

PROPOSED EXTENSION AT BARKING POWER STATION

ENVIRONMENTAL STATEMENT

Non-technical Summary

July 2006

BARKING
P O W E R

This document is the Non-Technical Summary of an Environmental Statement prepared for Barking Power Limited to support its application to the Secretary of State for Trade and Industry for consent to construct and operate an electricity generating station at Chequers Lane, Dagenham, Essex. The Environmental Statement is a comprehensive technical document that may be purchased from Barking Power Limited at the address below at a cost of £70. A copy of this Non-Technical Summary may be obtained free of charge from Barking Power Limited and the project's web site at <http://www.barkingx.info/>

Copies of the Environmental Statement have been placed on deposit at the following locations where members of the public may examine them during normal office hours:

London Borough of Barking and Dagenham
Spatial Regeneration
Ground Floor
Town Hall
Barking
IG11 7LU

Barking Power Limited
Administration Building
Barking Power Station
Chequers Lane
Dagenham
Essex RM9 6PF

London Borough of Barking and Dagenham
Central Library Unit 53
Vicarage Field Shopping Centre
Ripple Road
Barking
IG11 8DQ



Existing station (dark green) Barking extension (light green)

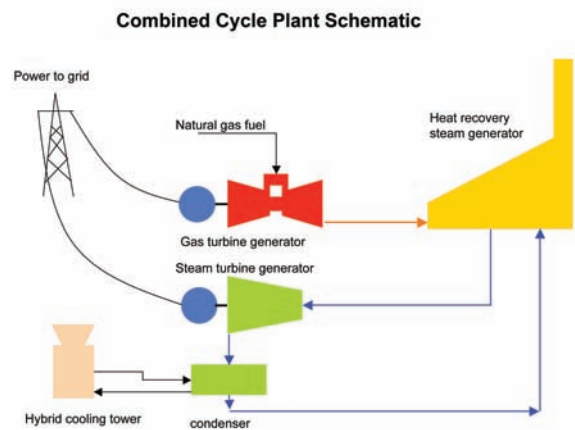
BACKGROUND

Barking Power Limited owns Barking Power Station, a gas-fired electricity generating station of 1000 megawatt (MW) capacity located at Chequers Lane, Dagenham.

Barking Power Station consists of two blocks of combined cycle gas turbine (CCGT) plant. Natural gas, the principal fuel, is supplied at high pressure through a buried pipeline connecting with the National Transmission System.

Barking Power Station has provided electricity to the National Grid since it was commissioned in 1995 and is the largest power station in Greater London, an area short of power generation. The infrastructure in the area can easily support additional gas-fired electricity generation. An application to build an extension to Barking Power Station was submitted to the Secretary of State in 1997. This has not been determined since the lifting of the moratorium on new generation stations following the Government's review of the coal industry, and has been withdrawn. The area has seen considerable change since 1995, with

improvements in transport infrastructure and several major developments completed and proposed.



THE PROJECT

The project (designated Barking Extension) involves construction of a new CCGT block of 470MW nominal capacity.

The new CCGT block would comprise 1 large gas turbine, a waste heat boiler (also known as a heat recovery steam generator), 1 steam turbine, generators and associated plant. The waste heat boiler would have a steel chimney and a second smaller chimney would allow flexible operation of the new block. A buried cable would take the electrical power from the new CCGT to the existing National Grid substation in Renwick Road. Provision to extract heat in the form of low-pressure steam would be made so that the new CCGT block could operate as a combined heat and power (CHP) plant. Space would be allowed for heat exchangers enabling hot water to be made available to new developments and associated district heating schemes in the area.

Barking Extension would share some services with the existing Barking Power Station, and would use gas from the existing high-pressure gas pipeline supplying the Station.

The new CCGT would be constructed on a site adjoining Barking Power Station. An experienced engineering, procurement and construction

contractor would carry out all the design and construction. A temporary construction area to lay down materials and equipment prior to building the new plant, and provide parking during construction, would be set up on a nearby site to the west.



