ROSE ENERGY

Proposed Biomass Fuelled Power Plant

Land off Ballyvannon Road, Nr Glenavy, County Antrim

CONTROL OF DUST EMISSIONS

Final

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Submitted to:

ROSE ENERGY

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Engreen Environmental Consultants Ltd.

Engreen Environmental Consultants have a dedicated team of environmental specialists, with a combined experience of over 30 years working in the environmental sector within the organisation. Qualifications of the authors of this document are listed below.

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Engreen have aided clients in obtaining planning permissions, preparing Environmental Impact Assessment planning applications, obtaining Waste Management Licenses, Integrated Pollution Prevention and Control permits and assisting with technical issues in relation to plant design and environmental protection.

Direct experience in relation to this report covers specifications for air emissions control, odour control and effluent control. Key experience has been gained from:

- Reviewing processes to minimise the need for abatement;
- Reviewing available data to assess the requirements for abatement and specifying further data collection tests to fill in gaps;
- Specifying performance criteria for abatement systems;
- Evaluating options to select the most effective abatement techniques and ensure Best Available Technique requirements are met;
- Providing specifications for performance trials;
- Evaluating system performance and producing options for improvement;
- Establishing monitoring programmes to evaluate abatement performance and meet regulatory requirements.

Contents

1. Introduction

1.1 General

1.1.1 Rose Energy proposes to construct a biomass fuelled power plant, fuelled by Poultry Bedding and Meat and Bone Meal (MBM). As part of the Environmental Statement that is being prepared for the proposal there is a requirement to address potential sources of dust releases and to demonstrate how these have been minimised, controlled and mitigated.

1.2 Report Format

1.2.1 This report looks at the possible sources of fugitive and point source dust emissions from the process and describes how they are controlled. In particular it addresses control measures relating to dust potentially created:

- During plant construction;
- In the delivery and handling of the incoming fuel sources;
- During storage and feeding of the fuels;
- From the fuel combustion process;
- From treatment of the flue gas;
- The loading of ash for off-site disposal.

1.2.2 The potential for dust emissions and risk management control measures in place are then summarised in the Risk Assessment Table, Table 3, at the end of this report. The report and the risk assessment tables have taken into account the Technical Guidance Document M17, 'Monitoring of particulate matter in ambient air around waste facilities' produced by the Environment Agency. Although M17 principally focuses on monitoring techniques it does contain outline descriptions of applicable abatement techniques and it is these techniques that have been considered in this assessment of dust control and risks.

1.2.3 Further to this the 'Control of dust from construction and demolition activities' guidance produced by the British Research Establishment was used in identifying potential dust emission sources and abatement techniques during the construction phase. It is expected that this assessment will be developed further into a detailed dust control report within the overall construction management plan.

1.2.4 This report is confined to addressing potential sources of dust and explaining how they are managed and controlled to minimise potential releases. The quantitative impact of any dust releases from point sources is more fully addressed in the Air Quality Impact Assessment, Reference: AS 0080 Rose Energy - Air Quality Impact Assessment.

2. Potential Dust Emissions

2.1 Potential Dust Impacts

2.1.1 The main potential impacts associated with dust emissions are considered to be:

- Airborne dust leading to irritation of the respiratory tract or eyes and/or perception of potential health effects;
- Deposition onto and soiling of surfaces.

2.2 Potential Dust Deposition

2.2.1 In terms of dust deposition, nuisance may be caused by the soiling of surfaces, which may then require more regular cleaning. Such nuisance may also be affected by:

- The degree of colour contrast between dust and deposition surface. Dark dusts tend to be more annoying than light dusts;
- The attitude of the receptor as to what level of soiling constitutes a nuisance;
- The period of exposure;
- The nature of the surface on which the dust is deposited. Glossy surfaces tend to be visually affected more than matt surfaces.

