and groundwater. This report is included in Section 6.0, Aquatic Emissions, of the Submission of Further additional Information requested for P03/446.

9.2 Existing Environment

There are no major surface water features such as lakes, ponds, rivers or streams within the boundary of the proposed development. There is a small stream located approximately 38m from the site boundary. This stream feeds into the River Mountain Water. This is an eroding upland river, located at a distance approximately 1km from the site. The River Mountain Water is a tributary of the river Blackwater with their confluence approximately 10km to the east of the site boundary. The Mountain Water River is an important local fishing area and has stocks of Pike, Tench, Roach, Bream, Perch and Rudd.

Current site drainage consists of drainage ditches at the perimeter of the site fields. The drainage ditches are open and water falling on the proposed site area will flow overgound to the ditches or it will percolate trough the soil and drain to the ditches, which are at a lower level to the fields themselves. At one point on the proposed site area, surface water leaves the site and gradually flows a distance of 38m along an open drainage ditch in the next field to a stream, which is a tributary of the River Mountain Water. The existing surface water quality at both the site drainage stream and the Mountain Water River can be described as moderately polluted, probably as a result of the intensive agricultural activities within the area. This was confirmed through both biological as well as physico-chemical sampling upstream and downstream on both channels. In March 2005 when all the ditches were visually examined, those to the west of the proposed site were dry and those to the east contained water which was not flowing.

9.3 Construction Impacts and Mitigation Measures

Potential impacts during construction are from accidental spillages of oils or chemicals as well as sedimentation resulting from soil and overburden removal. As unmitigated construction runoff water is often high in suspended solids, all activities during the construction period will be controlled to minimise and contain sediment runoff, which may otherwise impact negatively on the receiving water body. Good construction housekeeping measures, including the provision of a settlement/sedimentation tanks or silt traps, oil water interceptors and dust control measures, will minimise any impact on the river water quality during this period.

9.4 Operation Impacts and Mitigation Measures

(i) Accidental Spillages

Accidental spillages of chemicals and fuel resources could result in surface water contamination during plant operation. To mitigate against this, good housekeeping in conjunction with correct storage of all site chemicals and oil, will prevent any spillages which could impact on surface water quality.

(ii) Stormwater Runoff

An increase in surface water runoff can be expected as a result of the addition of

impermeable surfaces (hardstanding) at the proposed plant. Rainwater falling on site will be diverted to a single surface water discharge point. Pollution of surface water will be minimized by proper design of the discharge point to prevent alteration of existing conditions within the ditch into which it will discharge. Such design could include having a gradual gradient at the discharge point to prevent pools of water forming and also controlling the flow rate at the discharge point. In addition, run-off from storm water to surface water will be through sediment traps and surface water oil interceptors. A Stormwater retention pond is also proposed as part of the site design to minimise flooding in high rainfall events.

(iii) Waste Water

Waste water will be generated from various processes on site. As there is no access to sewer, wastewater from the plant will be directed to a single surface water discharge point. Waste water will arise from the water treatment plant, boiler blowdown, condensate from fuel drying and floor drains. A wheel wash can also be installed on the site, if required which will also generate process effluent.

All process effluents will be directed in separate drainage lines to a submerged sedimentation and oil separation tank, with an approximate capacity of 60m^3. In this tank, sedimentation, cooling, separation and neutralisation takes place. The normal discharge volume will be approximately 5m^3/day.

(iv) Foul Sewage

Domestic effluent from operator washrooms and site offices will be treated via on-site treatment, as a public sewer is not available. The sewage treatment will be via a "Bioclear" treatment unit. This unit will treat the effluent to a high quality standard; which will then be discharged to a soil polishing filter, where it will be further polished at treated before slowly percolating to groundwater.

9.5 Conclusion

The surface water drainage route from the site has been identified. With the proposed measure in place for protection and mitigation of pollution of surface water discharged from the site, no major impacts on the quality of the River Mountain Water are anticipated. The site will be operated under an EPA licence therefore all emission from the plant will be strictly controlled to adhere to the licence requirements.

10.0 Climate

10.1 Introduction

Impacts of a new development can impact both the macro and microclimate conditions. Impacts on local microclimate can include local dust nuisances during earth moving operations, alterations to airflow from building obstructions, the formation of fog from cooling towers and thermal pollution from stack discharges. On a larger or macroclimatic scale, developments can impact global climate systems through the formation of greenhouse gases.

10.2 Existing Environment

As part of the Environmental Impact assessment carried out in 2001, meteorological data for Monaghan was obtained from the Clones monitoring station, being the closest monitoring station to the development. Wind direction, rainfall, temperature, humidity and sunshine were all examined to establish baseline climatologically conditions and to assess the impacts, if any, the development would have on the local and global climate. Prevailing wind direction in the region is south westerly with mean annual wind speeds of 4.3m/s. Annual rainfall for Clones monitored from 1961-1990 was 928mm and annual average temperature ranged from 5.1- 14.7^{o}C.

10.3 Construction Impacts and Mitigation Measures

Construction activities on site are not anticipated to have an impact on the climate on a microclimatic or macroclimatic scale. Therefore no mitigation measures are considered necessary.

10.4 Operation Impacts and Mitigation Measures

A) Microclimatic (Local) Impacts

i) Wind: Any alterations on air flow around plant buildings will be within the boundary of the site only and will not impact on the external environment

ii) Precipitation, Temperature, Sunshine and Humidity: There will be no impacts on precipitation or temperature as a result of the development. Shadow casting from the plant will be very localised and will not impact on the local environment. The plant will employ an air-cooling system and therefore will not add to the ambient humidity of the locality

iii) Fog: Saturated air from the main stack will result in a visible plume. Stack height will prevent this from condensing as ground fog.

B) Macroclimatic (Global) Impacts

Global Warming: Emissions from CO_2 are the greatest contributor to global warming. As biomass is CO_2 neutral this development operating at full capacity will result in the annual avoidance of 188kT of CO_2 to the atmosphere and thus will help Ireland in limiting its greenhouse gas emissions. The avoidance of land filling or land spreading waste will minimise the production of methane, another greenhouse gas contributor.

10.5 Conclusion

The development will not adversely impact on local climatic conditions and will have a positive impact on global climate.

11.0 Flora and Fauna

11.1 Introduction

An ecological survey was completed in 2001 at the site of the proposed development at Killycarran, Co. Monaghan spanning the seasons of summer and autumn with the objective of gathering primary information for the compilation of a comprehensive and accurate description of the existing environment. Predicted impacts of the development were then projected onto this baseline ecological configuration and their significance assessed. Ameliorative measures, which would be employed to mitigate any impacts associated with the project, were described.

In March 2005 Cunnane Stratton Reynolds Land Planning and Design Ltd were commissioned to prepare a revised landscaping plan for the proposed development.

11.2 Existing environment

i) Flora

A site survey, identifying ecological habitats and divisions within the site boundary, was conducted. No rare, threatened or protected plant species, as listed in the Irish Red data Book (Curtis and Mc Gough, 1988) were recorded at the site during the survey nor did the Conservation ranger for the area have any knowledge of the occurrence of any rare plant species. The area of the site does not include any semi-natural habitats such as woodland, true marsh, or surface water bodies. The main habitat components of interest are the hedgerow and tree line field boundaries. These ecological entities at the site have not undergone maintenance in recent times and therefore display poor structural development and are of limited ecological value. Some specimens of woody species in the field boundaries hold the potential to become valuable to local wildlife. Some shallow drainage ditches occur along field boundaries within the site also, but have not been managed or maintained in recent times and are, largely, filled in.

ii) Fauna

A site survey for mammalian species was conducted. One abandoned Rabbit (*Oryctolagus cuniculus*) burrow was recorded. No additional burrows, faeces or indicators of activity were found to occur within the site. No existing or potential bat roosts were recorded, nor was any bat activity observed at the site during the survey period. Common agricultural grassland and wet grassland bird species were observed. An outline of bird species occurring in the locality and extended area was given, based on information from local sources. A butterfly survey recorded the occurrence of three common wayside and wet meadow species.

11.3 Construction and Operation Impacts and Mitigation Measures

i) Flora

The proposed development will impact on terrestrial flora through the removal of vegetation for the construction of building units and areas of hard-standing. The impacts are significant on a local scale. Impacts are not significant on a regional or national scale. The development will require the removal of four lengths of hedgerow/tree-line within the site boundary and the partial removal of a fifth for entrance widening.

ii) Fauna

Potentially, the disturbance of greatest significance to faunal species would be the removal of field boundary lengths to accommodate the development. Hedgerows and embankments are the ecological elements with the greatest potential to accommodate mammal species. The occurrences of mammalian species were not recorded at the site. No burrows, faeces or indicators of activity were found to be present. There will therefore be no significant impact on mammal populations in the area. The site itself does not act as a wildlife corridor and no disruption of this nature is anticipated either during the constructional phase or the operational phase due to the contained nature of the site area.

Mitigation Measures

Strategic management and maintenance of the tree lines in particular would enhance and increase the faunal diversity accommodated by the trees. It is proposed that the most valuable specimens of indigenous and locally important tree species be selected along the tree lines. Weaker species between these selected specimens will be eliminated in order to allow the maturation of a number of ecologically valuable individual trees rather than the poor development of a great number. This will play a role in enhancing the ecological richness of the area in addition to providing a visual screen for the development. There is also an opportunity for the planting of new hedgerows for division and screening of various sections of the installation. Indigenous species from local genetic stock would be employed respecting the genetic integrity of local plant specimens.

11.4 Conclusion

The introduction of the proposed development to the receiving environment described is not predicted to have a significant impact on ecology on a regional or national scale. Removal of existing gappy hedgerows will have a local impact but it is believed that the introduction of a regime of maintenance and management to remaining hedgerows will enhance their ecological richness and provide a significant habitat of high quality replacing a more abundant poor quality habitat type.

12.0 Cultural Heritage

12.1 Introduction

In order to establish the existing archaeological environment at the site an archaeological site survey was carried out on behalf of South Western Environmental Services. A field site survey and desk based assessment were carried out. No evidence of archaeological features was noted.

12.2 Construction and Operation Impacts and Mitigation Measures

Although there was no clear evidence of archaeological activity within the environs of the site, it is however possible that previously unrecorded archaeological sites may be affected during ground works associated with construction. In view of this, an archaeologist will monitor topsoil removal on site. In the event of discovering any archaeological features, they will be investigated and reported to the Duty Officer of the National Museum of Ireland and to Dúchas, the Heritage Service.

12.3 Conclusion

The mitigation measures outlined above will prevent any negative impacts on any potential archaeological finds on the site during construction.

13.0 Material Assets

13.1 Introduction

This section assesses the potential impacts of the development on the material assets of the surrounding area as well as assets of natural origin, and identifies measures to mitigate against any significant negative impacts. This section covers a number of issues already addressed in the Original EIS and in the documentation submitted in response to requests for additional information.

13.2 Existing Environment

The existing material assets include the surrounding road network, groundwater resource and fuel resources. All of these areas have been examined in various sections of the original EIS and in the documentation submitted in response to Monaghan County Councils requests.

13.3 Construction Impacts and Mitigation Measures

The principal impact during construction on material assets will be as a result of construction and operational traffic generated by the proposed development. Mitigation measures against the negative impacts arising from Construction HCV's and Construction Employee traffic include the implementation of a traffic management plan and limiting construction traffic movements to the daytime hours where possible.

13.4 Operation Impacts and Mitigation Measures

i) Traffic

In order to accommodate increased traffic associated with the development and to enhance traffic capacity and overall safety on the route, the third class road linking the site to the N2 and the R86 will require upgrading. Full details of the proposals for carriageway widening and improvement to the surface quality of this section of road are detailed in Section 4.0, Traffic Impacts of the Submission of Further Additional Information requested for P03/446.

ii) Fuel Resource (Economic)

Biomass based fuels are locally sourced and sustainable in contrast with fossil fuels which are ultimately unsustainable. The development will reduce carbon dioxide emissions and have a positive impact through the generation of locally generated electricity.

iii) Groundwater Resource

It is intended to extract potable groundwater on the site for use as potable and process water for the proposed development. It is unlikely that normal pumping at the required rate will significantly impact local groundwater levels. Excluding the domestic well located in use close to the site, which is owned by the site owner, all other residences in the area are supplied by a group scheme with a surface water source

13.5 Conclusion

The material assets within the area of the proposed development will not be adversely impacted by the development

14.0 Interaction of the foregoing

14.1 Introduction

Environmental Impact Assessment (S.I No. 349 of 1989; S.I. No. 93 of 1999) states that not only are the impacts on the individual elements of the environment to be considered, but so too are the interactions between those elements. Table 14.1 illustrates the interaction of impacts assessed for this project.

Table 14.1 Impact Interaction Matrix

	Geology	Air	Water	Noise	Climate	Flora & Fauna	Cultural Heritage	Land-scape	Traffic	Human Beings	Material Assets
Geology			✓			✓		✓			
Air				✓	✓				✓	✓	
Water					✓	✓					
Noise									✓	✓	
Climate		✓	✓								
Flora & Fauna	✓		✓								
Cultural Heritage								✓		✓	✓
Landscape	✓						✓			✓	✓
Traffic		✓								✓	✓
Human Beings		✓		✓							
Material Assets							✓		✓	✓	

14.2 Discussion

The elements of the development that may be considered to have a negative impact on the environment are atmospheric emissions from the plant stack, noise emissions, an increase in traffic resulting from fuel haulage and visual impact as a result of the introduction of a new agri-industrial element to the rural landscape.

Noise generated from the plant will comply with noise legislation designed to minimise any noise impacts. Air emissions will represent only minor fractions of applicable air quality standards and therefore will not adversely impact public health or safety. The plant will be designed to mitigate emissions from the stack. Improvements to the current road network will ensure traffic increases can safely be accommodated and road safety. The landscape and visual impact assessment has concluded that the that the proposed development makes optimal use of existing vegetation and landcover and also proposes effective screening and landscaping measures to minimize visual impact. The development is in keeping with an existing trend of agricultural transition to gri-industrial land-use in the region. The predicted landscape and visual changes are ultimately appropriate and acceptable.

