11

11.0 CONSTRUCTION IMPACTS

11.1 Monaghan County Council's Comments and Requests

"Construction of the Killycarran facility will take an estimated 25 months and is likely to involve significant impacts. However, construction-related issues are not comprehensively documented in the EIS. In the County Council's notice, you were asked to provide information on the impact of traffic-related noise from the construction phase of the development. No additional information was submitted in response. Instead, Section 7.5.2 of the EIS was alluded to which refers only to mitigation relating to a traffic management plan, the provision of buses for the workforce and the development of a temporary car park.

This is not considered an adequate response to the requirements of the notice, nor to the statutory obligation that an EIS covers all significant environmental impacts. An EIS for development of this magnitude must cover all relevant construction issues, impacts and set down mitigation measures. A significant amount of boulder clay is to be removed to make way for the foundations of the proposed buildings. What will happen to it is not clear being apparently contradicted by elements of the EIS - and the EIS does not contain a materials balance for the site. The issue of suspended solids-contaminated surface waters when the site is being prepared needs to be addressed. The EPA's EIS Guidelines and Advice Notes set out what is required

You are required to comprehensively assess the impacts of the construction phase of this development in a manner that fully complies with the requirements for the content of EIS as defined by the Planning and Development Regulations 2001 and the EPA's Guidelines and Advice Notes. A materials balance for the site should be provided and the output/conclusions arising from this exercise fully discussed."

11.2 Response

11.2.1 Construction Schedule

The construction period will last approximately 20 – 25 months. Construction of the facility will commence when full planning permission is received. Construction activities include the following

- Design and engineering
- Procurement of equipment
- Site preparation
- Construction of foundations
- Building construction and equipment installation
- Plant start-up and testing
- Final site cleanup
- Landscaping.

Figure 11.1 outlines the general time schedule for construction of the facility. This information was supplied by Aalborg Energie Technik, the plant designers. During construction, approximately 50 workers will be employed.

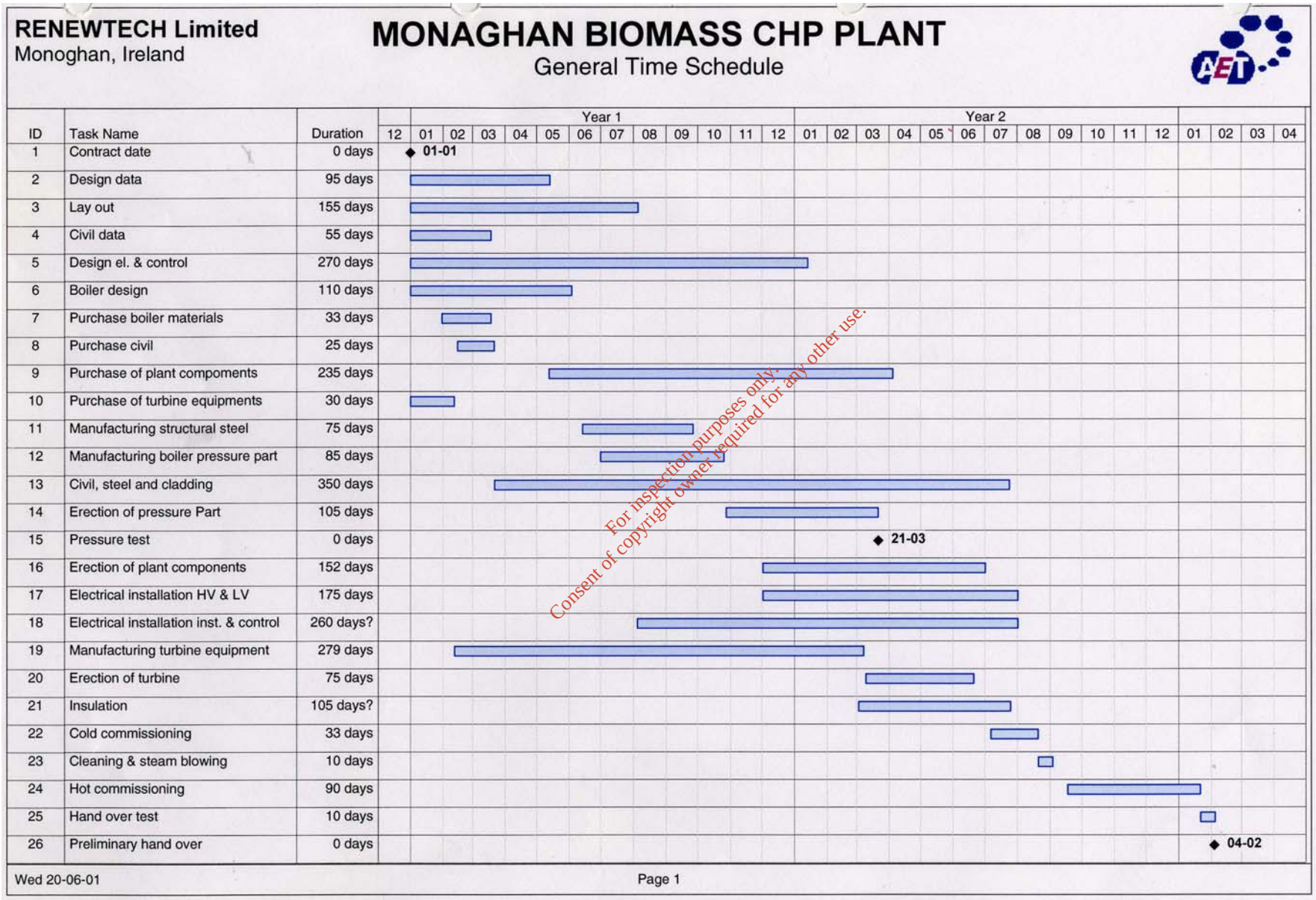
Figure 11.1 General Time Schedule for Construction of Biomass CHP Plant

RENEWTECH Limited
Monoghan, Ireland

MONAGHAN BIOMASS CHP PLANT

General Time Schedule

ID	Task Name	Duration
1	Contract date	0 days
2	Design data	95 days
3	Lay out	155 days
4	Civil data	55 days
5	Design el. & control	270 days
6	Boiler design	110 days
7	Purchase boiler materials	33 days
8	Purchase civil	25 days
9	Purchase of plant compoments	235 days
10	Purchase of turbine equipments	30 days
11	Manufacturing structural steel	75 days
12	Manufacturing boiler pressure part	85 days
13	Civil, steel and cladding	350 days
14	Erection of pressure Part	105 days
15	Pressure test	0 days
16	Erection of plant components	152 days
17	Electrical installation HV & LV	175 days
18	Electrical installation inst. & control	260 days?
19	Manufacturing turbine equipment	279 days
20	Erection of turbine	75 days
21	Insulation	105 days?
22	Cold commissioning	33 days
23	Cleaning & steam blowing	10 days
24	Hot commissioning	90 days
25	Hand over test	10 days
26	Preliminary hand over	0 days



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11.2.2 Environmental Impacts – Construction Phase

Construction impacts and mitigation measures have been comprehensively assessed under 12 headings. Details of previous analysis of each aspect addressed have been included with the further additional information for ease of reference.

1 Human Environment

The impacts of the proposed development on the Human Environment are dealt with in Chapter 3.0 of the Original EIS drafted in 2001 and are also addressed in Section 3.0 of this submission.

a) Land Use, Zoning and Housing

Predicted Impacts

Site clearance and construction of the Biomass CHP development site will result in the loss of some land (ca. 7 acres), which was previously used for agricultural purposes. It is not predicted that the construction phase of the development will have any impact on land use in the surrounding area. No one will be physically displaced by the development nor should the development alter current usage of adjacent property.

Proposed Mitigation Measures

- Construction noise will be evident and noticeable on occasions at nearest residences, however, all operations will have to adhere to strict guidelines and standards see Section 8.0 of this submission.
- Dust Blow will also be minimised by implementing mitigation measures outlined for protection of air quality.

b) Health and Safety Considerations

Predicted Impacts

As with any major construction site there will be potential risks to the health and safety of construction personnel and visitors to the site.

Proposed Mitigation Measures

The plant will be constructed in accordance with Health Safety and Welfare at Work Construction Regulations 1995. A comprehensive Health and Safety programme will be put in place on the site to minimise any risks to and ensure the health and safety of construction personnel and site visitors. This will address all relevant items including the following:

- Traffic Safety during transport of oversized loads to and from the site
- Working with electricity

- Working at Heights
- General construction safety

Appropriate training instruction and resources will be provided to ensure that training appropriate to roles and responsibilities is provided. The Health and Safety programme must also ensure that the company is in compliance with the following legislation:

- Health Safety and Welfare at Work Act 1989
- Health Safety and Welfare at Work (Construction) Regulations
- Fire Services Act 1981

Site access will be restricted in a similar manner to any construction site.

c) Economic Benefits and Employment

During the Construction period, up to 50 workers both skilled and unskilled will be employed on site. The construction of the development would have a significant temporary positive impact on employment both directly and indirectly through associated expenditure within the local community.

Where possible, local services and construction staff from Monaghan and its surrounding areas and counties will be utilised. Haulage contracts have not yet been agreed, but Haulage companies will be required to comply with national road safety standards and any additional conditions stipulated by the Local Authority.

d) Electricity usage During Construction

It is assumed that a preliminary connection for site construction will be made to the 38KV station located 0.1kms from the development. This will eliminate use of generators on site.

e) Telecommunications

Mobile phones or hand held radios would be used during site construction.

2 Air Quality

The Impacts of the proposed development on Air Quality are addressed in Chapter 4.0 of the Original EIS drafted in 2001 and also addressed in Section 5.0 of this report

Predicted Impacts

During the construction phase, the major air quality impacts will be dust release from site activities. Earthworks and site preparation work may give rise to some fugitive dust. Loose dry materials may become mobile in air currents during dry spells either due to site traffic or climatic

conditions. Other emissions include fumes from traffic on site and from generators of fixed construction equipment. Emissions from such sources will be prevented by correct maintenance of equipment and also it is proposed to make a preliminary electricity connection to eliminate the requirement for generators. Air borne dust blow will largely be maintained within the confines of the site but a number of mitigation measures are proposed to minimise the transfer of site generated dust off site.

Proposed Mitigation Measures

- Good housekeeping measures such as proper storage of spoil/loose material on site
- Proper containment of loose materials transported on or off site
- The use of bowsers (mobile tanks) during periods of dry weather to dampen potentially flyaway material and cleaning of adjacent roads where necessary
- Sealing of stockpiles by rolling and damping down or covering fully if necessary
- Soil to be excavated during construction can be pre wet if during dry weather if necessary
- Installation of windbreaks on the windward side of construction areas prior to soil disturbance if required
- Speed limits for on-site vehicles will be controlled especially on unpaved areas
- Vehicles will be maintained to minimise their potential to carry material off site and also to minimise gaseous emissions
- Site work will be completed under stringent site management quality standards in order to minimise impacts as outlined.

3 Noise and Vibration

The impacts of the proposed development in relation to noise are addressed in Chapter 5.0 of the Original EIS drafted in 2001 and are also addressed in Section 8.0 of this submission.

Predicted Impacts

The largest potential noise impacts are likely to be generated during the construction phase. Construction noise will be unavoidable but the impacts will be temporary and noise abatement measures will be implemented. The information provided in the Chapter 5.0 includes the predicted noise levels from construction plant and construction activities. These were calculated using procedures set out in BS 5228 Part 1:1997 and the results are expressed as LAeq (12 hour) dB(A) equivalent continuous noise levels, which is a standard unit used to express construction noise.

