ENVIRONMENTAL RISK ASSESSMENT

Saltholme South Gas Fired Generating Facility
Permit Application EPR/LP3300PZ/A001

JER1691
ENVIRONMENTAL RISK ASSESSMENT
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1 INTRODUCTION

1.1.1 This Environmental Risk Assessment has been carried out in support of an application for an environmental permit. It includes an assessment of the risk to the environment and human health from a gas fired generating facility (GFGF) activity. The Environment Agency's Risk Assessments for your environmental permit[1] covers a range of environmental risks. Those aspects relevant to the operation of the proposed GFGF are covered within the following sections

1.1.2 'Amenity and Accidents', 'Emissions to Air' and 'Global Warming Potential' will be supported by the H1 assessment software tool, which can be found in the Appendix to this Environmental Risk Assessment.

1.1.3 This document provides the relevant risk assessments covering the above aspects.

[1] Environment Agency, Risk assessments for your environmental permit, https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit

2 AMENITY AND ACCIDENTS

2.1.1 This section provides an assessment of risks to environmental amenity and from accidents that could arise from operation of the GFGF. The assessment has been completed in accordance with the EA's Risk Assessments for your environmental permit [1].

2.1.2 The scope of the assessment has covered the following aspects:

- odour;
- noise and vibration;
- fugitive emissions;
- visible emissions; and
- accidents.

2.1.3 For each of the above, the approach to the assessment has followed the following six stage process:

1. identify and consider risks for the site, and the sources of the risks;
2. identify the receptors at risk;
3. identify the possible pathways from the sources of the risks to the receptors;
4. assess risks relevant to the activity;
5. choose appropriate further measures to control these risks (if required); and
6. submit the assessment of overall risk.

2.1.4 Results of the assessment are provided in the following tables:

Table 2-1 Odour risk assessment and management plan

Hazard What has the potential to cause harm?	**Receptor** What is at risk? What do I wish to protect?	**Pathway** How can the hazard get to the receptor?	**Risk management** What measures will you take to reduce the risk? If it occurs – who is responsible for what?	**Probability of exposure** How likely is this contact?	**Consequence** What is the harm that can be caused?	**What is the overall risk?** What is the risk that still remains? The balance of probability and consequence.
Odour emissions from operation of the GFGF	Local residents (nearest residential receptor is around 1.1 km to the north west of the plant) Nearby industrial and commercial installations (nearest receptor is around 850 m to the west of the plant)	Air	The operations at the GFGF are not anticipated to be odorous. The gas to be used within the GFGF will be unodourised therefore odour impacts will be avoided. In the event of a complaint, the operator will follow a complaints procedure to record the complaint and take appropriate action or provide further monitoring as necessary.	Very Low	Very Low	Very Low

Table 2-2 Noise and vibration risk assessment and management plan

Hazard What has the potential to cause harm?	**Receptor** What is at risk? What do I wish to protect?	**Pathway** How can the hazard get to the receptor?	**Risk management** What measures will you take to reduce the risk? If it occurs – who is responsible for what?	**Probability of exposure** How likely is this contact?	**Consequence** What is the harm that can be caused?	**What is the overall risk?** What is the risk that still remains? The balance of probability and consequence.
Noise from vehicle movements onsite	Local residents (nearest residential receptor is around 1.1 km to the north west of the plant) Nearby industrial and commercial installations (nearest receptor is around 850 m to the west of the plant)	Air	There will be no deliveries associated with the transmission of natural gas fuel. The GFGF will be remotely operated, typically 1 to 2 people will attend the site daily to carry out routine maintenance inspections, hence staff vehicle movements will be minimal. Additional vehicle movements will be associated with planned servicing and deliveries which will take place during normal working hours. In the event of a complaint, the operator will follow a complaints procedure to record the complaint and take appropriate action or provide further monitoring as necessary.	Very Low	Very Low	Very Low

