



Thurrock Flexible Generation Plant

**Environmental Statement Volume 1
Non-Technical Summary**

Date: May 2020

Environmental Impact Assessment

Environmental Statement

Volume 1

Non-Technical Summary

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<http://www.thurrockpower.co.uk>

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Summary

This document summarises information in the Environmental Statement using non-technical language for a general audience. It describes the proposed development, the baseline environmental information gathered, the assessment of environmental impacts and the significance of predicted effects. This document also lists the structure of the Environmental Statement, directing readers to where more detailed information can be found.

Qualifications

This document has been prepared by Tom Dearing, a Chartered Environmentalist and full Member of the Institute of Environmental Management and Assessment, who has ten years' experience of environmental impact assessment.

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1. Project Overview

1.1 Introduction to the proposed development

- 1.1.1 Thurrock Power Ltd proposes to build a flexible electricity generation plant on land next to Tilbury Substation in Thurrock, just north of the decommissioned Tilbury Power Station site.
- 1.1.2 The plant would have up to 33 to 48 engines fuelled by natural gas to generate 600 megawatts of electricity, plus batteries that can store surplus energy from the grid and allow the facility to export a further 150 megawatts of electricity to the national grid when needed. The batteries deliver frequency modulation, which provides a stable grid supply and will store energy with a low carbon intensity when there is a surplus of renewable supply and prices are low. Having a number of individual gas engines means the facility is able to start up or vary the amount of electricity it generates more quickly and efficiently than a conventional power station, which complements intermittent renewable energy. This, together with the battery storage, is why it is described as a flexible generation plant.
- 1.1.3 The flexible generation plant would require a new underground gas pipe from the existing gas transmission network near East Tilbury to supply its fuel. To transmit the electricity it generates to the national grid, the facility would be connected directly by underground cable into Tilbury Substation, which is next-door to the south. No new overhead power lines are needed.
- 1.1.4 Two new private road accesses to the facility would be constructed, one from Station Road (just east of the Tilbury Loop railway crossing) and the other around the eastern side of Tilbury Substation, which would then connect to the A1089 via existing roads across the former Tilbury Power Station and Tilbury2 port sites.
- 1.1.5 A causeway on the Thames foreshore downstream of Tilbury2 port would also be constructed. This would be used for docking special 'roll-on, roll-off' barges that would deliver large plant items, such as transformers and the gas engine blocks, instead of transporting these as abnormal loads on the road network. The causeway would be kept and maintained after construction is over in case a gas engine or other very large item were to break down and need replacing.
- 1.1.6 Construction has been assessed for two options: one phase taking one to two years or three phases spread over three to six years. It is then expected to operate for up to 35 years.

- 1.1.7 Flexible generation plants are urgently needed to help balance the intermittent and less predictable generation from wind and solar as the UK reduces the carbon footprint of national electricity supplies. Renewable generators such as wind farms can't be switched on and off at will to meet electricity needs, since they depend on weather conditions. By starting up quickly and also using the batteries, the flexible generation plant will help National Grid respond to peaks in electricity demand, balancing the load and keeping the grid stable.
- 1.1.8 This location has been chosen because Tilbury Substation provides one of the best points of connection to the high-voltage transmission network around London, where there is existing infrastructure with substantial capacity and a need for new generators to supply London due to older power stations closing down, including the recently decommissioned and demolished Tilbury Power Station.
- 1.1.9 Because of its generating capacity, the proposed development is a Nationally Significant Infrastructure Project and Thurrock Power is submitting an application to the Planning Inspectorate for development consent.
- 1.1.10 A more detailed description of the flexible generation plant is given in Section 3 starting on page 5.

1.2 The applicant

- 1.2.1 Thurrock Power is a subsidiary of Statera Energy Limited, a private British company that designs, builds and operates flexible electricity generating plant in the UK.
- 1.2.2 Statera Energy was established with the aim of delivering increased flexibility for the UK electricity system, to assist in the transition to a low carbon economy, in the expectation that renewable energy sources, such as solar and wind, will become the dominant form of generation of the future.
- 1.2.3 Thurrock Power will be a fully integrated developer, owner, and operator of Thurrock Flexible Generation Plant.

1.3 Project timeline

- 1.3.1 The expected timeline for consultation, decision-making and development of Thurrock Flexible Generation Plant is as follows.
- Quarter 2 of 2020 – submission of application with ES to the Planning Inspectorate.
 - Quarter 3 2020 to Quarter 1 2021 – examination of the application by an Inspector or panel of Inspectors.
 - Quarter 2 2021 – determination by the Secretary of State.

- In 2020 – possible advance works not requiring consent to prepare for habitat and common land creation.
- From Q2 2021 – construction commences, potentially in phases lasting between one and six years in total.

1.4 Further information

- 1.4.1 The purpose of this document is to provide a non-technical summary of the Environmental Statement (ES) for the proposed development.
- 1.4.2 At the end of this summary is a contents page for the full ES, which shows where to find more detailed information about particular environmental topics or impacts. A glossary and list of abbreviations is also provided at the end of this summary to explain technical terms used in the full report.
- 1.4.3 All application documents and information published during examination of the application by the Planning Inspectorate will be available on the inspectorate's website at: <https://infrastructure.planninginspectorate.gov.uk/projects/>

2. Purpose of this Environmental Statement

2.1 Purpose

- 2.1.1 The purpose of the Environmental Statement (ES) is to describe the predicted environmental impacts of the proposed development, identifying any significant effects that would result.
- 2.1.2 To do this it explains the proposed development, the surrounding location and the baseline environmental information that has been gathered. It then documents the process of environmental impact assessment (EIA) and presents the findings.
- 2.1.3 In October 2018 a Preliminary Environmental Impact Report (PEIR) was published for consultation. The PEIR showed initial EIA findings. Further assessment work has since been carried out and consultation responses have been considered.
- 2.1.4 The following sub-sections explain the EIA process and the information that can be found in the ES.

2.2 Need for EIA

- 2.2.1 Environmental Impact Assessment (EIA) is a process designed to identify and study the likely significant environmental impacts of a development. EIA is used to inform the public, decision-makers and their advisors about environmental impacts and to recommend measures that avoid, reduce or offset any significant harmful (adverse) effects. It can also recommend measures to maximise any potential beneficial effects or environmental enhancement opportunity. EIA studies the environmental baseline (the existing and future situation without the development) and how this may change if the development were to proceed.
- 2.2.2 'Environment' in this context means both the natural and human world, including natural habitats and species, air, water and land quality, places where people live, roads, footpaths and workplaces. It also includes less tangible elements such as landscape character and cultural heritage.
- 2.2.3 EIA is employed when the nature or scale of a proposed development means that it is considered to have the potential to cause significant environmental effects. The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 govern what types of developments require EIA, the impacts that may need to be studied and the information to be reported.

- 2.2.4 In the case of Thurrock Flexible Generation Plant, formal consultation with the Planning Inspectorate has confirmed that EIA is required. The Planning Inspectorate has given its view on the impacts the EIA should study through a Scoping Opinion published on 20 September 2018, with inputs from its technical advisors and other interested parties.

2.3 Process of EIA

- 2.3.1 EIA is a systematic and evidence-based process with the following main stages:
- gathering information about the baseline (current and future situation without the development) from surveys, existing studies and consultation;
 - predicting how this would be changed by the proposed development (the 'impacts');
 - considering how these changes would affect 'receptors' such as people, protected species or landscapes;
 - assessing the significance of effects, based on the size of impacts and the sensitivity of receptors to the changes;
 - suggesting ways to avoid, reduce or compensate for impacts causing significant adverse effects ('mitigating' the impacts);
 - reporting any remaining ('residual') effects after mitigation; and
 - considering effects from the combination of impacts (e.g. changes in noise and air quality together) and from the proposed development together ('cumulatively') with other developments in the area.
- 2.3.2 The ES talks about 'impacts' and 'effects', making a distinction between these terms. Impacts are changes in the environment caused by some aspect of the proposed development's construction or operation. Effects are the consequences of an impact.
- 2.3.3 For example, construction work will cause noise that isn't currently present on the site, which is an impact. The effect of this noise might be to cause disturbance and annoyance to people in nearby residences, if it were loud enough to be noticeable and intrusive. If this effect were potentially significant, the impact could be mitigated (e.g. by limiting working hours or using an alternative construction technique) to reduce the effect. Impacts and effects can be adverse or beneficial.

2.3.4 The 'significance' of an effect is based on the magnitude of the impact together with the importance and sensitivity of the element of the environment (the 'receptor') that is affected. The size of an impact is described in a range from negligible, low, medium to high, or there may be no change (a neutral impact). Taking into account the importance and sensitivity of the receptor, the resulting effect may be described on the following scale.

- Substantial: only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a severely damaging impact and loss of resource integrity.
- Major: these beneficial or adverse effects are important considerations and are likely to be material in the decision-making process.
- Moderate: these beneficial or adverse effects may be important, but are not likely to be key decision making factors. The cumulative effects of such factors may influence decision making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
- Minor: these beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the development.
- Negligible: no effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

2.3.5 EIA studies and the evaluation of the significance of effects are carried out using professional guidance or standards, and with regard to legislation protecting specific elements of the environment, but also rely upon the professional judgement of the topic expert who has undertaken the assessment.

2.3.6 The EIA studies are based upon the development design as specified in Chapter 2 of Volume 2 of the ES and use up-to-date baseline information gathered from published sources and surveys undertaken specifically for the project. Where there is uncertainty in the assessments, which is inherent to some degree when predicting future impacts and effects, the EIA takes a conservative approach and uses 'worst-case' assumptions, erring on the side of caution with regard to adverse impacts.

2.3.7 At this stage of the project, some aspects of design are ongoing and Thurrock Power may also need to retain flexibility in the development consent on some matters. For example, the number and size of gas engines and batteries will depend on the technology provider and equipment models selected, without exceeding the total electricity generation and storage capacity applied for. Flexibility to make final

decisions on the most practical gas pipeline and access road routes within the corridors of land identified for them is also needed.

2.3.8 For that reason, where flexibility is needed, maximum parameters have been defined for the assessment that would not be exceeded in the development's final design. This is referred to as a design envelope in the ES, and can include both physical dimensions of the development and the nature of construction and operational activities. Assessing the design envelope ensures the EIA has studied the reasonable maximum potential for impacts from these aspects of the development.

2.3.9 The EIA studies also consider potential cumulative effects that may result from the combination of impacts from the proposed development and other major developments that are proposed or have consent but have not yet been constructed. This may involve assessing the combined impact of the proposed development and other developments together (e.g. additional traffic from multiple developments on local roads) or may involve assessing impacts on new receptors introduced by other developments (e.g. new residential areas). It also considers inter-related effects, which are those where several different types of impact could combine to have a more significant effect on a particular receptor than when considered individually.

2.3.10 EIA is carried out at an early stage in the design of a proposed development alongside consultation with the public and other stakeholders. In this way it can influence the design and respond to concerns about environmental impacts that are raised during consultation. Mitigation and enhancement measures can be included in the proposed development design, with the goal of ensuring that (a) significant adverse environmental effects are avoided and (b) advantage is taken of opportunities for beneficial effects.

3. The Proposed Development

3.1 Site location and setting

- 3.1.1 The flexible generation plant would be built on land in Thurrock immediately north of Tilbury Substation and the decommissioned Tilbury Power Station, south of the London, Tilbury and Southend Railway. It would be around 0.75 km east of Tilbury and 1.1 km north of the Thames.
- 3.1.2 The main development site for the flexible generation plant, shown in Figure 3.1 and Figure 3.2, is currently open fields crossed by steel pylons carrying three high-voltage overhead power lines and is around 20 hectares (ha) in size. Ten hectares of the site in the south is registered common land called Walton Common.
- 3.1.3 Figure 3.3 and Figure 3.4, overleaf, show the development location and application boundary. Figure 3.5 shows further illustrative detail of the potential layout of the flexible generation plant main development site.
- 3.1.4 In addition to the main development site for the flexible generation plant, further land would be required for its underground gas connection, road access routes, causeway, habitat creation and exchange Common Land. This is also shown in Figure 3.3, with broad zones shown in some cases to allow flexibility for the final route of the gas pipeline or access roads to be decided within those zones.



Note: boundary of the main flexible generation plant site (red dashed line) shown is approximate only

Figure 3.2: Main development site baseline photograph – looking south towards Tilbury Substation

- 3.1.5 The eastern edge of Tilbury is approximately 750 m west of the main development site, the village of West Tilbury is approximately 1 km to the north and East Tilbury village is approximately 2 km to the east. There is a small number of houses outside these settlements within around 600–800 metres of the main development site.
- 3.1.6 The site setting is a mixture of agricultural land with small settlements and light industry to the north and east, crossed by the railway line, but more heavily developed with the power station site, associated overhead power lines, Port of Tilbury and town of Tilbury to the south and west. The landscape is generally flat, with fields typically separated by drainage ditches.
- 3.1.7 Tilbury Fort, a Scheduled Monument, is between the power station and Port of Tilbury just under 1 km south-west of the main development site. Approximately 2.4 km to the west is the Thames Estuary and Marshes site designated for ecological protection and Coalhouse Fort, also a Scheduled Monument.
- 3.1.8 Substantial other development is envisaged in the area, with the consented extension of the Port of Tilbury to the west (the ‘Tilbury2 development’) and proposed Lower Thames Crossing major highway scheme to the east and north, among other proposals. Tilbury2 and the Lower Thames Crossing are also Nationally Significant Infrastructure Projects.



Figure 3.1: Main development site baseline photograph – looking north from Tilbury Substation.