2.2.2 Airborne dust, especially particles in the inhalable and respirable fractions, may cause irritation of the eyes, nose and throat and may trigger/exacerbate allergic reactions such as asthma. Waste derived dusts may also include bio-aerosols which could, in extreme circumstances, be associated with potential health effects.

2.2.3 The level of any dust nuisance will also depend on proximity to the source and the duration of exposure.

3. Potential Dust Sources and Controls

3.1 Potential Dust sources and Controls

3.1.1 There are a number of potential sources of dust at the proposed plant including:

- Construction activities;
- Directly from delivery vehicles carrying the Poultry Bedding and MBM fuel sources and the flue gas treatment chemical (powdered lime);
- Storage and feeding of the fuel sources;
- Fuel combustion process;
- Treatment of the flue gas.

3.1.2 The intention is to operate the plant at a steady state, which will limit potential variability in dust generation as far as possible. Limiting these variabilities gives a more stable situation for ensuring effective control.

3.2 Construction

3.2.1 Construction activities, including ground preparation, soil handling, concreting and building works, along with emissions from construction traffic, may emit dust over the construction period. Emissions will tend to be greatest in dry and windy conditions. Construction, in some circumstances, can represent a significant cause of short-term dust nuisance.

3.2.2 All employees and appointed sub-contractors are to be made aware of the potential environmental effects of dust emissions and their roles and responsibilities in ensuring compliance with environmental standards.

3.2.3 Construction phase dust emission control techniques will be put into place to limit potential dust emissions. It is proposed that construction activities are only carried out in the appropriate weather conditions to limit dust emissions and where required the use of water sprays/ bowsers will be used as a further control mechanism. In the event of severe winds leading to uncontrollable emissions relevant construction work will be suspended until such emissions have been abated. To minimise potential dust generation from on-site traffic movements the construction yard area is to be built upon hard standing.

3.2.4 Dust emissions from construction traffic will be mitigated as road ways constructed of hard standing will be introduced at the earliest possible stage. Wherever possible, construction materials will be brought onto site in enclosed or covered vehicles. Those vehicles removing construction waste and taking materials off site will also be enclosed and covered wherever possible. Vehicles will run over dedicated internal routes and when leaving

the site will have to pass through a vehicle wheel wash before exiting onto the public highway.

3.2.5 To minimise the re-suspension of dust there will be a speed limit imposed on all vehicles on the site. Roads both on-site and at the site entrance will be regularly swept using a road sweeper and the frequency of this shall be recorded. Records of any vehicle maintenance will also be kept

3.3 Poultry Bedding, MBM and Lime Deliveries

3.3.1 Poultry Bedding will originate from poultry farms. Due to the variety of poultry farms where the bedding originates there will be some variability in the nature of the bedding. Additionally, it can be expected that there may be some seasonal variations in bedding quality.

3.3.2 The Poultry Bedding will consist of loose material so it too has a dust emission risk potential. However, transport of Poultry Bedding will be in covered vehicles to prevent wind blown emissions.

3.3.3 MBM is a granular and friable material so has a high potential for dust emissions during transfer between sites. MBM will be transported onto site in covered vehicles to prevent wind blown emissions of dust.

3.3.4 Lime will be delivered as a bulk powder in dedicated, enclosed bulk tankers. It will be offloaded from the tanker via an enclosed conveyor that couples directly to the tanker outlet.

3.4 Poultry Bedding, MBM and Lime Storage

3.4.1 Poultry Bedding will be deposited into and stored in a bunker located in the Fuel Reception Area. After arriving on site vehicles will be directed into the Fuel Reception Area via a roller-shutter door. Only once this door is shut will the vehicles empty their load of Poultry Bedding into the bunker. Air from the enclosed Fuel Reception Area is extracted to secondary combustion air in the boiler

3.4.2 MBM will be deposited into an enclosed hopper and be conveyed into a dedicated silo for storage. The enclosed hopper will be fitted with a bag filter and extraction fan to ensure there are no fugitive dust releases.

