



## **KNAUF INSULATION, ST HELENS APPLICATION TO VARY ENVIRONMENTAL PERMIT: ENVIRONMENTAL RISK ASSESSMENT AND ACCIDENT SCENARIO ASSESSMENT**

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This environmental risk assessment has been produced to support the application to vary the Environmental Permit to increase manufacturing capacity at the installation in 2024. The modifications outlined in the application relating to the following:

- Deliveries of raw materials and despatch of finished product.
- Additional storage of finished product
- Release of storm water run-off from the area within the extension to the installation boundary.
- Increased manufacture of glass wool product
- Packaging of the finished product
- Replacement of the existing cooling towers, air compressors and associated systems.

Further details on each of the above changes are outlined in the Application Technical Report .

The environmental risk assessment considers the associated environmental risks associated with the modifications and more broadly. The approach to undertaking this assessment and presentation of the findings are consistent with the approach set out in Environment Agency guidance “Risk assessments for your environmental permit” in the GOV.UK website (<https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit>).

The installation is operated in accordance with an Environmental Management System (EMS) which is certified to ISO 14001: 2015. The existing EMS will continue to be implemented at the site and it will be reviewed and updated as necessary in order to reflect any changes introduced by the permit variation.



## LAND AND GROUNDWATER CONTAMINATION RISK ASSESSMENT AND MANAGEMENT PLAN

| No  | Hazard  | Receptor   | Pathway  | Risk Management  | Probability     | Effect   | Overall risk        |
|---|---|--|--|--|-----------------|--|---------------------|
| Note: Risks to soil and groundwater are considered in the Site Condition Report for the installation. An addendum to the Site Condition Report that assesses risks to soil and groundwater associated with the extension to the installation boundary is provided at Appendix B of this application to vary the Environmental Permit. |   |  |  |  |                 |  |                     |
| 1   | Spillage of solid raw materials (site wide)<br>Borax, or MnO <sub>2</sub><br><br>(Inert raw materials: cullet, dolomite, sand)<br><br>(Note: The application does not include any additional storage capacity though the frequency of | Soil / vegetation<br>Groundwater<br><br>Ravenhead Dam in the unlikely event of transfer to the drainage system | Site drains<br>Percolation through soil<br><br>Groundwater percolation ( <i>in the unlikely event that condition of the hardstanding fails</i> ) | None of the solid raw materials on site are classified as hazardous or harmful to the aquatic environment or land. Glass, dolomite and sand are inert granular materials.<br><br>With the exception of cullet, bulk deliveries of raw materials are transferred into sealed storage silos using pneumatic systems. Where practicable, site pneumatic systems are used for transfer instead of vehicle systems for improved reliability.<br><br>Silos for solid raw materials are located at the batch plant area of the site. This is founded on competent hardstanding with the primary containment maintained to prevent spill of solid material to ground.<br><br>Bunding is not installed within the area of the silos as the materials are dry solids, but the surrounding areas are kerbed hard standing, which allow any spillages to be swept/vacuumed. The risk of cullet entering the drainage systems is relatively low, as there are no surface water drains in the area of the silos and batch plant, although, that it is acknowledged that it is possible. To ensure flow through the drainage system is not impeded, a housekeeping schedule for the site incorporates drains to be checked daily as part of site walkovers including to identify the presence of vegetation. In the event, cullet, vegetation or any other foreign material is identified in the drains, a third party vacuum 'gully cleaning trucks' is brought to site. | Unlikely<br>(1) | Negligible (1)<br>(for spills of inert or other materials)<br><br>Contamination of soil or surface water with cullet or sand | Very low<br><br>(1) |

| No | Hazard                     | Receptor | Pathway | Risk Management  | Probability | Effect | Overall risk |
|----|----------------------------|----------|---------|--|-------------|--------|--------------|
|    | deliveries will increase). |          |         | <p>Unloading areas are located and designed for ease of manoeuvrability and to optimise visibility of vehicle drivers. Spill containment and pollution control equipment is provided at these locations.</p> <p>A documented unloading procedure is already implemented as part of existing site operations. Personnel supervising raw materials are appropriately trained for these activities including spill containment and clean up.</p> <p>Deliveries are supervised by site personnel in accordance with this procedure. Personnel are empowered to take appropriate action in the event of a spillage deliveries.</p> <p>Silos, tanks, intermediate containment, offloading facilities and hardstanding are routinely inspected for damage, deterioration and wear and tear, with remedial measures undertaken as necessary.</p> <p>Bulk storage silos and tanks are installed with level detection and high level alarm and high high level trip systems to minimise the potential for overfilling and loss of containment.</p> <p>Spillages are recorded in accordance with the EMS and reviewed as part of annual management review in order to assess trends and target opportunities for improvements.</p> <p>Any personnel handling chemicals will be suitably trained and aware of processes and procedures to manage and mitigate risks.</p> <p>Spillage equipment and pollution prevention measures are provided at relevant locations and the Emergency Spillage Procedure will be followed in the event of a spill.</p> |             |        |              |



| No | Hazard   | Receptor  | Pathway   | Risk Management  | Probability  | Effect   | Overall risk |
|----|--|---|---|--|--------------|--|--------------|
|    |  |   |   | <p><b>Proposed modifications:</b></p> <p>No additional offloading facilities and storage arrangements are proposed as part of the modifications.</p> <p>There is an extension to the Installation boundary, this matter is considered in the Site Condition Report presented at Appendix E. No raw materials (other than cullet), chemicals, fuel or waste will be stored within the proposed extension to the Installation boundary. Washed cullet may also be stored within this area from time to time. This material will be clean and is inert and will be stored on kerbed, competent hardstanding.</p>  |              |  |              |
| 2  | <p>Spillage of liquid raw materials or fuels (site wide)</p> <p>(ammonia, caustic, diesel, water treatment chemicals, adblue)</p> <p>(Note: The application does not include any additional storage)</p> | <p>Soil / vegetation</p> <p>Groundwater</p> <p>Ravenhead Dam in the unlikely event of transfer to the drainage system</p> | <p>Site drains</p> <p>Percolation through soil</p> <p>Groundwater percolation (<i>in the unlikely event that condition of the hardstanding fails</i>)</p> | <p>No additional offloading facilities and storage arrangements are proposed as part of the modifications.</p> <p>A limited inventory of liquid raw materials is imported. Raw materials imported in IBCs or storage tanks are unloaded and stored in designated bunded areas founded on hardstanding that are not connected to the site drainage systems. The bund sump arisings can be pumped to the process water system for dilution and safe treatment.</p> <p>Unloading areas are located and designed for ease of manoeuvrability and to optimise visibility of vehicle drivers. Spill containment and pollution control equipment is provided at these locations.</p> <p>A documented unloading procedure is already implemented as part of existing site operations. Personnel supervising raw materials are appropriately trained for these activities including spill containment and clean up.</p> | Unlikely (1) | <p>Serious (3)</p> <p>(for large spills)</p> <p>Contamination of soil and groundwater or surface water (Ravenhead Dam)</p> | Low (3)      |