Table 11.1 presents a summary of predicted noise levels from construction plant based on sound power levels and expected operation times (detailed in section 8) A reference distance of 150m has been chosen to represent a worst case scenario although the nearest dwelling is at a distance of approximately 180m.

Table 11.1 Summary of Noise from Construction Plant

Item of Plant	LAeq(l2 h) at 150m, dB(A)
Compressor	46.6
Welding Generators	13.0
Pneumatic Breakers	48.9
Cranes	43.6
Wheeled Loader	47.0
Excavator	52.6
Site Truck	51.6
Bulldozer	53.6
Piling Rig	58
Truck Concrete Mixer	49.6
Poker Vibrators	53.6

It is envisaged that foundations for the proposed plant will require piling. Piling and works involving earth moving and concreting tend to be the noisiest activities during construction.
The likely noise levels from these activities, at various distances from the site, are calculated below. It should be noted that these activities are not coincidental so the noise is not additive.

Piling noise and vibration will be temporary during the construction of the power station foundations. Vibration will not be significant due to scale of the piling works and the distance to the nearest residences. Table 11.2 presents predicted noise levels at 150m from the site boundary to represent a worse case scenario for nearest noise sensitive dwellings. A more detailed assessment of impacts is contained in section 8 of this submission.

Table 11.2 Summary of Noise from Construction Activities at 150m distance

Activity	LAeq (12 hour), dB(A)
Earth Moving	**58.3**
Piling	**58.0**
Concreting	**55.4**

The nearest dwelling is over 180m from the site boundary, as illustrated in Figure 8.1 in Section 8.0 of this submission. One combined use dwelling/office building is located directly across from the site entrance on the map and it is at a shorter distance from the plant but does not represent a noise sensitive dwelling as it is associated with the development.

Noise levels at this distance were calculated from the sound power data assuming the plant would be operating at the nearest point of the boundary to the sensitive receivers. Construction equipment will not generally operate at the boundary of the site. The results are expressed as $dB_{LAeq,\ 12\ hour}$, equivalent continuous noise levels, the standard units for construction noise. Calculations for the sound pressure levels at a distance of 150m from the various sources were calculated as per BS 5228: Part 1:1997. These are summarised in Table 11.1.

Earthworks on site have the potential for elevated noise and vibration impacts. Earth moving equipment has the potential for increased noise levels and also a certain degree of vibration. Excavation and piling activities, particularly where rock is encountered, has the potential to cause disturbance. Piling noise and vibration will be temporary during the construction of the power station foundations and the impacts are reduced in the plant layout by locating all major structures towards the rear of the site at a maximum distance to the nearest residences. Predicted noise levels over a range of distances are presented in Table 11.2.

Construction noise levels at the sensitive locations which are 150 m or more in distance from the site boundary should remain within background noise limits appropriate to such activities in rural areas. During the initial construction period, site noise as defined in BS 5228:1997 shall not exceed the following criteria:

Leq (1hour)	**Time period**
65 dB(A)	0800 hours - 1800 hours Monday - Friday inclusive And 0800 -1300 Saturdays excluding public holidays and Sundays.
45dB(A)	Any other time.

These parameters will not be exceeded at any noise sensitive premises in the locality when measured in accordance with Annex E of BS 5228:1997: Part 1.

An appropriate correction shall be applied in the case of tonal or impulsive components in the measurements of noise in accordance with the provisions of ISO 1996.

Proposed Mitigation Measures

- It is proposed to limit outside noisy construction activity to daytime hours where possible
- The duration of the overall construction period is limited to a set time period
- Provision of notification in advance of planned periods of noisy construction activity
- Any possibility of local disturbance will be further limited by restricting piling work to daytime hours.
- Establishing communication links between the developer, contractor, Local Authority and local residents;
- Locating pumps and generators in positions that cause the least noise disturbance. It is hoped to have an initial temporary power connection to eliminate the requirement for generator use
- During the initial construction period, BAT (best available technology) 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".

Construction equipment shall comply with the following EU Directives on Construction Plant Equipment in Force July 1999:

- Council Directive 79/113/EEC of 19 December 1978, a directive on the approximation of the laws of Member States relating to the determination of the noise of construction plant and equipment (amended by 81/105 1/EEC and *85/405/EEC).*
- Council Directive 84/532/EEC of 17 September 1984, a Framework Directive on the approximation of the laws of Member States relating to common provisions for construction plant and equipment.
- Council Directive 84/533/EEC of 17 September 1994 on the approximation of the laws of Member States relating to the permissible sound power level of compressors (amended by 85/406/EEC).
- Council Directive 84/535/EEC of 17 September 1994 on the approximation of the laws of Member States relating to the permissible sound power level of welding generators (amended by 85/407/EEC).

- Council Directive 84/536/EEC of 17 September 1994 on the approximation of the laws of Member States relating to the permissible sound power level of power generators (amended by 85/408/EEC).

- Council Directive 84/537/EEC of 17 September 1994 on the approximation of the laws of Member States relating to the permissible sound power level of powered hand-held concrete-breakers and picks (amended by 85/409/EEC).

- Council Directive 84/538/EEC of 17 September 1994 on the approximation of the laws of Member States relating to the permissible sound power level of lawnmowers (amended by 87/252/EEC, 88/1 80/EEC, 88/181/EEC).

- Council Directive 86/662/EEC of 22 December 1986 on the limitation of noise emitted by hydraulic excavators, rope-operated excavators, loaders and excavator-loaders (amended by 89/5 14/EEC and 95/27/EEC).

5 Construction Traffic

The Impacts of the proposed development in relation to traffic are addressed in Chapter 7.0 of the Original EIS drafted in 2001. Traffic Impacts and associated road improvements are also addressed in Section 4.0 of this submission. Consideration given to traffic movements to and from the proposed facility during the site selection process is addressed in Section 2.0 of this submission.

Predicted Impacts

Peak construction traffic is expected to be approximately 50 passenger cars. As the majority of construction employees will work 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 traffic flows.

Construction Heavy Goods vehicles (HGVs) are expected to be in the order 15 HGVs per day, or 45 Passenger Car units (PCU's) with a total two way peak of 12 PCU's.

Assuming a 60:40 east west distribution for construction employees (based on population centres around the site) and a 30:70 east west distribution for construction HGVs (based on the assumption that the majority of HGVs will travel via the better approach road from the R186 direction), this results in a peak hourly flow of 30 PCU's for personnel and 4 PCU's for HGVs. This represents an increase of 34 PCU's or 117% increase over the surveyed traffic flows of 29

PCU's. The impact of construction traffic will be confined to a short-term duration i.e. construction period.

Construction HGVs have the potential to cause noise nuisance and both ground and airborne vibration when passing houses in close proximity to the road. The houses most affected by this will be the two residences in closest proximity to the plant. This is illustrated in Figure 8.1 in section 8.0 of this submission. These are located near the roadside and will also experience the highest volume of site- related traffic. Other houses along the route will have more dispersed volumes of site-related traffic and are also located distances from the road to provide good attenuation from noise. It is proposed that construction is completed in stages over approximately a 25 month period.

Proposed Mitigation Measures

The following measures will be adopted to mitigate the impact of construction traffic:

- Necessary Road Improvements and associated environmental impacts and mitigation measures are outlined in Section 4.0 of this submission.

A traffic management plan will be implemented during the construction phase to minimise traffic impacts occurring as a result of construction activities. These will include the following:

- Provision of buses from population centres (Monaghan and Emyvale) for site workers. All employees during the construction period will be encouraged to travel to the site on buses to minimise the number of vehicles travelling to the site. This will reduce the number of vehicles travelling to the site significantly. It is anticipated that no more than 2-3 buses will be required to transport the employees from Emyvale and Monaghan to the site via the N2 approach.

- A temporary car park will be constructed on-site for the duration of the construction period.

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6 The Landscape

The impacts of the proposed development on Landscape and Visibility are addressed in chapter 6.0 of the Original EIS drafted in 2001

Landscape Impacts are also addressed in Section 9.0 of this submission

Predicted Impacts

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 impact of construction works on the character of the landscape is dependent on the sensitivity of the affected landscape. This is discussed in detail in Section 9.0 of this submission.

Proposed Mitigation Measures

- 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, 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.

7 Soils, Geology and Groundwater Quality

The impacts of the proposed development on soils, geology and groundwater quality have been addressed in Chapter 8.0 of the original EIS drafted in 2001

Aquatic Emissions are also addressed in section 5.0 of this submission

Predicted Impacts

In October 2001 KT Cullen & Co Ltd conducted a Geogological and hydrogeological Assessment of the site at Killycarran. This is detailed in Appendix 8.0 of the Original EIS.

- Mitigation measures undertaken to prevent contamination of surface water will also apply for the protection of groundwater

8 Surface Water

Predicted Impacts

The drainage ditch close to the site that feeds into the River Mountain water is required to be protected from contamination as a result of construction activities on site

During site construction, surface water run-off can be contaminated with suspended solids, chemicals, diesel and oil etc which can be seriously damaging to aquatic ecology, water quality and groundwater. Any discharge or surface water runoff into receiving systems should be free from such pollutants. Silty water can arise from excavations, exposed ground, stockpiles, plant and wheel washing and site roads. It is possible that accidental oil spills may occur from tanks or vehicles during refuelling activities. There is potential for diesel leaks/spills to impact on groundwater quality.

During the construction period water will be required for site construction compounds including a canteen, staff offices and toilets. Potable water will be supplied through either a connection to the local group water scheme or a private well. Water usage during this period will not impact on local water requirements.

It is proposed that portable toilets will be used for construction personnel. Waste effluent will be removed by an appropriate waste contractor for treatment off- site.

Proposed Mitigation measures

- Water containing silt / suspended solids will be treated using silt trays or settlement tanks and consequently the developer will be required to install silt traps/settlement tanks during the construction of the site until such time as permanent structures are constructed.
- Oil will be delivered to the site by tanker. Any chemicals or diesel used on site will be stored in a suitable tank (steel/ plastic). Storage tanks will be bunded to 110% of the tank capacity. Any leaks or spills will therefore be contained and will be disposed of with a suitable hazardous waste contractor. Drainage from bunded areas will be diverted for collection and safe disposal. The developer will also be required to install temporary oil interceptors at the outlet of surface water drains during the construction of the site until such time as permanent structures are constructed.

With these measures in place no adverse impact on surface water quality is anticipated.

9 Climate

The impacts of the proposed development on climate are addressed in Chapter 10.0 of the Original EIS drafted in 2001

Predicted Impacts

Construction activities associated with the propose development are not predicted to have an impact on the local climate therefore no mitigation measures are anticipated to be required.

10 Flora & Fauna

The impacts of the proposed development on Flora and Fauna were addressed in Chapter 11.0 of the Original EIS

Predicted Impacts

a) Flora

It is predicted that the proposed development will impact on terrestrial fauna through the removal of vegetation for the construction of building units and areas of hard-standing. The impacts are significant on a local scale. However, impacts on a regional or national scale are not considered significant. The site is limited in both habitat and species diversity. The ecological survey carried out as part of the EIA in 2001 identified that the site does not contain any ecological entities of particular special ecological interest. 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.

b) 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 during the ecological survey carried out as part of the EIA in 2001. 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. The proposed development will not have any significantly negative effect on butterfly species diversity or population sizes in the area.