Noise from operation of the GFGF, including gas engines, air-intake, fin-fan coolers etc.	Local residents (nearest residential receptor is around 1.1 km to the north west of the plant) Nearby industrial and commercial installations (nearest receptor is around 850 m to the west of the plant)	Air	The GFGF is designed to provide additional electricity generation when demand is high and thus is to operate for no more than 3,500 hours per annum. Typically, the facility would be required to operate between 1 and 7 hours per day, between 8 am and 8 pm. Operation during night time, although not impossible, is less likely as peak demand hours are outside of night time periods. Engines and associated plant will be enclosed within the engine hall. A silencer will be incorporated on each engine stack. In the event of a complaint, the operator will follow a complaints procedure to record the complaint and take appropriate action or provide further monitoring as necessary. A Noise Impact Assessment is included as Appendix D of the supporting information document. The NIA found that the design incorporates mitigation measures to minimise noise to the lowest reasonably practicable level, and that noise will be mitigated such that it does not cause a significant impact.	Low - the gas engines will operate intermittently, when demand is high and will only generate noise during operation.	Low - the noise assessment has determined that by utilising mitigation measures, the noise levels generated would not be significant enough to result in a significant adverse impact.	Low
Vibration from the GFGF	Local residents (nearest residential receptor is around 1.1 km to the north west of the plant) Nearby industrial and commercial installations (nearest receptor is around 850 m to the west of the plant)	Land	Significant vibration effects are not anticipated for the plant. In the event of a complaint, the operator will follow a complaints procedure to record the complaint and take appropriate action or provide further monitoring as necessary.	Negligible - it is anticipated that no significant vibration effects will result from operation of the plant.	Low	Very Low

Table 2-3 Fugitive emissions risk assessment and management plan

Hazard What has the potential to cause harm?	**Receptor** What is at risk? What do I wish to protect?	**Pathway** How can the hazard get to the receptor?	**Risk management** What measures will you take to reduce the risk? If it occurs – who is responsible for what?	**Probability of exposure** How likely is this contact?	**Consequence** What is the harm that can be caused?	**What is the overall risk?** What is the risk that still remains? The balance of probability and consequence.
To Air						
Dust	Local residents (nearest residential receptor is around 1.1 km to the north west of the plant) Nearby industrial and commercial installations (nearest receptor is around 850 m to the west of the plant)	Air	There are no significant dust-generating activities or dusty materials used or stored within the installation. In the event of a complaint, the operator will follow a complaints procedure to record the complaint and take appropriate action or provide further monitoring as necessary.	Negligible - significant dust generation is not anticipated for operation of the facility.	Very low	Very Low
Leaks from ammonia storage tank	Local residents (nearest residential receptor is around 1.1 km to the north west of the plant) Nearby industrial and commercial installations (nearest receptor is around 850 m to the west of the plant)	Air	The ammonia tank will be lined with suitably resistant material and will be within a shared bund with a capacity of 110% of the volume of the largest tank within the bund. The tank will be fitted level indication and alarm. This tank will be subject to routine inspection during routine site maintenance visits.	Low	Medium	Low
Leaks within natural gas pipework.	Local residents (nearest residential receptor is around 1.1 km to the north west of the plant) Nearby industrial and commercial installations (nearest receptor is around 850 m to the west of the plant)	Air	Gas pipelines will be sealed and above ground sections routinely inspected. The gas supply system will be designed, installed and tested as to comply with the requirements of EN 14161, ATEX and other local regulations applicable, as well as complying with relevant National Fire Protection Association (NFPA) or equivalent standards to ensure increased safety and reduced hazard from fuel gas handling. Gas detection and alarm equipment will be in place. Scheduled inspections of natural gas containment/pipework will help to prevent a risk from leakage of unburned natural gas.	Low	Medium	Low

