APPENDIX A

Report

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Flood Warning and Evacuation Plan
Spalding Energy Expansion

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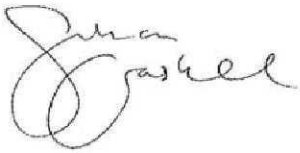
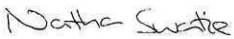
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Spalding Energy Expansion Limited

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1 INTRODUCTION

1.1 Background

InterGen proposes to expand its existing power station operation in Spalding, Lincolnshire, by constructing a 900 MW CCGT power station. The proposed power station will be known as the Spalding Energy Expansion (SEE) or the 'proposed SEE'. The proposed SEE to be constructed adjacent to the existing power station, will be owned and operated by Spalding Energy Expansion Limited (SEEL), an affiliate of InterGen.

ENVIRON has completed an Environmental Statement (ES) and Flood Risk Assessment (FRA) for the proposed SEE, on which the Environment Agency (EA) has provided comments. The EA has requested that in addition to the information provided in the Flood Risk Assessment (February 2009) a Flood Warning and Evacuation Plan (FWEP) be produced to address the matters raised in the EA letter of 27 May 2009.

The proposed SEE is currently at the planning stage and final details about the site layout and operational procedures are not yet available. Nevertheless, this draft FWEP has been prepared, based on information available at the present time, demonstrating that potential flood risks and necessary resilience measures have been appropriately considered that will be incorporated into the planned development.

The draft FWEP has been prepared using all currently available information for the site and some information such as final roles, responsibilities and identities for the proposed SEE will be finalised as the development progresses. This document will be kept 'live' through revisions and updates as further information becomes available through key stages of the project lifecycle.

1.2 Policy Context and Consultation

PPS25 states the following in Annex G with respect to FWEPs:

"The receipt of and response to warnings of floods is an essential element in the management of the residual risk of flooding. Particular attention should be given to the communication of warnings to vulnerable people including those with impaired hearing or sight and those with restricted mobility. Attention should also be given to the communication of evacuation plans and warnings to transient occupants of camp sites, caravan sites and holiday facilities. Evacuation plans should be in place for those areas at an identified risk of flooding and should take into account that the occupiers are likely to lack local knowledge. The mobility of occupants also needs to be considered. Those proposing developments should take advice from the emergency services when producing an evacuation plan for the development as part of the FRA. Local Resilience Forums (see Annex H) should ensure that flood risk is fully considered as part of their activities, including the resilience of emergency infrastructure required to operate during floods."

The type of proposed development will be subject to a range of Health & Safety requirements which will ensure that site staff are familiar with the local area and hazards associated with the power station itself.

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Consultation has been undertaken with the Local Authority on the content and detail of the FWEP for the proposed SEE. A response is anticipated before the end of July 2009.

1.3 Site Location

The proposed SEE site is located approximately 2 km to the north-east of Spalding town centre, Lincolnshire at National Grid Reference (NGR) TF 259 249 (Figure 1.1). The existing SECL power station is located adjacent to the northern site boundary of the proposed SEE.

Primary access to the SECL site, and in turn the SEE site, is from Gate A on West Marsh Road to the north, immediately before it bridges Vernatt's Drain. A secondary (emergency) access road will be provided to the south of the proposed SEE onto West Marsh Road, allowing a southern access route (Gate C). This will not be the main access point but will be available in the event of flooding.

1.4 Responsibilities

Responsibilities for maintaining and updating this FWEP and the hierarchy for ensuring its proper implementation and tasks identified by it are yet to be determined. These will be finalised in due course, prior to the proposed SEE becoming operational.

The FWEP has been prepared by ENVIRON on behalf of SEEL. The report has been appropriately reviewed in accordance with ENVIRON's Quality Management System (QMS) procedures. ENVIRON is an ISO 9001 company.

Final implementation and updates to the FWEP both prior to and following the proposed SEE becoming operational will be the responsibility of SEEL.

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2 AIMS AND OBJECTIVES

2.1 Overview

This document has been prepared in draft only, being a live document that will be updated and revised when the required Section 36 consent for the proposed SEE has been obtained and during both construction and operational phases of the project.

The primary objective of the FWEP is to ensure the safety of all staff, contractors and visitors to the proposed SEE in the event of flooding occurring in the Spalding area which could impact on the site. The FWEP aims to provide plans and procedures so the need for assistance or intervention by the emergency services and/or EA and potential environmental impacts associated with flooding of the site will be minimised as far as practicable.

2.2 FWEP Aims and Objectives

The aims of the FWEP are to:

- Inform all staff, contractors and visitors to the proposed SEE of the flood risk to the area;
- Ensure all staff, contractors and visitors are warned and informed when there is a risk that flooding may occur in the area;
- List appropriate actions to be taken by operational staff to ensure the safety of staff, contractors and visitors in the event of a Flood Warning being received or should flooding occur without warning including evacuation procedures; and
- Inform local Category One Responders (the local authority and the 'blue light' emergency services) of the procedures in place and actions to be implemented in the event of Flood Warnings being received or flooding occurring.

The FWEP aims to achieve these aims by:

- Identifying in detail the potential flood risks in relation to the proposed SEE location and layout;
- Ensure Flood Warning communications are appropriately set up and maintained both to the site (from the EA) and within the site (to all staff, contractors and visitors);
- Providing procedures to be followed and equipment to be utilised in the event of an evacuation;
- Identifying and describing safe evacuation route(s) from the proposed SEE site;
- Developing further drafts of the FWEP in consultation with the Local Authority, EA and local Category One Responders;
- Providing an outline plan for management of changes to the FWEP and testing the plan; and
- Provide outline actions for communicating issues associated with the FWEP following a flooding event.