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.

Proposed Mitigation measures

- Landscaping and Planting proposals are detailed in Section 9.0 of this submission.
- In consultation with landscape architects and horticultural experts, the developer intends to improve the overall condition of hedgerows surrounding the site through the introduction of a management regime where there previously was none. The result will be hedgerow units of greater ecological value. It is therefore predicted that the development will have a positive impact on bird populations on a local scale by establishing new and higher quality habitats.

- Whilst no rare or protected plant or animal species were recorded as occurring or having occurred at the site, it is acknowledged that ecological value lies in that which is typical in addition to that which is rare. In order to minimise the impact of the proposed development on ecological assets typical and special to the locality and region a stringent policy of care will be employed and enforced by site managers at the constructional phase and the operational phase to ensure that quality control targets are met and exceeded with respect to all activities.

- Numerous woody species in the hedgerows and field boundaries hold the potential to become valuable to local wildlife. In their current state of poor structural development they are of limited ecological value. Where relevant, 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. The shrub and herb layers of these field boundaries will be maintained in a manner that will encourage the nesting of birds and other small animals. This contrasts with their current gappy state and poor habitat value. Strategic management and maintenance of the tree lines in particular would enhance and increase the faunal diversity accommodated by the trees.

- 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 introduced respecting the genetic integrity of local plant specimens.

- The noise impact on wildlife will be minimised through noise abatement measures to ensure compliance with Irish and European legislation as detailed in Chapter 5.0 of the original EIS and section 8.0 of this submission

- In order to minimise the impact of the proposed development on ecological assets typical and special to the locality and region, a stringent policy of care will be employed and enforced by site managers at the constructional phase and the operational phase to ensure that quality control targets are met and not exceeded with respect to all activities.

11 Cultural Heritage

a) Natural Heritage Areas and Special Areas of Conservation

Predicted Impacts

There are no Natural Heritage Areas or Special Areas of Conservation within 5 km of the site. No impacts are predicted and no mitigation is considered necessary

b) Archaeological Features

Predicted Impacts

Although the archaeological study carried out indicates that there are no items of significance on the site. Nevertheless, where extensive earthmoving is involved, archaeological features are often discovered. Based on the study carried out as part of the EIA in 2001, there is no evidence of clearly defined archaeological remains or artefacts on the site of the proposed development or in the immediate vicinity. While the proposed development will not directly affect any known archaeological sites, it is possible it will affect any previously unrecorded archaeological sites, which might still exist undetected below the ground surface during groundworks.

Proposed Mitigation Measures

Earthworks will be associated with site clearing activities during the construction period. It is therefore considered necessary that:

- an archaeologist should monitor all topsoil removal on the site
- in the event of discovering any archaeological features, their investigation and recording by an archaeologist should be facilitated and funded by the developer and the discovery reported to Duchas, 51 St. Stephen's Green, Dublin 2. Duchas the Heritage Service and the National Monuments and Historic properties and Planning Authority can advise on what procedures should be adopted for the preservation of such features.

- Artefacts discovered should be reported to the Duty Officer of the National Museum of Ireland, Kildare Street, Dublin 2.

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

12 Material Assets

Predicted Impacts

The construction phase of the development will not have a significant impact on the material assets of the area. Mitigation against increased construction traffic includes a traffic management plan. Water will be supplied from the developers well for use as a potable supply during construction. All domestic effluent generated on site will be discharged to temporary sewage containment facilities prior to transport and treatment off-site.

11.2.3 Materials balance for the proposed Biomass CHP Facility

Vegetation and Topsoil stripped from the site during construction will be stockpiled for later on-site use. Over 50% of the overburden estimated to be stripped from the site during excavation works for the **fuel unloading areas, fuels silos and fuel unloading pits** will be used for the construction of screening berms. Remaining overburden will be utilised where possible for backfilling where additional on-site cutting and filling activities occur on site.

Table 11.3 Quantifiable Overburden Strip

	Estimated Amount of Overburden Strip (m^3)
Fuel Unloading Area and Fuel Silos	2,100
Fuel Unloading Pits	2,024
Total	4,124

Note: Quantities in m^3 were calculated using scope of works estimations, prepared by Bascon Architects and Engineers A/S Denmark in 2001 and supplied by Aalborg Energie Technik.

Table 11.4 Quantifiable Overburden Re-use

	Estimated Amount of Overburden Re-use (m^3)
Construction of Screening Berms	2,213

Note: Quantities in m^3 were calculated using proposed height width and length of screening berms as illustrated in the Landscaping Plan (see Section 9 of this submission)

In the event that a small amount of overburden would be required to be transported off-site, suitable re-use or disposal methods will be determined by the site developers in accordance with the Waste Management Acts 1996 to 2003 and in accordance with best practice methods, prior to the removal of the overburden.

Waste management on site

Design Specifications and bills of quantities will be utilised with the aim of waste minimisation during site construction. This will be beneficial from both an economic and environmental perspective. Re-use, recycling, and proper disposal of construction wastes both on and off-site will be considered at the project preparation stage prior to commencement of construction activities

Table 11.5 Re-use and recycling options for Construction Waste

Material	Re-use and Recycling Considerations
Concrete	Recycle for use as aggregate in new concrete Recycle for use as unbound aggregate in roads or fill
Steel and other metals	Recycle
Excavation Spoil	Re-use on site for landscaping and levelling
Topsoil	Re-use on site for landscaping
Oils, Paints and Chemicals	Re-use
Packaging and Plastics	Recycle
Unused blocks and Bricks	Re-use or sell to builders yard
Glass	Recycle for use as new glass or use as aggregate in roads or fill

Overall, waste can be reduced during construction in a variety of ways

- Just in time delivery of materials – this causes less damage from handling and storage
- Early consultation with an appropriate professional adviser to reduce the need for unnecessary excavation and concrete in foundations and floors
- Sorting waste and off-cuts for re-use and recycling
- Careful analysis of bills of quantities and materials orders to reduce excess and waste

11.3 References

Pollution Prevention Guidelines Working At Construction and Demolition Sites: PPG 6, The Environment Agency UK, 2001

www.sheilapantry.com/fulltext/samples/evpd/eppg06.asp

Sustainable Design, Construction & Pollution Control, Thurrock Council Environment

http://www.thurrock.gov.uk/environment/

ExternE – Externalities of Energy. A research Project of the European Commission

www.externe.jrc.es/af36file1.htm

Enhancing sustainable qualities by demolition and construction management, Elevate East Lancashire

www.elevate-eastlancs.co.uk/sustain_framework_8.html

12

12.0 ASH REMOVAL

12.1 Monaghan County Council's Comments and Requests

"The discussion of the arrangements for the ash generated by this proposed facility is inadequate in both the EIS and in the response received by the County Council in November 2003. Indeed the response to the County Council's notice for additional information gives two different figures for the ash generated from the site : 54,000 tonnes and 47, 000 tonnes

No differentiation is made between fly ash and bottom ash.

Both the EIS and the additional information submitted assert that the ash does not fall within the legal definition of "waste" under the Waste Management Act. This statement seems to be highly questionable particularly in light of judicial precedent set by the European Court of Justice.

The EIS and your response of last November by no means clarify the end-uses for the ash. From the EIS, it seems that the management options are to be determined once the plant is commissioned. This approach is inappropriate and the end-users and disposal options need to be clarified. The suggestion that all of this material could pass to the County Council s landfill at Scotch Corner fails to take into account that the site's waste licence contains very significant restrictions on acceptable waste types and quantities. In the event the fly-ash is defined as a hazardous waste, this facility is not licensed to accept this material

The County Council's earlier notice also requested that you show whether the disposal of the ash from this site was compatible with any relevant waste management plan. It is noted that aspect of the request was not answered.

You are requested to clarify the exact amount of ash produced by this facility and to set out the relevant proportions of fly-ash and bottom ash. You are also requested to take a worst case scenario — whereby all of this material falls within the definition of 'waste' under the Waste Management Act — and to clearly set out the intended disposal sites and options. You should clarify whether or not the fly ash may constitute a hazardous waste material and, having regard to such a finding, indicate what is supposed to happen to this material. In the event that you remain of the opinion that the fly ash is not a hazardous waste, a full reasoning behind this position should be given. This should take into account results of chemical analysis of ashes from similar plants in operation elsewhere. The compatibility of the ash arising from this proposed plant in respect of the requirements and polices of the relevant waste manage plans needs to be assessed."

12.2 Response

The proposed development is a scheduled activity under the Integrated Pollution Control licensing scheme controlled by the Environmental Protection Agency (EPA).

All aspects of the licensed activity's potential impact on the environment are examined and determined under the EU Integrated Pollution Prevention and Control (IPPC) Directive 96/61/EC, including emissions to air and water, energy and resource use efficiency, environmental management systems, and waste and residuals management.

Licensing, waste management, effluent discharges, odour emissions, noise emissions and atmospheric discharges fall within the remit of the Authorised Regulatory Authority (the EPA) under the IPPC Directive and not the Planning Authority.

Requests for additional information and clarification on this matter will however will dealt with here in the interest of transparency.

12.2.1 Amount of ash produced by the facility

The volume of ash produced by combustion processes is function of the inherent properties of the raw material being combusted. The moisture content, the fuel mix and the combustion characteristics of the fuel have a direct influence on the type and volume of ash produced.

Available Fuels	Volume (tonnes)
Spent Mushroom Compost	198,000
Poultry Litter	155,000

Note: The fuel volumes were calculated as part of the Waste Resource study carried out in 2001. This is detailed in Appendix 13 of Volume 2 of the original EIS. These are the two main types of fuel to be used at the facility. Wood Chips will be used as a tertiary fuel if required.

Tables 12.1 and 12.2 present calculated minimum and maximum volumes of ash produced using fuels over varying moisture ranges. Only spent mushroom compost and poultry litter are examined as they are the primary fuel types. Lower ash volumes are expected in cases where wood chips are used.

Table 12.1 Calculation of Minimum Volume of Ash to be produced by the Facility

Fuel	Total Volume (tonnes)	Moisture Content %	% Ash	Ash Volume (tonnes)
Spent Mushroom Compost	198,000	60 – 65	10.5	20, 790
Poultry Litter	155,000	30 – 35	12.25	18, 988
Total	353,000	-	-	39, 780

Table 21.2 Calculation of Maximum Volume of Ash to be produced by the Facility

Fuel	Total Volume (tonnes)	Moisture Content %	% Ash	Ash Volume (tonnes)
Spent Mushroom Compost	198,000	65-70	11.5	21, 780
Poultry Litter	155,000	35-45	20	31,000
Total	353,000	-	-	54,000

Note:

Total Fuel volumes are based on the maximum amount of fuel proposed to be accepted at the facility

Representative Moisture Content values and % Ash values provided are based on the following:

- Data obtained from the Waste Resource Study as detailed in Appendix 13 of the Original EIS, Volume 3
- Data obtained from the Survey of Available *Agri- Combustible Waste in the Economic Vicinity of the proposed Monaghan Power Station, Integrated Energy Systems, 2001*
- Fuel Characteristic Analysis carried out by Aalborg Energie Technik in 2000 to determine the parameters and specification for Boiler operation
- Data on Fuel Characteristics for Eye Power Station, Suffolk, UK Report: *ETSU B/FW/00235/REP*
- Moisture Content and % Ash Values are based on proximate analysis for fuel as received
- Fuel Sampling and analysis was carried out according to standard methods.
- Fuels will be subject to drying prior to combustion, this has been accounted for in assessing predicted ash volumes.
- Moisture Content and % Ash values for Wood Chips are not included in the calculations

The % Ash values for suitable wood sources are quoted as <5%. Addition of Wood Chips as a substitute for either fuel type if required would reduce the overall volumes of ash produced by the Facility.