PROJECT RATIONALE & ALTERNATIVES

There is an ongoing need for new generation capacity in the country at large and more specifically in the London area.

Many of the existing coal and nuclear generating stations are coming to the end of their working lives. The Government's Energy Review has made clear that all options for providing power need to be considered. Recent concerns over security of supplies, and rises in oil and gas prices, coupled with increasing pressures to develop low carbon generating sources, have raised the profile of the nuclear option. However, even if the decision was made today to commit to new nuclear stations, there is little prospect that they would be ready within 10 years. Some new generation will be based on renewable sources of power (mainly wind and biomass). These may be supplemented with emerging technologies such as domestic or micro combined heat and power together with more conventional CHP sources. However, even with energy saving measures such as better insulation and more efficient domestic and industrial heating systems, there will be a requirement for new thermal power generation. CCGTs, with efficiencies of 55% (or higher when

operated as CHP plant), represent the best available technology for thermal power generation.

There are a number of benefits that make the site adjacent to Barking Power Station a particularly favourable location for additional gas fired generation capacity:

- The existing buried natural gas pipeline has sufficient capacity for an additional 470MW of generation.
- A National Grid 400kV substation is available for connection approximately 2 km from the site.
- Some services can be obtained from the existing station with virtually no environmental effects
- Sufficient area is available for a CCGT extension.
- The site has good road access being close to the A13.
- The site has access to back-up fuel storage.

ENVIRONMENTAL STATEMENT & CONSENT

The Electricity Act 1989 requires that consent be obtained to construct or extend, and operate an electricity generation station of more than 50MW capacity; this is usually referred to as Section 36 consent.

Provision is made in the legislation for planning permission to be granted by a direction of the Secretary of State at the same time as Section 36 consent. The relevant regulations require that an Environmental Statement (ES) be prepared to support a Section 36 application. The ES sets out information on the environmental effects of the project so that the Secretary of State can take these into account when determining consent. This document is a Non-Technical Summary of the ES.

Barking Power is a statutory undertaker and, as such, entitled to lay electric cables under highways. An assessment of the environmental effects of laying and operating the cable is included in the ES.

The ES also includes an assessment of the environmental effects of the temporary use of a nearby site for construction purposes.

Operation of Barking Extension would require a permit in accordance with Integrated Pollution Prevention and Control (IPPC). The necessary permit would be applied for in due course as a separate matter to the Section 36 consent.

As part of the application for Section 36 consent, a comprehensive investigation has been undertaken of the available and future opportunities for using CHP in the area. The planned configuration delivers a heat output of about 100MW (as hot water), which could be supplied at low cost at the boundary of the generating station. Today there are no potential heat users who can be economically supplied but this situation is expected to change in the next few years with projects such as the Barking Riverside and Barking Town Centre Re-generation. Barking Extension is therefore to be developed as a conventional electricity generation project, but with the capability of conversion to CHP when suitable heat loads have been developed.

PROJECT DESCRIPTION

The proposed Barking Extension would occupy an area of about 3 hectares to the east of Chequers Lane, and immediately to the south of Barking Power Station

This site is vacant, previously having been used as dry goods storage. The existing structures on the site would be demolished as part of the project. An existing warehouse within the Barking Power Station boundary would also be demolished and a replacement constructed a little further north. Good road access is available from the A13.

A turbine hall of 68m by 56m and 26m high would contain the gas turbine, steam turbine and some ancillary equipment. The specific turbines have not yet been selected, but there are a number of possible manufacturers whose products could be accommodated in the turbine hall as proposed.

PLAN OF BARKING EXTENSION

The turbine hall would be at right angles to Chequers Lane (and the existing Barking Power Station turbine hall) and would have the same architectural style and a colour consistent with the existing Barking Power Station.