| No | Hazard  | Receptor | Pathway | Risk Management   | Probability | Effect | Overall risk |
|----|---|----------|---------|---|-------------|--------|--------------|
|    | capacity though the frequency of deliveries will increase). |          |         | <p>Deliveries are supervised by site personnel in accordance with this procedure. Personnel are empowered to take appropriate action in the event of a spillage deliveries.</p> <p>An integrally bunded diesel tank is installed within an enclosed secure building to meet the fuel requirement for trailer shunters and standby pumps only. There are no drainage system within the vicinity of the tank. The modifications proposed will not give rise to an increased requirement for diesel or increase the associated environmental risk.</p> <p>Silos, tanks, intermediate containment, offloading facilities and hardstanding are routinely inspected for damage, deterioration and wear and tear, with remedial measures undertaken as necessary.</p> <p>Bulk storage silos and tanks are installed with level detection and high level alarm and high high level trip systems to minimise the potential for overfilling and loss of containment.</p> <p>Responsibility for activities associated with storage, handling and dosing of chemicals will be controlled to ensure access is provided for designated personnel only. Automated dosing will be optimised to minimise the requirement for manual intervention and overfilling/overflows. Automated dosing systems were located within a bunded area, and the storage of dosing chemicals is within secondary containment.</p> <p>Spillages are recorded in accordance with the EMS and reviewed as part of annual management review in order to assess trends and target opportunities for improvements.</p> <p>Any personnel handling chemicals will be suitably trained and aware of processes and procedures to manage and mitigate risks.</p> |             |        |              |



| No | Hazard   | Receptor  | Pathway                                 | Risk Management   | Probability     | Effect   | Overall risk |
|----|--|---|---|---|-----------------|--|--------------|
|    |  |   |   | <p>Spillage equipment and pollution prevention measures are provided at relevant locations and the Emergency Spillage Procedure will be followed in the event of a spill.</p> <p><b>Proposed modifications:</b></p> <p>No additional offloading facilities and storage arrangements are proposed as part of the modifications.</p> <p>There is an extension to the Installation boundary, this matter is considered in the Site Condition Report presented at Appendix E. HGVs will access the area to remove finished product from this area, however, no liquid materials will be stored in this area.</p>  |                 |  |              |
| 3  | Spillage of process effluent (wash water) (in the event of deviation from normal operating arrangements) | Soil / vegetation<br>Groundwater<br>Ravenhead Dam | Site drains<br>Percolation through soil | <p>The HD dewatering screws are located in the eastern (furnace) end of the main building, this section of the building is provided with secondary containment which drains to a sump which feeds the wash water system.</p> <p>LD dewatering screws are located at the northeast corner of the main building but have the potential to overflow externally. Fibres are periodically removed from the system to prevent blockage of the screws (which is the primary cause of overflows). There is a high-level alarm fitted to the system to provide advance warning of potential overflows. This area is installed with secondary containment and the drainage system in this area has been extended to capture spillages and transfer flow to the process water system.</p> <p>Sedimentation pits are also installed to remove solids from the washwater system to prevent blockage. These are operated on a duty/standby basis and installed with high level alarms. In the</p> | Possible<br>(2) | Negligible (1)<br>Minor contamination of soil and groundwater or surface water (Ravenhead Dam) | Very Low (2) |



| No | Hazard | Receptor | Pathway | Risk Management  | Probability | Effect | Overall risk |
|----|--------|----------|---------|--|-------------|--------|--------------|
|    |        |          |         | <p>event of the high level alarm being activated, the flow can be diverted to the other pit to provide contingency storage.</p> <p>The changes will not give rise to new effluent streams being generated, although there will be increased throughput. Blowdown water from the cooling towers will be transferred to the wash water system and used in the manufacturing process.</p> |             |        |              |



## ODOUR RISK ASSESSMENT AND MANAGEMENT

| No | Hazard | Receptor | Pathway | Risk Management | Probability | Effect | Overall risk |
|----|--------|----------|---------|-----------------|-------------|--------|--------------|
|----|--------|----------|---------|-----------------|-------------|--------|--------------|

Note: The activities outlined are not associated with odour emissions and are therefore not considered further.

There have been odour complaints but these have not been substantiated. These are potentially related to BOC plant, but not confirmed. Note: the BOC plant does not form part of the Knauf regulated Installation.





## NOISE AND VIBRATION RISK ASSESSMENT AND MANAGEMENT

| No  | Hazard   | Receptor  | Pathway                           | Risk Management  | Probability  | Effect   | Overall risk   |
|---|--|---|-----------------------------------|--|--|--|--|
| <p>Note: The site is operated subject to a Noise Management Plan. This has been updated and is presented at Appendix G.</p> <p>It should be noted that as part of the modifications, equipment associated with elevated noise emissions (e.g. compressors, air supply units, cooling towers) approaching the end of the design life will be replaced with new equipment, for which selecting of units with reduced sound power levels has been afforded a high priority in the selection process. Noise emissions associated with operation of these replacement units will reduce.</p> <p>Given the limited space available and the requirement to operate new and existing plant alongside each other until commissioning activities are completed, the compressor house and associated cooling towers will be relocated within an area of the site slightly closer to residential receptors. The other cooling towers (Cullet cooling and Fiberiser [furnace] cooling will be replaced in the same location. While the storage locations for raw materials, cullet and wastes will remain unchanged, deliveries and collections will be more frequent.</p> <p>Noise complaints have been previously been received at the site. Substantiated complaints typically relate to abnormal operations or failure of plant and equipment – matters that have been promptly rectified. Noise complaints are promptly investigated and where substantiated, remedial measures implemented as soon as practicable, in accordance with the arrangements of the EMS. Any corrective actions identified will be implemented accordingly.</p> <p>A Noise Impact Assessment has been undertaken to support this application. This is presented at Appendix G. In summary, the assessment predicts there will be no appreciable addition to the industrial noise generated by the site as a result of the proposed modifications. The noise modelling has assessed the impact, both, in isolation and accumulation with existing plant and the proposed modifications related to the variation does not generate adverse impact at any receptor.</p> |  |   |                                   |  |  |  |  |
| 4   | Vehicle movements including importing raw materials and exporting finished product.<br><br>(Site wide) | Residential properties at The Shires, Factory Row, Stafford Road and adjacent streets | Sound propagation through the air | <p>Vehicle numbers will increase as a result of the increased capacity with approximately 100 HGVs accessing site per day. HGV movements are restricted to daytime hours (7am-5pm).</p> <p>To minimise noise effects, HGVs will continue to access and exit the site using the route agreed with St Helens Metropolitan Borough Council that diverts vehicles away from residential properties. The layout of the site is designed and operated to minimise the requirement for reversing (alarms).</p> <p>Drivers will be required to comply with the site speed limit (10 mph) to minimise noise effects associated with accelerating and braking.</p> <p>Vehicle engines will not be left idling.</p> | Likely<br><br>(Ranked based on worst case – rows 7 & 8)<br><br>(3) | Marginal<br>(2)<br>Potential audible noise at receptors leading to noise complaints from residents | Medium<br>(6)<br>(Ranked based on worst case – rows 7 & 8) |



