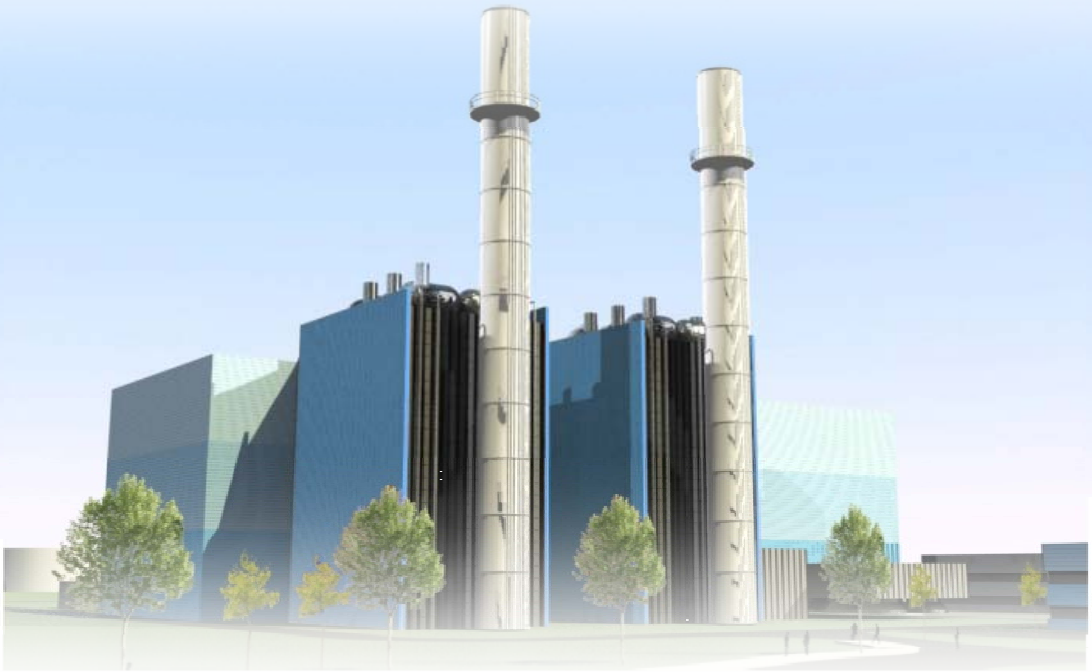
Gateway Energy Centre



ENVIRONMENTAL STATEMENT

Non-Technical Summary

Prepared by

PARSONS BRINCKERHOFF

125 YEARS

February 2010

CONTENTS

LIST OF ABBREVIATIONS

ACC	Air Cooled Condenser
BAT	Best Available Technologies
CECL	Coryton Energy Centre Limited
CEMP	Construction and Environmental Management Plan
CHP	Combined Heat and Power
CCR	Carbon Capture Ready
CCS	Carbon Capture and Storage
CCGT	Combined Cycle Gas Turbine
BERR	Department of Business Enterprise and Regulatory Reform
CO_2	Carbon dioxide
DECC	Department of Energy and Climate Change
DP	Dubai Ports
EA	Environment Agency
EERA	East of England Regional Assembly
EIA	Environmental Impact Assessment
EPR	Environmental Permitting Regulations
ES	Environmental Statement
EWT	Essex Wildlife Trust
GEC	Gateway Energy Centre
GECL	Gateway Energy Centre Limited
GW	Gigawatt
HRSG	Heat Recovery Steam Generator
HV	High Voltage
km	Kilometre
LCPD	Large Combustion Plant Directive
LG	London Gateway
m	Metres
MWe	Megawatt
NE	Natural England
NGC	National Grid Company
NTS	Non Technical Summary
NTaS	National Transmission System
OFGEM	Office of Gas and Electricity Markets
OS	Ordnance Survey
PB	Parsons Brinckerhoff Ltd
PPE	Personal Protective Equipment
RSPB	The Royal Society for the Protection of Birds
SYS	Seven Year Statement
SEEL	Spalding Energy Expansion Limited
TMP	Transport Management Plan
TTGDC	Thames and Thurrock Gateway Development Corporation
UK	United Kingdom

SECTION 1

INTRODUCTION

1 INTRODUCTION

1.1 The Proposed Development

1.1.1 Gateway Energy Centre Limited (GECL) proposes to construct a Combined Cycle Gas Turbine (CCGT) Power Plant to be known as Gateway Energy Centre or GEC.

