

APPENDIX A: 2019 UPDATED FLOOD RISK ASSESSMENT

Intended for
Gateway Energy Centre Limited

On behalf of
InterGen


Date
June 2019

Project Number
1620002349-018

GATEWAY ENERGY CENTRE, CORYTON

2019 UPDATED FLOOD RISK ASSESSMENT

Project No. **1620002349-018**
Issue No. **1**
Date: **24/06/2019**
Made by: **Sarah Fotheringham**
Checked by: **Christopher Day**
Approved by:

Made by:	
Checked / Approved by:	Christopher Day

This report is produced by Ramboll at the request of the client for the purposes detailed herein. This report and accompanying documents are intended solely for the use and benefit of the client for this purpose only and may not be used by or disclosed to, in whole or in part, any other person without the express written consent of Ramboll. Ramboll neither owes nor accepts any duty to any third party and shall not be liable for any loss, damage or expense of whatsoever nature which is caused by their reliance on the information contained in this report.

Version Control Log

Revision	Date	Made by	Checked by	Approved by	Description
A-D		SF	CD	-	Internal Drafts
1	24/06/2019	SF	CD	AG	Final

Ramboll
Aston Court,
Pynes Hill,
Exeter,
Devon,
EX2 5AZ
United Kingdom

T +44 1392 440 600
www.ramboll.co.uk

CONTENTS

1.	INTRODUCTION	4
1.1	Scope of Services / Background	4
1.2	The 2019 Variation Application	4
1.3	The Purpose of this Document	5
2.	GATEWAY ENERGY CENTRE (THE PROPOSED DEVELOPMENT)	7
3.	CHANGES TO THE POLICY FRAMEWORK	8
3.1	National Policy	8
3.2	Regional Policy	9
3.3	Local Policy	10
4.	UPDATED DATA AND INFORMATION SOURCES	11
4.1	Updated Data Sources	11
4.2	Updated Information Sources	12
4.3	Consultation Undertaken	13
5.	REVIEW OF UPDATED DATA AND INFORMATION	14
5.1	Application Site Layout and Topography	14
5.2	Geology and Ground Conditions	14
5.3	Hydrology	14
5.4	Surface Water Drainage	15
6.	UPDATED FLOOD RISK ASSESSMENT	17
6.1	Overview and Purpose	17
6.2	Flooding	17
6.3	Surface Water Drainage	18
FIGURES		
APPENDIX 1: TOPOGRAPHIC DATA		
APPENDIX 2: ENVIRONMENT AGENCY PRE-APPLICATION RESPONSE		
APPENDIX 3: AGREED SCOPE OF WORKS FOR THE 2019 UPDATED FRA		
APPENDIX 4: ENVIRONMENT AGENCY DATA		

1. INTRODUCTION

1.1 Scope of Services / Background

Gateway Energy Centre Limited (GECL) (the Applicant) is submitting the 2019 Variation Application under Section 36C of the Electricity Act 1989, to the Secretary of State for Business, Energy and Industrial Strategy (the Secretary of State) via the Department for Business, Energy and Industrial Strategy (BEIS), to vary the existing consent for the Gateway Energy Centre (GEC) (the Development or the Proposed Development).

Ramboll Environment and Health UK Limited (Ramboll) has been commissioned by the Applicant to prepare an updated Flood Risk Assessment (FRA) to accompany the 2019 Variation Application.

1.1.1 General Limitations and Reliance

This Report has been prepared by Ramboll exclusively for the intended use by GECL / InterGen in accordance with the agreement (reference number 1620002349-018), between Ramboll and the client defining, among others, the purpose, the scope and the terms and conditions for the services. No other warranty, expressed or implied, is made as to the professional advice included in this report or in respect of any matters outside the agreed scope of the services or the purpose for which the report and the associated agreed scope were intended, or any other services provided by Ramboll.

In preparation of this Report, Ramboll has relied upon publicly available information, information provided by the client and information provided by third parties. Accordingly, the conclusions in this report are valid only to the extent that the information provided to Ramboll was accurate, complete and available to Ramboll within the reporting schedule.

Ramboll's services are not intended as legal advice, nor an exhaustive review of site conditions and / or compliance. This report and accompanying documents are initial and intended solely for the use and benefit of the client for this purpose only and may not be used by or disclosed to, in whole or in part, any other person without the express written consent of Ramboll. Ramboll neither owes nor accepts any duty to any third party, unless formally agreed by Ramboll through that party entering into, at Ramboll's sole discretion, a written reliance agreement.

1.2 The 2019 Variation Application

In August 2011, the Original Consent was granted for GEC under Section 36 of the Electricity Act 1989. The following documents accompanied the Original Consent Application:

- February 2010 FRA¹; and,
- December 2010 Supplementary FRA².

Subsequently, in November 2014 and August 2016 the consent was varied (the 2014 Varied Consent and the 2016 Varied Consent, respectively) under Section 36C of the Electricity Act 1989. The 2016 Varied Consent is the existing consent for GEC.

Condition 2 of the existing consent provides that: *"the Development shall be up to 1250 MW capacity and comprise:*

- (a) *Either:*
- (i) *Up to two Combined Cycle Gas Turbine (CCGT) units (including for each CCGT unit: a gas turbine; a heat recovery steam generator; steam turbine plant; and, associated equipment); or,*
 - (ii) *(1) One CCGT unit (including: a gas turbine; a heat recovery steam generator; steam turbine plant; and, associated equipment), and,*

¹ February 2010 Environment Statement: Appendix D – Flood Risk Assessment, Parsons Brinkerhoff, February 2010

² December 2010 Environmental Statement Further Information Document: Supplementary Flood Risk Assessment, Parsons Brinkerhoff December 2010

(2) One or more Open Cycle Gas Turbine (OCGT) units with the OCGT units having a combined rated electrical output of less than 300 MW³ (including for each OCGT unit: a gas turbine; and, associated equipment)”.

Based on a number of influencing factors, including electricity market changes and technological advancements, GECL is submitted to the 2019 Variation Application which seeks to:

- Vary Condition 2(a) to provide that GEC shall remain up to 1250 MW, but shall comprise either *(green italic text added to highlight proposed variations)*:
 - (i) *Development Option (i)*, comprising:

Up to two CCGT units (including for each CCGT unit: a gas turbine; a Heat Recovery Steam Generator (HRSG); steam turbine plant; and, associated equipment); or,
 - (ii) *Development Option (ii)*, comprising:
 - (1) One CCGT unit with a rated electrical output of up to 630 MW (including: a gas turbine, HRSG; steam turbine plant; and, associated equipment);
 - (2) One or more OCGT units, with the OCGT units having a combined rated electrical output of less than 300 MW (including for each OCGT unit: a gas turbine; and, associated equipment); and,
 - (3) A Battery Energy Storage System (BESS) with a rated electrical output of up to 320 MW (including: batteries; associated enclosures; control and protection systems; temperature control systems; and, power conversion systems).*
- Provide that the commencement of GEC shall take place not later than 31 December 2023;
- Better allow for a phased development of GEC; and,
- Make changes regarding Carbon Capture Readiness (CCR), and the associated designated site.

1.3 The Purpose of this Document

To accompany the 2019 Variation Application, GECL is providing the following information to BEIS:

- The 2019 Environmental Statement Further Information Document (2019 ES FID); and,
- The 2019 Updated CCR Feasibility Study.

This document is the 2019 Updated FRA, which forms part of the 2019 ES FID.

Following on pre-application consultation with the Environment Agency, the purpose of this 2019 Updated FRA is to reflect (since the preparation of the February 2010 FRA and the December 2010 Supplementary FRA):

- Changes to the policy framework; and,
- Updated data and information, including:
 - Recent and proposed development within the DP World® London Gateway Logistics Park;
 - Environment Agency (EA) and Thurrock Borough Council hydraulic modelling of flood risks;
 - Modelling carried out as part of the Environment Agency's Thames Estuary TE 2100 Strategy; and,
 - Revised climate change data.

³ 300 MW refers to the OCGT(s) and not the CCGT and the OCGT(s).

In addition, the purpose of this 2019 Updated FRA is to determine whether the conditions within the existing consent (specifically Condition (41), concerning flood risk, and Condition (34), concerning a Sustainable Drainage Scheme (SuDS)) remain valid and appropriate.

2. GATEWAY ENERGY CENTRE (THE PROPOSED DEVELOPMENT)

GEC will have an operational lifetime of approximately 35 years.

The 2019 Variation Application seeks to vary Condition 2(a) of the existing consent to provide that GEC shall remain up to 1250 MW generating capacity, but shall comprise either:

- Development Option (i), comprising:
Up to two CCGT units with a rated electrical output of up to 1250 MW; or,
- Development Option (ii), comprising:
 - (1) One CCGT unit with a rated electrical output of up to 630 MW;
 - (2) One or more OCGT units having a combined rated electrical output of less than 300 MW; and,
 - (3) A BESS with a rated electrical output of up to 320 MW.

GEC will be located within the overall red-line boundary (see Figure 63114-PBP-0025 (associated with the existing consent)). The Ordnance Survey (OS) Grid Reference of the centre of the GEC site is approximately 573209, 182165. The overall red-line boundary covers a total area of approximately 29.1 hectares (ha) (see FIGURE 4.5 (associated with the original consent application)), which includes:

- The GEC site, which covers a total area of approximately 11.3 ha (including the land to be set aside for the purposes of CCR); and,
- Land to the north and west which is intended to be used during construction for temporary laydown and storage.

The overall red-line boundary, and the GEC site, is located on the north bank of the Thames Estuary on land within the DP World® London Gateway Logistics Park (Plot 5020), to the north of the DP World® London Gateway Port.

The GEC site is located approximately 6 km east of the A13. The A1014 dual carriageway (The Manorway) lies approximately 0.5 km to the north of the site and runs east to west to provide a link with the A13, which in turn connects with the M25 at Junction 30.

Within the immediate surrounding area, the predominant land use is industrial, with some residential settlements located further afield. In brief, the surrounding land uses comprise:

- To the north, the A1014 (dual carriageway) (The Manorway);
- To the east, the Shell Have Terminal (approximately 100 m), the Coryton CCGT generating station (approximately 700 m) and the former Petroplus Coryton Oil Refinery site⁴ (approximately 950 m);
- To the south, the DP World® London Gateway Port and Thames Estuary; and,
- To the west, the DP World® London Gateway Logistics Park.

The nearest residential settlements are:

- To the north, Basildon (approximately 7 km);
- To the east, Canvey Island (approximately 5 km) and,
- To the west, Corringham and Fobbing (approximately 4 km).

Within the wider surrounding rural area, the predominant land use is agricultural.

⁴ The former Petroplus Coryton Oil Refinery ceased production in June 2012. Following its sale, the site is being used for new developments, including the Thames Enterprise Park.

3. CHANGES TO THE POLICY FRAMEWORK

This Section summarises the changes to the policy framework since the preparation of the February 2010 FRA and the December 2010 Supplementary FRA.

3.1 National Policy

3.1.1 National Planning Policy Framework (NPPF)

In 2012, the National Planning Policy Framework (NPPF)⁵ published. In June 2018, the NPPF was updated⁶.

As per the NPPF, flood risk remains primarily regulated through planning policy, and the NPPF requires that an FRA should be submitted with planning applications for all development sites within Flood Zones 2 and 3 and all development sites over one hectare (ha) in area to determine the risks of flooding from all sources including rivers, the sea, sewers and groundwater.

The NPPF sets out that flood risk should be defined according to Flood Zone 3 (High Probability), Flood Zone 2 (Medium Probability) and Flood Zone 1 (Low Probability).

Flood Zone 3 represents land that the Environment Agency (EA) consider could be affected by flooding:

- from the sea by an event with a 0.5 % (1 in 200) or greater chance of occurring each year; or
- from a river by an event with a 1 % (1 in 100) or greater chance of occurring each year.

Flood Zone 2 represents land that the EA consider could be affected by flooding, from rivers or the sea with up to a 0.1% (1 in 1,000) chance of occurring each year.

Flood Zone 1 represents land assessed as having less than a 0.1% (<1 in 1,000) annual probability of flooding from rivers or the sea.

In terms of flood risk, the NPPF classifies land uses according to vulnerability as follows:

- Essential infrastructure;
- Highly vulnerable;
- More vulnerable;
- Less vulnerable; and,
- Water-compatible development

3.1.2 Planning Practice Guidance

Supplementing the NPPF, as part of the Planning Practice Guidance (PPG)⁷, the 'Flood Risk and Coastal Change' guidance provides further information on the requirements for sustainable drainage systems (SuDS). Surface water drainage for a proposed development should aim to discharge as high up the following hierarchy of drainage options as reasonably practicable:

- Into the ground (infiltration);
- To a surface water body;
- To a surface water sewer, highway drain, or another drainage system; and,
- To a combined sewer.

The PPG also sets out that clear arrangements should be put in place for ongoing maintenance of any sustainable drainage systems (SuDS) and drainage measures. However, the PPG

⁵ National Planning Policy Framework, Department for Communities and Local Government, March 2012.

⁶ National Planning Policy Framework, Ministry of Housing, Communities & Local Government, June 2018.

⁷ Planning Practice Guidance [online]. Ministry of Housing, Communities & Local Government (Live Document). Available at: <http://planningguidance.communities.gov.uk/>

acknowledges that it is unlikely to be reasonably practical to expect compliance with the technical standards if these are more expensive than complying with building regulations.

3.1.3 The Town and Country Planning (Development Management Procedure) Order 2015

As from 6 April 2015, the Government has strengthened planning policy on the provision of sustainable drainage for 'major' planning applications.

Generally, decisions about the suitability of sustainable drainage provision are made by the local planning authority (i.e. the TBC in this case); however, under The Town and Country Planning (Development Management Procedure) Order 2015⁸, Lead Local Flood Authorities (LLFA) are now statutory consultees for all major applications.

3.2 Regional Policy

3.2.1 2009 London Flood Risk Appraisal

In 2009, a Regional Flood Risk Appraisal⁹ (RFRA) was undertaken for London.

With regards to sustainable drainage, it includes Recommendation 5, which confirms that developments across London should reduce surface water discharge in line with the Sustainable Drainage Hierarchy set out in the proposed Policy '5.13 Sustainable Drainage' of the proposed London Plan.

3.2.2 2014 Sustainable Design and Construction Supplementary Planning Guidance

Published in 2014, to support the development of the proposed London Plan, the 'Sustainable Design and Construction Supplementary Planning Guidance'¹⁰ produced by the Mayor of London, sets out that, with regards to sustainable drainage, developers will be expected to clearly demonstrate that all opportunities to minimise runoff have been taken, such that discharge is as close to greenfield rate as practical.

It is suggested that, on previously-developed sites, runoff rates should not be more than three times the calculated greenfield rate; however, it is acknowledged that there are exceptions to this where a pumped discharge would be required to meet the standards or where surface water drainage is to tidal waters.