In general, Poultry Litter is more stable in terms of fuel characteristics, with moisture content being lower than that of SMC. Spent Mushroom compost is more variable with moisture content ranging from 60-70%, this is seasonally dependent.

Fuel characteristics affect plant efficiency. These were assessed in detail by the Plant Designers when determining optimal Boiler Operation specifications. Variations do exist in both the composition and structure of biomass fuels and these variations are taken into account when calculating ash volumes and atmospheric emissions produced as a result of the combustion of biomass.

Detailed analysis of the fuel was based on proximate and ultimate analysis. Data obtained from Analysis carried out by AET, the plant designers, was compared with data from additional

research and development and data obtained from existing facilities, as outlined above, to obtain representative values for Moisture Content and % Ash.

Average Volume of ash to be produced by the facility

Based on Maximum and Minimum values of 54,000 tonnes (Table12.1) and 39,780 tonnes (Table 12.2) respectively, the average volume of ash predicted to be produced by the Facility is

47,000 tonnes per annum

Relevant proportions of Bottom ash and Fly ash

The proportion of Fly Ash to Bottom Ash predicted to be produced is 40:60

Note: this figure is based on plant specifications provided by Aalborg Energie Technik

Fly Ash (40%)

The total quantity of Fly Ash produced will be approximately 19, 000 tonnes per annum

The proposed plant will be in operation for 8,200 hours per year (95% on line availability)

Fly Ash production equates to approximately 2,300 tonnes per hour

Bottom Ash (60%)

The total quantity of Bottom Ash produced will be approximately 29,000 tonnes per annum

The proposed plant will be in operation for 8,200 hours per year (95% on line availability)

Bottom Ash production equates to approximately 3,600 tonnes per hour

12.2.2 Worst Case Scenario - whereby all of the ash material falls within the definition of 'waste' under the Waste Management Act

Introduction:

Ash is classified as a waste product under the Waste Management Act 1996 and therefore it is at the discretion of the EPA to determine suitable disposal sites and also to determine whether suitable recovery and re-use alternatives for ash produced by the facility may be found. Furthermore, in line with Council Directive 75/442/EEC of 15 July 1975 on waste; where waste is produced, it is recovered; Monopower Ltd will seek to determine sustainable alternative routes for ash produced by the facility in order to reduce the amount sent to landfill. The final decision regarding the classification of the ash (as hazardous, non- hazardous or inert), re-use or recovery options and/or disposal sites falls within the remit of the EPA as part of the IPC licence application process.

The information provided in this report aims to demonstrate that issues regarding ash production, classification and consequent waste management strategies have been considered during the EIA process.

Description of ash and waste characterisation

The ash produced from the CHP plant is a product of combustion of the raw material which originates from Spent Mushroom Compost, Poultry Litter and Wood Chip Biomass residues. The characteristics of the ash from the plant are determined by the inherent properties of the fuel as modified by the combustion process. The physico- chemical characteristics of each raw material proposed to be utilised in the biomass CHP Facility have been analysed in Appendix 13 of the original EIS, which was prepared in 2001. The lighter fly ash comprises approximately 40 % of the total ash with the coarser bottom ash making up the remainder.

Ash classification

Ash is classified according to the Consolidated European Waste Catalogue (EWC). The Environmental Protection Agency (EPA) has adopted the EWC and the Hazardous Waste List (HWL) as the reference system for collecting, collating and reporting statistics on waste. Section 4(2) of the Waste Management Act 1996 implements the Hazardous Waste Directive and the associated EWC and HWL.

As per Commission Decision 2001/118/EC of 16th January 2001 amending decision 2000/532/EC as regards the list of wastes, ash from the biomass CHP plant is classified according to Chapter 10, Wastes from Thermal processes

The ash may be assigned the following EWC Codes

10 01 01 bottom ash, slag and boiler dust (excluding boiler dust in 10 01 04)
10 01 03 fly ash from peat and untreated wood
10 01 15 fly ash from co- incineration other than those mentioned in 10 01 14

Spent Mushroom Compost

As part of the Waste Resource Study, detailed in Appendix 13 of the Original EIS which was completed in December 2001, a series of Raw Spent Mushroom Compost were taken from a representative number of farms in the Monaghan region in July 2000 and October 2001. Raw and ashed samples dried at 550^{o}C, 850^{o}C and 1100^{o}C were analysed for a wide range of parameters including heavy metals, dioxins/furans, volatile organics, organo p-pesticides and chlorinated organic pesticides

Table 12.1 details the results of chemical analysis on samples ashed at 550 ^{o}C, provided by Aalborg Energie Technik in July 2000.

Table 12.2 details analysis results of samples ashed at 1100^{o}C. Overall, the heavy metal content of the samples ashed at 1100^{o}C is regarded as low. Analysis of the raw and ashed samples for pesticide residue levels indicates that all results were found to be below the sample detection limit of 20 ng/kg (ppb)

Tables 12.3 and 12.4 detail the results of analysis on the dioxin content of the raw spent mushroom compost and samples ashed at 850^{o}C and 1100^{o}C. Calculation of the I-TEQ for the raw sample on a dry weight basis gave a value of 0.13 ng/Kg. Calculation of the I TEQ for the ashed samples at 850^{o}C and 1110^{o}C indicated that dioxin levels were undetectable in the samples. The total dioxin/furan content for the raw sample was calculated to be 26 ng/kg. Analysis of the samples ashed at 850^{o}C and 1100^{o}C yielded total dioxin concentrations of 5ng/kg and 3.9 ng/kg respectively.

Analysis of ashed spent mushroom compost samples was commissioned by SWS Environmental Services and also by Aalborg Energie Technik, the plant designers as this is the first development of its kind proposed to be built in Ireland.

Table 12.1 Spent Mushroom Compost Ashed at 550 ^{o}C and 29.7% O_2 Dry Basis

Parameter	Units	Mean	Basic/Acidic	Melting Point ^{o}C
P_2O_5	%	6.6	A	580
CaO	%	44	B	2614
MgO	%	3.1	B	2852
Na_2O	%	1.1	B	1275
K_2O	%	7.7	B	350
SiO_2	%	16	A	1610
Al_2O_3	%	1.3	B	2072
Fe_2O_3	%	0.92		1565
SO_3	%	16		
TiO_2	%	1.1		
Cl	%	0.091		
Total	%	97.9		

Source: Sampling results issued by Aalborg Energie Technik in July 2000

Table 12.2 Raw Spent Mushroom Compost and Ashed Samples

Heavy Metal Content, Pesticide Residue Levels and Volatile Organics

Parameter	Units	Raw Received	Ashed Samples 1100°C
Metal Analysis			
Arsenic	mg/Kg	<8.0	48
Cadmium	mg/Kg	<0.6	<0.6
Chromium	mg/Kg	5	27
Copper	mg/Kg	35	160
Lead	mg/Kg	4.3	3
Nickel	mg/Kg	<6.0	17
Mercury	mg/Kg	0.03	<0.10
Antimony	mg/Kg	0.2	2.6
Manganese	mg/Kg	210	1000
Tin	mg/Kg	<10	23
Vanadium	mg/Kg	11	61
Pesticides			
Azinphos-Methyl	µg/Kg	<20	<20
Chlorfenvinphos	µg/Kg	<20	<20
Diazinon	µg/Kg	<20	<20
Dichlorvos	µg/Kg	<20	<20
Fenrtioithion	µg/Kg	<20	<20
Malathion	µg/Kg	<20	<20
OPP Total	µg/Kg	<20	<20
Propetamphos	µg/Kg	<20	<20
Aldrin	µg/Kg	<20	<20
BHC-Alpha	µg/Kg	<20	<20
BHC-Beta	µg/Kg	<20	<20
BHC-Gamma	µg/Kg	<20	<20
Dieldrin	µg/Kg	<20	<20
Endosulphan-Alpha	µg/Kg	<20	<20
Endosulphan-Beta	µg/Kg	<20	<20
Endrin	µg/Kg	<20	<20
HCB	µg/Kg	<20	<20
Isodrin	µg/Kg	<20	<20
OCP Total	µg/Kg	<20	<20
op-TDE	µg/Kg	<20	<20
PCB Congener 118	µg/Kg	<20	<20
PCB Congener 138	µg/Kg	<20	<20
PCB Congener 153	µg/Kg	<20	<20
PCB Congener 180	µg/Kg	<20	<20
PCB Congener 28	µg/Kg	<20	<20
PCB Congener 52	µg/Kg	<20	<20
PCB Total	µg/Kg	<20	<20
Pp-DDE	µg/Kg	<20	<20
pp-DDT	µg/Kg	<20	<20
pp-TDE	µg/Kg	<20	<20
Triffyuralin	µg/Kg	<20	<20
VOC scan on solids			
Chloroform	µg/Kg	1700	
Ethanol	µg/Kg	870	
3-Octanone	µg/Kg	3200	
3-Octanol	µg/Kg	2000	
trans-2-Undecen-1-ol			64
2,4,4-Trimethyl-1-pentanol		270	

Source: Analysis carried out by AES Laboratories in 2001, commissioned by SWS Environmental Services

Legend:

<: Below detection limit

Sampled: Top, middle, bottom - 4 mushroom houses

Table 12.3 Raw Spent Mushroom Compost and Ashed Samples Dioxin/Furan Analysis Summary

Parameter	ng/kg	ng/kg
Raw SMC	0.13	26
Ashed 850^{o}C	Not detected	5.0
Ashed 1100^{o}C	Not Detected	3.9

Source: Analysis carried out by AES Laboratories, commissioned by SWS Environmental Services in 2001

Legend: Analysis based on 17 PCDD and PCDF contingers containing chlorine substitutions at the 2,3,7,8 positions used to calculate I-Teq values

Table 12.4 Raw Spent Mushroom Compost and Ashed Samples Dioxin/Furan Analysis Results

Totals	Raw SMC	Ashed 850^{o}C	Ashed 1100^{o}C
TCDF's	2.151	2.577	ND
TCDD's	1.719	ND	ND
PeCDF's	0.293	ND	ND
PeCDDs	ND	1.476	0.497
HxCDF's	1.087	ND	1.067
HxCDDs	ND	ND	ND
HpCDF's	ND	0.972	1.233
HpCDD	1.596	ND	1.149
OCDF	ND	ND	ND
OCDD	18.857	ND	ND
Total	**25.703**	**5.025**	**3.946**

Source Analysis carried out by AES Laboratories, commissioned by SWS Environmental Services in 2001

Note: Detailed analytical results showing individual contingers along with further analytical details are not included here due to space considerations

Nd: Not Detected

Poultry Litter

Table 12.5 details the results of sampling and analysis for heavy metal content in Poultry litter ash carried out by FEC Consultants at Eye Power Station in Suffolk in the UK. This analysis was carried out on behalf of the Energy Technology Support Unit (ETSU) and the Department of Trade and Industry and the EC.

Table 12.6 details the results of analysis for dioxin/furan content in Poultry Litter ash also carried out by FEC Consultants Ltd at Eye Power Station in Suffolk.