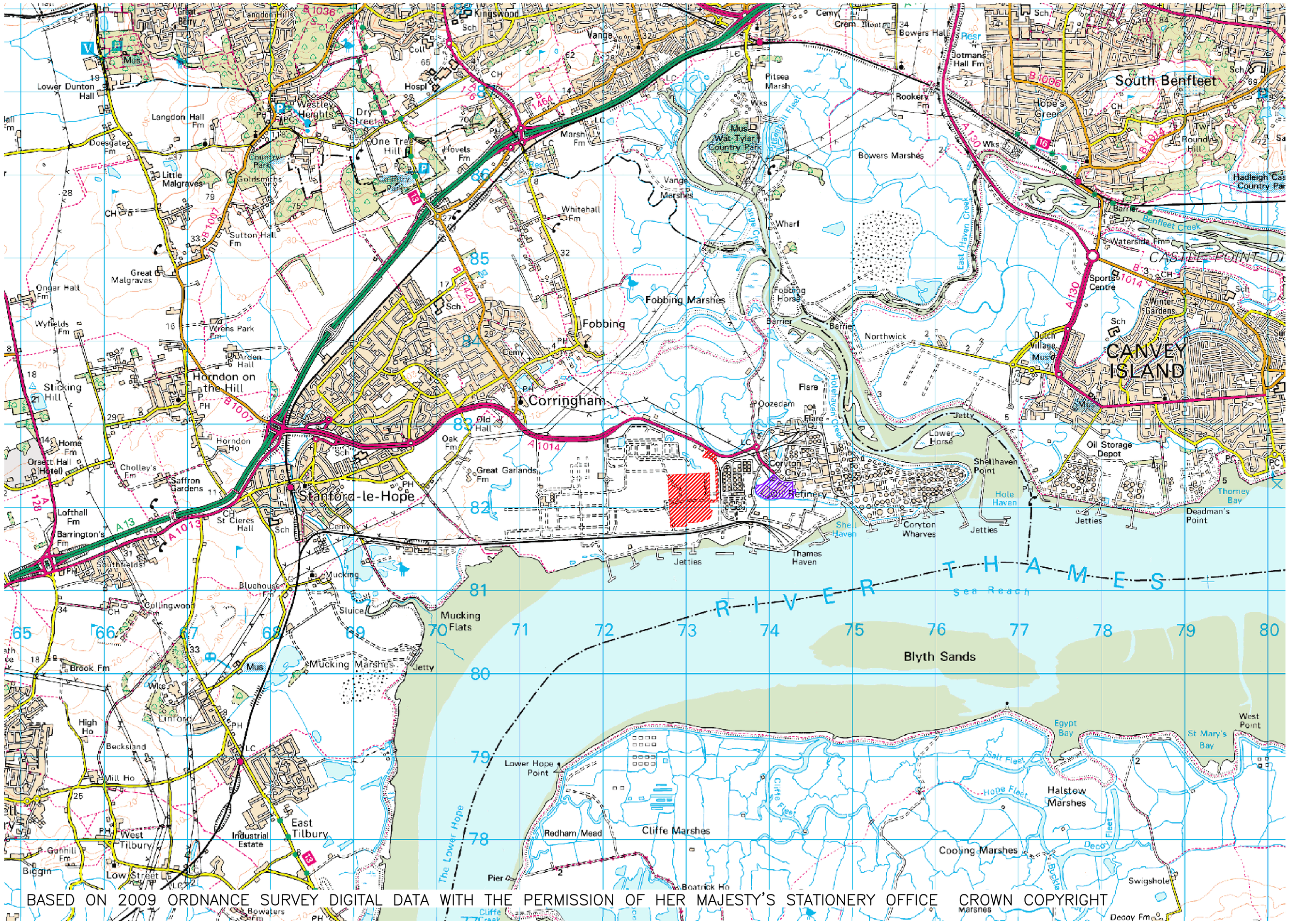
1.1.2 GEC will be located on land within the London Gateway Port / London Gateway Business and Logistics Park development, collectively called the LG Development. The LG Development, promoted by DP World, is currently in the early stages of construction.

1.1.3 GEC will provide up to 900 megawatts electric (MWe) of electrical generation capacity. This will include the provision of up to 150 MWe to the LG Development, which is expected to meet its long-term electricity requirements. Additionally, there is also the possibility for GEC to supply heat in the form of steam or hot water to facilities and / or customers in the vicinity of the site.

1.1.4 GECL considers that GEC provides the following benefits:

- Up to 900 MWe of new generating capacity, enough to supply approximately one million homes, thus helping to ensure continuity of supply of electricity in the UK and the south east of England given the pending closure of old coal and nuclear plants;
- Minimal transmission losses given GEC's location in the UK close to the area of maximum demand (the south east of England, including London). Effectively, reducing fuel usage and lowering carbon dioxide CO_2 emissions;
- Potential to help reduce the UK's carbon emissions as the GEC would emit approximately 50 per cent less CO_2 than existing coal fired power stations;
- Offers flexibility of power generation to enable electricity production to be increased or decreased as renewable generation fluctuates e.g. when there is little wind;
- Creation of up to 600 construction jobs and 40 direct long term jobs during operation, and spend with local firms and suppliers;
- Provision of up to 150 MWe to the LG Development to meet its power requirements, further minimising transmission losses and CO_2 emissions;
- Potential for the provision of steam and / or hot water to the LG Development and local area, which could reduce the overall amount of fuel needed to meet the equivalent energy requirements of standard heat generation equipment;
- GEC will be designed to be Carbon Capture Ready (CCR) such that it will be able to be retrofitted with Carbon Capture and Storage (CCS) if this becomes technically and economically feasible. GEC is well located for CCS given its proximity to other power stations in the south east of England and prospective off shore CO_2 storage facilities; and
- The power station, which will be built on brownfield land, will be designed to be sympathetic to the LG Development and the local area.

1.1.5 The GEC site location is shown in Figure 1.



BASED ON 2009 ORDNANCE SURVEY DIGITAL DATA WITH THE PERMISSION OF HER MAJESTY'S STATIONERY OFFICE CROWN COPYRIGHT

LEGEND

GEC APPLICATION SITE LOCATION

CECL POWER STATION LOCATION

0 1000m 2000m 3000m

BAR SCALE 1:50,000

REV	DATE	DESCRIPTION	BY	CHKD	APPD

00/00/00

• NOTES

PARSONS BRINCKERHOFF

Parsons Brinckerhoff

Amber Court, William Armstrong Drive, Newcastle upon Tyne, NE4 7YQ
Tel: 44-(0191) 2261234 Fax: 44-(0191) 2262345

• CLIENT/PROJECT
GATEWAY ENERGY CENTRE

• TITLE
GEC APPLICATION SITE LOCATION

• DATE 13/10/09
• SCALE 1/50000
• CAD REF

DRAWN BY	DD
PRODUCED BY	DD
CHECKED	EA
APPROVED	EA

• DRAWING NUMBER
FIGURE 1 | –

THIS DRAWING WAS PRODUCED USING AUTOCAD AND SHOULD ON NO ACCOUNT BE AMENDED BY HAND

1.2 The Developer

1.2.1 GEC will be owned and operated by GECL. GECL and the Coryton Energy Company Limited (CECL), which owns the nearby Coryton Power Station, are both part of the InterGen group.

1.2.2 InterGen, formed in 1995, is a global power generation company with 12 power plants representing an equity share of 6 254 MWe of production capacity. InterGen's plants are located in the UK, the Netherlands, Mexico, the Philippines and Australia. InterGen has developed more than 20 power generation facilities in ten countries across six continents, with a combined generating capacity of over 16 000 MWe.

1.2.3 InterGen is the UK's largest independent gas fired power producer, with three plants in the UK that provide 6 per cent of the country's average demand. Its gas fired power plants are among the cleanest and most technologically advanced in the world.