3.4.3 Level probes and alarms will be fitted to the MBM storage silo to ensure that there is no overfilling or spillage. The silo will be inspected as part of the plant's ongoing planned and preventative maintenance system to ensure that blockages, bridging and MBM build-ups, which could all impact on the smooth running of the system and the prevention of dust releases, do not occur.

3.4.4 From the silo the MBM is conveyed to the bubbling bed process system in a dedicated conveyor and is introduced into the bed via a dedicated inlet system. All conveyors are fully enclosed so dust emissions remain minimal.

3.4.5 Lime will be conveyed directly from the enclosed tanker into a dedicated silo for storage. The transfer conveyor will be enclosed and will couple directly to the tanker to minimise spillages and fugitive emissions.

3.4.6 Level probes and alarms will be fitted to the lime storage silo to ensure that there is no overfilling or spillage. The silo will be inspected as part of the plant's ongoing planned and preventative maintenance system to ensure that blockages, bridging and lime build-ups, which could all impact on the smooth running of the system and the prevention of dust releases, do not occur.

3.4.7 From the silo the lime will be conveyed to the flue gas treatment system in a dedicated conveyor and introduced into the treatment system via a dedicated inlet system. All conveyors are fully enclosed so dust emissions remain minimal.

3.5 Fuel Preparation and Feeding

3.5.1 Poultry Bedding will be taken from the bunker via a grab and placed into a hopper before being transferred to the bubbling bed process system via enclosed conveyors. Any potential dust emissions will be minimised as the loading process will occur within the enclosed Fuel Reception Area from which air will be extracted to secondary combustion air in the boiler.

3.5.2 As discussed above the MBM fuel source will be conveyed enclosed into the bubbling bed process system and, therefore, the potential for dust emissions kept at a minimum.

3.6 Ash Handling

3.6.1 Furnace ash will be extracted from the fluidised bed on a continuous basis and pass through a classifying device. The oversized material will be directed into lidded storage compartments prior to mechanical removal for disposal. The rest of the furnace ash will be returned to the furnace bed by enclosed pneumatic conveyor. If there is excess material then this will be pneumatically conveyed to an ash silo.

3.6.2 Fly ash will be collected at the bottom of each boiler pass by gravity. This will be pneumatically conveyed to an enclosed screen which will separate out "oversize". The oversize will collect in lidded compartments as per the oversize from the furnace ash. The remaining ash will be pneumatically conveyed to the ash silo.

3.6.3 Further fly ash and residues from the pollution control equipment will be collected from the bag filter unit. A proportion will be recycled by pneumatic conveying back into the pollution control unit. The rest will be pneumatically conveyed to a screen which will separate out "oversize". The oversize will collect in lidded compartments as per the oversize from the furnace ash. The remaining ash will be pneumatically conveyed to the ash silo.

3.6.4 The emission from the treatment process will be treated in a bag filter to capture airborne particulate prior to discharge of the flue gas to air. Some of the collected material will be recycled through the flue gas treatment system to ensure maximum efficiency in the use of the lime (and carbon if used). However, there will inevitably be some un-reacted components in the waste stream from the flue gas treatment system.

3.6.5 All conveying of ash will be in enclosed conveyors to minimise dust release potential. Bag filters will be present on silos to abate any fugitive dust releases.

3.7 Ash Storage and Removal

3.7.1 The combined fly ash and boiler ash streams will be pneumatically conveyed to the main ash silo in an enclosed conveyor. The silo will have a 1,000 m^3 capacity, equivalent to approximately 750 Te of ash, giving over 6 days' storage capacity in the silo.

3.7.2 The silo will have a high level indicator and be fitted with both a visual and an audible high level alarm to ensure overfilling is prevented.

3.7.3 The silo will be fitted with a bag filter on the vent to minimise dust releases during transfer. The silo will be inspected as part of the plant's ongoing and preventative maintenance system.

