Thurrock Flexible Generation Plant

Preliminary Environmental Information Report
Appendix 2.3: Accident and Emergency Management

Date: September 2018

Environmental Impact Assessment

Preliminary Environmental Information Report

Volume 5

Appendix 2.3

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Report Number: OXF10872

Version: Final

Date: September 2018

This report is also downloadable from the Thurrock Flexible Generation Plant website at:
http://www.thurrockpower.co.uk

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Summary

This document considers the potential for accidents and emergencies to occur during construction and operation of the Thurrock Flexible Generation Plant, identifies measures to control such risks (and consequent effects) and indicates where any remaining risks are considered within this Preliminary Environmental Information Report (PEIR).

Qualifications

This document has been prepared by Mark Barrett BSc (Hons), MSc, an Associate with 16 years' experience in environmental impact assessment.

It has been checked by Tom Dearing, a Chartered Environmentalist and full Member of the Institute of Environmental Management and Assessment, who has eight years' experience of environmental impact assessment.

1. Overview and Purpose

1.1.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, as amended, require consideration of:

"the risk of major accidents and/or disasters relevant to the development concerned, including those caused by climate change, in accordance with scientific knowledge" (Schedule 4, Part 1(f).

1.1.2 In addition, Part 8 of Schedule 4 requires:

"A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned"

1.1.3 This report forms Appendix 2.3 of the PEIR (Volume 5) and considers the potential accidents and disasters relevant to the proposed Thurrock Flexible Generation Plant. It should be noted that such accidents and disasters, together with any resulting environmental effects, are considered unlikely to occur. Key measures that form part of the design or proposed operating procedure for the proposed development are set out. With such measures in place, most of the identified accidents and disasters are considered sufficiently unlikely that no further consideration is required. In some cases, potential environmental effects have been identified. Where this is the case, this report indicates where such effects have been assessed within Volume 3 of the PEIR.

2. Risk and Resilience

2.1 Introduction

2.1.1 Good sustainable design proactively considers resilience requiring the integration of hazard identification, risk evaluation and risk management into the design process. Resilience measures could include flood mitigation and climate change adaptation or resilient products and management procedures, ensuring business continuity.

2.1.2 As set out above, the EIA Regulations require that an assessment must identify, describe and assess expected significant effects arising from the vulnerability of the proposed development to major accidents or disasters. Vulnerability of the development to potential hazards introduced by the location should be covered as well as risks that are an inherent characteristic of the development.

2.1.3 This may be seen as a departure from the standard approach to Environmental Impact Assessment (EIA), which generally focuses on assessing the 'likely significant effects' because by definition disaster will be a low-likelihood event.

2.1.4 Furthermore, if risk is sufficiently significant to justify assessment, it is likely to have a major consequence and is therefore covered by specific legislation e.g. regulations on the control of major accident hazards or regulations on the secondary containment of pollutants such as the oil storage regulations.

2.2 Approach

2.2.1 The objective of this report is to establish whether the proposed development increases risks to existing receptors or increases the sensitivity of those receptors, for example, by introducing new links/pathways between a possible hazard and a receptor.

2.2.2 The main task therefore has been to assemble a list of potential risks and the receptors that could be affected. Consideration of how geographical extent, duration, sensitivity and severity affects the risks posed by accidents and disasters has been taken into consideration when determining the likelihood of a pathway between them being realised.

2.2.3 The Civil and Contingencies Act 2004 defines an emergency as "*an event or situation which threatens serious damage to human welfare, environment or security in a place in the UK*". Every two years the UK Government produces an assessment of the risks facing people in the UK (National Risk Register of Civil Emergencies) which can be used as a starting point for relevant local risks.

2.2.4 The proposed development lifespan (35 years) has also been applied to the risk assessment when considering likelihood, for example the probability of flooding and effects of climate change over that period.

2.2.5 Risks may differ during the construction, operational (including maintenance) and decommissioning phases of the proposed development. For example, unintentional excavation of a cable or pipeline is more likely during construction or decommissioning.