1.2.4 In the UK, InterGen currently operates three gas fired power plants at Coryton in Essex, Rocksavage in Cheshire and Spalding in Lincolnshire.

1.2.5 At Coryton, the gas fired power plant (which is situated 700 m east of the proposed GEC site), is operated by CECL and is known as the CECL Power Station (or the Coryton Power Station).

1.2.6 In March 2009, Spalding Energy Expansion Limited (SEEL) submitted a Section 36 consent application for a 900 MWe expansion at the Spalding CCGT Power Station site. SEEL is an affiliate of Spalding Energy Company Limited and both are part of the InterGen group.

1.3 The Purpose of this Document

1.3.1 This document is a Non-Technical Summary (NTS) of the Environmental Statement (ES) for GEC.

1.3.2 It has been prepared to accompany the application for Section 36 consent to the Secretary of State at the Department of Energy and Climate Change (DECC) to construct and operate an electricity generating station with an output greater than 50 MWe under Section 36 of the Electricity Act 1989. On granting any consent under Section 36 of the Electricity Act 1989, the Secretary of State for DECC may direct that planning permission for the development under Section 90 of the Town and Country Planning Act 1990 shall be deemed to be granted.

1.3.3 The ES provides extensive details of the Environmental Impact Assessment (EIA) which was undertaken in full accordance with the requirements of the Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2000 (as amended) (the Electricity Works EIA Regulations).

1.3.4 The ES for the GEC comprises three separate volumes, and is structured as follows:

- Volume 1 – Main Text
  - Preface
  - Section 1 : **Introduction**;
  - Section 2 : **Rationale for Development**;
  - Section 3 : **Planning Policy Context**;
  - Section 4 : **Description of GEC**;
  - Section 5 : **Description of GEC Site and Its Surroundings**;
  - Section 6 : **Alternatives**;
  - Section 7 : **EIA Methodology and ES Content**;

- Section 8 : **Stakeholder Consultations and Additional Studies**;
- Sections 9 to 17 : Covers the **Environmental Impact Assessment** for each aspect of the environment relevant to the project; and
- Section 18: **Summary of Mitigation and Monitoring**.

- Volume 2 – Technical Appendices
- Volume 3 – Figures

1.3.5 Sections 9 to 17 of Volume 1 of the ES present the results of the EIA for each aspect of the environment, including:

- Air Quality;
- Noise and Vibration;
- Landscape and Visual;
- Ecology;
- Water Quality;
- Geology, Hydrology and Land Contamination;
- Traffic and Infrastructure;
- Cultural Heritage, and
- Socio-Economics.

1.3.6 Cumulative impacts of GEC when considered with other local developments were also assessed within the relevant chapters of Volume 1 of the ES. These included the gas pipeline and electrical connection associated with the development of GEC, as well as the LG Development.

1.3.7 In addition to the NTS and Volumes 1 to 3 of the ES, a number of documents have been prepared in support of the Section 36 Consent application including a:

- Carbon Capture Ready (CCR) Feasibility Study (A);
- Combined Heat and Power (CHP) Assessment (A);
- Design and Access Statement;
- Planning Statement; and
- Statement of Community Involvement.

- (A) Documents which have informed the EIA process.

1.4 Consultation

1.4.1 In undertaking the EIA and associated studies, GECL and its consultants have undertaken consultations with a variety of stakeholders. These have included the Secretary of State for DECC, the Thurrock Thames Gateway Development Corporation (TTGDC), local residents and governmental and non-governmental organisations.

Discussions with Consultees

1.4.2 GECL and its project team held face to face meetings with a number of consultees to the Section 36 consent process throughout the EIA study period. These meetings were intended to allow consultees to question the project team on the project and in so doing inform the EIA methodologies.

1.4.3 Consultees to the process have included DECC, the East of England Regional Assembly (EERA); the Environment Agency (EA); TTGDC; Essex Wildlife Trust (EWT); and Natural England (NE).

1.4.4 Consultation with interested parties has continued throughout the EIA for GEC, through meetings and exchanges of correspondence. Further consultation will take place following submission of the application for Section 36 consent to the Secretary of State for DECC.

1.4.5 GECL has also informed the public of proposals regarding GEC via a number of measures. These have included: meetings; exhibitions (Residents Information Days); newsletters; website and e-mail; free-phone and freepost; advertisements; and press releases.

1.4.6 At the Residents Information Days members of GECL, InterGen and their consultancy team were available to address the questions and queries of the local community.

1.4.7 The Residents Information Days aimed to:

- Raise awareness of GEC and its likely impacts;
- Receive comments on GEC and the scope of the EIA; and
- Establish the concerns of stakeholders in order that these can be addressed and, where practical, mitigated.

1.4.8 Two Residents' Information Days were held as follows;

- 9 February 2010 from 2 pm to 8 pm in Corringham Village Hall, Springhouse Road, Corringham, SS17 7LE; and
- 10 February 2010 from 2 pm to 8 pm in East Thurrock Community Association, 77 Corringham Road, Stanford le Hope, SS17 0NU.

1.4.9 A Questionnaire / Feedback Form was available at the Resident's Information Days which visitors were encouraged to complete to give their opinion on GEC and ask any questions in writing. A total of 85 questionnaires were completed or partially completed during the exhibitions.

1.4.10 From the 85 questionnaires:

- 53 per cent of people were very positive / positive towards GEC;
- 34 per cent of people were neutral;
- 8 per cent of people were negative / very negative; and
- 5 per cent of people did not provide a response.

Future Consultations

1.4.11 On completion of the ES and submission of the Section 36 consent application, GECL must publicise the application by placing a notice within two newspapers available in the locality of GEC, a national newspaper and within the London Gazette.

1.4.12 Public notices will also be placed at a number of locations within the vicinity of the GEC site. Copies of the ES will be made available at key locations within the area, including Thurrock District Council, TTGDC, Corringham Library and Stanford-le-Hope Library, so that members of the public may view the ES and make any representations on the application.