Table 12.5 Poultry Litter Ash Heavy Metal Analysis Results

Ash Analysis	Precipitator Ash	Bottom Ash
	mg/kg	mg/kg
Cadmium	2.1	<0.1
Mercury	<0.1	1.3
Arsenic	7.6	<0.1
Lead	22.4	0.6
Chromium	26.7	2.3
Nickel	32.9	4.2
Copper	465	77
Manganese	690	365
Cobalt	13.8	0.63
Antimony	4.1	<0.1
Tin	2.9	1.6
Thallium	<0.1	0.8
Vanadium	17	2.8

Source: Data from Eye Power Station, Suffolk, UK Report: ETSU B/FW/00235/REP

The ash analysis results outlined in Tables 12.5 and 12.6 were obtained as part of an extensive Environmental Monitoring programme carried out at Eye power station in Suffolk. The focus of the programme included environmental monitoring of raw materials, ash analysis and atmospheric emissions. Monitoring also included an environmental survey of soil metal content, a visual examination of flora and dioxin/furan sampling on milk samples. The environmental monitoring programme carried out over a period of 16 months has shown that there is no evidence of the deposition of harmful substances from the 41.5m high chimney onto the surrounding plants and soil.

Table 12.6 Poultry Litter Ash Dioxin/Furan Analysis Results

Sample Ref	Precipitator Ash	Bottom Ash
	ng/g	ng/g
2378 TCDD	0.01	<0.001
Total TCDD	0.36	<0.005
12378 –PeCDD	0.008	<0.002
Total PeCDD	0.55	<0.005
123478-Hx CDD	0.012	<0.003
123678-HxCDD	0.011	<0.003
123789-HxCDD	0.012	<0.003
Total HxCDD	0.28	<0.02
1234678-HpCDD	0.045	0.005
Total HpCDD	0.085	<0.01*
OCDD	0.058	0.02
2378-TCDF	0.02	<0.001
Total TCDF	0.34	<0.005
23478-PeCDF	0.01	<0.001
12378-PeCDF	0.01	<0.001
Total PeCDF	0.12	<0.005
123478-HxCDF	0.013	0.004
123678-HxCDF	0.007	0.003
234678-HxCDF	0.005	<0.001
123789-HxCDF	0.001	<0.001
Total HxCDF	0.045	0.01
1234678-HCDF	0.012	0.005
1234678-HpCDF	0.002	<0.001
Total HpCDF	0.02	<0.01*
OCDF	0.042	0.01
I-TEQ	0.028	<0.005
TCDD Recovery	>90	>90

Source: Data from Eye Power Station, Suffolk, UK Report: ETSU B/FW/00235/REP

Note: Total refers to all isomers of the congener group

*Interference of lock (suppression)

Wood Chips

Table 12.7 details the results of wood ash analysis recorded by various authors between 1996 and 2002. Data on Heavy metal and other elemental content in wood ash was documented by The Forestry Ecosystem Research Group (UCD) who are responsible for the PEnrich Project, jointly funded by COFORD and the EPA In their report on “The Use and Environmental Impact of Wood Ash on Forestry in Ireland (2003)

Levels of Dioxins left in wood ash residue after wood biomass from combustion may vary significantly for different operations, depending on a number of parameters. Figures of between 2.81 -24893 ng TEQ of Dioxins per tonne of wood burned have been given in the scientific literature (Hayes and Marnane 2001) (*The Use of Wood-Ash on Forestry in Ireland, Forest Ecosystem Research Group 2003)*

Table 12.7 Wood Ash Analysis Data

Concentrations of Heavy Metals and other elements (mg/kg ash) in wood ash presented by several authors

Author	Number of Samples	Particle Size	As	Ba	B	Cd	Cl	Co	Cr	Cu	Hg	Mo	Ni	Pb	Se	Ti	V	Zn
Someschwar et al (1996)	9 (min –max)		23.2		119.9	5		8.7	39	75.3	0.4	14.9	23.5	65.6	0.1			443
Eriksson (1998b)	1	0-1.9 mm				15.2	1200		353	301			260	390		27	96	2740
	1	1.9-5 mm				15.6	1200		386	300			264	390		26	100	2820
	1	0-1.9 mm				1.1	400		300	344			246	292		3	61	950
Steenai et al (1998)	1	2.8-8 mm	5		230	9.6	5000		115	85	0.1	9	240	205	1	1100	28	1320
	1	<2.8 mm	5		230	9.5	5000		106	73	0.1	7	210	210	1	1000	25	1130
	1	2.8-8mm	5		410	6.8	3000		84	100	0.02	< 5	320	320	<1	70	28	1860
	1	<2.8 mm	5		460	7.5	4000		85		0.02	< 5	360	360	<1	70	30	2450
Korpilahti et al (1999)	3 (min-max)				180-310	10-26.4			43-99					46-56				
Bundt et al (2001)	1									131				14				267
Chirenje et al (20002)	1					3								1.3				
Anonymous (2002)	Coefficient of variation (%)			110	38	12			32				24	4.2				1700
				63	66	65			38				30	28				75
Holberg et al (2003)	24 (min –max)		<3-5	752-826		5-6		15-17	13-76	107-116		<1-2	24-27	26-31		0.02-0.03		449-506

Source: The Use and Environmental Impact of Wood-Ash on Forestry in Ireland, Mark J. Mc Corry, Forest Ecosystem Research Group, 2003

Note: Values are shown either as a range from the minimum to maximum values or as a range of mean values with the number of samples.

Table 12.8 Average concentrations of plant nutrients in various ash fractions of combustion plants using wood residues and waste wood

	Bottom ash		Cyclone fly ash		Filter fly ash	
Nutrient	Wood residues	Waste Wood	Wood Residues	Waste Wood	Wood Residues	Waste Wood
CaO	32.6	31.1	32.3	28.5	--	16.7
MgO	3	2.8	3.2	3	--	0.5
K_2O	6.6	2.3	7.5	2.7	--	7.5
P_2O	0.9	0.9	1.3	1.4	--	0.4
Na_2O	--	1.1	--	1.1	--	3.3

Source: Handbook of Biomass Combustion and Co-Firing, Sjaak van Loo and Jaap Koppejan (eds.) 2002

Note: Concentrations % (w/w) (d.b.). Approximately seven samples were analysed from each ash fraction and each biomass fuel taken from test runs in Switzerland.

Classification of Mixed Ash Waste

With regard to the disposal and/or end use of the material, classification of the waste will be based on the requirements of Council Decision 2003/33/EC of 19th December 2002 - establishing criteria and procedures for the acceptance of waste at Landfills. Such criteria and additional criteria may be chosen by the EPA to determine the suitability of proposed re-use or recovery options as part of IPC Licence requirements.

Ash produced at the Biomass CHP Facility would fall under the description set out in EN 1.1.3 (a) of 2003/33/EC where the waste is regularly generated from the same process where: the installation and the process generating the waste are well known and the input materials to the process and the process itself are well defined.

Council decision 2003/33/EC sets out the requirements for the basic characterisation of the waste. Monopower Ltd will be required to meet the requests of the EPA in order to fulfil these requirements as part of the IPC licence application process

EN 2.2.2 of 2003/33/EC sets out Limit values for wastes acceptable at Landfills for non-hazardous waste. Based on the specific requirements of the EPA, sampling, analysis and compliance testing of ash generated by the biomass CHP plant will be carried out according to the standards set out in Chapter 3 of 2003/33/EC Sampling and Test Methods

Classification of fly-ash as non-hazardous

Based on the EWC Codes assigned to the ash waste produced by the facility and taking into account chemical analysis results for ash material from similar plants and from ash analysis commissioned for the purposes of the EIA, the fly ash produced by the proposed facility at Killycarran can be classified as industrial non-hazardous waste. Detailed analysis of ash

produced by the plant once it is in operation, including the analysis of the leaching behaviour will enable the fly ash to be classified definitively.

In a worst –case scenario situation where the fly-ash is found to exceed the limits set out in EN 2.2.2, proposed mitigation measures would include collection and disposal of the fly ash, (in particular the filter fly ash) separately as a singular residual by-product or waste stream. Suitable disposal sites for the fly ash would also be sought in accordance with the requirements of the EPA. Collection systems for all of the ash produced will adhere to the relevant BAT (Best Available Technology) guidelines.

12.2.3 Proposed Re-use and Disposal options for the ash produced by the facility

Disposal to Landfill at Scotch Corner

The Scotch Corner Landfill facility located at Letterbane, Annyalla, Castleblaney, Co. Monaghan (Waste Licence Register Number 20-1) has been considered as a potential disposal site for the ash produced by the facility. It is licensed to accept a maximum total of 39,500 tonnes per annum of waste, 12,800 tonnes of which has been allocated as Industrial non-hazardous waste. The licence conditions are regulated by the EPA and acceptance of the ash produced by the proposed facility at Killycarran will be subject to compliance with these conditions. Alternative Landfill sites are discussed in section 12.2.4

The proposed facility is predicted to produce approximately 47,000 tonnes of ash per annum. In accordance with Council Directive 75/442/EEC of 15 July 1975 on waste, Monopower Ltd will endeavour to find suitable re-use and recovery options for the ash in order to reduce or if possible, eliminate the amount directed to Landfill

Reuse as an additive in Cement Manufacture, Road building and Other Construction activities

Fly ash from coal combustion is currently utilised successfully in the Cement industry. The influence of co-combustion on fly-ash and its use in concrete using range of ashes derived from secondary materials such as sawdust, woodchips, cocoa shells, sewage sludge and poultry litter has been the subject of a number of studies carried out in the US *(2005 World of coal ash, Kentucky, 2005)*. A recent study in Nigeria dealt with wood residue ash, specifically from the combustion of sawdust *(Udoeyo and Dashibil, 2002*). According to the study's test results, the use of sawdust ash decreased slump and increased the expansion of the ash/cement mortar as it hardened. The ash also caused an increase in the initial and final setting times for the concrete mixes.

Monopower Ltd are exploring the possibility of utilising mixed ash by-product from the combustion of Poultry Litter, Spent Mushroom compost and Wood Chips in studies to be carried

out by the Dept of Engineering at the Queen's University of Belfast which will assess the feasibility of using this material as an additive in cement manufacture.

Re-use as a fertiliser (additive to fertiliser) for landspreading

A wide range of wastes and by-products of industrial processes are being spread on land in agriculture, forestry and land reclamation operations throughout Europe. In general, the amount of ash used for fertilising depends on the specific cultivation of the soil as well as on additional fertilisers used, and should be calculated annually by nutrient balance

Poultry litter ash is a recognised fertiliser in the UK. Ash produced by the Fibropower Poultry Litter CHP plant at Eye is marketed by Fibrophos; a wholly-owned subsidiary of the Fibro watt Group Ltd. Burning of broiler litter concentrates the nutrients in the ash. It is suitable in agriculture or horticulture as has ideal levels phosphate and potash. The nutrient content of ash analysed from a demonstration plant located in Worcestershire in England yielded the following results outlined in table 12.9

Table 12.9 Nutrient Content of Ash analysed at a demonstration poultry litter CHP plant in Worcestershire

	Concentration
Nitrogen	3.6 kg/t
Phosphate	298 kg/t
Potash	172 kg/t
pH	11.3

Source: Energy Technology Support Unit. Ref: ETSU B/FW/00224

The nutrient content of the ashed Poultry litter is compatible with current successfully marked commercial fertiliser which contain the Nitrogen Phosphate and Potash in the ratio 0:30:15

Due to the generally high Calcium and Magnesium content in wood ash, the effects of using wood ash as a fertiliser are similar to fertilising the forest with lime (similar ratio$CaO/CaCO_3$, high pH value of wood ash) The larger particle size of wood ash lowers its aggressiveness in comparison to lime. Therefore, wood ash is recommended for forest soils where an increase in pH value is desirable. In essence, this is a matter of replacing what one has already taken from the land as most of the ash can be spread on the soil beneath the source forest from which the timber originates. This encompasses one the main principles of sustainable forestry management because the remains of the wood used for energy is returned to the forest. Consultation with the Forestry Service here in Ireland has indicated that there is currently no specific legislation covering forestry spreading of ash.