The waste heat boiler could be either of a horizontal or vertical configuration, but the overall external dimensions would be about 50m by 20m and 35m high whichever form is selected. A series of supplementary burners would be included in the waste heat boiler to increase steam output and provide additional flexibility in responding to electricity demand from the Grid and/or heat demands from district heating users.

A self-supporting steel chimney 75m high would connect with the waste heat boiler to allow combustion gases to exhaust. A second, by-pass, chimney 35m high would be constructed

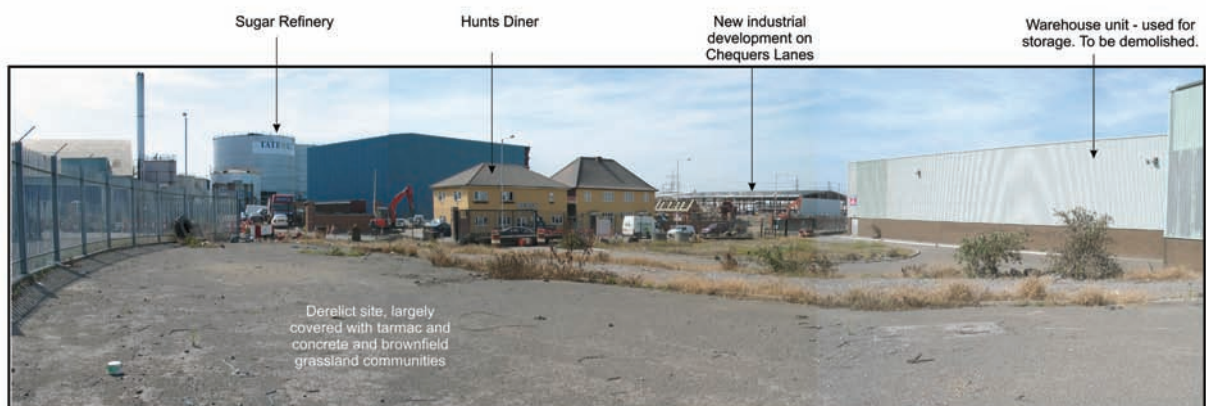
between the gas turbine and the waste heat boiler. The by-pass chimney allows the gas turbine to start-up more quickly and facilitates a rapid response to load changes on the Grid. Also, when the boiler or steam turbines are out of service, some generation can be maintained from the plant.

The chimneys would have external access ladders and platforms at intervals to comply with health and safety requirements.

The chimney heights would be subject to the approval of the Environment Agency when IPPC permitting is sought, but are expected to be no higher than proposed. The height of the chimneys would both minimise local building wake effects and ensure effective dispersion of emissions.

The steam turbine would have the facility to export heat for district heating purposes. Even with CHP operation, however, there is a need to condense excess steam and re-use the water. The steam condensers would be cooled using cooling cells. These would incorporate a heater in the exhaust stream to eliminate visible water vapour plume in all but the most unusual weather conditions.

Natural gas treatment (heating and filtering) would be carried out in a new unit at the northern end of the existing Station. New pipelines within the site would convey gas to the new CCGT, and connect with the existing gas oil storage at Barking Power Station. Gas oil would be used as back-up fuel in the event of interruption of the natural gas supply.



Barking Extension Site looking north west

Services such as water treatment, public address, telephone, drainage, sewerage, security and fire protection would be provided from Barking Power Station.

The existing internal road layout would be amended as necessary. The security fence around Barking Power Station would be extended to enclose the Barking Extension. New vehicular access for the Barking Extension would be constructed to connect with Chequers Lane.

CONSTRUCTION

Construction contracts would be let following competitive tendering. Construction would take about 2 years and, subject to obtaining consent, could start in 2007/8.

The Extension Site would be secured during construction with hoarding and fencing. The turbines and other principal structures such as the chimneys, waste heat boiler and cooling cells would require piled foundation. Driven piles are likely to be used, as was the case for Barking Power Station, and for more recent development in the area.