3.2.3 2016 London Plan

Published in 2016, the London Plan¹¹ includes:

- Policy '5.12 – Flood Risk Management' which confirms that development proposals must comply with the requirements set out in the NPPF and associated technical guidance (i.e. as part of the PPG, the 'Flood Risk and Coastal Change' guidance); and,
- Policy '5.13 - Sustainable Drainage' which confirms that a development should include SuDS measures unless there are practical reasons for not doing so. Under Policy '5.13 - Sustainable Drainage', it is also set out that a development should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:
 1. Store rainwater for later use;
 2. Use infiltration techniques, such as porous surfaces in non-clay areas;
 3. Attenuate rainwater in ponds or open water features for gradual release;

⁸ The Town and Country Planning (General Permitted Development) (England) Order 2015. Her Majesty's Stationery Office (HMSO), 2015. Statutory Instruments 2015, No. 596, Town and Country Planning, England.

⁹ London Regional Flood Risk Appraisal. Greater London Authority (GLA), 2009.

¹⁰ Sustainable Design and Construction Supplementary Planning Guidance. London Plan 2011 Implementation Framework. Greater London Authority (GLA), 2014.

¹¹ The London Plan – The Spatial Development Strategy for London, Consolidated with Alterations since 2011. Greater London Authority (GLA), 2016.

4. Attenuate rainwater by storing in tanks or sealed water features for gradual release;
5. Discharge rainwater direct to a watercourse;
6. Discharge rainwater to a surface water sewer/drain; and then
7. Discharge rainwater to the combined sewer.

3.2.4 2018 Draft London Plan

Published in August 2018, a new, updated draft London Plan is currently subject to examination in public. Although the current 2016 London Plan is still the adopted Development Plan, the 2018 Draft London Plan is a material consideration in planning decisions.

With regard to surface water drainage, the 2018 Draft London Plan confirms, with regards to sustainable drainage, that: *“development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy. There should also be a preference for green over grey features:*

1. *Rainwater use as a resource (for example rainwater harvesting, and blue roofs for irrigation;*
2. *Rainwater infiltration to ground at or close to source;*
3. *Rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens);*
4. *Rainwater discharge direct to a watercourse (unless not appropriate);*
5. *Controlled rainwater discharge to a surface water sewer or drain;*
6. *Controlled rainwater discharge to a combined sewer”.*

3.3 Local Policy

Originally adopted in 2011¹² before being updated in 2015¹³ to be consistent with NPPF, the Thurrock Council Core Strategy and Policies for Management of Development (Core Strategy) includes:

- Policy CSTP 27 – Management and Reduction of Flood Risk
This sets out the council's requirement for development to be in line with NPPF, Planning Practice Guidance and the Thames Estuary TE2100 Project, as well as the incorporation of Sustainable Drainage systems where appropriate.
- Policy CSTP 28 – River Thames
This requires development proposals to undertake appropriate level of flood risk assessment as set out by the NPPF and take account of the need for flood mitigation measures and to accommodate any necessary flood defence measures.

¹² Core Strategy and Policies for Management of Development, Thurrock Council, January 2011.

¹³ Core Strategy and Policies for Management of Development, Thurrock Council, January 2015.

4. UPDATED DATA AND INFORMATION SOURCES

This section summarises the updated data and information sources which have become available since the preparation of the February 2010 FRA and the December 2010 Supplementary FRA that have been reviewed or relied upon, and the consultation undertaken to prepare this 2019 Updated FRA.

4.1 Updated Data Sources

4.1.1 Environment Agency Flood Mapping

Fluvial / Tidal Flood Risk

As defined in the NPPF, the 2019 EA Flood Map for Planning¹⁴ shows areas of Flood Zones 1, 2 and 3.

The EA Flood Map for Planning also indicates the presence of flood defences; however, the EA specifically state that the Flood Zones show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements.

Surface Water Flood Risk

The 2019 EA Flood Map for Surface Water¹⁵ delineates risk from pluvial sources (i.e. flooding caused by rainwater exceeding the capacity of drainage systems) into the following four categories:

- Very Low: each year, this area has a chance of flooding of less than 1 in 1,000 (<0.1 %);
- Low: each year, this area has a chance of flooding of between 1 in 1,000 (0.1 %) and 1 in 100 (1 %);
- Medium: each year, this area has a chance of flooding of between 1 in 100 (1 %) and 1 in 30 (3.3 %); and
- High: each year, this area has a chance of flooding of greater than 1 in 30 (3.3 %).

Reservoir Failure

The EA flood mapping also includes flood risks associated with breaches in reservoirs. This mapping represents a 'worst case' scenario assuming that a reservoir would release all the water it contains were it to fail.

4.1.2 British Geological Society Online Data

The British Geological Society (BGS) publishes online mapping¹⁶ of superficial and bedrock geology at 1 to 625,000 and 1 to 50,000 scales. The BGS also publishes records of historical borehole investigations.

The 2019 datasets have been used to determine the likely geology beneath the masterplan site and associated factors relating to groundwater depth and potential for groundwater emergence.

4.1.3 Thurrock Council Strategic Flood Risk Assessment

Published in September 2009, Thurrock Council's Level 1 Strategic Flood Risk Assessment (SFRA)¹⁷ provided a strategic overview of flooding within the Thurrock Borough Council area.

Published in February 2010, Thurrock Council's level 2 SFRA¹⁸ provided the additional detail required in order to inform allocation sites for the Core Strategy.

¹⁴ Flood Map for Planning [online], UK Government, 2019. Available at:

<https://flood-map-for-planning.service.gov.uk/>

¹⁵ Long Term Flood Risk Assessment for Locations in England [online], UK Government, 2019. Available at:

<https://flood-warning-information.service.gov.uk/long-term-flood-risk>

¹⁶ Geology of Britain Viewer [online], British Geological Survey (BGS), 2019. Available at:

<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

¹⁷ Thurrock Council Level 1 Strategic Flood Risk Assessment, Scott Wilson, September 2009.

¹⁸ Thurrock Council Level 2 Strategic Flood Risk Assessment, Scott Wilson, February 2010.

Following updates in data and revised planning policy, published in June 2018, a revised Level 1 SFRA¹⁹ included new breach modelling to assess any residual flood risks.

4.1.4 Environment Agency's 2000 Thames Estuary 2100 (TE2100) Plan

Published in 2012, the EA's Thames Estuary 2100²⁰ (TE2100) Plan was established with the aim of developing a strategic flood risk management plan for London and the Thames Estuary to 2100.

The TE2011 Plan sets out action for 23 policy units, which are grouped into Action Zones.

The Proposed Development site falls within 'Policy Unit 7 – Shell Haven and Fobbing Marshes'.

4.1.5 TE2100 5 Year Monitoring Review

Undertaken in 2016, the TE2100 5 Year Monitoring Review²¹ was the first review of TE2100 Plan, and identified the changes taking place in the Thames Estuary and any changes required in the overall TE2011 Plan or in the monitoring of the Estuary.

4.2 Updated Information Sources

As noted previously, the following documents accompanied the Original Consent Application:

- February 2010 FRA; and,
- December 2010 Supplementary FRA.

The following sub-Section summarise the updated information sources which have become available.

4.2.1 Topographical Information

The topography of the site and the surrounding area is understood to have altered a number of times over recent years and in part due to land remediation works. LiDAR (Light Detection and Ranging) aerial topographic survey datasets available on the DEFRA website have been acquired for the site and the immediate surrounding area, and have been reviewed as part of this assessment and confirm this. The data sets reviewed include data sets from 2011, 2012, 2013, 2014, 2015 and 2016.

Appendix 1 presents the original topographic data from the December 2010 Supplementary FRA, and the updated topographic data. The updated topographic data is referenced in 4.2.4.

4.2.2 2013 DP World® London Gateway Logistics Park Local Development Order: Flood Risk Assessment²²

In 2013, in support of the LDO, the DP World® London Gateway Logistics Park LDO FRA was submitted.

From this document, it is noted that the Proposed Development site is located at 'Plot 5020'.

4.2.3 2013 DP World® London Gateway Logistics Park Local Development Order: Drainage Strategy (Draft)²³

In 2013, in support of the DP World® London Gateway Logistics Park LDO FRA, a Drainage Strategy was produced covering surface and foul water discharge for the whole DP World® London Gateway Logistics Park including the Proposed Development site ('Plot 5020').

Some elements of the associated network are believed to have already been designed and partially implemented.

¹⁹ AECOM Infrastructure & Environment UK Limited, June 2018.

²⁰ TE2100 Plan – Managing Flood Risk through London and the Thames Estuary. Environment Agency, 2012.

²¹ TE2100 5 Year Monitoring Review. Environment Agency, 2016.

²² London Gateway Logistics Park Local Development Order – Flood Risk Assessment. URS Infrastructure and Environment UK Limited, January 2013.

²³ London Gateway Logistics Park Local Development Order – Park Drainage Strategy. AECOM, January 2013.

4.2.4 2015 DP World® London Gateway (DPWLG) Prior Notification Submission Site Area (With Levels)

Dated April 2015, a prior notification submission site area (with levels) plan (LG-CTW-PRK-MPN-C10001-DRA-ART-0515) is available for the DP World® London Gateway Logistics Park. This plan identifies existing and proposed levels for the wider World® London Gateway Logistics Park.

Appendix 1 provides the plan.

4.2.5 2016 GEC Environmental Permit (EPR/EP3536EN)

During operation, activities on the Proposed Development site will be undertaken in accordance with an Environmental Permit. Issued in 2016, GECL already holds an Environmental Permit for the development permitted by the 2014 Varied Consent.

4.3 Consultation Undertaken

4.3.1 Thurrock Council

In March 2019, a pre-application request was made to Thurrock Council.

Subsequently, in a letter dated 5 April 2019, comments were received back from the EA. Amongst other items, the letter included flood risk issues. Appendix 2 provides the letter.

4.3.2 Environment Agency

Following on from the letter dated 5 April 2019, comprising comments received from the EA, on 1 May 2019, a teleconference was held between the EA and Ramboll to discuss the flood risk issues on site, available updated data and information (i.e. between the 2010 assessments and the proposed application date) and the considerations for any updated FRA.

At the teleconference meeting, it was concluded that Ramboll would submit a scope of works for the updated FRA for comment and agreement with the EA.

Appendix 3 provides the submitted scope of works, and subsequently agreement with the EA.

In addition to this, a formal data request regards flood risk and flood defence infrastructure was made to the EA. Appendix 4 provides the associated data and information.

5. REVIEW OF UPDATED DATA AND INFORMATION

5.1 Application Site Layout and Topography

The site topography has not changed materially from that described in the February 2010 FRA and December 2010 Supplementary FRA. The original FRA (February 2010) had indicated that current ground levels at the site were approximately 2.1 m AOD. The December 2010 Supplementary FRA utilised more up to date LiDAR information which indicates that the site was situated at between 2 and 2.9 m AOD.

5.2 Geology and Ground Conditions

The 2013 DP World® London Gateway Logistics Park LDO FRA notes that the geology on site consists of clay and silt overlying a bedrock of clay silt and sand. There are also areas of made up ground up to a depth of 1 m below ground level (m BGL). This is understood to remain the current situation with regard to ground conditions.

5.3 Hydrology

5.3.1 Surface Water Features

As described in the previous FRA, the Proposed Development site is located on the left hand (north bank) of the River Thames with the DP World® London Gateway Port between the site and the river.

Approximately 1.5 km east of the site the Shellhaven Creek flows south before discharging into the River Thames.

A designated main river, the Stanford Boundary Drain, flows generally eastward immediately north of the site and to the south of the A1014 (The Manorway), although channel invert levels shown on the topographic survey undulate along its length. It passes below the A1014 (The Manorway) in a 900mm diameter culvert to join the Fobbing Common Sewer. It then crosses Fobbing Marshes to Manorway Creek which itself discharges to Holehaven Creek via a tidal flapped outfall. Holehaven Creek is tidal and linked to the Thames Estuary.

5.3.2 Environment Agency Flood Zone Classification

As presented Appendix 4 the entire Proposed Development site is shown to be located within Flood Zone 3 (high probability), as had been described in the previous FRA. However, the extent of Flood Zone 3 specifically ignores the presence of flood defence assets. The Proposed Development site is located entirely within a designated 'area benefiting from defences'. Therefore, flood risk is considered to be lower than typically associated with Flood Zones 2 and 3.

5.3.3 Flood Defences

The application site benefits from the Thames Tidal Defences (TTD) which protect against direct tidal flooding from the River Thames. The Standard of Protection (SoP) offered by the flood defences in this area of the Thames is 0.1 % annual exceedance probability (AEP); i.e. they are designed to defend London from tidal flooding during events with up to and including a 1 in 1,000 annual probability. The defences are all raised, man-made and privately owned. The EA inspects the defences twice a year to ensure that they remain fit for purpose. Appendix 4 presents the flood defence asset information, provided by the EA, for existing defences.

The DP World® London Gateway Port runs for approximate 3.5 km along the River Thames, south of the site. Since the 2010 FRA, the wharf associated with DP World® has been constructed and acts as a de-fact flood defence, affording protection to the site to against tidal flood waters to level of 6.85m AOD. According to the 2013 LG FRA, the raised wharf has replaced the existing flood defence wall at this location.

In the wider surrounds, alongside the River Thames south east of the site (downstream), outside of the demise of the DP World® London Gateway sites, there is a flood defence wall with a minimum level of 6.54 m AOD, which the EA have given an overall condition grade of 3 'fair'.

Alongside Shellhaven Creek (Holehaven Creek) east of the site, there is a flood defence wall with a minimum crest level of 6.2m AOD, which the EA have also given an overall condition grade of 3 'fair'.

5.3.4 Environment Agency Flood Map for Reservoirs

According to the EA Flood Map for Reservoirs, the Proposed Development site is not shown to be at risk of flooding from reservoirs.

5.3.5 Environment Agency Historic Flood Records

Appendix 4 presents the EA recorded flood events outline map. This shows one historic flooding event in 1953. No flooding has been recorded since the 2010 FRA.

5.3.6 Hydraulic Modelling

The original FRA (February 2010) had commented that a breach analysis had been undertaken for the entire LG Development site by Scott Wilson Ltd. in 2008. However, in response to EA concerns, a revised breach analysis was completed, specific to the GEC site.

The maximum flood level and depth data, as informed by the site-specific breach assessment and reported within the December 2010 Supplementary FRA are set out below. Although 3 different breach locations were considered, the results from the nearest breach location to the site are presented as these give the worst-case flooding scenario specific to the proposed GEC development. These results are for the 'existing' ground condition prior to the proposed development of the GEC.

Model Simulation	Maximum Water Level (mAOD)
1 in 200 annual probability	3.10 mAOD
1 in 1,000 annual probability	3.20 mAOD

As per further correspondence between the EA and Ramboll, the EA advised on a need for the updated FRA to focus on flood risk implications in the event of a breach. Subsequently it was confirmed that hydraulic modelling of breach analysis scenarios had been carried out by Thurrock Council, as part of the 2018 Revised Level 1 SFRA. Whilst Ramboll have used all reasonable endeavours to obtain the associated data and information, the data was not made available for this updated FRA.

5.4 Surface Water Drainage

The EA's online mapping of surface water flood risks suggest that the site would be at Low or Very Low risk of flooding from surface water. However, this represents the pre-development topography and does not take account of any existing or proposed surface water drainage which would be expected to reduce such risks further.

