

MATERIAL. EVOLUTION LTD

PROPOSED CEMENT REPLACEMENT MANUFACTURING PLANT

NOISE AND DUST ASSESSMENT

Prepared by Green Portal Business Solutions Ltd

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1. INTRODUCTION

1.1 Introduction

As part of the planning process Green Portal Business Solutions Ltd has been commissioned by Materials Evolution Ltd ('the client') to undertake an initial noise and dust assessment study to establish the impact of the proposed installation of a cement replacement manufacturing plant on the neighbouring industrial estate, residential amenity and local habitat.

The client submitted a pre-application enquiry to Wrexham Borough County Council which indicated that the proposed development would be acceptable in principle and although not a validation requirement, it was indicated that a noise and dust assessment would need to be submitted as part of any planning application.

Alongside the planning application a permit application is also being made for which a noise and dust assessment is similarly required.

1.2 Location

The clients development will be situated on the CCP Building Products Ltd ("CCP") site that lies within the industrial estate in Llay, Wrexham. The location address is:

CCP Building Products Ltd
Llay Road
Llay
Wrexham
LL12 0TL

The northern site boundary is adjacent to Llay Quarry and further to the north is a continuation of the industrial estate. The eastern boundary is adjacent to several industrial sites including Poundfield Precast, the HGV Test Centre and Wrexham LGV Test Centre. The site is separated from Llay Road to the south by Huws Gray Ltd brick centre. To the west is a strip of vegetation separating the site from a small residential estate.

The site is flanked by embankments sloping steeply upwards to the west and north which assist in providing a barrier to both noise and dust.

A site location plan is shown in appendix A.

1.3 Description of Development

The client plans to develop a cement replacement manufacturing plant on the CCP site. The majority of the manufacturing plant will be located inside the existing CCP building that houses the existing CCP block manufacturing process.

Three external silos will be erected as part of the development next to the west side of the existing CCP building. Two silos will feed raw materials into the cement replacement process inside the building and the remaining new silo will be fed with the finished product resulting from the process. A small compressed air receiver tank will also be installed in that area.

A weigh bridge will be located externally to the side of the front of the existing CCP building.

The plant within the building will consist of feeding and dosing systems, hoppers, a mixer, debagging units, Pneumatic senders, compressors and a dryer and all the control and electrical

panels needed for operating and controlling the plant. A small control room will be installed in this area. The compressors and dryer will be situated within an enclosed room within the existing building. All raw materials stored in silos will be fed via enclosed systems to the enclosed mixer and, similarly, the finished product will be fed via enclosed systems to the finished product silo. Other powder raw materials which are used in smaller quantities in the process will be delivered in both bulk and smaller bags and stored inside the existing CCP building. The bagged powder will be added to the process inside the building via enclosed debagging units.

Approximately 40% of the cement replacement material produced by the client will be utilised in the CCP process to replace existing cementitious materials that are currently delivered in powder tankers. Therefore, the client's deliveries will in part replace CCP's deliveries to site reducing the overall increase in vehicular movements.

In summary, the only external plant for the development will be 3 new silos and feed systems to send materials to and from the process that is located inside the existing building, a weighbridge and a small compressed air tank receiver. The only external activities will be receipt of raw materials delivered in powder tankers, loading of finished product from silo to powder tankers, delivery of bagged raw material on articulated vehicles and unloading & storing of palletted bags by forklift trucks.

1.4 Scope of Works

An initial noise and dust assessment has been made based on knowledge of:

- The proposed manufacturing process carried out by the client
- Best Available Techniques (BAT) being applied
- The location of the site and plant
- Identified sensitive receptors
- Identified pathways
- Known background noise levels
- Known mitigation measures that will be put in place

2. NOISE AND DUST RECEPTORS

Figure 1 shows the location of the clients new silos (depicted by red circles) next to the existing CCP building and the surrounding area within a 0.5km radius (depicted by the yellow circle).



