

## Methodology

The following tables in this section assess the potential risk to receptors from the following hazards, taking into account the measures proposed to reduce those risks.

The method relies on a scoring system that is based on the frequency or probability of the event occurring and the resulting consequence or potential effect of the event on the environment.

Controls or mitigation are also identified in the assessment, which consist of measures or actions that can be carried out to limit the potential for impacts.

The probability of exposure is the likelihood of the receptors being exposed to the hazard, and is defined as low, medium or high. These terms are qualified as follows:

- Low: exposure is unlikely, barriers in place to mitigate against exposure;
- Medium: exposure is fairly probable, barriers to exposure less controllable; and
- High: exposure is probable, direct exposure likely with few barriers.

The aim is to reduce the risk of fugitive emissions from the facility or the impact of the emissions on the environment, through specific mitigation measures identified for each specific risk.

Control and mitigation measures have been identified for all risks identified in the assessment, based on the Best Available Techniques (BAT) measures set out in the guidelines and on operational experience. The measures specific to each risk are described in the assessment. The mitigation measures will be incorporated into the Site management processes and Site operatives will be made aware of these measures during training.

More general mitigation measures to avoid emissions, in line with indicative BAT standards, are also set out in the relevant sections of the Main Supporting Document.

**Figure 3: Risk Assessment Matrix**

Consequence	Exposure probability		
	Low	Medium	High
Low	Low Risk	Low Risk	Medium Risk
Medium	Low Risk	Medium Risk	High Risk
High	Medium Risk	High Risk	High Risk

**Table 3.1: Severity Index**

Severity of harm	Severity Index
Impact to people or designated receptor	High
Impact to non-designated receptor	Medium
All other impacts	Low

**Table 3.2: Probability Index**

Likelihood of harm occurring	Probability Index
Harm is near certain or very likely to occur	High
Harm is likely to occur	Medium
Harm is unlikely	Low

**Table 3.3: Magnitude of risk**

Magnitude of risk	Probability index		
Severity index	Low	Medium	High
Low	Low	Low	Medium
Medium	Low	Medium	High
High	Medium	High	High

**Figure 3: Climate Change Risk Assessment Matrix**

Risk Assessment	Definition	Score Range
<b>Frequency (or probability)</b>	Describes the likelihood of the event occurring.	1 (least frequent) – 6 (most frequent)
<b>Consequence</b>	Describes the potential effect of the event on the environment.	1 (least consequent) – 6 (most consequent)
<b>Risk</b>	Risk is frequency multiplied by consequence.	1 – 36 (36 greatest risk)

**Emissions to air**

Hazard	Receptor	Pathway	Risk reduction measures	Exposure probability	Potential consequences	Exposure rating	Consequence rating	Overall risk
Emissions to air	Local residents and businesses beyond the boundary of the Proposed Installation. See human and ecological receptors listed in Main Supporting Document Table 8 and 9.	Air	<p>A dispersion modelling exercise of the main stack has been carried out for 100% hydrogen and 100% natural gas firing scenarios.</p> <p>The results of the assessment showed that impacts at human receptors are considered to be insignificant. For ecological receptors the results in terms of the critical level and critical loads can all be considered to be insignificant. The overall effect of the Proposed Installation in relation to air quality is therefore considered to be insignificant.</p>	Low probability of exposure is considered to be very low by application of appropriate management procedures which will be developed prior to the commencement of operation of the Proposed Installation.	Low. Potential consequence on human health and ecological receptors in surrounding area.	Low	Low.	TBC
Emissions to air	Local residents and businesses beyond the boundary of the Proposed Installation. See human and ecological receptors listed in Main Supporting Document Table 8 and 9.	Air	<p>A screening exercise was undertaken using the SCAIL tool to determine if the operation of the emergency diesel generator would result in an impact (see Appendix G - Air Quality Impact Assessment for further details).</p> <p>The results of the SCAIL Assessment showed that emissions from the diesel generator (for testing and emergency scenarios) indicated that the impact of human receptors is considered to be insignificant. For ecological receptors the results in terms of the critical level and critical loads can all be considered to be insignificant. The overall effect of the EDG in relation to air quality is therefore considered to be insignificant.</p>	Low probability of exposure is considered to be very low by application of appropriate management procedures which will be developed prior to the commencement of operation of the Proposed Installation.	Medium. Potential flammable vapour in the vicinity of local receptors.	Low	Medium.	TBC