1.4.13 TTGDC will also place a copy of the ES on its Planning Register together with any related documents. Within four months of the application being received, TTGDC will communicate its views on the application to DECC, who will subsequently make a decision on whether or not to give consent to the GEC. The Section 36 consent and deemed consent under Section 90 of the Town and Country Planning Act 1990 (if appropriate) will be for GEC. A separate application(s) will be made by GECL for

both the gas pipeline and electrical connection and there will be further consultation process(es) for these application(s) in due course.

1.4.14 Throughout the determination process, GECL will continue to address any questions or concerns raised by stakeholders with regard to GEC.

1.5 Viewing the Section 36 Consent Application

1.5.1 Copies of the Section 36 consent application (with a plan showing the land to which it relates), ES (explaining GECL's proposals in more detail and presenting full details of the EIA) and NTS of the ES may be inspected during normal office hours at the following addresses:

Thurrock Council
Civic Offices
New Road
Grays
Essex
RM17 6SL

Thurrock Thames Gateway Development Corporation
Gateway House
Stonehouse Lane
Purfleet
Essex
RM19 1NX

Corringham Library
Communities, Libraries and Cultural Services
St. John's Way
Corringham
Essex
RM17 7LJ

Stanford-le-Hope Library
High Street
Stanford-le-Hope
Essex
SS17 0HG

1.5.2 Alternatively, paper copies of this ES (including Volumes 2 and 3 and the stand alone documents) can be purchased for a fee of £250 each by writing to:

Richard Wearmouth
Parsons Brinckerhoff Limited
Amber Court
William Armstrong Drive
Newcastle Business Park
Newcastle-Upon-Tyne
NE4 7YQ

CD copies of this ES (including Volumes 2 and 3 and the stand-alone documents) can be purchased for a fee of £5 each.

Cheques should be made payable to Parsons Brinckerhoff Limited.

Copies of the NTS are available free of charge. An electronic version of the consent application and associated reports, including the ES, can be downloaded free of charge at the GEC website:

http://www.gatewayenergycentre.co.uk

1.6 Commenting on the application

1.6.1 Should you wish to make a representation regarding the Section 36 consent application, then it should be forwarded to the Electricity Supply Consents team at DECC as follows:

For the Attention of:
Mr Gary Mohammed
Electricity Supply Consents
Department of Energy and Climate Change
Area A
3rd Floor
3-8 Whitehall Place
London
SW1A 2HD

SECTION 2

THE CONSENTS PROCESS

2 THE CONSENTS PROCESS

2.1 Consents Required

2.1.1 GEC will require consent under Section 36 of the Electricity Act 1989.

2.1.2 Section 36 of the Electricity Act 1989 requires that those seeking to construct, extend or operate an electricity generating station with an output of over 50 MWe located within England and Wales must apply to the Secretary of State for DECC for consent.

2.1.3 Section 90 of the Town and Country Planning Act 1990 provides that on granting any consent under Section 36 of the Electricity Act 1989, the Secretary of State for DECC may direct that planning permission for the development shall be deemed to be granted.

2.1.4 As GEC will have an output of up to 900 MWe, it falls within the requirements of Section 36 of the Electricity Act 1989 and accordingly GECL has submitted an application to the Secretary of State for DECC for a Section 36 Consent and deemed planning permission.

2.1.5 GECL will apply for a separate planning application(s) for the gas pipeline and electrical connection to either TTGDC and / or the Infrastructure Planning Commission.

2.1.6 In addition and in due course, GECL will separately apply to the EA for an Environmental Permit under the Environment Agency Environmental Permitting (England and Wales) Regulations 2007 (EPR). The Environmental Permit will define the manner in which GEC is operated on a day-to-day basis.

2.1.7 Other miscellaneous consents and permits will be sought as necessary throughout the course of the project.

SECTION 3

RATIONALE FOR THE DEVELOPMENT OF THE GATEWAY ENERGY CENTRE

3 Rationale for the Development of the Gateway Energy Centre

3.1 Background

3.1.1 Electricity is essential in a modern society. It powers a huge variety of things, from computers to lights to kitchen appliances to industrial plant.

3.1.2 At present, a number of substantial challenges face the UK energy market including:

- The forced retirements of existing nuclear and coal / oil plant for safety and environmental reasons; and
- The general rising demand for electricity.

3.1.3 These challenges are discussed in this section, which provides the rationale for the development of GEC.

3.2 Current Power Generation Capacity and Electricity Demand

3.2.1 Currently, the UK has a total electricity generating capacity of around 82 GW based on various technologies. Based on information from UK Energy in Brief 2009, of the electricity distributed into the National Grid National Electricity Transmission System, some 78% comes from fossil fuelled power stations (coal and oil 32% and gas 46%)[1].

3.2.2 The Large Combustion Plant Directive (Directive 2001/80/EC) (LCPD) requires power stations to adhere to stringent air quality standards. Several coal and oil plants throughout the UK, totalling just under 12 GW, have opted-out of this obligation and, as such, are required to close by the end of 2015 or after 20 000 hours of operation after 1 January 2008, whichever is sooner.

3.2.3 In addition to the expected closure of 12 GW of electricity generating plant, around 7.4 GW of generating capacity will be lost by around 2020 due to the planned closure of some old nuclear power plant, with a further loss of 3.6 GW anticipated by 2035.