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3 FLOOD RISKS

3.1 Mechanisms

The ENVIRON FRA has determined that the principle risk of flooding at the site is associated with the tidal River Welland to the east of the proposed SEE. Flood risks from Vernatt's Drain, to the west have been determined to be negligible.

The modelled tidal flood level in the River Welland during an extreme event (assessed in the FRA to be an event with an annual probability of 1 in 200 (0.5%)) corrected for climate change through the lifespan of the proposed SEE, is 6.54 mAOD. The site is currently defended by earth embankments, which are in good condition, to a minimum height of 6.97 mAOD.

Potential flooding of the site has therefore been determined to only occur in the event of tidal flooding in excess of the 1 in 200 year event (i.e. extremely unlikely) or if there is a breach of the tidal flood defences in combination with an extreme flood event. The following description of flood extents and hazards is based on the FRA assessment of flood risk in the event of such a breach.

3.2 Flood Extent and Hazard

The probability of inundation is considered to be very low as the defences are known to be in good condition. However, the FRA considered potential post-development breach scenarios as follows:

- Breach 1: a breach of the flood defences immediately adjacent to the proposed SEE site; and
- Breach 2: a breach of the flood defences to the south of the proposed SEE site.

The local topography falls away to the north. A breach scenario for a breach to the north of the proposed SEE was not considered as this would be unlikely to impact on the proposed SEE site itself and a safe dry means of access/egress to/from the site would be possible to the south.

Flood modelling simulations have been undertaken for the FRA. These use a tidal cycle of three high tides in sequence. A map of flood hazard during both breach scenarios is presented in Figures 3.1 and 3.2.

Only during Breach 1 will flood water potentially inundate areas of the proposed SEE site. During Breach 2, flood water occurs adjacent to the site but not within the site boundary.

The hazard posed by flooding is a function of the depth of flood water and the velocity at which it flows. Techniques described in Defra/EA advice[1,2] provide methods for estimating flood hazard.

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[1] Defra/Environment Agency (2005) Flood Risk Assessment Guidance for New Development, R&D Technical Report FD2320
[2] Defra/Environment Agency (2005) Flood Risks to People, Guidance Document FD2321

Flood hazards are categorised in the following danger classifications:

- Danger for None – intrinsically safe for all;
- Danger for Some – includes children, the elderly and infirm;
- Danger for Most – includes the general public; and
- Danger for All – includes emergency services.

No children, elderly or infirm adults where this would compromise site safety will be permitted on-site during normal operation.

3.3 Breach 1

The majority of the existing SECL power station site is shown to be inundated by flood waters. The majority of the section of West Marsh Road adjacent to the existing SECL power station site is also shown to be inundated; this includes the northern access point (Gate A). The land between West Marsh Road and the River Welland is also shown to be inundated. Gate C onto West Marsh Road and the section of West Marsh Road which continues south from this point remain outside the modelled flood extent and therefore comprises the proposed access/egress route.

Within the proposed SEE site, the majority of the proposed power station is shown to the entirely outside the extent of flooding. However, initially the proposed substation was shown to be inundated with a flood level of 5.27 mAOD. This has since been resolved by raising the substation to a minimum Finished Floor Level of 5.3 mAOD. The proposed SEE will therefore be entirely outside the extent of flooding.

During the Breach 1 scenario, flooding adjacent to the site begins immediately after the breach. The following sequence shows the progression of flood risks adjacent to the site where flooding occurs along West Marsh Road to the north of the site and within the site area itself:

Table 3.1: Flood Hazard Breach 1

Time After Breach	North along West Marsh Road		
	Depth (m)	Velocity (m/s)	FD2320 Flood Hazard
0 mins	0.40	1.43	Danger for Most
15 mins	0.71	1.53	Danger for All
30 mins	0.88	2.03	Danger for All
45 mins	0.95	2.21	Danger for All
60 mins	0.88	1.91	Danger for All

At the end of the breach simulation, approximately 7 hours 15 minutes after the breach, flood water will remain a Danger for All along West Marsh Road to the north of the site.

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3.4 Breach 2

The existing SECL power station site, in this scenario, remains largely outside the flood extent. Only a small area of the existing SECL power station site adjacent to West Marsh Road is flooded. Some areas of West Marsh Road adjacent to the existing SECL power station site are flooded and the land between West Marsh Road and the River Welland is also flooded.

The Gate A access point to West Marsh Road remains free from flooding as does the section of West Marsh road which extends north from this point. The Gate C access point onto West Marsh Road is affected by flooding as is the majority of West Marsh Road adjacent to and south of the proposed SEE site.

The proposed SEE site remains above the flood extent. This includes the power station and substation elements of the proposal.

The following sequence shows the progression of flood risks adjacent to the site where flooding occurs along West Marsh Road to the south of the site:

Table 3.2: Flood Hazard Breach 2

Time After Breach	South along West Marsh Road		
	Depth (m)	Velocity (m/s)	FD2320 Flood Hazard
0 mins	-	-	Danger for None
15 mins	0.70	1.37	Danger for Most
30 mins	0.92	2.30	Danger for All
45 mins	0.98	2.80	Danger for All
60 mins	0.94	2.70	Danger for All

At the end of the breach simulation, approximately 7 hours 15 minutes after the breach, flood water will be a Danger for None along West Marsh Road to the south of the site.