| No | Hazard   | Receptor  | Pathway                           | Risk Management   | Probability | Effect                                    | Overall risk |
|----|--|---|-----------------------------------|---|-------------|---|--------------|
|    |  |   |                                   | <p>Bulk solid raw materials will be transferred using pneumatic systems. Where practicable, site pneumatic systems will be used in preference to vehicle systems to minimise noise emissions further.</p> <p>Site vehicle movements are limited and restricted to forklift trucks and tugs. No vehicles are allowed to operate between stores and main building after 5pm due to proximity of houses on Stafford Road.</p>  |             | (Ranked based on worst case – rows 7 & 8) |              |
| 5  | Import and unloading cullet for all operations         | Residential properties at The Shires, Factory Row and Stafford Road | Sound propagation through the air | <p>The cullet storage silo is installed with a roof and enclosed on three sides, with the delivery opening facing away from residential properties.</p> <p>Deliveries and offloading cullet will take place during daytime hours only.</p> <p>The design of the cullet offloading hopper is optimised to reduce the drop height and speed of offloading to minimise attrition of cullet and noise emissions.</p> <p>More frequent offloading of cullet but cullet offloading is not a significant contributor to overall noise emissions associated with site operations.</p>   |             |   |              |
| 6  | Noise breakout from main building (for all operations) | Residential properties at The Shires, Factory Row and Stafford Road | Sound propagation through the air | <p>Manufacturing activities are undertaken within the enclosed main building that effectively attenuates noise emissions.</p> <p>The site operates under an approved Noise Management Plan.</p> <p>New equipment is specified to comply with the Supply of Machinery (Safety) Regulations 2008 (as amended). An extensive programme of refurbishment works have been undertaken in recent decades to ensure compliance with these requirements.</p> <p>Manufacturing plant and equipment associated is managed in accordance with the Preventative Inspection and Maintenance Plan, which operates to minimise noise emissions associated with wear and tear of equipment and deterioration of equipment.</p> |             |   |              |



| No | Hazard   | Receptor  | Pathway                           | Risk Management  | Probability     | Effect            | Overall risk    |
|----|--|---|-----------------------------------|--|-----------------|-------------------|-----------------|
| 7  | Operation of externally located equipment(WESP compressors, cooling towers) used for all activities) | Residential properties at The Shires, Factory Row and Stafford Road | Sound propagation through the air | <p>All equipment is specified to comply with the Supply of Machinery (Safety) Regulations 2008 (as amended).</p> <p>A Noise Impact Assessment (consistent with BS 4142) predicts no adverse effects due to noise, the proposed modifications reflect net noise reductions in all nighttime and daytime cases. This is included at Appendix G.</p> <p>The compressors will be located within a dedicated GRP enclosure with air intakes directed away from the nearest residential receptors. The enclosures have been specified with a Sound Reduction Index (R<sub>w</sub>) of 24 dB.</p> <p>The new compressor cooling towers have been specified to incorporate a 'low sound' fan to achieve additional sound power reduction. Compressor cooling tower will operate between 33-50% capacity</p> <p>The cullet and fiberiser cooling towers are to be installed in the same location as the existing systems. Low noise fans have been specified for the cooling towers to minimise offsite noise emission.</p> <p>These items will be managed in accordance with the Preventative Inspection and Maintenance Plan, which operates to minimise noise emissions associated with wear and tear of equipment and deterioration of equipment.</p> <p>Every effort has been made to locate the plant and emission points (e.g. louvres and intakes) in a manner that will reduce potential noise emissions to a minimum.</p> |                 |                   |                 |
| 8  | Failure of plant (general)   | Residential properties at The Shires, Factory Row and Stafford Road | Sound propagation through the air | <p>The majority of plant failures do not present an environmental hazard and would only curtail manufacturing operations or lead to damaged assets.</p> <p>Some failures or damage to systems could lead to inefficient operation of those systems, which may generate increase noise e.g. damage to fan bearings leading to increased eccentricity in fans.</p>   | Possible<br>(2) | Negligible<br>(1) | Very low<br>(2) |



| No | Hazard | Receptor | Pathway | Risk Management  | Probability | Effect | Overall risk |
|----|--------|----------|---------|--|-------------|--------|--------------|
|    |        |          |         | <p>These items will be managed in accordance with the Preventative Inspection and Maintenance Plan, which operates to minimise noise emissions associated with wear and tear of equipment and deterioration of equipment.</p> <p>More specific to noise. e.g. there will likely be sirens etc, but such exposure over a day period will likely cause annoyance, but not be detrimental to health once audible alerts are silenced.</p> |             |        |              |



## FUGITIVE EMISSIONS RISK ASSESSMENT AND MANAGEMENT PLAN

| No | Hazard                                      | Receptor                                   | Pathway          | Risk Management  | Exposure probability | Effect  | Overall risk |
|----|---|--|------------------|--|----------------------|---|--------------|
| 9  | Litter associated with site wide activities | Residential receptors and local land users | Air (wind-blown) | <p>The modifications will not give rise to releases of litter. Activities undertaken at the installation are not associated with litter being generated or released from the installation.</p> <p>Waste arisings are limited and will be segregated and stored in appropriate receptacles sited in designated areas of the site and frequently removed by licensed contractors. Waste packaging is minimised as raw materials are typically imported in bulk.</p> <p>Finished product will be packaged in robust uPVC inside the production building to prevent attrition and release to the environment as litter. The packaging materials are stored within the site buildings.</p> <p>Contract cleaners are present on site to clean internal and external areas and remove any litter deposited onsite.</p> <p>Any litter complaints will be investigated in accordance with procedures within the EMS. Any corrective actions identified will be implemented accordingly.</p> | Possible (2)         | <p>Negligible (1)</p> <p>Potential litter nuisance at receptors</p> | Very low (2) |
| 10 | Pests associated with site wide activities  | Residential receptors and local land users | Vermin           | <p>The activities undertaken at the installation are not associated with the storage or handling of organic matter that encourages pests and vermin.</p> <p>Wastes will be segregated and stored in appropriate receptacles sited in designated areas of the site and frequently removed by licensed contractors.</p> <p>The site has a third-party pest contractor who regularly attends site for the control of pests.</p>   | Unlikely (1)         | <p>Negligible (1)</p> <p>Pest nuisance at receptors</p>             | Very low (1) |