The development will support the initiatives of the Monaghan County Development Board's Economic Infrastructure Working Group "swap analysis" providing serviced industrial land for development and needs of local industry and large-scale inward investment, investment in infrastructure, improving waste management for industries in a sustainable manner and developing renewable energy sources within the region. Additional benefits are outlined below.

i) Environmental Benefits

The utilisation of locally generated biomass fuel to generate electricity will help reduce CO_2 emissions and reduce reliance on fossil fuels Help promote EU Policy for the development of new renewable energy fuels and the reduction of environmental burdens of fossil fuel power generation. The proposed plant will help to reduce water quality impacts associated with land application of waste of high nutrient content and will reduce odour emissions from stockpiling and land application of SMC and PL.

ii) Economic Benefits

Plant construction will result in estimated employment figures of 50 over the construction period and 25 jobs during plant operation. In addition there will be indirect employment created in the form of local support services and fuel transport. Plant operational expenses will also benefit the local community. Improvements in road infrastructure will improve road safety and access to business and dwelling along the route in question.

iii) Benefits to Mushroom and Poultry Industries

The proposed plant will provide better management options for disposal of wastes associated with these industries. The reduction of landspreading waste will impact positively on the viability of agricultural enterprises in County Monaghan. The proposed development will aid farmers in meeting the requirements of increasing regulation of waste management with the provision of a sustainable and economic alternative.

14.3 Conclusion

The development of a biomass poultry litter and spent mushroom compost combined heat and power plant will provide a reliable year-round alternative to land application of these materials. While there will be some unavoidable impacts in terms of increases in traffic and air emissions, mitigation will be put in place to minimise these and no significant adverse environmental effects are anticipated from the development. The poultry and mushroom industries are very important economically in Monaghan and the border regions and their continued development is dependant on finding an environmentally acceptable solution to the current waste disposal problems associated with land spreading. Finally, the EIS and also the documentation submitted in response to the requests for additional information, provide the community, government, non-government bodies and other interested parties with information regarding the existing environment, potential impacts associated with the proposed development during the construction and operation phases, and any mitigation measures required to ameliorate these impacts.

{End of Revised Non Technical Summary; February 2007}

3. Capacity of Plant, Fuel and Waste Quantities

All references in the EIS documents to the capacity of the plant and quantities of fuel to be used and wastes generated should be replaced as follows (February 2007 data);

The site proposes to generate 20 MW_{el} (net) of electricity by combustion of the following wastes;

Table 1. Monopower Predicted Fuel Quantities

Waste	Assumed Water Content %	Quantity (tonnes/annum)
Spent Mushroom Compost (SMC)	70	50,000
Poultry Litter (PL)	45	200,000
Wood Chips (WC)	55	75,000
Total Tonnes / Annum		***325,000***

If the PL has a lower annual average water content, the need for WC will be reduced and the total fuel consumption will be less than 325,000 t/a. Also note that the actual split between the three fuels will vary somewhat from year to year, depending on fuel availability and quality among other things.

The average (wet) ash content of the fuel is estimated to be 7.3%. Added to this there will be a small amount of unburned carbon (estimated as approx. 0.2% of the fuel flow), meaning that approx. 22,000 t/a of dry ash will be produced. Roughly half of this will leave the boiler as bottom ash and will absorb water in the wet ash conveyor, equal to the amount of ash, so as a result 22,000 t/a of wet bottom ash will be produced.

The remainder of the ash will be fly ash captured in the bag filter. This will also contain a significant amount of residual from the flue gas desulphurisation process (calcium sulphate and excess lime). With the fuel mix shown in the table above, it is estimated that approx. 3,000 t/a lime will be needed (i.e. significantly less than before). Because of the chemical reactions in the flue gas desulphurisation process, we end up with approx. 5,500 t/a residual product, or a total of approx. 16,500 t/a ash/residue collected in the filter (fly ash).

The total amount of ash is thus approx. 38,500 t/a. However, this figure is very dependent on the ash and sulphur content of the fuel and also on the assumed split between bottom ash and fly ash. It can therefore vary somewhat from the estimate.

4. Disposal of Fly Ash and Bottom Ash

All references in the EIS documents to disposal of fly ash and bottom ash should be replaced as follows (February 2007 data);

The optimum disposal routes for fly ash and bottom ash are;
1. Use as a fertilizer
2. Use as a raw material in the cement industry
3. Disposal to landfill

Use as Fertilizer

In the UK, three poultry biomass fuelled electricity stations produces a very fine quality ash that is rich in phosphates and potassium. The ash is sold as a high quality agricultural fertiliser by another group company Fibrophos. In 2004/05 Fibrophos sold over 63,000 tonnes of product.

Fibrophos is a concentrated fertiliser of totally organic origin consisting mainly of phosphate, potash, with sulphur, magnesium, calcium, sodium and significant quantities of essential trace elements required by crops and grass. Fibrophos is a unique modern fertiliser, which is a compound fertiliser and not a blend.

When Monopower is set up it will examine the fly ash and bottom ash contents and determine if it can be used in the same way as Fibrophos is used. At present it is not possible to know exactly what the end concentration of the ash will be, so further details on this issue will not be available until the site is operational.

Use in the cement industry

Fly ash is commonly used in the production of cement. Once the Monopower site is operational, the concentration of the ash will be determined and if it meets the required standards its use will be considered for this purpose.

Disposal to landfill

If the above two methods for re-using the fly ash at the site fail, the company will have no other option but to disposal of this product to landfill. Because the concentration of the end product is not known, it is not possible to provide these details to a landfill to determine if they are licenced to accept such waste. However, if disposal is the only option for this waste product, this route will be pursued at the relevant time.

Similar biomass fuelled power stations do not have any problems in the re-use or disposal of their end products, so it is not envisaged that this will arise on the Monopower site.

5. Emissions of Process Effluent

All references in the EIS documents to wastewater discharges from the site should be replaced as follows (February 2007 data);

Process effluent from the Monopower CHP plant arises from 4 main sources as shown in the following table. The normal and maximum volume of effluent water to be generated is also provided.

Table 2. Monopower Predicted Process Effluent Volumes

Effluent	***Normal volume generated m^3/day***	***Maximum volume generated m^3/day***
1. Water Treatment Plant	0.15	20
2. Boiler blowdown	2.4	20
3. Condensate from Fuel Drying	1	40
4. Floor Drains	0.2	1
Total volume	***3.75***	***81***

A wheel wash can also be installed on the site, if required which will also generate process effluent.

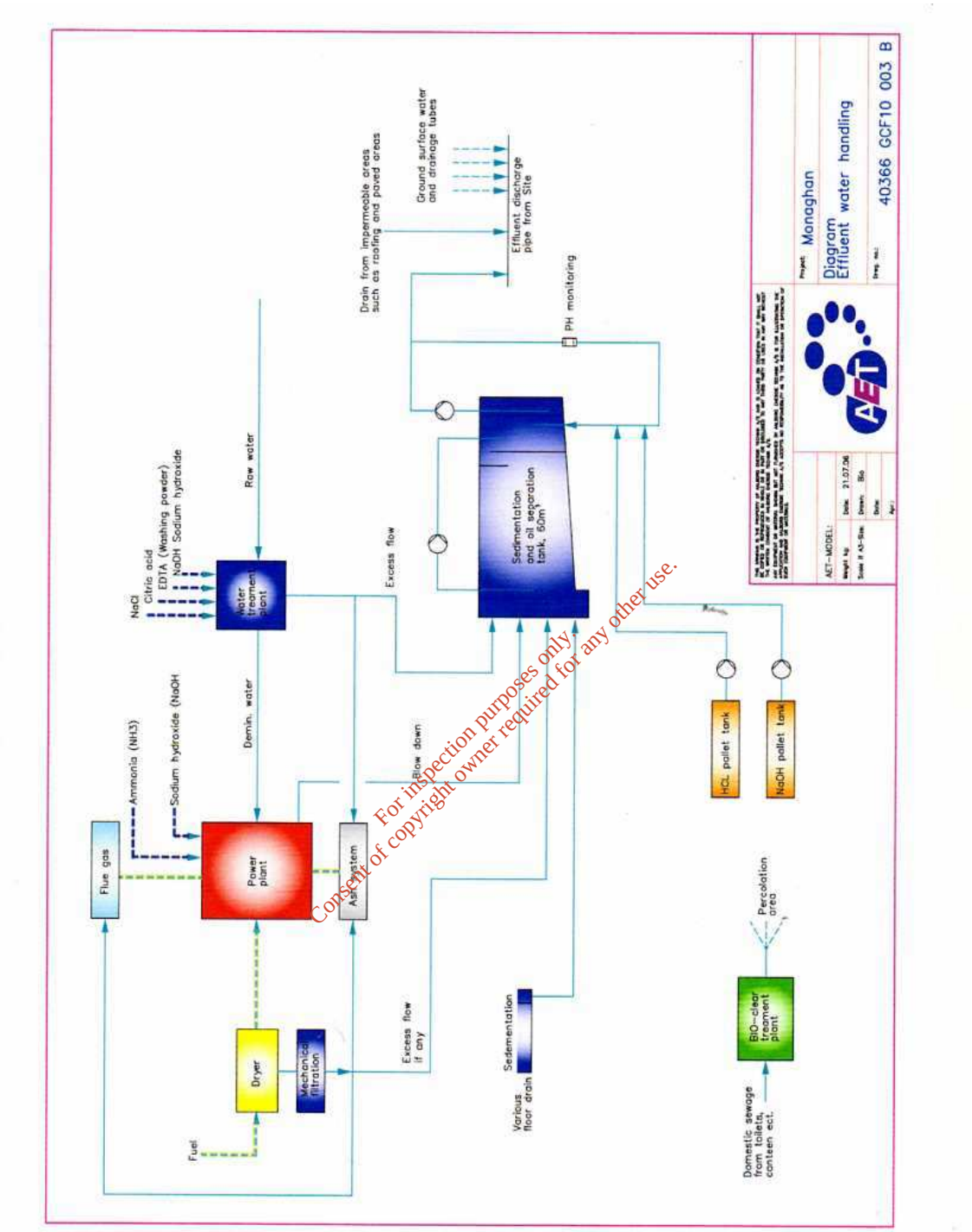
All process effluents (1-4) above will be directed in separate drainage lines to a submerged sedimentation and oil separation tank, with an approximate capacity of 60m^3. In this tank, sedimentation, cooling, separation and neutralisation takes place. Based on the above inputs to the sedimentation tank the normal discharge volume will be approximately 5m^3/day.

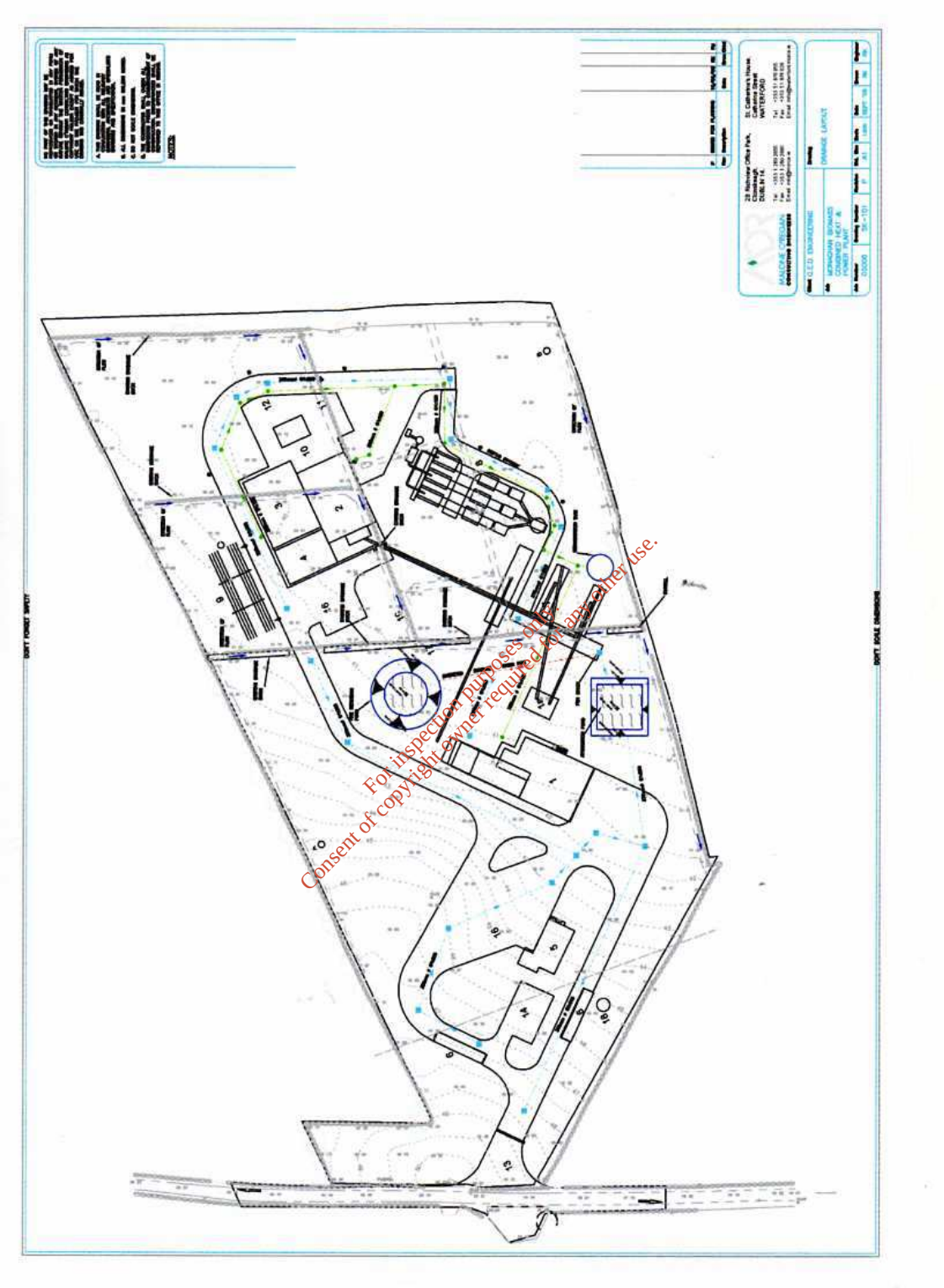
Process effluent in the sedimentation tank is neutralised by NaOH and HCL to stabilise the pH. If ammonia removal from the wastewater is required a small scale constructed wetland could be installed. In a year 55kg of 25% ammonia solution is to be added to the boiler water i.e. 13.75kg of pure ammonia. A significant part of this, 50% will escape with sootblowing steam, so the total ammonia discharge will be less than 10kg/year.