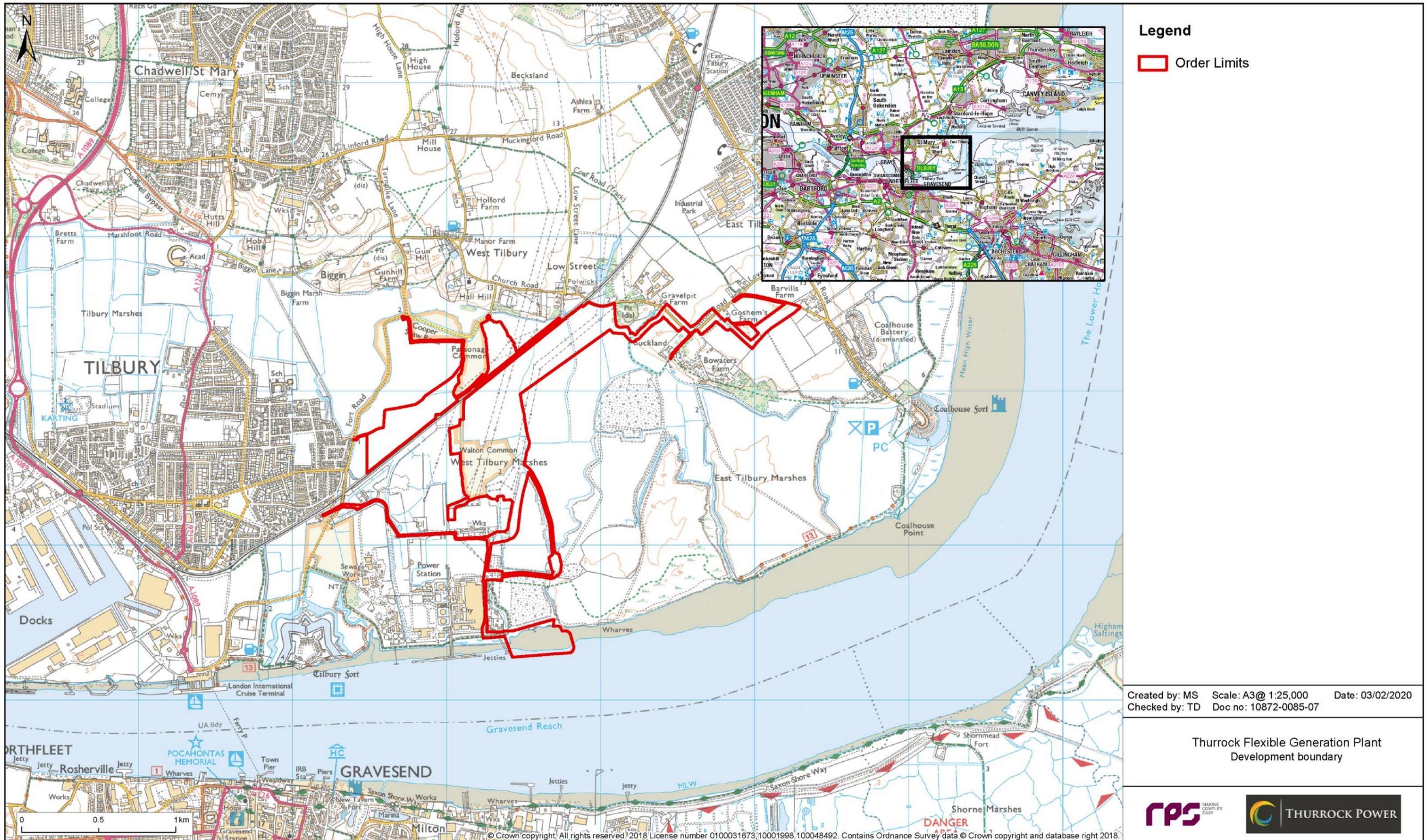


Figure 3.3: Development site location

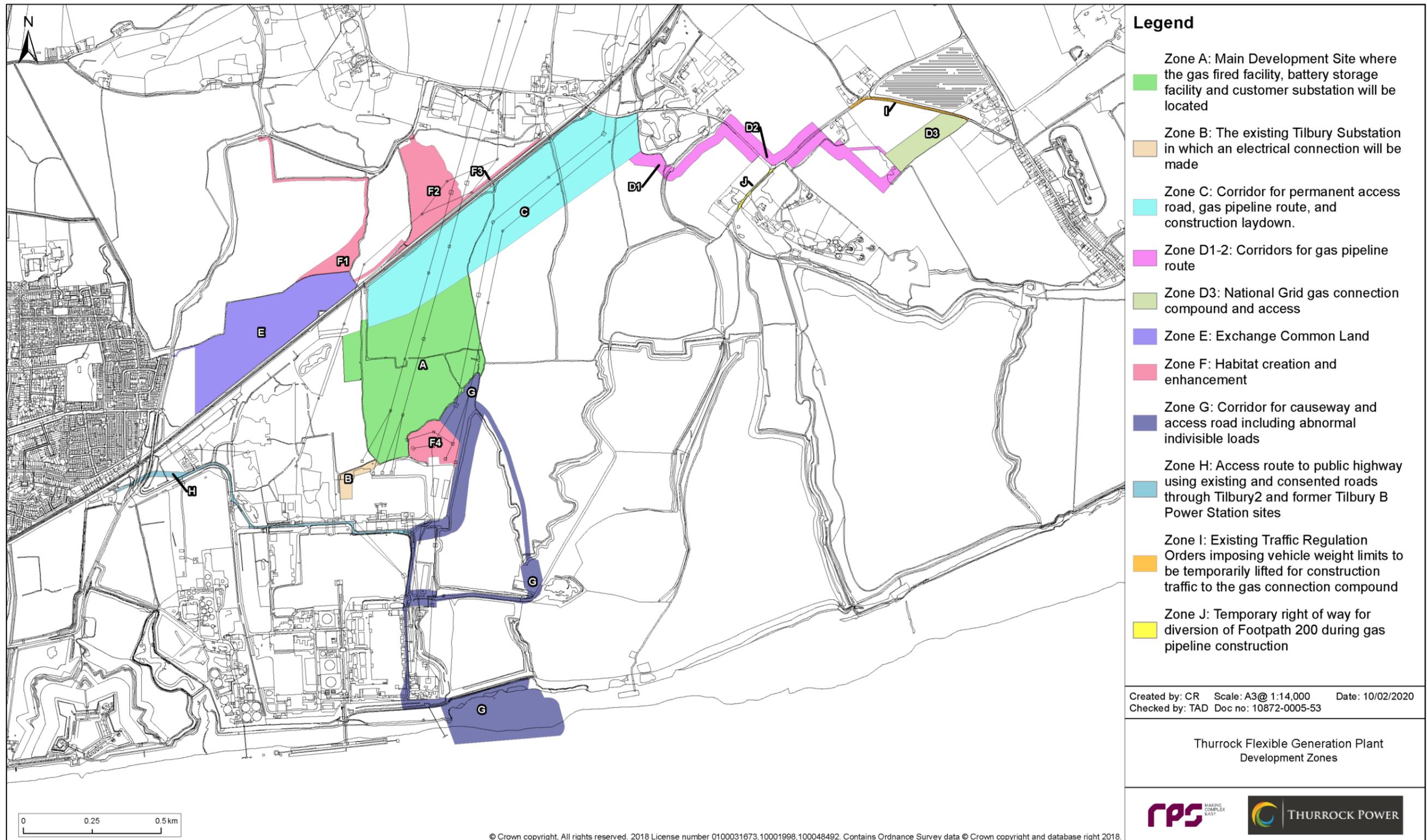


Figure 3.4: Main elements of the proposed development



Figure 3.5: Main development site layout (illustrative)

3.2 The main development site

- 3.2.1 The flexible generation plant would be built on the main development site, labelled 'Zone A' on Figure 3.4, with one possible layout shown on Figure 3.5.
- 3.2.2 On the eastern side of the main development site would be up to 48 gas engines, each of which is a generating unit with the engine, electrical generator, cooling system and exhaust pipe. If a larger engine model is chosen, there will be fewer engines to generate the 600 megawatts of power, but no more than 48 in total. The engines will be housed inside buildings or structures up to 20 metres high.
- 3.2.3 Each engine would have an individual exhaust pipe (an exhaust 'stack'), but these may be grouped together into several clusters of two to six exhausts. The maximum height of the stacks, whether individually or in groups, would be 40 metres. The final height will be determined via an Environmental Permit application to the Environment Agency, which will regulate the plant during its operation.
- 3.2.4 These fast-starting engines would not run continuously, instead starting up when there is electricity network demand for some or all of them to do so. This can be for short periods several times a day. The gas engines will help to balance the existing renewable generators on the national grid and also help support the UK's transition to an electricity supply with an even greater use of wind and solar generation. During times of low renewable electricity generation (due to weather conditions) or high demand, the gas engine generators can quickly support the grid to ensure electricity supplies are maintained, being able to reach full power in less than five minutes and are more efficient in providing flexible generation than conventional power stations. The maximum running time of the gas engines each year would be up to 4,000 hours (i.e. less than half the year in total).
- 3.2.5 The battery storage system on the western side of the site would have units that, like the gas engines, are self-contained systems each with battery cells, cooling and an inverter to convert the power output into alternating current used on the electricity grid. The battery systems would be either housed in a building or in units that look similar to shipping containers stacked two high, in either case up to 10 metres tall.
- 3.2.6 Battery technology, which can import or export large amounts of electricity with no time lag, helps National Grid balance loads on the electricity grid and maintain the frequency of 50 Hz required for safe network operation. The batteries can also store spare renewable electricity generated during times of low demand (such as at night) for use later when demand is high. The batteries would be able to store four hours' worth of power at their rated output of 150 megawatts.

- 3.2.7 In the southern part of the site there would be electrical switchgear used to step-up the voltage of electricity from the batteries and gas engines to match that of the grid connection and relay it to Tilbury Substation. This electrical equipment would look similar to the existing substation that is immediately to the south. The short connection between them would use underground cables.
- 3.2.8 Also on the main development site would be internal access roads, car parking, a control room, and a drainage system with ponds to hold runoff during heavy rain.
- 3.2.9 An area of land is reserved within the main development site for carbon capture readiness. This means that there is space available in future on the site if infrastructure for capturing and storing carbon dioxide is developed in the UK and that becomes a feasible (or required) option for the flexible generation plant. However, such infrastructure does not yet exist and carbon capture does not form part of the current development design. Thurrock Power will keep this and other options for reducing the carbon intensity of power generation under review.
- 3.2.10 The flexible generation plant would require an Environmental Permit to operate, which is regulated by the Environment Agency. The permit will specify monitoring and reporting of emissions that must be carried out and will require Thurrock Power to use a formal Environmental Management System for the facility.

3.3 Access, gas pipeline and exchange Common Land

- 3.3.1 The other areas of land within the application boundary, shown in Figure 3.4, would be needed for building the underground gas pipe, access roads, a causeway for barge deliveries of large plant items, and providing new Common Land and ecological habitat to compensate for the areas lost on the main development site.
- 3.3.2 The different areas of land have been labelled as zones A to J so they can be described. Zones A and B are the main development site and electricity cable connection to Tilbury Substation, which have been described above.
- 3.3.3 A permanent access road would be built south of the railway between Station Road and the flexible generation plant. This would be through Zone C. The zone is shown wider than needed for the road to allow for final design of the route around pylons and across ditches in those fields.
- 3.3.4 The first section of underground gas pipe would also be constructed through the fields in Zone C and Zone D. It will cross under Station Road in two places and then connect to the existing high-pressure gas main near East Tilbury.

- 3.3.5 For the gas connection to the existing high-pressure main in Zone D, a fenced compound approximately 50 metres square would be built with access for vehicles off Station Road. This compound would have instrument kiosks, pressure valves and pipe inspection equipment, no more than 5 metres high. The section of Station Road here is subject to a 7.5t vehicle weight restriction, which would be temporarily lifted for access during construction: this is shown as Zone I.
- 3.3.6 In Zone E, an agricultural field north of the railway line, new Common Land would be provided in exchange for the loss of Walton Common. This new Common Land would be next to Parsonage Common, allowing for access through to it from Cooper Shaw Road without crossing the railway. A permissive path from Fort Road near the edge of Tilbury would also be provided for access into the new Common Land.
- 3.3.7 Further areas of agricultural fields north of the railway and an area of degraded grassland adjacent to the main development site, labelled as Zones F1-4, would be used for habitat enhancement. This would be designed to improve biodiversity, provide connections to existing habitats and allow protected species such as reptiles to be moved from the main development site. Existing farm accesses off Cooper Shaw Road and across the south of Parsonage Common would be used when creating and maintaining the habitat areas north of the railway.
- 3.3.8 A causeway would be constructed on the Thames foreshore downstream of Tilbury2 port, which would be used for docking special 'roll-on, roll-off' barges that would deliver large plant items, such as transformers and the gas engine blocks, instead of transporting these as abnormal loads on the road network. The causeway would be kept after construction is over in case a gas engine or other very large item were to break down and need replacing.
- 3.3.9 Zone G shows the causeway area and two route options for a road northwards to the flexible generation plant main development site. For the first leg, vehicles transporting loads delivered via the causeway would use the existing road on the former Tilbury B Power Station site, which is still in place following demolition of the power station. After that, a new section of road will be constructed either along the eastern edge of Tilbury Substation or further east in the next field. Only one of these options will be used, but both are being kept open at this stage due to ongoing land-raising operations in the area which affect the choice of route.
- 3.3.10 Zone H shows the primary access route for other construction traffic. This route uses the road through the Tilbury2 port to an extension to the A1089 that is being constructed for Tilbury2, providing a direct connection to the trunk road network. This will also remain as an access route, together with the road in Zone C, during operation.

- 3.3.11 Zone J shows the route of a potential temporary diversion of 'Footpath 200' (between Coalhouse Fort and Station Road), which may be required for a short period while the gas pipeline is being constructed since its route crosses the footpath near Station Road.

3.4 Construction

- 3.4.1 If development consent is granted for the flexible generation plant, construction work could start in 2021, subject to a final investment decision. The whole of the flexible generation plant could be built in one phase, which is expected to take one to two years. In that case, the expected programme would be as follows.
- Q2-Q3 2021: main development site preparation and ground works, construction of causeway and construction access roads, start of gas pipeline trenching;
 - Q4 2021: construction/installation of gas engines, batteries and associated equipment; connection of gas supply pipeline and electricity export cables;
 - Q4 2021 – Q1 2022: commissioning and energisation; completion of landscaping and permanent access road; and
 - end of Q1 2022: facility is available for operation.
- 3.4.2 Alternatively, the flexible generation plant could be built in three phases over a period of up to six years in total. If that is the case, the first phase would involve installing half of the gas engines (i.e. 300 megawatts capacity) plus the gas pipe and electricity export cables, both sized to provide the full fuel supply and electricity export capacity for the flexible generation plant. The full areas of exchange Common Land and habitat creation would also be provided in this phase.
- 3.4.3 In the second phase, the remaining gas engines and associated equipment would be built. Installing the batteries and associated equipment would be the third phase of construction.
- 3.4.4 Construction of the proposed development would be managed under a Code of Construction Practice that sets out the principles of good environmental management to be followed in order to avoid or minimise environmental impacts.
- 3.4.5 Typical construction plant to be used would include excavators, drilling rigs, graders and haulage vehicles, mobile and tower cranes, and heavy and light goods vehicles.
- 3.4.6 Normal construction working hours would be Monday to Friday 08:00–18:00 and Saturday 08:00–13:00. No Sunday, bank holiday or night working is proposed, with certain exceptions described below.

3.4.7 Non-noisy work such as fit-out within buildings may be done outside normal working hours where the work would not cause disturbance off-site. It is also possible that some construction activities that cannot be interrupted will be needed, such as continuous concrete pouring. In such cases 24-hour construction working could be required for limited periods, expected to be no more than 10 days per construction phase.

3.5 Decommissioning

3.5.1 The flexible generation plant has an initial design lifetime for operation of up to 35 years. Continued operation beyond that time is possible, depending on market conditions at that point. The physical plant items such as gas engines and batteries, if in continuing use, may then need to be upgraded, which would follow any necessary approvals process in place at that time.

3.5.2 If the flexible generation plant ceases operation, since it would mostly be built of components these can be decommissioned and dismantled without substantial demolition work being required. In this case, all above ground structures would be removed from the site, with the maximum value being recovered from materials and equipment via re-use or recycling at the time. The decision on how much of the below ground infrastructure (including concrete pads) would be retained would be agreed with the landowner and any other interested parties, accounting for decommissioning methods and timescales at the time.

3.6 Alternatives considered

3.6.1 Given the extent of Green Belt around London and the M25, extensive work was undertaken to consider first whether alternatives outside the Green Belt were possible and then subsequently sites within it where the impact could be minimised. Alternative options have been considered in two stages. Firstly, the operational needs of the flexible generation plant were used to consider:

- gas and electricity grid connection point selection; and
- site selection and justification.

3.6.2 Any generating station must connect to the electricity grid at a suitable location, ideally without needing to build new infrastructure, such as substations and overhead lines. The suitability is determined by the generation scale and the available capacity to accept the new power both at the substation and along the transmission network. For a gas-fired generator, an existing gas supply where enough capacity is available and can be reserved to provide the fuel supply is also essential.

3.6.3 Proximity to both gas and electricity grids is the principal driver for this project's location. National and regional grid operators have been consulted to ensure that the project delivers the optimum public benefits. National Grid has identified a need for additional generation capacity to serve London due to closure of older power stations, and there is a regional and national need for flexible generation and storage to complement greater deployment of intermittent renewable electricity generators.

3.6.4 A number of existing electrical substations located on the grid network around Greater London were shortlisted due to their grid capacity, proximity to gas supply and land availability and cost. These substations were tested against the following environmental and technical criteria to identify potentially available development areas in the vicinity of each substation:

- access;
- environmental designations;
- residential receptors;
- land use and policy; and
- other development proposals.

3.6.5 Land immediately next to Tilbury Substation was selected as the preferred connection point as it had fewer environmental and technical constraints than other options, and better conformed to the requirements for deliverability.

3.6.6 The second stage involved the comparison of environmental and technical issues at the selected site, to evaluate alternatives relating to:

- site arrangement and scale options;
- design and appearance options;
- phasing and future-proofing options; and
- access and construction method options.

3.6.7 This stage sought to optimise the development site's capacity to respond to its environmental risks and opportunities through evolution of the masterplan. Iterative design options also considered land use efficiency and cost optimisation to ensure the proposed development would meet commercial and deliverability imperatives.

3.6.8 A number of access options were considered and consulted on for construction traffic, particularly the large abnormal loads of the gas engine blocks and transformers, which cannot use parts of the highway network such as Fort Road railway bridge and the Station Road level crossing. In the consultation during 2018, the PEIR described access routes from the north, including construction haul roads between the A126 at the Gateway Academy roundabout and Gun Hill, along High House Lane, and in Parsonage Common for craning loads over the railway.

- 3.6.9 Subsequently, a better solution has been proposed with barge delivery of large loads to the causeway (avoiding impacts on the highway network) and construction traffic access primarily from the south, directly from the A1089, making use of the new access being constructed for Tilbury2.
- 3.6.10 The gas pipeline route has also been refined to make two crossings of Station Road (rather than run along underneath it, as initially proposed), reducing the impact of construction in the road and time it would need to be closed for.

4. Environmental Impacts

4.1 Environmental impacts studied

4.1.1 Environmental impact assessment studies have been carried out for the following topic areas, agreed with the Planning Inspectorate through the EIA scoping process.

- Landscape and visual resources
- Historic environment
- Land-use, agriculture and socio-economics
- Onshore ecology
- Traffic and transport
- Noise and vibration
- Air quality
- Human health
- Climate change
- Hydrology and flood risk
- Geology, hydrogeology and ground conditions
- Marine environment

4.1.2 Volume 3 of the Environmental Statement (ES) has a chapter about each of these topics and Volume 6 has appendices providing further technical information about each. The structure of the whole ES is set out in Section 5 of this non-technical summary.

4.1.3 The following summary describes the baseline environmental information gathered, the impacts that have been assessed and the conclusions about the significance of predicted effects, for each topic.

4.2 Landscape and visual resources

4.2.1 The character of the existing landscape is described in publications from Natural England and Thurrock Council, which divide the area into characteristic zones sharing similar features.

4.2.2 The application site lies mainly in the 'Greater Thames Estuary' national character area, which is described as a low-lying coastal landscape with open grazing pastures and drained, ploughed arable land protected from floods by sea walls, with a network of reed-fringed drainage ditches, few hedges or fences, and with tree cover a rarity. Areas of remoteness persist but the character profile also notes that urbanised areas on marsh edges are already "*subject to chaotic activity of various major developments*

including ports, waste disposal, marine dredging, housing regeneration, mineral extraction and prominent power stations plus numerous other industry-related activities".

4.2.3 The main development site is in the Thurrock character area 'Tilbury Marshes', which provides a similar description to the national character area. The description notes that it is an open and exposed landscape dominated by the sky and with few settlements, but the "*influence of the urban edge of Tilbury and associated roads/industrial and port building is significant in the north and west of the area [and] the large-scale building and bulk of the Tilbury Power Station provides a dramatic contrast to the prevailing flatness of the landscape.*"

4.2.4 The application site is not within any designated (protected) landscape; the nearest is the Kent Downs Area of Outstanding Natural Beauty around 6 km to the south east.

4.2.5 The area within which the flexible generation plant could theoretically be visible was initially worked out based on the tallest part (the gas engine exhaust stacks at up to 40 m) and information on ground heights. In consultation with Thurrock Council, Gravesham Borough Council and Essex County Council, representative locations were selected for photography of the existing landscape and views. These locations included footpaths, roads and residential areas.

4.2.6 The height and shape of the completed flexible generation plant have then been considered in the assessment of visual and landscape character impact during operation, using the baseline photography from the viewpoints and 'wireline' outlines of the maximum dimensions for the proposed development main buildings. In addition to the maximum-dimension (worst-case) wirelines, photomontage visualisations of an illustrative design for the flexible generation plant have also been provided.

4.2.7 In the current baseline, residences on the Chadwell St. Mary – West Tilbury – East Tilbury ridgeline have views of the main development site in some cases (depending on elevation and intervening buildings or vegetation), looking across the drained marshland, existing industrial facilities and the River Thames into north Kent. From residential areas on the eastern edge of Tilbury, views south towards the main development site are generally filtered by the vegetation along the railway, but Tilbury Substation, Tilbury Power Station and the overhead power lines and pylons are prominent in the existing view. Residential areas in East Tilbury generally do not have significant views of the main development site.

4.2.8 Where vegetation and orientation allow, there are long views for some residential areas in Gravesham across the River Thames to the existing industrial facilities on the northern bank and beyond to the low ridgeline.