The construction laydown and parking area would provide about 250 car/van park spaces on the site of the former municipal tip. This temporary use would not affect the Barking Riverside proposals or provisions for new transport links. Drainage to protect Gores Brook, fencing, and lighting would be needed. Shuttle buses would be provided to convey workers between the Extension Site and

the car park. Car and van parking would not be allowed on Chequers Lane or other local roads.

The cables would be laid in a trench probably under the roads. Single lane traffic with temporary traffic lights is likely to be required for several weeks at a time over the 40 weeks of cable construction.

An Environmental Management System (EMS) based on international standards, and a Construction Code of Practice would be implemented during construction to ensure proper control of activities and protect the environment.

OPERATION

The Barking Extension is expected to operate in a similar way to Barking Power Station: usually continuously as base load electricity supplier, but it may well operate at different loads as market requirements vary.

Interruptions to the natural gas supply usually occur in blocks of up to a few days at a time in winter months when the gas system experiences peak demand. When there is an interruption to the natural gas supply Barking Extension would use gas oil, as does Barking Power Station.

Supplementary firing of the waste heat boiler is likely to occur at times of peak electricity demand.



Laydown and Gores Brook

CONSULTATION

From an early stage Barking Power consulted with the London Borough of Barking and Dagenham, the Greater London Authority and the Environment Agency

Barking Power has also consulted with all key local stakeholders, providing information on its plans and inviting comments on the Barking Extension proposals by way of a newsletter, the company's website and a public exhibition held locally.

Support for Barking Power's proposals has been overwhelming from those residents who attended the exhibition and returned feedback cards. There has only been a limited public response as most

residents are clearly supportive of Barking Power's aims and do not regard Barking Extension as controversial. During construction Barking Power will continue to liaise with the local authority and communities by having regular meetings with councillors and distributing information to residents. There will also be a resident's hotline so that any problems resulting from construction activity can be quickly identified and remedied.

ENVIRONMENTAL IMPACT ASSESSMENT

A comprehensive technical assessment of potential environmental impact has been made taking into account feedback from consultation.

A comprehensive technical assessment of potential environmental impact has been made taking into account feedback from consultation. The result of the assessment is reported in the ES and summarised below. Mitigation to address possible adverse significant effects on the environment as a result of the project includes avoidance by design, reduction or remediation.

AIR QUALITY

The combustion of natural gas and gas oil gives emissions of oxides of nitrogen (NOx), and carbon monoxide and carbon dioxide. Very low levels of sulphur dioxide and some very small solid particles (less than 10 millionths of a metre and denoted as PM10) are emitted at times when the back up fuel, gas oil, is used.

During construction there is a potential for dust to arise when excavation and demolition works are carried out. The contractor would be required to put in place measures to control dust emissions including:

- Water suppression to reduce dust emissions;
- Use of solid hoardings;
- Wheel washing; and
- Sheeting of loads.

When in operation, the most important emission affecting local air quality is NOx. This is particularly so in the Dagenham location where NOx emissions from road traffic are very high. The relevant air quality standards are already

exceeded along some roads in the area, and the London Borough of Barking and Dagenham intends to create a borough-wide air quality management area (AQMA).

NOx emissions from the Barking Extension would be controlled using dry low-NOx (DLN) burner technology when firing on natural gas. This technology depends on proprietary systems developed by each potential turbine manufacturer to suit its design. DLN burners represent the "best available techniques" for reducing NOx emissions. DLN burners, for use with both natural gas and gas oil fuel, have not yet been developed commercially. NOx emissions would be controlled by water injection when firing with the back-up gas oil. Water injection reduces the temperature of the combustion and so reduces the formation of oxides of nitrogen. Similar NOx control technologies are currently employed on Barking Power Station, which has some of the lowest emissions in the country.