3.2.4 The 2007 'White Paper on Energy – Meeting the Energy Challenge' (published by BERR, now DECC) officially recognised the need to replace the retiring power generation capacity in the UK, stating that:

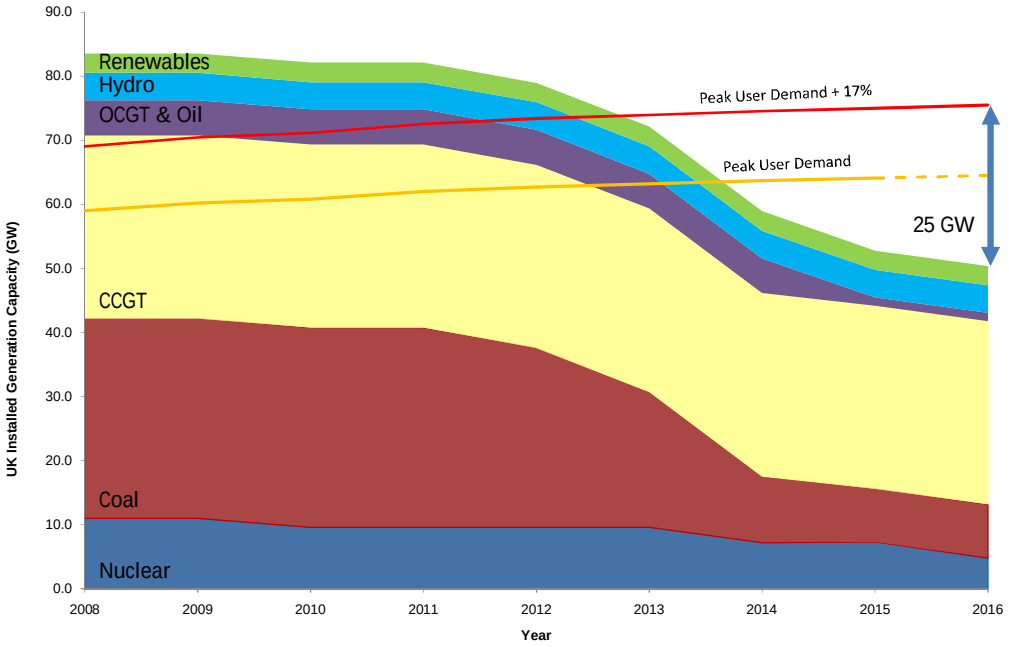
"*If we are to maintain levels of electricity generation capacity equivalent to those available today, then new power stations need to be built in time to replace these closures and to meet increases in demand. On this basis, around 20 to 25 GW of new power stations will be needed by 2020*".

3.2.5 The Government has re-enforced this statement in publications including the "Draft Overarching National Policy Statement for Energy (EN-1)" published in November 2009.

3.2.6 The margin between demand forecast and the available generation capacity is a strong indicator of the security of the electricity supply. This has been falling steadily in recent years, indicating that there is a decreasing amount of spare capacity available in the electricity network, see Insert 3.1.

[1] *UK Energy in Brief , July 2009 (DECC)*

INSERT 3.1: DEMAND PROJECTIONS: PEAK DEMAND AND SUPPLY



3.2.7 Insert 3.1 excludes projects currently in the planning system / consented but which are yet to be constructed and commence electricity production. Furthermore, it assumes an increase in demand of 3.5 MWe by 2015. Even when allowing for expected projects coming on-line, in the coming years there is clearly a need for additional electricity generation in the UK such as GEC.

3.2.8 In addition, there is a clear need for new generating capacity to be delivered on a timely basis – something which is deliverable by CCGTs given their relatively short build period (around 28–36 months).

3.3 Location of New Power Plant

3.3.1 National Grid Company (NGC) provides guidance on locations. As part of this guidance, NGC issues a Seven Year Statement (SYS) that details the areas in the UK which would in its view benefit from additional generating capacity.

3.3.2 The 2009 SYS suggests that the general area where GEC would be located, i.e. the south east of England including London, requires a high amount of extra generation. This statement does not take into account future plant closures which are expected to be significant (as discussed above at 3.2).

3.3.3 Locating GEC in the Thames Gateway will meet the power demands of the LG Development which requires up to 150 MWe to power the Port facility and Business and Logistics Park.

3.3.4 In addition, locating GEC in the south-east reduces transmission losses that are associated with additional electricity generation situated in the north of the country and is, therefore, considered to be a more environmentally sustainable option. Supplying the neighbouring LG Development directly further reduces transmission loses and hence further improves environmentally sustainability e.g. by effectively lowering CO_2 emission.

3.3.5 GEC is also located near local businesses and organisations which offer the potential for CHP which can reduce the overall amount of fuel needed to meet the equivalent energy requirements compared to separate generation of heat and power (lowering

CO_2 emissions). GEC is being designed to incorporate features which, with suitable modifications, will allow for the export of heat in the event that suitable users are confirmed.

3.3.6 A further benefit of GEC is that it will offer flexibility of power generation to enable electricity production to be increased or decreased as renewable generation fluctuates e.g. when there is little wind. This further assists towards ensuring security of supply in the south east of England and the UK.

3.3.7 In conclusion, there is a clear need for new generating plant in the UK and the GEC is located in the very region where new capacity is needed most as it is the UK's area of highest and growing demand. The location ensures that GEC can supply the LG Development directly with up to 150 MW and also provides CHP supply potential for local businesses and organisations. These location advantages mean that electricity will not have to be transported far reducing transmission losses and there is the potential for CHP to be utilised – effectively maximising the efficiency of fuel used and lowering CO_2 emissions.

SECTION 4

SUMMARY OF THE GATEWAY ENERGY CENTRE

4 Summary of the GEC

4.1 Alternatives

4.1.1 The Electricity Works EIA Regulations require that the ES should include an outline of the main alternatives that have been considered and an indication of the main reasons for selecting the application site.

4.1.2 In the case of GEC, the alternatives that have been considered are:

- Alternative development sites;
- Alternative technologies for electricity generation
- Alternative technologies for cooling;
- Alternative layouts; and
- Alternative infrastructure connections.

4.1.3 Through consideration of these alternatives it was found that:

- The proposed GEC site is suitable for the intended use of power generation;
- A gas-fired CCGT plant will offer Best Available Technologies (BAT) for GEC; and
- Air Cooled Condensers (ACCs) offer the most practical cooling system for the GEC site.

4.1.4 The alternative layouts and infrastructure connections will be the subject of further studies in the future.

4.2 Application Site

4.2.1 The location of the GEC site is shown in Figure 1. An aerial photograph of the GEC site is shown in Figure 2. The Ordnance Survey (OS) Grid Reference of the centre of the site is approximately 573209, 182165.

4.2.2 Whilst the application site boundary for GEC incorporates areas to the north and west which may be used for temporary laydown during construction, overall approximately 29.1 hectares (71.9 acres), once constructed the GEC site will be approximately 11.3 ha (28.0 acres) in size. The GEC site includes land to be set aside for the purpose of installing carbon capture equipment if required in the future.