- 4.2.9 From some sections of Common Land (which is open to public access), Parsonage Common in particular, there are close views of the main development site and access route. There are wide and open views of the Kent side of the estuary, Gravesend, Tilbury Power Station, the sewage treatment works, Tilbury Substation and the cranes and wind turbines of Tilbury docks from some footpaths and public rights of way in the area (depending on landform and hedgerows).
- 4.2.10 From Tilbury Fort, views towards the main development site are limited due to the intervening infrastructure of the sewage treatment works and woodland planting. Views from Coalhouse Fort are again mainly restricted by vegetation, but possible in some locations from the car park and footpaths around the outer edge of the moat.
- 4.2.11 In addition to the emerging flexible generation plant structures and equipment as they are installed, plant such as cranes would be visible during construction, and the access roads and gas pipeline trenching would also have a minor temporary impact on views and landscape character. Construction and use of the causeway will be prominently visible for people who pass it on the 'Two Forts Way' coastal footpath and distantly visible from Gravesham, but it will be seen in the context of nearby similar or larger pier, dock and outfall structures both upstream and downstream.
- 4.2.12 Directional and motion-activated security lighting would be used during operation of the flexible generation plant but full-time external lighting at night will not be required. Lighting during winter months and motion-activated security lighting are likely to be required during construction.
- 4.2.13 In the context of a dynamic landscape that is undergoing change, with substantial existing electricity infrastructure and other industrial development, the flexible generation plant is considered to have a minor adverse effect on the Thames Estuary National Character Area and a moderate adverse effect on the local character area of Tilbury Marshes, neither of which is significant. The development does not lie in or adjacent to the Kent Downs Area of Outstanding Natural Beauty (AONB) and would have no impact on the special qualities of the AONB nor compromise the reasons for its designation.
- 4.2.14 During construction, temporary significant adverse effects on views are predicted from the section of Two Forts Way at the causeway while it is being constructed. Temporary significant adverse effects on views from access land along the verges of Fort Road or Cooper Shaw road could occur if people are using this access land along the roads for recreation. Other effects during construction would be non-significant.
- 4.2.15 Potential views of the completed flexible generation plant in the area are complex. As the immediate landscape around this part of the River Thames is very flat, changes in topography and elements such as buildings, ships and pylons are noticeable, but also more effective as screens to views of the flexible generation plant.
- 4.2.16 From the south-west, views towards flat farmland are short, curtailed by the sewage treatment works and the woodland that surrounds it as well as the many pylons and overhead power lines. Views from Tilbury Fort towards the proposed development will be restricted by these elements in the landscape. From Fort Road bridge and from the easternmost properties at Tilbury, the development will be seen in the context of the infrastructure and pylons in the foreground. From residences, the vegetation along the railway will help to screen views of the lower elements of the development and no significant adverse effect is predicted.
- 4.2.17 From flat farmland to the north of the railway line, there are views across arable farmland crossed by pylons and overhead powerlines towards Tilbury Substation, Tilbury2 port construction and beyond to higher land in north Kent. From further north on the ridgeline, the higher elevation gives views of the drained marshland and the full extent of pylons, power lines and industrial operations to the west are revealed. While most views of the flexible generation plant will not be significant from this direction, certain elevated views from directly north and close views from the access land will experience moderate to major adverse effects. These effects are not considered to be significant overall or unacceptable given the existing industrial and dockside landscape context in which the flexible generation plant would be seen.
- 4.2.18 Views looking west towards the flexible generation plant are possible from some locations around Coalhouse Fort but due to distance and intervening vegetation these are limited and no significant effect is predicted.
- 4.2.19 Travelling west along the Thames Estuary Path, also known as Two Forts Way, the views towards the proposed development are limited until the area of land that is being land raised is passed. For a short section the elevation and the lack of vegetation on the northern side of the path would allow views across to the flexible generation plant and the causeway. The context of the view would remain that of the Tilbury Substation, extensive powerlines and existing jetties and wharfs on the northern bank of the River Thames. The moderate effect on the view from this direction is not considered to be significant.
- 4.2.20 From Gravesend and higher land in north Kent, the development would be visible in some long views but again seen in the context of infrastructure such as the sewage treatment works and the 'wirescape' of pylons and overhead power lines, and against the backdrop of higher ground to the north, so no significant adverse effect on views is predicted. From locations on the south side of the Thames with open views of the

causeway construction, such as from the Saxon Shore way, effects would be at most moderate, which is not significant.

- 4.2.21 Overall, significant adverse effects on landscape character and visual resources are not predicted.

4.3 Historic environment

- 4.3.1 A substantial amount of information about the history of the area is available from the Essex Historic Environment Record, records held by Historic England, historical maps and other published sources. This information has been studied to consider the potential for archaeological features of interest to be present and to understand the context of designated heritage features in the area.

- 4.3.2 There are few sites or finds of medieval date and mapping indicates that the main development site was probably marshland used for common grazing during the medieval period. While there were medieval settlements in Tilbury and Gravesham, there is no evidence for medieval settlement activity on the main development site or indeed recorded evidence for later activity, other than use as agricultural land, until the Second World War when parts of the site were used for defensive purposes.

- 4.3.3 During the early post-medieval period the wider area was significant in the defence of the River Thames from at least the reign of Henry VIII onwards, with forts and artillery batteries constructed at Tilbury Fort, Coalhouse Fort and Gravesend Blockhouse among other locations. These defensive structures have subsequently undergone extensive alterations through to use in the Second World War.

- 4.3.4 In the 19th and 20th centuries, development of the railway line, facilities for ocean liner passengers and increasing industrial use such as the Tilbury A and B power stations were developed, together with the growth and expansion of urban residential areas.

- 4.3.5 There are no designated heritage assets within the application site and no World Heritage Sites, Registered Battlefields or Registered Parks and Gardens in the vicinity. There are six Scheduled Monuments at 1–3 km distance, all forts, blockhouses or anti-aircraft batteries, and one Scheduled Monument that is closer, comprising earthworks at the church in West Tilbury. There are designated Conservation Areas in West and East Tilbury and in a number of areas in Gravesend. Within 1 km of the main development site are four Grade II Listed Buildings and the Church of St James, in West Tilbury, which is Grade II* listed.

- 4.3.6 A geo-physical survey of the main development site was carried out to identify features below ground that could be of archaeological significance. This has guided further

borehole investigations of the site and development of a geo-archaeological deposit model.

- 4.3.7 There is evidence of prehistoric and Romano-British activity in the form of landscape reclamation and management (drainage channels), and the potential for possible industrial activity (salt production) and settlement, as well as anti-glider ditches dating to WWII within the main development site.

- 4.3.8 There is also the potential to discover additional Palaeolithic and/or Mesolithic material during construction of the flexible generation plant, and low to moderate potential for archaeological assets dating from prehistoric to Post Medieval periods in the marine and intertidal zone affected by construction of the causeway.

- 4.3.9 Two avenues of potential impact due to the proposed development on the historic environment have been assessed: potential for construction work to disturb archaeological features and potential for the development to affect the setting of heritage assets, primarily due to being visible from them, or affect the overall historic landscape.

- 4.3.10 A potential moderate to major adverse effect on buried archaeological remains, if present, is predicted prior to mitigation, which would be significant. In order to mitigate this effect, a written scheme of archaeological investigation for works in both the onshore and marine environment has been prepared, which provides for further pre-construction archaeological investigation, avoidance of any remains by design (if possible) and monitoring by a qualified archaeologist during earthworks. With the implementation of this mitigation, the residual effect would be minor adverse, which is not significant.

- 4.3.11 At the great majority of designated heritage assets, where the setting would be affected by the proposed development, negligible to minor effects are predicted which are not considered to be significant. This is based on factors including distance and the limits to visibility of the proposed development from the assets' locations, and takes into account their evidential and historical, aesthetic and communal value and sensitivity. Similarly, minor and non-significant effects are predicted for the historic landscape overall.

- 4.3.12 A minor to moderate adverse effect on Tilbury Fort is predicted, which is considered significant, at the lowest end of the scale. Given the wide ranging existing built and industrial landscape in the area, the changes to the setting of the fort due to the limited views of the proposed development are considered to be slight, but the high sensitivity of the fort and the important contribution that its setting makes to its overall value are acknowledged in the prediction of a significant effect.

4.3.13 Moderate adverse effects on the setting of the West Tilbury Conservation Area are predicted, which are considered to be significant. Again, given the existing industrialisation of the conservation area's setting, only a slight but discernible reduction to the setting's contributions to the assets' importance due to the flexible generation plant is predicted but the significance of effect acknowledges the medium to high sensitivity of this asset.

4.4 Land-use, agriculture and socio-economics

4.4.1 The potential impacts of the proposed development on agricultural land use, common land, recreational resources (such as footpaths) and the socio-economic impacts of jobs that would be created by the project have been investigated. Baseline information has been gathered from published agricultural land and soil data, the Register of Common Land and Village Greens, rights of way maps and labour market statistics. Surveys of soil characteristics, agricultural land and rights of way have also been undertaken.

4.4.2 Soils in the area of the proposed development are generally clayey (classified as the 'Wallasea Soil Association'), with groundwater controlled by ditches and drainage improvements where land is in agricultural use. Some areas of soil in the gas connection compound zone and pipeline route are more loamy, underlain by sand and gravel. The majority of land affected by the proposed development forms part of a single large arable-based family farm holding. The majority of land permanently affected comprises lower quality agricultural land, but around 1.15 ha of higher quality 'best and most versatile' agricultural land would be likely to be permanently affected.

4.4.3 The loss of agricultural land and the impact on farm holdings are considered to be negligible to minor adverse effects, which are not significant.

4.4.4 No existing rights of way cross the main development site. 'Footpath 200' near Station Road would be crossed by the gas pipeline route. Depending on the construction method, temporary diversion of this footpath for around one month may be required on a route that has been agreed with Thurrock Council. The Thames Estuary Path and cycle path (also known as Two Forts Way) runs along the shore of the Thames and would be crossed by vehicles for construction and use of the causeway. This would be intermittent, for short durations, and managed by a banksman. No significant effects on public rights of way are predicted.

4.4.5 The main development site includes all of Walton Common, which is grassland with grazing rights. Rights of access across small areas of common adjacent to Cooper Shaw Road and in Parsonage Common would also be used for access to the ecological enhancement land. A very small area, less than 0.1 ha, of common land at Footpath

200 would be affected temporarily by construction where the gas pipeline route crosses it.

4.4.6 Approximately 10.1 ha of common land (Walton Common) would be permanently lost and a small part of Parsonage Common may be temporarily affected during construction. However, included within the application is provision of 11.5 ha of replacement common land in zone E (with the same rights of public access and grazing, and improved access from Parsonage Common and Fort Road Common). The permanent effect is therefore considered to be minor beneficial, which is not significant.

4.4.7 Approximately 6.2% of the workforce in Thurrock is employed in the construction sector. Unemployment in the financial year 2018 was 4.0% of the economically active population, which is higher than the regional average but lower than the national average during that period.

4.4.8 The employment generated during construction and the 'multiplier effect' to the local economy due to construction supply-chain and worker spending are considered to have a minor beneficial socio-economic local effect overall. Given the mobility of the construction workforce in the region, it is not expected that there would be any significant adverse impact on the usual resident population of the study area. The proposed development would require only a very small workforce in operation (likely to be largely remote-based) so, while this is beneficial, no significant socio-economic effect in operation is predicted.

4.5 Ecology

4.5.1 Information about the existing habitats and species has been gathered from the Essex Wildlife Trust Biological Records Centre, the Kent and Medway Biological Records Centre, and the Essex Field Club and a range of site-specific surveys carried out during 2017, 2018 and 2019. These included habitat and botanical (vegetation) surveys, and further surveys where existing records, consultation with Natural England and other stakeholders and/or the habitat surveys suggested that protected species may be present including invertebrates, eels, Great Crested Newts, reptiles, breeding and wintering birds, water vole, bats, otter and badger.

4.5.2 Mucking Flats and Marshes Site of Special Scientific Interest and the Thames Estuary and Marshes Special Protection Area and Ramsar site, east of the proposed development, are of international importance for wintering birds and provide mudflat, lagoon and saltmarsh habitat with ecological and hydrological value. There are also a number of Local Wildlife Sites in the area of the proposed development which are of interest mainly for their acid-grassland flora and invertebrate populations.

- 4.5.3 The main development site for the flexible generation plant is a mixture of arable farming land (of no particular conservation value) in the north and former grazing marsh in the southern part, which is degraded and has little botanical or breeding bird value. Other land within the application boundary, to be crossed by the gas pipeline and used for access roads, is mainly farmland with either arable fields or grassland which is not considered to have significant ecological value. Ditches crossing or forming the boundaries of many of the areas of land within the application boundary provide habitat for water voles and also connect other areas of habitat in the local area. Hedgerows are relatively patchy and have limited value for connecting local habitat areas.
- 4.5.4 The main development site has populations of adder, grass snake, common lizard and slow-worm. Water voles have been found to be present in the ditches in some surveys, but at other times many of the ditches had dried out and were no longer supporting water voles. No active badger setts were observed in the survey area. Eighteen species of birds with conservation concern are breeding within the survey area, including Cetti's Warbler, and overall the breeding bird groups are considered to be of district-level importance. Wintering terrestrial bird surveys have indicated that the farmland in and adjacent to the proposed development are not used by birds from the nearby Special Protection Area (SPA). Wintering bird surveys of the foreshore in the vicinity of the proposed causeway carried out in September–March 2019/20 recorded Avocets in November–March that would be sensitive to disturbance from its construction. A review of previous years' surveys in 2016/17 and 2017/18 suggested that the foreshore in this location is not used by significant numbers of birds from the nearby SPA. Bat surveys indicate that bat activity in the vicinity of the main development site is minimal.
- 4.5.5 The nearby Lytag Brownfield Local Wildlife Site (outside the application boundary) has high importance for invertebrates but is being affected by the construction of Tilbury2 (with ecological mitigation). While the flexible generation plant site itself is not considered to have invertebrate groups of significance, it is likely to contribute to the overall diversity of invertebrate populations in the surrounding area.
- 4.5.6 The permanent loss of grassland and ditch habitat on the main development site, and consequent impacts on invertebrates, reptiles and water voles, is predicted to have a moderate adverse effect that is considered significant. The Flexible Generation Plant design has been developed to retain ditches at the boundary of the site as far as possible to reduce this impact. To further mitigate these impacts, several new areas of habitat creation north of the railway and also adjacent to the main development site are included in the application, in what are currently agricultural fields and an area of degraded grassland. The habitat design will provide a net gain of grassland area and of ditch length, allowing for the relocation of protected species, and overall is considered to provide a minor net ecological benefit.

- 4.5.7 The impacts of temporary disturbance to onshore species and temporary habitat loss during construction are not considered to be significant. Loss of foreshore habitat for wintering birds and disturbance during use of the causeway for barge deliveries are not predicted to be significant effects. Construction of the causeway was considered to have the potential for a significant adverse effect on Avocets, and therefore construction of the causeway will not take place in November–March (unless further evidence supports a conclusion that unacceptable impacts would not occur and/or appropriate mitigation can be agreed with Natural England) to avoid this impact.
- 4.5.8 Noise and air pollutant emissions have been modelled as discussed in the sections below, which has included predicting levels in areas of sensitive habitat. Noise disturbance during construction or operation of the proposed development and the impacts of air pollutant emissions on designated habitat sites are not predicted to be significant.

4.6 Traffic and transport

- 4.6.1 Information about traffic flows on the public road network, records of accidents, existing sustainable travel options and the status of existing road links (such as weight restrictions and any existing delay or capacity issues) has been gathered from published data and via consultation with Highways England and the local Highways Authority, Thurrock Council. In addition, inspection surveys have been made of the access routes, including land where new roads would be constructed, to evaluate their suitability and undertake preliminary engineering design.
- 4.6.2 Potential growth in baseline traffic (without the proposed development) has been projected forward to the start of construction in 2022 using Department for Transport growth rates and information about other local development projects.
- 4.6.3 During construction, the proposed development is estimated to require on average 40 heavy goods vehicle (HGV) deliveries per day (i.e. 80 trips in total, both ways) and a peak of 160 two-way HGV trips per day. The average HGV traffic is equivalent to four HGVs in each direction per hour over a ten-hour day. On average 250 construction staff, peaking at 350, are expected to be required. It is proposed that minibus, coach and car sharing will be used for site access by 90% of construction staff with 10% arriving as a car driver. This would equate to around 70 daily car movements (both ways), 36 minibus and four coach movements for the peak construction workforce.
- 4.6.4 Abnormal indivisible loads will be delivered by up to sixty barges over the construction period, using the causeway and road constructed from it to the main development site.