3.5 Summary of Flood Risks

The FRA has concluded that the proposed SEE site will be protected from all but the most extreme of floods. Even in the event of a flood occurring as a result of a breach, the site itself is extremely unlikely to be affected by flooding.

Although a dry escape route along West Marsh Road can be achieved in all circumstances, the principle issue will be that roads leading to and from the proposed SEE may be impacted over a widespread area and, critically, may be affected close to the site as well. This could impinge on the ability of emergency services staff to gain unrestricted access to the site in the event of a flood. Safe refuge will be provided in the power station, above potential extreme flood levels in the event that the site cannot be evacuated.

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4 ACCESS/EGRESS ARRANGEMENTS

4.1 Site Infrastructure

Ground elevations for the proposed SEE are yet to be designed in detail. As a result of the flood modelling, the substation will be constructed with a minimum Finished Floor Level (FFL) of 5.3 mAOD and will therefore be above all potential flood levels modelled. The power station element of the proposed SEE development will be set at 6.5 mAOD and therefore at least 1.2 m above the Breach 1 flood level.

During the Breach 1 scenario, flooding occurs along the northern side of the site access/egress on West Marsh Road. As such, evacuation along this route would not be safe. During the Breach 2 scenario, flooding occurs along the southern side of the site access/egress on West Marsh Road and likewise would not be safe in this event.

A drawing showing a parameter block model layout of the site is presented in Figure 4.1. It is likely that there will be approximately 15-20 staff on-site during the operational phase of the project. If the power station is operated on a standalone basis, then nearly 40 staff will be directly employed. Furthermore, there could be a larger number of people (up to an annual equivalent of 28 persons) on-site during regular maintenance shutdowns when contracted engineering staff will be present. The majority of these are considered to be occupied within the main power station – the substation will generally remain unmanned except for specific maintenance operations.

4.2 Evacuation Routes

Depending on whether a breach occurs adjacent to the site or to the south of the site, access/egress to/from the site should take place along a safe, dry route to the north or south along West Marsh Road accordingly. The two potential routes are presented in Figure 4.2.

As the site itself will not be impacted by flooding in either of the breach scenarios discussed here, the proposed SEE will be entirely safe for people to remain *in situ* until the flood waters recede when the tide falls.

However, due to the residual risk of an extremely unlikely event occurring that would be greater than the flood defences or a catastrophic failure of the flood defences larger than the modelled breach, internal muster points are recommended to be located within the power station area of the proposed SEE at an elevation above 6.5 mAOD.

No additional work associated with the proposed SEE application will be required to ensure the site or access/egress routes will be above the breach scenarios flood levels. As West Mains Road will be safe and dry, both vehicular and pedestrian access/egress will be possible here.

Consultation will be undertaken with the emergency services, EA and Local Authority to determine the evacuation route to be taken from West Mains Road to a position of safety within Flood Zone 1. In the event of an extreme flood event, it is likely that a large number of people will need to evacuate from the area and district-wide planning is needed to ensure that additional problems of congestion and isolation do not occur as a result. Prior to

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occupation of the site, evacuation routes beyond the immediate vicinity will have been discussed and agreed and incorporated into a further draft of this FWEP.

4.3 Evacuation Risk

Evacuation of the site can itself present a risk to Health & Safety. In the event of the site being impacted by flooding, the FWEP will only be invoked under extreme circumstances. Close cooperation and communication with the emergency services and EA plus the implementation of the flood warning and emergency procedures outlined in Sections 5 and 6 will allow the site to be properly made safe prior to an orderly evacuation.

Floods are unpredictable in nature and, as such, a precautionary approach to evacuating the site must be taken. Although those areas within the control of the proposed SEE and West Marsh Road (either to the north of the south) will be dry, it is possible that during a tidal flood event other areas further afield will be inundated.

Where it is not possible to make a safe evacuation beyond the immediate locality, staff, contractors and visitors should return to a safe refuge point within the proposed SEE site until such time as flood waters have receded sufficiently to allow safe evacuation. Further information on evacuation procedures are presented in Section 6.

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5 WARNING ARRANGEMENTS

5.1 Flood Warning Procedures

The site will register with the EA's Floodline Warnings Direct which will mean that the site receives automated flood warning messages via Automated Voicemail Message (AVM), text and/or email. This will allow the site to be kept informed of changes in the flood warning status for the area.

At this stage, given the lack of detail available regarding the personnel with responsibility for various aspects of implementing the FWEP, no flood warning procedure can be formalised. Nevertheless, suggested procedures are provided as follows:

- On receipt of information about a change in the flood warning status, this information will need to be logged and relayed to personnel with responsibility for implementing the FWEP (e.g. Shift Team Leader, Duty Manager);
- Actions to be taken in the event of a change in flood warning status will be implemented as detailed in Section 5;
- All site staff, contractors and visitors should be made aware of the EA Floodline telephone number (0845 988 1188) and the four Flood Warning Codes and their meaning;
- Minimum warning times from the EA for the site are to be provided by the EA to ensure that an appropriate set of emergency actions can be developed in further iterations of the FWEP;
- Training on the flood warning and emergency procedures will be provided to site staff at Health & Safety Briefings – staff will be made aware of evacuation routes, EA Floodline and Flood Warning Codes;
- Site induction at the commencement of employment for any staff working on-site should include awareness of flood warning and emergency procedures; and
- All contractors and visitors to the site should be made aware of flood warning and emergency procedures through a separate site induction procedure.