Emission of sulphur dioxide from combustion plant is proportional to the sulphur content of the fuel. Natural gas transported through the National Transmission System is sulphur free. Gas oil with sulphur content of less than 0.1% would be used for the Barking Extension project in line with the relevant EU Directive.

Carbon monoxide is produced when incomplete combustion takes place. It is often monitored as a measure of combustion efficiency and an operator has strong incentives to maximise the process efficiency.

The emissions of carbon dioxide depend on the carbon content of the fuel. Carbon dioxide is not a toxic gas, has no local air quality issues but it is a significant contributor to the 'global warming'. Carbon dioxide emissions from the Barking Extension would be minimised by optimising plant operational efficiency. The efficiency of the proposed CCGT technology compares favourably with other established UK generation technologies such as coal-fired boilers. The Barking Extension would typically achieve overall efficiencies of about 55%. By comparison, coal-fired boilers typically achieve efficiencies of 36-37%. Should CHP be employed it would allow a further significant increase in efficiency.

A computer-based dispersion model approved by the Environment Agency for the assessment of emissions from power stations has been used to predict ground level concentrations of the pollutants of interest noted above. Different operational scenarios have been modelled covering the two fuels used, supplementary firing in the waste heat boiler, and the cumulative effect of both Barking Power Station and Barking Extension operating together. The emission levels used for the analysis are consistent with the maximum permitted for new gas turbines under the EU's Large Combustion Plant Directive. This is the emission level that manufacturers of new gas turbines will warrant achieving, but the emission levels in practice are invariably lower, as is the case of the existing Barking Power Station emissions. The dispersion modelling therefore represents the worst-case. Even with this

approach, Barking Extension emissions would not result in air quality standards being exceeded.

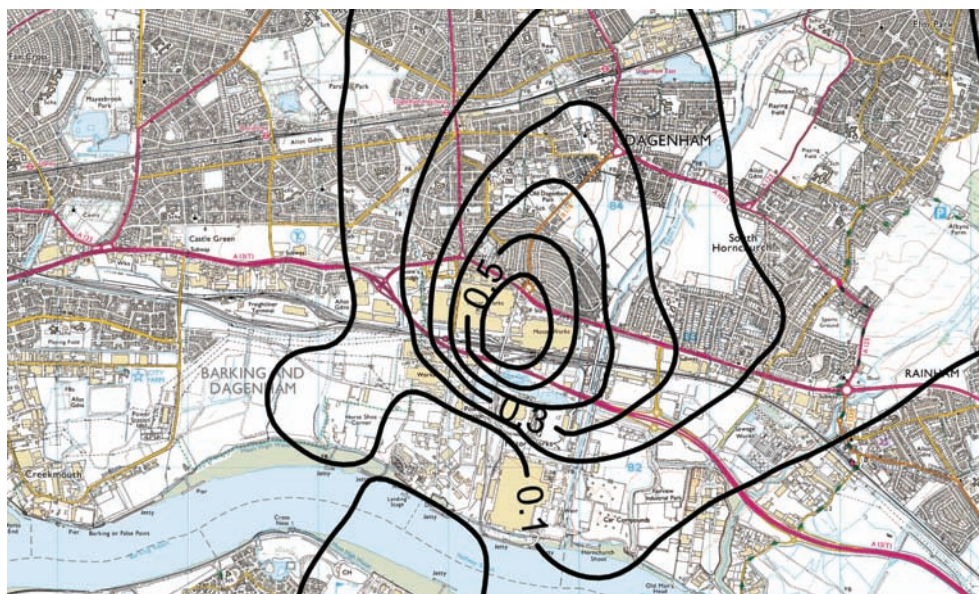
Studies of designated nature conservation sites show no material contributions from airborne concentrations of NOx and therefore deposition of NOx is not considered a significant effect on such sites.

ARCHEOLOGY

Barking Extension operation has no effects on archaeology, but its construction has the potential to affect archaeological resources in the area. No site-specific archaeological information is available. The assessment concludes that the importance of the archaeological remains (if there are any) is likely to be low, and no large change to them is expected as a result of the Barking Extension.