- 4.6.5 The gas pipeline route crosses Station Road at East Tilbury in two locations. During the open cut trenching works to cross the road, it will have to be closed and a local diversion put in place, which is expected to be for a matter of days for each crossing. The contractor may choose to undertake these works over a series of nights, meaning that the local diversion is only in place at nights. The method and diversion route will be developed with Thurrock Council as the Local Highway Authority.
- 4.6.6 During operation, traffic generation would be very minor as the flexible generation plant requires a workforce of only around four to six full-time equivalent staff on site in normal operation or up to 20 additional workers during annual maintenance periods, which would result in much lower traffic flows than the construction period.
- 4.6.7 Access routes to the main development site have been designed to provide connections to the trunk road network while avoiding built-up residential areas where possible. As discussed in the project description section, this involves use of the new access road and A1089 connection being constructed for Tilbury2 as the primary route.
- 4.6.8 As a secondary route, construction traffic could also travel via Fort Road, Cooper Shaw Road, Church Road and Station Road to the site if there are times when this is necessary; Station Road would also be used to access the gas pipeline construction area, which will require temporary suspension of the *Borough of Thurrock (Station Road (Love Lane to Princess Margaret Road) East Tilbury) (Weight Restriction) Order 1995* on one section of Station Road.
- 4.6.9 The average and peak traffic generated by the proposed development during construction would be below the threshold in transport assessment guidance at which any significant effects are likely for the majority of sections of road assessed.
- 4.6.10 The potential impacts of traffic using the secondary access route, if there are times when that is necessary, has been further assessed. Taking into consideration highway capacity and existing traffic flows, accident records, and guidance on the levels of traffic flow that can cause delay or severance of routes used by pedestrians, no significant existing road capacity or safety issues have been identified and no significant adverse effects are predicted for drivers or other road users due to additional construction traffic generated on these road sections.
- 4.6.11 Construction traffic will be controlled by measures in a Construction Traffic Management Plan, which will set enforceable requirements that construction contractors must follow for vehicle routes and safety. A Construction Worker Travel Plan has also been developed to manage and control the number of construction workers arriving by car, as described above.
- 4.6.12 Overall, no significant adverse effects due to construction traffic are predicted.
- 4.6.13 No significant effect is predicted due to the small and irregular amount of traffic generated during operation, primarily for periodic maintenance visits.
- ## 4.7 Noise and vibration
- 4.7.1 Baseline noise levels were monitored in February 2018 at seven locations that are representative of the nearest noise-sensitive receptors around the proposed development. Noise levels were measured for a week (including weekend days) and in addition, attended surveys were carried out during shorter periods in the day, evening and night-time to describe the types of sound that could be heard.
- 4.7.2 Existing background noise levels are mostly influenced by the sound of local and distant traffic, and in some locations the sound of a metal recycling facility, industrial sound from the Port of Tilbury and passing trains or the hum of railway power lines.
- 4.7.3 Best practicable means to minimise noise during construction will be followed, as specified in the Code of Construction Practice. Noise experienced at sensitive human and ecological receptors from construction works, including general construction plant use, piling, horizontal drilling (for gas pipeline) and traffic on access roads, would be temporary and are not predicted to cause significant effects. Due to the distance to residences, no effects from vibration during construction and no significant effect from piling are predicted.
- 4.7.4 The main source of noise from the flexible generation plant in operation would be the gas engines themselves, their cooling fans and their exhausts. Other sources including the batteries' cooling system, gas metering equipment and substation components have also been assessed.
- 4.7.5 Designed-in mitigation measures for operational plant have been proposed to reduce noise levels as far as is reasonably practical and to ensure noise levels generated would not cause a significant adverse effect at nearby receptors.
- 4.7.6 A moderate adverse effect at the most-affected residential receptors in the vicinity of Buckland is predicted during operation. Negligible or minor effects are predicted at all other sensitive receptors. Taking both the change in noise levels and the absolute sound levels during the day and night into consideration, it is considered that sound from the facility will not result in any adverse impacts on the quality of life of residents, and the noise effects will not be significant in operation.
- 4.7.7 The flexible generation plant would have no significant traffic in operation and no significant adverse effect due to traffic-related noise.
- 4.7.8 Overall, no significant adverse noise effects are predicted.

4.8 Air quality

- 4.8.1 Information about current air quality in Thurrock and Gravesham has been gathered from routine monitoring published by the local councils plus additional monitoring from December 2017 to June 2018 at five locations around the development site.
- 4.8.2 The results of this project-specific monitoring show that background concentrations of nitrogen dioxide in the area around the development site are within the relevant health-based air quality objectives. However, both Thurrock Council and Gravesham Borough Council have designated Air Quality Management Areas (due to high levels of traffic or industrial pollution in areas further from the main development site) the nearest of which is 1.8 km away.
- 4.8.3 Potential dust during construction would be controlled by measures in the Code of Construction Practice and no significant adverse effect is predicted.
- 4.8.4 Air pollutant emissions from construction vehicles on the road network have been modelled and no significant adverse effects on air quality are predicted. The flexible generation plant would have no significant traffic in operation.
- 4.8.5 The main air pollutant emitted by the flexible generation plant in operation would be nitrogen dioxide from the gas engine exhausts. The gas engines would comply with the emission limit for nitrogen dioxide set by the Industrial Emissions Directive. Dispersion modelling has been used to design a suitable exhaust stack height of 40 metres for dispersion of pollutants at these emission limits and individual stacks.
- 4.8.6 At the majority of the representative residential and other sensitive receptor locations modelled, no significant adverse effect is predicted. For long-term average nitrogen dioxide concentrations, there are two existing receptor locations at Walnut Tree Farm and West Street where a moderate adverse effect is predicted. For short-term average concentrations, there are nine existing receptors where a moderate adverse impact is predicted. However, the total nitrogen dioxide concentration is predicted to remain within the relevant air quality objectives at all but one modelled receptor. At West Street, the annual-mean nitrogen concentration is predicted to exceed the air quality objective with or without the development in the opening year of 2022.
- 4.8.7 The primary reason for non-compliance at West St is traffic emissions and as such exceedances of the air quality objective are predicted only close to the façade of properties immediately adjacent to the road at this location. Thurrock Flexible Generation Plant does not delay or prevent compliance with the annual mean objective for nitrogen dioxide, which is predicted to be achieved at West Street between 2025 and 2030.

- 4.8.8 The assessment is a maximum-case prediction with up to 48 individual exhaust stacks and with emissions at the Industrial Emissions Directive limit. Thurrock Power will use a process called selective catalytic reduction to treat the exhaust gas, which will reduce nitrogen dioxide emissions below that limit and resulting concentrations. Its air pollutant emissions, monitoring and the requirement to use Best Available Techniques (BAT) will be controlled by the Environmental Permit.
- 4.8.9 The potential for nitrogen deposition, acid deposition and concentration of nitrogen oxides to affect sensitive ecological habitats has also been assessed. No significant air quality effects on designated habitats are expected to arise due to the proposed development.
- 4.8.10 Overall, no significant adverse air quality effects are predicted.

4.9 Human health

- 4.9.1 Environmental or socio-economic impacts of a development can have the potential to affect people's health, which has been studied using information about those impacts as described in the rest of this non-technical summary. 'Health' here means people's physical, mental and social wellbeing, rather than a narrow definition of just disease or infirmity.
- 4.9.2 Baseline information on existing health and the socio-economic factors influencing it for communities in the area of the proposed development has been gathered from NHS statistics, health profiles published by Public Health England and the Joint Strategic Needs Assessment developed by local public health teams. Thurrock district has relatively high levels of socio-economic and health deprivation compared to regional and national averages, with lower life expectancy, higher hospital admission rates and higher rates of factors such as obesity and smoking. Social indicators such as employment rates and levels of education or qualifications are lower than the regional and national averages.
- 4.9.3 The health assessment has considered environmental and social pathways through which the proposed development has the potential to influence health. These include air pollution and noise, which can affect people's physical health or their wellbeing if significant annoyance or sleep disturbance were caused, and traffic levels which can affect road safety or the routes that people walk or cycle. Any impacts on footpaths, Common Land and the amenity of the landscape that could affect recreation and exercise have been considered, as has the impact of employment generated, which is important to the social and economic factors that influence people's health and wellbeing.

- 4.9.4 No significant adverse effect on health due to changes in air quality during construction or operation is predicted. Change in exposure to air pollution at sensitive locations including residential areas, schools and healthcare facilities would be minor and not of a level to result in measurable changes in health outcomes. With appropriate mitigation as discussed above, noise during construction and operation is not predicted to lead to annoyance or sleep disturbance that could cause a significant adverse health effect.
- 4.9.5 Construction traffic flows would not be significant compared to existing road traffic and access routes have been designed for use of the trunk road network where possible. No significant adverse effect on health due to road safety or creating barriers to pedestrians or cyclists is predicted.
- 4.9.6 Construction employment generation, estimated to average 250 full-time equivalent jobs, has the potential for a beneficial effect on health on an individual level. This can be enhanced by recruitment with training and skills development for local people in longer-term unemployment, which has been discussed by Thurrock Power with Thurrock Council.
- 4.9.7 The exchange Common Land provided would maintain this resource for public access, with a slight improvement to accessibility as crossing the railway is no longer needed. No adverse effect on health and wellbeing due to changes in green space available for exercise and recreation is predicted.

4.10 Climate change

- 4.10.1 Climate change impacts can mean any risks that climate change may pose to the flexible generation plant, the way in which climate change may influence other environmental effects (such as by increasing the stress on ecosystems impacted by the development), and the impact that the flexible generation plant itself has on climate change due to greenhouse gas emissions.
- 4.10.2 Climate change risks were evaluated at the EIA scoping stage and the main risk was considered to be flooding, which is described in the hydrology and flood risk summary, below. Other risks are not considered to be significant to the proposed development.
- 4.10.3 The emission of greenhouse gases due to burning natural gas fuel in the gas engines has been calculated based on their maximum annual running hours. The estimated greenhouse gas emissions due to the supply chain for extracting and delivering the gas have also been taken into account. Total emissions over the flexible generation plant's 35 year design operating lifetime are predicted to be approximately 46 million tonnes of carbon dioxide equivalent.

- 4.10.4 However, building and operating the flexible generation plant would avoid the need for an equivalent amount of electricity generation capacity to be provided by a different existing or new power generators. The peak electricity supply capacity it provides and the battery storage will also play a role in enabling greater use of low-carbon renewable generation. Several scenarios for emissions sources avoided have been considered, based on government and National Grid projections about future electricity supplies and a comparison with other gas-fired flexible generation technologies.
- 4.10.5 Taking the avoided emissions into account, the net predicted effect of the flexible generation plant is a reduction in greenhouse gas emissions of between -13 and -17 million tonnes of carbon dioxide equivalent, i.e. a beneficial effect compared to the business-as-usual future baseline scenario without the development.
- 4.10.6 Greenhouse gas emissions due to construction activity and producing the materials used are estimated to be very minor compared to the operational impacts, at less than 1% of the total, and are not considered to be significant.

4.11 Hydrology and flood risk

- 4.11.1 The Environment Agency publishes flood risk maps for tidal and river flooding and further detailed information is available from flood modelling for the Thurrock Strategic Flood Risk Assessment and the Environment Agency's TE2100 management plan for the Thames Estuary. Information concerning the baseline status of watercourses has been gathered from the Environment Agency's catchment data, which is produced to meet the requirements of the Water Framework Directive. A walkover survey of the main development site to characterise its hydrology and visually inspect the local watercourses has also been undertaken.
- 4.11.2 The main development site is currently drained by a complex network of buried land drains and the development as a whole, including gas connection and access routes, crosses a number of existing field drains, ditches and irrigation channels. The majority of the surface water channels crossed are privately owned and maintained, but some are managed by the Environment Agency or Essex County Council. The drainage network ultimately discharges to the Thames, in some cases via the West Tilbury Main river.
- 4.11.3 West Tilbury Main has an overall moderate Water Framework Directive quality status, with moderate ecological status and good chemical status. The River Thames also has an overall moderate status, with moderate ecological status but failing chemical status.
- 4.11.4 The majority of the proposed development is located in EA Flood Zones 2 and 3a, which indicates medium to high risk of flooding prior to considering any flood defences.

However, the Thames has substantial tidal flooding defences that provide a standard of protection designed to defend flood events with a 1 in 1,000 year return period. Baseline flood risk to the proposed development is therefore considered to be low.

- 4.11.5 The Thurrock Council Strategic Flood Risk Assessment modelling of a potential breach in the tidal defences indicates that the flood depth at the Flexible Generation Plant site could be 2.45 m above Ordnance Survey datum, to which an additional 0.39 m depth has been added to account for worst-case sea level rise projections (due to climate change) published since the modelling was undertaken. The resulting 2.84 m depth would be greater than the expected finished site level for building bases of 2.0 m. The development will therefore incorporate additional flood resilience measures to ensure critical assets such as its electrical infrastructure are afforded an appropriate level of flood protection, and no significant adverse effects due to flooding are expected.
- 4.11.6 Potential increase in flood risk due to increased runoff from the impermeable surfaces of the proposed development has been assessed taking into account a 40% climate change allowance for potential increased rainfall rates in future. Drainage design for the development incorporates the necessary runoff attenuation and storage as recommended by the flood risk assessment to ensure no increase in runoff rates compared to the baseline and hence no increase in flood risk for off-site receptors. No significant adverse effect on flood risk is therefore predicted.
- 4.11.7 Where the gas pipeline route or construction access roads cross existing watercourses and drains, whether with open cut techniques or a trenchless (horizontal drilling) approach, there is potential to affect the flow characteristics or cause sediment to be released. Watercourse crossings will be designed in accordance with the Environmental Permitting Regulations 2016 and Drainage Board Byelaws, and undertaken with best-practice measures to prevent pollution, which is a committed measure in the Code of Construction Practice. No significant effect on watercourses or Water Framework Directive status (where applicable) is therefore predicted.
- 4.11.8 Good-practice measures for management of construction activity and safe storage of materials on site to avoid any surface water contamination from runoff are set out in the Code of Construction Practice.
- 4.11.9 In operation, potentially polluting materials such as engine lubricating oil and the chemical (either urea or ammonia) used in the air pollution control system would be stored in accordance with the Environmental Permit and regulatory requirements, including secondary containment to capture any leaks, and no significant adverse effects on surface water contamination from runoff are predicted.

4.12 Geology, hydrogeology and ground conditions

- 4.12.1 Baseline information about the condition of the ground and the underlying geology and hydrogeology (groundwater) is available from British Geological Survey mapping, Environment Agency data and pollution records, and the history of land-uses in the local area which give a guide to potential sources of contamination. In addition, a walkover survey to observe any above-ground signs or sources of contamination (such as waste or chemical storage, or signs of contamination in watercourses or the ground surface) was undertaken in 2018.
- 4.12.2 The geology of the majority of the area within the application boundary is alluvium (clay, silt, sand and peat) over sand and gravel, further finer sand, and ultimately white chalk as the lowest stratum. In the area of the gas connection to the gas transmission network, shallower sand and gravel or head deposits (mixed with silt and clay) are present. The main development site and majority of other land within the application boundary are not within a groundwater Source Protection Zone. The gravel layer is a secondary aquifer, which may in some cases be an important source of groundwater flows to surface watercourses, and the white chalk is a principal aquifer. There is conflicting information about the baseline chemical quality of groundwater, but it may have a poor status.
- 4.12.3 There is ongoing extraction of pulverised fuel ash deposits from the former Tilbury Power Station, followed by land-raising using soil and inert waste from other construction schemes, occurring adjacent to and in some areas crossed by one proposed access road route to the flexible generation plant.
- 4.12.4 The main development site has historically been in agricultural use and is not considered likely to be an existing source of any ground contaminants of concern. Aside from fly-tipping of waste on Parsonage Common, no visual evidence of existing contamination was found in the site walkover survey. Possible sources of contamination in the wider area include the current and historical operation of Tilbury Power Station and substation, various historical landfills including municipal waste and ash from the power station (which is being mined and exported for re-use) and a former brickworks in the Low Street area. However, these would not be directly affected by construction work required for the proposed development.
- 4.12.5 The potential for construction work including excavation and piling to mobilise any existing contamination and impact on groundwater, surface waters or human health is considered to be low and no significant adverse effect is predicted. Before the start of construction work, further targeted environmental sampling (in conjunction with geo-technical site investigation work that's needed for construction) would be undertaken to confirm the ground conditions. Should any unexpected ground contamination be

encountered, it would be appropriately remediated (the approach to be agreed with Thurrock Council), which is a commitment of the Code of Construction Practice.

- 4.12.6 Good-practice measures for management of construction activity and safe storage of materials on site to avoid any ground or water contamination are set out in the Code of Construction Practice.

4.13 Marine environment

- 4.13.1 Due to the proximity of the proposed development's causeway to the Tilbury2 project and the formerly proposed Tilbury Energy Centre, substantial baseline data concerning the marine ecological and hydrological environment is available from these projects which has been drawn from in the assessment, together with published information from the Port of London Authority, Cefas and the Thames Marine Mammal Sighting Survey.

- 4.13.2 A further intertidal survey has been undertaken in 2019 at the causeway location, which included surveys of habitats, benthic ecology (organisms living on the estuary bed) and sampling of sediment for physical and chemical analysis.

- 4.13.3 The Thames Estuary is an important UK waterway, supporting a busy international port and extensive recreational use. It has typical UK estuarine habitats such as mudflats, sandflats, boulders and rocky habitats, saltmarsh, saline lagoons and intertidal creeks. These habitats, along with a strong tidal influence and large freshwater input, support a variety of flora and fauna at various life cycle stages.

- 4.13.4 There are four Thames Estuary sites designated for ecological protection within 5 km of the proposed causeway location, comprising features such as intertidal mudflats and saltmarsh that support internationally important breeding and overwintering populations of waterfowl. Slightly further upstream is the Swanscombe Marine Conservation Zone (designated for protection of intertidal mud and tentacled lagoon worm features).

- 4.13.5 Immediately to the west of the proposed causeway location is the existing Thurrock Power Station pontoon/jetty infrastructure, which is being retained as part of the Tilbury2 development. To the east is the recently constructed jetty at Goshems Farm / Ingrebourne Valley which is being used for delivery of Thames Tideway spoil for land raising.

- 4.13.6 The morphology (estuary shape and form) of Gravesend Reach, as this section of the estuary is known, is characterised by intertidal mudflats backed by saltmarsh along the estuary banks, behind which are tidal defence structures. Hydrodynamics (water flows) at the proposed causeway location are typical of the lower Thames Estuary, although with small scale localised circulations evident around existing jetty structures. Within the Gravesend Reach, historic encroachment on the banks has resulted in an increase in the speed of tidal currents, which have the capability to mobilise large volumes of sediment. The main mode of sediment transport within Gravesend Reach is through suspended sediment, indicative of a highly dynamic environment.

- 4.13.7 The intertidal survey at the causeway location found that it was a sheltered area with extensive mud flats, saltmarsh habitats at the upper shore, and a narrow strip of man-made boulders and seaweed. The surface sediment across the intertidal area surveyed comprised sand and mud of varying stiffness and compaction, with intermittent seaweed-covered large cobbles and boulders. Chemical analysis of sediment samples taken showed that the sediment chemistry and levels of contamination at this location are typical for this part of the Thames Estuary. Water quality in this section of the Thames is classified as having a 'moderate' ecological status but, in most years save 2015, a 'failed' chemical status.

- 4.13.8 The benthic (estuary bed) survey found that both intertidal and subtidal benthic species assemblages were typical of those found throughout the Thames Estuary, with consistency across the site-specific survey data and historic datasets from the area.