4.2.3 The GEC site is located on land within the LG Development. The GEC site will be cleared of all vegetation and ecology and will be provided to GECL in a condition ready for development. An illustrative site plan for the LG Development, showing the location of GEC, is provided as Figure 3.

LEGEND

GEC APPLICATION SITE LOCATION

REV	DATE	DESCRIPTION	BY	CHKD	APPD

00/00/00

• NOTES

THIS DRAWING WAS PRODUCED USING AUTOCAD AND SHOULD ON NO ACCOUNT BE AMENDED BY HAND

PARSONS BRINCKERHOFF
100 YEARS

Parsons Brinckerhoff Ltd
Amber Court, William Armstrong Drive, Newcastle upon Tyne, NE4 7YQ
Tel: 44-(0191) 2261234 Fax: 44-(0191) 2262345

• CLIENT/PROJECT

GATEWAY ENERGY CENTRE

• TITLE

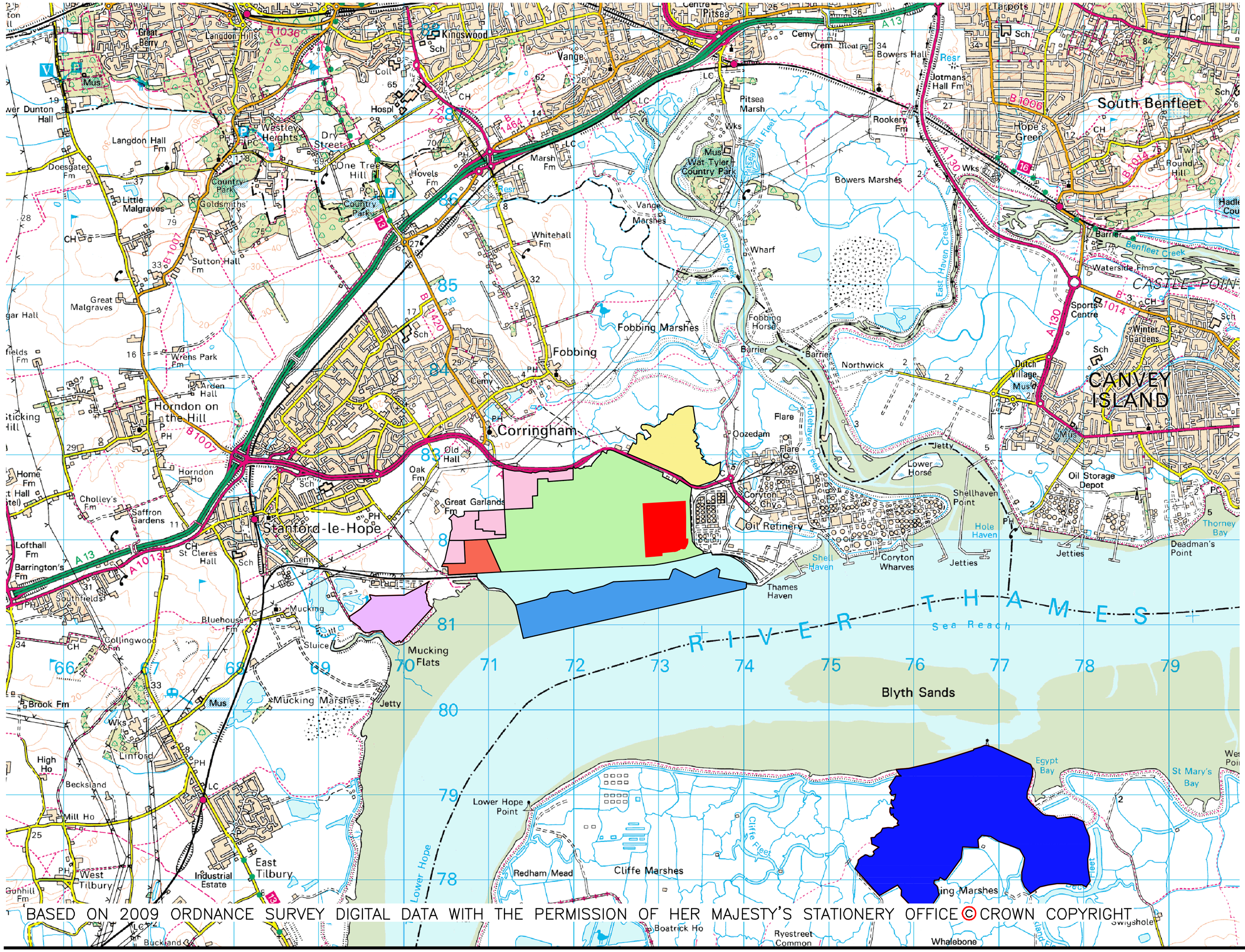
AERIAL PHOTOGRAPH SHOWING APPROXIMATE LOCATION OF GEC APPLICATION SITE

• DATE 15/02/10
• SCALE NTS
• CAD REF

DRAWN BY DD
PRODUCED BY DD
CHECKED EA
APPROVED

• DRAWING NUMBER

FIGURE 2 | –



NORTHERN TRIANGLE

RECLAMATION AREA

PORT AREA

FORMER REFINERY LAND

REFINERY EXPANSION LAND

THE TONGUE

SITE "A"

SITE "X"

GEC APPLICATION SITE LOCATION

BAR SCALE 1:50,000

REV	DATE	DESCRIPTION	BY	CHKD	APPD

00/00/00

• NOTES

PARSONS BRINCKERHOFF

Parsons Brinckerhoff

Amber Court, William Armstrong Drive, Newcastle upon Tyne, NE4 7YQ
Tel: 44-(0191) 2261234 Fax: 44-(0191) 2262345

• CLIENT/PROJECT

GATEWAY ENERGY CENTRE

• TITLE

GEC APPLICATION SITE LOCATION & LG DEVELOPMENT

• DATE 13/10/09

• SCALE 1/50000

• CAD REF

DRAWN BY

PRODUCED BY

CHECKED

APPROVED

• DRAWING NUMBER

FIGURE 3 | –

THIS DRAWING WAS PRODUCED USING AUTOCAD AND SHOULD ON NO ACCOUNT BE AMENDED BY HAND

4.2.4 The River Thames runs in a west to east direction to the south of the site where DP World has recently commenced works on a new port facility associated with the LG Development.