Spent Mushroom Compost is originally comprised of Poultry litter and straw and the resultant ash will reflect this combination. Ash produced by the combustion of Spent Mushroom Compost

is high in potassium, calcium and sulphur. Gypsum and Lime present in the Spent Mushroom Compost may dilute the fertilising value of the combined ash end product

There are currently no specific regulatory controls at the community level on waste applied to land with the exemption of sewage sludge. However in Annex IIB of the Waste Framework Directive 75/442/EC as amended by Directive 91/156/EEC (CEC 1991) states that landspreading operations of waste other than animal carcases and animal manures are considered as recovery operations as long as they are carried out in accordance with Article 4, i.e. without endangering human health and the environment. The Directive specifies that companies undertaking such operations have adopted specific rules for these exemptions *(EC Document: Survey of wastes spread on land 08/07/2003)*

Information on the utilisation of a mixed ash by-product containing Poultry Litter, Spent Mushroom compost and Wood Chip ash is limited. Detailed analysis of the mixed ash produced would be required and it is at the discretion of the EPA to determine whether or not the ash produced meets the required standards and whether it will constitute a viable fertiliser or soil amendment.

Re-use as a capping material for Landfill applications

Ash produced as a by-product of Biomass Combustion, particularly the heavier bottom ash component can be used as a capping material for inert or non-hazardous landfill operations. Again, in order to be considered as a suitable material the ash must meet the requirements set out in Council Decision 2003/33/EC. In particular, the leaching behaviour of the material must be taken into account. Leaching behaviour can be analysed for according to test method prEN 14405 as outlined in Chapter 3 of 2003/33/EEC, Sampling and Test methods. Grate fire ashes are in fact already in use as filling material abroad *(Exploratory investigation into the possibilities of processing ash produced in the combustion of reject wood, 1999*)

Additional physico-chemical and morphological properties which are also required to be assessed when determining the acceptability of the material for remediation works, include the following

- moisture content
- particle size distribution
- laboratory compaction
- specific gravity
- pH

12.2.4 Compatibility of the ash in respect of the requirements and policies of the relevant waste management plans

The Northeast Waste Management Plan (1999 -2004) which encompasses the counties Monaghan, Louth, Meath and Cavan states in Section 8.3.6, Waste Disposal Policy that " The diversion of waste from landfill is the primary objective of the waste Management plan"

Proposed re-use and recovery options which have been outlined in section 12.2.3 of this report, would be further explored and developed in order to comply with this objective.

Section 5.4, Waste Disposal, of the Northeast Waste Management plan lists nine local Authority operated landfill sites within the four counties. The EPA waste licensing database lists a total of 11 licensed landfill facilities operating in the Northeast region. In line with the objectives of the draft waste management plan for the Northeast region, the proximity principle will be utilised in the determination of suitable waste disposal sites.

A Feasibility Study of Thermal Options for Waste Treatment/ Recovery in the Northeast region which was carried out by MCOS/COWI in 1999 concluded that that waste combustion with energy recovery (WTE) and gasification are the most suitable thermal technologies for the Northeast region. It was also recommended that thermal treatment recommendations need to be integrated as recovery elements into County Regional strategies/plans to complement proposals for waste reduction, recycling and disposal.

Section 3.7.4, Options for treatment of excess slurries, of the Northeast Waste Management Plan outlines thermal treatment options as a means of managing such wastes. Volume reduction is the main objective when considering thermal treatment and management of the residues resulting from such process is also an important consideration.

The development of a Biomass Combined Heat and Power Plant with the capacity to reduce an original approximate waste volume of 353,000 tonnes to a figure of 47,000 does present a waste management option which is in line with the plans and policies set for the Northeast region.

12.4 References

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http://europa.eu.int.comm/environment/waste/studies/compost/landspreading.htm

Council Directive 75/442/EEC of 15 July 1975 on waste

Council Directive 199/31/EEC of 26 April 999 on the landfill of waste

Council Decision (2003/33/EEC) of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC

Commission Decision (2001/118/EC) of 16th January 2001 amending Decision 2000/532/EC as regards the list of wastes (notified under document number C(2001)108)

13

13.0 EMERGENCY SERVICES

13.1 Monaghan County Council's Comments and Requests

"The applicant is required to submit details on the adequacy of the proposed firewater retention structures and to outline whether or not a firewater reservoir is required. The physical dimension of these structures should be shown on a drawing."

13.2 Response: Report prepared by QED Engineering Ltd

QED Engineering Ltd were commissioned in March 2005 to prepare a report addressing the requests as outlined above. The report overleaf, entitled "Risk Assessment Report & Risk Management Programme for Fire Water Retention" is based on a desktop research model and current information regarding firewater retention at the proposed site. This information was provided by AET, the plant designers, Monopower Ltd, the plant developers, SWS Environmental Services and public bodies including; The Environmental Protection Agency and the Local Fire Fighting Unit.

Risk Assessment Report &

Risk Management Programme

for

Fire Water Retention

at

Monopower Ltd.

Killycarran
Emyvale
Co. Monaghan

by

Q.E.D. Engineering Ltd
11 Market Street
Monaghan
tel: 047-72060
fax: 047-72061

March 2005

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1. Introduction

Monopower Ltd, Killycarran, Emyvale, Co. Monaghan has made a Planning Application to Monaghan County Council for the construction of a Biomass Combined Heat & Power Plant (Planning Ref. 03/446). On 1/12/04 a request for further information was made by the council as follows;
"The applicant is required to submit details on the adequacy of the proposed firewater retention structure and to outline whether or not a fire water reservoir is required. The physical dimensions of these structures should be shown on a drawing."

The following assessment is used to determine the risk that will exist at Monopower Ltd for the release of contaminated firewater and the consequences of this release to the surface and groundwater bodies in the immediate and surrounding areas. Following on from this a risk management programme is outlined in order to control fire and runoff of contaminated fire water into the environment. The assessment has been carried out in line with the Environmental Protection Agency's "Draft Guidance Note to Industry on the Requirements for Firewater Retention Facilities", 1995. Regard was also had to CIRIA Report 164, "Design of containment systems for the prevention of water pollution from industrial incidents", 1997.

The report has been carried out by Patricia Murtagh and Hugh Doherty of Q.E.D. Engineering Ltd and is based on a site survey and on available information supplied by

1. Monopower Ltd, the developer
2. SWS Environmental Services, Cork, who compiled the Environmental Impact Statement for the development
3. Lars Bronden, Aalbork Energie Technik a/s (AET), Denmark, the designer and supplier of the Biomass CHP plant
4. Environmental Protection Agency
5. The Local Fire Fighting Unit.

The report gives a brief introduction to the proposed development and surface and groundwater features at the site. All raw materials and products stored at the site are outlined along with safety and control measured and fire abatement information. A risk assessment of areas where contaminated fire water could be generated is then presented along with calculations on the volume of fire water to be generated for 90minute fire. The final sections of the report outline the firewater containment measures to be installed on the site and the fire water retention risk management programme.

2. Description of Activity

The proposed site is a Biomass Combined Heat & Power (CHP) plant. It will take in 3 raw materials; poultry litter (PL), spent mushroom compost (SMC) and wood chips (WC), which will be fed to a large steam boiler for combustion. The steam generated from this process will be converted via a steam turbine generator to electricity, which will be sold to the national grid. The capacity of the site will be 22.5MW of electricity per annum.

3. Description of Operation

A schematic of the site is provided in Figure 1. 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; (2 x 1,250m^3 silos for SMC, 1 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 3 steam-heated fuel driers. PL and WC will not require drying.
6. Feeding of raw materials (SMC from the drying plant and PL and WC from the silos) to the combustion plant (boiler). Each raw material will have a separate fuel feeding system. A 4th fuel-feeding system will be in place from an oil burner. Oil is required 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.

Figure 1. Monopower, Proposed Site Layout

4. Surface and Groundwater Features

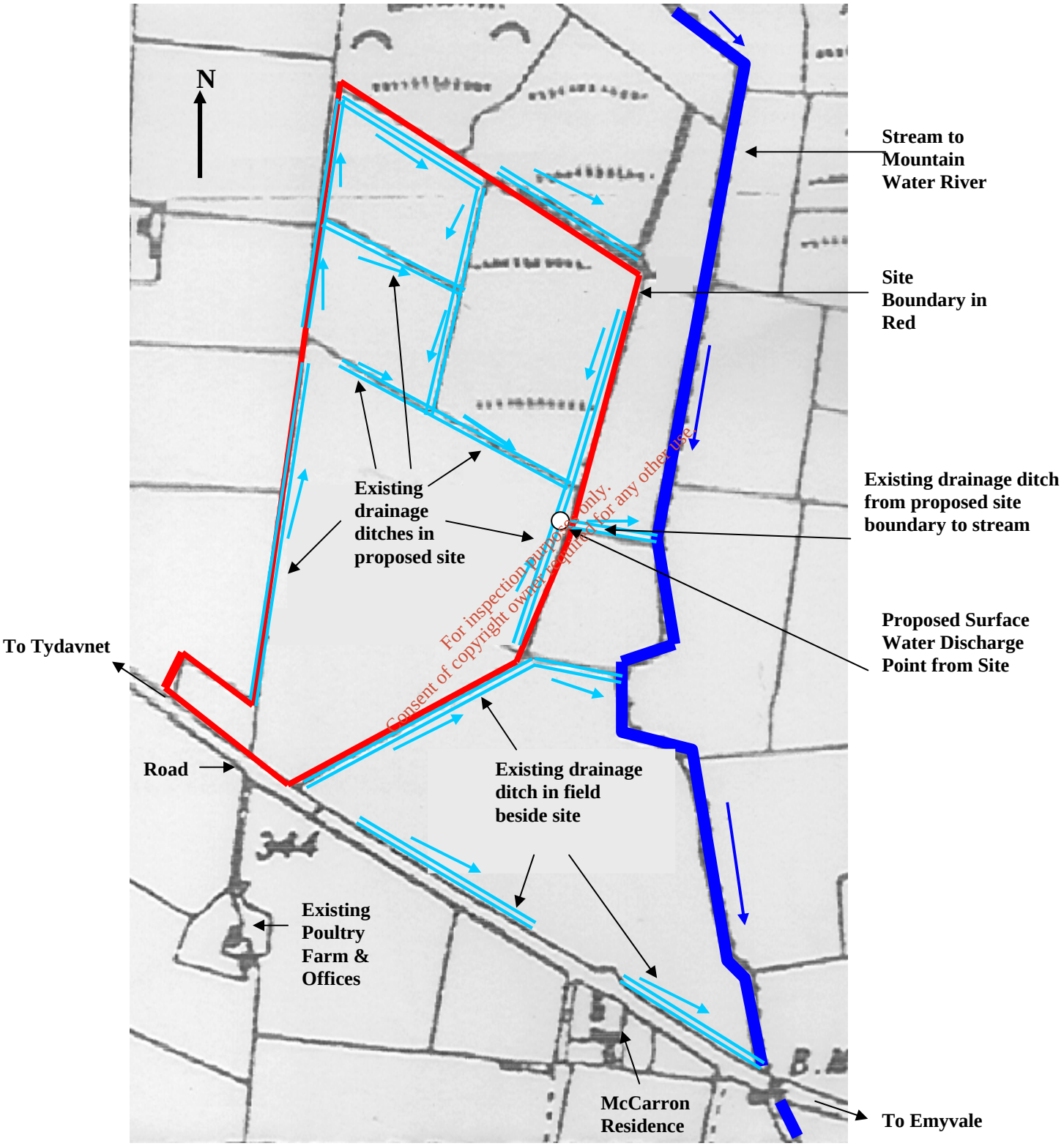
The site will be constructed on a Greenfield site, which has a total site area in the order of 7acres (28,328m^2). Currently the site is drained via ditches, which discharge to the stream near the site boundary, which is a tributary of the Mountain Water River. The Mountain Water discharges to the Ulster Blackwater, which in turn discharges to Lough Neagh in Northern Ireland. The site lies in the Neagh Bann International River Bed District.