Figure 1: Site Plan depicting surrounding area within 0.5km radius of the site.

The plan in figure 1 clearly shows that the majority of the surrounding area is either open land or other units on the Llay industrial estate. Some residential housing falls within the 0.5km radius which has been highlighted in yellow on figure 1. The closest residential area is a small number of houses to the West of the site, however these properties are protected by a strip of vegetation that lies at the top of an upward sloping embankment from the site boundary. The strip of vegetation and embankments are shown in figure 2. Further residential properties, which are situated a greater distance from the development site, lie to the south and south-east.



Figure 2: Surrounding upward sloping embankment from site & vegetation strip

The industrial estate and nearby residential properties are considered receptors for airborne dust and noise.

A Site of Scientific Special Interest (SSSI), Llay Bog lies to the south-west approximately 850m from the development site. The SSSI has a hydrological link to the River Alyn due to the lie of the land but there is no direct link and there is no known direct link from watercourses on the development site to the SSSI, resulting in no pathway existing for pollution from dust carried by water. Therefore the SSSI will only be considered to be a sensitive receptor for airborne dust in the dust assessment where a pathway exists.

The surrounding land will include flora and fauna, both of which will be receptors to airborne dust and the latter will be a receptor to noise.

Employees working within the existing CCP building, operating the external silos and working in the stock yard are considered receptors to noise and dust.

3. NOISE ASSESSMENT

3.1 Baseline Noise

CCP commission an Occupational Noise Exposure assessment bi-annually with the last survey taking place in January 2023 by EEUK Group Ltd. The survey considered the noise generated in the stock yard and loading yard, which was created by shovel vehicles, forklift trucks moving materials, lorries collecting materials and tankers delivering materials. It was concluded that drivers of the shovels and forklifts were not exposed to noise exceeding the personal noise exposure of 80dBA. The survey also considered noise levels within the existing CCP building where discernible noise sources were identified to be the vibration forming press and cubing machine with no other significant noise sources of note. The cubing machine generates levels in excess of 80dBA at approximately 1 metre from the equipment but noise levels dissipated significantly with distance and there was low exposure to employees. Hearing protection zones have been identified within the building to protect employees from noise where required.

A baseline noise survey at receptor points is not available. It is recommended that prior to start-up a baseline noise survey is carried out at receptor points and followed up with a similar survey at the same receptor points after start-up of the clients process to determine any increase in noise level.

3.2 Noise Sources and Pathways

3.2.1 The external plant comprises 3 silos and the feeding systems to both fill and empty the silos, a small compressed air receiver and a weighbridge. Noise ratings for external plant range from 76-83 dBA. The highest rating is from Butterfly/Gate/Ball valves which generate noise for a 10 second pulse every 8 minutes and Senders which run continuously. All noise ratings from plant are included in appendix E.

3.2.2 Externally other noise sources are forklift trucks used to move bagged raw materials from delivery lorries to storage within the existing CCP building and vehicles delivering and collecting materials. However, as CCP will be using 40% of the finished product produced by the client to replace existing materials delivered to site, CCP will see a reduction in vehicle movements. In total the increase in vehicle movements is expected to be 5-7 additional vehicles to and from site per day assuming that a 50% backload is achieved; an increase of only 10% which is considered to be insignificant.

3.2.3 The internal plant consists of a mixer with dosing systems, hoppers, pneumatic senders and de-bagging units with noise ratings ranging from 75-85DbA. In addition there are 3 compressors and an air dryer with a noise rating of 72dBA and 78dBA respectively which will be housed in an enclosed room within the existing building. All noise ratings from plant are included in appendix D. It is likely that ear protection will be required when working inside the building and a noise survey will be carried out after installation of the plant to confirm where ear protection is required to protect employees from noise and provide a safe working environment. The noise levels are no higher than those of the existing CCP plant and therefore noise disturbance to external receptors is expected to be insignificant.