**Fugitive emissions**

Hazard	Receptor	Pathway	Risk reduction measures	Exposure probability	Potential consequence	Exposure rating	Consequence rating	Overall risk
Release of feed gas through leakage and valves (hydrogen and/or natural gas)	On-site staff and local residents and businesses beyond the boundary of the Propsoed Installation. See human and ecological receptors listed in Main Supporting Document Table 8 and 9	Gas carried on wind leading to the development of flammable atmospheres	<p>No on-site gas storage facilities, minimising the likelihood of large gas release and the development of an explosive atmosphere on site.</p> <p>If there is a leak in the gas supply pipeline, the quantity released is expected to be dispersed and not lead to the development of an explosive atmosphere. An emergency shutdown valve will be in place, that will shut in the event of sudden depressurisation of the pipeline. Its primary function is to prevent the continuous loss of gas in the unlikely event of a major leak in the downstream pipework.</p> <p>The site will be fitted with fire and gas detection which will be connected to the control system. New fire suppression system will be installed for the new process areas.</p> <p>All pipework will be constructed and maintained in accordance with the Pipeline Safety Regulations 1996. Safety mechanisms, such as safety valves, and pressure relief valves shall be integrated to protect against overpressure and overheating. An additional 10% safety margin will be added to all pipework and equipment. Regular inspection of the site infrastructure will be undertaken by suitably trained employees.</p>	Low exposure probability due to implementation of risk reduction measures to prevent a gas leak	Medium potential consequence on human health and ecological receptors in surrounding area.	Low	Medium	Low

<p>Spillage of diesel to surface water or groundwater during</p>	<p>Local surface water and groundwater</p>	<p>Flow path is determined by surface topography and drainage systems</p>	<p>Site drains are designed in accordance with industry best practice and appropriate safety standards including CIRIA Guidance 736. The diesel will be stored in accordance with Oil Storage Regulations.</p> <p>Diesel will be delivered by an SSE approved contractor to appropriate unloading bays. Appropriate site training/ induction shall be in place and appropriate monitoring points and audio/ visual alarms shall be present during any bulk chemical transfers to minimise chance of leaks/ overflow.</p> <p>Raw material substances will be stored in an appropriately bunded container which will be regularly inspected. Spill kits designed to deal with the stored material will be in the proximity of storage areas and fill points in the event of a spill.</p> <p>The EMS will comprise procedures for controlling raw material delivery including for oil transfer operations, and spill response procedures. All relevant personnel will be trained on how to handle a spill incident.</p>	<p>Low due to site design and management procedures.</p>	<p>Medium adverse impact on human health and ecological receptors in surrounding area due to close proximity of designated ecological receptor.</p>	<p>Low</p>	<p>Medium</p>	<p>Low</p>
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Spillage/ escape of raw materials including chemicals	Local surface water and groundwater	Flow path is determined by surface topography and drainage systems	<p>Areas where chemicals are handled will comprise concrete hardstanding of watertight construction and be kerbed/ bunded to ensure that spillages and/ or leaks in those areas are contained, manually cleaned up and removed for treatment off-site. Containment bunds would be provided around above ground storage tanks (AGST) where there is risk of spillage and would be designed and constructed according to the requirements of CIRIA C736 , API 650 and relevant Eurocodes. Road tanker unloading areas will have the kerbed/ bunded areas sized to hold the full inventory of the tanker, in line with the CIRIA guidance in the event of a full loss of containment.</p> <p>All chemicals will be delivered by an SSE approved contractor to appropriate unloading bays. Appropriate site training/ induction will be in place and appropriate monitoring points and audio /visual alarms will be present during any bulk chemical transfers to minimise chance of leaks/ overfill.</p>	Low due to site design and management procedures.	Medium adverse impact on human health and ecological receptors in surrounding area due to close proximity of designated ecological receptor.	Low	Medium	Low
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## Nuisances