The 2013 DP World® London Gateway Logistics Park Local Development Order: Drainage Strategy (Draft), states that the current situation regards discharge of surface water drainage from the site is as follows " *the flows from the site are currently discharged through either the ditch network or pumped via the Carters Bay Outfall. Carter's Bay Outfall comprises two 1220mm diameter steel mains running under the railway line and the sea defence wall. There is currently one pumping station serving the site. This pumping station is currently used to control the ground water level in the site. The northern part of the site is understood to drain to the Stanford Boundary Drain*".

In addition, the 2016 Environmental Permit enforces the following:

Table S3.2 Point Source emissions to water (other than sewer) – emission limits and monitoring requirements						
Emission point ref. & location	Parameter	Source	Limit (incl. unit)	Reference period	Monitoring frequency	Monitoring standard or method
Combined cooling waters, blow down and uncontaminated surface waters Via W1 on site plan in Schedule 7 emission to the LG Park Swale System.	Maximum daily flow	Combined demineralisation plant, blow down and uncontaminated surface waters	-	Total daily volume, 24 hour period beginning 00.01	Continuous	MCERTS
	PH		6-9	Instantaneous	Continuous	BS EN ISO 10523:2012
	Visual appearance		The discharge must so far as is reasonably practicable have no significant adverse visible effect on the receiving water, watercourse bed or any plants or animals within the watercourse	Visual Examination		-
	Oil or grease		No visible emission	Visual examination	Fortnightly	-

6. UPDATED FLOOD RISK ASSESSMENT

6.1 Overview and Purpose

Considering the changes to the policy framework, and using the updated data and information, this Section seeks to determine whether the conditions within the existing consent (specifically Condition (41), concerning flood risk, and Condition (34), concerning a Sustainable Drainage Scheme (SuDS)) remain valid and appropriate.

6.2 Flooding

6.2.1 Sources of Flood Risk

The main flood risk on-site is tidal flooding from the River Thames. However, the Thames Tidal Defences, supplemented by the wharf associated with DP World®, which has been constructed and acts as a de-fact flood defence, provides protection to the site against tidal flooding events with up to and including a 1 in 1,000 (0.1%) annual probability. Therefore, only residual flood risk requires further consideration.

No significant surface water flood risks have been identified and the proposed surface water drainage network, both on-site and within the wider DP World® London Gateway Logistics Park, would manage flood risk from this source.

No other significant sources of flood risk have been identified.

6.2.2 Existing Planning Condition

Within the existing consent, Condition (41) concerning flood risk provides that: *"The Development shall be carried out in accordance with the details contained in the document entitled "Gateway Energy Centre Supplementary Flood Risk Assessment" dated December 2010, and shall include for the provision of safe route(s) into and out of the Site and for any place of refuge for Site staff and visitors to be provided at a minimum of 3.7 m AOD, the details of which shall be submitted to and approved in writing by the LPA"*.

The design flood level of 3.7 m AOD was informed by the previous site-specific breach modelling undertaken as part of the December 2010 Gateway Energy Centre Supplementary FRA. The breach analysis had concluded that the finished floor levels of GEC should be set at a minimum of 3.2 m AOD plus a freeboard of at least 300 mm (i.e. 3.5 m AOD). The existing planning Condition had included a greater freeboard of 500 mm.

Although more recent hydraulic modelling of breach analysis scenarios has been carried out by Thurrock Council, as part of the 2018 Revised Level 1 SFRA, the data was not made available for this updated FRA despite Ramboll having used all reasonable endeavours to obtain the associated data and information. Furthermore, it is considered that site-specific modelling, such as that undertaken as part of the December 2010 Gateway Energy Centre Supplementary FRA, should take precedence.

Although the SFRA document presents flood depth mapping and not flood level data, Ramboll has undertaken initial review of the flood depth mapping presented within the 2018 Revised Level 1 SFRA. This suggests that the modelling had utilised LiDAR aerial topographic survey data from 2011 and the resulting flood depth data appears broadly comparable with the results of the December 2010 Gateway Energy Centre Supplementary FRA. Given that a freeboard of 500 mm was required above the peak flood level, it is considered unlikely that the full results of the updated SFRA data would materially contradict the previous site-specific modelling. On this basis, the existing Condition (41) is considered to remain appropriate.

6.2.3 Proposed Amendments within the 2019 Variation Application

Based on the updated FRA, the following are the proposed amendments to Condition (41) concerning flood risk (*green italic text to highlight proposed variations*): *"The Development shall be carried out in accordance with the details contained in the document entitled "Gateway Energy Centre Supplementary Flood Risk Assessment" dated December 2010, as amended by the*

document titled "Gateway Energy Centre 2019 Updated Flood Risk Assessment" dated June 2019, and shall include for the provision of safe route(s) into and out of the Site and for any place of refuge for Site staff and visitors to be provided at a minimum of 3.7 m AOD, the details of which shall be submitted to and approved in writing by the LPA".

It is also proposed that the existing Condition be supplemented by a commitment to provide flood resilient/resistant design details prior to commencement and for a Flood Warning Evacuation Plan to be prepared for the site prior to occupation.

6.2.4 Suitability of Development

As set out in the December 2010 FRA, as floor levels of all sensitive areas and equipment (e.g. electrical equipment, steam generators) would be raised above all potential breach scenarios, the GEC site will still be able to remain operational in the event of a 1 in 1,000 annual probability event, even during a breach of the flood defences. As the proposed development is considered as 'Essential Infrastructure' in flood risk terms, it is considered an appropriate land use for the location given the identified flood risk and existing flood defence mitigation.

6.3 Surface Water Drainage

6.3.1 Existing Condition

Within the existing consent, Condition (34) concerning a SuDS provides that: *"Except for the Permitted Preliminary Works, the commencement of the Development shall not take place until there has been submitted to, approved in writing by, and deposited with the LPA, in consultation with the Environment Agency, a scheme for SuDS. Such SuDS shall include the details and measures contained in the document entitled "Gateway Energy Centre Supplementary Flood Risk Assessment" dated December 2010 and identified on FRA Figure 1 of that document, and be put in place in accordance with the approved scheme"*

As noted in the previous applications (2010, 2014 and 2016) and as required by the Environmental Permit, site drainage (including surface water runoff) will be monitored and discharged to this wider drainage network. Therefore, a separate Surface Water Drainage Strategy has not been developed for GEC. However, the FRA describe the wider drainage network and confirms that GEC would not exceed the associated parameters.

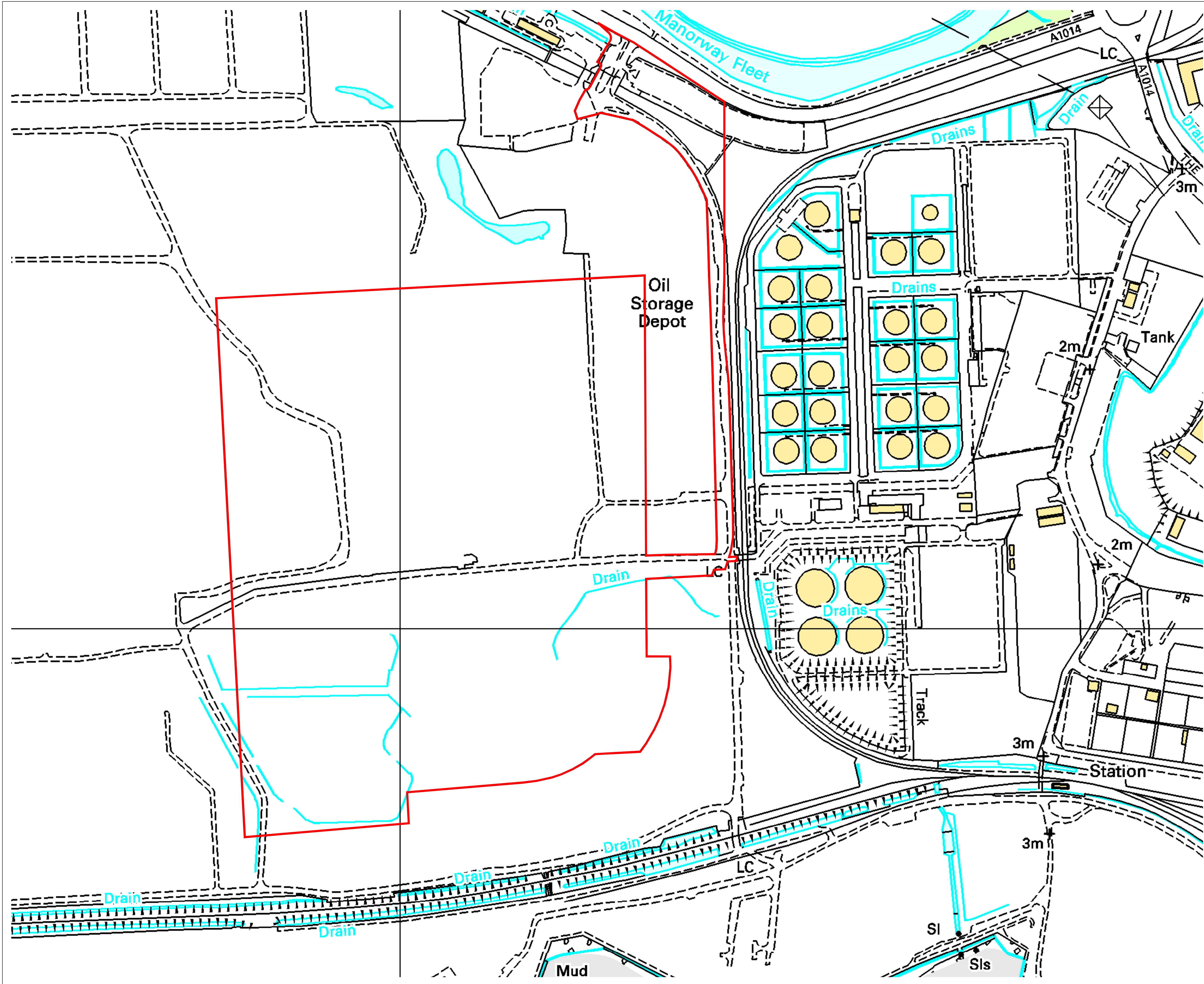
6.3.2 Proposed Amendments within the 2019 Variation Application

Based on the updated FRA and to better allow for a phased development of GEC, the following are the proposed amendments to Condition (34) concerning a SuDS (*green italic text to highlight proposed variations*): *"Except for the Permitted Preliminary Works, the commencement of each phase of the Development shall not take place until there has been submitted to, approved in writing by, and deposited with the LPA, in consultation with the Environment Agency Lead Local Flood Authority, a scheme for SuDS. Such SuDS shall include the details and measures contained in the document entitled "Gateway Energy Centre Supplementary Flood Risk Assessment" dated December 2010 and identified on FRA Figure 1 of that document, as amended by the document titled "Gateway Energy Centre 2019 Updated Flood Risk Assessment" dated June 2019, and be put in place in accordance with the approved scheme"*

FIGURES

The following figures have been provided:

- Overall Red-Line Boundary (Figure 63114-PBP-0025 (associated with the existing consent)).
- GEC site within the Overall Red-Line Boundary (FIGURE 4.5 (associated with the original consent application)).



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

REV	DATE	BY	CHKD	APPD

NOTES

- CLIENT INTERGEN
- PROJECT GATEWAY ENERGY CENTRE
- TITLE RED LINE BOUNDARY

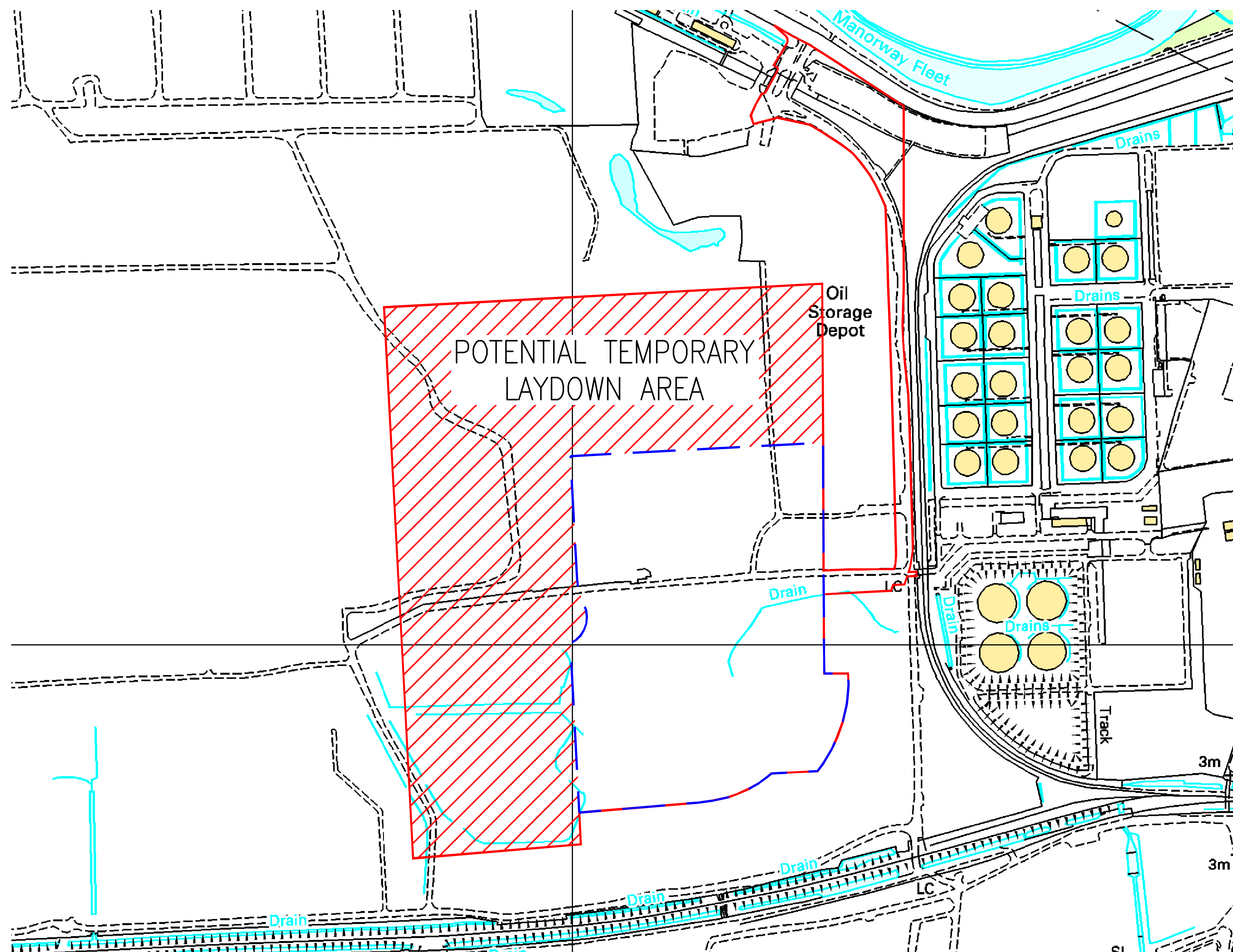
DATE	18/02/10	DRAWN BY	DD
SCALE	1/2000 @A1	PRODUCED BY	DD
CAD REF		CHECKED	JS
		APPROVED	JS



Parsons Brinckerhoff
Amber Court, William Armstrong Drive, Newcastle upon Tyne, NE4 7YQ
Tel: 44-(0)191 2261234 Fax: 44-(0)191 2262345

DRAWING NUMBER
63114-PBP-0025 | -

© Copyright Parsons Brinckerhoff
Copyright in this drawings belongs to Parsons Brinckerhoff Ltd. This drawing may not be used, sold, licensed, transferred, copied or reproduced in whole or in part or in any manner or form other than with the prior written consent of Parsons Brinckerhoff.