- 4.13.9 Fish species present in the Thames range from freshwater species, estuarine residents (i.e. those that spend their entire lifecycle within estuary) to marine species, which may use the estuary for part of their life cycle. A diversity of both commercially important and ecologically protected fish species has been observed in surveys in this part of the estuary and the lower Thames Estuary is an important spawning and nursery ground for European smelt and common sole.

- 4.13.10 The most frequently observed marine mammal species in the Thames Estuary are grey seal, harbour seal, harbour porpoise and bottlenose dolphin, but the presence of marine mammals is lower than elsewhere in the UK. The waters surrounding the proposed development area are not known to support breeding marine mammals.

- 4.13.11 The area to be dredged for the vessel berthing pocket is very small in the context of the intertidal mudflat habitats present across the marine ecology study area, and the loss of inter-tidal habitat due to dredging will be temporary and reversible, so no significant effect is predicted.

- 4.13.12 Assessment of sediment plume modelling has been used to determine the impact of sediment mobilised by dredging for both the causeway construction and vessel berthing pocket. Due to the small volume of sediment to be mobilised, the generally low levels of contaminants present in sediments and the high dilution potential of the Thames Estuary (where contaminants are brought into suspension), no significant effects are predicted.
- 4.13.13 No significant effects on fish or marine mammal species due to noise or disturbance from causeway construction or use are predicted. The Thames Estuary is a busy working river, with nearby ports and heavy vessel traffic; in this context the short-term impacts of causeway construction and barge traffic will be negligible and have no significant effect. Effects on wintering bird species were discussed in the onshore ecology section, above.
- 4.13.14 Construction of the causeway across the saltmarsh and intertidal mudflat habitats will lead to a change to the physical structure of these habitats, from soft sediment and vegetated habitats to a rock substrate. The communities within these habitats will be directly affected, with no potential for recovery while the causeway is in place. While the extent of the impact is highly localised and would represent only a small proportion of the habitats within the wider area, the habitats affected are of high value and therefore the loss of these is considered to be a significant adverse effect, although only at a local level. Mitigation of this effect through saltmarsh creation is therefore proposed, discussed further below.
- 4.13.15 Hydrodynamic modelling has been used to assess potential effects of the causeway and barges using it on flow conditions, estuary bed sediment and other nearby marine infrastructure. Noticeable changes to flow conditions would be limited to close proximity of the causeway itself and there is no significant effect predicted.
- 4.13.16 Build up of sediment in the lee of the causeway is predicted, which will be negligible at the scale of the Thames Estuary and Gravesend Reach but will be appreciable at the scale of the causeway location. As sediments build up in the lee of the causeway and the level of the mudflat increases to the level of the saltmarsh it is expected that pioneer saltmarsh species will colonise the newly accreted mudflats. This would lead to the extension of saltmarsh habitats beyond the current extents. It is proposed to support this natural process by depositing dredged material from the causeway construction, leading to a greater extent of saltmarsh growth and compensating for the habitat lost in construction.
- 4.13.17 Overall, it is considered that the effects of the causeway on the marine environment during construction and operation will be insignificant and most likely unmeasurable within the natural variability of the Thames Estuary. The only exception is the loss of saltmarsh and intertidal mudflat habitats beneath the footprint of the causeway, which would result in irreversible effects on these receptors that are considered significant at a local level. However, the accretion of muddy sediments in the lee of the causeway has the potential to result in the expansion of saltmarsh habitats beyond the current extent, particularly when considering further measures proposed to encourage and enhance this process (e.g. deposition of dredged sediment in the lee of the causeway). In the long term therefore, losses will be offset through creation of new saltmarsh habitat, with a neutral or long-term minor beneficial effect predicted.
- #### 4.14 Decommissioning stage effects
- 4.14.1 As discussed above in the project description, the flexible generation plant has an initial design lifetime of up to 35 years. Depending on market conditions at that time, it may then continue to operate (potentially with upgrades or replacements to equipment) or may be decommissioned.
- 4.14.2 For the environmental assessments, the potential impacts of both these future options have therefore been considered.
- 4.14.3 If the flexible generation plant were to continue operating, the effects at that future time are considered unlikely to be any greater than in the initial 35 year operational period for the environmental topics studied. Any changes to equipment would be subject to regulations (for example, air pollutant emission limits) as applicable at that time.
- 4.14.4 The potential future evolution of baseline conditions with respect to climate change has been considered to the end of this century. As an industrial facility with minimal on-site workforce the proposed development would have low vulnerability to physical climate risks beyond its initial 35-year operating lifetime, save for flooding (considered for the whole century in the flood risk assessment, above).
- 4.14.5 If the flexible generation plant were to be decommissioned, effects are considered unlikely to be any greater than in the construction phase. It is not possible to predict decommissioning and waste management methods several decades hence with certainty, but the development design is considered suitable mainly for dismantling rather than needing demolition, and the expectation of no greater effects than the construction phase is reasonable.
- 4.14.6 No significant adverse effects from continued operation or decommissioning after 35 years are therefore predicted.

4.15 Cumulative impacts with other developments

Relevant developments

- 4.15.1 Several other major development projects are consented and proposed in the area around Thurrock Flexible Generation Plant, including three other Nationally Significant Infrastructure Projects and several housing, mixed-use or smaller industrial developments.
- 4.15.2 For the environmental impact assessment, planning application records from Thurrock Council, Gravesham Borough Council and the Planning Inspectorate were searched to identify developments proposed.
- 4.15.3 Two main ways in which other developments could affect the impacts predicted for Thurrock Flexible Generation Plant when taken together have been considered: firstly, where impacts from another development and Thurrock Flexible Generation Plant could both affect the same receptor (not necessarily at the same time) and cause a greater effect overall; and secondly, where another development would create new sensitive receptors such as a housing estate that could be impacted by Thurrock Flexible Generation Plant if they were built.
- 4.15.4 Based on the planning records search, an initial long-list of possibly relevant developments was drawn up and discussed with planning officers at Thurrock Council to identify any developments that might have been missed or that are already completed. The long-list was then narrowed down to a short-list based on the scale, nature or location of each development or other factors such as the development having needed an environmental impact assessment, that suggest significant cumulative impacts could be possible. All Nationally Significant Infrastructure Projects in the long-list were also short-listed.
- 4.15.5 The Port of Tilbury has development consent to extend its operation to land immediately west and south-west of the Thurrock Flexible Generation Plant main development site. That project is called Tilbury2 and construction is ongoing at the time of writing this Environmental Statement, with initial operation expected in 2020. To the south of the main development site, adjacent to Tilbury2, demolition of the former Tilbury Power Station site has largely been completed (with major buildings removed). An application for a further small peaking plant near to Tilbury Sewage Treatment works, adjacent to Tilbury2, has also been made.
- 4.15.6 To the east, the Lower Thames Crossing project proposes a new motorway crossing of the Thames and route north to the M25, with construction access via a similar route across the Tilbury2 site as proposed for Thurrock Flexible Generation Plant.
- 4.15.7 On the Swanscombe peninsula on the south bank of the Thames, south west of Thurrock Flexible Generation Plant, a new major leisure development is proposed called the London Resort.
- 4.15.8 Outline planning permission has been granted for several residential and mixed-use developments that would expand East Tilbury and Linford in the direction of Thurrock Flexible Generation Plant. Early proposals for Thurrock Council's future Local Plan suggest possible zones for residential and commercial/employment development in areas east of the Thurrock Flexible Generation Plant, around the corridor of the Lower Thames Crossing project, and a review of the Green Belt land is being undertaken.
- 4.15.9 These other development projects are at various stages of the planning process with varying levels of information about their design and possible impacts available. The development consent application for Tilbury2 included an Environmental Statement and the Lower Thames Crossing has published a Preliminary Environmental Impact Report (PEIR). The London Resort proposals have not yet been published and there is limited design information available.
- 4.15.10 The application boundary for the Lower Thames Crossing, amended at the time of writing in February 2020, includes large amounts of land in the Thurrock area, some of which overlaps with the Thurrock Flexible Generation Plant boundary (though not the main development site) and several of the other development proposals. The road itself would occupy less space and it is understood that additional land is for purposes such as temporary construction areas, alterations to high-voltage power lines, biodiversity mitigation or enhancement and runoff attenuation to control flood risk.

Cumulative effects

- 4.15.11 The potential for air quality, noise, traffic and visual impacts on new residential receptors that could be introduced by cumulative developments is not considered to be any greater than the adjacent existing residential areas and no more significant adverse cumulative impact is predicted.
- 4.15.12 The cumulative landscape character effect of Thurrock Flexible Generation Plant with Tilbury2 would be to reduce the areas of open grassland within the Tilbury Marshes landscape character area, but given the existing character of this part of the character area, the cumulative effect is not considered significant.
- 4.15.13 Views from the west and south-west would have Tilbury2 processing buildings in the foreground and the addition of Thurrock Flexible Generation Plant is not considered to have a significant cumulative effect. From the east around Coalhouse Fort the Thurrock Flexible Generation Plant stacks would be seen further from the Tilbury2 silo, container

- storage areas and processing buildings, and again cumulative effects would not be significant.
- 4.15.14 From the Thames Estuary Path, the separation between the Tilbury2 container storage areas and processing buildings and the flexible generation plant in views means that the cumulative intensification of visual effects from this viewpoint would not be significant.
- 4.15.15 In representative views that might be obtained from elevated positions on the ridgeline north of Tilbury2 and Thurrock Flexible Generation Plant, the cumulative impact of Tilbury2 adds built development and industrial elements to the view and so intensifies the significant adverse effect predicted for Thurrock Flexible Generation Plant alone.
- 4.15.16 The published assessment of the impact of Tilbury2 on the setting of Tilbury Fort heritage asset indicates a major adverse effect prior to mitigation and a moderate adverse effect after mitigation. The cumulative impact with Thurrock Flexible Generation Plant would contribute to this effect but is not considered to increase its significance, as the primary impact is from the (much closer) Tilbury2 development.
- 4.15.17 No significant cumulative effect on agricultural land use or farm holdings due to the cumulative impact of Thurrock Flexible Generation Plant and Tilbury2 is predicted due to the negligible effect of the flexible generation plant.
- 4.15.18 Habitat creation for Tilbury2 includes ponds, ditches, reptile and invertebrate habitat on land immediately adjacent to the west of the Thurrock Flexible Generation Plant main development site and south of the habitat creation and Common Land exchange proposed (on the other side of the railway). Habitat creation proposals for both schemes appear complementary, in that taken together the mitigation areas will provide for a greater area of habitat for species such as reptiles and water voles than exists in this area at present.
- 4.15.19 Tilbury2 is significantly impacting invertebrates in the local area due to the loss of the majority of the Lytag Brownfield Local Wildlife Site, for which offsite compensation is proposed, but it is not considered that this impact is increased by the construction of Thurrock Flexible Generation Plant so no greater cumulative effect is predicted.
- 4.15.20 The contribution of Thurrock Flexible Generation Plant construction traffic to cumulative traffic flows from developments including Tilbury2 is predicted to be negligible and no significant cumulative effects on transport due to Thurrock Flexible Generation Plant are predicted.
- 4.15.21 Any overlap in construction activity would likely be of short duration and therefore cumulative noise effects from Tilbury2 and Thurrock Flexible Generation Plant are unlikely to be significant. During operation, predicted noise levels at the most-affected receptors from the operation of Tilbury2 are considerably higher than those from Thurrock Flexible Generation Plant and a negligible cumulative effect due to the flexible generation plant is predicted.
- 4.15.22 Conservative assumptions have been made to estimate possible cumulative effects on air quality from Tilbury2, the Lower Thames Crossing and other relevant developments together with Thurrock Flexible Generation Plant operational emissions. Moderate adverse impacts are predicted at 13 receptor locations (considering both long- and short-term periods) but total nitrogen dioxide concentration is predicted to remain within the relevant air quality objectives save at West Street in Gravesend, where the annual-mean objective is exceeded with or without the effect of Thurrock Flexible Generation Plant or other developments.
- 4.15.23 The primary reason for non-compliance at West St is traffic emissions and as such exceedances of the air quality objective are predicted only close to the façade of properties immediately adjacent to the road at this location. Thurrock Flexible Generation Plant does not delay or prevent compliance with the annual mean objective for nitrogen dioxide, which is predicted to be achieved at West Street between 2025 and 2030.
- 4.15.24 No significant cumulative effect on hydrology and flood risk with Tilbury2 and Thurrock Flexible Generation Plant is predicted as each development is required to provide appropriate flood risk mitigation and safe storage of any potentially-polluting materials. No significant cumulative effect on geology, hydrogeology or ground contamination is predicted as construction areas would not overlap and Thurrock Flexible Generation Plant is not considered to represent a significant risk in terms of contaminated soil and/or groundwater.
- 4.15.25 As mentioned, less information is available about the other Nationally Significant Infrastructure Projects since they are at an earlier stage of planning. If the Lower Thames Crossing were to be consented in the form currently proposed, its working areas for construction and access would closely surround and in places overlap with elements of Thurrock Flexible Generation Plant, particularly its accesses and gas pipeline connection.
- 4.15.26 Specific cumulative impacts with Thurrock Flexible Generation Plant would be for the promoters of the Lower Thames Crossing and other developments at the pre-application stage of planning to assess and mitigate if necessary when they undertake environmental impact assessments to support their applications for development consent. Nevertheless, a general description of cumulative impacts that might occur is given below where possible.

- 4.15.27 The construction periods of the cumulative developments are unlikely to all be simultaneous. If Thurrock Flexible Generation Plant were built in one phase, it is quite likely that it would be completed before construction of the Lower Thames Crossing and the London Resort as they are more complex developments and less advanced in the planning process. If Thurrock Flexible Generation Plant were built in three phases over up to six years, construction overlap during later phases is more likely. Even where construction of the other cumulative developments does not overlap in time, cumulative construction impacts are still possible due to the extended period of disruption to the local area from several successive sets of construction works.
- 4.15.28 The cumulative developments are likely to have a large combined need for construction workforce, with both potential beneficial impacts due to employment opportunities and potential for adverse impacts on the capacity of local services such as accommodation and healthcare. However, Thurrock Flexible Generation Plant's construction employment needs (estimated to average around 250 full-time equivalent workers) are expected to be minor compared to the much larger construction work likely to be required for other developments, especially the Lower Thames Crossing.
- 4.15.29 Similarly, given their scale and the need for much more civil engineering and building work (especially for the Lower Thames Crossing compared to Thurrock Flexible Generation Plant's installation of pre-manufactured components, it is considered likely that Thurrock Flexible Generation Plant's construction traffic generation would be a very minor contribution to cumulative impacts.
- 4.15.30 With regard to traffic generation, daily percentage increases in total traffic flows along the cumulative development flow links would be negligible, at up to 4% for total vehicles or 10% for heavy vehicles with the addition of Thurrock Flexible Generation Plant flows for the peak construction phase and cumulative development traffic. The much more significant and wide-ranging effects of the Lower Thames Crossing would not occur in the expected peak construction year for Thurrock Flexible Generation Plant of 2022. Should the Thurrock Flexible Generation Plant construction period overlap with that of the Lower Thames Crossing, the latter's impacts would outweigh the impact of Thurrock Flexible Generation Plant to such a degree that no significant cumulative effect arising from the contribution of Thurrock Flexible Generation Plant is predicted.
- 4.15.31 Construction of the Lower Thames Crossing would result in impacts on and greater fragmentation of populations of protected species, but it is expected that mitigation or compensation for significant effects would be provided. Thurrock Flexible Generation Plant and the Lower Thames Crossing together would result in a larger permanent loss of arable land that may be considered functionally linked land for birds associated with the Thames Estuary and Marshes protected site.
- 4.15.32 No significant adverse cumulative effects on designated sites of ecological protection due to air pollutant emissions are predicted.
- 4.15.33 As set out above, no significant contribution to the cumulative effect with Tilbury2, The Lower Thames Crossing and other cumulative developments by Thurrock Flexible Generation Plant is predicted for traffic and noise changes, and new exceedances of air pollutant concentrations air quality standards set to be protective of health would not be caused. No significant adverse cumulative impact on health due to Thurrock Flexible Generation Plant is therefore predicted.
- 4.15.34 The Lower Thames Crossing is considered likely to be a major visual feature in the landscape, adversely affecting character and views including those in north Kent. Taken together with other cumulative developments this is likely to represent a significant intensification of the developed and industrial character of the landscape setting around Thurrock Flexible Generation Plant. Within that context, given its significantly smaller land-take compared to the other cumulative developments collectively, Thurrock Flexible Generation Plant is considered to have a small incremental impact on the landscape and visual resources of the surrounding area, which would not be significant.
- 4.15.35 It is considered likely that there would be some significant effects on heritage assets and potentially archaeological assets from the cumulative developments, and as described above, there would be limited significant effects on heritage assets from Thurrock Flexible Generation Plant. In the context of the greater scale of the other developments, cumulative effects resulting from the combination with Thurrock Flexible Generation Plant are considered unlikely to be more significant than those created by the various other developments, which are already considered likely to be significant adverse.
- 4.15.36 All developments are required to consider flood risks to and from their sites, providing adequate mitigation as necessary, and to have safe storage of any potentially-polluting materials. No significant adverse cumulative effect of Thurrock Flexible Generation Plant with other developments is therefore predicted with respect to flood risk.
- 4.15.37 Thurrock Flexible Generation Plant is not predicted to cause adverse impacts due to ground contamination or on hydrogeology, and no cumulative impact with developments on other sites is therefore likely.

4.16 Conclusion

- 4.16.1 The proposed development is designed to meet a clear national need for flexible electricity generation infrastructure, with the location of the site chosen after

considering environmental sensitivities and land availability in the areas around suitable connection points to the national electricity and gas grids. Although on undeveloped Common Land in the Green Belt, the selected development site is immediately adjacent to a major National Grid substation and is in a landscape with substantial current and historical industrial use, including Tilbury Power Station and the Port of Tilbury.