Fumes (VOCs) from delivery and storage oils (transformer and lubricating) on site.	Local residents (nearest residential receptor is around 1.1 km to the north west of the plant) Nearby industrial and commercial installations (nearest receptor is around 850 m to the west of the plant)	Air	No significant sources of risk are anticipated from delivery and storage of oils on site. The use of oils on site will be minimal and limited to the occasional use in transformers or where lubrication is required. Bulk storage of oils is limited to the lubricating oil tank and a waste oil tank. These tanks are fully bunded and will be subject to routine inspection during routine site maintenance visits. Usage of oils will be minimal.	Very Low	Very low	Very Low
To Water						
Leakage of lubricating oils and/or urea or ammonia solution from delivery and storage	Belasis Beck; attenuation ponds.	Surface water drainage systems	Bulk storage of oils is limited to the lubricating oil tank and a waste oil tank. Either 40% urea solution or 24.5% ammonia solution will also be stored in a 50 m^3 tank. These tanks are fully bunded and will be subject to routine inspection during routine site maintenance visits. Usage of oils will be low. When using oils or urea / ammonia solution, a spill kit (chemical or oil as appropriate) will be provided to contain and clean up any spills. The operational part of the site will be laid to hardstanding and therefore the opportunity for direct contact to land is minimal.	Very Low – oils are unlikely to reach surface waters due to low quantities to be present on site and the measures in place on site.	Very Low – based on the low quantities available for release.	Very Low
To Land						
Spillage of oil and / or urea or ammonia solution to land.	Land	Direct contact	Bulk storage of oils is limited to the lubricating oil tank and a waste oil tank. Either 40% urea solution or 24.5% ammonia solution will also be stored in a 50 m^3 tank. These tanks are fully bunded with a capacity of 110% of the stored volume and will be subject to routine inspection during routine site maintenance visits. All tanks will be compliant with the Oil Storage Regulations. An appropriate spill kit will be provided to contain and clean up any spills during deliveries. On delivery, only personnel trained in spillage procedures by their supervisors will be permitted to carry out deliveries of lubricating oils to the site. The engines and lubricating systems will be located within a building with sealed floor and therefore the opportunity for direct contact to land is minimal. Routine inspections of the building surface will be carried out in order to ensure it remains in good working order throughout the lifetime of the facility.	Very Low – due to the low quantities of oil involved in the process, the likelihood of spillages is very low.	Low – based on the low quantities available for release.	Low
Litter						

Litter from waste storage and removal from site.	Local residents (nearest residential receptor is around 1.1 km to the north west of the plant) Nearby industrial and commercial installations (nearest receptor is around 850 m to the west of the plant)	Windblown to air	Minimal waste generation is anticipated on site. In general there will staff will be trained in waste management procedures by their supervisors.	Very Low - significant waste on site is not anticipated	Very Low	Very Low
Pests						
Flies, and other pests or vermin.	Local residents (nearest residential receptor is around 1.1 km to the west of the plant) Nearby industrial and commercial installations (nearest receptor is around 850 m to the west of the plant)	Land/air	Not relevant to the operation.	Negligible	Negligible	Negligible

Table 2-4 Visible emissions

Hazard What has the potential to cause harm?	**Receptor** What is at risk? What do I wish to protect?	**Pathway** How can the hazard get to the receptor?	**Risk management** What measures will you take to reduce the risk? If it occurs – who is responsible for what?	**Probability of exposure** How likely is this contact?	**Consequence** What is the harm that can be caused?	**What is the overall risk?** What is the risk that still remains? The balance of probability and consequence.
Plume from emission stacks	Local residents (nearest residential receptor is around 1.1 km to the north west of the plant) Nearby industrial and commercial installations (nearest receptor is around 850 m to the west of the plant)	Visual	Visible plumes are not anticipated to occur for the majority of operational time due to the natural gas being combusted and resulting high exhaust gas temperatures.	Low	Low – Minor visual disturbance	Low

Table 2-5 Accidents risk assessment and management plan

Hazard What has the potential to cause harm?	**Receptor** What is at risk? What do I wish to protect?	**Pathway** How can the hazard get to the receptor?	**Risk management** What measures will you take to reduce the risk? If it occurs – who is responsible for what?	**Probability of exposure** How likely is this contact?	**Consequence** What is the harm that can be caused?	**What is the overall risk?** What is the risk that still remains? The balance of probability and consequence.