A detail of current drainage at the site is provided in Figure 2. Drainage consists of ditches at the perimeter of the fields. The drainage ditches are open and water falling on the proposed site area will flow over-ground to the ditches or it will percolate through the soil and drain to the ditches, which are at a lower level than the fields themselves. The arrows along drainage ditches in Figure 2 indicate the likely direction of flow in the drainage ditches, in times of high rainfall. In March 2005 when all ditches were visually examined those to the west of the proposed site were dry and those to the east contained water, but it was not flowing.

At one point in the proposed site, surface water leaves the site and gradually flows a distance of 38m along an open drainage ditch in the next field to the stream (tributary of the Mountain Water). The field beside the site along the road to the front has its own separate ditches draining to the stream.

According to most recent Geological Survey of Ireland (GSI) records, the site lies on a locally important aquifer (Lm) which has a low vulnerability to pollution (L). There are two bored wells on the site and when these were dug, the overburden deposits were quite thick, in the order of 24 to 30m. Any contaminants falling within impermeable surfaces on the site will enter the subsurface and be absorbed into these clays, thereby affording the underlying groundwater protection from pollution.

Figure 2.
Existing Surface Water Drainage at the Proposed Development Site



5. Water Supply

The water supply to the site will be predominantly from groundwater, from the bored well(s) on the site. The Truagh Group Water Scheme supplies water locally to the area, so this water source will likely be used to supply fire hydrants on the site and for potable water, if required. Pumping tests carried out on the groundwater resource at the site determined that the well was capable of yielding 650m^3 of water per day, (27m^3/hr) which is substantial. The estimated maximum requirement for water at the site is 10m^3/hr (during abnormal operation) and the average water use requirement (for normal operation) is expected to be between 3-5m^3/hr.

6. Meteorological Data

Annual average rainfall for the rainfall station at Emyvale, located 3.5km from the site is 966mm (30 year average). Currently rain falling on the site (all grass) will either percolate through the soil to recharge the aquifer and some will drain naturally to the drainage ditches, and on to the stream. The hydrological study in the EIS determines that the volume of recharge in this area is likely to be significantly lower than average as a result of the presence of large thickness of low permeability clays overlying the bedrock, so the aquifer-recharge area may be quite a distance from the site.

Extreme rainfall data for the Emyvale rain gauge station, provided by Met Èireann are shown in the Table 1.

Table 1. Extreme Rainfall Return Periods

Location: Emyvale

Average Annual Rainfall: 966

Maximum rainfall (mm) of indicated duration expected in the indicated return period.

Duration	Return Period (years) 1/2	1	2	5	10	20	50	100	Special (loglog) 30
1 min				1.9	2.2	2.6	3.2	3.6	2.8
2 min				3.2	3.7	4.4	5.5	6.3	4.9
5 min				5.8	6.7	8.0	10.0	11.5	8.8
10 min				8.3	9.7	11.6	14.7	17.0	12.9
15 min	5.2	6.5	7.3	10.0	12.3	14.8	18.9	22	16.5
30 min	6.9	8.6	9.6	13.1	16.0	19.1	24	28	21.3
60 min	9.0	11.1	12.5	16.7	20.2	24	30	35	27
2 hour	11.7	14.3	16.0	21.1	25	30	37	43	33
4 hour	15.9	19.2	21.1	27	32	37	44	51	40
6 hour	19.1	22.9	25	32	37	43	52	59	47
12 hour	24.4	29	32	40	47	53	64	73	58
24 hour	30	35	39	48	56	64	76	85	69
48 hour	37	43	47	58	67	76	89	101	82
96 hour									

Notes: Larger margins of error for 1, 2 ,5 and 10 minute values and for 100 year return periods

M560: 16.7 M52d: 55 M560/m52d: 0.30

7. Site Drainage

An outline of drainage routes from the proposed site, once constructed is provided in Figure 3. The existing drainage ditch flowing west-east across the centre of the site will be piped and will constitute the main drainage channel into which all surface water from the site will flow. This drain will link up with the ditch in the field beside the site, which will transport water to the stream, as is currently the case. Drainage from the site will be split in two so that water from the southern side of the main drainage channel will be kept separate from water from the northern side of the main drainage channel.

When the site is constructed it will comprise a number of buildings as shown in Figure 1 (administration, fuel/raw materials unloading, shredding, boiler, turbine and service building). The total site area of buildings is in the order of 2,160m^2 (7.6% of the total site area). Rainwater falling on roofs of these buildings will be collected via down pipes and discharge to the surface water drainage system outlined above.

Internal primary roads and hard standing areas will be paved with asphalt (6,900m^2). Areas for handling of containers etc. will be paved with reinforced concrete (450m^2). Secondary roads for service access only will be paved with gravel (950m^2). The asphalt and concrete paving will be impermeable (7,350m^2) so surface water drains / gullies will be installed along roadways and car parks to catch rainwater falling on these areas. This rainwater will discharge to the surface water drainage system outlined above.

The remainder of the site will be permeable, allowing rainwater to percolate through the soil. This area will consist of 950m^2 of gravel paving and the remainder will be grass/landscaped, comprising an area of approximately 17,868m^2. Kerbing will be placed along boundaries between impermeable and permeable areas so that surface water falling on impermeable areas is directed to the surface water drainage system.

A pond is to be located on the site which may accept process water, but its main function will be for fire water retention.

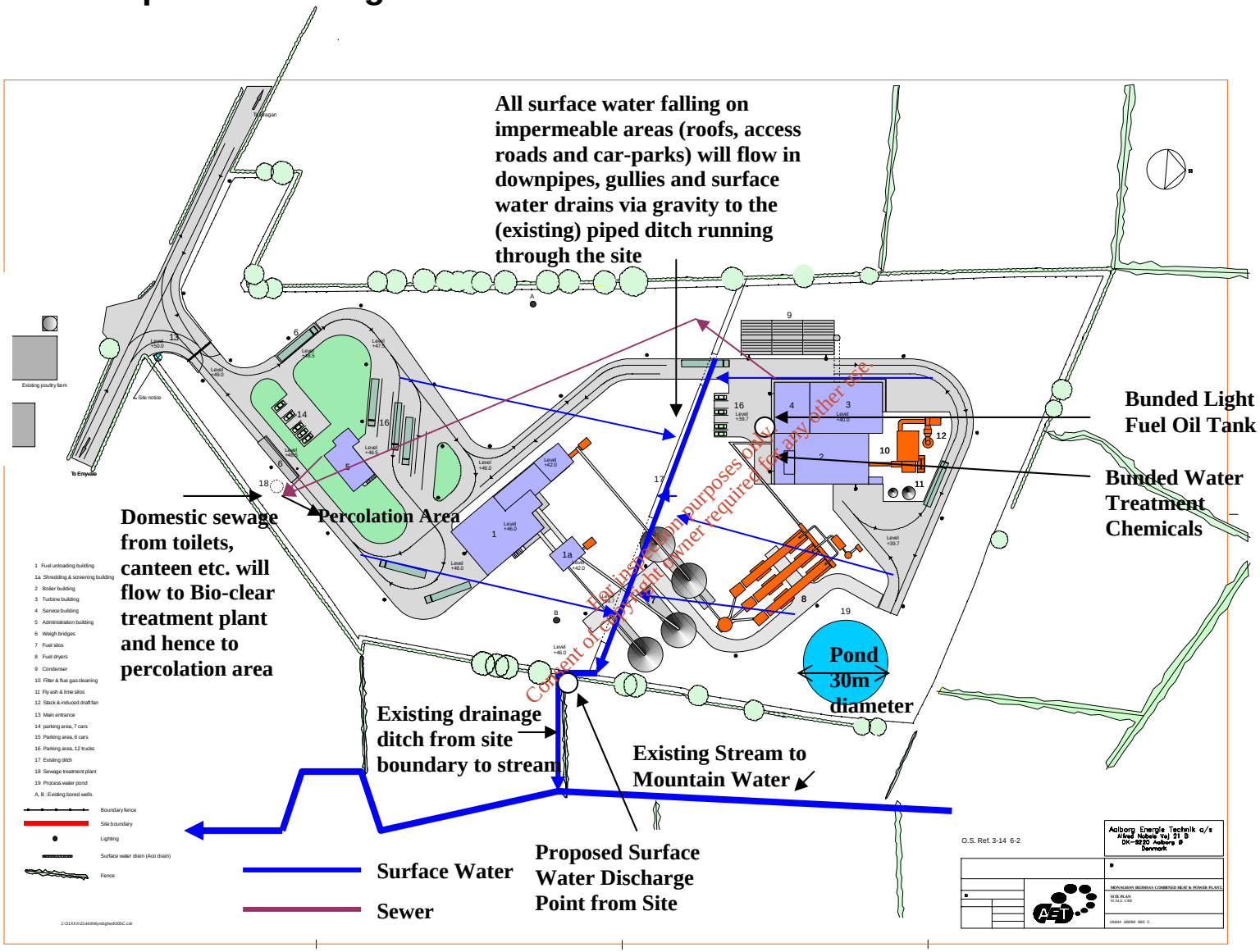
The site will be fitted with two oil interceptors, one at the oil tank loading area and one at the surface water discharge outlet from site at the eastern boundary.

Domestic effluent on the site, from toilets, sinks, showers and canteen areas will discharge to a dedicated treatment plant –a bio-clear treatment system. This system will be designed for a maximum of 25 staff (working 3 x 8hour shifts). Raw sewage from the administration and services building is discharged to an aerated tank, which fully treats the wastewater, prior to discharge to a percolation area. Within the percolation area, treated effluent is discharged via a network of pipes into the underlying soil, where it undergoes further polishing and treatment, prior to discharge to groundwater.

The bio-clear treatment system is a fully enclosed plant, accepting only domestic-type wastewaters. No process water will be discharged to the bio-clear system.

In summary, all surface water runoff from the site will discharge via over-ground flow and via the surface water drainage system to the site outlet at the eastern site boundary and hence to the nearby stream. A large amount of surface water will also percolate through the soil to ground and groundwater, as approximately over half of the site area is permeable (i.e. grass/landscaped).

Figure 3. Proposed Drainage Routes from New Site



8. Materials

The raw materials, intermediates and products used on the site are provided in the following table. The table also provides details on the pollution potential of the materials if they were to be involved in a fire incident and lead to contamination of firewater, which has the potential to discharge to the stream nearby the site.