4.2.5 The GEC site is situated on the north bank of the Thames Estuary and lies approximately 6 km east of the A13. The A1014 dual carriageway (The Manorway) is located to the north of the site and runs east to west to provide a link with the A13, which in turn links in with the M25 at Junction 30.

4.2.6 The nearest residential settlements are at Corringham and Fobbing which lie approximately 4 km to the west, Canvey Island approximately 5 km to the east, and Basildon approximately 7 km to the north. The nearest residential property is Oozedam Farm, approximately 1 km to the north east of the GEC site.

4.2.7 To the east of the GEC site is the existing Coryton CCGT Power Station (700 m east), Shell Tanker Farm and Petroplus' Coryton Oil Refinery (950 m east).

4.3 Other Developments with Potential Cumulative Impacts

4.3.1 In addition to considering the potential impacts associated with GEC, the EIA has considered the potential for cumulative impacts with additional elements of the GEC and other developments in the vicinity of GEC which have been identified as potentially generating cumulative impacts are:

- CECL Power Station;
- Coryton Oil Refinery; and
- LG Development.

4.3.2 However, it should be noted all developments with the exception of the LG Development (which has only recently commenced construction), are already included in the existing baseline environment.

4.3.3 In addition indirect impacts of the proposed GEC have also been considered where appropriate in the assessment. These include impacts associated with:

- The gas pipeline;
- The electricity transmission connection; and
- Any CHP infrastructure.

4.4 Operational Details

4.4.1 GEC will provide up to 900 MWe of power generation capacity. This will include the provision of up to 150 MWe to the LG Development, which is expected to meet its long-term electricity requirements.

4.4.2 The electricity generated at GEC will most likely be dispatched to the High Voltage (HV) National Grid system via either a HV underground cable, a new HV overhead line or a combination of both to a new substation to be constructed by NGC most likely at Mucking Flats. The feasibility work undertaken has identified that the most likely connection would be via an underground cable to a point north of the A1014 (The Manorway) and via an over ground connection to the proposed NGC substation most likely at Mucking Flats. This route is the subject of ongoing studies. A separate consent application(s) will be submitted for the HV cable / overhead line connection in due course. NGC is responsible for permitting and constructing the new substation.

4.4.3 GEC will burn natural gas only. The natural gas used as fuel will most likely be taken from a new lateral pipeline to be constructed from the National Grid National Transmission System (NTaS) Number 5 Feeder pipeline. Feasibility work has identified two preferred routes, including a route that follows the existing Coryton

Power Station gas pipeline. A separate consent application will be submitted for the gas pipeline in due course.

4.4.4 In addition to the new gas pipeline and electricity connection, interconnections and easements may also be required for CHP (for the export of steam / hot water) and CCR (for the export of captured CO_2). These are discussed further in the CHP Assessment and CCR Feasibility Study respectively, which have been submitted with the Section 36 Consent application.

The Combined Cycle Gas Turbine Principle

4.4.5 GEC will likely comprise two gas turbine units which will be fuelled by natural gas. Each unit will comprise a gas turbine and a Heat Recovery Steam Generator (HRSG), which will serve steam turbine equipment.

4.4.6 The natural gas will be burnt in the combustion chamber of each gas turbine from where the hot gases will expand through the gas turbine to generate electricity. The hot exhaust gases are then used in the HRSG to generate steam, which in turn is used to generate electricity via the steam turbine equipment. The use of a combined gas and steam cycle increases the overall efficiency of the power plant.

4.4.7 GEC will be capable of generation in combined cycle mode with an overall electrical generation efficiency of approximately 55 per cent based on the lower calorific value of the fuel. This efficiency rating does not take into account the potential for added efficiency if it proves technically and economically feasible to supply waste heat.

4.4.8 The spent steam leaving the steam turbine equipment will pass to an ACC where it will be condensed. The resultant condensate will be returned to the HRSGs for reuse. The use of ACCs has the potential to eliminate other environmental impacts associated with other cooling systems.

4.4.9 The flue gases from each CCGT module will be discharged to two dedicated 75 m stacks. The height of these has been determined by a computer dispersion modelling study.

SECTION 5

THE ENVIRONMENTAL IMPACT ASSESSMENT

5 The Environmental Impact Assessment

5.1 Overview

5.1.1 The design of the proposed GEC has been considered carefully to avoid key areas of environmental sensitivity and impact. The potential impacts of the proposed GEC during construction and operation have been assessed in relation to the following impacts:

- Air Quality;
- Noise and Vibration;
- Landscape and Visual;
- Ecology;
- Water Quality
- Geology, Hydrology and Land Contamination
- Traffic and Infrastructure;
- Cultural Heritage; and
- Socio-Economics;

5.1.2 The following pages contain a summary of the key potential environmental impacts. The measures included as part of the proposed GEC in order to avoid and reduce impacts are also listed along with the associated mitigation. More in depth information is contained in the ES (Volumes 1 to 3).

Issue	***Description of Potential Impact***	***Design Measures and Mitigation***
Air Quality	During construction, dust may be generated.	The control of dust emissions during the construction period will be ensured through the implementation of a Construction Environmental Management Plan (CEMP) which will include measures such as soil dampening. It is anticipated there will be no significant adverse impacts.
	During operations, the principal atmospheric emission will be nitrogen oxides.	Low pollution technology has been specified for GEC in order to minimise such emissions to the air during operations. Modelling of the air emissions, based on similar CCGT plants, shows that there will be no significant adverse impacts. Such emissions will be within limits set and monitored by the EA.