Operator error	Air/Water/Land	Variable - dependent on nature of the error	The facility will be automatically controlled which will minimise potential for operator error on site. The automatic control system will include alarms and warning lights to alert of potential operational problems. Any manual tasks will be undertaken within bunded areas by trained operators. All staff (including contractors) will be qualified for the role to be carried out and trained specifically to carry out their responsibilities in relation to the GFGF.	Low	Low	Low
Loss of power	None	N/A	During operational periods plant will be powered by electricity generated onsite. In the event of a loss of power to the site during non-operational periods the plant may not be able to start-up and therefore no operations can commence.	N/A	N/A	N/A
Loss of containment during storage or transfer of oil and / or urea or ammonia solution	Water and land	Surface water drainage system or direct contact with land.	Bulk storage of oils is limited to the lubricating oil tank and a waste oil tank. Either 40% urea solution or 24.5% ammonia solution will also be stored in a 50 m^3 tank. These tanks are fully bunded with a capacity of 110% of the stored volume of the largest tank within the bund and will be subject to routine inspection during routine site maintenance visits. All tanks will be compliant with the Oil Storage Regulations. A spill kit will be provided to contain and clean up any spills identified and all maintenance staff will be trained by their supervisors in the actions to take in the event that an oil spill is detected. Anyone using spill kit materials will be required to ensure replacements are ordered to ensure the spill kit inventory is re-stocked. All leaks and spills will be recorded as part of the site incident procedures, subject to follow-up and review to ensure any further actions are instigated as appropriate. Regular inspections will be in place to identify potential for deterioration or damage. Procedures will be put into place to ensure that damaged or leaking plant will be dealt with as soon as possible. This will be managed by the O&M contractor carrying out the inspection. The operational part of the site will be laid to hardstanding and therefore the opportunity for direct contact to land is minimal.	Very Low – due to the low quantities of oil involved in the process, the likelihood of spillages is very low.	Low – based on the low quantities available for release.	Low
Fire causing emissions to air	Air	Direct release of combustion gases to air	Fire protection systems will be in place. This will include smoke detectors and gas / electricity isolation. Further fire management procedures will be set out in the AMP. There will be an automatic link between fire detection systems on site and the control centre. In the event of a fire, a local engineer will be alerted, will respond directly and will then call the local fire and rescue service (FRS) to attend if necessary. Fire procedures will be kept onsite within the site office and	Low	Low - Medium	Low

			copies will also be provided to the FRS and maintenance contractor, as well as centralised copies being kept at the remote control centre.			
Fire causing emissions to water	Belasis Beck; attenuation ponds	Surface water drainage system	It is unlikely that firefighting using water/foam would be used to tackle a fire at the GFGF. Should a fire occur in one of the engines then the likely approach would be to stop the gas feed and allow the fire to burn out residual fuel. There are also no fire hydrants in proximity to the site. The only potential for firewater/foam would be from supplies on the fire engine, which if used would collect within the site drainage system and discharge into the attenuation ponds which are fitted with a pen stock valve to enable releases into Belasis Beck to be prevented.	Low	Medium	Low
Failure of combustion control system	Air	Stack	The combustion control system will link to automatic alarm systems in the control room to alert the remote operators and enable appropriate action to be taken to prevent a system failure, where possible, or to trigger a safe plant shutdown. Operational staff (including contractors) will be trained in the actions to take in the event of control system alarms being triggered.	Low	Low	Low
Vandalism	Air/water/land	Various	A 3m security fence will be in place around the facility complex shared with the Saltholme North GFGF. CCTV surveillance (including infrared CCTV) shall be provided to monitor the perimeter fence for intruders and also to provide coverage within the main plant areas. The CCTV system will feed back to the remote control centre and the on-site office. An intruder alarm system is in place which if triggered alerts the remote control centre and the Security Contractor.	Low	Low to Medium - depending on nature of the event.	Low
Flooding	Buildings and structures on site; neighbouring land	Surface water drainage system; local surface watercourses	Flood risk has been addressed in a Flood Risk Assessment, which was prepared to support the planning application and concluded that there is a low risk of flooding from all sources. Emergency procedures will be developed within the Accident Management Plan and will describe actions to take should a flood event occur.	Low	Low	Low

3 EMISSIONS TO AIR

3.1.1 This section provides the relevant screening assessments of point source emissions to air that could arise from operation of the GFGF. The assessment has been completed in accordance with the EA's Risk Assessments for your environmental permit [1].

3.1.2 The scope of the assessment has covered the following aspects:

- Release point characteristics;
- Air emissions inventory and mass flows;
- Emissions screening for further assessment;
- Photochemical Ozone Creation Potential (POCP).

3.1.3 Air emissions screening using the H1 software has identified a subset of emissions whose significance warrants further modelling. The results of that modelling for these and a range of other emissions are presented in the air quality report in Appendix C to the supporting information document.

3.2 Emissions release point

3.2.1 Point-source emissions to air from the proposed facility will be from a four 15 m stack, at an efflux velocity of 23.6 m/s, and a normalised volumetric flow rate of 67,356 m^3/hr.

3.2.2 The H1 screening assessment has considered long term emissions of NOx at the guaranteed emission level of 20 mg/Nm^3 as a result of using SCR. As a conservative basis short term peak emissions have been assessed at 30mg/Nm^3.