REV	DATE	DESCRIPTION	BY	CHKD	APPD	NOTES
-----	------	-------------	----	------	------	-------

00/00/00



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
POTENTIAL TEMPORARY
LAYDOWN AREA

• DATE 19/08/09
• SCALE 1:5000 @ A3
• CAD REF

DRAWN BY DD
PRODUCED BY DD
CHECKED EA
APPROVED

• DRAWING NUMBER

FIGURE 4.5

© Copyright Parsons Brinckerhoff

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

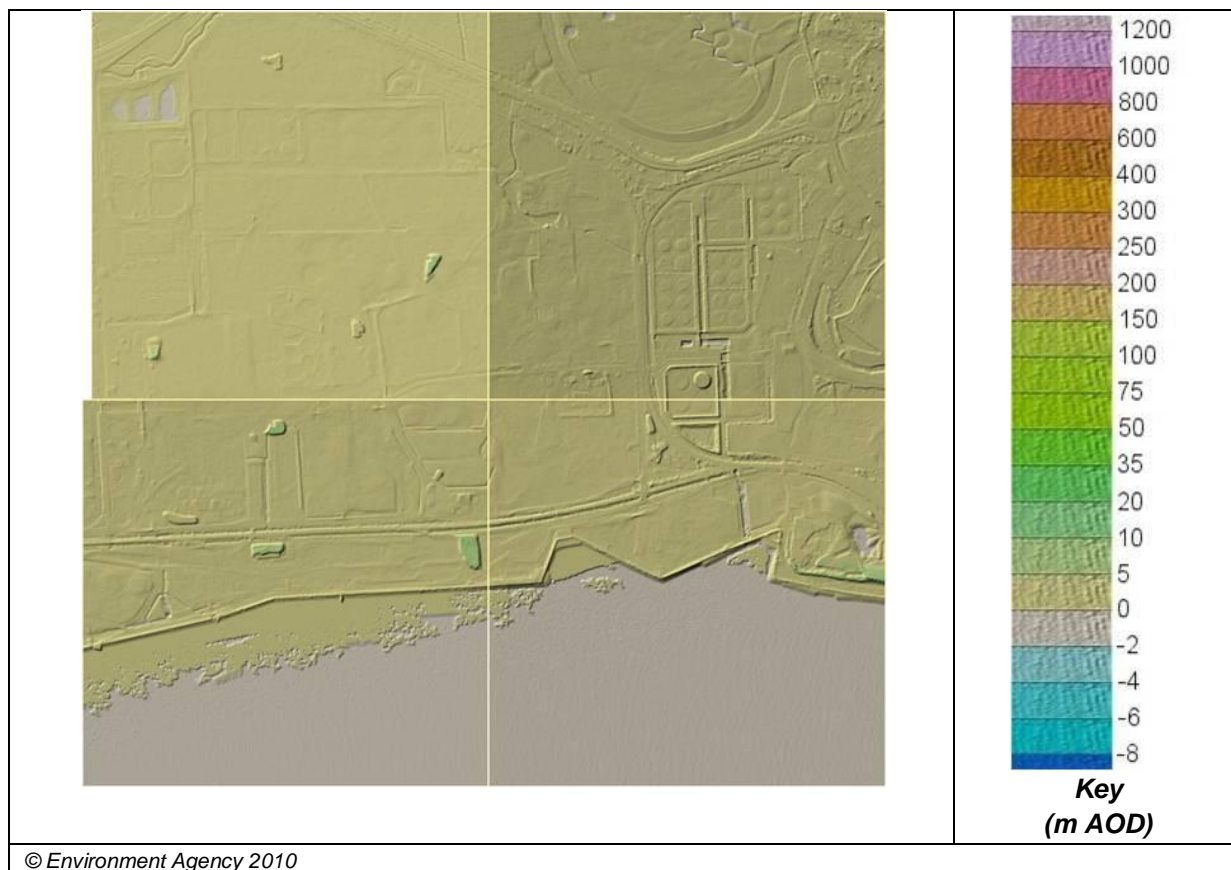
APPENDIX 1: TOPOGRAPHIC DATA

3 SUPPLEMENTARY INFORMATION ON TOPOGRAPHICAL SURVEY AND FINISHED FLOOR LEVELS

3.1 Topographical Survey

3.1.1 The original FRA (February 2010) indicated that current ground levels at the site (based on LiDAR Data) were approximately 2.1 m AOD. Since the submission of the original FRA, more up to date LiDAR information has been made available which indicates that the site is situated at between 2 - 2.9 m AOD. This data is reproduced below in Figure 3.1.

FIGURE 3.1 – TOPOGRAPHICAL LIDAR DATA FOR GEC SITE

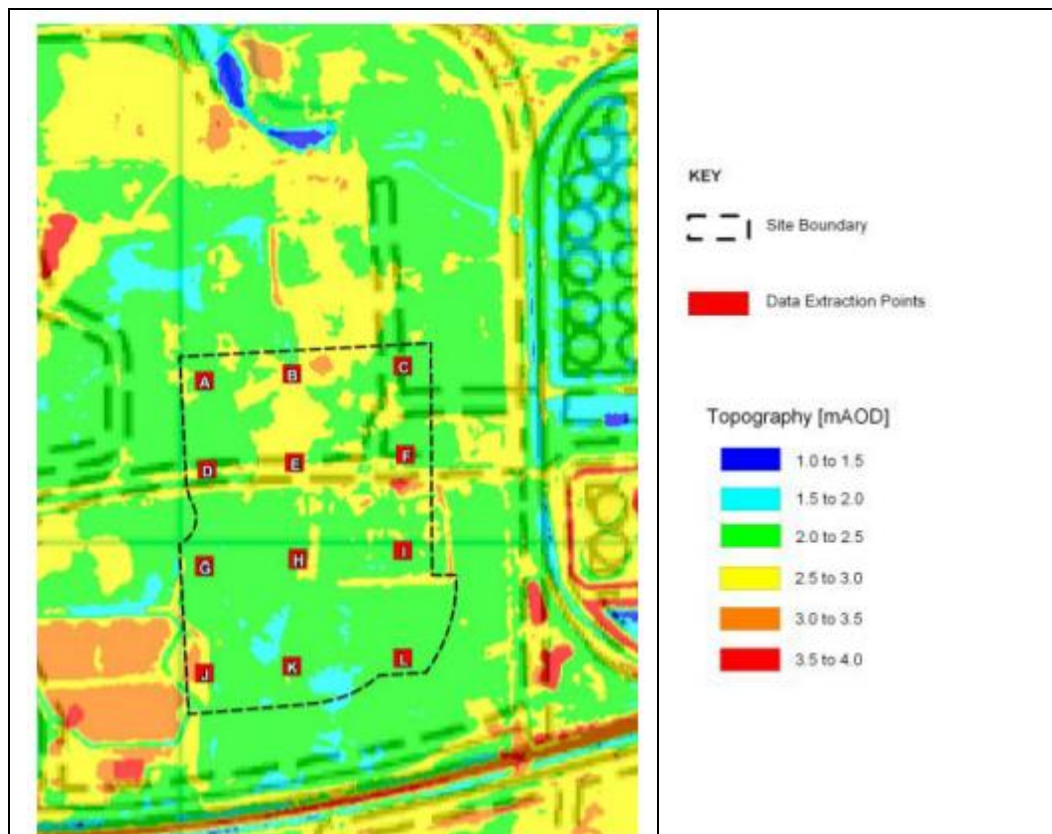


3.1.2 Further to this Spot Levels across the GEC site are given in Table 3.1, and this is related to their location which is shown on Figure 3.2.

TABLE 3.1 – SPOT LEVELS AT THE GEC SITE

<i>Location (Grid Reference)</i>			<i>Topographical Data (m AOD)</i>
A	573027	182187	2.50
B	573127	182195	2.62
C	573254	182204	2.26
D	873030	182087	2.51
E	573130	182095	2.59
F	573257	182104	2.33
G	573027	181977	2.16
H	573134	181985	2.27
I	573254	181994	2.26
J	573027	181856	2.90
K	573127	181864	2.21
L	573254	181873	2.12

FIGURE 3.2 – SPOT LEVELS AT THE GEC SITE





Legend:-
PL = Proposed Level
EL = Existing Ground Level
AOD = Above Ordnance Datum

- Notes:-
- Existing ground levels are approximate. They have been calculated from the 2008 Topographical Survey and will not reflect any changes due to regrading.

Client:				Project:				Title:				Saxon House, Duke Street, Chelmsford, Essex, CM1 1HT				Design: AC				CAD: AC			
DPW COMMENTS INCORPORATED				LONDON GATEWAY CONTRACT 6010				PARK INFRASTRUCTURE				Tel: +44 (0) 1245 77 1200				Chk'd: RIWL				App'd: JW			
INITIAL ISSUE				HIGHWAY AND ROADWORKS DESIGN								Date: 2011/08/08				Scale: 1:4000 (@A1)				Rev: 0.2			
Rev Date Detail				Made Chkd App'd				No. LG-FBM-PRK-INF-C6010-SKT-CIV-0018				CM				A1							

APPENDIX 2: ENVIRONMENT AGENCY PRE-APPLICATION RESPONSE



Mr. Jon Bowen
DWD Property Planning
6-7 New Bridge Street
London
City of London
EC4V 6AB

Our ref: AE/2019/123931/01-L01
Your ref: 19/30075/PMAJ

Date: 05 April 2019

Dear Mr. Bowen

**PRE-APPLICATION REQUEST FOR PROPOSED S36 (ELECTRICITY ACT)
VARIATION APPLICATION FOR GAS FIRED ELECTRIC GENERATING STATION
AND PLANNING APPLICATION FOR GAS PIPELINE AND ABOVE GROUND
INSTALLATION FOR OPEN-CYCLE GAS TURBINE LAND BETWEEN THE
PROPOSED GATEWAY ENERGY CENTRE AND EXISTING NATIONAL GRID
SUB STATION, THE MANORWAY, CORYTON, ESSEX**

We have received a request from Thurrock Council for pre-application advice relating to the above development. Our process for providing pre-application advice means we need to provide comments directly to you but have copied in Thurrock for their information.

Based on the information currently available the development raises some environmental concerns that you will need to address as part of your planning application. Further work will be needed to show how these issues can be satisfactorily addressed to ensure no environmental impacts.

Flood Risk

The site lies within tidal Flood Zone 3, defined by the 'Planning Practice Guidance: Flood Risk and Coastal Change' as having a high probability of flooding. The proposal is for Pre-application request for proposed s36 (Electricity act) variation application for gas fired electric generating station and planning application for gas pipeline and above ground installation for open-cycle gas turbine, which is classed as "essential infrastructure" in [Table 2: Flood Risk Vulnerability Classification](#) of the Planning Practice Guidance.

To comply with national policy any future application will therefore need to pass the Sequential Test and Exception Test and be supported by a site specific FRA. You will need to talk to the Council about the Tests at your earliest convenience, as failure to pass them is likely to result in the refusal of planning permission.

Flood Risk Assessment

Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood.

In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood. The lifetime of development should be specified.

In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.

Paragraph: 067 Reference ID: 7-067-20140306

Data Available

Our Customers and Engagement team can provide any relevant flooding information that we have available. Please be aware that there may be a charge for this information. Please contact: Enquiries_EastAnglia@environment-agency.gov.uk. For further information on our flood map products please visit our website at: www.environment-agency.gov.uk/research/planning/93498.aspx

Strategic Flood Risk Assessments

Strategic Flood Risk Assessments (SFRA) are undertaken by local planning authorities as part of the planning process. The SFRA may contain information to assist in preparing site-specific FRAs. Applicants should consult the SFRA while preparing planning applications. Please contact your local authority for further information.

Actual Risk

The site is currently protected by flood defences and is not at risk of flooding in the present-day 0.5% (1 in 200) annual probability flood event, and the defences will continue to offer protection over the lifetime of the development, provided that the TE2100 policy is followed and the defences are raised in line with climate change, which is dependent on future funding.

Depending upon the lifetime of development, Overtopping modelling may need to be

completed for the 0.1% event, inclusive of climate change, as based upon the still water level and the existing crest level of the defences, these defences would be expected to overtop along some of the lower frontages. Whilst there is a Thames Estuary 2100 (TE2100) plan providing the aspirations for future defence improvement, this plan does not guarantee that funding will be available for such improvements, and it is therefore imperative that the FRA considers the risk to the site should the defences be overtopped over the development lifetime.

The FRA should also consider any fluvial flood risk from Shellhaven Creek.

Breach Risk

The FRA must explore the risk of a breach of the defences. You must provide this information in your FRA for the local council to assess. You can ascertain this from the Thurrock Strategic Flood Risk Assessment (SFRA) OR you can obtain a worst case approximation of the breach flood risk by obtaining our undefended flood levels.

There has been some significant land raising within the flood cell of the site, at DP World – London Gateway Port, to the west of the site. This means that the breach analysis carried out as part of the 2010 FRA study is no longer relevant as the landform has changed, which may impact upon flood depth, flood flow rates, the onset of flooding and the duration of flooding.

It is important that the risks to the site are appropriately reflected within the FRA and we do not therefore consider that the FRA provides sufficient information on the residual flood risk at the site. Thurrock Borough Council have been preparing a revised version of their SFRA, and we recommend that you contact them to establish when this information may be available, and clarify whether the London Gateway Port levels are accurately represented within the revised SFRA. If the SFRA outputs are not yet available for use, or the Port topography is not accurately represented, then the FRA will need to include revised breach modelling, which takes into account the land raising and details the result flood risk within the flood cell.

Climate change

An important consideration at present are the updated UK Climate Change Projections (UKCP) 2018 which are due for publication this year. It is important that consideration is given to the most recent and up to date projections. It will need to be demonstrated that future adaptation/flood mitigation would be achievable at the site, which allow for any future credible predictions that might arise during the life of the development. Modelling may need to be updated with the UKCP18 projections, if it is considered that the latest climate change predictions may result in significant increases flood levels.

Thames Estuary 2100 Plan

The Gateway Energy Centre (GEC) and associated infrastructure are located within the [Thames Estuary 2100 \(TE2100\) plan's](#) Shellhaven & Fobbing Marshes policy unit.

The Plan provides a vision for improving the tidal flood defence system for the 100 years up to 2100 so that current standard of tidal flood risk management is maintained or improved across the estuary taking account of sea level rise. The Plan sets out how 1.3 million people and £275 billion worth of property will continue to be protected from tidal flood risk. The Plan recommends actions that we and others will need to take in the short, medium and long term. The Plan is based on contemporary understanding of predicted climate change, but is designed to be adaptable to changes in predictions (including for sea level rise) throughout the century.