A schematic diagram to indicate the effluent and water handling at the site is included (Drawing No. 40366 GCF10 003 B) showing the 4 separate inputs to the sedimentation tank i.e. water treatment plant, blow down, condensate from the dryer and floor drains.

The wheel wash system will be designed according to best practice and will also have a separate drainage line, discharging to the sedimentation tank. This is not shown on the AET drawing as they typically do not have to deal with wheel wash effluents on their biomass CHP plants. However if it is deemed necessary a wheel wash will be installed at the site.

In summary, all process effluents on the site will be kept separated from the uncontaminated surface water (rainwater) and treated as required prior to discharge in the sedimentation tank and small scale constructed wetland, if necessary. This is shown further in the drainage layout provided.





6. Surface Water Quality

The site proposes to discharge treated process effluent to the stream 38m from the site boundary. This stream feeds into the River Mountain Water 1km from the site. The Mountain Water River is a tributary of the Ulster Blackwater, which feeds into Lough Neagh.

The site proposes to discharge 5m^3/day of wastewater from the site over a 3-5 hour period. This equates to 0.00035m^3/sec (0.35 l/s) over a 4 hour day or 0.00006m^3/sec (0.06 l/s) over a 24hour day. Even taking into consideration the maximum discharge of 70m^3/day (rare occurrence) this equates to 0.0008m^3/sec (0.8 l/s) over a 24 hour day. The flow rate in the stream in February 2005 (month of low rainfall) was 10.2 l/s. Therefore the flow in the stream is greatly in excess of any discharge of process effluent from the site i.e. 0.35l/s for 4 hours per day or 0.06l/s over a 24 hour day or even 0.8l/s over a 24 hour day during maximum discharge. Therefore the process effluent flow from the site is very small in relation to the potential capacity of the stream.

The discharge of process effluent will not impact on ambient surface water quality in the vicinity of the site or beyond. Any effluent generated will be treated to the required standard in the sedimentation tank/small scale constructed wetland. Details of the standards to be achieved are provided in Table 3. If additional standards or limits are set by the EPA, these will be met. Therefore ensuring that process effluents are treated to the required standards will ensure that the site does not impact on ambient water quality.

All surface water discharged from the site to the nearby river will meet the maximum discharge limits, as outlined in Table 3.

Table 3. Monopower Maximum Concentration of Surface Water Discharges

Parameter	Maximum Daily Average Discharge Concentration (mg/l)
Total Suspended Solids	30 (95% of the time) 45 (100% of the time)
Mercury and its compounds	0.03
Cadmium and its compounds	0.05
Thallium and its compounds	0.05
Arsenic and its compounds	0.15
Lead and its compounds	0.2
Chromium and its compounds	0.5
Copper and its compounds	0.5
Nickel and its compounds	0.5
Zinc and its compounds	1.5
Dioxins and furans	0.3
pH	6-9

7. Treatment of Air from Fuel Reception and Storage areas

All references in the EIS documents to the venting of air from the fuel reception and storage areas to the boiler should be replaced as follows (February 2007 data);

A biofilter is proposed to clean the ventilation air from the fuel reception and storage areas. Ventilation air from these areas will be drawn through a biofilter to mitigate emission of dust, odours and air borne pathogens. As the air passes through the filter, micro organisms decompose any compounds into CO_2 and water. Due to the low air velocity in the filter, non-organic dust in the ventilation air will also be retained.

8. Air Quality - Predicted Stack Emissions

All references in the EIS documents to predicted air emissions from the site should be replaced as follows (February 2007 data);

Table 4. Monopower Predicted Emissions from Boiler Stack

Parameter	Predicted Average Concentration mg/Nm^3	Predicted Maximum Concentration mg/Nm^3
Particulates	<3	10
Nitrogen Oxides	150	200
Carbon Monoxide	45	50
Volatile Organic Carbon	2	10
Sulphur Oxides – SO2	45	50
Hydrogen Chloride (as HCL)	2	10
Hydrogen Fluoride (as HF)	0.3	1
Dioxins and Furans	0.002ng/Nm^3	0.1ng/Nm^3
Metals Cd & Ti	<0.001	0.05
Metal Hg	<0.001	0.05
Metals Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V	<0.5	0.5

- Average Temperature – 100^{0}C
- Efflux Velocity – 20m/s

Table 5. Monopower Predicted Emissions from Biofilter

Parameter	Predicted Maximum Concentration mg/Nm^3
Ammonia	<50ppm
Amines	<5ppm
Hydrogen Sulphide and Mercaptans	<5ppm

9. Atmospheric Air Dispersion Modelling

All references in the EIS documents to air dispersion modelling should be replaced with the Air Dispersion Modelling Study for Monopower Ltd carried out by Q.E.D. Engineering Ltd, August 2006, as provided in this updated EIS.

Air Dispersion Modelling Study

for

Monopower Ltd.

Killycarran
Emyvale
Co. Monaghan

by

Q.E.D. Engineering Ltd
11 Market Street
Monaghan
Ireland
Tel: 00353 47 72060
Fax: 00353 47 72061

August 2006

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1. Introduction

An air quality modelling study was undertaken for Monopower Ltd, Killycarran, Emyvale, Co. Monaghan to predict the air quality impact of maximum proposed emission levels from the main stack on the proposed Biomass CHP Plant. The study used the ADMS-3 atmospheric dispersion model from Cambridge Environmental Research Consultants Ltd (CERC). The work was carried out as part of the company's Waste Licence Compliance requirements.

There is one proposed emission point on the site: A1-1 from the CHP plant. The stack is to be located at the back of the site, behind the boiler building. For the purposes of this air dispersion modelling study, the maximum air emission limit values specified in Annex V of Council Directive 2000/76/EC on the Incineration of Waste (WID) were input onto the model, as detailed in Table 1. Actual predicted emission rates from this stack are lower than the maximum permitted values given in Table 1 therefore this modelling study represents worst case conditions.

Table 1. Directive 2000/76/EC, Annex V Air Emission Limit Values

Parameter	**Concentration mg/Nm^3**
Total Dust	10
Total Organic Carbon (TOC)	10
Hydrogen Chloride (as HCL)	10
Hydrogen Fluoride (as HF)	1
Sulphur Dioxide (SO_2)	50
Nitrogen Oxides (as NO_2)	200
Cadmium, Cd & Thallium, Ti	0.05
Mercury, Hg	0.05
Amtimony, Sb; Arsenic, As; Lead, Pb; Chromium, Cr; Cobalt, Co; Copper, Cu; Manganese, Mn; Nickel, Ni; Vanadium, V.	0.5
Carbon Monoxide (CO)	50
Dioxins & Furans	0.1 ng/Nm^3

Table 2 gives the emission point characteristics that were used in the model.

Table 2: Characteristics of Air Emission Point A1-1

Parameter	**A1-1**
Stack Height (m) *	50
Stack Diameter (m)	1.75
Exit Velocity (m/s)	20
Exit Volume (m^3/s)	48.1
Stack Temp (^{0}C)	100
	Emission Rate g/s**
Total Dust	0.5778
Total Organic Carbon (TOC)	0.5778
Hydrogen Chloride (as HCL)	0.5778
Hydrogen Fluoride (as HF)	0.0578
Sulphur Dioxide (SO2)	2.8889
Nitrogen Oxides (as NO2)	11.556
Cd & Ti	0.0029
Hg	0.0029
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V.	0.0289
Carbon Monoxide (CO)	2.8889
Dioxins & Furans (PCDD / PCDF)	6.0E-09

* Highest buildings on site are 40m. Therefore stack must be at least 45m high to achieve adequate dispersion over buildings. A 50m stack was chosen to provide optimum dispersion of emissions from the stack.

** Using the maximum predicted gas flow of 208,000Nm^3/s

2. Air Quality Dispersion Modelling

A gaussian air quality dispersion model was used to compute the long-term average (annual average) and percentile ground level concentrations of the various emissions from A1-1. The model used was the Atmospheric Dispersion Modelling System (ADMS-3) developed by Cambridge Environmental Research Consultants (CERC).

This model provides a significant improvement in air quality dispersion modelling compared to the 2nd generation Industrial Source Complex models (ISC) developed by the U.S. Environmental Protection Agency over the past 20 years. The ADMS-3 takes account of substantially improved understanding of dispersion of an emission plume within the atmospheric boundary layer. The effects of buildings on the dispersion of an emission plume from a nearby source can also be included in the model to take account of the effect of building wake and the resulting downwind concentration pattern.

The long term average and percentile concentrations was carried out with a single year (1999) of hourly sequential meteorological data obtained from the nearest meteorological station, Clones, Co. Monaghan. The dry bulb temperature, wind speed, wind direction and total cloud cover parameters were utilised in the model. The Wind Rose for the year's data is provided in Figure 1.

The ground level concentration was calculated at a distance of 2,000m either side of the site. Eight building structures were entered into the model in total. Terrain data for the area was also entered into the model, to include any effects of terrain on dispersion. All data entered into the model was referenced to the national grid.

3. Ambient Air Quality Standards

The results of air dispersion modelling are directly comparable to ambient air quality standards.

1. Irish Standard; S.I. No 271 OF 2002, Air Quality Standards Regulations 2002
2. Germany Standard "Technical Instructions on Air Quality Control" commonly referred to as the TA Luft.
3. World Health Organisation Guidelines; WHO 2000 & 1999

Relevant limits in the ambient air quality standards are provided in Table 3.

Table 3. Ambient Air Quality Standards

Parameter	Averaging Time	Percentile	SI No. 271 of 2002 µg/m^3	TA Luft µg/m^3	WHO 2000 & 1999
NO_2	1 hour	99.8	200	200	
NO_2	Annual		40	40	
NO_x	Annual		30 [1]		
SO_2	1 hour	99.7	350	350	
SO_2	24 hour	99.2	125	125	
SO_2	Annual		20 [2]	50	
PM_{10}	24 hour	90	50	50	
PM_{10}	Annual		40	40	
CO	8hr		10000		
TOC	Annual		5 [3]	5 [3]	
TOC	1 hour	98		Class I - 50 Class II - 200 Class III - 1000	
HCL	1 hour	98		100	
HF	1 hour	98		3	
HF	Annual			0.3	0.3
Hg	Annual			0.05	1
Cd	Annual				0.005
Ti	Annual			0.05	
Pb	Annual		0.5	0.5	
Sb	1 hour			1	
As	Annual				0.005
Cr	Annual			1	
Co	Annual			0.5	
Cu	Annual			1	
Mn	Annual			1	0.15
Ni	Annual			0.5	
V	24 hour			1	1
PCDD / PCDF	[4]				

1. Limit value for the protection of vegetation

2. Limit value for the protection of ecosystems

3. Limit Value for Benzene

4. There are no air quality standard limit values for dioxins and furans. The WHO currently proposes a maximum TDI of between 1-4 pgTEQ/kg of body weight per day. A TDI of 4pgTEQ/kg of body weight per day should be considered a maximum tolerable intake on a provisional basis and that the ultimate goal is to reduce human intake levels of below 1pgTEQ/kg of body weight per day.

4. Results & Discussion

Results of air dispersion modelling are provided in Table 4. Contour plots are also provided in Figures 2 to 18.

Table 4. Air Dispersion Modelling Results

Pollutant	Averaging Period (percentile)	Predicted Maximum Ambient Concentration µg/m^3	Ambient Air Quality Standard µg/m^3	See Figure
Total Dust (PM_{10})	24 hr (90)	2.94	50	2
	Annual	0.952	40	3
Total Organic Carbon (TOC)	1 hr (98)	8.71	50	4
	Annual	0.946	5	5
Hydrogen Chloride (as HCL)	1 hr (98)	8.71	100	6
Hydrogen Fluoride (as HF)	1 hr (98)	0.871	3	7
	Annual	0.0946	0.3	8
Sulphur Dioxide (SO_2)	1 hr (99.7)	48.3	350	9
	24 hr (99.2)	29	125	10
	Annual	4.76	20	11
Nitrogen Oxides (as NO_2)	Annual	18.9	30	12
Cd & Ti	1 hr	0.00475	0.005	13
Hg	1 hr	0.00475	0.05	14
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V.	1 hr	0.0473	1	15
	24 hr	0.0476	1	16
Carbon Monoxide (CO)	8 hr	4.76	10000	17
Dioxins & Furans	1 hr	0.00982 pg/m^3	None Available	18

The predicted level of Total Dust, Total Organic Carbon (TOC), Hydrogen Chloride (as HCL), Hydrogen Fluoride (as HF), Sulphur Dioxide (SO_2), Nitrogen Oxides (as NO_2), Metals and Carbon Monoxide (CO) from the proposed site are very low compared to ambient air quality standards. Therefore no adverse impact on public health or the environment is envisaged to occur under maximum operating site conditions in the vicinity of this site.

Dioxins and Furans

There is no ambient air quality standard for dioxins and furans. The USEPA and WHO currently proposes a maximum TDI of between 1-4 pgTEQ/kg of body weight per day. A TDI of 4pgTEQ/kg of body weight per day should be considered a maximum tolerable intake on a provisional basis and that the ultimate goal is to reduce human intake levels of below 1pgTEQ/kg of body weight per day. Background levels of dioxins/furans occur everywhere. The EPA report on "Dioxin Levels in the Irish Environment, Third Assessment (Summer 2004) based on levels in cows' milk" concluded that the levels of dioxins in Ireland were uniformly low by international standards. A UK paper[1] on dioxins

in air states that the general trend is; remote sites < 0.5 pg/m^3 (sigma TEQ < 10 fg/m^3); rural sites approximately 0.5-4 pg/m^3 (sigma TEQ approximately 20-50 fg/m^3); and urban/industrial sites approximately 10-100 pg/m^3 (sigma TEQ approximately 100-400 fg/m^3). The predicted concentration of dioxins and furans to be emitted by the site are minimal compared to the above figures, therefore no adverse impact on public health or the environment is envisaged to occur under maximum operating site conditions in the vicinity of this site.