Construction provides the opportunity for additional information to be gathered and, in order to ensure all sensible precautions are taken, a hierarchy of mitigation measures would be implemented.

Site investigation pits or boreholes constructed for engineering purposes would be monitored. The results of this initial activity would allow suitable mitigation measures to be taken in advance of and during the construction if required. A programme of archaeological mitigation would be agreed with the Local Authority.



Predicted contours of annual average NOx concentrations (microgrammes per cubic metre)

CABLES

New buried electricity cables are expected to follow the line of existing highways between the Barking Extension and the National Grid substation at Renwick Road. The cables would be laid in lengths of about 300m in a trench about 1.3m deep and a similar width. The cables would not be fluid filled, so leakage to the surrounding ground would be eliminated.

The temporary traffic signals used to control traffic flow around the trench works would incorporate a bus priority system. Measurements of existing traffic flow have been made, and no unacceptable traffic queues or delays are predicted from the use of traffic signals.

The assessment shows that the electromagnetic fields produced by the energised cables are well within exposure guidelines recommended by the National Radiological Protection Board, which advises the Government in such matters. No interference with electrical equipment including cardiac pacemakers and visual display units would occur. The cables would emit no noise.

GROUND CONTAMINATION & WASTE

Available records and site inspection have been sufficient to provide satisfactory knowledge of the historic use of the site and the likely contamination that exists.

The site comprises 'made ground' underlain by superficial deposits of alluvium and other strata, with the Upper Chalk (a minor aquifer) at depth. The 'made ground' includes ash, clinker and furnace slag.

The site history shows previous industrial uses including an iron foundry and concrete pile manufacture, as well as the more recent storage of dry goods. These uses, together with the uses to which surrounding land has been put, suggest that some historical contamination is to be expected. This contamination is generally limited to the 'made ground' in the area, which has widespread low level of pollution with localised pockets of heavier contamination, including some hydrocarbons.

There are impermeable strata between the fill and the Chalk, so little vertical movement of groundwater occurs. Thus any contamination that might exist is unlikely to migrate downwards or threaten water resources. Piles are expected to be used as part of the foundation construction, but would not be of a depth to enter the Chalk nor

create a pollution pathway between the Chalk and the upper levels.

Much of the material excavated during construction of the Barking Extension could be re-cycled for use. Some would need to be removed as waste, and some of this waste would be contaminated and require special handling. The volumes are not large, however, and no significant effects on the region's waste disposal capacity have been identified. No excavation is planned on the temporary laydown and car park area.

No effects on ground contamination during operation would arise. The operation of Barking Extension does not produce waste products other than from maintenance, which would be combined with similar waste from Barking Power Station and disposed of in accordance with regulatory controls.

LAND USE PLANNING & EMPLOYMENT

A review of the several planning policies and plans that apply to development in the location at Dagenham Dock has been made.

The provision of new electrical generating power is basic to meeting the needs of industry, commerce, transport and residential use. The development plan does not make specific provision for the development of power stations, but the clear implication of the regeneration of the Thames Gateway is that infrastructure must be made available if the regeneration of the area is to be a success. The Barking Extension extends an existing power station site rather than introducing a new site.

The scale and nature of both the existing surrounding development, and the redevelopment that is already taking place, is such that the proposal does not dominate the surroundings. The major issue of sustainability has been addressed through the examination of CHP.

Barking Extension is expected to provide an average of 280 jobs in construction over a 1 to 2 year period. The permanent workforce would increase by up to 4 people. The long-term social and economic impact of the proposal is likely to be neutral but the short-term effect of the construction jobs would be a beneficial although not a significant effect. There will be some benefit to local providers of services through indirect economic activity.

NOISE & VIBRATION

Noise and vibration effects would arise both from construction of Barking Extension and its operation.