It should be noted that the receipt of a change in flood warning status does not necessarily mean that the site will flood as this has been assessed to be largely dependent on whether a breach of the flood defences occurs or not. Likewise, the EA is unlikely to be able to provide a warning of a breach before the site becomes aware of it.

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Vigilance must be observed by all site staff, contractors and visitors at all times upon receipt of a Flood Warning Notice. Staff, contractors and visitors should pay particular attention to any indications that a breach of the flood defences has occurred or, following a breach, whether water has encroached towards the site boundary or even low lying areas within the site boundary.

This information must be relayed to personnel with responsibility for implementing the FWEP giving the following details if possible:

- Location and extent of flood water;
- Estimated depth of water in this location (e.g. at least 1 m deep, minor ponding – NB staff, contractors and visitors should not enter the water);
- Indication of flow direction and rate (e.g. moving north, fast flowing, still); and
- Evaluation of whether water is rising or falling (e.g. visual signs of water rise, observed tide marks where water has now fallen).
- Similar information can be provided in the event of a real or potential breach of the flood defences.

This type of information can then be used by those with responsibility for implementing the FWEP to guide subsequent actions to be taken.

5.2 EA Flood Warnings

EA Flood Warnings will be received via the Floodline Warnings Direct service and will update site staff on the flooding status for the area. This will involve relaying information in the form of Flood Warning Codes.

The Four Flood Warning Codes are summarised as follows:



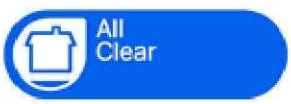
Flooding of low lying land and roads is expected. Be aware, be prepared, watch out.



Flooding of homes and businesses is expected. Act now!



Severe flooding is expected. There is extreme danger to life and property. Act now!



Flood watches or warnings are no longer in force for this area.

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5.3 Sources of Information

Flood Warnings are broadcast by Television and Radio networks, usually during weather or traffic reports.

The EA website provides information on current flood warnings (http://www.environment-agency.gov.uk/)

BBC Ceefax – Page 419.

ITV teletext regional weather pages – Page 154.

Calling Floodline on 0845 988 1188 where there are options to listen to recorded information or to speak to an operator for up-to-date information and advice 24 hours a day.

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6 EMERGENCY PROCEDURES

6.1 Overview

The FRA has concluded that the site will be protected from all but the most extreme of floods. Even in the event of a flood occurring as a result of a breach, the site itself is extremely unlikely to be affected by flooding. Infrastructure and site operation is therefore not likely to be directly impacted under all but the most extreme circumstances.

Emergency procedures will be subject to change as the project develops. However a suggested series of procedures to be taken are provided in this section.

6.2 Actions on receipt of a Flood Warning

Flood Watch

- Call will be acknowledged and logged.
- Site staff with duty responsibility for site management (e.g. Shift Team Leader) will monitor local news and weather forecasts and inform higher management of situation.
- All staff, contractors and visitors will be instructed of the level of flood warning.
- Necessary preparations will be made to implement the FWEP.
- Communications with on-site and off-site staff with responsibility for management will be checked and maintained.

Flood Warning

- Call will be acknowledged and logged.
- Site staff with duty responsibility for site management will continue to monitor local news and weather forecasts and inform higher management of situation.
- All staff, contractors and visitors will be instructed of increased level of flood warning and to be vigilant for indications of flooding in the local area and, in particular, the site.
- Preparations as necessary will be made to implement further stages of the FWEP.
- Communications with on-site and off-site staff with responsibility for management will be regularly maintained.

Severe Flood Warning

- Call will be acknowledged and logged.
- Site staff with duty responsibility for site management will continue to monitor local news and weather forecasts and inform higher management of situation.
- If applicable, a note of predicted high tide/storm surge dates and times will be made.
- All staff, contractors and visitors will be instructed of increased level of flood warning and to be vigilant for indications of flooding.

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- If safe to do so, a member of staff will check on water levels in the River Welland to assess the potential risk of flooding and signs of any potential breach – security cameras may also be used to assess water levels.
- Communications with on-site and off-site staff with responsibility for management will be regularly maintained.

In the event that the risk of flooding is not imminent (e.g. a potentially severe storm surge has been predicted with a lead time of **over 8 hours** and water levels in the River Welland are currently at normal levels), the following actions will be implemented:

- An assessment of the need for a full or partial evacuation and/or temporary shutdown of the site to correspond with predicted flooding extremes will be made by appropriate personnel.
- (where applicable) Staff, contractors and visitors will evacuate using normal routes and exercise vigilance.
- On-site or off-site staff will monitor the situation as it progresses and determine when the level of flood risk has fallen to a lesser Flood Warning Code and (where applicable) the site can be re-occupied.

In the event that the risk of flooding is considered to be real but there is longer than a two hour lead time to that risk being realised (e.g. a potentially severe storm surge has been predicted with a lead time of **over 2 hours**), the following actions will be implemented:

- An assessment of the need for a full or partial evacuation and/or temporary shutdown of the site will be made by appropriate personnel.
- This will include an assessment of the adjacent flood defences to determine whether and where a breach could occur.
- (where applicable) Staff, contractors and visitors will evacuate using an appropriate route as identified in Section 4 and exercise vigilance.
- It is essential that all staff, contractors and visitors understand which route is to be utilised i.e. Route 1 or Route 2 though this does not preclude the need for all staff, contractors and visitors to exercise vigilance and good judgement when utilising a pre-determined evacuation route.
- On-site or off-site staff will monitor the situation as it progresses and determine when the level of flood risk has fallen to a lesser Flood Warning Code and (where applicable) the site can be re-occupied.