3.2.4 The pathway identified is air transportation of noise.

3.3 Noise Mitigation

3.3.1 The majority of the client's process is carried out inside the existing CCP building reducing the noise levels that could be transmitted to the identified receptors.

3.3.2 The compressors housed in the existing building will be contained in a room to further reduce transportation of noise.

3.3.3 A noise survey at receptor points will be conducted before and after start-up to assess whether additional measures are required to protect employees from noise such as additional ear protection.

3.3.4 Vehicles will only access the site between the hours of 06:00 and 18:00; this is also the time that CCP vehicles arrive and leave site.

3.3.5 The nearest residential receptors are protected by a strip of vegetation and an upward sloping embankment from the site.

3.4 Noise Risk Assessment

A risk assessment has been carried out taking account of the sources of noise and receptors identified, potential pathways and control and mitigation measures put in place to further reduce magnitude of risk.

Severity and Likelihood ratings are scored 1-5 (5 high, 1 low). The risk rating is calculated by multiplying the severity and likelihood ratings and hence are scored 1-25 with the highest score of 25 identifying a very high risk of exposure with severe consequences.

The noise risk assessment is provided in appendix B the risk matrix and risk descriptors are provided in appendix D.

3.4.1 Risk of Noise Disturbance from Plant

Risk Rating = 6, low

The plant will generate noise which is at a similar level to that produced by vehicles within the existing CCP yard. Noise ratings of plant that will be located within the existing building are similar to the noise levels of the existing CCP plant. It is likely that PPE will be required and further noise surveys will be carried out once the plant is installed with additional measures being put in place where required.

3.4.2 Risk of Noise Disturbance from Vehicular Movements

Risk Rating = 3, Very low

As the movements are external with increased risk of transportation and residents and fauna will be sensitive to noise levels a likelihood rating of 3 has been applied. A severity score of 1 has been applied as the increase in number of vehicles is low at an expected 5-7 vehicles a day (assuming a 50% backload), external noise from forklift trucks will be limited as they are only used to unload a delivery of bagged material which will only occur approximately 2-3 times a week and many CCP vehicles are already moving around the site yard so increase compared to background noise will be minimal.

4. DUST ASSESSMENT

4.1 Dust Sources and Pathways

4.1.1 All the raw materials delivered to site and the cement replacement produced are dry powders. The plant is designed as an enclosed system so release of dust is minimised by design. In addition best available techniques have been applied in plant design to build in controls for dust release mitigation as discussed in 4.2. However, there is a risk of accidental release at several points in the process and as such the following potential dust sources have been identified:

- release of dust when loading raw material and finished product silos (if silos become over pressurised)
- release of dust when unloading raw material silos and feeding the process (if the receiving hopper becomes over pressurised)
- release of dust when unloading finished product silos
- release of dust when unloading bagged powders

4.1.2 The main pathway for dust is air transportation followed by inhalation and deposition. The site has no watercourses and therefore it is considered there is no pathway for dust to be transmitted to groundwater.

4.2 Dust Mitigation

4.2.1 The design of the plant incorporates best available techniques (BAT) to mitigate dust release. BAT features are:

- Fully enclosed system with sealed screw conveyors and pneumatic transfer of powders via airtight pipes
- Installation of high-level alarms on silos to prevent overfilling
- Continuous monitoring of the filling level of the silo using a radar sensor which is used to set the high-level alarm in the silo and stop delivery of powder
- Silos are fitted with pressure relief valves to prevent overpressure with valves being checked on monthly basis
- Fitting of an independent high-level sensor to auto stop transfer of powder to silos and hoppers to prevent overfilling.
- The hoppers, silos, sack opener unit and the bulk bag discharge unit are fitted with bag filters for dust arrestment. Filters are frequently cleaned using compressed air and fitted with a differential pressure controller to monitor the condition of the filter elements. High differential pressure will indicate that filter elements need to be replaced.