At present, tidal defences within the Shellhaven & Fobbing Marshes policy unit have a 0.1% annual exceedance probability. The Plan's preferred policy for the tidal defences benefitting the applicant's site is "to continue with existing or alternative actions to manage flood risk. We will continue to maintain flood defences at their current level accepting that the likelihood and/or consequences of a flood will increase because of climate change. We will supplement this policy with improved defences to protect key sites such as Coryton".

It is extremely important to note that not all of the defences within the Shellhaven & Fobbing Marshes policy unit will be raised in line with climate change projections. Furthermore the Plan in no way guarantees funding for the improvement of the defence system in line with climate change. The Plan does not, therefore, commit to the raising of defences and thus continuing the defences 0.1% annual exceedance probability, but provides details of the aspirations for the future management of the defences, dependent upon funding.

Under [Defra's Flood and Coastal Resilience Partnership funding policy](#), the Plan's Shellhaven & Fobbing Marshes policy unit does not currently attract 100% central government Grant in Aid contributions towards the cost of any defence repairs, refurbishment or raising. Currently half of the cost must be secured from other external sources ahead of any defence crest level raising aspirations described in the Plan. Furthermore, the latest version of Thurrock Council's Strategic Flood Risk Assessment (SFRA) (dated, June 2018) identifies in section 3.12.2 the expected costs associated with improving defences (in Thurrock as a whole) and how financial contributions will be required from partners (including landowners and other key stakeholders) to ensure that the required funding will be available, before the defences can be raised.

We would welcome further strategic conversation with the applicant and Thurrock Council to progress this matter.

Flood Resilient/Resistant Construction

We recommend that consideration is given to the use of flood proofing measures to reduce the impact of flooding when it occurs. To minimise the disruption and cost implications of a flood event we encourage development to incorporate flood resilience/resistance measures up to the extreme 1 in 1000 year climate change flood level. Both flood resilience and resistance measures can be used for flood proofing. Flood resilient buildings are designed to reduce the consequences of flooding and speed up recovery from the effects of flooding; flood resistant construction can help prevent or minimise the amount of water entering a building.

Information on preparing property for flooding can be found in the documents 'Improving the flood performance of new buildings' and 'Prepare your property for flooding' (<https://www.gov.uk/government/publications/flood-resilient-construction-of-new-buildings> and <http://www.environment-agency.gov.uk/homeandleisure/floods/31644.aspx>).

Safe Access

There should be the consideration of if the site can be operated remotely in times of flood, so that users of the site are not placed at risk.

During a flood, the journey to safe, dry areas completely outside the 0.5% (1 in 200)> annual probability event with climate change floodplain would involve crossing areas of potentially fast flowing water. Those venturing out on foot in areas where flooding exceeds 100 millimetres or so would be at risk from a wide range of hazards, including for example unmarked drops, or access chambers where the cover has been swept away.

Safe access and egress routes should be assessed in accordance with the guidance document [Defra/EA Technical Report FD2320: Flood Risk Assessment Guidance for New Development](#).

Where safe access cannot be achieved an emergency flood plan that deals with matters of evacuation and refuge should demonstrate that people will not be exposed to flood hazards. The emergency flood plan should be submitted as part of the FRA and will need to be agreed with the Local Council.

Emergency Flood Plan

Where safe access cannot be achieved, or if the development would be at residual risk of flooding in a breach, an emergency flood plan that deals with matters of evacuation and refuge should demonstrate that people will not be exposed to flood hazards. The emergency flood plan should be submitted as part of the FRA and will need to be agreed with the Local Council.

The local council will assess the adequacy of the evacuation arrangements, including the safety of the route of access/egress from the site in a flood event or information in relation to signage, underwater hazards or any other particular requirements. Their emergency planners will be consulted as they make this assessment.

Other Sources of Flooding

In addition to the above flood risk, the site may be within an area at risk of flooding from surface water, reservoirs, sewer and/or groundwater. We have not considered these risks in any detail, but you should ensure these risks are all considered fully within the FRA.

Environmental Permit Regulations 2010 (Flood Risk Activities)

The applicant may need an environmental permit for flood risk activities if they want to do work in, under, over or within 8 metres (m) from a fluvial main river and from any flood defence structure or culvert or 16m from a tidal main river and from any flood defence structure or culvert.

The EPR are a risk-based framework that enables us to focus regulatory effort towards activities with highest flood or environmental risk. Lower risk activities will be excluded or exempt and only higher risk activities will require a permit. Your proposed works may fall under either one or more of the below:

- 'Exemption,
- 'Exclusion',
- 'Standard Rules Permit'
- 'Bespoke permit.

Application forms and further information can be found at:

<https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>. Anyone carrying out these activities without a permit where one is required, is breaking the law.

Access and Maintenance

We will always seek an undeveloped margin between built development and the top of bank or rear edge of river wall/defence as a starting position when we are advised about any proposals close to a main river watercourse.

If we currently use or require access at the location, we should be contacted before any work is carried out so that we can advise on what may be acceptable. This may include the need to preserve an access strip from the nearest public road through to the riverside which is wide enough to enable large vehicles to pass, probably in excess of 6 metres wide.

Maintenance of the area close to and within the watercourse, out to the centreline of the channel, is a riparian responsibility and you will find more details about this in our 'Living on the Edge' document which can be found at :

<http://www.environment-agency.gov.uk/homeandleisure/floods/31626.aspx>

Land Contamination

The former use of the site as an oil refinery presents a risk of contamination that could be mobilised during construction to pollute controlled waters. The site is located on superficial Tidal Flat deposits of Clay and Silt, designated as Unproductive Strata, overlying Bedrock of the Lambeth Group (Clay, Silt & Sand), designated as Secondary A aquifer or the unproductive London Clay Formation. River Terrace Gravels above the bedrock are Secondary A aquifer. The site is not within a Source Protection Zone.

We request a Preliminary Risk Assessment (PRA) is undertaken which has identified:

- All previous uses
- Potential contaminants associated with those uses
- A conceptual model of the site indicating sources, pathways and receptors

- Potentially unacceptable risks arising from contamination at the site.
-

The PRA should be followed up by a scheme of site investigation, risk assessment, remediation where necessary and verification.

Piling

Piling at the site has the potential to create preferential pathways which may allow contamination to migrate to underlying aquifers. A piling risk assessment will need to be undertaken. This will need to demonstrate that the proposed works will not cause an unacceptable risk to controlled waters.

An appendix at the end of this letter provides more information in regards to surface water management and sources of information for the developer in regards to contaminated land.

Environmental Permitting Regulations (installations)

The site currently was granted an environmental permit in 2016 for a 1250 MWe Closed Cycle Gas turbine (CCGT) with up to two 6.5 MWe auxiliary boilers, two heat recovery steam turbines and associated infrastructure. Since permit issue the applicant is submitted further section 36 applications under the Electricity Act (1989) have been made to include an Open Cycled Gas turbine (OCGT) and a Battery Energy Storage System (BESS). As a result of these changes a permit variation is required to reflect the new proposed development. Details on how to vary a permit can be found on www.gov.uk at:

<http://www.gov.uk/topic/environmental-mangement/environmental-permits>.

The applicant is advised to review the requirements of the Large Combustion Plant BRef (BAT reference document) and the Medium Combustion Plant Directive, published in 2017 and 2018 respectively.

We recommend that pre-application advice is recommended prior to permit variation and a request for pre-application advice can be sought by the applicant via the following link: <https://www.gov.uk/government/publications/environmental-permit-pre-application-advice-form>

Should you wish us to review any technical documents or want further advice to address the environmental issues, we can do this as part of our charged for service.

Further engagement at the pre-application stage will speed up our formal response to your planning application and provide you with certainty as to what our response to your planning application will be. It should also result in a better quality and more environmentally sensitive development. As part of our charged for service we will provide a dedicated project manager to act as a single point of contact to help resolve any problems.

We currently charge £100 per hour plus VAT. We will provide you with an estimated cost for any further discussions or review of documents. The terms and conditions of our charged for service are available [here](#).

Please note: This response is based on the information you have made available at this time. It is based on current national planning policy, associated legislation and environmental data / information. If any of these elements change in the future then we may need to reconsider our position.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Pat Abbott', is centered within a rectangular box. The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Mr. Pat Abbott
Planning Advisor

Direct dial 0208 4748011

Direct e-mail pat.abbott@environment-agency.gov.uk

Appendix – Advice for applicant

Surface Water Management

Advice to Applicant / LPA Sustainable Drainage Systems (SuDS) informative

1. Infiltration sustainable drainage systems (SuDS) such as soakaways, unsealed porous pavement systems or infiltration basins shall only be used where it can be demonstrated that they will not pose a risk to the water environment.
2. Infiltration SuDS have the potential to provide mobilise pollutants and must not be constructed in contaminated ground. They would only be acceptable if a site investigation showed the presence of no significant contamination.
3. Only clean water from roofs can be directly discharged to any soakaway or watercourse. Systems for the discharge of surface water from associated hard-standing, roads and impermeable vehicle parking areas shall incorporate appropriate pollution prevention measures and a suitable number of SuDS treatment train components appropriate to the environmental sensitivity of the receiving waters.
4. The maximum acceptable depth for infiltration SuDS is 2.0 m below ground level, with a minimum of 1.2 m clearance between the base of infiltration SuDS and peak seasonal groundwater levels.
5. Deep bore and other deep soakaway systems are not appropriate in areas where groundwater constitutes a significant resource (that is where aquifer yield may support or already supports abstraction).
6. SuDS should be constructed in line with good practice and guidance documents which include the SuDS Manual ([CIRIA C753](#), 2015), Guidance on the Construction of SuDS C768 and the [Susdrain website](#).

For further information on our requirements with regard to SuDS see our Groundwater protection position statements (2018), in particular Position Statements G1 and G9 – G13 available

at: <https://www.gov.uk/government/publications/groundwater-protection-position-statements>

We recommend that developers should:

- 1) Refer to our '[Groundwater Protection](#)' website;
- 2) Refer to our [CL:AIRE Water and Land Library \(WALL\)](#) which includes the risk management framework provided in [CLR11, 'Model Procedures for the Management of Land Contamination'](#), when dealing with land affected by contamination, and also includes the [Guiding Principles for Land Contamination](#) for the type of information that we require in order to assess risks to controlled waters from the site. The Local Authority can advise on risk to other receptors, for example human health;
- 3) Refer to our [Land Contamination Technical Guidance](#);

4) Refer to '[Position Statement on the Definition of Waste: Development Industry Code of Practice](#)';

5) Refer to British Standards BS 5930:1999 A2:2010 *Code of practice for site investigations* and BS10175:2011 A1: 2013 *Investigation of potentially contaminated sites – code of practice*

6) Refer to our '[Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination](#)' National Groundwater & Contaminated Land Centre Project NC/99/73. The selected method, including environmental mitigation measures, should be presented in a 'Foundation Works Risk Assessment Report', guidance on producing this can be found in Table 3 of '[Piling Into Contaminated Sites](#)';

7) Refer to our '[Good Practice for Decommissioning Boreholes and Wells](#)'.

8) Refer to our '[Dewatering building sites and other excavations: environmental permits](#)' guidance when temporary dewatering is proposed

APPENDIX 3: AGREED SCOPE OF WORKS FOR THE 2019 UPDATED FRA

Emily Agus

From: Emily Agus
Sent: 08 May 2019 13:52
To: 'Abbott, Pat N'
Cc: Sarah Fotheringham
Subject: GEC - Flood Risk

Hi Pat,

EA REF: ENVPAC/1/EAN/00181 & AE/2019/123931/01-L01

GATEWAY ENERGY CENTRE

Following on from our call last week, please find below a summary and our proposed scope of works relating to the update of flood risk aspects for GEC, which I hope are in alignment with your expectations.

Please let me know if you have any comments or questions, and whether you agree the scope is appropriate.

Background

Gateway Energy Centre Limited (GECL), a wholly owned subsidiary of InterGen, is intending to submit an application under Section 36C of the Electricity Act 1989 to vary the consent for the Gateway Energy Centre (GEC), a gas-fired electricity generating station, located on land within the DP World London Gateway Logistics Park Development, off the A1014 (the Manorway) in Coryton, Essex. GEC has a proposed operational lifetime of 35 years.

The original consent for GEC was granted in August 2011, and this has been varied twice (also under Section 36C of the Electricity Act 1989). The varied consents are dated November 2014 and August 2016.

Condition 2 of the current (as varied) consent (dated August 2016) provides that GEC: *"shall be up to 1250 MW capacity and comprise:*

- (a) *Either:*
 - (i) *up to two Combined Cycle Gas Turbine (CCGT) units (including for each CCGT unit: a gas turbine; a heat recovery steam generator; steam turbine plant; and, associated equipment); or,*
 - (ii) *(1) one CCGT unit (including: a gas turbine; a heat recovery steam generator; steam turbine plant; and, associated equipment), and*
(2) one or more Open Cycle Gas Turbine (OCGT) units with the OCGT units having a combined rated electrical output of less than 300 MW¹¹ (including for each OCGT unit: a gas turbine; and, associated equipment).
- (d) *air cooled condensers and auxiliary cooling;*
- (e) *gas receiving facility;*
- (f) *one or more electrical switchyards;*
- (g) *ancillary plant and equipment; and,*
- (h) *the necessary buildings (including administration offices) and civil engineering works".*

In addition to the consent, an Environmental Permit (for the development currently proposed under Condition 2(a)(i)) was granted (EPR/EP3536EN) in July 2016.

In terms of the assessment of flood risk, the application for the original consent was accompanied by the February 2010 Flood Risk Assessment by Parsons Brinckerhoff, and also the December 2010 Supplementary Flood Risk Assessment by Parsons Brinckerhoff (which included breach modelling by Scott Wilson). These assessments considered the development currently proposed under Condition 2(a)(i), and together provided breach modelling for the following scenarios:

- 'Existing' ground conditions (which in 2010 were prior to the land raising / build out undertaken for the DP World London Gateway Development);
- Development of GEC with no land raising / build out undertaken for the DP World London Gateway Development; and,
- Development of both GEC and DP World London Gateway Development.

No further update to the assessment of flood risk was undertaken for the varied consents dated November 2014 (application made in August 2014) or August 2016 (application made in February 2016), and rather the Environmental Statement Further Information Documents considered that there were no material changes to the conclusions of the February 2010 and December 2010 assessments, with the proposed mitigation remaining valid and appropriate.

GECL's application will seek to vary Condition 2 to provide that GEC shall remain up to 1250 MW generating capacity, but – at (a) – shall comprise either (*green italic text added to highlight proposed variations*):

- (i) *Development Option (i)*, comprising up to two CCGT units (including for each CCGT unit: a gas turbine; a Heat Recovery Steam Generator (HRSG); steam turbine plant; and, associated equipment); or,
- (ii) *Development Option (ii)*, comprising:
 - (1) One CCGT unit with a rated electrical output of up to 630 MW (including: a gas turbine, HRSG; steam turbine plant; and, associated equipment);
 - (2) One or more OCGT units, with the OCGT units having a combined rated electrical output of less than 300 MW (including for each OCGT unit: a gas turbine; and, associated equipment); and,
 - (3) *A Battery Energy Storage System (BESS) with a rated electrical output of up to 320 MW (including: batteries; associated enclosures; control and protection systems; temperature control systems; and, power conversion systems).*

GECL's application will also seeks to provide that the commencement of GEC shall not be later than 31 December 2023^[2], and allow for a phased development of GEC.