In the event that the risk of flooding is considered to be real and **imminent** (e.g. a breach has occurred and flood water has begun to inundate areas adjacent to or within the site area), the following actions will be implemented:

- The Power Station will be shut down in a controlled manner including all necessary actions to ensure damage will not occur to site infrastructure and the environment.
- An assessment will be made of the potential for a safe full or partial evacuation of the site along the routes identified in Section 4.
- It is essential that all staff, contractors and visitors understand which route is to be utilised i.e. Route 1 or Route 2 though this does not preclude the need for all staff,

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contractors and visitors to exercise vigilance and good judgement when utilising a pre-determined evacuation route.

- One route only will be used by all site staff, contractors and visitors who will exercise extreme caution in progressing along the evacuation route.
- If flood risks are deemed to be hazardous at any stage along pre-determined routes, staff, contractors and visitors should return along the same route to the proposed SEE site (the FRA has determined that it is unlikely that the safe evacuation routes outlined in Section 4 will be inundated therefore it is unlikely that staff, contractors and visitors would be cut-off from the site).
- Safe refuge will be provided within power station buildings at the proposed SEE site.
- On-site or off-site staff will monitor the situation as it progresses and determine when the level of flood risk has fallen to a lesser Flood Warning Code and (where applicable) the site can be re-occupied – this will involve taking external advice on the flooding situation beyond the site boundary.

All Clear

- Call will be acknowledged and logged.
- All staff, contractors and visitors will be instructed of the changed level of flood warning and that flood risk issues have therefore dissipated.
- At an appropriate stage, a review of the actions implemented, potential issues and areas for improvement will be undertaken and the FWEP revised accordingly.

6.3 Actions Required During an Evacuation

In the event that a full or partial evacuation of the site is decided upon, specific actions to be taken are as follows:

- Records of all staff, contractors and visitors present on-site at the time of evacuation will be obtained.
- An assessment of those who can and those who should or should not evacuate the site will be made including the ability of those individuals to make a safe evacuation.
- Where people require assistance, this will be provided by duly appointed individuals.
- A record of those who will be evacuating the site will be made and contact details for each person will be logged (e.g. mobile phone numbers).
- Each person evacuating the site will be made aware of the proposed evacuation route and procedures to be undertaken in the event that the evacuation route becomes unusable, taking into consideration the issues identified above.
- Each person leaving the site will take a note of the site's contact details and call to inform any staff, contractors and visitors remaining on-site of any relevant information with respect to the evacuation route (e.g. hazards, blocked roads, traffic congestion).
- If the evacuation is taking place within hours of darkness, portable lighting equipment should be provided to those being evacuated where possible.

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6.4 Post Evacuation

Following a full or partial evacuation of the site, the following actions will be required:

- Personnel with responsibility for implementing the FWEP will ensure that relevant Category One Providers are informed that the site has been fully or partially evacuated and the measures taken to render the site safe.
- All staff, contractors and visitors are to be made aware for the duration of the evacuation of the situation with respect to flooding.
- In the event of widespread flooding, it is considered likely that a co-ordinating centre from which the emergency services, EA, Local Authority etc. can manage the situation will have been established.
- Personnel with responsibility for implementing the FWEP will establish and maintain liaison with the co-ordinating centre to obtain situation reports and to determine and agree when it is safe to resume normal operation of the proposed SEE.
- It is essential to understand that whilst the proposed SEE is unlikely to be directly affected by flooding, there may be severe disruption to travel arrangements in the local area which may be subject to separate flood hazards.

6.5 Safe Refuge

- In the unlikely event that the site is affected by flooding without warning and/or evacuation from the site is compromised outside the vicinity of the area immediately surrounding the proposed SEE, all staff, contractors and visitors should be instructed to remain within the proposed SEE site. Details of the site layout are yet to be finalised but, at this stage, it has been assumed that refuge would be provided within the power station area of the site.
- If the site and surrounding area are affected, anyone leaving the site would be exposed to flooding and other hazards. Every effort should be used to persuade anyone that insists on leaving to remain but physical restraint cannot be used.
- Staff, contractors and visitors will remain safe and dry within buildings at the proposed SEE (minimum FFLs for the power station will be set at 6.5 mAOD – well above the potential flood levels in the event of a breach).
- Advice and assistance should be sought from the emergency services and, where given, instructions should be followed at all times.
- Further details on provisions for safe refuge will be made during the development of the project.