PM_{10} and $PM_{2.5}$

The developers of the plant AET do not have quantitative information on likely $PM_{2.5}$ and PM_{10} fractions as they normally only measure total dust emission from their biomass CHP sites - the size distribution of whatever dust is emitted (typically < 1-3 mg/Nm^3) is not measured. However, the fabric filter to be used as attenuation for particulate emissions from the stack at this site has a very high efficiency, therefore it is estimated that most of the dust emitted will probably be in the PM_{10} range.

Documentation[2]on particulate emissions for coal fired boilers with flue gas desulphurization and fabric filter state that roughly 90-100% of the dust emitted is PM_{10} and 50-60% is $PM_{2.5}$. Although these boilers are not identical to biomass fired boilers, this could be used as an estimate on the possible occurrence of these particulates from the Monopower site.

The dispersion model predicts that the annual average total particulate concentration will be 0.952 ug/m^3, with an 90th percentile 24hour average of 2.94µg/m^3. The PM_{10} and $PM_{2.5}$ fractions of the dust emitted are therefore of secondary importance, as the total dust emission will be minimal.

Health Risk Posed by Waste Incinerator Emissions

A Health Risk Assessment predicts the fate and transport of chemicals through the environment and evaluates their direct (inhalation) and indirect (ingestion and dermal contact) impact on human health. Numerous studies have shown the public to have real concerns about the health risks posed by waste incinerator emissions. Dioxins attract the most attention, as do heavy metals, acid gases and particulates.

Risk assessments of the health effects posed by waste incinerators have been undertaken in the past. Her Majesty's Inspectorate of Pollution (HMIP)[3] published a generic risk assessment of dioxin releases from municipal waste incinerators, which concluded that a plant complying with latest pollution control standards (WID in this instance) would pose an insignificant health risk to the local population irrespective of the many site specific factors. Similarly, the Royal Commission of Environmental Pollution's Report[4] on waste incineration concluded that the total pollution resulting from the operation of new and modern plant should not be cause for concern.

Air dispersion modelling of dioxins for this site predicts that the contribution of dioxin will be minor with levels significantly below levels which would be expected in rural areas. Therefore someone who has maximum exposure from the site at the nearest residential receptor for example will also be exposed to minor levels as a result of site operations.

Figure 1. Wind Rose, Clones, Co. Monaghan, 1999

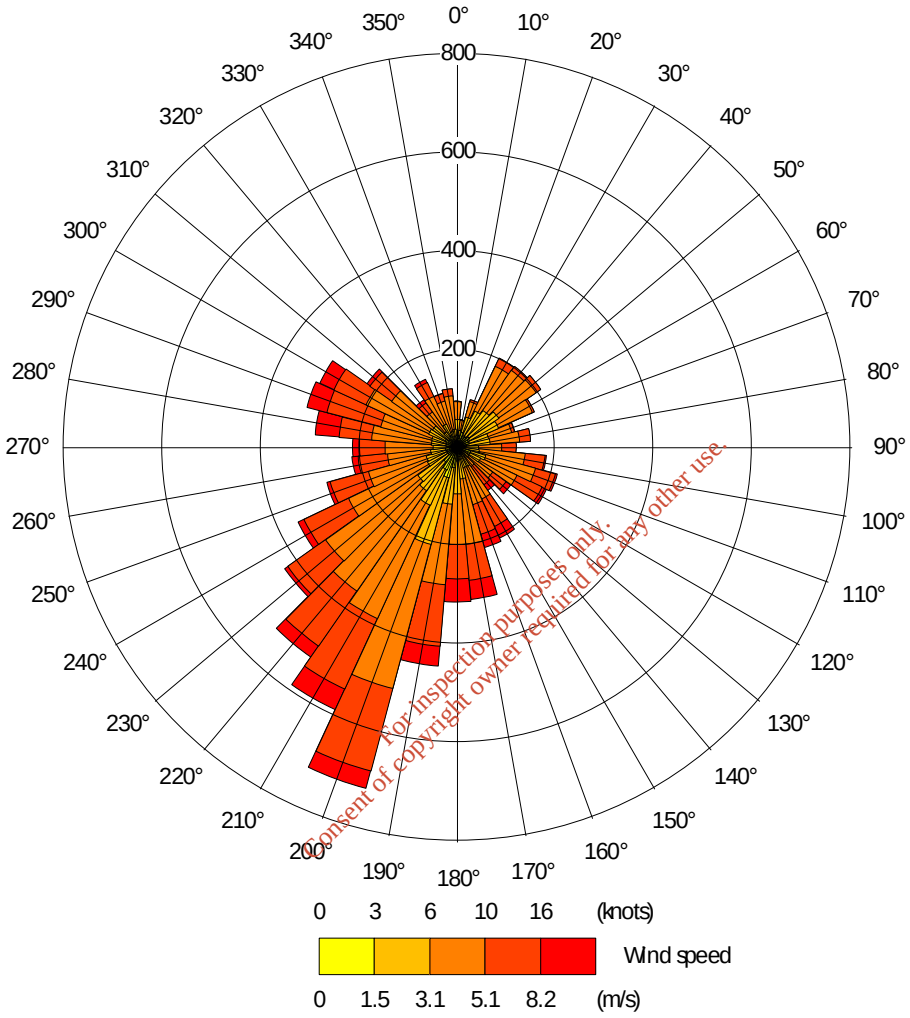


Figure 2. Monopower - Predicted 90th %tile of Total Dust 24-hr Concentrations (ug/m3)

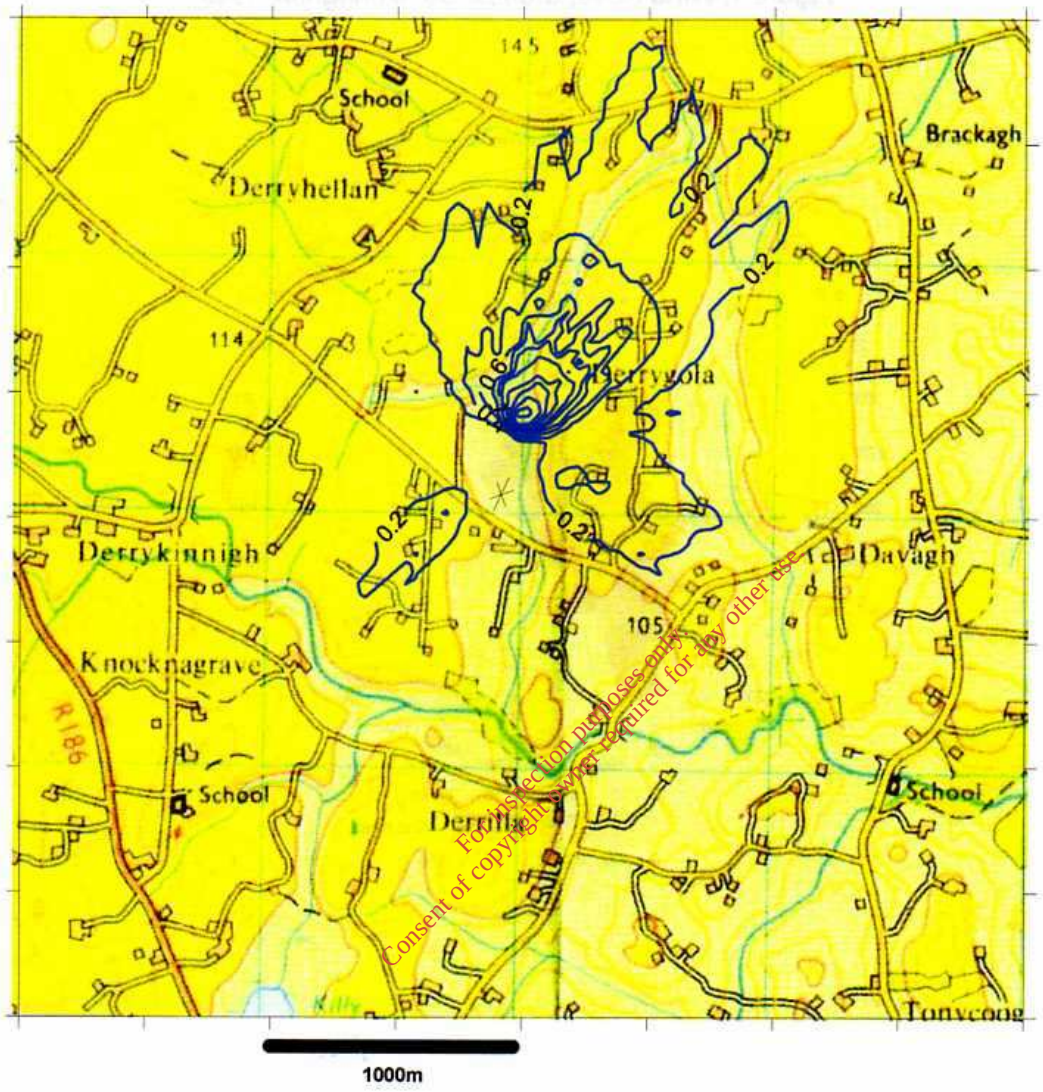


Figure 3. Monopower - Predicted Annual Average Dust Concentration (ug/m3)

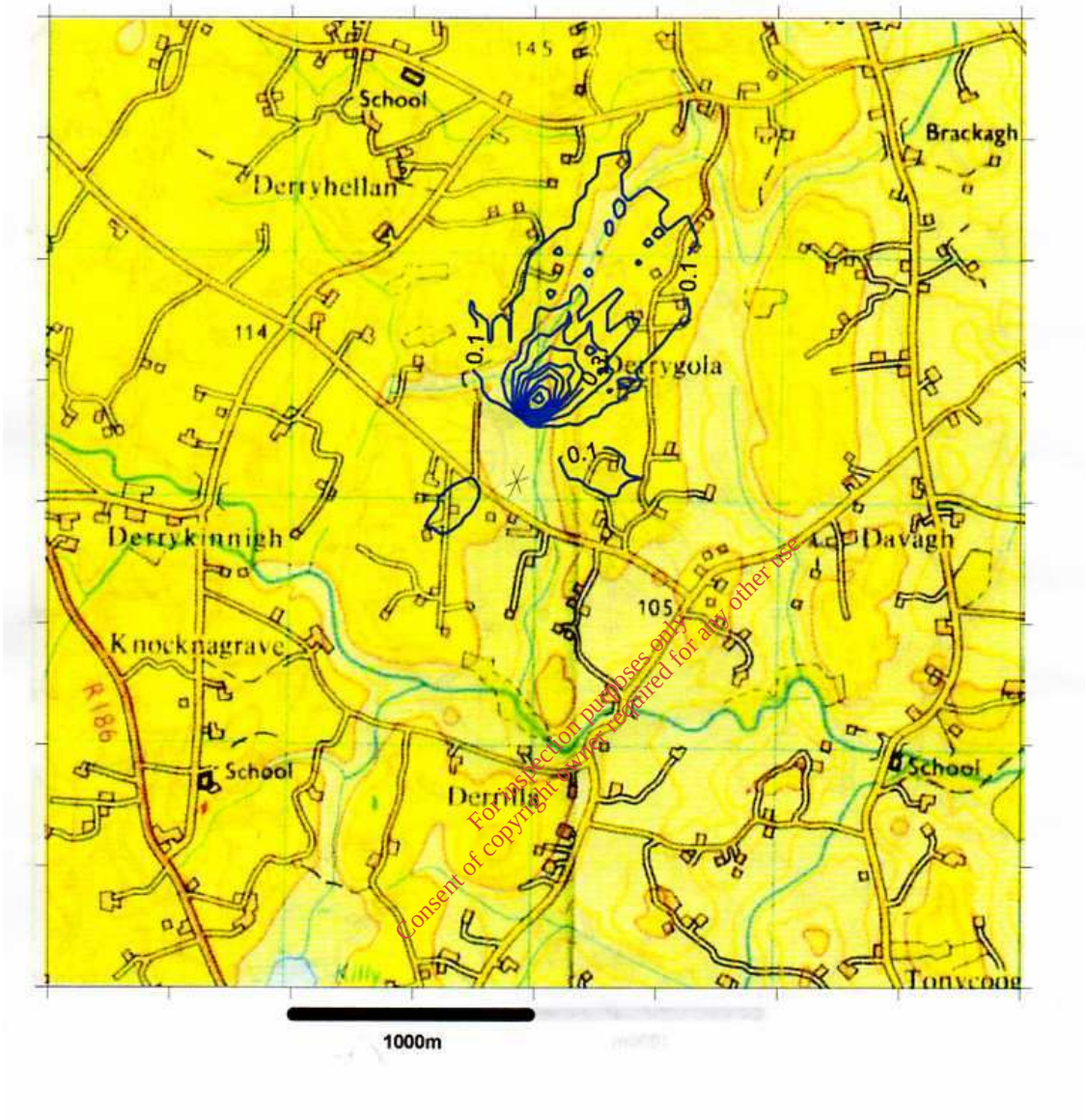


Figure 4. Monopower - Predicted 98th %tile of TOC 1-hr Concentrations (ug/m3)