3. Risk Assessment

3.1.1 The proposed development is not in itself considered to be a major accident hazard and does not require a quantitative risk assessment. The site will require an environmental permit and an accident management plan based on a qualitative risk assessment. The qualitative risk assessment has to consider the following in relation to each hazardous event identified:

- nature and quantity of substance released;
- pathways and receptors involved;
- probability of exposure; and
- environmental consequence(s) of the event

3.1.2 The overall risk and its significance to the environment will be a function of the control and mitigation measures in place to reduce the risk. The potential risks associated with the proposed development are listed in Table 3.1 below.

3.1.3 All of the risks/events identified are considered to be of low or very low likelihood and/or have specific legislation controlling them. Some events could result from a combination of low/very low likelihood events or multiple failures acting to cause a disaster. For example, a very low likelihood breach of the tidal flood defences during a low likelihood extreme flood event.

3.1.4 The final column of the table expresses the measures proposed to either reduce the likelihood of occurrence or increase resilience. Those measures will be taken forward into a Management Plan required as part of the Environmental Permit.

3.1.5 The key site vulnerabilities arising from the risk assessment are releases of pollutants (loss of containment), tidal flooding and fire/explosion. Flood risk is dealt with within the main text of the PEIR at Volume 3, Chapter 15: Hydrology and Flood Risk. In addition, all topic chapters in Volume 3 (Chapters 6 to 16) consider potential changes to baseline conditions as a result of future climate change, while overall effects of the proposed development on climate change are considered within Volume 3, Chapter 14: Climate Change.

3.1.6 The remainder of this section therefore assesses the vulnerability of the site to a major accident involving fire/explosion and/or a loss of material containment. Releases to air and water could result from either scenario or as a consequence of both acting together i.e. during fire suppression.

3.2 Mitigation by Design

3.2.1 Gas engines will be housed in engine halls. Engine halls will be fitted with fire fighting equipment in line with UK legislation, and engine halls will be fire rated. All fire alarms will be remote monitored to alert emergency services as appropriate. Gas systems will be equipped with slam shut and isolation valves, and gas detection will be included in all engine halls. Engine halls will be positioned so as to be thermally separated from transformers.

3.2.2 Battery storage systems will be laid out in either containers or purpose built enclosures. The individual enclosures or containers will be thermally separated from the switching / control systems. Each enclosure or container will be equipped with a number of levels of fire safety, including over temperature detection so that systems are shut down before battery temperatures exceed design limits, fire detection, fire suppression, fire rated enclosures or containers and remote monitoring.

3.2.3 Oil and other potentially polluting materials will be stored in bunded containment areas with at least 110% capacity of the material contents. Drainage systems are designed to be capable of shutting off discrete areas to prevent uncontrolled discharge of pollutants.

3.3 Risk Management

3.3.1 The operational site will have a management system to deal with potential accidents that may pose a risk of environmental pollution including fires and loss of material containment. The Management System will include plans dealing with:

- roles and responsibilities/lines of communication;
- competence and training;
- operating and maintenance procedures;
- incident investigation and reporting;
- emergency response; and
- auditing.

Roles and responsibilities

3.3.2 The operator would have clearly defined management structure with defined responsibilities assigned to roles, as set out in an Environmental Management System (EMS).

3.3.3 Procedures will be put in place which document responsibilities for accident prevention measures, i.e. plant operating procedures, maintenance procedures, monitoring and auditing as well as clearly defined responsibilities for accident management, incident reporting and follow-up and communication lines in the event of an incident.

Competence and training

3.3.4 The operator will be responsible for providing induction training for subcontractors for both health and safety and environmental training.

3.3.5 The environmental induction training will ensure that personnel, including third party contractors, have an awareness and understanding of:

- environmental policy and local objectives and targets;
- the requirements of the EMS and environmental permit;
- operational control in accordance with work station procedures;
- emergency procedures; and
- accident and incident reporting.

3.3.6 Staff and contractors will be required to be aware of and trained in the procedures outlined within the Emergency Response Plan so that they are able to:

- identify an accident;
- know what to do and who to contact;
- locate plans for emergency equipment;
- identify and implement operational contingencies;
- be aware of the procedure to close or isolate part of the facility;
- adequately document and assess the response; and
- implement a programme of inspection, maintenance and monitoring.

Operating and maintenance procedures

3.3.7 Management systems will be put in place to ensure that those operations which have the potential to give rise to significant environmental effects are controlled. These systems will not only cover normal running but will also address abnormal operation and start-up and shutdown of the plant.