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7 MANAGEMENT OF CHANGE

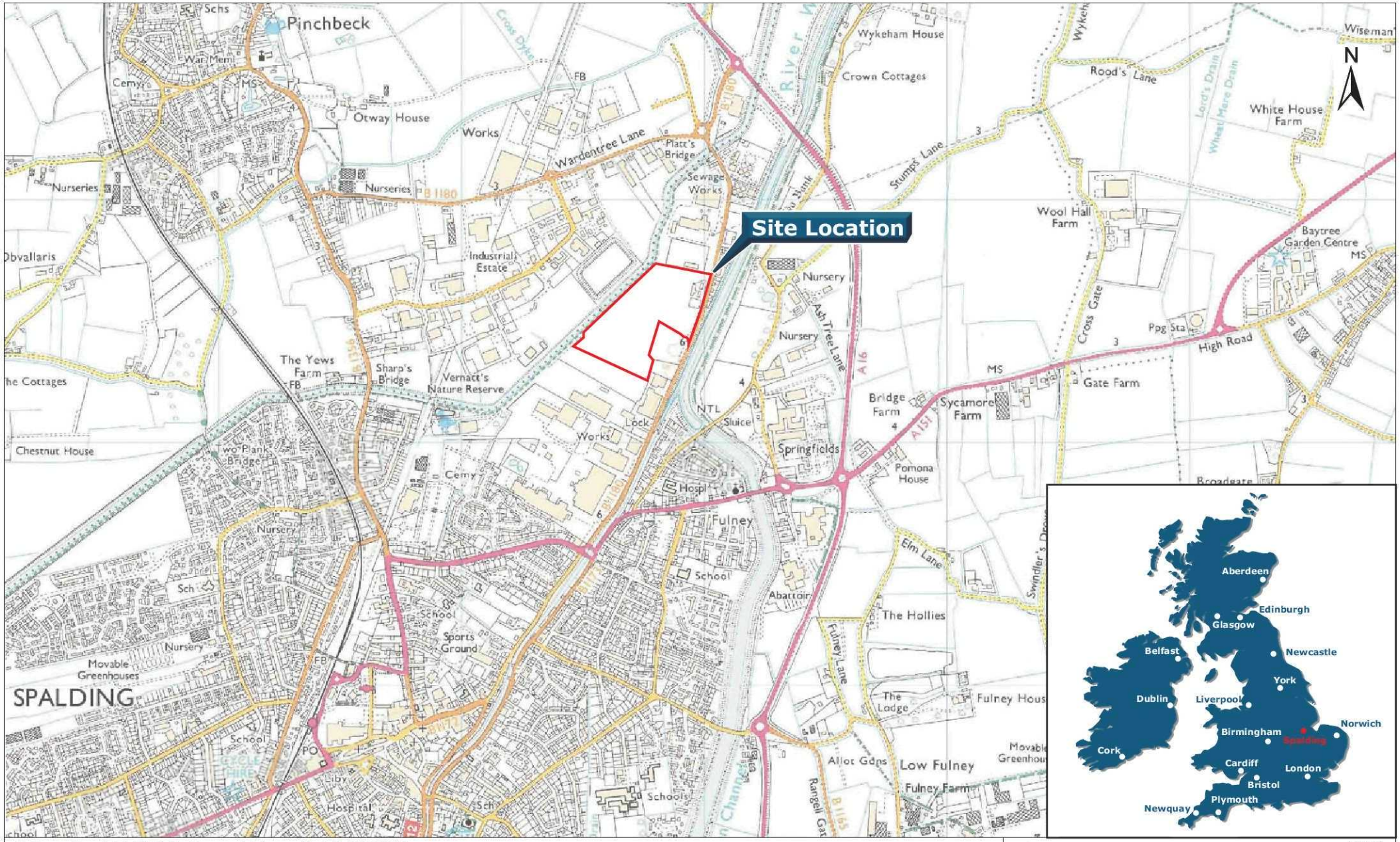
Site staff for the proposed SEE and/or external staff for InterGen and affiliates will be responsible for the updates, maintenance and distribution of the FWEP.

The FWEP is a live document and should reflect changes of any kind that occur through the lifespan of the proposed SEE where these will impact on the FWEP.

The FWEP should be tested in exercise and reviewed every 5 years, or sooner should there be a change to flood risks and/or warning systems, in consultation with the EA, Local Authority and other relevant organisations.

Following revision, the FWEP, including a revision schedule, shall be updated and re-issued. A copy of the FWEP should be made available to the emergency services and the local authority.

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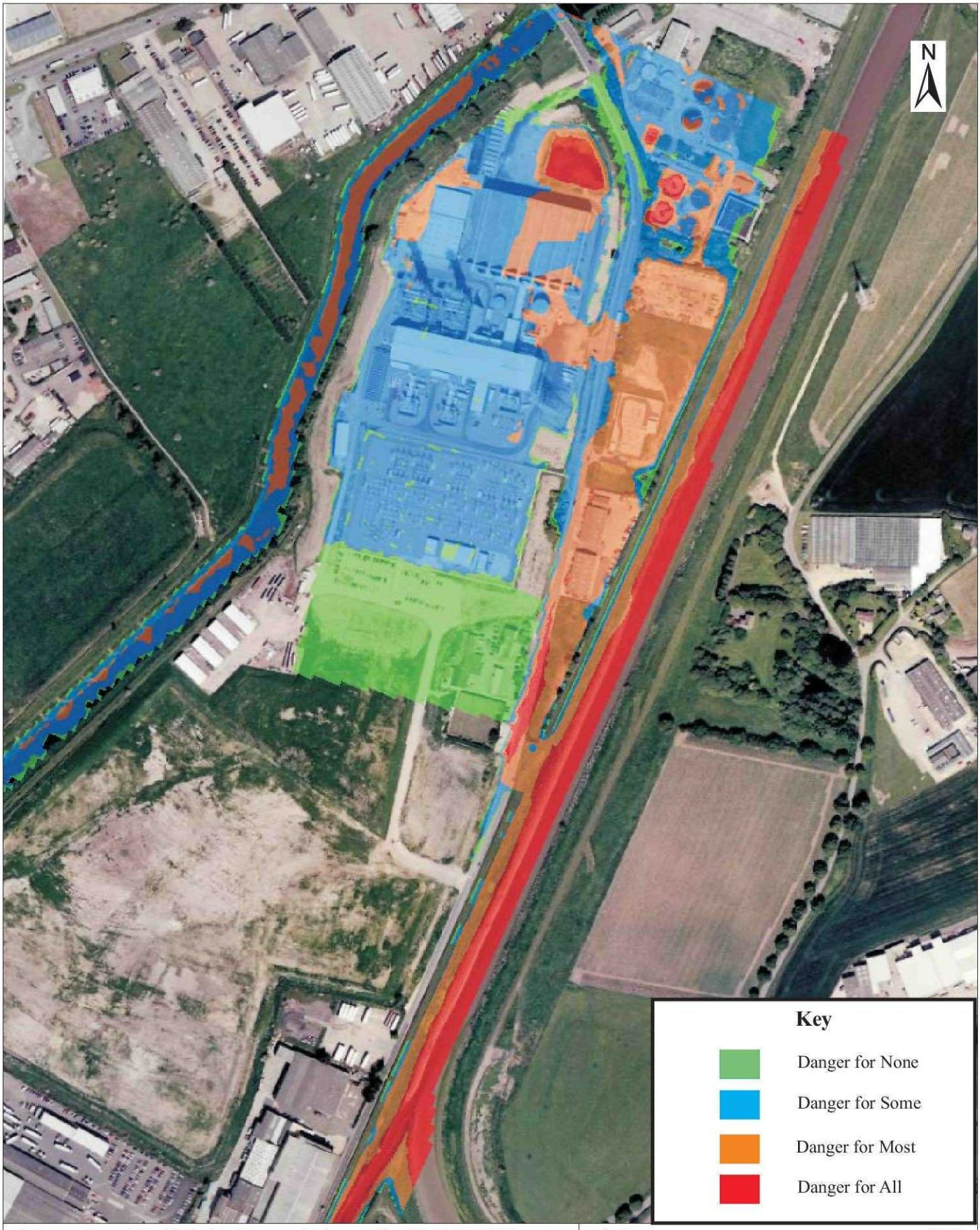
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Scale **NTS**