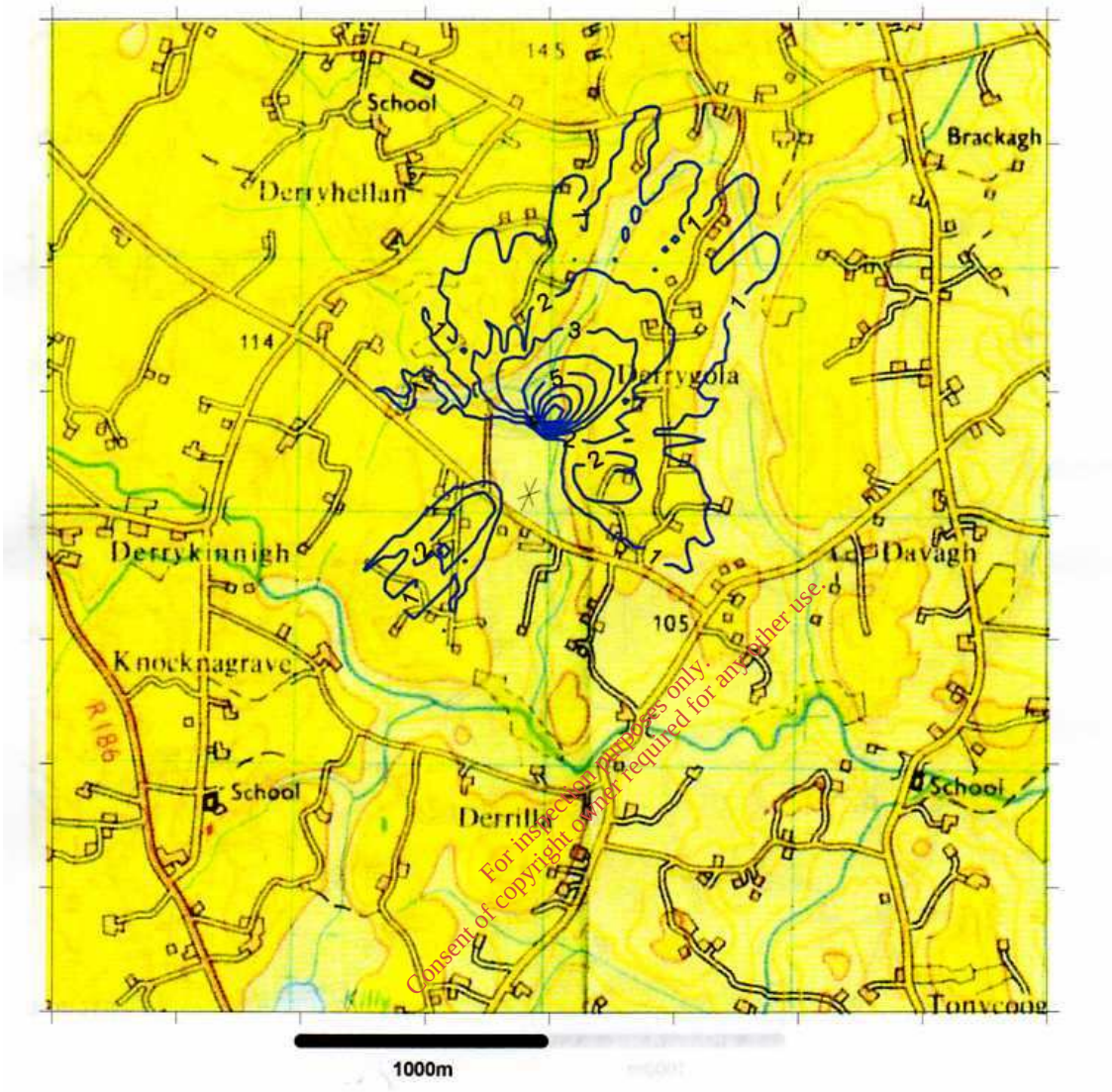


Figure 5. Monopower - Predicted Annual Average TOC Concentration (ug/ m3)

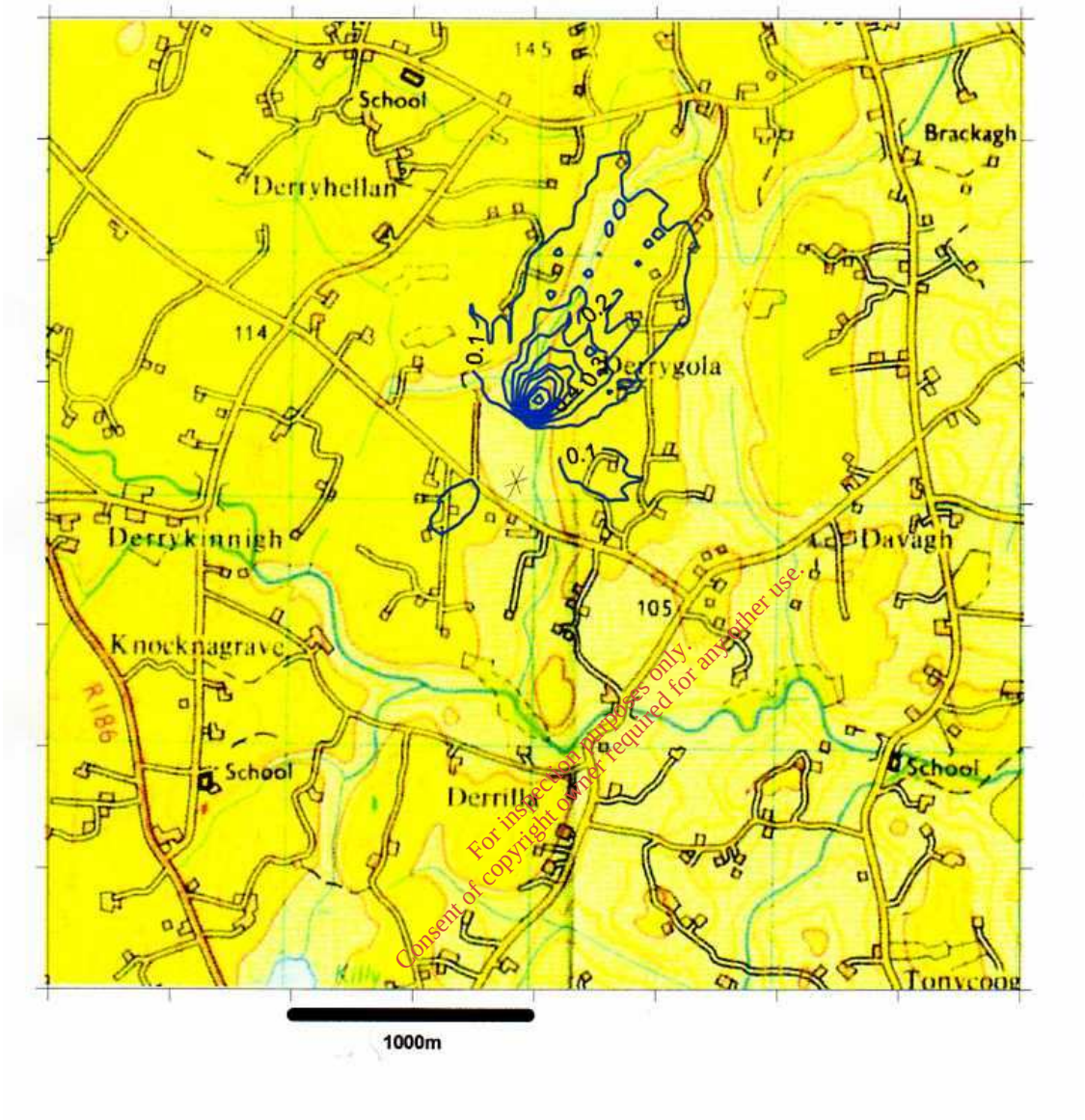


Figure 6. Monopower - Predicted 98th %tile of HCL 1-hr Concentrations (ug/m3)

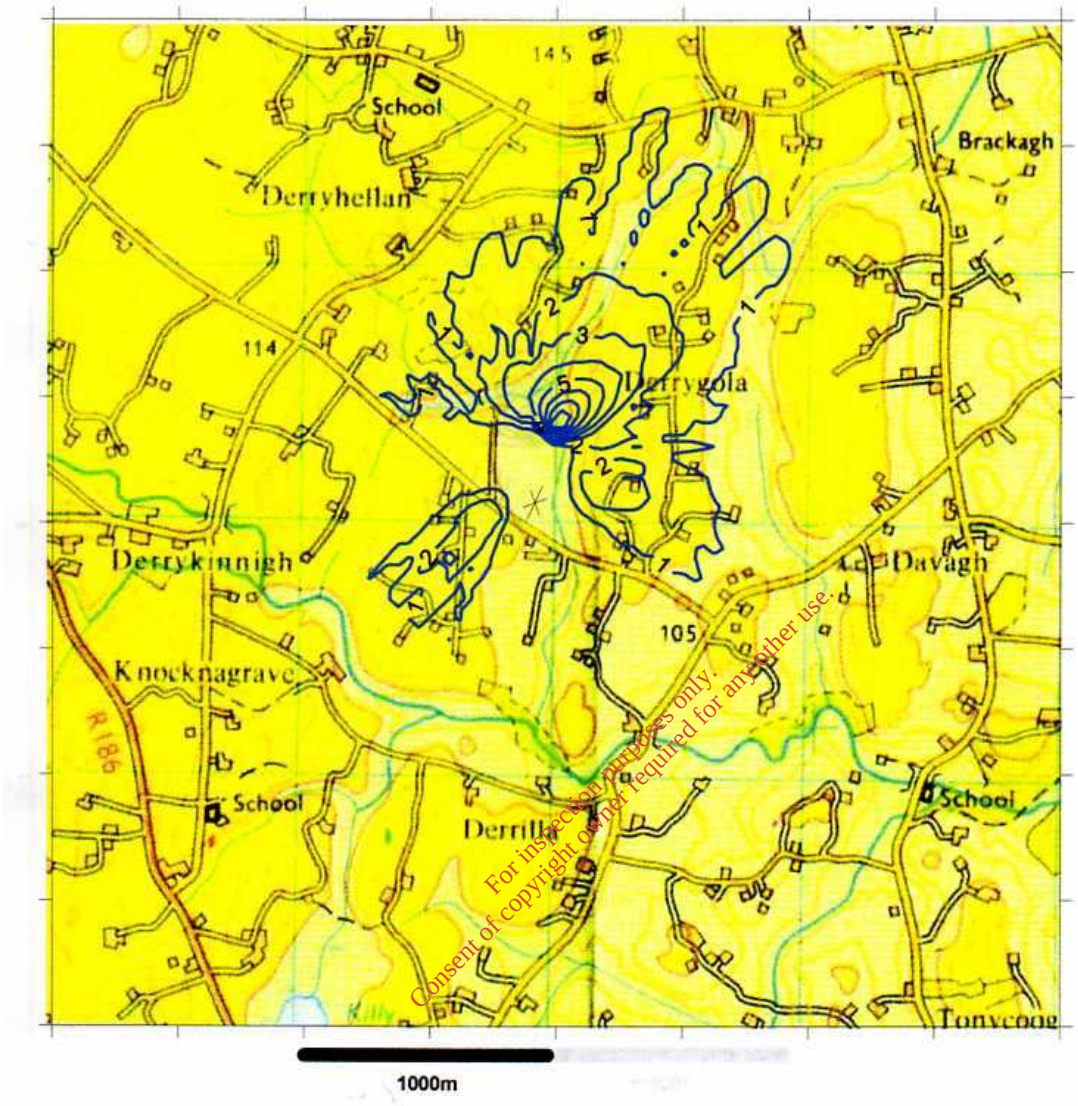


Figure 7. Monopower - Predicted 98th %tile of HF 1-hr Concentrations (ug/m3)

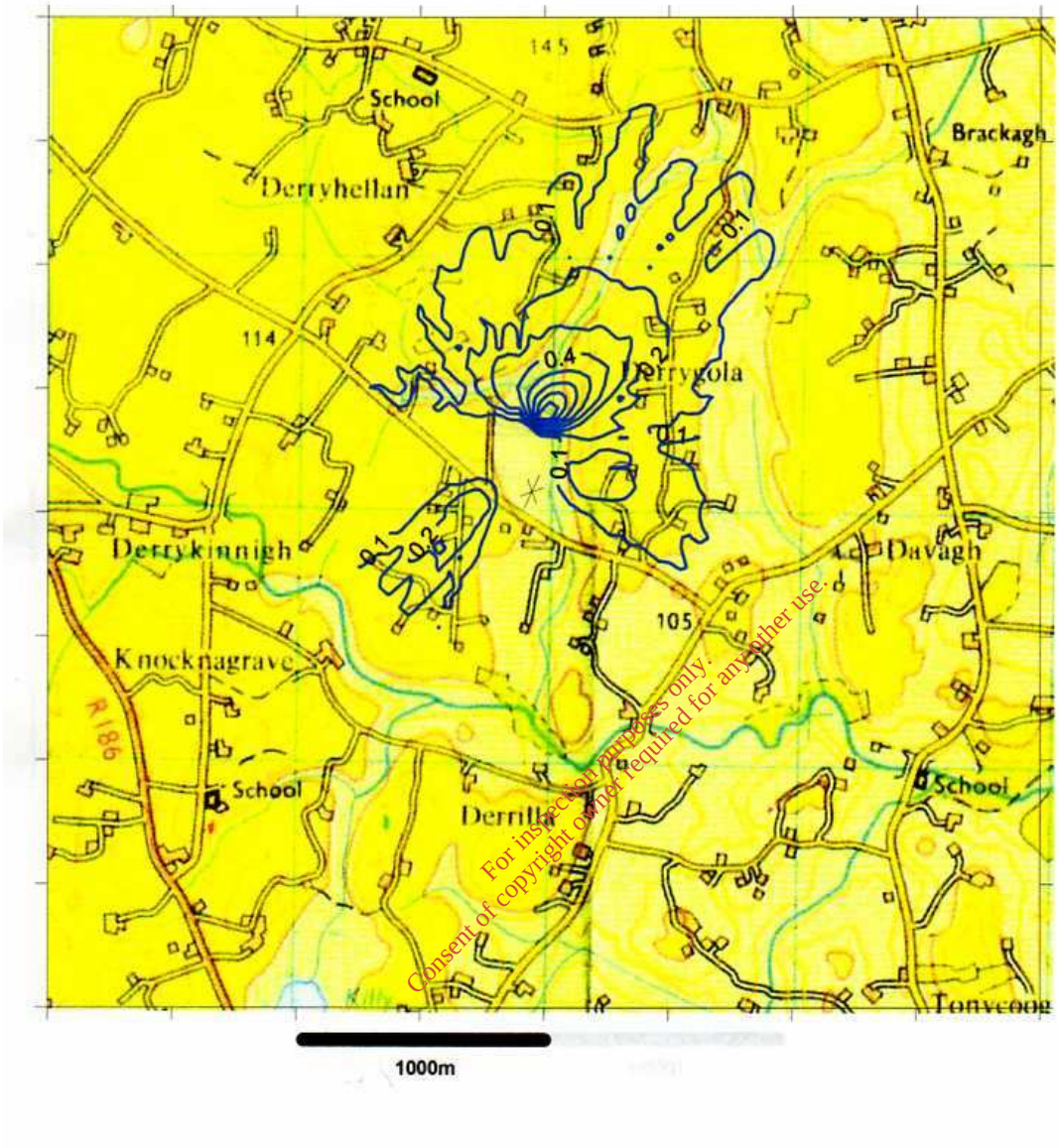


Figure 8. Monopower - Predicted Annual Average HF Concentrations (ug/m3)