- 4.16.2 The development layout, access routes, proposal for exchange Common Land and land for habitat creation and biodiversity enhancement have been designed iteratively with input from the assessments of potential environmental impacts. Appropriate mitigation has been included in the development design and secured through management plans for construction, ecology, landscaping and traffic.
- 4.16.3 The assessment of environmental impacts has concluded that no significant adverse effects are predicted, save for the following.
- 4.16.4 Baseline study and investigation to date has suggested the possibility of a significant adverse effect on buried archaeological remains if present, due to construction. This will be mitigated via a written scheme of further pre-construction investigation and recording of remains. A significant adverse effect on the setting of Tilbury Fort and the West Tilbury Conservation Area are predicted on the basis of their high sensitivity.
- 4.16.5 Loss of saltmarsh and intertidal mudflat habitats in the footprint of causeway construction is considered to be a significant adverse effect, albeit at a very local scale, due to the vulnerability and high value of these habitat types. This will be mitigated by new saltmarsh habitat creation and in the long term, a neutral or small beneficial effect would result. Similarly, the potential significant adverse effect of loss of grassland habitat on the main development site would be more than fully compensated for (with net biodiversity gain) by habitat creation and a significant beneficial long-term effect is predicted.
- 4.16.6 Extensive other development is occurring and being proposed for the area around Thurrock Flexible Generation Plant. The consented 'Tilbury2' expansion of the Port of Tilbury is under construction adjacent to the flexible generation plant site and the Lower Thames Crossing motorway development is proposed to the east, among other schemes.
- 4.16.7 Considering cumulative environmental effects of Thurrock Flexible Generation Plant with other consented and proposed developments, the only significant adverse effect to which Thurrock Flexible Generation Plant would make a relevant contribution is on air quality at a small number of locations in Tilbury and one location in Gravesend, but this is not predicted to lead to any new exceedance of air quality objectives, nor to delay compliance with the relevant air quality objective for nitrogen dioxide.

- 4.16.8 The proponents of other developments will have an equal duty to assess and where necessary mitigate significant cumulative impacts, and Thurrock Power is open to engagement with Highways England concerning the Lower Thames Crossing or with other developers where Thurrock Power's proposals for habitat creation or landscaping, for example, could contribute beneficially to a joined-up approach.

5. Environmental Statement Structure

Table 1: Environmental Statement structure.

Volume	Number	Title
-	-	Contents
-	-	Glossary, Acronyms and Units
1	-	Non-Technical Summary
2	Chapters	
	1	Introduction
	2	Project Description
	3	Consideration of Alternatives
	4	Environmental Impact Assessment Methodology
	5	Scoping and Consultation
3	Chapters	
	6	Landscape and Visual Resources
	7	Historic Environment
	8	Land Use, Agriculture and Socio-Economics
	9	Onshore Ecology
	10	Traffic and Transport
	11	Noise and Vibration
	12	Air Quality
	13	Human Health
	14	Climate Change
	15	Hydrology and Flood Risk
4	Chapters	
	18	Cumulative Effects Assessment Introduction and Screening

Volume	Number	Title
	19	Landscape and Visual Resources
	20	Historic Environment
	21	Land Use, Agriculture and Socio-Economics
	22	Onshore Ecology
	23	Traffic and Transport
	24	Noise and Vibration
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Volume	Number	Title
	9.3	Biodiversity Net Gain Assessment
	9.4	Foreshore Wintering Bird Surveys 2019-2020
	10.1	Transport Assessment
	11.1	Baseline Sound Monitoring Report
	11.2	BS4142:2014 Statements of Competence
	11.3	Construction Noise Assessment Methodology and Results
	11.4	Operational Noise Assessment Methodology and Results
	11.5	Standards and Guidance Relevant to Noise and Vibration
	12.1	Assessment of Air Quality Impacts on Ecological Receptors
	12.2	Baseline Air Quality Conditions
	12.3	Stack Height Determination
	12.4	Model Inputs and Outputs
	12.5	Results of Other Scenarios
	12.6	Assessment of Traffic-Related Emissions
	12.7	Assessment of Plume Visibility
	12.8	Further Analysis of Air Quality in Gravesend
	13.1	Health Baseline
	14.1	GHG Calculations
	14.2	Climate Change Risk
	15.1	Flood Risk Assessment
	15.2	Flood Zones and Model Data
	15.3	Surface Water Abstraction Licences, Discharge Consents and Pollution Incidents
	16.1	Phase 1 Preliminary Risk Assessment
	16.2	Phase 2 Site Investigation Report
	16.3	Team2100 Tilbury Ground Investigations
	17.1	Phase 1 Intertidal Survey Report and Benthic Ecology Desktop Review
	17.2	Hydrodynamic Modelling and Sediment Assessment

Volume	Number	Title
	17.3	Water Framework Directive Assessment
	17.4	Third Party Survey Reports

6. Description of Zones Used in the ES

6.1.1 For descriptive purposes, the Environmental Statement has divided the land within the application boundary into zones labelled A to J. These zones were illustrated in Figure 3.4 on page 7. Brief descriptions of each zone are as follows in Table 2.

6.1.2 Table 3 identifies the correspondence between zones and the Works that are listed in Schedule 1 of the Draft Development Consent Order, application document A3.1.

Table 2: Description of zones used in the Environmental Statement

Zone	Description of use
Zone A	The 'main development site' immediately north of Tilbury Substation, within which the principal buildings or structures of the proposed development would be constructed. The gas engines, batteries, electrical switchgear (customer substations), runoff attenuation, control room and staff parking would be within zone A.
Zone B	This is within the existing National Grid Tilbury Substation. The proposed development would connect to the 275 kV circuit at this substation via underground cables crossing from zone A into zone B.
Zone C	Zone C is a corridor of land south of the railway line in which the underground gas pipeline and a permanent access road would be constructed, between Station Road and the main development in zone A. The route of the access road and gas pipeline within this corridor would be defined following detailed design. Up to two hectares of zone C may also be used for laydown or temporary construction compounds, if required.
Zone D	Zone D comprises sections of agricultural fields within which the gas pipeline and National Grid gas connection compound would be constructed. The existing NTS 'Feeder 18' high pressure pipeline crosses zone D3.
Zone E	This zone north of the railway, currently agricultural land, is the area in which exchange Common Land would be provided together with a new footbridge and permissive path connection to Fort Road. A route for access from zone F to zone E, across the south of Parsonage Common, is provided for use during work to establish the Common Land and footbridge.
Zone F	Zone F, currently agricultural land and degraded grassland, will be used for habitat creation or enhancement to mitigate for the permanent loss of habitat within Zone A and other areas of the proposed development. Access routes for establishing and maintaining the habitat creation areas are provided from Cooper Shaw Road.
Zone G	This zone is a corridor for dredging and construction of a causeway in the Thames and construction of a road to the main development site for delivery of abnormal indivisible loads (AILs, primarily gas engine blocks) via roll-on roll-off barge and for access by other construction and operational traffic.

Zone H	Zone H comprises an existing private road through the former Tilbury B Power Station site and re-aligned private road, as consented for the Tilbury2 development, which would provide the primary access route for construction traffic (with the exception of AILs delivered via barge) from the new section of the A1089 public highway being constructed for Tilbury2.
Zone I	This section of public highway at Station Road is subject to a Traffic Regulation Order restricting access by vehicles >7.5t in weight, which would be rescinded temporarily to allow HGV traffic access to for construction of the gas connection compound in zone D3.
Zone J	A temporary public right of way would be created if necessary in this zone along the existing private road (where there is an existing marked recreational route). The temporary footpath would provide a diversionary route for Footpath 200 to Station Road if it is necessary the existing footpath to be stopped up temporarily where it crosses zone D1 for gas pipeline construction.

Table 3: Works in each zone

Zone	Work (see Schedule 1 of the draft DCO, application document A3.1)
A	1, 2, 3, 4, 8
B	3
C	4, 6, 7, 8
D	4
E	13, 14
F	2
G	9, 10, 11, 12
H	12
I	n/a
J	n/a

7. Glossary, Acronyms and Units

Table 4: Environmental Statement glossary.

Term	Definition
Abnormal indivisible loads	Loads or vehicles that exceed maximum vehicle weight, axle weight or dimensions as set out in the Road Vehicles (Construction and Use) Regulations 1986 as amended.
Above ground installation (AGI)	The infrastructure visible above ground at the connection point between Thurrock Flexible Generation Plant gas pipeline and Feeder 18 of the high-pressure National Transmission System. Also described as the National Grid gas connection compound.
Access Land	Land where the public have access either by legal right or by informal agreement.
Accident and emergency management procedures	Procedures that will be developed by Thurrock Power Ltd to minimise accident risks and respond to accidents or emergencies to protect health, safety and the environment.
Accretion	Accumulation of material
Agri-environment scheme	A government-funded scheme to encourage farmers to manage their land in an environmentally friendly way.
Alluvium	Unconsolidated (not cemented together into a solid rock) soil or sediment, which has been eroded, reshaped by water in some form, and redeposited in a non-marine setting.
Amphipod	Group of crustaceans
Anoxic	Water which does not hold any oxygen
Angiosperm	Flowering plant
Apex	The highest organism in the food chain
Application site	All land within the proposed Development Consent Order boundary.
Aquifer	A subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater.
Auger boring	A core of soil taken for examination to a depth of 1 m with a Dutch Combination hand auger.
Baseline studies	Work done to determine and describe the environmental conditions against which any future changes can be measured or predicted and assessed.
Best and most versatile land	The highest quality Grades 1, 2 and 3a agricultural land as determined by Defra.
Bioaccumulation	Gradual accumulation of substances in an organism through ingestion.
Bioavailability	The proportion of a substance which available to have an active effect.

Term	Definition
Biodiversity Action Plan (BAP)	The UK Government's response to the Convention on Biological Diversity, which the UK signed in 1992 in Rio de Janeiro and ratified in 1994. The Convention on Biological Diversity requires signatory countries to identify, develop and enforce action plans to conserve, protect and enhance biological diversity. The UK BAP addresses this requirement. Local BAPs have been produced by many counties, to detail measures to conserve, protect and enhance local/county biological diversity.
Biotope	The combination of physical environments and distinctive assemblages of species
Bioturbation	The disturbance of sedimentary deposits by living organisms
Birds Directive	Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.
Bivalve	A group of aquatic molluscs.
Briquetage	A coarse ceramic material used to make evaporation vessels and supporting pillars used in extracting salt from brine or seawater
Bronze Age	The time period 2,000 – 700BC.
Calcareous	Containing lime or being chalky.
Canadian Threshold Effects Levels (TEL)/ Probable Effect Level (PEL)	Threshold levels for concentrations of contaminants in aquatic sediments, developed by the Canadian Council of Ministers of the Environment.
Catchment Flood Management Plan	Catchment Flood Management Plans are documents produced by the Environment Agency to establish flood risk management policies which will deliver long term sustainable flood risk management across a catchment. They consider all types of inland flooding, from rivers, groundwater, surface water and tidal flooding within specific river basin district.
Catchments	An area that serves a watercourse with rainwater. Every part of land where the rainfall drains to a single watercourse is in the same catchment.
Cefas Action Level (AL1/AL2)	Cefas guideline action levels for the disposal of dredged material.
Characterisation	The process of identifying areas of similar landscape character, classifying and mapping them and describing their character.
Characteristics	Elements, or combinations of elements, which make a contribution to distinctive landscape character.
Code of Construction Practice (CoCP)	A document detailing the overarching principles of construction, contractor protocols, construction-related environmental management measures, pollution prevention measures, the selection of appropriate construction techniques and monitoring processes.
Compensation	Measures devised to offset or compensate for residual adverse effects which cannot be prevented/avoided or further reduced.

Term	Definition
Competent authority	The authority which determines the application for consent, permission, licence or other authorisation to proceed with a proposal. It is the authority that must consider the environmental information before granting any kind of authorisation.
Construction Environmental Management Plan (CEMP)	A document providing further detail of management measures to be employed during construction to avoid or minimise environmental impacts, following the principles and meeting the requirements set out in the CoCP. Construction Method Statements implementing the CoCP principles and requirements for particular construction activities may be collectively regarded as a CEMP.
Construction Method Statement	A description or plan for how a particular aspect of construction will be undertaken, including how CoCP principles and requirements and other relevant environmental commitments will be complied with for that activity.
Construction Traffic Management Plan (CTMP) and Construction Worker Travel Plan (CWTP)	Plans for managing all construction traffic, including protocols for delivery of Abnormal Indivisible Loads to site, personnel travel, measures for road cleaning and sustainable site travel measures.
Consultation bodies	Any body specified in the relevant EIA Regulations which the competent authority must consult in respect of an EIA, and which also has a duty to provide a scoping opinion and information.
Consultation Report	The Consultation Report records the consultation that has been undertaken, topics and issues raised by consultees, and how the applicant has responded.
Cropmark	A means through which sub-surface archaeological, natural and recent features may be visible from the air or a vantage point on higher ground.
Contaminant	Refers to the source of contamination (hazard).
Cumulative effects	The combined effect of Thurrock Flexible Generation Plant in combination with the effects from one or more other development projects on the same receptor or resource.
Cumulative impact	Impacts that result from reasonably foreseeable actions of other development projects together with Thurrock Flexible Generation Plant.
de minimis	An amount or impact that is immaterial or too small to be taken into consideration, often used in greenhouse gas accounting for very minor emission sources not appreciably affecting the total or within the bounds of other uncertainties.
Design envelope	A description of the range of possible elements that make up the Thurrock Flexible Generation Plant design options under consideration, as set out in detail in the project description. This envelope is used to define Thurrock Flexible Generation Plant for Environmental Impact Assessment (EIA) purposes when the exact engineering parameters are not yet known. This is also often referred to as the "Rochdale Envelope" approach.
Designated landscape	Areas of landscape identified as being of importance at International, national or local levels, either defined by statute or identified in development plans or other documents.
Development	A construction or engineering project, or a change to the consented operation of an existing facility.

Term	Definition
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Projects (NSIP).
Direct effect	An effect that is directly attributable to the proposed development.
Discharge consents	Consent granted by the Environment Agency to discharge into watercourses, subject to conditions.
'Do nothing' situation	Continued change or evolution in the baseline environment in the absence of the proposed development.
Drainage Board (DB)	Drainage Boards are an integral part of water level management in the UK. Each DB is a local public authority established in areas of special drainage need in England and Wales. They have permissive powers to manage water levels within their respective drainage districts. They undertake works to reduce flood risk to people and property and manage water levels to meet local needs.
Drainage Strategy	A document and drawings showing the outline ('concept') design for surface water drainage for Thurrock Flexible Generation Plant.
Driver delay	Delays incurred to the driver of vehicles as they move along the highway network.
Droughtiness	The assessment of the degree to which the shortage of soil water influences the range of crops which may be grown and level of yield that may be achieved.
Ecological Management Plan	A document detailing the management and protection of species and management or protection, enhancement or creation of habitats during the construction and operational phases of the proposed development.
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
EIA Directive	European Union Directive 85/337/EEC, as amended by Directives 97/11/EC, 2003/35/EC and 2009/31/EC and then codified by Directive 2011/92/EU of 13 December 2011 (as amended in 2014 by Directive 2014/52/EU).
EIA Regulations	The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended).
Elements (<i>landscape</i>)	Individual parts which make up the landscape, such as, for example, trees, hedges and buildings.
English Heritage	The Historic Buildings and Monuments Commission for England. Now replaced by Historic England.
Enhancement (<i>ecology</i>)	An ecological enhancement is the modification of a site which increases the site's capacity to support target plants or animals.
Enhancement (<i>landscape</i>)	Proposals that seek to improve the landscape resource and the visual amenity of the proposed development site and its wider setting, over and above its baseline condition.

Term	Definition
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Statement (ES).
Environmental Statement (ES)	A document reporting the findings of the EIA and produced in accordance with the EIA Directive as transposed into UK law by the EIA Regulations. <i>see also Preliminary Environmental Information Report (PEIR)</i>
European conservation site	A Special Area of Conservation (SAC) or candidate SAC, a Special Protection Area (SPA) or potential SPA, a site listed as a site of community importance or a Ramsar site.
European Protected Species (EPS)	The animal species listed in Annex IV(a) to the Habitats Directive and the plant species listed in Annex IV(b) to the Habitats Directive.
Environmental Quality Standard	The Environmental Quality Standard (EQS) is the threshold below which impacts on a habitat due to changes in air quality do not occur according to current knowledge. Three different EQS are referred to: critical level (a concentration – used in relation to gaseous pollutants), a critical load (CL, nutrient nitrogen deposition rate used in relation to pollutants deposited on the ground) and a critical load function (CLF – a description of deposition of acidifying compounds).
Eulittoral	Habitat formed on the lower shore of an aquatic ecosystem
Exceptions Test	The Exceptions Test ensures that development is permitted in flood risk areas only in exceptional circumstances and when strict qualifying conditions have been met. It is carried out if the Sequential Test demonstrates that a development cannot be located in areas of low flood risk.
Exchange Common Land	Land that will be designated as Common Land to replace that lost due to the proposed development.
Feature (<i>landscape</i>)	Particularly prominent or eye-catching elements in the landscape, such as tree clumps, church towers or wooded skylines, or a particular aspect of the project proposals.
Field drainage	Limiting the effect of flooding by maintaining surface water and land drainage systems.
Flood defences	A structure that is used to reduce the probability of floodwater affecting a particular area.
Flood Risk Assessment (FRA)	An evaluation of the baseline flood risk and effect as a result of Thurrock Flexible Generation Plant. The FRA sets out flood risk mitigation measures, as may be required.
Flood Zone 1	Low Probability Land having a less than 1 in 1,000 annual probability of river or sea flooding.
Flood Zone 2	Medium Probability Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.