Hazard	Receptor	Pathway	Risk reduction measures	Exposure proba	Potential consequ	Exposure rating	Consequence rating	Overall risk
Mud/ litter carried onto highway	Land and water	Public	All internal roads, storage and processing areas will be hard-surfaced with concrete or tarmac and swept when required	Low due to site design and management procedures	Low adverse impacts on local receptors	Low	Low	Low
Pest, vermin and scavengers	Land and water	Staff and public	Due to the nature of the proposed activity, pest/ vermin/ scavengers are unlikely to be an issue.	Low due to nature of the site.	Low adverse impacts on local receptors	Low	Low	Low
Waste generation	Land and water	Staff and public	<p>Only small quantities of waste will be generated from the operation and maintenance of the Proposed Installation, in addition to minor amounts of dry mixed recyclables and general domestic waste.</p> <p>All wastes will be stored in appropriate, labelled containers and stored in designated bunded waste storage areas. All bulk waste storage tanks will be within bunds with 110% capacity of the primary container.</p> <p>All waste generated on Site will be managed in line with the waste hierarchy and disposed of by licenced waste contractors where necessary.</p>	Low - Waste oil will be stored in a suitably bunded container before being transported off site by a third-party contractor to be disposed of off-site.	Low adverse impacts on local receptors	Low	Low	Low
Plume visibility	On-site staff and local residents and businesses beyond the boundary of the Proposed Installation. See human receptors in Table 8 of Main Supporting Document	Water vapour carried on wind	<p>Cooling towers will be fitted with plume abatement techniques however there is still the potential for visible plumes to occur.</p> <p>A cooling tower visible plume assessment was undertaken (see Annex E of Appendix G) which indicated that a short visible plume may be present for up to 24% of the time once the Installation is operational. The average length of the plume will be less than 1m with a maximum length of 241m, which was only predicted for one hour of one year of the modelled meteorological data.</p>	Medium exposure as the results show there to be a plume approximately 24% of the time.	Low adverse impacts on local receptors as the average plume will be less than 1m	Medium	Low	Low

**Noise**

Hazard	Receptor	Pathway	Risk reduction measures	Exposure probability	Potential consequences	Exposure rating	Consequence rating	Overall risk
Noise and vibration from the operation of the Proposed Installation	On-site staff, local residents and local residents and businesses beyond the boundary of the Installation. See human and ecological receptors listed in Main Supporting Document Table 8 and 9	Air/ wind	<p>A Noise Impact Assessment (Appendix I) has been undertaken which determined that additional attenuation of specific plant or buildings would be needed to achieve the defined noise criteria. As such, further assessment will be undertaken during the detailed design stage.</p> <p>It is proposed that confirmation of the specific mitigation measures to be applied is provided to the EA upon completion of the final detailed design, prior to commencement of operation of the Proposed Installation, and to demonstrate compliance with the requirements of the EP Regulations.</p> <p>Noise attenuation measures proposed include the following:</p> <ul style="list-style-type: none"> <li>•The sound power level of the noise sources assessed are not to be exceeded.</li> <li>•The minimum composite acoustic performance of the HRSG building, Gas Turbine Hall, and the Steam Turbine Hall fabric items (walls, roof, louvres and doors) should be 31 dB Rw with walls such as Kingspan structural insulated panels. This is an increase from the unmitigated modelling. The building fabric of all buildings is assumed to have holes/openings such as acoustic louvres or roller shutters acoustically treated and efficient sealing ensured around any penetrations, e.g. shafts, valves, etc. to control noise egress.</li> <li>•The water abstraction station and transformer yard should be enclosed within appropriate acoustic enclosures, such that the sound pressure level at 1m from the enclosures should not exceed 83 dB(A).</li> <li>•The transformers selected for the transformer yard should be limited to 100 dB (Lw).</li> <li>•Maintenance activities to be undertaken during the daytime only.</li> </ul>	Medium as the plant will be in operation frequently.	Low adverse noise impacts on local receptors due to proposed mitigation. Noise attenuation will be further considered at detailed design.	Medium	Low	Low

**Odour**

Hazard	Receptor	Pathway	Risk reduction measures	Exposure probability	Potential consequence	Exposure rating	Consequence rating	Overall risk
Odour resulting from operation of the plant or from escape of stored chemicals	On-site staff, local residents and local residents and businesses beyond the boundary of the Proposed Installation. See human and ecological receptors listed in Main Supporting Document Table 8 and 9	Air/ wind	<p>Given the CCGT plant will use natural gas and/ or hydrogen as a fuel, it is expected that odour from the proposed CCGT operations will not be a significant issue.</p> <p>Storage of ammonia for the Selective Catalytic Reduction (SCR) plant, may have the potential to generate odour. In order to minimise the potential for odour to occur, carbon filters will be present on the breather vents.</p>	Low due to the nature of the facility, site design and management procedures.	Low adverse odour impact on local receptors.	Low	Low	Low