Regarding GECL's application, a pre-application request was made to Thurrock Council and comments were received back from the Environment Agency (EA) in a letter dated 5 April 2019. Amongst other items, the letter included flood risk issues.

Following on from the EA's letter, a teleconference meeting was held on 1 May 2019 between the EA and Ramboll to discuss the flood risk issues on site, available updated data (i.e. between the 2010 assessments and the proposed application date) and the updated considerations for any updated Flood Risk Assessment (FRA).

At the teleconference meeting, it was concluded that Ramboll would submit a scope of works for the updated FRA for comment and agreement with the EA.

Scope of works for the Updated Flood Risk Assessment

As noted in the 2010 assessments, the key source of flood risk at the site is associated with the tidal River Thames. However, risks associated with fluvial flooding of the Shellhaven Creek, surface water runoff, sewer surcharge and groundwater emergence have, and should, also been considered.

Therefore, the updated FRA will take particular account of existing flood defence assets, the impacts of climate change, and the residual risk associated with breach of flood defences. The updated assessment will follow national and local regulatory requirements, in particular the National Planning Policy Framework (NPPF), the

In order to inform the updated FRA, Ramboll would undertake a baseline desk-based assessment. This would include requesting the relevant Product 4 and 6 data from the EA as the results of flood defence breach modelling. Ramboll would also consult with Thurrock Borough Council and Thames Water to determine any other site-specific data regarding historic flooding, previous assessment of risk or ongoing flood risk management activities. It is understood that Thurrock Borough Council has completed more recent flood defence breach modelling as part of the latest revised version of the Strategic Flood Risk Assessment, and that this modelling takes account of the ground raising which has also been carried out within the site and the wider DP World London Gateway Development. Ramboll would also review any further assessments undertaken for the DP World London Gateway Development.

Based on the baseline desk-based assessment, Ramboll would review the 2010 assessments to:

- Justify whether the 2010 assumptions and conclusions remain valid; and,
- Review the 2010 proposed mitigation strategies to ensure that the site remains operational and all flood sensitive equipment is raised above the predicted breach level.

In terms of the 2010 assumptions and conclusions, it is understood that the updated Climate Change Projections for 2018 are due to be published. Whilst it is understood that these may change future predictions of flood risk at the site, the proposed development only proposed operational lifetime of 35 years and the impacts of climate change are not, therefore, likely to exceed the parameters already considered as part of previous modelling. Therefore, it is anticipated that further site-specific hydraulic modelling would not be considered necessary as it is understood that Thurrock Borough Council's recent breach assessment would provide data suitable for this FRA and the Environment Agency would also be able to provide flood modelling carried out as part of the TE2100 Strategy.

In terms of the 2010 proposed mitigation strategies, this would include the review of measures such as further localised raising of ground levels or buildings, or the use of flood resilient/resistant design measures. The review will consider the risk to any occupants and ensure they could remain safely on-site during an extreme event or would have safe access and egress routes available to or from the site.

Regarding surface water runoff, a wider DP World London Gateway Development drainage network has already been designed and partially implemented. As noted in the previous applications (2010, 2014 and 2016) and as required by the Environmental Permit, site drainage (including surface water runoff) will be monitored and discharged to this wider drainage network. Therefore, it is proposed that a separate Surface Water Drainage Strategy would not be developed for GEC and rather the updated FRA would describe the wider drainage network and confirm that GEC would not exceed the associated parameters.

Ramboll will also consider whether the conditions of the deemed planning permission (attached to the consent) remain appropriate.

Kind regards

Emily Agus

Senior Development & Environmental Engineer

D +44 7436562310

M +44 7436562310

emily.agus@ramboll.com

Ramboll UK Limited Registered in England & Wales Company No: 03659970
Registered office: 240 Blackfriars Road, London SE1 8NW

From: Abbott, Pat N <Pat.Abbott@environment-agency.gov.uk>

Sent: 05 April 2019 10:28

To: Emily Agus <Emily.Agus@ramboll.com>

Subject: gateway power station

Hello Emily

Hope you are okay. Please find attached a copy of the letter I have sent to Thurrock regarding the pre-application request for Gateway power station.

Thanks

Pat

Pat Abbott | Sustainable Places Planning Advisor
Environment Agency | Icen House, Cobham Road, Ipswich, Suffolk IP3 9JD

Pat.abbott@environment-agency.gov.uk

Tel: 0208 4748011



Do your future plans have environmental issues or opportunities? Speak to us early!

If you are planning a new project or development, we want to work with you to make the process as smooth as possible. We offer a tailored advice service with an assigned project manager giving you detailed and timely specialist advice. Early engagement can improve subsequent planning and permitting applications to you and your clients benefit. More information can be found on our website [here](#).



Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else.

We have checked this email and its attachments for viruses. But you should still check any attachment before opening it.

We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes.

Click [here](#) to report this email as spam

^[1] 300 MW refers to the OCGT(s) and not the CCGT and the OCGT(s).

^[2] The current consent provides that the commencement of GEC shall not be later than 3 August 2021.

Emily Agus

From: Abbott, Pat N <Pat.Abbott@environment-agency.gov.uk>
Sent: 14 May 2019 08:09
To: Emily Agus
Subject: GEC - flood risk

Hi Emily

I have heard back from Lucy regarding the notes you sent through for the telecom and the approach to the flood risk for the GEC, she is happy with the approach as outlined in your message.

Thanks

Pat

Pat Abbott | Sustainable Places Planning Advisor
Environment Agency | Icen House, Cobham Road, Ipswich, Suffolk IP3 9JD

Pat.abbott@environment-agency.gov.uk

Tel: 0208 4748011



Do your future plans have environmental issues or opportunities? Speak to us early!

If you are planning a new project or development, we want to work with you to make the process as smooth as possible. We offer a tailored advice service with an assigned project manager giving you detailed and timely specialist advice. Early engagement can improve subsequent planning and permitting applications to you and your clients benefit. More information can be found on our website [here](#).



Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else.

We have checked this email and its attachments for viruses. But you should still check any attachment before opening it.

We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes.

Click [here](#) to report this email as spam

Emily Agus

From: Hayward, Lucy <lucy.hayward@environment-agency.gov.uk>
Sent: 20 June 2019 10:53
To: Emily Agus; Abbott, Pat N
Subject: RE: GEC 2019 Variation Application - Updated Flood Risk Assessment

Hello Emily,

I am satisfied that the first email **Sent:** 19 June 2019 15:55 is an accurate representation of our conversation.

With regard to Condition 41, I don't think the words "in consultation with the Lead Local Flood Authority" or indeed "with the Environment Agency" should be used. Matters of flood resilience and flood evacuation fall within the LPA's remit therefore it would be their decision as to whether to have further consultation or for it to be cited in a condition.

Emergency Flood Plan

Where safe access cannot be achieved, or if the development would be at residual risk of flooding in a breach, an emergency flood plan that deals with matters of evacuation and refuge should demonstrate that people will not be exposed to flood hazards. The emergency flood plan should be submitted as part of the FRA and will need to be agreed with the Local Council.

The local council will assess the adequacy of the evacuation arrangements, including the safety of the route of access/egress from the site in a flood event or information in relation to signage, underwater hazards or any other particular requirements. Their emergency planners will be consulted as they make this assessment.

Safe Access

During a flood, the journey to safe, dry areas completely outside the 0.5% (1 in 200) annual probability event with climate change floodplain would involve crossing areas of potentially fast flowing water. Those venturing out on foot in areas where flooding exceeds 100 millimetres or so would be at risk from a wide range of hazards, including for example unmarked drops, or access chambers where the cover has been swept away.

Safe access and egress routes should be assessed in accordance with the guidance document [Defra/EA Technical Report FD2320: Flood Risk Assessment Guidance for New Development](#).

Where safe access cannot be achieved an emergency flood plan that deals with matters of evacuation and refuge should demonstrate that people will not be exposed to flood hazards. The emergency flood plan should be submitted as part of the FRA and will need to be agreed with the Local Council.

The decision as to whether the Emergency Flood Plan can be left to a condition rests with the LPA.

Kind Regards

Lucy

Lucy Hayward

FCRM Officer

Partnership & Strategic Overview (East Anglia)

Environment Agency

✉ Iceni House, Cobham Road, Ipswich IP3 9JD.

☎ [+4402030258442](tel:+4402030258442)

📧 lucy.hayward@environment-agency.gov.uk

HOME, SWEET HOME?



FLOODS
DESTROY
BE PREPARED

From: Emily Agus [mailto:Emily.Agus@ramboll.com]

Sent: 20 June 2019 10:09

To: Abbott, Pat N <Pat.Abbott@environment-agency.gov.uk>; Hayward, Lucy <lucy.hayward@environment-agency.gov.uk>

Subject: RE: GEC 2019 Variation Application - Updated Flood Risk Assessment

Hi Pat and Lucy,

Just following on from the below, I am proposing that we include the following minor amendment to Condition 34 on SuDS / drainage and add the new Condition 41A on flood resilience and flood evacuation.

Would these appear acceptable to cover requirements?

Condition 34:

Except for the Permitted Preliminary Works, the commencement of each phase of² the Development shall not take place until there has been submitted to, approved in writing by, and deposited with the LPA, in consultation with the Environment Agency Lead Local Flood Authority³, a scheme for SuDS. Such SuDS shall include the details and measures contained in the document ~~en~~² titled "Gateway Energy Centre Supplementary Flood Risk Assessment" dated December 2010 ~~and identified on FRA FIGURE 1 of that document, as amended by the document titled "Gateway Energy Centre 2019 Updated Flood Risk Assessment" dated June 2019,~~³ and be put in place in accordance with the approved scheme.

New Condition 41:

The commencement of each phase of the Development shall not take place until there has been submitted to, approved in writing by, and deposited with the LPA, in consultation with the Lead Local Flood Authority, details of the flood resilience and flood evacuation measures for the specified phase of the Development.³

As always, happy to discuss.

Kind regards

Emily Agus

Senior Development & Environmental Engineer

D +44 7436562310

M +44 7436562310

emily.agus@ramboll.com

Ramboll UK Limited Registered in England & Wales Company No: 03659970
Registered office: 240 Blackfriars Road, London SE1 8NW

From: Emily Agus

Sent: 19 June 2019 15:55

To: 'Abbott, Pat N' <Pat.Abbott@environment-agency.gov.uk>; 'lucy.hayward@environment-agency.gov.uk' <lucy.hayward@environment-agency.gov.uk>

Cc: Sarah Fotheringham <SFOTHERINGHAM@ramboll.com>

Subject: RE: GEC 2019 Variation Application - Updated Flood Risk Assessment

Hi Lucy,

**GATEWAY ENERGY CENTRE: 2019 VARIATION APPLICATION
UPDATED FLOOD RISK ASSESSMENT**

Thank you again for your time today to talk through the above. As discussed, please find below a summary of our call, and agreed way forwards with regards to the documentation and condition amendment requirements.

For Flood Risk / Condition (41):

I noted that Thurrock have today (19/06/2019) stated that they are in the process of obtaining the updated SFRA data from AECOM, but that this may take another additional 2 weeks, as a minimum. However, it was discussed between us that:

- The existing Condition (41) requires that the finished floor levels are set at 3.7 m AOD.
- This was based on the previous December 2010 Gateway Energy Centre Supplementary FRA which contained site-specific modelling.
- Within this document, the site-specific breach analysis concluded that the finished floor levels of GEC should be set at a minimum of 3.2 m AOD plus a freeboard (for commercial developments in accordance with PPS 25) of at least 300 mm (i.e. 3.5 m AOD).
- The existing Condition includes a freeboard of 500 mm.
- The purpose of the updated SFRA data from AECOM would be to supplement any site-specific data available but, in any instance, site-specific modelling would always take precedence and be required.
- As such, the previous December 2010 site-specific modelling remains the most relevant modelling and data for the GEC site.
- Therefore, as long as the updated SFRA data does not materially contradict the previous site-specific modelling, the existing Condition (41) remains appropriate.

On this basis, we agreed that we would submit our updated FRA which references the updated SFRA available but excludes the data (which has not been received). We would also supplement the existing Condition with reference to both flood resilience and flood evacuation information to be provided during the Condition discharge stage.

Following submission, when we receive the updated data should this materially alter the Condition requirements, we would discuss and agree any further required changes with you.

Drainage and SuDS / Condition (34)

You noted the requirement to change the reference to "*in consultation with the Environment Agency*" to "*in consultation with the Lead Local Flood Authority*".

I would be grateful if you could advise on whether you agree this is an accurate reflection of our call, and please let me know if you had any further comments or questions.

Kind regards

Emily Agus

Senior Development & Environmental Engineer

D +44 7436562310

M +44 7436562310

emily.agus@ramboll.com

Ramboll UK Limited Registered in England & Wales Company No: 03659970
Registered office: 240 Blackfriars Road, London SE1 8NW

From: Emily Agus

Sent: 13 June 2019 17:02

To: Abbott, Pat N <Pat.Abbott@environment-agency.gov.uk>; lucy.hayward@environment-agency.gov.uk

Cc: Sarah Fotheringham <SFOTHERINGHAM@ramboll.com>

Subject: GEC 2019 Variation Application - Updated Flood Risk Assessment

Hi Lucy,

**GATEWAY ENERGY CENTRE: 2019 VARIATION APPLICATION
UPDATED FLOOD RISK ASSESSMENT**

As you may be aware, we have been having extreme difficulty trying to obtain the most recent modelling carried out by AECOM for Thurrock Borough Council for the 2018 Strategic Flood Risk Assessment (SFRA), and seemed to have reached a bit of an impasse. Planning for an event where we remain unable to obtain this data, we are hoping that we can agree an alternative way forward with regards to the updated FRA.

Please could you advise on whether the following approach would be acceptable.

For background, the existing consent contains two relevant conditions:

- Condition (41) regarding flood risk; and,
- Condition (34) regarding SuDS / drainage.

The existing consent can be viewed at: <https://itportal.beis.gov.uk/EIP/pages/projects/GatewayEConsent.pdf>

Condition (41): Flood Risk

Condition (41) was based on the previous FRAs carried out (the February 2010 FRA, and the December 2010 Supplementary FRA). Within the December 2010 Supplementary FRA it was noted that the GEC site-specific breach analysis (using the existing ground conditions) suggested that the finished floor levels of GEC should be set at a minimum of 3.2 m AOD plus a required freeboard (for commercial developments in accordance with PPS 25) of at least 300 mm (i.e. 3.5 m AOD).

Condition (41) currently requires that the finished floor levels are set at 3.7 m AOD (i.e. is above the breach analysis level plus freeboard).

GEC will have an operational lifetime of 35 to 40 years, and the 2019 Variation Application seeks to provide that the commencement of GEC shall take place not later than 31 December 2023. As such, when deciding suitable climate change allowances, a date up until 2063 would seem appropriate.

On this basis, we have carried out some initial analysis of the breach modelling outputs, as presented graphically within the June 2018 SFRA. However, peak flood level data (relative to Ordnance Datum) was not presented, so the analysis has been based on flood depth mapping.