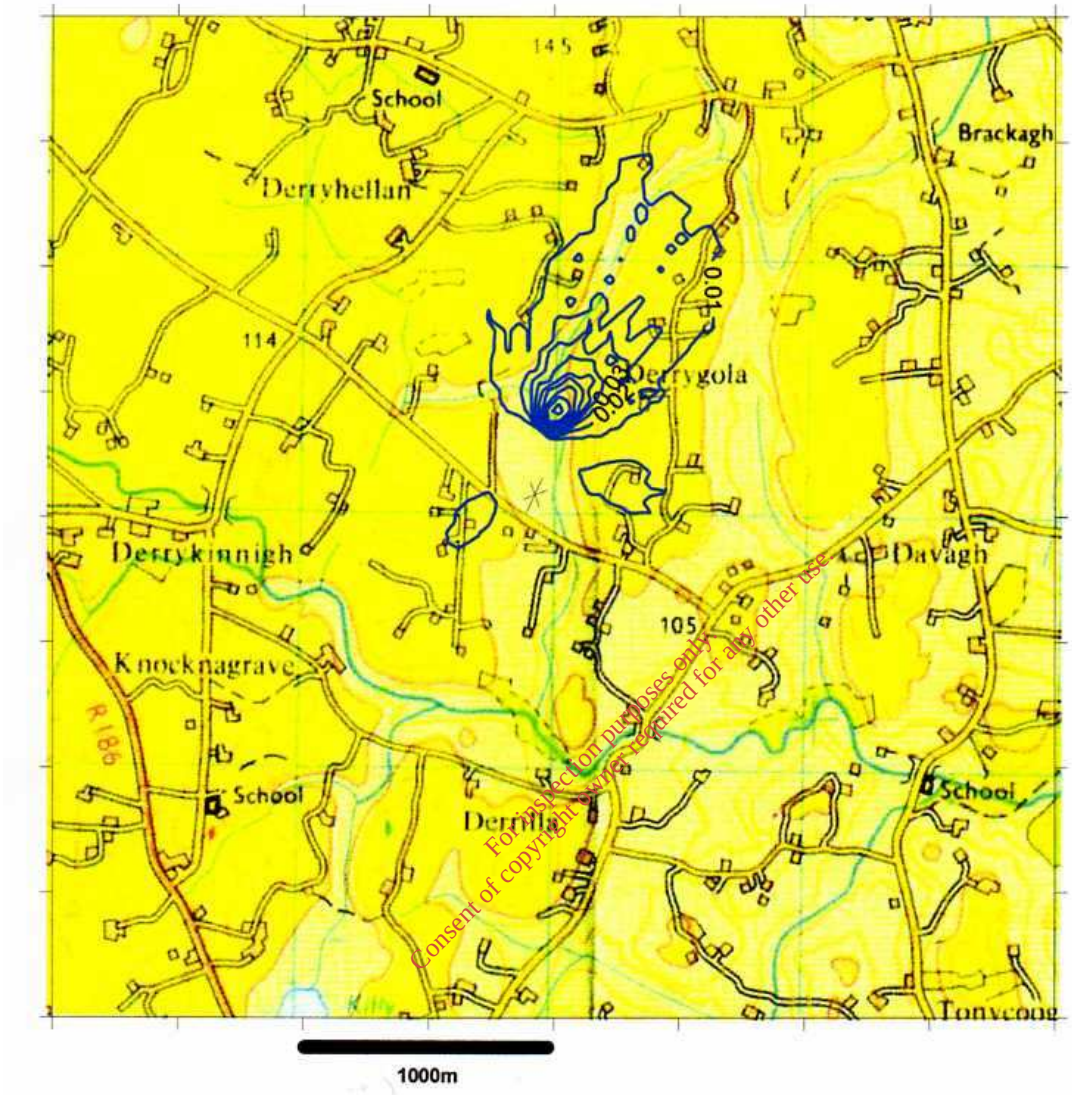


Figure 9. Monopower - Predicted 99.7th %tile of SO2 1-hr Concentrations (ug/m3)

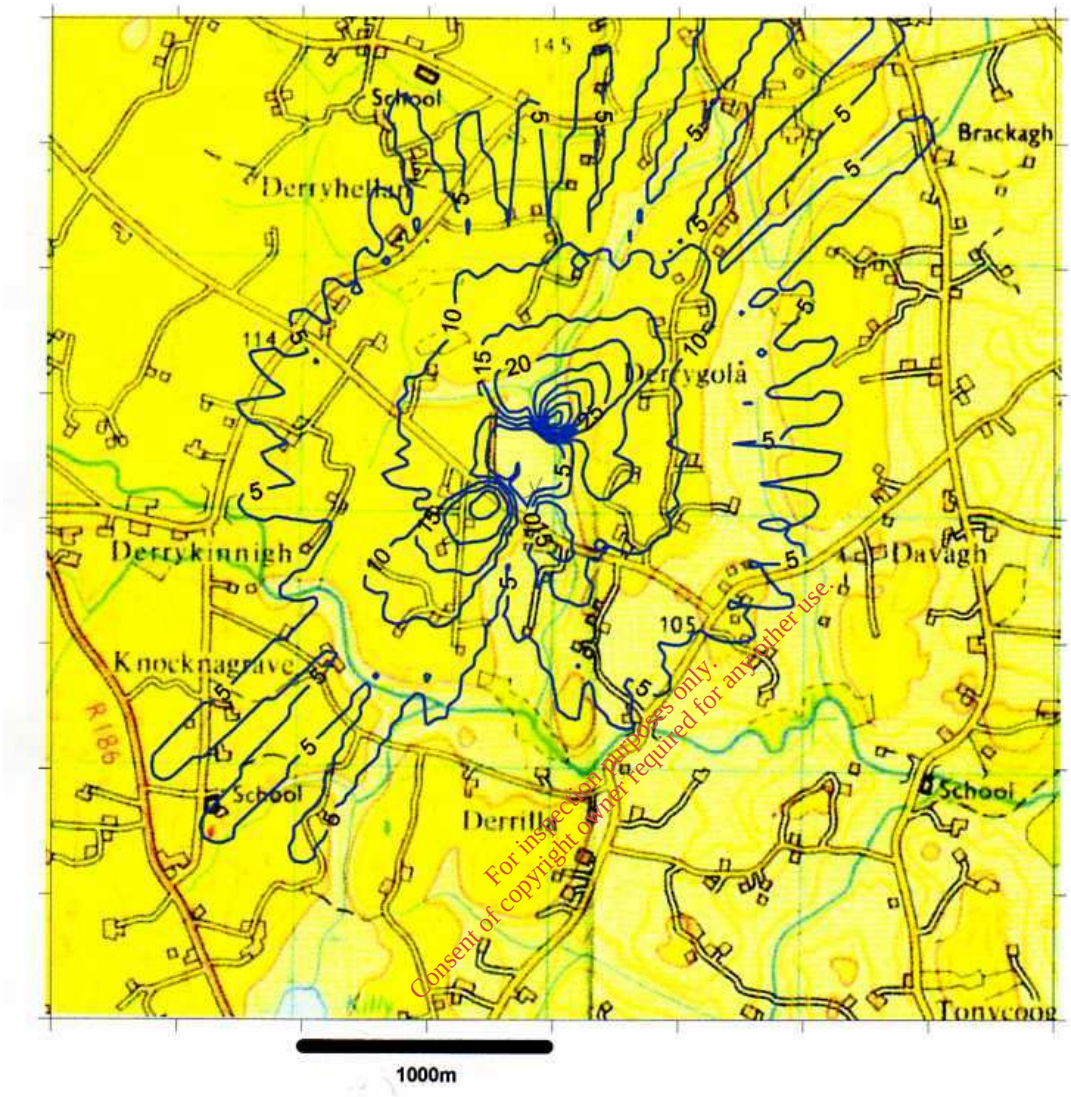


Figure 10. Monopower - Predicted 99.2th %tile of SO2 24-hr Concentrations (ug/m3)

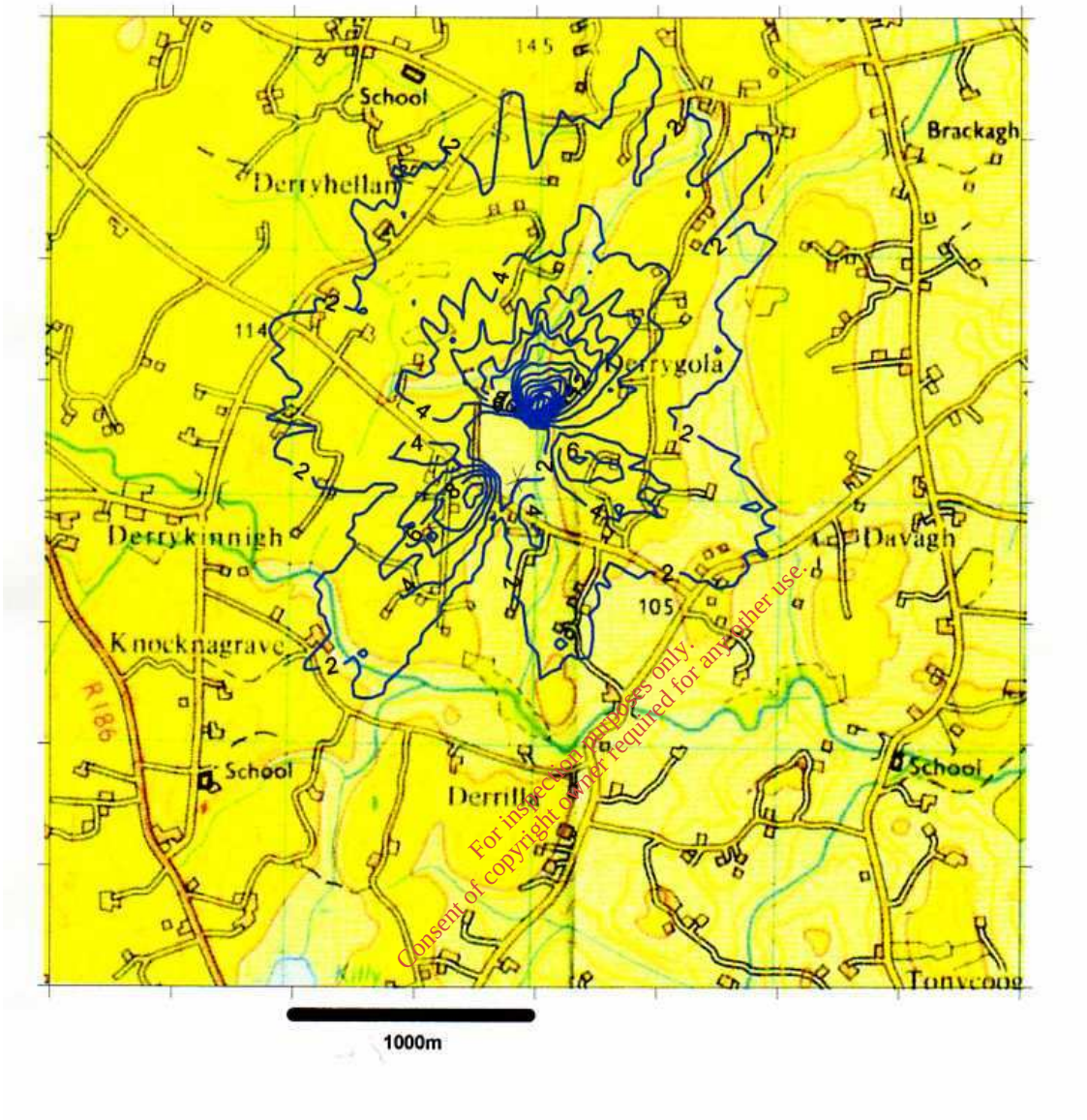


Figure 11. Monopower - Predicted Annual Average SO2 Concentrations (ug/m3)

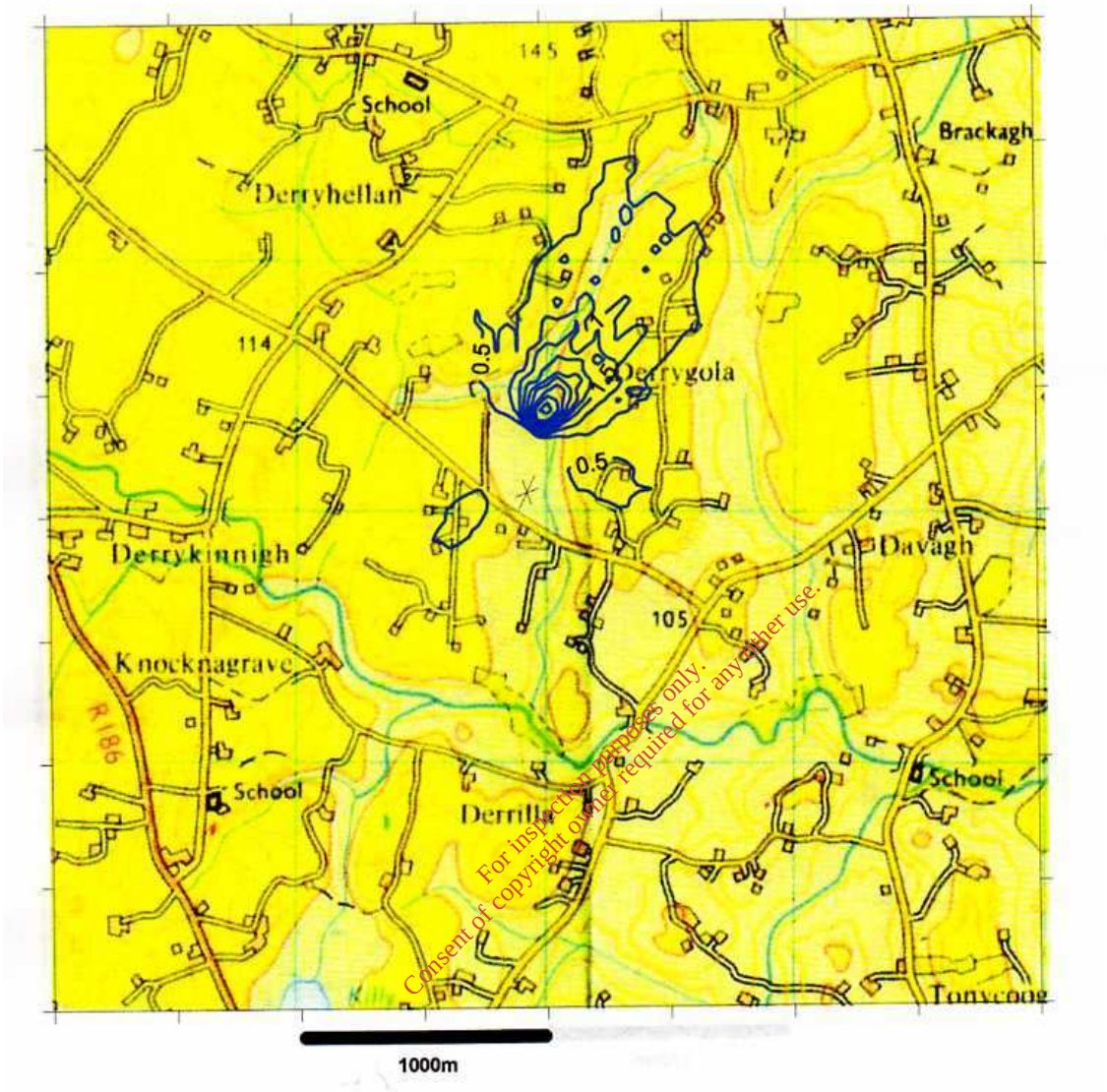


Figure 12. Monopower - Predicted Annual Average NOx Concentrations (ug/m3)