Term	Definition
Flood Zone 3a	High Probability Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.
Flood Zone 3b	The Functional Floodplain. This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.
Fluvial flooding	Fluvial flooding occurs when rivers burst their banks as a result of sustained or intense rainfall.
Gabion wall	A cage, cylinder or box filled with rocks, concrete, or sometimes sand and soil for use in civil engineering, road building, military applications and landscaping.
Gas connection corridor (zones C and D)	The areas of land within which the buried gas pipeline route and connection to the National Transmission System (see also above ground installation) would be located. The exact location of the pipe route and connection compound is flexible within these zones, subject to further constraints study and agreements with third parties prior to construction.
geoarchaeological	a multi-disciplinary approach which uses the techniques and subject matter of geography, geology, geophysics and other Earth sciences to examine topics which inform archaeological knowledge and thought
Geology	The scientific study of the origin, history and structure of the earth.
Geotextile	Textile matting laid under aggregate to provide coherence and stability to a temporary road surface.
Greater Thames Estuary National Character Area	predominantly remote and tranquil landscape of shallow creeks, drowned estuaries, lowlying islands, mudflats and broad tracts of tidal salt marsh and reclaimed grazing marsh that lies between the North Sea and the rising ground inland
Green infrastructure	Networks of green spaces and watercourses and waterbodies that connect rural areas, villages, towns and cities.
Greenfield runoff rate	Rates of surface water runoff from a site that is undeveloped (greenfield).
Ground conditions	The chemical and physical characteristics of the soil at a particular location and how it has been affected by historical land uses.
Groundwater	All water which is below the surface of the ground in the saturated zone and in direct contact with the ground or subsoil.
Groundwater Source Protection Zone 1 (inner protection zone)	Any pollution that can travel to the borehole within 50 days from any point within the zone is classified as being inside zone 1. This zone also has a minimum 50m protection radius around the borehole and is designed to protect against the transmission of toxic chemicals and water-borne disease.
Groundwater Source Protection Zone 2 (outer protection zone)	The outer zone covers pollution that takes up to 400 days to travel to the borehole, or 25% of the total catchment area, whichever area is the biggest. This travel time is the minimum amount of time that pollutants need to be diluted, reduced in strength or delayed by the time they reach the borehole.

Term	Definition
Groundwater Source Protection Zone 3 (total catchment)	The total catchment is the total area needed to support removal of water from the borehole, and to support any discharge from the borehole.
Growthed	The application of traffic growth rates to traffic flows.
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.
Habitats Regulations Assessment (HRA)	A process which helps determine likely significant effects and (where appropriate) assesses adverse impacts on the integrity of European conservation sites and Ramsar sites. The process consists of up to four stages of assessment: screening, appropriate assessment, assessment of alternative solutions and assessment of imperative reasons of over-riding public interest (IROPI).
Health determinant	The range of behavioural, biological, socio-economic and environmental factors that influence the health status of individuals or populations.
Heritage	The historic environment and especially valued assets and qualities, such as historic buildings and cultural traditions.
Highway link	Length of highway.
Historic England	The Historic Buildings and Monuments Commission for England.
Historic Landscape Characterisation	Historic characterisation is the identification and interpretation of the historic dimension of the present-day landscape or townscape within a given area.
Holocene	The name given to the last 11,700 years* of the Earth's history
Impact	Change that is caused by an action; for example, land clearing (action) during construction which results in habitat loss (impact).
Indirect effects	Effects that result indirectly from the proposed project as a consequence of the direct effects, often occurring away from the site, or as a result of a sequence of interrelationships or a complex pathway. They may be separated by distance or in time from the source of the effects.
Infauna	The animals living in the sediments of the ocean floor or river.
Infralittoral	Region of shallow water closest to the shore in the marine environment
Inter-related effects	Multiple effects on the same receptor arising from Thurrock Flexible Generation Plant. These occur either where a series of the same effect acts on a receptor over time to produce a potential additive effect or where a number of separate effects, such as noise and habitat loss, affect a single receptor.
Intertidal area	The area between mean low water and mean high water.
Iterative design process	The process by which project design is amended and improved by successive stages of refinement which respond to a growing understanding of environmental issues.
Key characteristics	Those combinations of elements which are particularly important to the current character of the landscape and help to give an area its particularly distinctive sense of place.

Term	Definition
L _{A90}	Background noise level. The A-weighted sound level exceeded for 90% of the measurement duration.
L _{Aeq}	Noise parameter describing a sound level with the same energy content as the varying acoustic signal measured.
L _{Aeq,T}	L _{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A – weighted fluctuating sound measured over that period.
Land cover	The surface cover of the land, usually expressed in terms of vegetation cover or lack of it. Related to but not the same as land use.
Land use	What land is used for, based on broad categories of functional land cover, such as urban and industrial use and the different types of agriculture and forestry.
Landform	The shape and form of the land surface which has resulted from combinations of geology, geomorphology, slope, elevation and physical processes.
Landscape and Visual Impact Assessment (LVIA)	A tool used to identify and assess the likely significance of the effects of change resulting from the development both on the landscape as an environmental resource in its own right and on people's views and visual amenity.
Landscape character	A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse.
Landscape Character Areas	These are single unique areas which are the discrete geographical areas of a particular landscape type.
Landscape Character Assessment	The process of identifying and describing variation in the character of the landscape and using this information to assist in managing change in the landscape. It seeks to identify and explain the unique combinations of elements and features that make landscape distinctive. The process results in the production of a Landscape Character Assessment.
Landscape Character Types	These are distinct types of landscape that are relatively homogeneous in character. They are generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern, and perceptual and aesthetic attributes.
Landscape classification	A process of sorting the landscape into different types using selected criteria but without attaching relative values to different sorts of landscape.
Landscape effects	Effects on the landscape as a resource in its own right.
Landscape Management Plan (LMP)	A document detailing the proposed landscape planting and landscape enhancement measures. Can be combined with ecological management to be a Landscape and Ecology Management Plan (LEMP).
Landscape quality (condition)	A measure of the physical state of the landscape. It may include the extent to which a typical character is represented in individual areas, the intactness of the landscape and the condition of the individual elements.
Landscape receptors	Defined aspects of the landscape resource that have the potential to be affected by a proposal.

Term	Definition
Landscape strategy	The overall vision and objectives for what the landscape should be like in the future.
Landscape value	The relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a whole variety of reasons.
L _{AT} (DW)	Average 'A'-weighted downwind sound pressure level at receptor, where T indicates the averaging period (e.g. 12hr).
Laydown areas	Areas within the application boundary which may be used temporarily during the construction period for offloading and laydown or storage of construction materials, pre-manufactured components, or construction plant.
Lead Local Flood Authority (LLFA)	Lead Local Flood Authorities have responsibility for developing a Local Flood Risk Management Strategy for their area identifying local sources of flooding. The local strategy produced must be consistent with the national strategy. It will set out the local organisations with responsibility for flood risk in the area, partnership arrangements to ensure co-ordination between these organisations, an assessment of the flood risk, and plans and actions for managing the risk.
Lighters	A type of flat-bottomed barge
Lipophilic	Combines with / dissolves in fats.
List Entry Number	Reference number for entry in the National Heritage List.
Loam	Soil composed of sand, silt, and clay in relatively even concentration.
Local authority	A local authority is a body empowered by law to exercise various statutory functions for a particular area of the United Kingdom. These include unitary authorities and county, district or borough councils.
Local Biodiversity Action Plan (LBAP)	Local BAPs have been produced by many counties, to detail measures to conserve, protect and enhance local/county biological diversity.
Local highway authority	The public organisation responsible for the maintenance of local roads and consideration of the effects of proposed development projects on the road network.
Local Nature Reserve (LNR)	A local authority designation under the National Parks and Access to the Countryside Act 1949 (as amended), and in consultation with relevant statutory nature conservation agencies.
Local Wildlife Site (LWS)	Defined in local and structure plans under the Town and Country Planning system. The designation is a material consideration when planning applications are being determined.
Lower Super Output Area (LSOA)	Is a geographic area within a geographic hierarchy designed to improve the reporting of small area statistics in England and Wales.
Lower Thames Crossing (LTC)	The proposed development by Highways England of a new road crossing of the Thames to the east of the application site with possible link road to Tilbury Port passing to the north of the main development site.
L _s	Specific sound level.
L _w	Overall sound power level.

Term	Definition
Magnitude	A combination of the extent, duration, frequency and reversibility of an impact/effect.
Main development site (zone A)	The area of land within which the principal built elements of the flexible generation plant will be constructed, i.e. gas engines, batteries and substations.
Main river	The term used to describe a water course in respect of which the Environment Agency has permissive powers in relation to its management.
Major horizontal directional drilling (HDD) operations	Those being over 200 m in length. HDD refers to a technique for laying a pipe or cable underground by drilling laterally from the surface, rather than cutting an open trench.
Measures adopted as part of the project	Enhancement, mitigation or monitoring commitment (which may include process or design measures) intended to avoid, reduce and where possible, remedy significant adverse impacts of a development.
Medieval	The time period AD410 – AD1540.
Mesolithic	The time period 10,000 – 3,500BC.
Minor watercourses	The term used to describe a water course owned and operated by a local Drainage Board, a Lead Local Flood Authority or a private land owner.
Modern	The time period 1901 onwards.
NATA/WebTAG Methodology	A standard national approach to undertaking assessments of major transport infrastructure projects.
National Nature Reserve	Designated under the National Parks and Access to the Countryside Act 1949 (as amended) and Wildlife and Countryside Act 1981 (as amended). Support examples of some of the most important natural and semi-natural ecosystems in Great Britain. Managed to conserve habitats and species within them, and to provide scientific study opportunities.
National Policy Statement (NPS)	A document setting out national policy against which proposals for NSIPs will be assessed and decided upon.
National Transmission System (NTS) and Feeder 18	The network of high-pressure gas transmission pipes operated by National Grid Gas. Feeder 18 is the closest such pipe to the application site.
Nationally Significant Infrastructure Project (NSIP)	Large scale development including power generating stations which requires development consent under the Planning Act 2008. An offshore wind farm project with a capacity of more than 100 MW constitutes an NSIP.
Natura 2000	A coherent European ecological network of Special Areas of Conservation and Special Protection Areas.
Noise sensitive receptor	A component of the natural or man-made environment that is affected by a perceived change in noise level.
Non-statutory consultee	Organisations that a local planning authority and/or PINS may choose to engage with (if, for example, there are planning policy reasons to do so) who are not designated in law but are likely to have an interest in a proposed development.

Term	Definition
Non-statutory designated sites	Non-statutory designated sites are sites which have been designated due to their nature conservation interest, typically through the local planning process, which are usually protected by planning policies but not legally protected.
Oligochaete	Group of earthworms, can be in the marine environment
Operational assessment (transport)	The assessment of the degree to which a junction is operating within its theoretical capacity.
Order Limits	The boundary of the DCO application within which all temporary and permanent works for the proposed development would be undertaken.
Ordinary watercourses	A river, stream, ditch, cut, sluice, dyke or non-public sewer that is not a designated Main river, and for which the local authority has flood risk management responsibilities and powers.
Palaeoenvironmental	Of or pertaining to the environment at a particular time in the geologic past
Parameters	A limit or boundary which defines the scope of a particular process or activity.
Pathway	Route for the contaminant to move/migrate to receptor(s).
Pedestrian amenity	The convenience or comfort of movement on foot.
Pedestrian delay	Delay incurred to pedestrians moving from one side of a road to another.
Perception	Combines the sensory (that we receive through our senses) with the cognitive (our knowledge and understanding gained from many sources and experiences).
Phase 1 Preliminary Risk Assessment	A document which assesses the potential for contamination to be present which could significantly constrain the use of the site.
Photomontage	A visualisation which superimposes an image of a proposed development upon a photograph or series of photographs.
Planning Inspectorate (PINS or the Inspectorate)	The executive agency of the Ministry of Housing, Communities and Local Government responsible for operating the planning process for NSIPs.
Polychaete	Marine Bristle worms
Post-Medieval	The time period AD1540 to 1901.
Preliminary Environmental Information Report (PEIR)	The Preliminary Environmental Information Report (PEIR) presented the findings of Environmental Impact Assessment work undertaken to inform pre-application consultation during 2018.
Principal Aquifer	These formations provide a high level of water storage and may support water supply and / or river base flow on a strategic scale.
Priority habitats	UK Biodiversity Action Plan priority habitats are those identified as being the most threatened and requiring conservation action under the UK BAP.
Priority species	UK Biodiversity Action Plan priority species were those that were identified as being the most threatened and requiring conservation action under the UK BAP.
Predicted environmental concentration	The term used in air quality assessments of industrial processes to describe the concentration or deposition of a pollutant (i.e. process contribution (PC) plus baseline).

Term	Definition
Process contribution	The term used in air quality assessments of industrial processes to describe the incremental impact of the proposed development on the concentration or deposition flux of a pollutant.
Project description	A description of the design envelope, construction process, activity in operation and future decommissioning options for Thurrock Flexible Generation Plant.
Ramsar Convention	The Convention on Wetlands of International Importance especially as Waterfowl Habitat of 2 February 1971 (as amended) which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.
Ramsar site	Wetlands of international importance, designated under the Ramsar Convention.
Ratio of flow to capacity (RFC)	A measure of the operational performance of one arm of a junction calculated as the number of vehicles using an arm of a junction divided by the theoretical maximum number of vehicles that are able to use the arm during a specified period.
Receptor	The environmental or social feature that could be affected by an impact.
Relevant planning authority	A relevant planning authority is the local authority in respect of an area within which a project is situated, as set out in Section 173 of the Planning Act 2008. relevant planning authorities may have responsibility for discharging requirements and some functions pursuant to the Development Consent Order, once made. The relevant planning authority in this case is Thurrock Borough Council.
River Basin Management Plan	River Basin Management Plans describe the current state of the water environment in the river basin district. It sets out what improvements are possible by 2015 and how the actions will make a difference to the local environment - the catchments, estuaries, the coast and groundwater.
Roman	The time period AD43 – AD410.
Ro-ro barge	A 'roll-on, roll-off' barge with a loading ramp that allows vehicles to drive off it when docked at a suitable point rather than requiring cranes to unload cargo.
Scope 1	Scope 1 greenhouse gas emissions are those released directly by the entity being assessed, e.g. from combustion of fuel at an installation.
Scope 2	Scope 2 greenhouse gas emissions are those caused indirectly by consumption of imported energy.
Scope 3	Scope 3 greenhouse gas emissions are those caused indirectly, not defined in scopes 1 or 2.
Scoping	The process of identifying the issues to be addressed by an EIA. It is a method of ensuring that an EIA focuses on the impacts likely to give rise to significant effects.
Secondary A Aquifer	These formations are formed of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers.

Term	Definition
Secondary B Aquifer	These formations are generally formed of lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.
Secondary Undifferentiated Aquifer	These formations have varying characteristics in different locations.
Section 47 consultee	Consultees identified in the Thurrock Flexible Generation Plant Statement of Community Consultation (SoCC), including the local community. Once the SoCC is finalised, the applicant has a duty under Section 47 of the Planning Act 2008 to carry out the consultation in accordance with that document.
Sensitivity	The extent to which a receptor can accept a change, of a particular type and scale.
Sequential Test	A Sequential Test aims to steer new development to areas with the lowest probability of flooding by recommending that development is not allocated if there are reasonably available sites appropriate to the proposed development in areas with a lower probability of flooding.
Serious personal injury accident	An accident leading to serious injuries requiring hospital treatment.
Severance	Real or perceived difficulties moving between one part of a community to another.
Shoreline Management Plan	A Shoreline Management Plan is a large-scale assessment of the risks associated with coastal processes and sets out a policy framework to address these risks to people and the developed, historic and natural environments. Coastal processes include tidal patterns, wave height, wave direction and the movement of beach and seabed materials.
Shuttle working	The use of either manual control or traffic signals to allow alternate traffic streams to pass through a length of highway where the width is reduced and insufficient to allow two vehicles to pass each other.
Significance	The significance of an effect combines the evaluation of the magnitude of an impact and the sensitivity of the receptor.
Site of Importance for Nature Conservation	Alternative title to Wildlife Site, as defined below. Defined in local and structure plans under the Town and Country Planning system. The designation is a material consideration when planning applications are being determined.
Site of Nature Conservation Importance	Alternative title to Wildlife Site, as defined below. Defined in local and structure plans under the Town and Country Planning system. The designation is a material consideration when planning applications are being determined.
Sites of Special Scientific Interest (SSSI)	Sites designated by Natural England under the Wildlife and Countryside Act 1981 (as amended) as areas of land of special interest by reason of any of their flora, fauna, or geological or physiographical features.
Slight accident (<i>transport</i>)	An accident leading to slight injuries which are defined as cuts, bruises or sprains requiring roadside attention but not normally requiring admission to hospital.
Soundplan	Acoustic modelling and prediction software.

Term	Definition
Special Areas of Conservation	A site of Community importance designated under Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora through a statutory, administrative and/or contractual act where the necessary conservation measures are applied for the maintenance or restoration, at a favourable conservation status, of the natural habitats and/or the populations of the species for which the site is designated.
Special Protection Area (SPA)	An area which has been identified as being of international importance and designated under Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds for the breeding, feeding, wintering or the migration of rare and vulnerable bird species found within European Union countries.
Statement of Community Consultation (SoCC)	This details the approach to consultation proposed by the applicant and agreed with Thurrock Borough Council.
Statutory consultee	Organisations that are required to be consulted by a local planning authority and/or PINs, and who also have with a duty to respond to that consultation within a set deadline. This includes consultees that the applicant is required to consult with, under Section 42 of the Planning Act 2008. Not all consultees will be statutory consultees (see non-statutory consultee definition).
Statutory designated sites	Sites which have been designated under UK and in some cases European or international legislation which protects areas identified as being of special nature conservation importance.
Strategic Flood Risk Assessment	A Strategic Flood Risk Assessment provides information on areas at risk from all sources of flooding.
Subtidal	Area of the seabed which is covered by water all the time.
Surface water resources	Water on the surface of the land such as in a river, lake, wetland, or ocean.
Surface water runoff	Surface water runoff is flow of water that occurs when excess storm water, meltwater, or other sources of water flows over a surface.
Susceptibility (<i>landscape</i>)	The ability of a defined landscape or visual receptor to accommodate the specific proposed development without undue negative consequences.
Sustainable urban drainage systems (SuDS)	A sequence of management practices and control measures designed to mimic natural drainage processes by allowing rainfall to infiltrate, and by attenuating and conveying surface water runoff slowly at peak times.
The Secretary of State for Business, Energy and Industrial Strategy	The decision maker with regard to Thurrock Power Ltd's application for Development Consent.
Thurrock Power Ltd or the applicant	The company developing Thurrock Flexible Generation Plant. Thurrock Power Ltd is a subsidiary of Statera Energy Ltd, which has developed a number of flexible generation plants around the UK.
Tidal (coastal) flooding	Tidal flooding is caused by extreme tidal conditions including high tides and storm surges, overtopping local flood defences or coastal features.