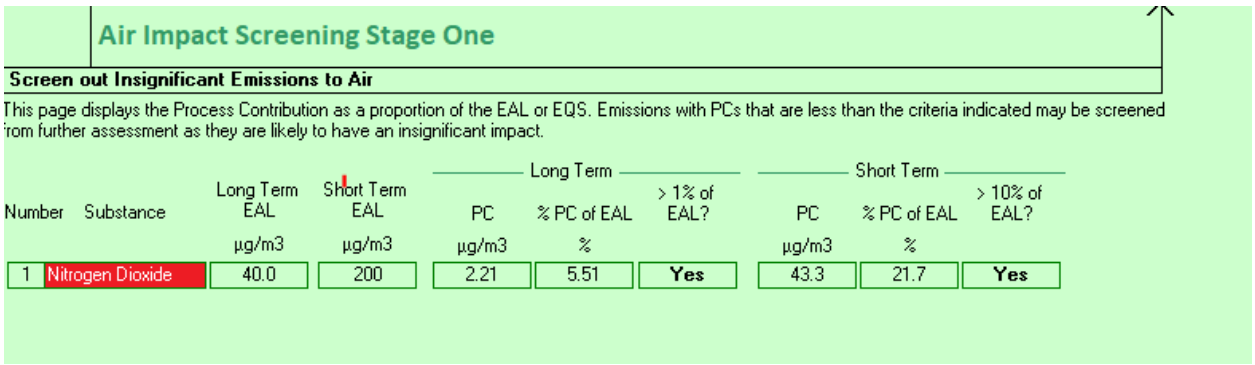
3.3 Emissions screening

3.3.1 Estimated emissions have been screened for significance against appropriate environmental standards for long-term and short-term exposure. Emissions standards are based on statutory air quality limits where available, and upon human health protection Environmental Assessment Levels (EALs) as given in H1 guidance.

3.3.2 Modelled concentrations have been included based on the data presented in the Air Quality Assessment (Appendix C).

3.3.3 Process contributions (PCs) have been calculated using atmospheric dispersion modelling, details of which are given in Appendix C. Emissions which are lower than 1% of the relevant emissions standard for long-term exposure and lower than 10% of the relevant limit for short-term exposure are screened out as insignificant. Figure 3-1 below shows the emissions screening.

Figure 3-1 Air Impact Screening Stage One



Air Impact Screening Stage One

Screen out Insignificant Emissions to Air

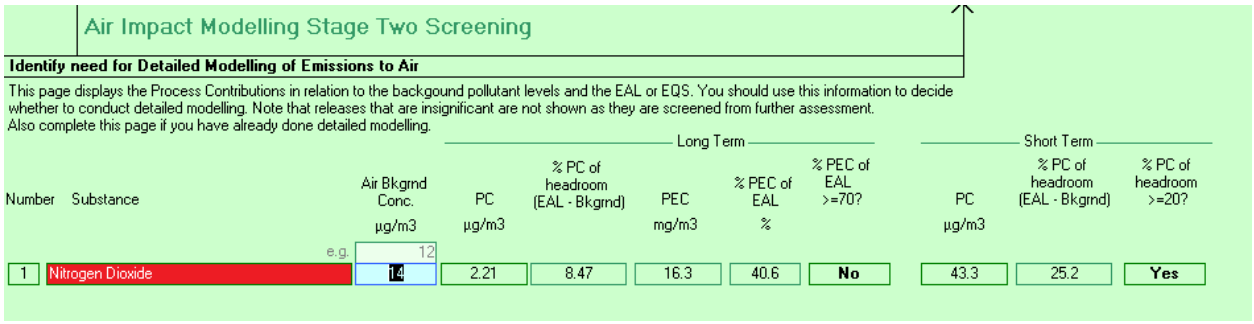
This page displays the Process Contribution as a proportion of the EAL or EQS. Emissions with PCs that are less than the criteria indicated may be screened from further assessment as they are likely to have an insignificant impact.