ENVIRON

Title	**Figure 1.1: Site Location**
Site	**Spalding Energy Expansion, Spalding, Lincolnshire**

Client	**Spalding Energy Expansion Limited**		
Project No.	**UK12-12701**	Issue	**1**
Date	**July 2009**	Drawn by	**KJ/NS**



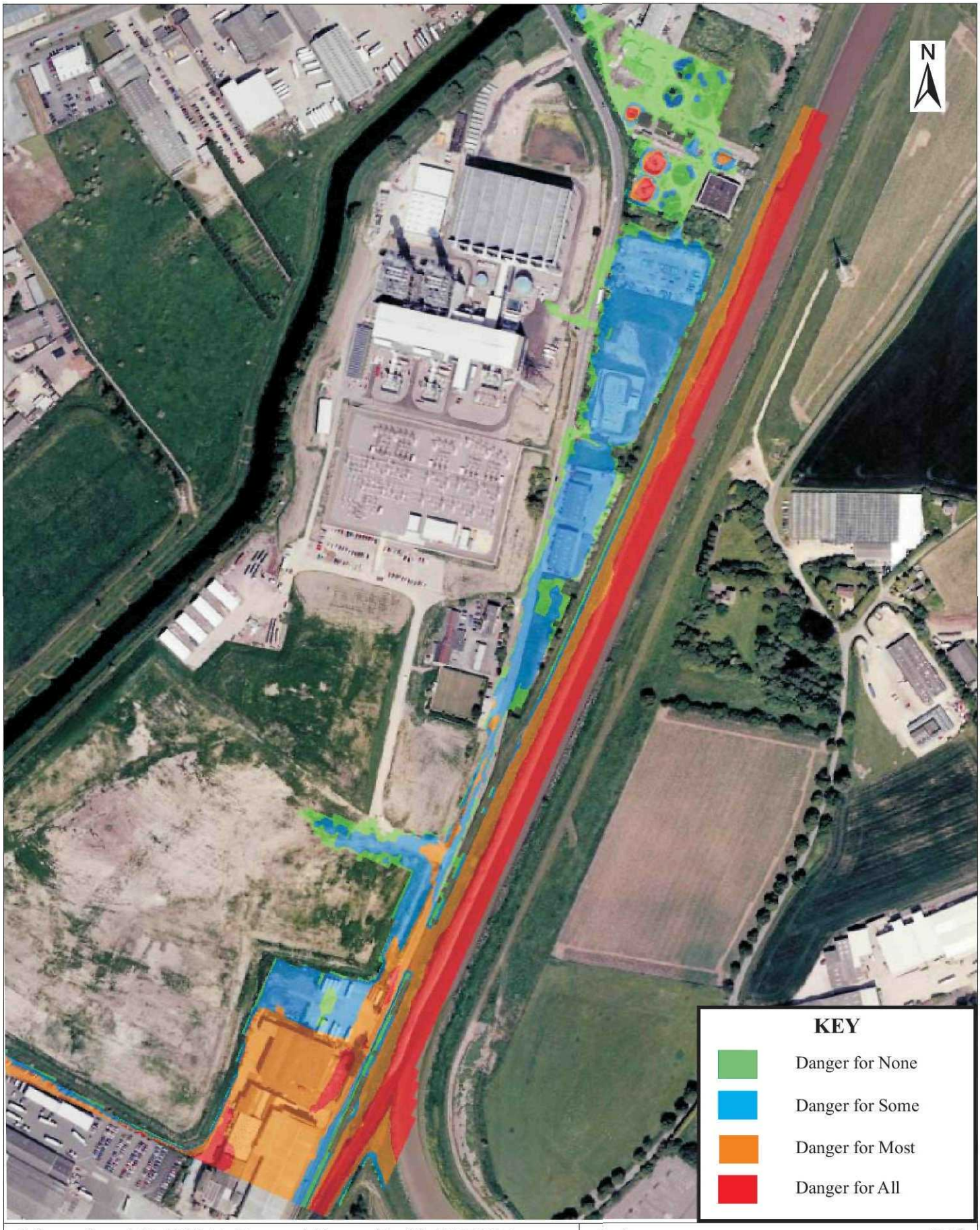
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Scale **NTS**