Noise sensitive areas have been identified at Scrattons Farm Estate and the Keel Close area. Particular attention has been given to these residential areas as well as the potential developments to the west at Barking Reach.

The contractor would be obliged to seek consent from the local authority to the methods used for controlling noise from the construction. No adverse significant effects are identified from construction noise, although there would be some noise heard from time to time, as is the case with all construction work.

During operation of Barking Extension, even combined with noise from the existing power station, there are no adverse noise or vibration effects identified at any of the residential areas. Also the noise levels at the boundary of the potential development to the west would be within the limits agreed with the local authority to protect the amenity of the area.

ECOLOGY

Surveys of the terrestrial ecology of the Barking Extension site have not revealed any concerns.

None of the plant or animal species observed was of local or national conservation importance and are common at sites throughout the East London. The development of the site would not affect the region's biodiversity. No effects on ecology would result from the temporary use of the laydown and car park area.

No adverse effects on any areas nationally or internationally designated for nature conservation have been identified from any emission from Barking Extension.

TRAFFIC

The road traffic generated by the construction and operation of the Barking Extension has been assessed. During operation there would be virtually no additional traffic movements.

Construction traffic movements between the site and the A13 trunk road, the site and the construction laydown area have been estimated. Many heavy goods vehicles use the local road network and the additional traffic generated by the construction of the Barking Extension is not predicted to cause any significant effects on the capacity of the local road network.



TOWNSCAPE & VISUAL

The visual effects of the Barking Extension have been assessed. The Barking Extension site is located in an area of low townscape quality, and the proposals would help to improve the townscape quality through the removal of unused land.

The visual impacts of the Barking Extension would be largely contained within the surrounding immediate locality of the site.

From greater distances the views would be restricted to the chimney and upper sections of the new buildings and structures. The visual amenity of the area would not be diminished. The architectural style of the new buildings would match those at Barking Power Station. Limited space is available for landscaping, but some additional planting would be carried out where possible.

WATER

The Barking Extension would not use the River Thames for direct cooling, as does the existing power station. Use would be made of the existing connection with the River to provide very small volumes of make-up water for the cooling cells, which lose water due to evaporation.

Some relatively minor flows from the Barking Extension would pass to the River Thames, but diluted with the large cooling water return flow from Barking Power Station. Rainwater from Barking Extension would flow to the Dagenham Breach, and be of benefit to this lake. No local water bodies would experience adverse effects.

During construction effective controls would ensure that the local drainage was not affected by run off from the site.

Water used in the waste heat boiler to raise steam and for NO_x control when using the stand by gas oil fuel, would be supplied from Barking Power Station's existing demineralised water treatment plant.