Term	Definition
Tilbury Energy Centre (TEC)	The formerly proposed development by RWE of a new power station on part of the Tilbury Power Station site with 2.5 GW combined cycle gas turbine and 300 MW open cycle gas turbine generating capacity plus battery storage. This proposal has now been withdrawn.
Tilbury National Grid Substation	The existing National Grid Tilbury 275 / 400 kV substation to which Thurrock Flexible Generation Plant will connect via underground cables.
Tilbury Power Station	Decommissioned coal-fired power station to the south of Thurrock Flexible Generation Plant, presently undergoing demolition.
Tilbury2	The consented development of an extension to Tilbury Port on land immediately west of Tilbury B Power Station together with new highway and improvements to existing highways.
Time depth	Historical layering – the idea of landscape as a palimpsest, a much written over manuscript.
Townscape	The character and composition of the built environment including the buildings and the relationship between them, the different types of urban open space, including green spaces, and the relationship between buildings and open spaces.
TRACK Analysis	Computer modelling of area taken up by a moving vehicle.
Traffic growth rate	An estimate of the rate of change in traffic flows from one year to another year.
Tranquillity	A state of calm and quietude associated with peace, considered to be a significant asset of landscape (as defined in GLVIA3).
Transboundary	Crossing into other European Economic Association (EEA) States.
Transport Assessment	A Transport Assessment is a comprehensive and systematic process that sets out transport issues relating to a proposed development. It identifies what measures will be taken to deal with the anticipated transport impacts of the scheme and to improve accessibility and safety for all modes of travel, particularly for alternatives to the car such as walking, cycling and public transport.
Treated effluent	Water that has received primary, secondary or advanced treatment to reduce its pollution or health hazards and is subsequently released from a wastewater facility after treatment.
Trip assignment	The routes that vehicles take between a site and other areas.
Trip distribution	The proportion of vehicle trips between a site and other areas.
Trip generation	The number of vehicle movements into and out of a development.
Trunk road	A trunk road is a road maintained by a national government body, as distinct from the great majority of roads, which are maintained by local Highway Authorities.
UK Climate Projections 2018 (UKCP18)	Climate projections expressed in terms of absolute values or changes from a baseline period. A projection of the response of the climate system to emission scenarios of greenhouse gases and aerosols, or radiative forcing scenarios based upon climate model simulations and past observations.
Unproductive strata	These formations have a low permeability and have negligible significance for water supply or base flow.

Term	Definition
Upper Palaeolithic	The time period 30,000 – 10,000BC.
Vibration	Vibration is an oscillatory motion. The magnitude of vibration can be defined in terms of displacement how far from the equilibrium something moves, velocity (how fast something moves), or acceleration (the rate of change of velocity).
Visual amenity	The overall pleasantness of the views people enjoy in their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of the people living, working, recreating, visiting or travelling through an area.
Visual effects	Effects on specific views and on the general visual amenity experienced by people.
Visual receptors	Individuals and/or defined groups of people who have the potential to be affected by a proposal.
Visualisation	A computer simulation, photomontage or other technique illustrating the predicted appearance of a development.
Water quality	The physical, chemical and biological characteristics of water.
Wildlife Site	Local authority designation for sites of local conservation interest. Designation criteria can vary between areas, as can titles which include Local Wildlife Site, Local Nature Conservation Site, Site of Importance for Nature Conservation or Site of Nature Conservation Importance. They are defined in local and structure plans under the Town and Country Planning system.
Windowless Sampling	A specialist sampling technique that involves a narrow steel tube with a plastic liner, being driven into the ground in order to retrieve a sample.
Woodland	As described under the Phase 1 habitat survey guidelines (JNCC, 2010); vegetation dominated by trees more than 5 m high when mature, forming a distinct, although sometimes open, canopy. In accordance with Natural England's guidelines for Environmental Stewardship (Natural England, 2013, native woodland is defined as a group of trees with overlapping canopies covering at least 0.1 ha, at least half of which are native species.
Works areas	The areas within which all works associated with the construction, operation and decommissioning of the proposed Flexible Generation Plant are undertaken, including access, drainage and landscaping.
Written Scheme of Investigation (WSI)	A plan detailing the protocol for any archaeological investigation to be carried out prior to the construction of Thurrock Flexible Generation Plant, including procedures for field survey and watching briefs, as may be required.
Zone A	The 'main development site' immediately north of Tilbury Substation, within which the principal buildings or structures of the proposed development would be constructed. The gas engines, batteries, electrical switchgear (customer substations), runoff attenuation, control room and staff parking would be within zone A.
Zone B	This is within the existing National Grid Tilbury Substation. The proposed development would connect to the 275 kV circuit at this substation via underground cables crossing from zone A into zone B.

Term	Definition
Zone C	Zone C is a corridor of land south of the railway line in which the underground gas pipeline and a permanent access road and would be constructed, between Station Road and the main development in zone A. The route of the access road and gas pipeline within this corridor would be defined following detailed design. Up to two hectares of zone C may also be used for laydown or temporary construction compounds, if required.
Zone D	Zone D comprises sections of agricultural fields within which the gas pipeline and National Grid gas connection compound would be constructed. The existing NTS 'Feeder 18' high pressure pipeline crosses zone D3.
Zone E	This zone north of the railway, currently agricultural land, is the area in which exchange Common Land would be provided together with a new footbridge and permissive path connection to Fort Road. A route for access from zone F to zone E, across the south of Parsonage Common, is provided for use during work to establish the Common Land and footbridge.
Zone F	Zone F, currently agricultural land and degraded grassland, will be used for habitat creation or enhancement to mitigate for the permanent loss of habitat within Zone A and other areas of the proposed development. Access routes for establishing and maintaining the habitat creation areas are provided from Cooper Shaw Road.
Zone G	This zone is a corridor for dredging and construction of a causeway in the Thames and construction of a road to the main development site for delivery of abnormal indivisible loads (AILs, primarily gas engine blocks) via roll-on roll-off barge and for access by other construction and operational traffic.
Zone H	Zone H comprises an existing private road through the former Tilbury B Power Station site and re-aligned private road, as consented for the Tilbury2 development, which would provide the primary access route for construction traffic (with the exception of AILs delivered via barge) from the new section of the A1089 public highway being constructed for Tilbury2.
Zone I	This section of public highway at Station Road is subject to a Traffic Regulation Order restricting access by vehicles >7.5t in weight, which would be rescinded temporarily to allow HGV traffic access to for construction of the gas connection compound in zone D3.
Zone J	A temporary public right of way would be created if necessary in this zone along the existing private road (where there is an existing marked recreational route). The temporary footpath would provide a diversionary route for Footpath 200 to Station Road if it is necessary for the existing footpath to be stopped up temporarily where it crosses zone D1 for gas pipeline construction.
Zone of Theoretical Visibility (ZTV)	A map, usually digitally produced, showing areas of land within which a development is theoretically visible (considering terrain, but not intervening structures, vegetation &c).

Table 5: Environmental Statement acronyms.

Acronym	Description
A/HMWB	Artificial and heavily modified water bodies
AA	Appropriate Assessment
AADT	Annual average daily traffic
AC	Ambient concentration
ADMS	Atmospheric Dispersion Modelling System
AEP	Annual event probability
AGI	Above ground installation
AGL	Above ground level
AILs	Abnormal indivisible loads
ALC	Agricultural Land Classification
aOD	Above Ordnance (Survey) Datum
AONB	Area of Outstanding Natural Beauty
AoS	Appraisal of Sustainability (undertaken on all of the NPSs)
APC	Air pollution control
APIS	Air Pollution Information System
AQAL	Air quality assessment level
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
ATC	Automatic traffic counter
BAP	Biodiversity Action Plan
BAT	Best Available Technology
BSS	Bed shear stress
BC	Borough Council
BEIS	Department for Business, Energy and Industrial Strategy
bgl	Below ground level
BGS	British Geological Survey
BMV	Best and most versatile
BPM	Best practicable means

Acronym	Description
BoCC	Birds of conservation concern
BRC	Biological Records Centres
BS	British Standard
BSP	Bulk supply point (substation)
CA	Conservation Area
CBM	Ceramic building material
CC	County Council
CCG	Clinical Commissioning Group
CCGT	Combined cycle gas turbine
CCR	Carbon capture readiness
CCS	Carbon capture and storage
CD	Chart Datum
CEA	Cumulative Effect(s) Assessment
CEMP	Construction Environmental Management Plan
CERC	Cambridge Environmental Research Consultants
CFMP	Catchment Flood Management Plan
CHD	Coronary heart disease
CHP	Combined heat and power
CIEEM	Chartered Institute for Ecological and Environmental Management
CIRIA	Construction Industry Research and Information Association
CITB	Construction Industry Training Board
CL	Critical load or critical level (as applicable)
CLF	Critical load function
CLR	Contaminated Land Regulations
CoCP	Code of Construction Practice
COMAH	Control of Major Accident Hazards
CoPA	Control of Pollution Act
COPD	Chronic obstructive pulmonary disease

Acronym	Description
CPRE	Campaign to Protect Rural England
CRTN	Calculation of Road Traffic Noise
CSM	Conceptual site model
CSSP	Core Strategic Spatial Policy
CSTP	Core Strategic Thematic Policy
CTMP	Construction Traffic Management Plan
CWS	County Wildlife Site
DB / IDB	(Internal) Drainage Board
DBT	Dibutyltin
DCLG	(former) Department for Communities and Local Government
DCMS	Department of Digital, Culture, Media and Sport
DCO	Development Consent Order
DECC	(former) Department of Energy and Climate Change
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
DMMP	Dust Management and Monitoring Plan
DML	Deemed Marine Licence
DSM	Digital surface model
DNO	Distribution network operator
EA	Environment Agency
EAL	Environmental assessment level
ECC	Essex County Council
EclA	Ecological Impact Assessment
ECoW	Ecological Clerk of Works
EEA	European Economic Association
EHHER	Essex Historic Environment Record
EIA	Environmental impact assessment

Acronym	Description
EMP	Ecological Management Plan
END	Environmental Noise Directive
EPA	Environmental Protection Act 1990, Part III
EPS	European protected species
EPUK	Environmental Protection UK
EQS	Environmental quality standard
ES	Environmental Statement
ETS	Emissions Trading Scheme
EWG	Expert Working Group
EQSD	Environmental Quality Standards Directive
FGD	Flue gas desulphurisation
FM	Flexible mesh
FRA	Flood Risk Assessment
FRP	Flood Response Plan
FRAP	Flood Risk Activity Permit
FTE	Full time equivalent
GBC	Gravesham Borough Council
GCN	Great crested newt (<i>in Chapter 9: Ecology</i>)
GCN	Guidelines for Community Noise (<i>in Chapter 11: Noise and Vibration</i>)
GCS	Good Chemical Status
GES	Good Environmental Status
GLVIA3	Guidelines for Landscape and Visual Impact Assessment; Third Edition (2013)
GSP	Grid supply point
GWP	Global warming potential
GVA	Gross value added
HD	Hydrodynamic
HDD	Horizontal directional drilling
HDV	Heavy duty vehicle
HE	Highways England (<i>in Chapter 10: Transport</i>)

Acronym	Description
HE	Historic England (<i>in Chapter 7: Heritage</i>)
HER	Historic Environment Record
HGV	Heavy goods vehicle
HHRA	Human Health Risk Assessment
HIA	Health Impact Assessment
HLC	Historic landscape character/characterisation
HLE	Healthy life expectancy
HM	Her Majesty's
HRA	Habitats Regulations Assessment
HRAR	Habitats Regulations Assessment Report
HSI	Habitat suitability index
IAQM	Institute of Air Quality Management
IBA	Important bird area
ICNIRP	International Commission on Non-Ionising Radiation Protection
IED	Industrial Emissions Directive
IEF	Important ecological feature
IEA	Institute of Environmental Assessment
IEMA	Institute of Environmental Management and Assessment
IMD	Index of Multiple Deprivation
INNS	Invasive non-native species
IROPI	Imperative reasons of overriding public interest
IPC	Infrastructure Planning Commission
ISO	International Organisation for Standardisation
JNCC	Joint Nature Conservation Committee
LA	Local authority
LAQM	Local air quality management
LBAP	Local Biodiversity Action Plan
LCA	Landscape Character Assessment
LCAs	Landscape character areas

Acronym	Description
LCTs	Landscape character types
LDA 1991	Land Drainage Act 1991
LGS	Local geodiversity sites
LiDAR	Light detecting and ranging
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LOAEL	Lowest observed adverse effect level
LSOA	Lower super output area
LWS	Local Wildlife Site
LPA	Local planning authority
LTC	Lower Thames Crossing
LTP	Local transport plan
L VIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Sites
MAFF	(former) Ministry of Agriculture, Fisheries and Food
MarESA	Marine evidence based sensitivity assessment
MarLIN	Marine Life Information Network
MCZ	Marine Conservation Zone
MCAA	Marine and Coastal Access Act
MHCLG	Ministry of Housing, Communities and Local Government
MHWN	Mean high water neaps
MHWS	Mean high water springs
MLWS	Mean low water springs
MMO	Marine Management Organisation
MPS	Marine Policy Statement
NCA	National Character Area
NCR	National Cycle Route
NE	Natural England
NERC	Natural Environment and Rural Communities (2006 Act)

Acronym	Description
NHLE	National Heritage List for England
NIC	National Infrastructure Commission
NISM	Notification of inadequate system margin
NNG	Night Noise Guidelines
NNR	National Nature Reserve
NOEL	No observed effect level
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPSE	National Policy Statement for England
NSIP	Nationally Significant Infrastructure Project
NSR	Noise-sensitive receptor
NTS	National Transmission System
NVC	National vegetation classification
NVQ	National Vocational Qualification
OCGT	Open cycle gas turbine
ODN	Ordnance datum Newlyn
OEMP	Outline Ecological Management Plan
OHL	Overhead (power) line
ONS	Office of National Statistics
ORC	Organic Rankine cycle
OS	Ordnance Survey
PAH	Polycyclic aromatic hydrocarbons
PC	Process contribution(s)
PCBs	Polychlorinated biphenyls
PEA	Preliminary Ecological Appraisal
PEC	Predicted environmental concentrations
PEIR	Preliminary Environmental Information Report
PEL	Probable effect level
PFA	Pulverised fuel ash

Acronym	Description
PHE	Public Health England
PIA	Personal injury accident
PINS	Planning Inspectorate
PLA	Port of London Authority
PM	Particulate matter
PMD	Policy for Management and Development
PoTLL	Port of Tilbury London Limited
PPE	Personal protective equipment
PPG	Planning Practice Guidance
PRoW	Public right of way
PSA	Particle size analysis
PSCA	Population size class assessment
RBMP	River Basin Management Plan
rMCZ	Recommended Marine Conservation Zone
RMA	Risk Management Authority
RoRo	Roll on, roll off
ROWIP	Right of Way Improvement Plans
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SAAR	Standardised average annual rainfall
SAR	Standardised Admissions Ratio
SCR	Selective catalytic reduction
SEESA	South-East Electricity Substation Alliance
SE MPA	South East Marine Plan Area
SFRA	Strategic Flood Risk Assessment
SIR	Standardized incidence ratio
SM	Scheduled Monument
SMC	Scheduled Monument Consent
SOAEL	Significant observed adverse effect level

Acronym	Description
SOC	Standard occupation classifications
SoCC	Statement of Community Consultation
SoP	Standard of protection
SoS	Secretary of State
SPA	Special Protection Area
SPD/SPG	Supplementary Planning Document/Supplementary Planning Guidance
SPZ	Source Protection Zone
SSC	Suspended sediment concentration
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
TBT	Tributyltin
TEC	Tilbury Energy Centre
TEL	Threshold effects level
TEMPRO	Trip End Model Presentation Programme
THC	Total hydrogen content
TLDF	Thurrock Local Development Framework
TMMSS	Thames Marine Mammal Sighting Survey
TT	Total tide
TTD	Thames Tidal Defences
UKBAP	UK Biodiversity Action Plan
UKAS	United Kingdom Accreditation Service
UKCP09/18	UK Climate Projections 2009 or 2018
UKHO	United Kingdom Hydrographic Office
UXO	Unexploded Ordnance
VER	Valued ecological receptor
VOC	Volatile organic compounds
WCA 1981	The Wildlife and Countryside Act 1981 (as amended)
WebTAG	Web Transport Analysis Guidance
WFD	Water Framework Directive

Acronym	Description
WHO	World Health Organisation
WID	Water injection dredging
WRA 1991	Water Resources Act 1991
WRMP	Water Resource Management Plan
WSI	Written Scheme of Investigation
Zol	Zone of influence
ZSL	Zoological Society for London
ZTV	Zone of theoretical visibility

Table 6: Environmental Statement units.

Unit	Description
° C	Degrees Celsius (temperature)
dB	Decibel (acoustic)
ft	Feet (distance)
g.s ⁻¹	Grams per second (mass emission rate)
ha	Hectare (10,000 m ²)
Hz	Hertz, cycles per second (frequency)
kg	Kilogram
kg/m ³	Bulk density – kilogrammes per metre cubed
km	Kilometre (distance)
kV	Kilovolt (electrical potential)
kW, MW, GW	Kilowatt, megawatt, gigawatt (power)
kWh, MWh, GWh	Kilowatt-hours, megawatt-hours, gigawatt-hours (total power during a period of time)
MW _e	Megawatt electrical (thermal power generator electrical output)
MW _{th}	Megawatt thermal (thermal power generator fuel input)
m	Metre (distance)
m ²	Metres squared (area)
m ³	Metres cubed (volume)
m aOD	Meters above Ordnance Survey datum
mg/kg	Milligram per kilogram (concentration)
mg/kg DW	Milligram per kilogram dry weight (concentration)
mph	Miles per hour (velocity)
mm/s	Millimetres per second (velocity of vibration)
m.s ⁻¹	Metres per second (velocity)
m ³ .s ⁻¹	Volumetric flow per second
N/m ²	Newtons per metre squared (pressure)
phi	Grain diameter (size)
t	Tonne (weight)
tCO ₂ e	Tonnes of carbon dioxide equivalent, i.e. greenhouses gases expressed as carbon dioxide based on their global warming potential

µg/kg	Microgram per kilogram (concentration)
µg.m ⁻³	Micrograms per cubic metre (concentration)
x, y	Grid coordinates, usually British National Grid or other co-ordinate system as specified
"	Inches (distance)