| No | Hazard   | Receptor   | Pathway | Risk Management  | Exposure probability | Effect  | Overall risk    |
|----|--|--|---------|--|----------------------|---|-----------------|
|    |  |  |         | Any pest and vermin complaints will be investigated in accordance with procedures within the EMS. Any corrective actions identified will be implemented accordingly.   |                      |   |                 |
| 11 | Dust associated with site wide activities including proposed modifications | Local residences<br>Ecological receptors<br>Adjacent land<br>Ravenhead Dam | Air     | <p>There are no requirements to undertake dust monitoring in the Environmental Permit.</p> <p>A screening assessment of dust emissions within internal and external areas of the site has been undertaken for occupational health purposes. This identified various activities / processes that may give rise to potential sources of fugitive dust, including product manufacture, line slitter, bandsaw, line wrapper, guillotine, and baler systems. Further assessment confirmed dust emissions associated with activities/operations associated with product manufacture and cutting product activities only, required further consideration only for occupational health purposes. The assessments have informed the design of dust mitigation and control measures within these areas as outlined below.</p> <p>Although the assessment considers exposure to dust for occupational health purposes, we do not consider releases from these sources require further controls to reduce effects on the environment. These operations / activities are undertaken within the enclosed main building and operated subject to local exhaust ventilation (LEV) systems. These systems are existing and unchanged by the proposed modifications</p> <p>Batching of raw materials has been confirmed to be associated with dust generation though these are of reduced significance as all batching operations are undertaken in enclosed systems and conveyors located within the enclosed batch plant building where a high level of protection is specified to safeguard the occupational health of workers. This also affords a high level of protection for the environment. Dust levels across the site are monitored annually for occupational health purposes.</p> | Possible<br>(2)      | Negligible<br>(1)<br><br>Potential dust nuisance at receptors | Very low<br>(2) |

| No | Hazard | Receptor | Pathway | Risk Management  | Exposure probability | Effect | Overall risk |
|----|--------|----------|---------|--|----------------------|--------|--------------|
|    |        |          |         | <p>Bag filters and LEV systems installed are managed in accordance with the Preventative Inspection and Maintenance Plan, and are tested to ensure performance on an annual basis. Critical spares are maintained on site and a maintenance contract is in place to respond to any failures which cannot be repaired by the onsite team.</p> <p>There have been no dust complaints received at the site and whilst occupational health controls provide effective management of dust within internal areas, dust is not visible within external areas. Notwithstanding the above, the following measures have been implemented:</p> <ul style="list-style-type: none"> <li>-Scheduled daily site walkovers inspections and audits review dust emissions within internal and external areas across the installation.</li> <li>-Effective housekeeping arrangements for internal and external areas are maintained and cleaning contractors are accountable for achieving these. The contractors are periodically audited to review performance.</li> <li>-Roads are swept twice weekly and on demand to remove dust generating materials on vehicles entering the site.</li> <li>-Cullet is washed before being imported to the site to prevent dust generation.</li> <li>-The cullet storage silo is installed with a roof and enclosed on three sides with the with the delivery opening facing away from residential properties to minimise noise and dust emissions associated with unloading.</li> <li>-The design of the cullet offloading hopper is optimised to reduce the drop height and speed of offloading to minimise attrition of cullet and dust emissions,</li> <li>-Any dust complaints will be investigated in accordance with procedures within the EMS. Any corrective actions identified will be implemented accordingly.</li> </ul> |                      |        |              |



| No | Hazard | Receptor | Pathway | Risk Management   | Exposure probability | Effect | Overall risk |
|----|--------|----------|---------|---|----------------------|--------|--------------|
|    |        |          |         | <p><b>Proposed modifications:</b></p> <p>The modifications will not change the materials handled or stored on site but more frequent deliveries will be required.</p> <p>Emissions associated with forming, curing and cooling activities will be extracted for abatement using the currently installed including suction boxes, impact jets, cyclones and WESP abatement systems.</p> <p>The increase in the number of trimming, cutting and splitting operations required to prepare product will still capture offcuts and dust locally which will be recycled/reclaimed via the Local Exhaust Ventilation (LEV) which releases clean air within the main building.</p> <p>There is no attrition of the glass fibre product in the slab baggers and multipack machines, so these systems do not have the potential to generate dust emissions, and therefore, do not require extraction.</p> |                      |        |              |





## ACCIDENTS RISK ASSESSMENT AND MANAGEMENT PLAN

| No | Hazard  | Receptor                                 | Pathway | Risk Management   | Exposure probability | Effect  | Overall risk  |
|----|---|--|---------|---|----------------------|---|---------------|
| 12 | Failure of critical plant - Dry EP – full breakdown | Local residences<br>Ecological receptors | Air     | <p>This scenario has the potential to give rise to releases of particulates which may contain boron.</p> <p>In the event of failure of the Dry EP, the furnace exhaust will switch from emission point A1 to emission point A32.</p> <p>A continuous emissions monitoring system is installed. This will alarm and identify the loss of abatement in the furnace stack.</p> <p>In the event of this scenario, releases will be transferred from the furnace stack to furnace emergency stack in accordance with documented operating procedures to protect the integrity of the furnace and abatement systems.</p> <p>Curing of product will not be undertaken when non-operation of the Dry EP exceeds 7 consecutive days or 8 days per calendar year, in accordance with the conditions of the current Variation Notice.</p> <p>The Dry EP will be managed in accordance with the Preventative Inspection and Maintenance Plan, to minimise the potential for failure.</p> <p>Critical spares are maintained on site and a maintenance contract is in place to respond to any failures which cannot be repaired by the onsite team.</p> | Possible<br>(2)      | Marginal<br>(2)<br><br>Potential for dust nuisance at local receptors | Medium<br>(4) |