3.7.4 The ash silo will be fitted with twin bottom discharge systems, one a direct, dry discharge system and the second a moistening system to allow water to be added to the ash prior as it is discharged. The dry unloading discharge system will feature a flexible coupling that will be connected directly to the enclosed ash tanker vehicles to prevent fugitive dust releases during loading. The moistened discharge will pass through a dampening system to dampen the ash, preventing any potential dust emissions, prior to direct discharge to a covered trailer unit.

3.8 Transport Vehicles

3.8.1 Emissions from transport vehicles during the operational plant phase are essentially those directly from delivery vehicles (carrying the Poultry Bedding and MBM fuel sources and the lime reagent) and ash removal vehicles.

3.8.2 As described above all vehicles carrying Poultry Bedding and MBM will remain covered to prevent wind blown emissions during transit. Lime will be delivered in enclosed tankers to minimise the potential for dust releases.

3.8.3 Ash removal vehicles taking "dry" ash will be of the enclosed tanker type. These will couple directly to the silo discharge via flexible coupling system to minimise fugitive dust releases. If ash is removed by bulk tipper trailers it will be moistened in the ash dampening system prior to being discharged into the trailer. The trailer will be fully covered before being removed from site to minimise windblown releases.

3.8.4 During the operational phase the plant roads will be regularly maintained and swept using a road sweeper on both internal roads and at the site entrance when necessary. All internal roads are to be constructed of concrete and tarmac so dust emissions and re-suspension of dust are likely to be minimal. There will also be a speed limit on all site roads of 20 kph.

3.8.5 Before leaving site and entering onto the public highway all operational site traffic will pass through a vehicle wheel wash.

4. Assessment of Risks

4.1 Introduction

4.1.1 The dust control mechanisms described above have been tabulated in summary form below. To provide a complete picture of the dust control mechanisms the residual dust release risk factors have been evaluated and included in the table. Because of the potentially substantial length of the construction phase this has been included as a separate item within the summary table.

4.2 Methodology

4.2.1 To estimate residual risks Probability (P) and Severity (S) scores have been assigned to each item as detailed in Tables 1 and 2 below. These are multiplied together to provide a total risk assessment score (R):

P x S = R

4.2.2 Scores are considered to be high or low risk using the following risk classification:

< 10 – Low Risk

≥ 10 – High Risk

Definitions

4.2.3 Low Risk: An event which will happen less than once per year and is contained within the site boundary and is recoverable.

4.2.4 High Risk: An event which could happen more than once per year and/or is not contained within the site boundary and/or is difficult to recover.

Table 1: Probability of an event occuring

Score	Description	Definition
1	Very low	Extremely unlikely to occur (<1 per 10 years)
2	Low	Unlikely to occur (<1 per year)
3	Moderate	Could occur (1 per year)
4	High	Could occur frequently (>1 per year)
5	Very high	Could occur continuously

Table 2: Severity of impact / Consequence should the event occur

Score	Description	Definition
1	Very low	Negligible impact
2	Low	Minor impact (contained in localised area on site & recoverable)

3	Moderate	Medium impact (contained within site boundary & recoverable)
4	High	Major impact (spread off site &/or difficult to recover)
5	Very high	Major impact (spread off-site & long term/permanent damage)

4.2.5 The risk management provision to be implemented on site has been detailed together with an assessment of the residual risk with the risk management controls implemented on site accounted for. This is presented in Table 3 below.