4.2.2 Procedures and training will be in place to mitigate dust release:

- Only properly trained personnel to load and unload powder tankers to and from silos.
- Preventative and corrective maintenance routines will only be performed by trained personnel.
- Accidental release response procedures will be in place to minimise any airborne dust.
- Emergency Shutdown controls and procedures will be in place

4.3 Dust Risk Assessment

A risk assessment has been carried out taking account of the potential sources of dust and receptors identified, potential pathways and control and mitigation measures put in place to further reduce magnitude of risk.

Severity and Likelihood ratings are scored 1-5 (5 high, 1 low). The risk rating is calculated by the multiplying the severity and likelihood ratings and hence are scored 1-25 with the highest score of 25 identifying a very high risk of exposure with severe consequences.

The dust risk assessment is provided in appendix C, the risk matrix and risk descriptors are provided in appendix D.

4.3.1 Risk of Dust Pollution from Release at Silos

Risk Rating = 3, Very low

The likelihood of dust release is considered to be very low as the silos are fitted with equipment meeting 'Best Available Techniques' (BAT) criteria. The greatest likelihood is due to accidental release which is mitigated by ensuring all personnel loading and unloading tankers are fully trained, preventative and corrective maintenance routines for silos are only carried out by fully trained staff or fully trained contractors, having emergency shutdown procedures in place and having an accidental release response procedure in place in which all required personnel are fully trained.

4.3.2 Risk of Dust Pollution from Release when loading powders from silos to the dosing system and mixer

Risk Rating = 3, Very low

The likelihood of dust release is considered to be very low as the plant is enclosed with powder transfer taking place pneumatically through airtight pipes with the dust arrestment systems meeting 'Best Available Techniques' (BAT) criteria. The greatest likelihood is due to accidental release which is mitigated by ensuring all personnel operating the plant are fully trained, preventative and corrective maintenance routines for plant are only carried out by fully trained staff or fully trained contractors, having emergency shutdown procedures in place and having an accidental release response procedure in place in which all required personnel are fully trained.

4.3.3 Risk of Dust Pollution from Release when unloading bagged powders

Average Risk Rating = 4, Very low

Highest Risk Rating = 6, low for harm to human health for employees

The highest likelihood of risk from dust is to employees during an occurrence of accidental release which is mitigated by the use of personnel protective equipment (PPE). In addition, dust release is mitigated by ensuring all personnel operating the forklift trucks and debagging units are fully trained, preventative and corrective maintenance routines for plant are only carried out by fully trained staff or fully trained contractors, having emergency shutdown procedures in place and having an accidental release response procedure in place in which all required personnel are fully trained.

Risk to other receptors from dust release is very low due to the majority of bag transfer and unloading taking place inside the existing CCP building greatly reducing the risk of airborne dust external to the building. In addition, the bag handling systems meet 'Best Available Techniques' (BAT) criteria.

5. CONCLUSIONS

The risk assessments demonstrate that the risk of either noise pollution or dust pollution is very low and the main reasons for this are:

- The location of the site to receptors including an embankment and vegetation existing between the site and nearest residential receptors
- Noise levels not expected to exceed existing background noise levels
- Minimal increase in vehicular movements
- Operations being limited to 06:00 – 18:00 hours
- Powder bag storage and de-bagging activities located inside the existing CCP building
- Design of plant meeting 'Best Available Techniques' (BAT) criteria and powder transfer systems in the plant being enclosed
- Procedures in place for accidental release response, maintenance routines and emergency shutdown
- Fully trained staff
- Use of PPE

6. APPENDICES

APPENDIX A: SITE PLAN

Material Evolution Ltd. CCP Building Products Ltd Site, Llay Road, Llay, Wrexham, LL12 0TL



APPENDIX B: NOISE RISK ASSESSMENT

MATERIAL EVOLUTION

ENVIRONMENTAL RISK ASSESSMENT

Risk Scoring: Severity: 5 high - 1 Low ; Likelihood: 5 high - 1 Low
Risk Rating (Severity x Likelihood): 25 High - 1 low