| No  | Hazard  | Receptor                                 | Pathway | Risk Management   | Exposure probability | Effect  | Overall risk |
|-----|---|--|---------|---|----------------------|---|--------------|
| 13a | Failure of critical plant – full breakdown of LD line WESP          | Local residences<br>Ecological receptors | Air     | <p>The LD line emissions will continue to be abated by the primary abatement systems (suction boxes, venturi scrubbers and drop out boxes) and secondary abatement systems (cyclones).</p> <p>Alarms would indicate the failure of the WESP system and trigger an immediate investigation to determine the appropriate response. This may ultimately require production on the LD line to be shut down in a safe and controlled manner.</p> <p>Curing of product will not be undertaken when non-operation of the WESP exceeds 7 consecutive days or 20 days per calendar year, in accordance with the conditions of the current Variation Notice.</p> <p>The WESP will be managed in accordance with the Preventative Inspection and Maintenance Plan, to minimise the potential for failure.</p> <p>Critical spares are maintained on site and a maintenance contract is in place to respond to any failures which cannot be repaired by the onsite team.</p> | Unlikely<br>(1)      | Marginal<br>(2)<br><br>Potential for dust nuisance at local receptors | Low<br>(2)   |
| 13b | Failure of critical plant – loss of single side of the LD line WESP | Local residences<br>Ecological receptors | Air     | <p>MCERTS accredited stack testing has been undertaken that confirms the WESP is effective at abating emissions to a level below the permitted emission limit values (ELV) on single sided operation.</p> <p>It has been confirmed that the WESP will can accommodate the increased manufacturing capacity and continue to be within design specification.</p>  | None                 | None  | None         |

| No  | Hazard  | Receptor                                 | Pathway | Risk Management  | Exposure probability | Effect  | Overall risk |
|-----|---|--|---------|--|----------------------|---|--------------|
|     |   |  |         | <p>The WESP will be managed in accordance with the Preventative Inspection and Maintenance Plan, to minimise the potential for failure.</p> <p>Critical spares are maintained on site and a maintenance contract is in place to respond to any failures which cannot be repaired by the onsite team.</p>   |                      |   |              |
| 14a | Failure of critical plant – full break down of HD line WESP | Local residences<br>Ecological receptors | Air     | <p>The HD line emissions will continue to be abated by the primary abatement systems (water sprays and venturi scrubbers) and the secondary abatement system (cyclones).</p> <p>Alarms would indicate the failure of the WESP system and trigger an immediate investigation to determine the appropriate response. This may ultimately require production on the HD line to be shut down in a safe and controlled manner.</p> <p>Curing of product will not be undertaken when non-operation of the WESP exceeds 7 consecutive days or 20 days per calendar year, in accordance with the conditions of the current Variation Notice</p> <p>The WESP will be managed in accordance with the Preventative Inspection and Maintenance Plan, to minimise the potential for failure.</p> <p>Critical spares are maintained on site and a maintenance contract is in place to respond to any failures which cannot be repaired by the onsite team.</p> | Unlikely<br>(1)      | Marginal<br>(2)<br><br>Potential for dust nuisance at local receptors | Low<br>(2)   |



| No  | Hazard   | Receptor | Pathway                              | Risk Management   | Exposure probability | Effect | Overall risk |
|-----|--|----------|--------------------------------------|---|----------------------|--------|--------------|
| 14b | Failure of critical plant – HD line WESP – loss of single side | N/A      | Emissions of abated emissions to air | <p>MCERTS accredited stack testing confirms the WESP effectively abates emissions in compliance with the emission limit values (ELV) on single sided operation i.e. 50% capacity.</p> <p>It has been confirmed that the design specification of the WESP will continue to provide effective abatement of releases to air to comply with the ELVs during single sided operation.</p> <p>The WESP will be managed in accordance with the Preventative Inspection and Maintenance Plan, to minimise the potential for failure.</p> <p>Critical spares are maintained on site and a maintenance contract is in place to respond to any failures which cannot be repaired by the onsite team.</p>  | None                 | None   | None         |
| 15  | Failure of critical plant – Blowing Wool line abatement        | N/A      | Air                                  | <p>Emissions abatement is provided by suction boxes with water sprays, scrubbers and cyclone to remove dust.</p> <p>Alarms would indicate the failure of the WESP system and trigger an immediate investigation to determine the appropriate response. This may ultimately require production on the blowing wool line to be shut down in a safe and controlled manner.</p> <p>The blowing wool line is never operated without abatement or with partial abatement.</p> <p>The blowing wool line abatement system will be managed in accordance with the Preventative Inspection and Maintenance Plan, which operates to ensure that all equipment will operate at optimal effectiveness.</p> | None                 | None   | None         |

| No | Hazard   | Receptor  | Pathway   | Risk Management  | Exposure probability | Effect  | Overall risk |
|----|--|---|---|--|----------------------|---|--------------|
|    |  |   |   | Critical spares are maintained on site and a maintenance contract is in place to respond to any failures which cannot be repaired by the onsite team.  |                      |   |              |
| 16 | Blocked wash water drains/ pipework systems leading to potential leaks or bursts | Ravenhead Dam<br>Adjacent drainage ditches<br>Soil / vegetation<br>Groundwater beneath site | Surface water<br>Percolation through soil<br>Groundwater percolation ( <i>if hardstanding fails</i> ) | <p>Regular inspection and maintenance of pipework for transfer of process effluent, chemicals and raw materials is undertaken in accordance with Preventive inspection and Maintenance arrangements.</p> <p>The drainage system is vacuumed periodically to remove vegetation to maintain effectiveness.</p> <p>The washwater system and pipework are largely located within the main building, which provides secondary containment and drains to a sump.</p> <p>The modifications will not give rise to new effluent streams being generated, although the flows to the wash water system will increase.</p> <p>Emergency procedures will be implemented in the event of a failure of any pipework or the drainage system.</p> <p>Spill containment equipment and cleaning equipment are provided, and the Emergency Spillage Procedure will be followed in event of a spill.</p> <p>Spills / leaks will be recorded in accordance with the EMS. Spillage and leakage incidents are reviewed as part of the annual management review to assess trends and target opportunities for improvements.</p> | Possible<br>(2)      | Negligible<br>(1)<br><br>Contamination of soil or surface water (Ravenhead dam) | Low<br>(2)   |



| No | Hazard  | Receptor   | Pathway   | Risk Management   | Exposure probability | Effect   | Overall risk    |
|----|---|--|---|---|----------------------|--|-----------------|
|    |   |  |   | Any potential impact to the environment will be reported to the Environment Agency in accordance with the requirements of the environmental permit.   |                      |  |                 |
| 17 | Failure of mains power  | None   | None  | <p>The electrical system design includes a redundancy through a standby transformer to allow the system changeover in the event of a transformer failure.</p> <p>The plant will shut down in a controlled manner / certain operations would cease in the event of failure of mains electricity supply.</p> <p>Emergency lighting is provided throughout the building to allow safe egress of personnel.</p>   | None                 | None   | N/A             |
| 18 | Fire<br><br>NOTE: This excludes the release of fire-fighting water – See Row 19 | Residential receptors and local users<br><br>Ravenhead Dam<br><br>Water environment beyond the installation boundary.<br><br>Ecological receptors<br><br>Soil / vegetation | Air<br>Site drainage system<br><br>Percolation through soil | <p>The modifications will not increase the potential for fire at the installation.</p> <p>Robust arrangements for fire prevention and detection are implemented and a site-wide fire risk assessment has been completed. The modifications to the plant is designed to KI Group Fire Safety Standards.</p> <p>The glasswool product is not combustible under normal circumstances.</p> <p>An x-ray system that identifies rogue large particles which can smoulder and lead to a fire when coming into contact with packaging.</p> <p>A 'punking' procedure is implemented to prevent this phenomenon from occurring.</p> | Possible<br>(2)      | Negligible<br>(1)<br><br>Deterioration of air quality.<br><br>Impact on human health | Very low<br>(2) |