Number	Substance	Long Term EAL	Short Term EAL	Long Term PC	Long Term % PC of EAL	Long Term > 1% of EAL?	Short Term PC	Short Term % PC of EAL	Short Term > 10% of EAL?
		µg/m3	µg/m3	µg/m3	%		µg/m3	%	
1	Nitrogen Dioxide	40.0	200	2.21	5.51	Yes	43.3	21.7	Yes

3.3.4 A second stage of screening assesses the predicted environmental concentration (PEC) against emissions limits. Assumed background concentrations are taken from the air quality modelling,

details of which are given in Appendix C. PECs which are lower than 70% of the relevant long-term emissions standard and lower than 20% of the relevant short-term standard minus 2 * the background concentration are screened out as insignificant, as shown in Figure 3-2 below. Those not screened out as insignificant are recommended for further detailed assessment.

Figure 3-2 Air Impact Screening Stage Two



Air Impact Modelling Stage Two Screening

Identify need for Detailed Modelling of Emissions to Air

This page displays the Process Contributions in relation to the backgound pollutant levels and the EAL or EQS. You should use this information to decide whether to conduct detailed modelling. Note that releases that are insignificant are not shown as they are screened from further assessment. Also complete this page if you have already done detailed modelling.

			Long Term						Short Term		
Number	Substance	Air Bkgrnd Conc. µg/m3	PC µg/m3	% PC of headroom (EAL - Bkgrnd)	PEC mg/m3	% PEC of EAL %	% PEC of EAL >=70?	PC µg/m3	% PC of headroom (EAL - Bkgrnd)	% PC of headroom >=20?
	e.g.	12								
1	Nitrogen Dioxide	14	2.21	8.47	16.3	40.6	No	43.3	25.2	Yes

3.4 Photochemical ozone creation potential

3.4.1 The photochemical ozone creation potential (POCP) has been calculated in accordance with the H1 guidance[2]. NO_2 emissions from the installation contribute to photochemical ozone creation. The NO_x release rate and associated POCP are shown within Table 3-1.

Table 3-1 Photochemical ozone creation potential

Substance	Annual rate tonne/yr	POCP value per tonne	POCP
Nitrogen Dioxide – from all 4 GFGF stacks (emission point A1-A4)	31.6	2.8	88.44
Total			**88.44**

3.4.2 The facility will be controlled to ensure that IED limits for NO_2 are met; section 6 of the supporting information document details the proposed measures for preventing and minimising the release of this POCP pollutant and concludes that the proposed measures are BAT.

[2] Environment Agency, H1 Annex F: air emissions [withdrawn] https://www.gov.uk/government/publications/h1-annex-f-air-emissions

4 GLOBAL WARMING POTENTIAL

4.1.1 The global warming potential (GWP) has been calculated assuming that all installed plant is operating at capacity for all permitted hours i.e. all 4 gas engines operate for 3,500 hours. The default CO_2 factors used within the H1 software have been applied. The total GWP score calculated on this basis is presented in Table 4-1 below.

Table 4-1 Global warming potential

Source	Release pathway	Amount per annum (MWh/yr)	GWP value per tonne of GHG	Annual GWP
Natural Gas usage from GFGF	Combustion	367,500	1	69,825
Total				**69,825**

4.1.2 The GWP presented represents the effect from gas burned within the engines. It should be noted that energy will be required for non-running times and for start-up and shut-down, but this consumption is likely to be very small

CONCLUSIONS

4.1.3 The following hazards from the operation of the proposed GFGF have been assessed:

- odour;
- noise and vibration;
- fugitive emissions;
- visible plumes; and
- accidents.

4.1.4 The assessment has concluded that the overall risks associated with the identified hazards, including the proposed management measures are negligible to low.

4.1.5 Detailed assessments of potential noise effects and flood risk have been carried out. The Noise Assessment (provided as Appendix D to this application) concluded that 'noise from the proposed development will be mitigated through the application of best available techniques, such that it does not cause a significant adverse impact'. The Flood Risk Assessment concluded that the proposed development 'is at low risk of flooding from all sources.

4.1.6 The H1 risk assessment software tool has been used to support this Environmental Risk Assessment. The completed H1 software can be found within the Appendix 1 to this Environmental Risk Assessment.

4.1.7 Stack emissions to air for relevant air pollutants have been subject to detailed modelling and it has been concluded that the proposed development will not result in significant adverse impact to human or ecological receptors.

4.1.8 The POCP for the facility is calculated as 88.44. The use of BAT minimises the POCP from the facility.

4.1.9 The total GWP score of 69,825 represents the effect from gas burned within the engines. It should be noted that energy will be required for non-running times and for start-up and shutdown but this consumption is likely to be very small.

APPENDICES

Appendix A

H1 Tool