Issue	*Description of Potential Impact*	*Design Measures and Mitigation*
Noise and Vibration	During construction, there is the potential for noise and vibration impacts as a result of machinery on site, construction activities and construction traffic.	The measures to avoid adverse noise conditions during construction will be set out in the CEMP. These will include guidance on the timing of deliveries, choice of plant machinery and switching off machinery when not in use. It is anticipated there will be no significant adverse impacts.
	During operation, there is the potential for noise and vibration impacts as a result of daily operations.	Noise barriers and silencers will be fitted where appropriate to the plant, thereby reducing the potential for noise during operations. It is anticipated there will be no significant adverse impacts.
Landscape and Visual	Throughout construction, the GEC site will have the appearance of a typical construction site. The principal landscape and visual impacts associated with the construction phases will be those associated with construction such as the installation of construction fencing, cranes etc.	Measures to avoid adverse landscape and visual impacts during construction will be set out in the CEMP. These will include: careful placement of the temporary storage of topsoil and any other material considered of value for retention; and careful design and layout of site construction areas. It is anticipated there will be no significant adverse impacts.
	The potential landscape and visual impacts during operation are mainly those associated with GEC's structures and operation of the proposed plant. Moreover, the proposed development site will result in the use of approximately 11.3 ha of "brownfield" development land.	Overall, the main element of mitigation incorporated into the scheme has been the careful contextual siting of the proposed plant. In addition, GEC has engaged an architect to design indicative structures to ensure they are sympathetic to the local area and the design principles of the LG Development (which has recently commenced construction). Other mitigations measures proposed include the likes of on-site landscaping. It is anticipated there will be no significant adverse impacts.

Issue	*Description of Potential Impact*	*Design Measures and Mitigation*
Ecology	In advance of any construction works a program of remediation and clearance works is to be undertaken across the GEC site. This will be undertaken under the licences already issued for the LG Development. This program of works has commenced but has yet to complete. As such, the GEC site will be cleared of all buildings and vegetation, levelled and provided to GEC for construction, professionally cleared of ecology.	During construction, it is anticipated there will be no significant adverse impacts.
	During operations, there may be an adverse impact on air quality of a low magnitude of significance at one Statutory Ecological Designated Site - Thundersley Great Common to the north east of the GEC site. This principally reflects the high sensitivity of this site given its existing poor air quality.	This potentially low magnitude of significance impact prediction (i.e. it is only a marginal deterioration) is based on a worst case operational mode that is unlikely to occur. It is proposed that potential measures are examined with the relevant authorities to mitigate this impact.
Water Quality	During construction and operation, spills / run off may affect water quality.	Measures to avoid adverse water quality impacts during construction will be set out in the CEMP. It is anticipated there will be no significant adverse impacts.
	During operation, additional mains water will be required.	A Sustainable Urban Drainage System has been designed to store and treat rain water. In addition, at the detailed design stage of GEC, consideration will be given to the incorporation of rainwater harvesting. This rainwater harvesting will reduce water consumption from other sources, adding to the sustainability of the project. It is anticipated there will be no significant adverse impacts.
	In addition, GEC needs to have an appropriate floor level to minimise flood risk.	GEC will be designed to take into account the flood risks associated with the site. The current flood defences offer adequate protection for the site from both a 1 in 200 and 1 in 1,000 year flood event. This is described in further detail in the Flood Risk Assessment that is included in the Environmental Statement Volume 2, Appendix D.

Issue	*Description of Potential Impact*	*Design Measures and Mitigation*
Geology, Hydrology and Land Contamination	Previous site investigations undertaken across the site and surrounding area have identified significant levels of contamination within the ground and groundwater beneath the site. The contamination most likely originates from previous uses of the site for the storage and processing of bulk fuel products.	A program of remediation is to be undertaken across the site prior to re-development works. Remediation validation reports will be produced as documentation of the works undertaken with the works undertaken to a standard such that the site can be developed for use as a power generating facility.
	The potential impacts from the development are likely to be limited to the construction period and are associated with the potential to impact upon watercourses. In particular drainage systems / culverts that flow to the River Thames in the vicinity of the site.	Measures to avoid adverse geology, hydrology and land contamination impacts during construction will be set out in the CEMP. It is anticipated there will be no significant adverse impacts.
	The construction period is of a relatively short duration.	Suitable mitigation measures, such as the use of Personal Protective Equipment for all site workers and the use of silt traps and buffer zones as appropriate, will be undertaken. A Working Practices Procedure for the Control of Pollution will be drafted for the projects construction phase to minimise impacts on the soil, geology, hydrology and hydrogeology. Similarly, a Site Waste Management Plan will also be developed prior to construction and would concentrate on the reduction, re-use and recycling of waste generated. It is anticipated there will be no significant adverse impacts.
Traffic and Infrastructure	The project will generate additional traffic in the construction and operational phases.	All vehicle movements associated with the construction of the GEC will operate under a Transport Management Plan (TMP). The purpose of the TMP is to provide a framework for the active management of the increased demand on the local transport infrastructure to ensure that all impacts are minimised or eliminated. Impacts from operational traffic on road usage will be negligible. No significant impacts to the existing road network are anticipated in the construction or operational phases.

Issue	*Description of Potential Impact*	*Design Measures and Mitigation*
Cultural Heritage	GEC has some potential to impact on archaeology within the site boundary.	Prior to construction, a programme of archaeological works will be developed in conjunction with the Essex County Archaeologist. However, given the industrial nature of the site, in terms of impacts that previous foundations and contamination are likely to have had, as well as the large amounts of archaeological work done on the site in the past, further works are unlikely to be necessary.
Socio-Economics	The construction and operation of GEC will provide jobs for the region and, directly and indirectly, bring increased expenditure into the local economy.	No mitigation is requires as no adverse impacts are anticipated.

5.2 Secondary and Cumulative Impacts

5.2.1 The impacts that are described above relate only to the proposed GEC. However, it is recognised that there is the potential for other environmental impacts to arise as a result of the cumulative impact of the proposed electrical transmission connection, the gas supply pipeline, the CHP and the LG Development.

5.2.2 EIAs will be undertaken for the proposed gas supply pipeline and High Voltage electricity connection to the National Grid in due course to accompany applications for consent for these projects. Nevertheless significant cumulative impacts are not anticipated.

5.2.3 The impacts of the LG Development have been the subject of numerous environmental studies and are well understood. No significant cumulative impacts are anticipated for the GEC and LG Developments.