3.3.8 The facility is expected to be operated by remote instruction. The maintenance contractors are required to ensure that all plant and equipment within the scope of their contract is appropriately maintained at all times, irrespective of whether it is operating. The maintenance contractors will be required to provide 24 hour, 7 days per week maintenance support cover.

3.3.9 The Operator will ensure that the maintenance contractor provides maintenance routines to ensure all key plant components which have the potential to affect the environmental performance of the facility remain in good working order. Maintenance routines will draw on manufacturer's recommendations, modified as appropriate by operational experience during the lifetime of the plant.

Incident investigation and reporting

3.3.10 A procedure will be put in place to document the process for incident investigation and reporting.

3.3.11 The scope of the incident investigation and reporting procedure includes all incidents with the potential to cause damage to the environment including near miss events and environmental complaints.

3.3.12 The incident investigation and reporting procedure will include the requirement to review the Emergency Response Plan as part of the follow-up actions where appropriate and where required that this is completed as soon as practicable after the event.

Emergency response

3.3.13 The Operator will put in place an emergency response procedure.

Auditing

3.3.14 An audit schedule will be established annually to monitor implementation of the above procedures. Audits will then be carried out in accordance with the agreed schedule and the outcome of audits is documented and communicated in accordance with the site audit procedure.

Operational Controls

3.3.15 The Management System and individual plans will be developed by the operator post consent to deal with fire/explosion risks. The Emergency Response Plan will include the following measures:

- physical control measures such as those identified above an including as a minimum:
  - plant isolation;
  - material containment;
  - fire prevention and control equipment; and
  - site security.

- Management measures such as:
    - plant condition monitoring systems;
    - automatic fail safe shutdown capabilities; and
    - automatic fire detection and suppression.

3.3.16 Taking the above measures into account, the residual risk of a major accident comprising an uncontrolled fire resulting from multiple system failures is very low.

Table 3.1: Preliminary Risk Identification

Risk Type	Risk Descriptor	Relevant considerations	Resilience Measures
Characteristics of the location – natural hazards	• Tidal flooding • Storm events • Temperature extremes	The site is protected by tidal flood defences to a standard of 1 in a 1000 yrs. If the defences were breached (rather than overtopped), the site would flood to a depth of 1m (effects on flood risk, water quality, people). Storm events could bring strong winds, coastal surges, snow loading on the overhead line, etc Very hot or very cold temperatures could impair the ability of the equipment to operate efficiently – particularly the batteries.	Flood risk is assessed at Volume 3, Chapter 15: Hydrology and Flood Risk. The proposed development will include a drainage strategy to meet current planning requirements (which require control of runoff rates, allowing for future climate change). Emergency procedures will be developed within the Emergency Response Plan and will describe actions to take should a flood event occur. Operation of temperature-sensitive equipment will be monitored and controlled remotely and can be shut down if that were required.
Characteristics of the location – manmade hazards	• Pylon topple • Conductor drop • Gas pipeline failure • Underground cable failure • Transport • Landfill sites	Gas supply will be fed from a high-pressure gas transmission pipeline. The proposed development is located in close proximity to both 5 feeder (Hordon/Tilbury Thomas North) and 18 feeder (Stapleford/Tilbury Thomas North). Construction work and the permanent infrastructure will therefore be within the consultation zone. Overhead line pylons could be toppled by an extreme event such as an explosion. Overhead line conductors could drop in extreme circumstances. An exhaust stack could topple towards overhead line conductors in an extreme event. Underground services such as gas mains and electricity cables could be damaged by excavation. Potential for accidents as a result of transport during construction or operation. Potential for construction to affect existing historic landfill sites, resulting in release of contaminants.	Infrastructure will not be placed directly underneath overhead line conductors. Strict management procedures will be in place to identify and protect underground services prior to construction. All temporary access routes and junctions with the existing highway network to be agreed with the local highway authority prior to construction commencing. No works to be undertaken near the railway (including crane works) without suitable approvals, including an asset protection agreement in place with Network Rail. The design of the internal roads, junctions with the existing highway network and any improvements to the highway network would be in accordance with standards and dimensions agreed with the local highways authority. Any new junctions would be subject to road safety audits to ensure that the design is suitable. In addition, the design will allow access for fire services in accordance with the Essex Act 1987. Effects in relation to safety in relation to transport are considered in Volume 3, Chapter 10: Traffic and Transport. Final routing of gas pipeline to take into account identified historic landfill sites in the area. Environment Agency to be consulted to ensure that details of all relevant sites are identified, with suitable measures in place to ensure that such sites are not disturbed/contaminants are not released.
Intentional threats	• Cyber security • Physical security (vandalism)	A deliberate attack on the UK grid transmission infrastructure could be physical or through the internet.	Cyber security will be managed through proven, industry standard methods, with a control system certified to ISO27001, the global information security management standard. The control system will also include two factor authentication to access the site. The site will be protected with a security fence. 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. An intruder alarm system will be put in place which if triggered alerts the security control centre.
Accidental threats	• Construction safety • Operator error	Potential effects on construction personnel or public using surrounding areas during construction. Potential effects (variable, depending on nature of error) on systems controlling plant through operator error (e.g. effects on air, water, land).	Construction to be undertaken in accordance with normal construction legislation and good practice. This includes regulation through the health and Safety at Work Act. Risk assessments to be undertaken for all activities. 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. 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 plant.
Characteristics of the infrastructure – gas	• Fire/explosion leading to spread of heat and	Gas engines have a small risk of leakage/fire/explosion (release of combustion gases to air, risks to people).	Fire protection systems will be in place. This will include smoke detectors, gas shutdown valve and fire suppression.