Table 2. Materials On-Site

Materials	Max Quantity Stored on Site	Use	Pollution potential if mixed with fire water
Spent Mushroom Compost	2,500 m^3	Raw material / fuel for process	High pollution potential, leachate from SMC will have a high BOD and high nutrient content
Poultry Litter	1,250 m^3	Raw material / fuel for process	High pollution potential, leachate from PL will have a high BOD and high nutrient content
Wood Chips	1,250 m^3	Raw material / fuel for process	High pollution potential, leachate from WC will have a high suspended solids content
Light Fuel Oil	100 m^3	Raw material / fuel for process	High pollution potential, oil spill will cause severe contamination of waters
Lime	100 m^3	For flue gas cleaning process	High pollution potential, lime will turn water alkaline, increase suspended solids and cause severe contamination
Fly Ash	600 m^3	By-product of combustion and from flue gas cleaning process	High pollution potential, fly ash will contain lime and other metals, increase suspended solids and cause severe contamination of waters
Sodium Chloride	250kg	Raw water treatment	High pollution potential, (salt) - would change the chemistry of water and increase suspended solids concentration in high doses
Citric Acid	1kg	Raw water treatment	High pollution potential, would change the chemistry of water in high doses
EDTA	0.6kg	Raw water treatment	High pollution potential, would change the chemistry of water in high doses
Sodium Hydroxide	1.2 kg	Raw water treatment	High pollution potential, caustic soda is strongly alkaline and would change the chemistry of water in high doses
Maintenance Oils	1.25 m^3	Maintenance	High pollution potential, oil spill will cause severe contamination of waters

9. Site Safety and Control

The Biomass CHP plant will be automatically controlled in accordance with standard TRD 601(German standard for the control of steam boilers) and monitored by SCADA (Supervisory Control And Data Acquisition) system. The automation system will be built using standard PLC hardware (ex. Siemens) and PCs.

All interlocks and control loops for the boiler plant will be programmed in the PLCs and the plant will be monitored and operated through an interface on PCs. Alarms will be collected, recorded and printed on the alarm list with time indication. The alarms will be grouped according to their importance. The system can handle a power failure of maximum 24 hours without any loss of system and application programme documentation.

The safety equipment functions independently of the control system and will disconnect the boiler plant in case of failure, i.e. too low water level, too high steam pressure, too high steam temperature, power failure and control failure.

The site will be constructed and operated in line with local and national safety requirements. The entire plant will be fenced with a 2.1m galvanised chain link fence. A responsible trained operative will be on-site at all times to oversee operations.

10. Fire Abatement, Response, Training and Awareness.

A number of measures are proposed to ensure fire safety at the site. The site will comply with all fire regulations in terms of building structures, emergency provisions and fire fighting equipment, and all other stipulations set out by the local fire safety officers.

Fire safety systems and fire fighting equipment will be strategically located throughout the site. The systems and equipment provided will allow for the early extinction of a fire to ensure minimum risk to employees. This in turn prevents the generation of contaminated firewater.

An automatic fire detection system and break glass points will be installed all main processing buildings on the site;

- Fuel unloading building
- Boiler house
- Turbine hall
- Services building

The fire alarm will have both audio and visual alarms.

Alarm panels with 10 zones will be placed in the control room in the service building.

Fire extinguishing systems to be provided at the site include;

- 4 external fire hydrants
- Hose reels & dry powder fuel unloading building, boiler and turbine building, service building and office/administration building.

Emergency telephone numbers of the local fire brigade, garda, doctors, ambulance and hospital will be posted in prominent locations throughout the site. Fire escape routes will be clearly identified and maintained available for use.

A safety statement will be devised for the site once constructed. This safety statement will include the company and site information to be adhered to in an emergency event i.e. emergency response procedure. All staff on the site will be fully trained in the safety aspects of the operation.

The Local fire-fighting unit will be invited to the site to relay details on site processes, chemical storage arrangements, flammable materials, hydrants, site access etc. Any suggestions or improvement measures deemed necessary by the local fire fighting team will be taken on board by the company.

The Local Fire Fighting unit, based in Monaghan town have 2 main pumps and one Emergency Tender Rescue Unit. There are three full time officers in the local fire brigade, the Chief Fire Officer and two Assistant Chief Fire Officers. In addition to this there are 9 firemen. The back-up services available to the local fire unit include that from the outside towns. These include the Clones, Ballybay, Castleblaney and Carrickmacross Fire Units. The response time of the local fighting unit in the event of an emergency call to the site would be between 10-15mins.

11 Risk Assessment

On examining the proposed Monopower site a number of areas which pose a risk for the generation of contaminated firewater are evident (see Figure 1).

Table 3. Contaminated Firewater Risk Areas

Ref. No	Details	Material posing risk of contaminating firewater
1	Fuel unloading building	Spent mushroom compost, poultry litter, wood chips
1a	Shredding and screening building	Poultry litter and wood chips
2	Boiler building	Spent mushroom compost, poultry litter, wood chips
4	Services Building	Maintenance oils
7	Fuel storage silos	Spent mushroom compost, poultry litter, wood chips
8	Fuel dryers	Spent mushroom compost
10	Filter and flue gas cleaning	Lime
11	Fly ash and lime silos	Fly ash and lime
	Oil tank	Oil
	Raw water treatment plant	Water treatment chemicals

In all other areas of the site, other than those mentioned above, the likelihood for contaminated firewater generation does not exist or is considered minimal.

The likelihood of fire starting in any of the areas listed above is low, due the fact that strict controls and alarm systems will be in place. In addition, all the areas listed above are segregated from each other, so the likelihood of fire spreading between areas is small.

However the possibility of fire starting always exists, and as shown in Table 2, the consequences of contaminated fire water getting into the surface water system will cause a serious pollution incident.

Therefore systems for the containment of contaminated firewater will have to be installed by the company.

12. Fire Water Calculations

In any fire incident on the site, the site's employees would use extinguishers and hose reels initially to put it out. If the fire brigade were involved in extinguishing the fire they would utilise water from the fire hydrants coming from mains and from the well supply to the site. The following section provides details on the volume of firewater that could be utilised in a fire incident at the site, following EPA guidelines.

Table 4. Calculation Assumptions

	Details	Comments on Data
1	Fire occurs in one area of the site only (as per Table 3)	Areas are segregated, so risk of fire spread is low
2	4 fire hydrants are proposed for the site, with an assumed capacity of 25 l/sec each (1.5 m^3/min). Given the size of the site, it is assumed that only the 2 closest hydrants to the fire will be used in a fire event.	Capacity of hydrants supplied by AET, the designer (water supply to the site has a minimum capacity of 7bar and a flow of minimum 25l/sec)
3	Fire tenders will be used to fight the fire 1,800 litres each (1.8m^3)	2 fire tenders in Monaghan
4	Water from the on-site well will be used to fight fire, with a capacity of 27m^3/hr (0.45m^3/min)	Capacity of well on site estimated in EIS
5	Duration of the fire is 90 minutes	Controls and safety features on plant deem that fire will be prevented and detected quickly, allowing fire to be brought under control within 90 mins.
6	Area of impermeable surface on the site is 9,510m^2, but as drainage will be collected in two separate systems (i.e. site split in half) the impermeable surface area for any fire event therefore 4,755m^2.	From roofs and paved areas
7	20 year, 24hour rainfall event is 64mm for Emyvale	Data provided from Met Èireann, as per Table 1.
8	No surface water is utilised for fire fighting purposes	No significant quantity available to the site

Table 5. Fire Water Calculation

1	**Fire water likely to be used for the site**	**m^3**
	Fire water from 2 fire hydrants on the site; 2 x 1.5m^3/min x 90mins	270.0
	Fire water from well on site; 0.45 m^3/min x 90 mins	40.5
	Fire water from fire brigade; 2 x 1.8m^3	3.6
	Total fire water likely to be used for the site	**314.1**
2	**Volume of contaminated water to be retained**	
	In a fire in any of the high contaminant risk areas (Table 3), leachate from the products present would generate contamination. Therefore contaminants present will not increase the volume of contaminated fire water to be generated.	
	Therefore the required retention volume of contaminated fire water	**314.1**
3	**Rainfall Allowance**	
	Amount of rainfall that could occur during a fire; 0.064 m x 4,755 m^2	**304.32**
	Total required retention volume for contaminated fire water is	**618.42**

13. Fire Water Containment

A pond is being constructed on the site, which may be used for storing process water. This pond was initially sized at 10m diameter and 1m deep, giving a volume of 78m^3. It is proposed increase the size of this pond, so that it can act as a firewater retention facility also.

The pond will be constructed to have a diameter of 30m and depth of 1m, as shown in Figure 3, which will provide a total retention area of 707m^3. This volume is estimated to have sufficient retention capacity for a 90 minute fire on the site, assuming an extreme rainfall event concurrently, as the calculated contaminated firewater volume for this event, as shown in the previous section is 618.42m^3. The pond will be constructed of a water-tight membrane and have sloping sides.

Along with the fire water retention pond, all storage tanks and areas on the site will be bunded to the required capacity. The EPA industry standard for bunding is; 110% the volume of the largest tank within the bunded area or 25% of the total volume to be contained in the bunded area, whichever is the greater. The site will comply with this standard.

For small fires, the company will have on site a supply of containment booms to contain the fire within small areas.

14. Fire Water Retention Risk Management Programme

- The site will be designed so that all chemical areas are adequately bunded.
- A fire water retention pond of 707m^3 capacity will be provided by the site.
- The drainage system will be set up so surface water drainage from the southern part of the site will be kept separate from the surface water drainage from the northern side.
- The drainage system will be designed so that that the final discharge location from the site can be closed and water can be diverted to the firewater containment pond.
- Water levels in the pond will be managed to ensure that there is a sufficient volume available in a fire incident.
- Containment for small fires/spills will be done via spill kits on the site (containment booms).
- Once the site has been constructed, all required safety documents and emergency response procedures will be put in place to ensure formal management of emergency events.
- All required staff will be trained in safety and emergency procedures.
- Kerbing will be placed between impermeable roads and car parks and permeable grass areas, to direct excess surface water falling on the site to surface water drains.

The above measures are considered adequate to ensure that any potentially contaminated firewater generated on the Monopower site does not pose a risk to surface or groundwater in the immediate area of the site and beyond, based on current knowledge of the site.

CONCLUSION

CONCLUSION

The Submission of Further additional information requested for P03/446 has addressed each of the 13 items of Information outlined in the request issued by Monaghan County Council on the 1st of December 2001. Specialist subcontractors have been commissioned by the developer to research and clarify additional information sought by the Public Authority.

All aspects of the licensed activity's potential impact on the environment will be covered under the EU Integrated Pollution Prevention and Control (IPPC) Directive 96/61/EC, including emissions to air and water, energy and resource use efficiency, environmental management systems, and waste and residuals management.

A significant proportion of the additional information sought in the December 2004 request is not within the remit of the Planning Authority. Requests for additional information on licensing, waste management, effluent discharges, odour emissions, noise emissions and atmospheric discharges fall within the remit of the Authorised Regulatory Authority (EPA) under the IPPC Directive and not the Planning Authority. However, requests for additional information and clarification on these matters are dealt with in this response in the interest of clarity and transparency.

The Environmental Impact Statement (EIS) and the documentation submitted in response to Monaghan County Council's requests for additional information, provide the community, government, non-government bodies and other interested parties with detailed 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.