| No | Hazard  | Receptor                                      | Pathway   | Risk Management  | Exposure probability | Effect   | Overall risk |
|----|---|---|---|--|----------------------|--|--------------|
|    |   | Groundwater beneath site                      |   | <p>Product that has been identified to present a risk of punking is diverted to a designated kerbed quarantine (punking) area of site to ensure the materials are subject to appropriate surveillance. Appropriate fire protection and firefighting equipment to mitigate the potential for fire is installed.</p> <p>Fire alarm systems are installed, and this is maintained and tested according to Fire and Rescue service recommendations. CCTV cameras with fire detection capability are provided in all storage areas.</p> <p>Fire extinguishers are located at appropriate locations and staff are trained in their use.</p> <p>The emergency procedure that incorporates measures to be taken in the event of fire will be implemented.</p> <p>A site Major Incident Plan is maintained which covers the response to significant fire events. All staff are instructed on steps to be taken in the event of fire. The emergency plan is subject to periodic drills. Nominated fire wardens are also in place at the site.</p> <p>Preventative maintenance on all electrical systems is conducted annually by an approved contractor.</p> |                      |  |              |
| 19 | Failure to contain fire water run-off (Site wide) | Ravenhead Dam<br>Water environment beyond the | Site drains<br>Surface water<br>Percolation through soil<br>Groundwater | <p>Fire prevention measures will be implemented as outlined at row 16.</p> <p>In the main building, all areas of elevated fire risk are banded. The remaining areas of the building would be captured in the secondary containment provided by the building cellar, which could be disposed of via an appropriate route.</p>   | Unlikely (1)         | Marginal (2)<br>Potential contamination of surface water (Ravenhead dam) | Very low (2) |



| No | Hazard                                | Receptor   | Pathway   | Risk Management  | Exposure probability | Effect | Overall risk |
|----|---------------------------------------|--|---|--|----------------------|--------|--------------|
|    |                                       | installation boundary  |   | <p>A firewater risk assessment has been undertaken to characterise the firefighting water that may be generated. The report confirms that there is sufficient capacity available in Ravenhead Dam to contain firefighting water associated with the worst case scenario.</p> <p>Drain covers will be used to prevent release to the surface water drainage system where practical to prevent releases to Ravenhead Dam.</p> <p>Ravenhead Dam can be monitored to identify and respond to contamination if required.</p> <p>Water from the dam is the primary source of fire water for site. If spent firewater is drained to the dam, this can be abstracted by the site to prevent release to the downstream environment.</p> <p>Spill kits are available around the plant for capturing small volumes of firefighting media.</p> |                      |        |              |
| 20 | Flooding / heavy rainfall (Site wide) | Ravenhead Dam<br>Soil<br>Water environment beyond the installation | Site drains<br>Surface water<br>Percolation through soil<br>Groundwater | <p>The site is located within Environment Agency Flood Zone 1 (the lowest) with an annual probability of flooding from rivers of less than 0.1%. The site has no historic risk of flooding, and the Ravenhead Dam provides significant capacity for draining surface water.</p> <p>The modifications associated with this application will not increase the risk of flooding at the installation or the environmental effects of flooding.</p> <p>All raw materials are stored within dedicated storage locations. The silos have been secured to the hard-standing to prevent movement in a flooding scenario.</p>  | None                 | None   | N/A          |



| No | Hazard  | Receptor  | Pathway   | Risk Management   | Exposure probability | Effect  | Overall risk |
|----|---|---|---|---|----------------------|---|--------------|
|    |   |   |   | <p>All liquid raw materials are provided with bunds to provide adequate secondary containment, provide protection from mobilisation and provide effective segregation from floodwater.</p> <p>The site is designed to minimise disruption associated with flooding, and environmentally critical equipment is located away from higher risk areas and elevated where appropriate. E.g. The emissions monitoring and abatement systems are located at an elevated level.</p> <p>The weather forecast is monitored and preventative actions are taken to amend operations in the event of adverse weather events.</p> <p>The Emergency Procedures incorporates actions to be taken in the event of flooding / adverse weather events.</p> |                      |   |              |
| 21 | Vandalism giving rise to nuisance or pollution events | <p>Residential receptors</p> <p>Ravenhead Dam</p> <p>Water environment beyond the installation boundary</p> | <p>Site drains</p> <p>Surface water</p> <p>Percolation through soil</p> <p>Groundwater</p> <p>Air</p> | <p>The installation is surrounded by secure fencing. Access and egress to the site is provided by secured gates.</p> <p>Security guards are in attendance at the installation 24 hours per day, 7 days per week</p> <p>The site is subject to extensive CCTV coverage subject to proactive monitoring. Production is a 24/7 operation</p> <p>All storage tanks and silos are locked or secured and would require tools or a key to unlock. All hazardous materials are provided with adequate secondary containment.</p>  | Unlikely<br>(1)      | <p>Serious<br/>(3)</p> <p>(worst case is based upon additional cause of Row 1)</p> <p>Contamination</p> <p>Harm to human health</p> | Low<br>(3)   |