Data & Information				Judgement			Actions
Source	Receptor	Pathway	Harm	Probability of Exposure (Likelihood)	Consequence (Severity)	Magnitude of Risk (Risk Rating)	Control & Mitigation Measures included in probability of exposure rating
<i>What is the process or object with potential to cause harm?</i>	<i>What is at risk? What do I wish to protect?</i>	<i>How might the receptor come into contact with the source?</i>	<i>What are the harmful consequences if things go wrong?</i>	<i>How likely is this contact</i>	<i>How severe will the consequence be if this occurs?</i>	<i>What is the overall magnitude of the risk?</i>	<i>On what did I base my judgement?</i>
SOURCE ASSESSMENT: NOISE							
Noise & Vibration from Plant	Local human population	Air transportation of noise and earth transportation of vibration	Nuisance, Loss of amenity, loss of sleep	3	2	6	Vibration from plant expected to be low. Noise level from plant inside building ranging from 75 - 85dBA which is no greater than that already produced by the CCP operations. Cumulative noise level from plant outside building expected to be below 80dBA and no greater than that already produced by the CCP operations. Noise ratings of external plant range from 78-83 dBA. The highest rating is from Butterfly/Gate/Ball valves which generate noise for a 10 second pulse every 8 minutes and continuous noise from pneumatic senders.
	Local fauna			3	2	6	
	Local Flora	Earth transportation of vibration	Harm to growth	3	1	3	
Noise & Vibration from Vehicular movements	Local human population	Air transportation of noise and earth transportation of vibration	Nuisance, Loss of amenity, loss of sleep	3	1	3	Local residents and fauna sensitive to noise & vibration hence higher likelihood score. Increase in number of vehicles is low at an expected 5-7 vehicles a day. Forklift trucks will only be used to unload a delivery of bagged material approximately once a week so movements are limited. Many CCP vehicles are already moving around the site yard so increase compared to background noise will be minimal.
	Local fauna			3	1	3	
	Local Flora	Earth transportation of vibration	Harm to growth	3	1	3	

APPENDIX C: DUST RISK ASSESSMENT

MATERIAL EVOLUTION

ENVIRONMENTAL RISK ASSESSMENT

Risk Scoring: Severity: 5 high - 0 Low ; Likelihood: 5 high - 0 Low
Risk Rating (Severity x Likelihood): 25 High - 0 low

Data & Information				Judgement			Actions	
Source	Receptor	Pathway	Harm	Probability of Exposure (Likelihood)	Consequence (Severity)	Magnitude of Risk (Risk Rating)	Justification for Magnitude	Control & Mitigation Measures included in probability of exposure rating
<i>What is the process or object with potential to cause harm?</i>	<i>What is at risk? What do I wish to protect?</i>	<i>How might the receptor come into contact with the source?</i>	<i>What are the harmful consequences if things go wrong?</i>	<i>How likely is this contact</i>	<i>How severe will the consequence be if this occurs?</i>	<i>What is the overall magnitude of the risk?</i>	<i>On what did I base my judgement?</i>	<i>How can I best manage the risk to reduce the magnitude?</i>
SOURCE ASSESSMENT: DUST								
Release of Dust when loading raw material and finished product silos	Local human population	Air transportation followed by inhalation & deposition	Harm to human health, respiratory/skin/eye irritation and/or damage	1	3	3	All loading of raw materials is done pneumatically via airtight pipes directly from tanker to silo. Finished Product is dosed directly from the mixer to an intermediate hopper then to the finished product silo with both transfers being made pneumatically via enclosed airtight pipes.	High level alarms implemented to prevent overfilling. Silos fitted with pressure relief valve to prevent overpressure and valves to be checked on weekly basis. Filling level of silo continuously monitored using a radar sensor used to set the high level alarm in the silo and stop delivery of powder. Independent high level sensor to auto stop transfer of powder to silo to prevent overfilling. High level sensor installed on intermediate hopper to auto-stop transfer of powder to hopper/silo to prevent overfilling. The hoppers, silos sack opener unit and the bulk bag discharge unit are fitted with bag filters for dust arrestment. Filters are frequently cleaned using compressed air and fitted with a differential pressure controller to monitor the condition of the filter elements. High differential pressure will indicate that filter elements need to be replaced. Main risk of dust from accidental release mitigated by properly trained personnel only to fill silos from tanker, accidental release response procedure in place, preventative maintenance routines for plant only carried out by fully trained staff or fully trained contractors. Emergency Shutdown procedures in place.
		Air transportation followed by deposition	Nuisance - dust on personal property	1	3	3		
	Employees	Air transportation followed by inhalation & deposition	Harm to human health, respiratory/skin/eye irritation and/or damage	1	3	3		
	Local fauna	Air transportation followed by inhalation and deposition	Harm to animal health, respiratory/skin/eye irritation and/or damage	1	3	3		
	Local Flora	Air transportation followed by deposition	Harm to plant health, cellular penetration of pollutants	1	3	3		