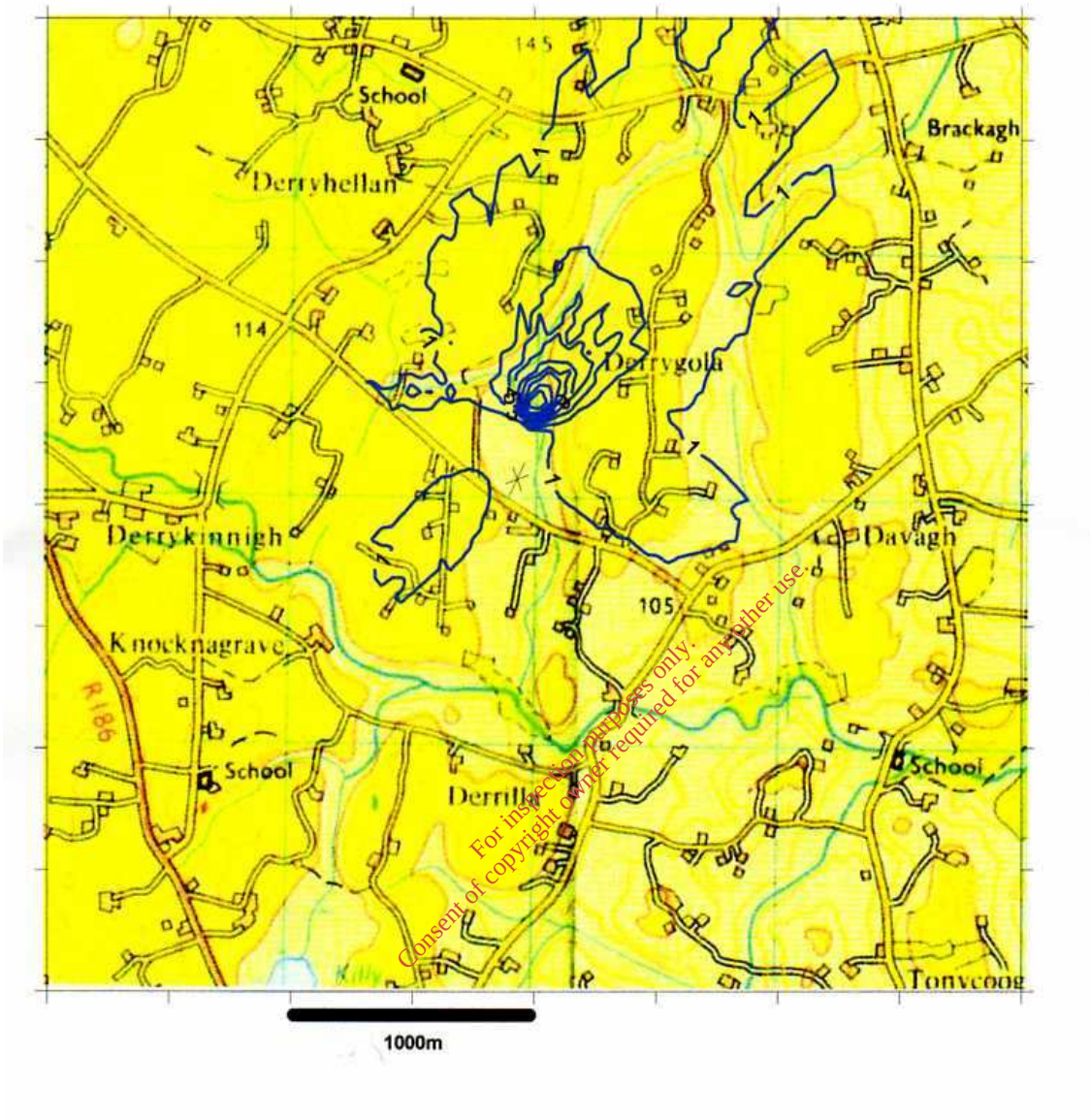


Figure 13. Monopower - Predicted Annual Average 1hr Cd & Ti Concentrations (ug/m3)

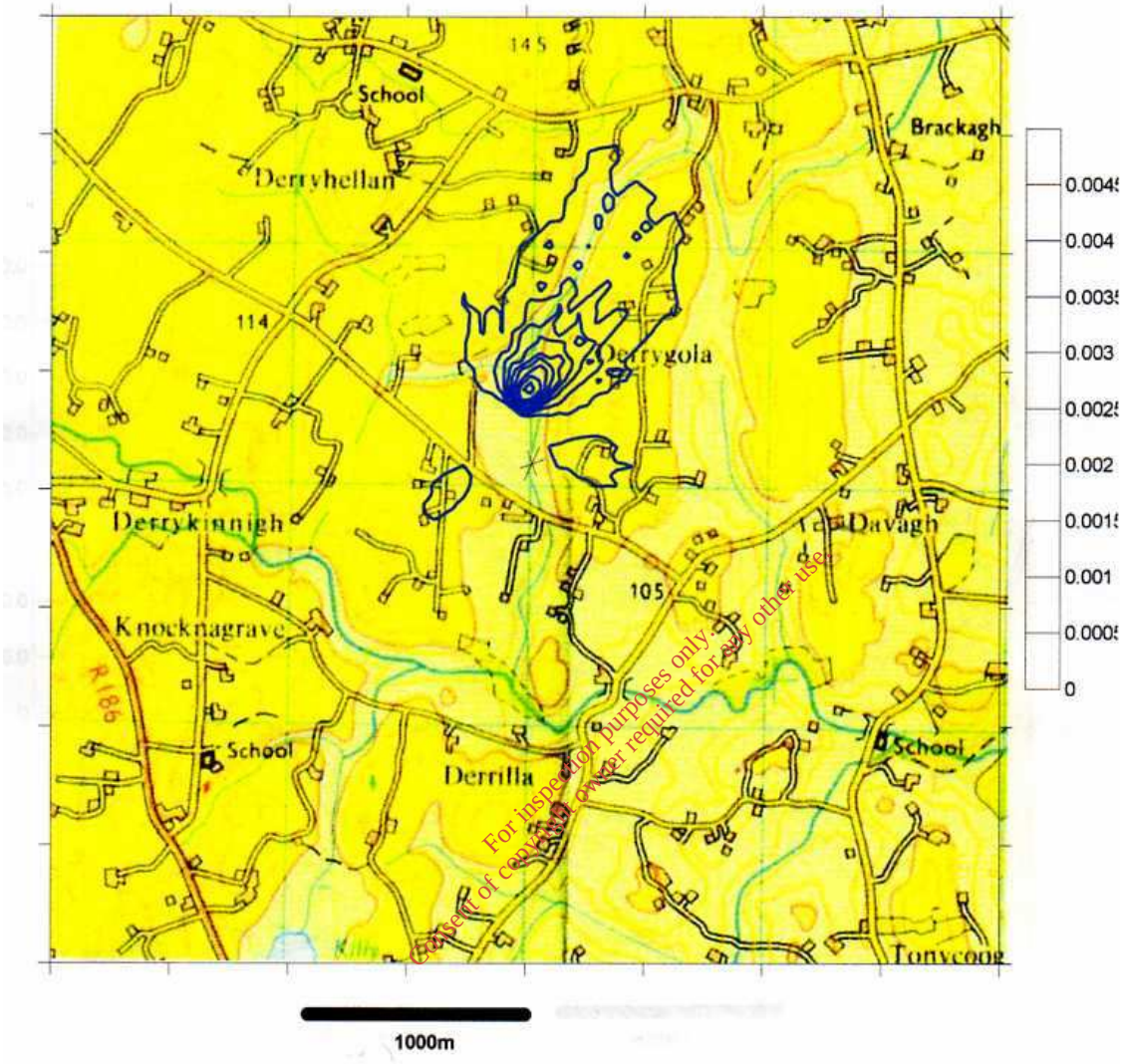


Figure 14. Monopower - Predicted Annual Average 1 hr Hg Concentrations (ug/m3)

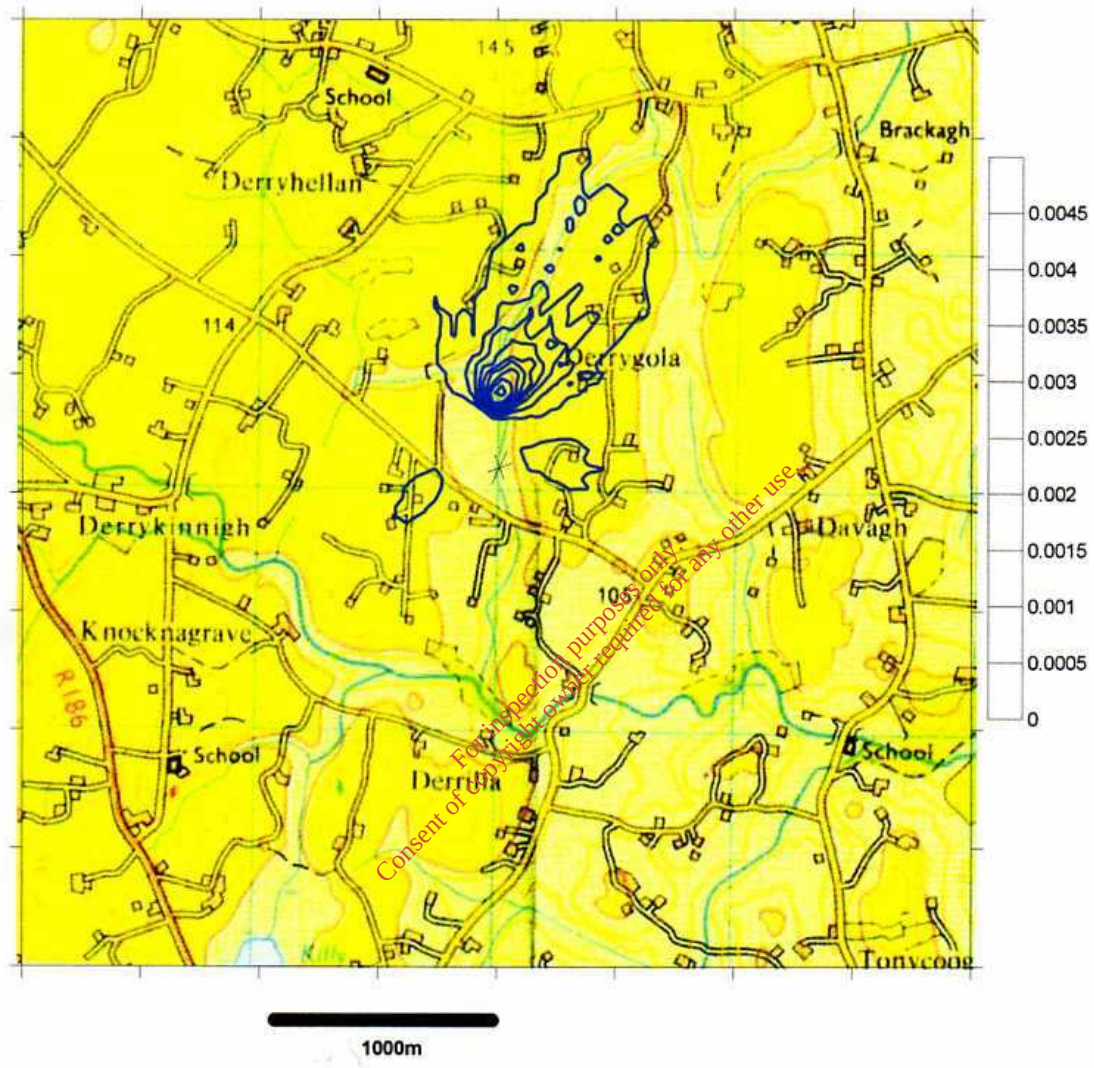


Figure 15. Monopower - Predicted Annual Average 1hr Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V Concentrations (ug/m3)