Within the initial analysis, we have geo-referenced the peak flood depth mapping output for the 1 in 200 annual probability breach event, inclusive of climate change through until 2116, and overlain this onto several different LiDAR aerial topographic survey datasets available on the DEFRA website. Based on the geo-referencing, it appears that the AECOM modelling used the 2011 LiDAR dataset, as the output depth contours match the topographic contours within this dataset. In addition, more recent LiDAR datasets do not correlate with the peak flood depth data.

However, as the potential flood depths are only presented in value ranges of '0 to 1 m', and '1 to 2 m', it is difficult to determine precise the potential depths across the site.

Nevertheless, as a means of progressing the analysis, at the boundary between the '0 to 1 m', and the '1 to 2 m' depth classifications, we have assumed that the flood depth is approximately 1 m. Analysis of the ground level data at these locations using the LiDAR data suggests that the peak flood levels would be broadly comparable to the previous assessment (within the December 2010 Supplementary FRA) at elevations of roughly 3.0 to 3.2 m AOD.

Given that this analysis has been undertaken for a climate change adjusted scenario (through until 2116) and GEC will have an operational lifetime of 35 to 40 years, we have not identified a requirement to raise the proposed development finished floor levels further than the already consented level of 3.7 m AOD. We believe this remains a conservative approach and appears to remain at least 500 mm above the estimated peak flood level for the scenario discussed.

Therefore, we propose to retain Condition (41) with the consented level of 3.7 m AOD. We would also note that this Condition also requires final details and measures to be submitted to and approved in writing by the LPA.

Should there be a specific requirement for a Flood Warning / Evacuation Plan, we could either add this into Condition (41) or agree some wording for a new Condition.

Condition (34): SuDS

This covers the requirement for a suitable SuDS to be submitted to and approved in writing with the LPA, in consultation with the Environment Agency. We are proposing to retain this Condition.

We would be grateful if you could advise on whether you believe this approach to be a suitable way forward.

Should you wish to discuss any of the above, you can either contact me or my colleague Sarah Fotheringham (who participated on the teleconference we had). My details are below, and Sarah can be contacted on the following:

Sarah Fotheringham

Consultant

D: 01392 440617

M: 07970 223984

sfotheringham@ramboll.com

Kind regards

Emily Agus

Senior Development & Environmental Engineer

1621754 - Power

D +44 7436562310

M +44 7436562310

emily.agus@ramboll.com

Ramboll

116 Quayside

Newcastle-Upon-Tyne

NE1 3DX

<https://uk.ramboll.com/energy>

Ramboll UK Limited Registered in England & Wales Company No: 03659970

Registered office: 240 Blackfriars Road, London SE1 8NW

This message has been scanned and no issues were discovered.
Click [here](#) to report this email as spam

Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else.

We have checked this email and its attachments for viruses. But you should still check any attachment before opening it.

We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes.

Click [here](#) to report this email as spam

APPENDIX 4: ENVIRONMENT AGENCY DATA

Sarah Fotheringham
SFOTHERINGHAM@ramboll.com

Our ref
Date

EAn/2019/125313
16 May 2019

Dear Sarah

Enquiry regarding Product 4 for The Manorway, Coryton

Thank you for your enquiry which was received on 10 April 2019.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

The information we hold and a copy of the Flood Risk Assessment (FRA) advisory note is attached to my email.

Name	Product 4
Description	Detailed Flood Risk Assessment Map for The Manorway, Coryton.
Licence	Open Government Licence
Information Warnings	Please see attached defence map and defence list.
Information Warning - OS background mapping	<i>The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.</i>
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2017 Ordnance Survey 100024198.

East Anglia Area

Ipswich Office, Icen House, Cobham Road, Ipswich, Suffolk, IP3 9JD
Brampton Office, Bromholme Lane, Brampton, Huntingdon, PE28 4NE
General Enquiries: 03708 506506

Email: enquiries@environment-agency.gov.uk

Website: <https://www.gov.uk/government/organisations/environment-agency>



INVESTOR IN PEOPLE



Coastal Modelling

Our New Coastal Hydraulic Modelling 2018 is now available on the .gov.uk website. To find the new mapping please use the following link: <https://flood-map-for-planning.service.gov.uk/>

You may be aware that some Local Planning Authorities have updated their Strategic Flood Risk Assessments (SFRAs) using data from this modelling study. As SFRA's are not updated regularly we agreed that they could use draft outputs as we wanted to ensure that the SFRA's were not out of date as soon as they were published.

Data Available Online

Many of our flood datasets are available online:

- Flood Map For Planning ([Flood Zone 2](#), [Flood Zone 3](#), [Flood Storage Areas](#), [Flood Defences](#), [Areas Benefiting from Defences](#))
- [Risk of Flooding from Rivers and Sea](#)
- [Historic Flood Map](#)
- [Current Flood Warnings](#)

What's In Your BackYard (WIYBY) is no longer available

Most of the data is still available via other sharing services such as [DATA.GOV.UK](#), [MAGIC map](#) and new [GOV.UK digital services](#). Where the datasets are no longer available as maps, you will be able to download and use within specialist applications.

To find out all the services the Environment Agency have available, please click [here](#).

For any other enquiries please send your request to us at:

Enquiries_EastAnglia@environment-agency.gov.uk.

Additional information

Please be aware that we now charge for planning advice provided to developers, agents and landowners. If you would like advice to inform a future planning application for this site then please complete our <https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion> and email it to our Sustainable Places team at: planning.ipswich@environment-agency.gov.uk.

They will initially provide you with a free response identifying the following:

- the environmental constraints affecting the proposal;
- the environmental issues raised by the proposal;
- the information we need for the subsequent planning application to address the issues identified and demonstrate an acceptable development;
- any required environmental permits.

If you require any further information from them (for example, a meeting or the detailed review of a technical document) they will need to set up a charging agreement. Further information can be found on our [website](#).

Please note we have published revised climate change allowances, which are available online. These new allowances will need to be reflected in your Flood Risk Assessment. If you want to discuss this please call our Sustainable Places team on 0203 025 5475.

East Anglia Area

Ipswich Office, Icen House, Cobham Road, Ipswich, Suffolk, IP3 9JD

Brampton Office, Bromholme Lane, Brampton, Huntingdon, PE28 4NE

General Enquiries: 03708 506506

Email: enquiries@environment-agency.gov.uk

Website: <https://www.gov.uk/government/organisations/environment-agency>

TEAM2100: delivering the first 10 years of investment in tidal flood defences for the Thames Estuary 2100 Plan. For more information, visit [the TEAM2100 website](#) or email team2100@jacobs.com

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely

T. Porter

Tom Porter
Customers and Engagement Officer
Environment Agency

Team Number: 0203 0255472

East Anglia Area

Ipswich Office, Icen House, Cobham Road, Ipswich, Suffolk, IP3 9JD
Brampton Office, Bromholme Lane, Brampton, Huntingdon, PE28 4NE
General Enquiries: 03708 506506

Email: enquiries@environment-agency.gov.uk

Website: <https://www.gov.uk/government/organisations/environment-agency>

Use of Environment Agency Information for Flood Risk Assessments

Important

The Environment Agency are keen to work with partners to enable development which is resilient to flooding for its lifetime and provides wider benefits to communities. If you have requested this information to help inform a development proposal, then we recommend engaging with us as early as possible by using the pre-application form available from our website:

<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

We recognise the value of early engagement in development planning decisions. This allows complex issues to be discussed, innovative solutions to be developed that both enables new development and protects existing communities. Such engagement can often avoid delays in the planning process following planning application submission, by reaching agreements up-front. We offer a charged pre-application advice service for applicants who wish to discuss a development proposal.

We can also provide a preliminary opinion for free which will identify environmental constraints related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In preparing your planning application submission, you should refer to the Environment Agency's Flood Risk Standing Advice and the Planning Practice Guidance for information about what flood risk assessment is needed for new development in the different Flood Zones. This information can be accessed via:

<https://www.gov.uk/flood-risk-assessment-standing-advice>
<http://planningguidance.planningportal.gov.uk/>

You should also consult the Strategic Flood Risk Assessment or other relevant materials produced by your local planning authority.

You should note that:

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment (FRA) where one is required, but does not constitute such an assessment on its own.
2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or surface water runoff. Information produced by the local planning authority referred to above may assist here.
3. Where a planning application requires an FRA and this is not submitted or is deficient, the Environment Agency may raise an objection.

Reference: EAn/2019/125313
Site Address: Gateway Energy Centre, The Manorway, Coryton
Date: 13/05/19

Included:

- Flood Map
- Historic Flood Outlines Map
- 1D Nodes Map & Table

Important information to note with your Product:

Flood Risk Assessments (FRAs)

If you are obtaining this information for use within a Flood Risk Assessment (FRA) required for a planning application, please include our unaltered Product 4 data within an appendix of your FRA.

Flood Zones

Please see the attached map showing the Flood Zones (outlines) for the area of the site. Our maps show the site is located in tidal Flood Zone 3. For further information with regards to Flood Zones, please see below:

Table 1: Flood Zones

These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
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. (Land shown in light blue on the Flood Map)
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. (Land shown in dark blue on the Flood Map)

Paragraph: 065 Reference ID: 7-065-20140306

Historic Flood Events

Examinations of our records of historic flooding show that the general area has previously flooded. Please note that these records show flooding to the land and do not necessarily indicate that properties within the historic flood events were flooded internally. It is also possible that the pattern of flooding in this area has changed and that this area would now flood under different circumstances. Please see the attached PDF for flood history information.

Surface Water

Please be aware that in recent years, there has been an increase in flood damage caused by surface water flooding or drainage systems that have been overwhelmed. We have worked with Lead local Flood Authorities (LLFAs) to develop a map which incorporates the best local and national scale information on surface water flood risk. These maps can be viewed on our website at the following:-

<https://flood-warning-information.service.gov.uk/long-term-flood-risk/>

Reservoir Flooding

You can obtain a map which shows the extent of flooding if a reservoir was to fail and release the water that it holds. The map shows the worst case scenario. These maps can be viewed on our website at the following:-

<https://flood-warning-information.service.gov.uk/long-term-flood-risk/>

Flood Map for Planning

At: Gateway Energy Centre - Created: 13/05/19 - Ref: EAn/2019/125313



Environment Agency
Iceni House
Cobham Road
Ipswich
Suffolk
IP3 9JD



0 120 240 480
Metres
1:10,000

Legend

- Site_Location
- Outline_Reservoir_Flood_Maps
- Flood Storage Area
- Areas Benefiting from Defence
- Flood Zone 3
- Flood Zone 2

Flood Map for Planning (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:
- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Modelled (Defended) Levels Location Map

At: Gateway Energy Centre - Created: 13/05/19 - Ref: EAn/2019/125313



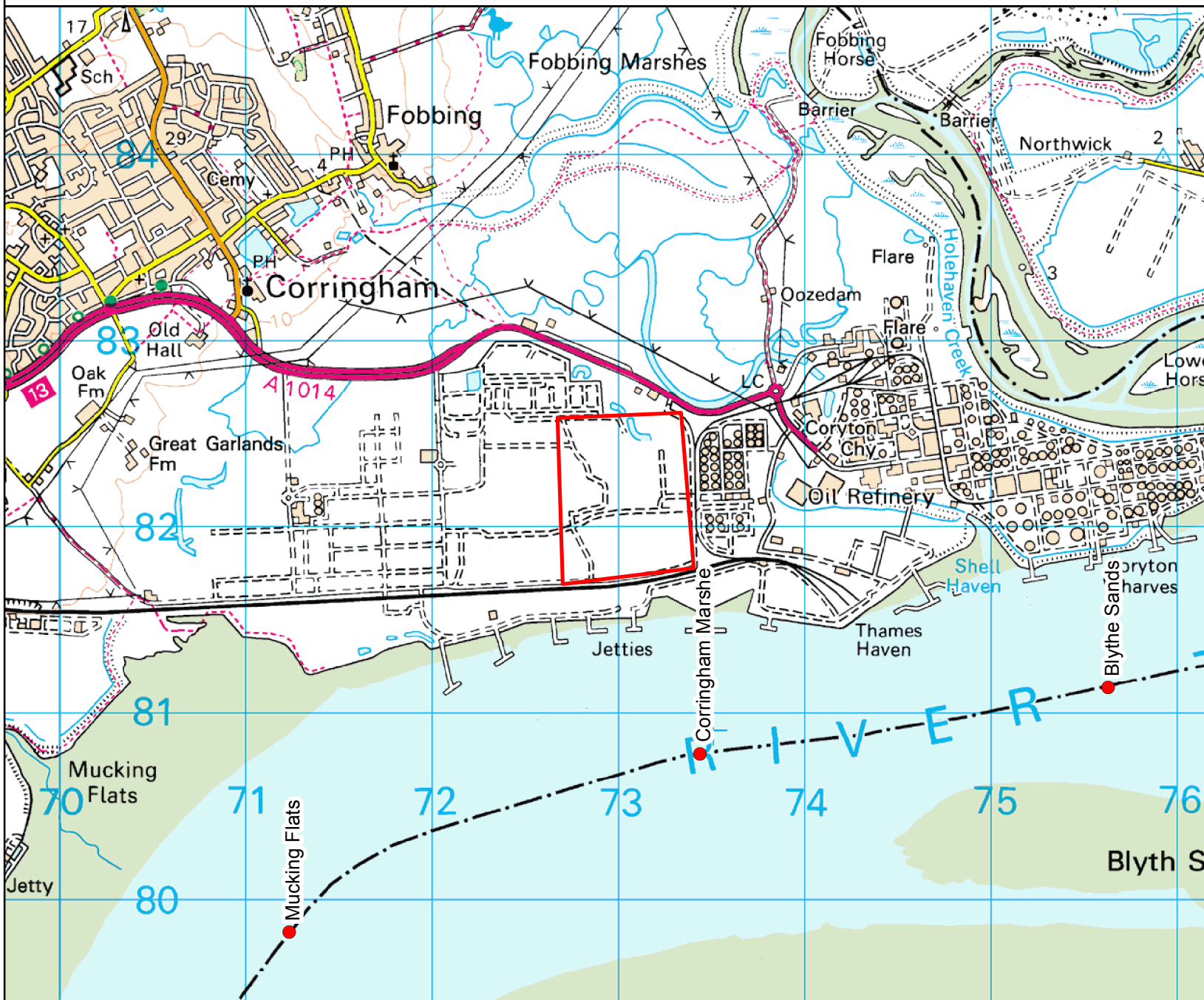
Environment Agency
Iceni House
Cobham Road
Ipswich
Suffolk
IP3 9JD



0 350 700 1,400
Metres
1:30,000

Legend

- Site_Location
- Levels



This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment. Modelled outlines take into account catchment wide defences if present.