## SURFACE WATER CONTAMINATION RISK ASSESSMENT AND MANAGEMENT PLAN

| No | Hazard   | Receptor      | Pathway              | Risk Management  | Probability     | Effect                   | Overall risk    |
|----|--|---------------|----------------------|--|-----------------|--------------------------|-----------------|
| 22 | Spillage of solid raw materials to surface water drainage system for current installation boundary (excluding extended area) | Ravenhead Dam | Site drainage system | <p>Solid raw materials are stored in designated areas in appropriately specified vessels/containment.</p> <p>None of the solid raw materials on site are classified as hazardous or harmful to the aquatic environment or land. These include glass, dolomite and sand which are inert granular materials.</p> <p>Only clean cullet that has been washed before transfer to the site will be accepted.</p> <p>With the exception of cullet, bulk deliveries of raw materials are transferred into sealed storage silos using pneumatic systems. Where practicable, site pneumatic systems are used for transfer instead of vehicle systems for improved reliability.</p> <p>Silos for solid raw materials are located at the batch plant area of the site. This is founded on competent hardstanding with the primary containment maintained to prevent spill of solid material to ground.</p> <p>Bunding is not installed within the area of the silos as the materials are dry solids, but the surrounding areas are kerbed hard standing, which allow any spillages to be swept/vacuumed. The risk of cullet entering the drainage systems is relatively low, as there are no surface water drains in the area of the silos and batch plant, although, that it is acknowledged that it is possible. To ensure flow through the drainage system is not impeded, a housekeeping schedule for the site incorporates drains to be checked daily as part of site walkovers including to identify the presence of vegetation. In the event, cullet, vegetation or any other foreign material is identified in the drains, a third party vacuum 'gully cleaning truck' is brought to site.</p> | Unlikely<br>(1) | Negligible effect<br>(1) | Very low<br>(1) |

| No | Hazard                             | Receptor      | Pathway              | Risk Management  | Probability     | Effect            | Overall risk    |
|----|------------------------------------|---------------|----------------------|--|-----------------|-------------------|-----------------|
|    |                                    |               |                      | <p>Unloading areas are located and designed for ease of manoeuvrability and to optimise visibility of vehicle drivers. Spill containment and pollution control equipment is provided at these locations.</p> <p>A documented unloading procedure is already implemented as part of existing site operations. Personnel supervising raw materials are appropriately trained for these activities including spill containment and clean up.</p> <p>Deliveries are supervised by site personnel in accordance with this procedure. Personnel are empowered to take appropriate action in the event of a spillage deliveries.</p> <p>Silos, tanks, intermediate containment, offloading facilities and hardstanding are routinely inspected for damage, deterioration and wear and tear, with remedial measures undertaken as necessary.</p> <p>Bulk storage silos and tanks are installed with level detection and high level alarm and high level trip systems to minimise the potential for overfilling and loss of containment.</p> <p>Spillages are recorded in accordance with the EMS and reviewed as part of annual management review to assess trends and target opportunities for improvements.</p> <p>Any personnel handling chemicals will be suitably trained and aware of processes and procedures to manage and mitigate risks.</p> <p>Spillage equipment and pollution prevention measures are provided at relevant locations and the Emergency Spillage Procedure will be followed in the event of a spill.</p> |                 |                   |                 |
| 23 | Spillage of process effluent (wash | Ravenhead Dam | Site drainage system | Effluent and wash water will be generated within the main building only.   | Unlikely<br>(1) | Negligible<br>(1) | Very Low<br>(1) |



| No | Hazard  | Receptor      | Pathway                       | Risk Management  | Probability | Effect | Overall risk |
|----|---|---------------|-------------------------------|--|-------------|--------|--------------|
|    | water) (in the event of deviation from normal operating arrangements) for current installation boundary (excluding extended area) |               |                               | <p>The HD dewatering screws are located in the eastern (furnace) end of the main building, this section of the building is provided with secondary containment which drains to a sump which feeds the wash water system.</p> <p>In the unlikely event of overflow of the LD dewatering screws, flow will be transferred to secondary containment and will not be released to the surface water drainage system.</p> <p>A high-level alarm is fitted to the system to provide advance warning of potential overflows. This area is installed with secondary containment and the drainage system in this area has been extended to capture spillages and transfer flow to the process water system to prevent release of process effluent to surface water.</p> <p>Fibres are periodically removed from the system to prevent blockage of the screws (which is the primary cause of overflows).</p> <p>Sedimentation pits are also installed to remove solids from the wash water system to prevent blockage. These are operated on a duty/standby basis and installed with high level alarms. In the event of the high level alarm being activated, the flow can be diverted to the other pit to provide contingency storage.</p> |             |        |              |
| 24 | Spillage of raw materials or fuels / mobilisation of pollutants on hardstanding within extended area of the installation boundary | Ravenhead Dam | Surface water drainage system | <p>No additional offloading facilities and storage arrangements for fuels are proposed as part of the modifications.</p> <p>With the exception of occasional requirements to store clean washed cullet, the extended area of the installation boundary will not be used for storage of any raw materials or wastes.</p> <p>No trade/ or process effluents will be generated, stored transferred or handled within this area that would give rise to contaminants being present in flow transferred to the Ravenhead Dam.</p> <p>Review of the condition of areas within the site in which loading and unloading activities are undertaken indicates that given the short duration of loading operations</p>  | None        | None   | None         |

| No | Hazard   | Receptor | Pathway | Risk Management   | Probability | Effect | Overall risk |
|----|--|----------|---------|---|-------------|--------|--------------|
|    | (diesel, hydrocarbons, pollutants finished product). |          |         | <p>and the nature of these operations, grease and other hydrocarbons will not be deposited on the hardstanding. Within this area of the site, the risk of oil and hydrocarbons being released to the dam is confined to release of fuel as a result of failure of a heavy goods vehicle fuel tank or vehicular collision, as fork lift trucks accessing this area will be powered by electricity or liquefied petroleum gas.</p> <p>The following controls and mitigations are considered to prevent this scenario:</p> <ul style="list-style-type: none"> <li>- Only reputable hauliers selected in accordance with the criteria specified in the Quality Management System (QMS) will be appointed as approved suppliers to transport finished products from the site. Given the robust requirements of the QMS and the stringent regulatory requirements for roadworthiness of heavy goods vehicles, it is not considered plausible that the fuel tank of a vehicle will fail without an event associated with impact damage*.</li> <li>- The prospect of a heavy goods vehicle being subject to impact damage within this area of the site that would cause damage to the fuel tank is also not considered plausible.</li> <li>- A traffic management system is implemented within this area of the site that imposes the following restrictions to mitigate the risk of vehicular collision*: <ul style="list-style-type: none"> <li>-Vehicles are required to be booked in to prevent congestion and standing traffic on the site thoroughfares</li> <li>-A one way system is implemented*</li> <li>-A 10 mph speed restriction is implemented*.</li> <li>-Vehicle movements are monitored by CCTV*.</li> </ul> </li> <li>- Loading areas are located and designed for ease of manoeuvrability and to optimise visibility of vehicle drivers*.</li> </ul> |             |        |              |