**Accidental release**

Hazard	Receptor	Pathway	Risk reduction measures	Exposure probability	Potential consequence	Exposure rating	Consequence rating	Overall risk
Fire	On-site staff and local residents and businesses beyond the boundary of the Proposed Installation. See human and ecological receptors listed in Main Supporting Document Table 8 and 9	Emission of smoke to the air, transported by the wind. Emission of firewater and foam to drainage systems, water and land.	The following measures will be in place to reduce the risk of fire: <ul style="list-style-type: none"> <li>- The layout will be designed such that location of areas and equipment does not introduce unacceptable risk related to fire and explosion.</li> <li>- Selection of electrical apparatus located in outside areas will follow authority regulations, standards, and Company requirements for operation in explosive atmosphere where applicable. All electrical and instrument equipment located outside in natural ventilated areas shall be certified safe type apparatus for the applicable level of hazardous areas.</li> <li>- The Proposed Installation will be equipped with a fire and gas detection system.</li> <li>- A new fire suppression system suitable for the new process areas will be installed.</li> <li>- An on-site firewater reservoir (supplied by Canal) will be present.</li> <li>- Site drainage will be segregated to allow containment of firewater in the event of a fire on-site.</li> <li>- All areas of the site housing the new build CCGT equipment will be constructed to retain contaminated firewater with impermeable surfaces and a raised kerb/bunded edge to prevent release of any liquid outside of the site boundary (tertiary containment).</li> <li>- Filtered water from the Water Treatment Plant is supplied to the fire water tank.</li> <li>- Equipment will be spaced appropriately to ensure there are safe distances between plant.</li> </ul>	Low due to fire risk reduction measures	High adverse impact on local ecological receptors	Low	High	Medium

Flooding	On-site staff and local residents and businesses beyond the boundary of the Proposed Installation. See human and ecological receptors listed in Main Supporting Document Table 8 and 9	Flow path is determined by topography and drainage systems	<p>The Environment Agency Flood Maps For Planning show that the site is located within a Flood Zone 3 and is at risk from fluvial/tidal flooding from River Trent. There are however EA maintained flood defences (embankments) along the River Trent.</p> <p>The following mitigation measures were considered to protect the Proposed Installation within the Site in accordance with the legislative and regulatory authority requirements:</p> <ul style="list-style-type: none"> <li>- The Proposed Installation will be raised above the modelled breach flood level for the 0.5% AEP plus climate change tidal event;</li> <li>- Critical operational infrastructure will be further raised, at least by 1m above the development platform;</li> <li>- A suitable surface water drainage network and management system will be provided for the Proposed Installation that will provide appropriate interception, conveyance, treatment, and attenuation of surface water runoff. It is anticipated that surface water discharge from the Site will be restricted to the existing greenfield runoff rate or if this cannot be accommodated by the IDB, at the agricultural runoff/ alternative rate agreed with the IDB.</li> <li>- A range of SuDS systems will be incorporated to both reduce peak flows and provide water treatment. It is anticipated that as far as reasonably practicable surface water runoff will be conveyed through drainage ditches and filter drains before attenuation in a basin. Locations with higher pollution potential will be independently bunded and spills treated outside of the surface water system. Where necessary, additional oil separators or sediment capture will also be incorporated into the system.</li> <li>- Preparation of a Flood Emergency Response Plan, and Emergency access and egress.</li> </ul>	Medium due to proposed potential flood mitigation options being considered.	Medium adverse impact on local ecological receptors	Medium	Medium	Medium
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Security and vanadalism	On-site staff and local residents and businesses beyond the boundary of the Proposed Installation. See human and ecological receptors listed in Main Supporting Document Table 8 and 9	Pathway of emissions could be land, air or water. Emissions could potentially occur due to failure/reduced performance of equipment and infrastructure	The boundary of the Proposed Installation will be fenced. There will be restricted access to the plant. Security personnel will be stationed at the plant 24 hours a day, 7 days a week and continuous monitoring will be conducted at designated points using CCTV technology	Low due to extensive security measures.	Low	Low	Low	Low
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**Global warming potential**