Thames Estuary 2100 (TE2100)



Location	Node Ref	Easting	Northing	2005		2040		2070		2100		2120		2070 Defence Crest Levels	
				1 in 200 (0.5% AEP)	1 in 1000 (0.1% AEP)	1 in 200 (0.5% AEP)	1 in 1000 (0.1% AEP)	1 in 200 (0.5% AEP)	1 in 1000 (0.1% AEP)	1 in 200 (0.5% AEP)	1 in 1000 (0.1% AEP)	1 in 200 (0.5% AEP)	1 in 1000 (0.1% AEP)	Existing Barrier	New Barrier
Dartford	3.15	554397	178402	5.64	5.97	5.85	6.18	6.00	6.33	6.32	6.65	6.52	6.85	7.60	6.10
Dartford Marshes	3.16	555012	177896	5.62	5.95	5.83	6.16	5.98	6.31	6.30	6.63	6.49	6.82	7.60	6.10
Long Reach	3.17	555831	177179	5.61	5.94	5.82	6.15	5.97	6.30	6.29	6.62	6.48	6.81	7.60	8.50
Dartford Tunnel	3.18	557090	176390	5.61	5.94	5.82	6.15	5.96	6.29	6.27	6.60	6.46	6.79	7.50	8.50
Stone Ness	3.19	558175	175703	5.59	5.92	5.80	6.13	5.95	6.28	6.27	6.60	6.45	6.78	7.50	8.50
West Thurrock	3.20	559355	176131	5.57	5.90	5.78	6.11	5.94	6.27	6.25	6.58	6.43	6.76	7.50	8.50
Swanscombe	3.21	560139	177011	5.56	5.89	5.77	6.10	5.91	6.24	6.22	6.55	6.41	6.74	7.50	8.50
Grays	3.22	561470	176679	5.53	5.86	5.74	6.07	5.91	6.24	6.21	6.54	6.40	6.73	7.50	8.00
Tilbury	3.23	562066	175589	5.52	5.85	5.73	6.06	5.89	6.22	6.19	6.52	6.38	6.71	7.50	8.00
Northfleet	3.24	562675	174950	5.50	5.83	5.71	6.04	5.86	6.19	6.16	6.49	6.36	6.69	7.40	8.00
Tilbury Ferry	3.25	564109	174800	5.48	5.81	5.69	6.02	5.84	6.17	6.14	6.47	6.34	6.67	7.40	8.00
Gravesend	3.26	565307	174848	5.45	5.78	5.66	5.99	5.81	6.14	6.11	6.44	6.32	6.65	7.40	8.00
Gravesend Power S	3.27	566916	174908	5.38	5.71	5.59	5.92	5.75	6.08	6.05	6.38	6.28	6.61	7.40	8.00
East Tilbury Mars	3.28	568488	175258	5.31	5.64	5.52	5.85	5.68	6.01	5.99	6.32	6.23	6.56	7.00	7.00
Coalhouse Point	3.29	569850	176137	5.25	5.58	5.46	5.79	5.60	5.93	5.92	6.25	6.18	6.51	6.48	6.48
Coastguard Cottag	3.30	570320	178011	5.21	5.54	5.42	5.75	5.56	5.89	5.86	6.19	6.13	6.46	6.75	6.75
Mucking Flats	3.31	571235	179824	5.16	5.49	5.37	5.70	5.53	5.86	5.85	6.18	6.12	6.45	7.50	8.10
Corringham Marshe	3.32	573440	180782	5.08	5.41	5.29	5.62	5.48	5.81	5.83	6.16	6.10	6.43	7.50	8.10
Blythe Sands	3.33	575633	181137	5.00	5.33	5.21	5.54	5.43	5.76	5.81	6.14	6.08	6.41	7.50	8.10
Halstow Marshes	3.34	577953	181149	4.95	5.28	5.16	5.49	5.37	5.70	5.76	6.09	6.04	6.37	7.40	8.10
West Point	3.35	579995	181222	4.89	5.22	5.10	5.43	5.33	5.66	5.72	6.05	6.01	6.34	7.40	8.10
East Canvey Point	3.36	583007	181318	4.81	5.14	5.02	5.35	5.30	5.63	5.69	6.02	5.98	6.31	7.40	8.10
Leigh	3.37	585820	181583	4.73	5.06	4.94	5.27	5.27	5.60	5.66	5.99	5.95	6.28	6.70	7.40
Southend	3.38	588653	181517	4.70	5.03	4.91	5.24	5.22	5.55	5.62	5.95	5.92	6.25	6.70	7.40

Thames Estuary 2100 (TE2100)

You have requested in-channel flood levels for the tidal river Thames. These have been taken from the Thames Estuary 2100 study completed by HR Wallingford in 2008.

Details about the TE2100 plan

The TE2100 plan is now live and within it are a set of levels on which the flood risk management strategy is based. The plan is the overarching flood management strategy for the Thames Estuary and therefore any development planning should be based on the same underlying data.

Details about the TE2100 in-channel levels

The TE2100 in-channel levels take into account operation of the Thames Barrier when considering future levels.

The Thames Barrier requires regular maintenance and with additional closures the opportunity for maintenance will be reduced. When this happens, river levels – for which the Barrier would normally shut for the 2008 epoch – will have to be allowed through to ensure that the barrier is not shut too often. For this reason, levels upriver of the barrier will increase and the tidal walls will need to be heightened to match.

Recorded Flood Events Outlines Map

At: Gateway Energy Centre - Created: 13/05/19 - Ref: EAn/2019/125313



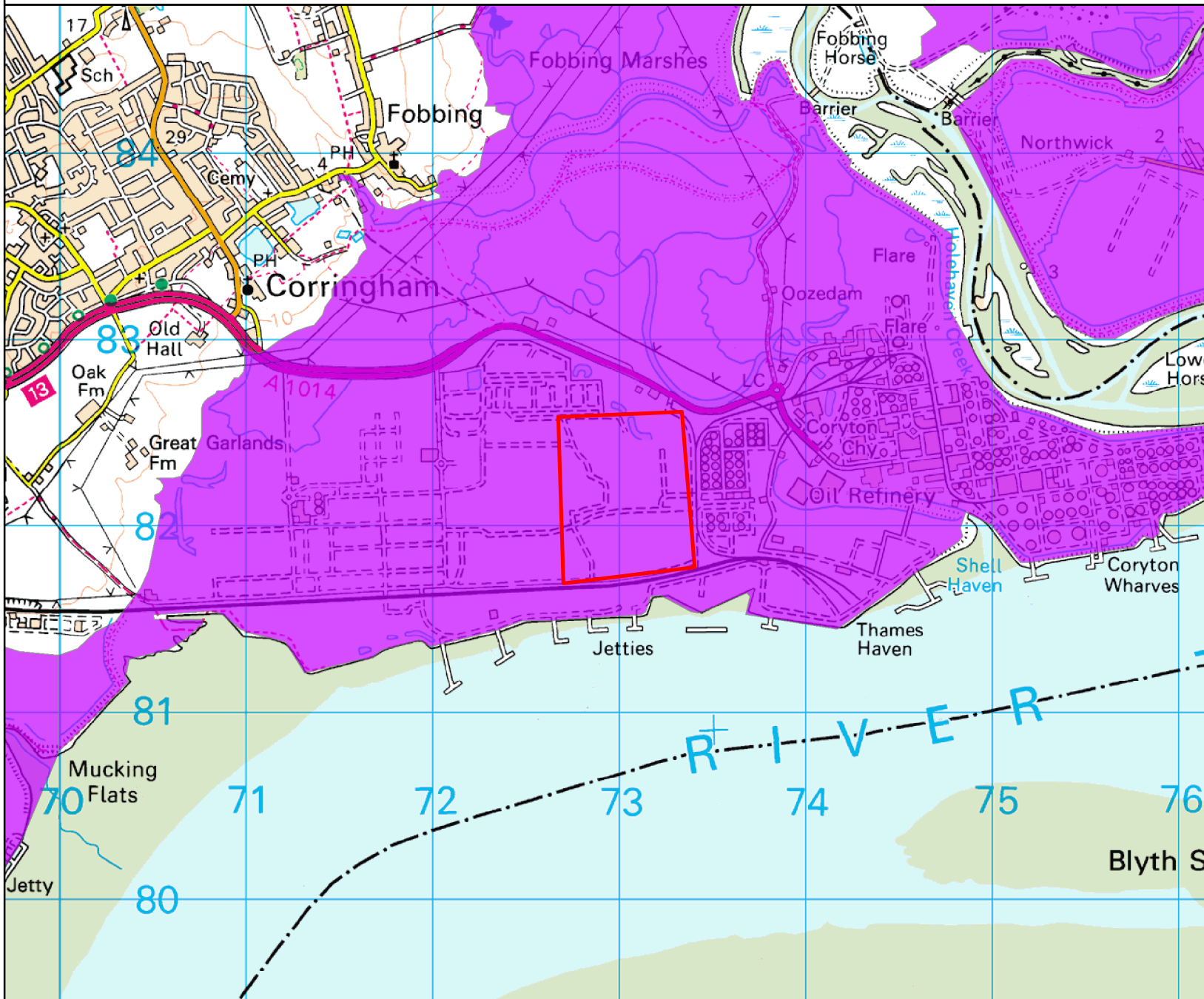
Environment Agency
Iceni House
Cobham Road
Ipswich
Suffolk
IP3 9JD



0 350 700 1,400
Metres
1:30,000

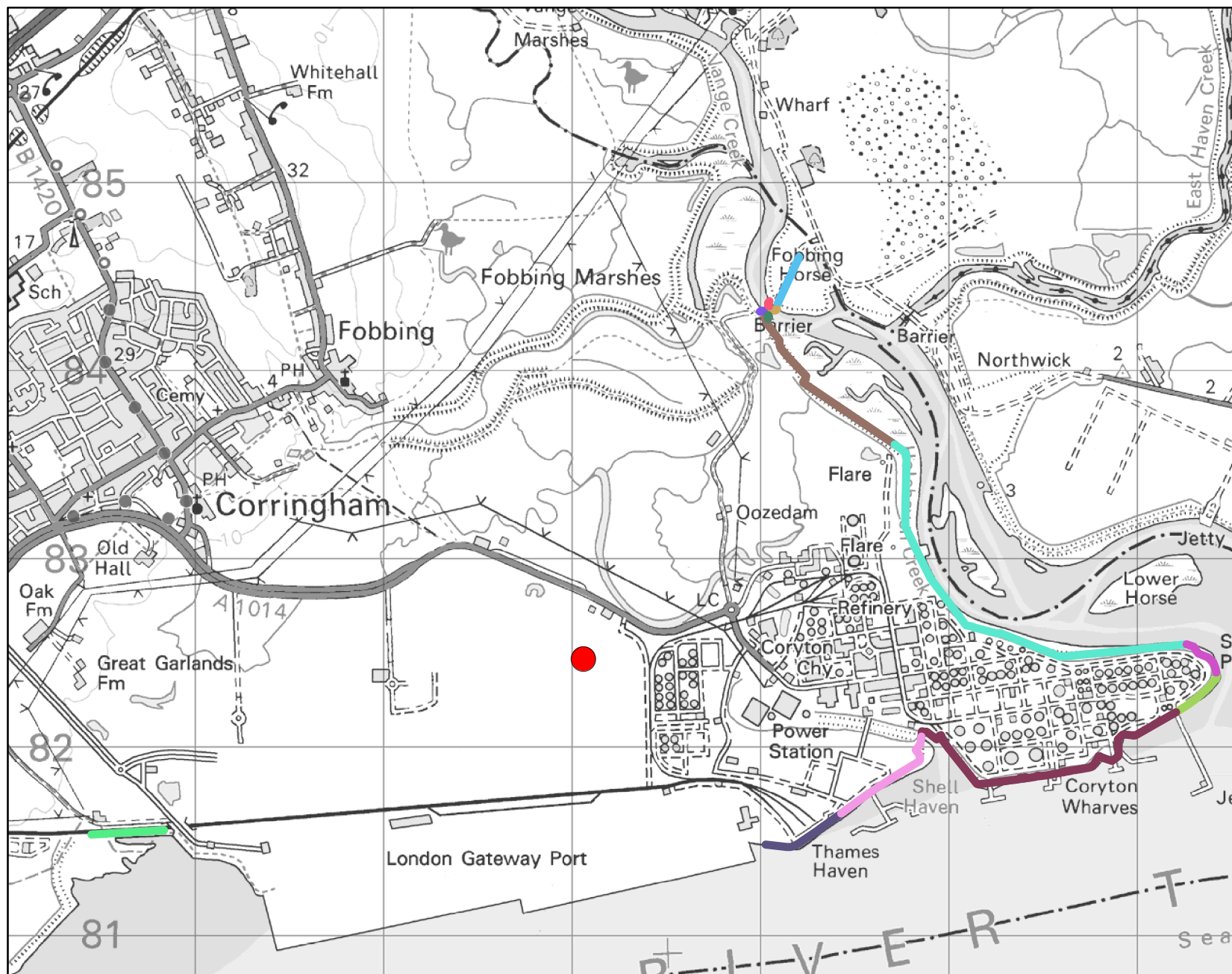
Legend

- Site_Location
- 1953 Outline



The historic flood event outlines are based on a combination of anecdotal evidence, Environment Agency staff observations and survey. Our historic flood event outlines do not provide a definitive record of flooding. It is possible that there will be an absence of data in places where we have not been able to record the extent of flooding. It is also possible for errors occur in the digitisation of historic records of flooding.

Flood Defence Location Map showing Gateway Energy Centre, The Manorway, Coryton (TQ 73065 82466) Ref: EAN/2019/125313



Legend

● Site

Defences

ASSET_ID

- 106807
- 106808
- 126194
- 126195
- 126196
- 126199
- 143047
- 143048
- 165519
- 513958
- 513961
- 513979
- 513980

© Crown copyright and database rights 2018 Ordnance Survey 100024198

© Environment Agency

Scale 1:30,000

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk



Date: 30/04/2019

Datasheet Reference: EAN/2019/125313



Defence Information

Asset Reference	Maintainer	Bank	Asset Type	Asset Description	Standard of Protection	Overall Condition Grade	Crest Level	
106807	Environment Agency	left	wall	Wall with embankment	1000.0	3	6.560	
106808	Environment Agency	left	wall	Wall with embankment	1000.0	3	6.560	
126194	Environment Agency	right	wall	Wall with embankment	1000.0	2	6.260	
126195	Environment Agency	right	wall	Wall with embankment	1000.0	3	6.260	
126196	Environment Agency	left	wall	Wall with embankment	1000.0	3	6.710	
126199	Environment Agency	left	wall	Wall	1000.0	2	6.550	
143047	Environment Agency	left	wall	Wall with embankment	1000.0	3	6.580	
143048	Environment Agency	left	wall	Wall with embankment	1000.0	3	6.540	
165519	Environment Agency	left	embankment	Earth embankment with road on top	1000.0	2	6.190	
513958	Environment Agency		wall	Sheet Pile Wall adjacent to Movable Flood Barrier		2		
513961	Environment Agency		wall	Sheet Pile Wall adjacent to Movable Flood Barrier		2		
513979	Environment Agency		wall	Sheet Pile Wall adjacent to Movable Flood Barrier		2		
513980	Environment Agency		wall	Sheet Pile Wall adjacent to Movable Flood Barrier		2		

Key to Overall Condition Grades

Grade	Rating	Description
1	Very Good	Cosmetic Defects that will have no effect on performance.
2	Good	Minor defects that will not reduce the overall performance of the asset.
3	Fair	Defects that could reduce performance of the asset
4	Poor	Defects that would significantly reduce the performance of the asset. Further investigation.
5	Very Poor	Severe defects resulting in complete performance failure.