| No | Hazard | Receptor | Pathway | Risk Management  | Probability | Effect | Overall risk |
|----|--------|----------|---------|--|-------------|--------|--------------|
|    |        |          |         | <p>-Spill containment and pollution control equipment are provided at these locations to ensure prompt access by vehicle drivers and those supervising loading activities*.</p> <p>-All forklift truck drivers are trained to manage spillages and deploying spill containment equipment including drain covers*.</p> <p>-All forklift drivers are dully trained and competent. The site requires drivers to be deployed for the first 2 years of experience at the site working on straightforward duties until competency for loading and unloading deliveries can be proven. Only drivers with 2 years or more experience will be authorised to operate in this area*.</p> <p>In addition:</p> <ul style="list-style-type: none"> <li>- Spill kits are located at strategic locations and a trained rapid response team is available for speedy mobilisation to control pollution events and to deploy the boom for the Ravenhead Dam as required*.</li> <li>- The Emergency Spillage Procedure will be followed in the event of a spillage*.</li> <li>- Finished product will be typically stored within internal areas under cover though it will also be stored externally.</li> <li>- The packaging for all finished product is robust, weatherproof and is specified to ensure the integrity and condition of the material is not compromised following extended periods of physical and mechanical handling and external storage by product suppliers and end users.</li> <li>- Finished product will typically be separately packaged and loads will be shrink wrapped on pallets to maintain integrity and ensure effective containment during loading activities.</li> </ul> |             |        |              |

| No | Hazard | Receptor | Pathway | Risk Management   | Probability | Effect | Overall risk |
|----|--------|----------|---------|---|-------------|--------|--------------|
|    |        |          |         | <ul style="list-style-type: none"> <li>- Drain covers will be available to isolate the surface water drainage system while heavy goods vehicles are operating in this area of the site.</li> <li>- The area will be subject to periodic inspection and effective housekeeping to prevent release of silt to the surface water drainage system.</li> <li>- This area of the site will be incorporated into the housekeeping schedule for the site. The area will therefore be subject to daily inspection during the site walkover, scheduled inspection and cleaning by the cleaning contractors in addition to the ongoing checking of the area by operatives using this area to ensure it remains clean and any incidents such as tearing of packaging are managed. The housekeeping programme will include dry cleaning techniques using a road sweeper deployed for hardstanding, curbs and other infrastructure within the area.</li> <li>- Hardstanding and site infrastructure within this area will also be routinely inspected for damage, deterioration, d wear and tear, with remedial measures undertaken as necessary*.</li> <li>- A documented loading procedure is implemented as part of existing site operations. Personnel supervising these activities are appropriately trained for this duty, together with training provided on activities including spill containment and clean up*.</li> <li>- Personnel are empowered to take appropriate action in the event non-conformances are identified*.</li> </ul> <p>* These control arrangements will be implemented within other areas of the installation.</p> |             |        |              |



## Knauf Risk Criteria

This section describes the Knauf Risk Assessment criteria which have been used as the basis of this Environmental Risk Assessment. These criteria are drawn from document KI\_F\_P001\_1 General Risk Assessment Template.

### LIKELIHOOD CRITERIA

The following probability criteria have been applied to the 'exposure probability' column of the risk assessment shown above.

| Rating              | Probability                   |
|---------------------|-------------------------------|
| <b>4 - Probable</b> | >50% chance of occurrence     |
| <b>3 - Likely</b>   | 10 - 50% chance of occurrence |
| <b>2 - Possible</b> | 1 - 10% chance of occurrence  |
| <b>1 - Unlikely</b> | <1% chance of occurrence      |





## EFFECT CRITERIA

The following harm criteria have been applied to the 'effect' column of the risk assessment shown above.

| Rating             | Category                       | Probability   |
|--------------------|--------------------------------|---|
| <b>4 - Major</b>   | Health and Safety              | Fatality or permanent disability  |
|                    | Energy                         | Very high energy consumption (>10% increase)  |
|                    | Public concern and image       | Local, international and non-governmental organisations outcry and demonstration resulting in large stock devaluation;<br>severe restrictions on license to practice,<br>large compensation payments,<br>national media interest<br>criminal prosecution                |
|                    | Regulatory impacts and censure | Unable to meet regulatory obligations leading to shutdown or sever restriction of operations  |
|                    | Environmental Impacts          | Catastrophic impact on habitat (irreversible and large)<br>Long term environmental damage   |
| <b>3 - Serious</b> | Health and Safety              | Lost time injury (LTI)<br>High Potential (HIPO) of severe injury or disability with some potential for a fatality<br>Hospitalisations   |
|                    | Energy                         | High energy consumption (>5% increase)  |
|                    | Public concern and image       | Multiple community complaints (5+)<br>Notification to authorities required<br>Civil prosecution<br>Local, international or protest activism resulting in political and financial impacts on company's 'license to do business' and major procedure or practice changes. |
|                    | Regulatory impacts and censure | Regularly or severely fail regulatory obligations or expectations – large fines or loss of regulatory trust   |
|                    | Environmental Impacts          | Significant irreversible impact on habitat<br>Uncontained off-site environmental damage (e.g. polluted water)   |



| Rating                | Category                       | Probability   |
|-----------------------|--------------------------------|---|
| <b>2 – Marginal</b>   | Health and Safety              | First aid or medical treatment case, LTI possible or potential for serious injury   |
|                       | Energy                         | Low energy consumption (>2% increase)   |
|                       | Public concern and image       | Local media interest<br>Repeat community complaints (2-5)<br>Occasional local, international and non-governmental organisation attention requiring minor procedure changes and additional public relations and communications |
|                       | Regulatory impacts and censure | Regulatory enforcement action (e.g. fine, notice or order)<br>Occasionally (less than once per year) or moderately fail regulatory obligations or expectations  |
|                       | Environmental Impacts          | Significant reversible impact on habitat<br>Contained offsite environmental damage (e.g. spill on road)   |
| <b>1 - Negligible</b> | Health and Safety              | First aid injury or small risk of serious injury  |
|                       | Energy                         | Negligible energy consumption (<2% increase)  |
|                       | Public concern and image       | An isolated community complaint<br>No or infrequent local, international and non-governmental organisation attention addressed by normal public relations and communications<br>Warning letter from authorities               |
|                       | Regulatory impacts and censure | Do not / seldom / marginally exceed regulatory obligations or expectations.<br>Some loss of regulatory tolerance or increased reporting.  |
|                       | Environmental Impacts          | No measurable or minor impact on habitat  |



## RISK MATRIX

The following risk matrix has been used to compute the risk levels given in the 'overall risk column'.

| Risk / Aspect Ranking |   | Impact Rating / Severity |    |   |   |
|-----------------------|---|--------------------------|----|---|---|
|                       |   | 4                        | 3  | 2 | 1 |
| Probability           | 4 | 16                       | 12 | 8 | 4 |
|                       | 3 | 12                       | 9  | 6 | 3 |
|                       | 2 | 8                        | 6  | 4 | 2 |
|                       | 1 | 4                        | 3  | 2 | 1 |

|       |           |
|-------|-----------|
| 12-16 | Very High |
| 8-9   | High      |
| 4-6   | Medium    |
| 3     | Low       |
| 1-2   | Very Low  |