Data & Information				Judgement			Actions	
Source	Receptor	Pathway	Harm	Probability of Exposure (Likelihood)	Consequence (Severity)	Magnitude of Risk (Risk Rating)	Justification for Magnitude	Control & Mitigation Measures included in probability of exposure rating
<i>What is the process or object with potential to cause harm?</i>	<i>What is at risk? What do I wish to protect?</i>	<i>How might the receptor come into contact with the source?</i>	<i>What are the harmful consequences if things go wrong?</i>	<i>How likely is this contact</i>	<i>How severe will the consequence be if this occurs?</i>	<i>What is the overall magnitude of the risk?</i>	<i>On what did I base my judgement?</i>	<i>How can I best manage the risk to reduce the magnitude?</i>
SOURCE ASSESSMENT: DUST								
Release of Dust when unloading raw material silos, dosing system and mixer	Local human population	Air transportation followed by inhalation & deposition	Harm to human health, respiratory/skin/eye irritation and/or damage	1	3	3	All loading of raw materials to the plant is done pneumatically via airtight pipes directly from silo to dosing systems to mixer.	Silos fitted with over-fill prevention systems and filters as described above. Main risk of dust from accidental release mitigated by properly trained personnel only to operate plant, accidental release response procedure in place and preventative maintenance routines for plant only carried out by fully trained staff or fully trained contractors. Emergency shutdown procedures in place.
		Air transportation followed by deposition	Nuisance - dust on personal property	1	3	3		
	Employees	Air transportation followed by inhalation & deposition	Harm to human health, respiratory/skin/eye irritation and/or damage	1	3	3		
	Local fauna	Air transportation followed by inhalation and deposition	Harm to animal health, respiratory/skin/eye irritation and/or damage	1	3	3		
	Local Flora	Air transportation followed by deposition	Harm to plant health, cellular penetration of pollutants	1	3	3		