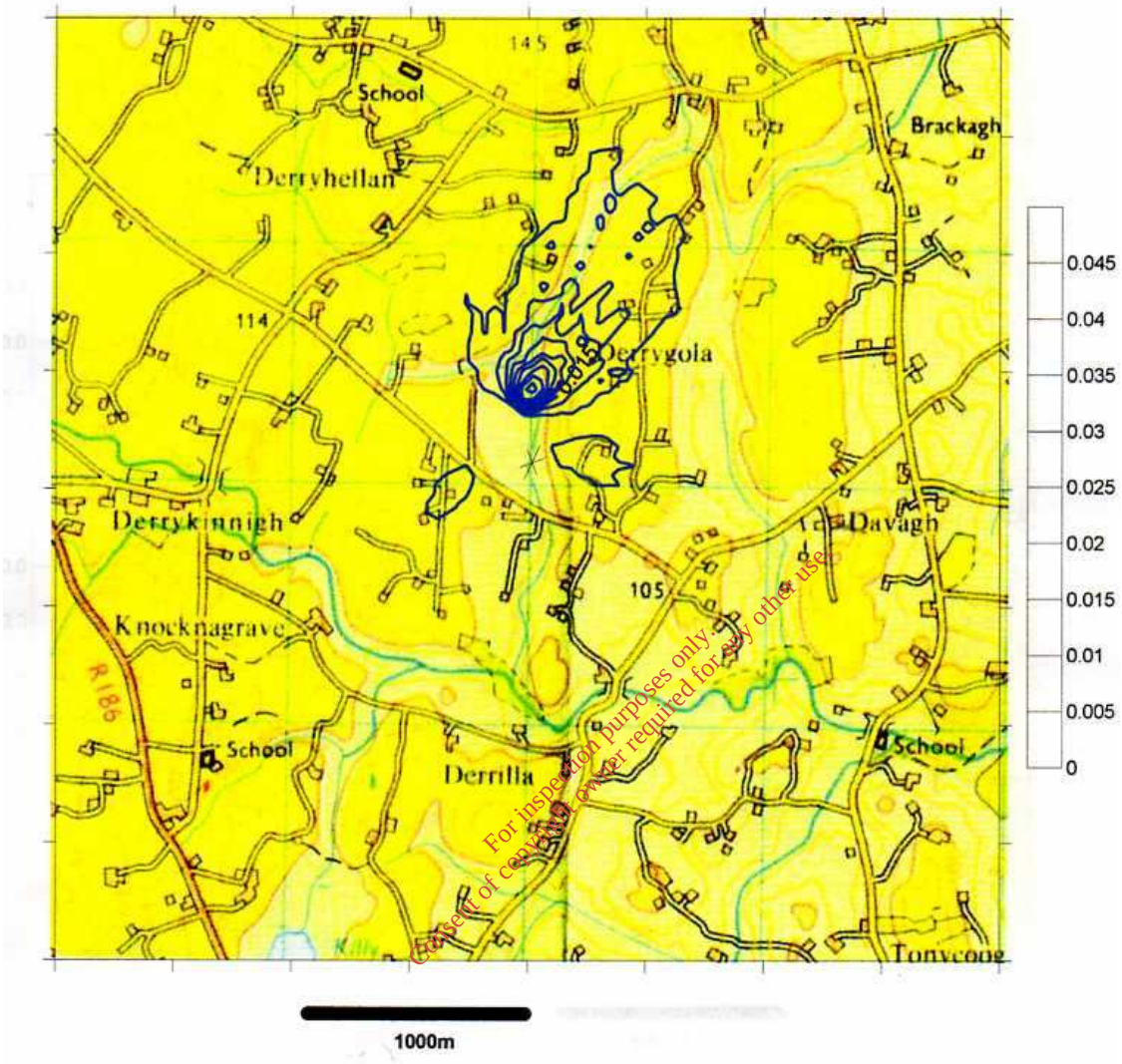


Figure 16. Monopower - Predicted Annual Average 24 hr Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V Concentrations (ug/m3)

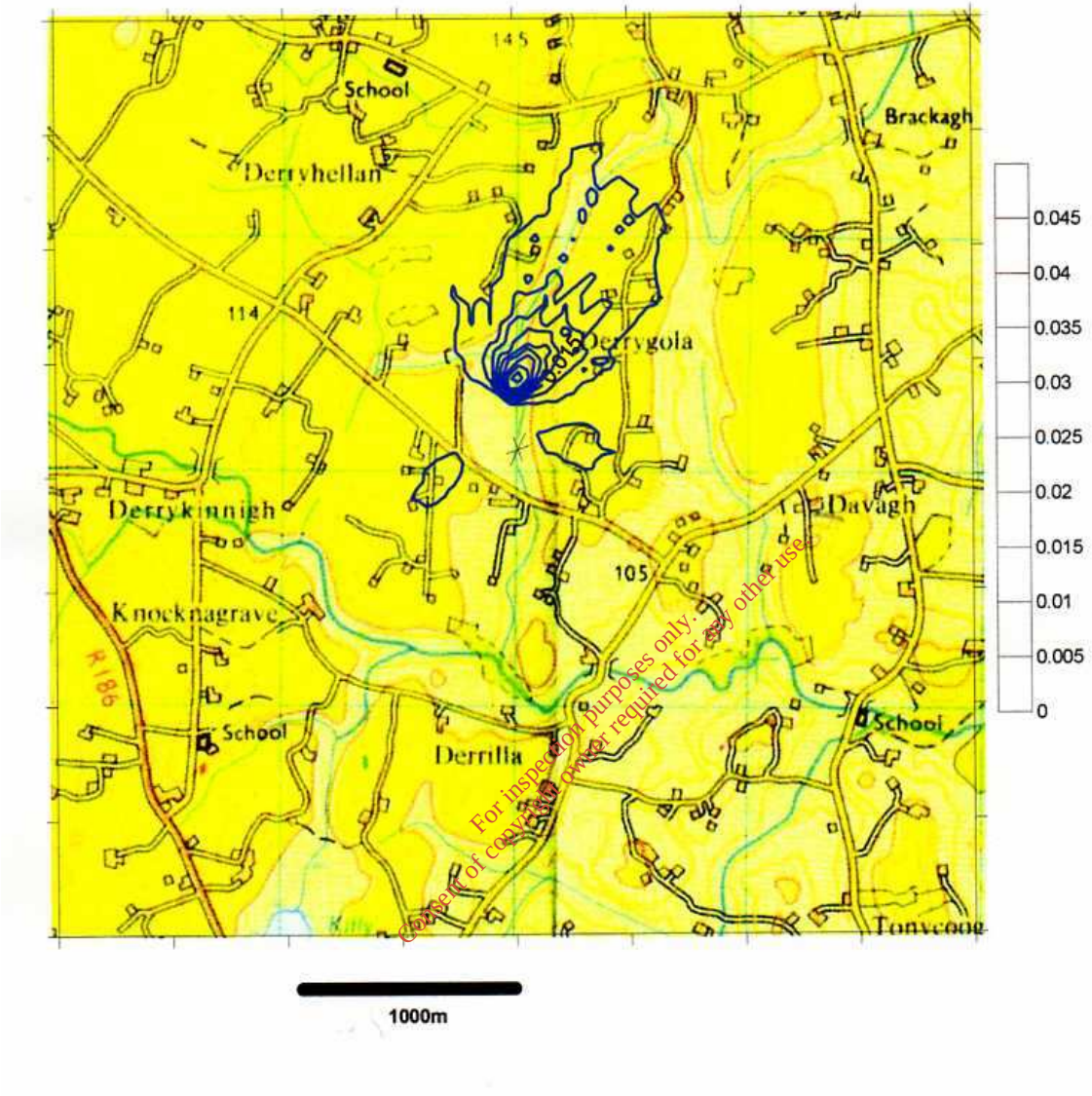


Figure 17. Monopower - Predicted 8hr Annual Average CO Concentrations (ug/m3)

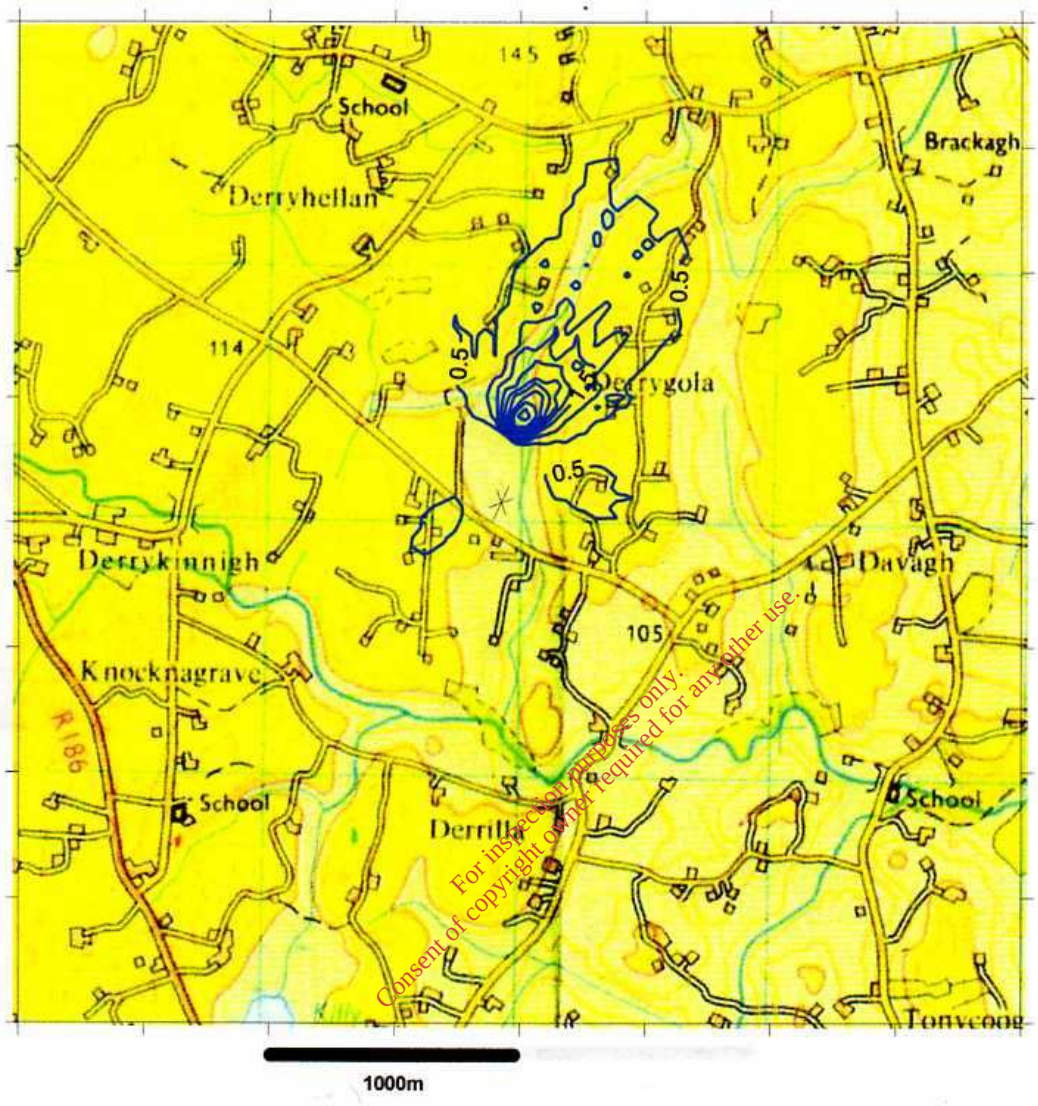
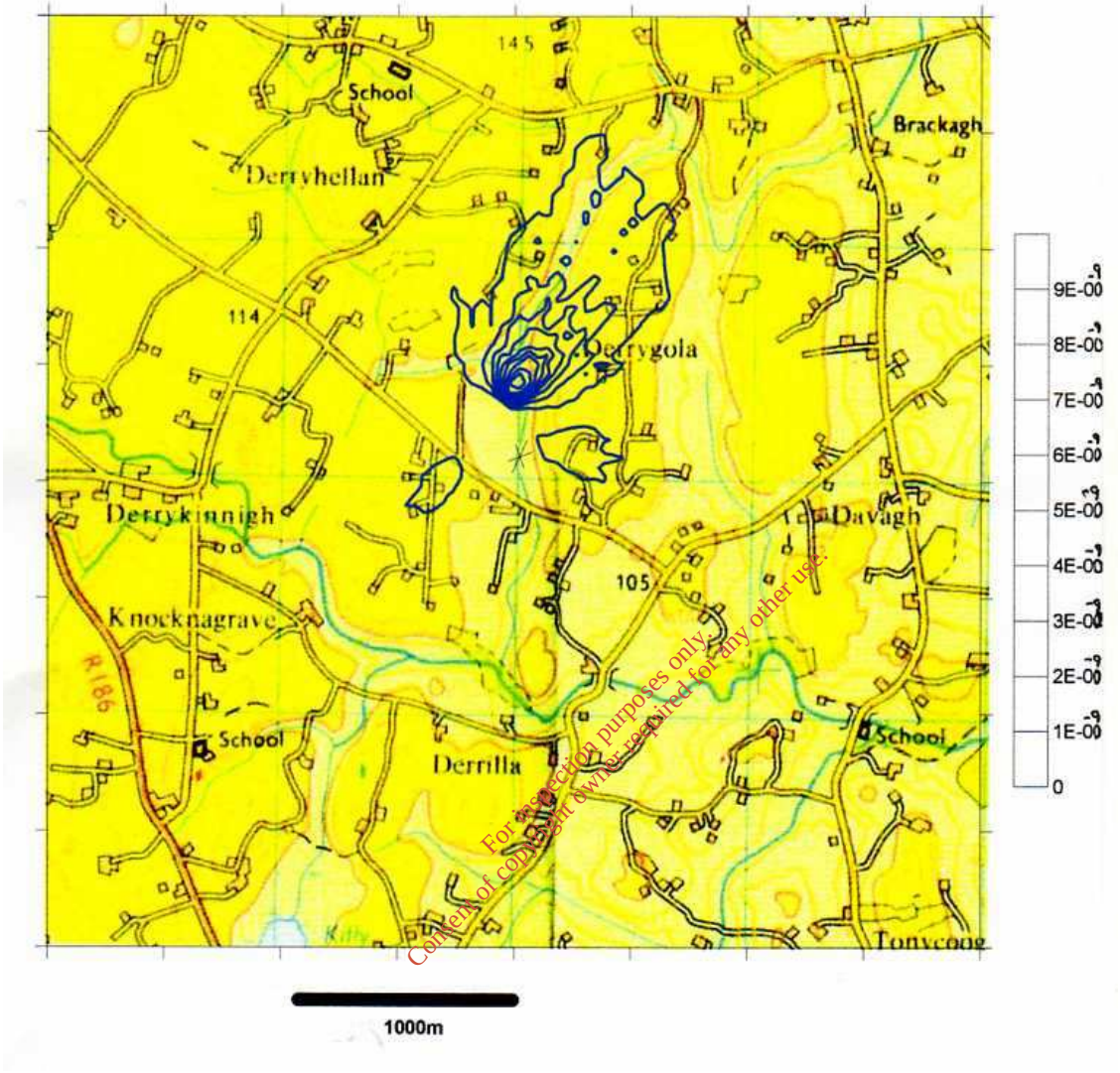


Figure 18. Monopower - Predicted Annual Average 1 hr Dioxins & Furans Concentrations (ug/m3)



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