Risk Type	Risk Descriptor	Relevant considerations	Resilience Measures
engines	uncontrolled emissions to air and water • Uncontrolled combustion emissions • Gas leaks (pipeline or gas engines) • Exhaust flue collapse	Suppression of fires in gas engines could pose a risk of emissions to air and water. Combustion systems release exhaust gasses to the atmosphere which must be controlled. Risk of collapse of exhaust flue on to overhead line.	There will be an automatic link between fire detection and suppression systems on site and the control centre. In the event of a fire the local fire and rescue service (FRS) will be alerted and will attend the site. Fire procedures will be kept onsite within the site office and copies will also be provided to the FRS, maintenance contractor as well as centralised copies. In the event of a fire being confirmed by the FRS attending the site, the fire procedures will be followed. The headroom from the top of an exhaust stack to the overhead line will be 1.5 times the height of the stack. The line position is taken to be the worst case sag/swing distance.
Characteristics of the infrastructure – battery storage	• Fire/explosion leading to spread of heat and uncontrolled emissions to air and water • Thermal runaway • Physical damage • Electrical management (loss)	Gas engines have a small risk of leakage/fire/explosion. Suppression of fires in batteries could pose a risk of emissions to air and water.	Battery storage is designed with: • Individual Containment/compartmentation • Thermal Barriers • Spatial Separation • Control system interlocks • Fire detection and protection systems • Separate switching/management systems • Protected control system cables
Characteristics of the infrastructure – material containment	• Oil leaks (transformers, lubricating oil) • Coolant leaks	Lubricating oils and liquid coolants are stored on site, transferred between containers. Pressurised vessels and pipework could leak (leading to effects on water, land). Secondary containment could become overfilled and pollution control drains become blocked. Transformers are filled with oil that could pose a risk to water resources either directly or through firefighting.	All vessels will have secondary containment which has sufficient capacity for all of the oil present. These tanks will be fully bunded and will be subject to routine inspection during routine site maintenance visits. Usage of oils will be minimal. 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. The operational part of the site will be laid to hardstanding and therefore the opportunity for direct contact to land is minimal.

4. Conclusions

4.1.1 This report has identified a range of potential accidents and emergencies relevant to the proposed Thurrock Flexible Generation Plant. As set out above, the proposed development includes suitable measures to reduce the likelihood for each potential occurrence and to avoid or minimise any resulting effect.

4.1.2 During construction, the potential risks identified are typical of any construction project. Such risks are effectively controlled through well-established safety procedures.

4.1.3 The identified operational phase risks would be controlled through the requirement for the proposed development to operate under an Environmental Permit, in addition to a range of legislative controls.

4.1.4 Overall, it is not considered likely that any significant environmental effects would occur as a result of accidents or emergencies as a result of the Thurrock Flexible Generation Plant.

5. References

Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

Planning Inspectorate (2017) Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information, and Environmental Statements

The Planning Inspectorate (2018) Advice Note eleven: Annex G – The Health and Safety Executive