Data & Information				Judgement			Actions	
Source	Receptor	Pathway	Harm	Probability of Exposure (Likelihood)	Consequence (Severity)	Magnitude of Risk (Risk Rating)	Justification for Magnitude	Control & Mitigation Measures included in probability of exposure rating
<i>What is the process or object with potential to cause harm?</i>	<i>What is at risk? What do I wish to protect?</i>	<i>How might the receptor come into contact with the source?</i>	<i>What are the harmful consequences if things go wrong?</i>	<i>How likely is this contact</i>	<i>How severe will the consequence be if this occurs?</i>	<i>What is the overall magnitude of the risk?</i>	<i>On what did I base my judgement?</i>	<i>How can I best manage the risk to reduce the magnitude?</i>
SOURCE ASSESSMENT: DUST								
Release of Dust when unloading finished product silos	Local human population	Air transportation followed by inhalation & deposition	Harm to human health, respiratory/skin/eye irritation and/or damage	1	3	3	The powder transfer between silo and tanker is done by gravity. The discharge of the silo is connected to the tanker via flexible loading chute. The loading chute head will seal the opened hatch of the tanker to reduce dust emission to the atmosphere. Filling rate and level of tanker is controlled via mass flow meter installed at the discharge of the silo.	Silos fitted with over-fill prevention systems and filters as described above. Main risk of dust from accidental release mitigated by properly trained personnel only to fill tankers from silo, accidental release response procedure in place and preventative maintenance routines for plant only carried out by fully trained staff or fully trained contractors.
		Air transportation followed by deposition	Nuisance - dust on personal property	1	2	2		
	Employees	Air transportation followed by inhalation & deposition	Harm to human health, respiratory/skin/eye irritation and/or damage	1	3	3		
	Local fauna	Air transportation followed by inhalation and deposition	Harm to animal health, respiratory/skin/eye irritation and/or damage	1	3	3		
	Local Flora	Air transportation followed by deposition	Harm to plant health, cellular penetration of pollutants	1	3	3		

Data & Information				Judgement			Actions	
Source	Receptor	Pathway	Harm	Probability of Exposure (Likelihood)	Consequence (Severity)	Magnitude of Risk (Risk Rating)	Justification for Magnitude	Control & Mitigation Measures included in probability of exposure rating
<i>What is the process or object with potential to cause harm?</i>	<i>What is at risk? What do I wish to protect?</i>	<i>How might the receptor come into contact with the source?</i>	<i>What are the harmful consequences if things go wrong?</i>	<i>How likely is this contact</i>	<i>How severe will the consequence be if this occurs?</i>	<i>What is the overall magnitude of the risk?</i>	<i>On what did I base my judgement?</i>	<i>How can I best manage the risk to reduce the magnitude?</i>
SOURCE ASSESSMENT: DUST								
Release of Dust when unloading bagged powders	Local human population	Air transportation followed by inhalation & deposition	Harm to human health, respiratory/skin/eye irritation and/or damage	1	3	3	Movement of bags outside the process building in the open air is forklift drivers loading bags from a lorry and transporting to storage racking inside the building. When in the building the bags are moved to and from storage. Bags are unloaded via a contained discharge unit. The bulk bag discharge unit and sack opener unit are fitted with a filter to arrest the dust generated and filters are frequently cleaned using compressed air. Discharge of filtered air is inside the process building.	Main risk of dust from accidental release from bag splitting or misuse of equipment mitigated by properly trained personnel only to operate forklifts and plant, accidental release response procedure in place and preventative maintenance routines for plant only carried out by fully trained staff or fully trained contractors. Staff wearing personnel protective equipment.
		Air transportation followed by deposition	Nuisance - dust on personal property	1	3	3		
	Employees	Air transportation followed by inhalation & deposition	Harm to human health, respiratory/skin/eye irritation and/or damage	2	3	6		
	Local fauna	Air transportation followed by inhalation and deposition	Harm to animal health, respiratory/skin/eye irritation and/or damage	1	3	3		
	Local Flora	Air transportation followed by deposition	Harm to plant health, cellular penetration of pollutants	1	3	3		

APPENDIX D: RISK DESCRIPTORS & MATRIX

DESCRIPTORS FOR MAGNITUDE OF NOISE EFFECTS

Rating	Receptor Perception	Description: Human Receptor	Description: Fauna Receptor
1	No Discernible Effect	No Reaction	
2	Non-Intrusive	Noise impact can be heard but does not cause any change in behaviour or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Noise causes a reaction, either physiological or behavioural, but fauna returns to pre-exposure conditions relatively quickly and without continuing effects.
3	Intrusive	Noise impact can be heard and causes small changes in behaviour and/ or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Potential for non-awakening sleep disturbance. Affects the character of the area such that there is a perceived change in the quality of life.	Noise causes a reaction, either physiological or behavioural, but cause more permanent changes that do not readily allow individuals or communities to return to pre-exposure conditions. Can include temporary nest abandonment.
4	Disruptive	Causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area.	Noise causes harm, such as permanent nest abandonment.
5	Physically Harmful	Significant changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Noise causes demonstrable harm, either injury or death.