4.3 Dust Risk Assessment Tables

Table 3: Dust Risk Assessment Table				
Identification of Potential Risks			**Risk Management**	
Risk	**Hazardous Event and Pathway**	**Receptors**	**Risk Management Controls**	**Residual Risk**
Risk of airborne dust, fibres, powders or particulates during the construction phase.	Release to air of dusts, fibres powders or particulates either directly from the construction materials or as a result of construction activities on site. This presents the following potential risks: • Environmental damage as a result of fallout causing smothering effects; • Harm to health through inhalation of dust etc; • Damage to property and loss of amenity caused by deposition of particulate.	• People • Properties • Ecosystems	• All employees and subcontractors will be informed of all appropriate dust control measures and made aware of their responsibilities; • Construction work will be suspended during adverse weather conditions leading to substantial fugitive dust emissions and will not be resumed until the correct dust abatement measures have been put into place or conditions improve; • The construction site yard is to be constructed on hard standing; • Where appropriate water sprays and bowsers will be used to suppress fugitive dust emissions; • Specific internal road ways will be commissioned and where ever possible construction traffic will run over hard standing; • Construction traffic entering and leaving site will wherever possible be covered; • Vehicles will pass through a vehicle wheel wash before exiting the site onto the public highway; • There is a speed limit of 20kph to be enforced on site; • Where necessary a road sweeper will be employed on site and at the site entry to help suppress dust emissions;	P: 3 S: 2 **R: 6**

Table 3: Dust Risk Assessment Table				
Identification of Potential Risks			**Risk Management**	
Risk	**Hazardous Event and Pathway**	**Receptors**	**Risk Management Controls**	**Residual Risk**
Risk of airborne dust, fibres, powders or particulates during the operational phase.	Release to air of dusts, fibres powders or particulates either directly from the operation or as a result of operational activities on site. This presents the following potential risks: • Environmental damage as a result of fallout causing smothering effects; • Harm to health through inhalation of dust etc; • Damage to property and loss of amenity caused by deposition of particulate.	• People • Properties • Ecosystems	• All employees and subcontractors will be informed of all appropriate dust control measures and made aware of their responsibilities; • Poultry Bedding and MBM delivered on to site in covered vehicles; • Lime delivered in an enclosed tanker; • All silos fitted with a bag filter to clean vented air and an alarm and high level probe to avoid spills; • All conveyors enclosed; • Vehicles will pass through a vehicle wheel wash before exiting the site onto the public highway; • There is a speed limit of 20kph to be enforced on site; • Where necessary a road sweeper will be employed on site and at the site entry to help suppress dust emissions; • Where appropriate water sprays and bowsers will be used to suppress fugitive dust emissions; • Poultry Bedding stored in an internal bunker within the Fuel Reception Area. Air from this building is extracted to secondary combustion air in the boiler; • Flue Gas treatment ash conveyed in an enclosed system;	P: 2 S: 2 **R: 4**

Table 3: Dust Risk Assessment Table				
Identification of Potential Risks			**Risk Management**	
Risk	**Hazardous Event and Pathway**	**Receptors**	**Risk Management Controls**	**Residual Risk**
			• Ash storage silo connected directly to the enclosed ash tanker vehicles to prevent fugitive dust releases during loading; • Ash storage silo has ash dampening system for discharge to trailers, trailers to be covered before removal from site.	

5. Conclusion

5.1 Construction Phase

5.1.1 Risks of dust emissions during the construction phase of the biomass fuelled power plant have been addressed. Rose Energy will implement and maintain dust control measures during and prior to the construction phase. As identified within the risk assessment tables, the residual risk of dust emissions during the construction phase has been assessed and the residual risks have been shown to be low.

5.2 Operational Phase

5.2.1 Risks of dust emissions during the operational phase of the biomass fuelled power plant have also been addressed. As with the construction phase of the operation the residual risks of dust emissions have been shown to be low. Rose Energy will present how they propose to meet Best Available Technique requirements as part of their PPC application.

5.2.2 All dust control measures developed to be implemented during the construction and operational phases will be agreed with the relevant authorities. In developing these measures the relevant guidance will be consulted including the Technical Guidance Document M17, 'Monitoring of particulate matter in ambient air around waste facilities' produced by the Environment Agency and the 'Control of dust from construction and demolition activities' guidance produced by the British Research Establishment.