Hazard	Receptor	Pathway	Risk reduction measures	Exposure probability	Potential consequences	Overall risk
Generation of greenhouse gas emissions	National and global climate	Air	<p>The release of greenhouse gas emissions is anticipated primarily from the direct emissions produced or associated with energy and natural gas fuel use. It is the intention that when hydrogen fuel is available, the project will fire on 100% hydrogen and therefore there will be no CO2 emissions associated with hydrogen fuel use.</p> <p>Diesel fuel will be used when testing the emergency diesel generators. However this will be limited and therefore unlikely to result in a significant impact.</p> <p>See Section 7.8 of Main Supporting Document for further details.</p>	Low	Low adverse impact on the environment	Low

**Climate change risk assessment**

Potential change	Impact	Likelihood	Severity	Risk	Mitigation	Likelihood (after mitigation)	Severity (after mitigation)	Residual Risk
1) Summer daily maximum temperature may be around 7°C warmer than average summer temperatures now	Reduced efficiency of CCGT	1	2	2	The power plant is designed to operate over a large range of ambient conditions. Temperature changes could have an impact on plant efficiency on warm days.	1	2	2
2) Winter daily maximum temperature could be 4°C more than the current average, with the potential for more extreme temperatures, both warmer and colder than present.	Increases in temperature may cause a drop in efficiency, but a lower risk than in summer.	1	2	2	The power plant is designed to operate over a large range of ambient conditions. Temperature changes would not have a noticeable impact on plant efficiency.	1	1	1

<p>3) Daily rainfall intensity could increase by up to 20% on today's values resulting in flooding on the Site.</p>	<p>Surface water flooding and standing water.</p> <p>Increased soil moisture levels leading to deterioration of structure or foundations.</p> <p>Damage to infrastructure through storm surge and river flooding.</p>	<p>2</p>	<p>3</p>	<p>6</p>	<p>The flood defences in proximity to the Site consist of a combination of high ground and raised defences, including raised embankment. Based on the information provided by the Environment Agency, it has been determined that the proposed installation Site is at a 'low' risk of flooding from tidal and fluvial sources with the defences in place or resulting from overtopping of the defences during events that exceed a 0.5% AEP (1 in 200 chance) and 0.1% AEP. The Environment Agency inspects these defences routinely to ensure potential defects are identified.</p> <p>The Proposed Installation site is considered to be at low residual risk of flooding. Mitigation measures will be implemented at the site, a system would be put in place to safeguard the site occupants. Measures will include, but not be limited to, implementation of a Flood Response Plan.</p> <p>Site drainage has been suitably designed to ensure sufficient drainage of surface water from the site.</p>	<p>1</p>	<p>3</p>	<p>3</p>
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4) Average winter rainfall may increase by over 40% on today's averages resulting in potential increased risk of Site surface flooding and could impact Site wide drainage capacity	<ul style="list-style-type: none"> <li>- Flash flooding on Site</li> <li>- Surface water run-off systems need to be cleared and account for increased flows to prevent them being overwhelmed</li> <li>- Potential for increased Site Surface water flooding</li> </ul>	1	3	3	See above response.	1	3	3
5) Sea level rise which could be as much as 0.6m higher compared to today's level.	<p>Fluvial flooding on the Site.</p> <p>Site surface water systems and effluent treatment plant may become overwhelmed and unable to discharge for prolonged periods due to backing up.</p>	1	3	3	See above response.	1	3	3
6) Drier summers which could see potentially up to 40% less rain than now.	Reduction in availability of water consumption on Site. There is a condition in the abstraction license which prevents abstraction when levels in the canal drop below a certain point.	2	2	4	The use of hybrid cooling and the lower cooling water volumes required, water reuse from HRSG blow-down and maximising the efficiency of the cooling water system .	1	2	2
7) Flows in river could be 50% more than now at its peak and 80% less than now at its lowest	Fluvial flooding	2	2	4	The flood defences in proximity to the Site consist of a combination of high ground and raised defences, including raised embankment. Based on the information provided	1	2	2

	Surface flooding	2	3	6	See above response.	1	3	3
8) Storms	Storms could see a change in frequency and intensity. The unique combination of increased wind speeds, increased rainfall, and lightning during these events provides the potential for more extreme storm impacts.	2	2	4	See above response.	1	2	2