Choats Road and laydown



CLIMBERS TO BE USED AGAINST INTERNAL FENCE LINES WHERE POSSIBLE



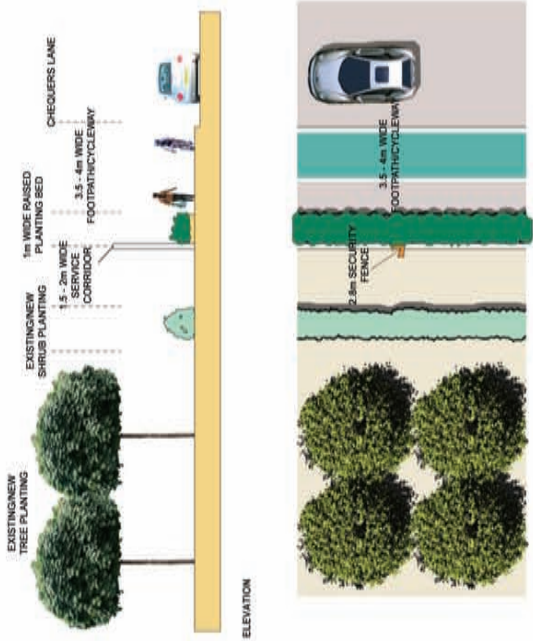
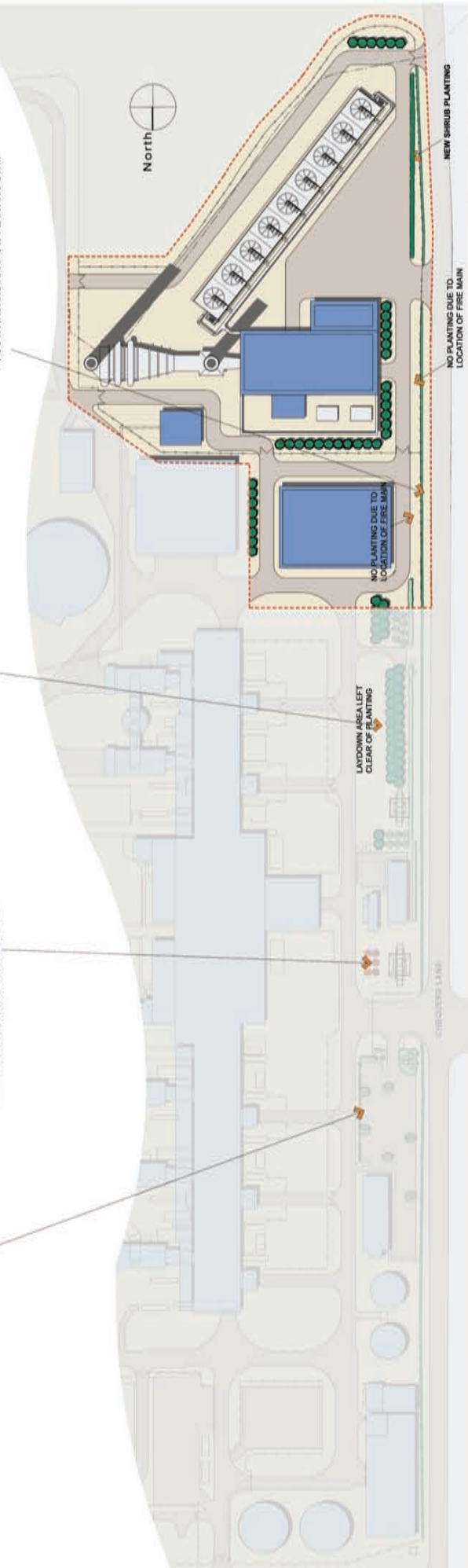
EXISTING TREES SITUATED BELOW EXISTING ELECTRICITY LINES TO BE CAREFULLY REMOVED AND TRANSPLANTED



LARGE EXTENTS WHICH ARE FREE FROM UNDERGROUND CABLES AND SERVICES ARE SUITABLE FOR MORE EXTENSIVE WOODLAND PLANTING



CHEQUERS LANE FRONTAGE IS LARGE ENOUGH TO ACCOMMODATE A CYCLEWAY, FOOTPATH AND NARROW PLANTING STRIP



PLAN VIEW
TYPICAL SECTION THROUGH CHEQUERS LANE FRONTAGE

KEY

- EXISTING TREE TO BE RETAINED
- EXISTING TREE - RECOMMEND REMOVAL
- EXISTING SHRUBS TO BE RETAINED
- AREA OF POTENTIAL NEW TREE PLANTING
- AREA OF POTENTIAL NEW SHRUB PLANTING
- AREA OF POTENTIAL NEW LOW SHRUB PLANTING
- ALONG CHEQUERS LANE

NOTE: BROAD PLANTING AREAS IDENTIFIED FROM SERVICES DRAWING BAK/KC/MMS/LX/AD100/00/001. NO INFORMATION AVAILABLE ON PROPOSED NEW SERVICE LOCATIONS. TREES AND SHRUB SPECIES TO BE AGREED FROM PALETTE PROPOSED FOR CHEQUERS LANE IMPROVEMENTS