DESCRIPTORS FOR MAGNITUDE OF DUST EFFECTS

Rating	Receptor Perception	Description: Human Receptor	Description: Fauna Receptor
1	No Discernible Effect	Little Dust noticed	Little Dust noticed
2	Non-Intrusive	Dust annoyance. Small quantities of dust in air or depositing on surfaces.	Dust causes a reaction, either physiological or behavioural, but fauna returns to pre-exposure conditions relatively quickly and without continuing effects.
3	Intrusive	Dust annoyance and loss of amenity. Affects the character of the environment such that there is a perceived change in the quality of life e.g. noticeable dust in air and depositing on material items where damage may then be caused.	Dust causes a reaction, either physiological or behavioural, but cause more permanent changes that do not readily allow individuals or communities to return to pre-exposure conditions. Can include temporary nest abandonment.
4	Disruptive	Adverse Health Effects. Quality of life diminished due to effects such as skin irritation.	Dust causes harm, such as permanent nest abandonment.
5	Physically Harmful	Severe Health Effects. significant, medically definable harm, e.g. hospitalisation required.	Dust causes demonstrable harm, either injury or death.

NOISE & DUST RISK MATRIX

LIKELIHOOD		SEVERITY				
		1	2	3	4	5
Rare	1	Very Low Risk	Very Low Risk	Very Low Risk	Low Risk	High Risk
Unlikely	2	Very Low Risk	Low Risk	Low Risk	Medium Risk	High Risk
Possible	3	Very Low Risk	Low Risk	Medium Risk	Medium Risk	High Risk
Likely	4	Low Risk	Medium Risk	Medium Risk	High Risk	High Risk
Almost Certain	5	Low Risk	Medium Risk	High Risk	High Risk	Very High Risk

APPENDIX E: NOISE RATINGS OF PLANT

Item	Plant location	Element	Operation	Noise (dB)
1	Raw material 3 Big-Bag discharger. (Internal)	Vibrator	during big bag unloading/ about 20 min every 60 min	76
2	Raw material 25 kg sacks discharger (internal)	Vacuum pump	Continuous	75
3	Raw material 25 kg sacks discharger (Internal)	Filter cleaning (reverse jet)	Pulse 10s every 5 minutes	85
4	Raw material 25 kg sacks discharger (Internal)	Sacks breaker	30 s every 90 s	85
5	Raw material 25 kg sacks discharger (Internal)	Elevator	Continuous	80
6	Raw material 1 hopper (External)	Vibrator	1 min every 8 min	76
7	Raw material 3 hopper (internal)	Vibrator	1 min every 7 min	76
8	Raw material 4 hopper (Internal)	Vibrator	1 min every 25 minutes	76
9	Dosers extraction (Internal)	Extractor (filter)	Continuous	78
10	Flexomix (Internal)	Flexomix	Continuous	80
11	Flexomix extraction (Internal)	Extractor (filter)	Continuous	78
12	Final product silo (External)	Extractor (filter)	Continuous	78
13	Across the plant (Internal/External)	Butterfly/Gate/Ball valves/senders	Pulse 10 s every 8 minutes	83
14	Across the plant (Internal/External)	Filters cleaning (reverse jet)	Pulse 10s every 5 minutes	78
15	Air compressors (3) (Internal)	Compressor	Continuous	72
16	Air dryer (Internal)	Air dryer	Intermittent , 50% of time	78
17	Across the plant (Internal/External)	Pneumatic senders	Continuous	83