Title	**Figure 3.1: Breach 1**
Site	**Spalding Energy Expansion** **West Marsh Road** **Spalding** **Lincolnshire**

Client	**Spalding Energy Expansion Limited**		
Project No.	**UK12-14701**	Issue	**1**
Date	**July 2009**	Drawn by	**KJ/NS**

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Scale **NTS**

Title	**Figure 3.2:Breach 2**
Site	**Spalding Energy Expansion** **West Marsh Road** **Spalding** **Lincolnshire**

Client	**Spalding Energy Expansion Limited**		
Project No.	**UK12-14701**	Issue	**1**
Date	**July 2009**	Drawn by	**KJ/NS**

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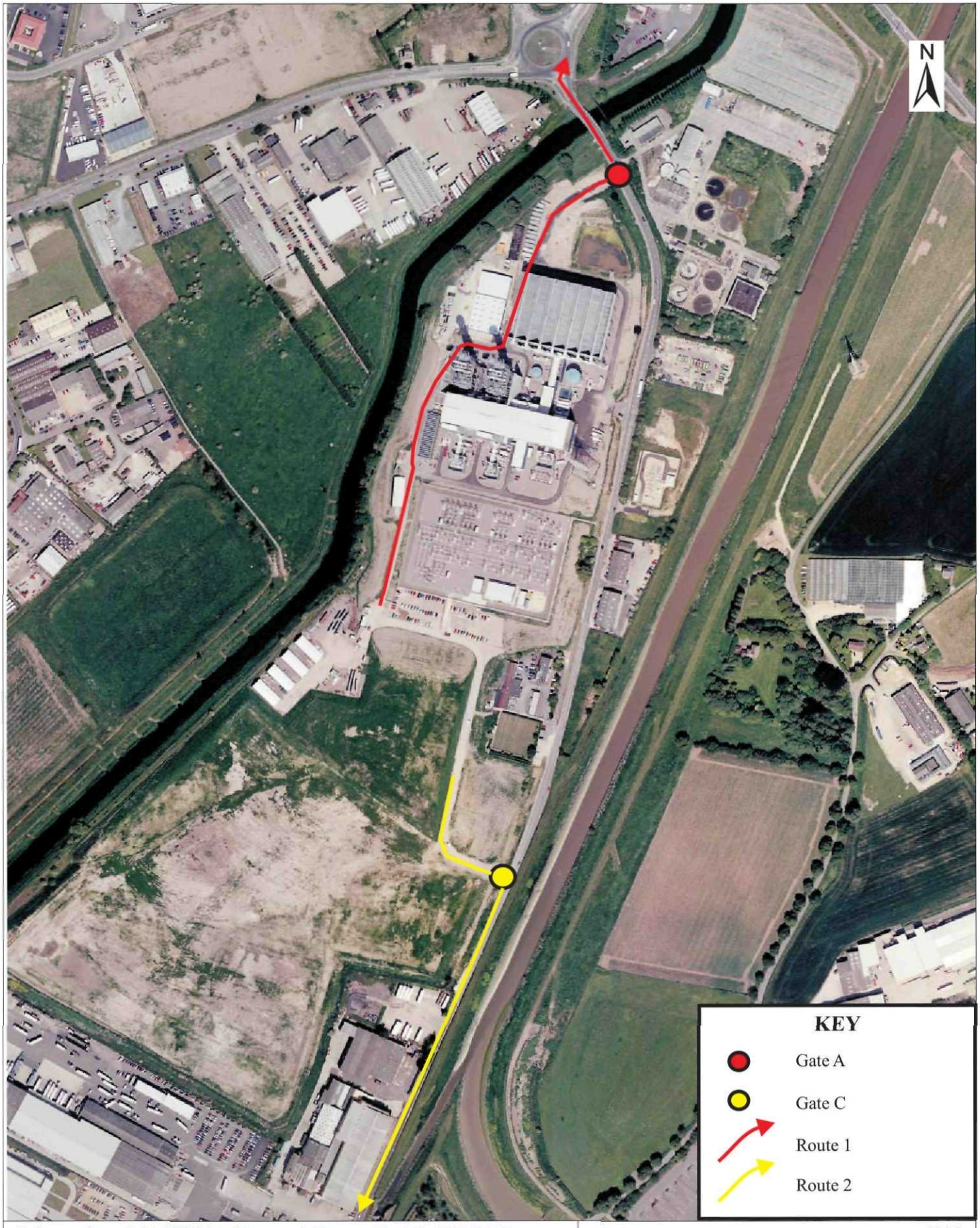
Scale **NTS**

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Title **Figure 4.1: Parameters Plan**

Site **Spalding Energy Expansion, Spalding, Lincolnshire**

Client	**Spalding Energy Expansion Limited**		
Project No.	**UK12-12701**	Issue	**1**
Date	**July 2009**	Drawn by	**KJ/NS**



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Scale NTS

Title	**Figure 4.2:Evacuation Routes**
Site	**Spalding Energy Expansion** **West Marsh Road** **Spalding** **Lincolnshire**

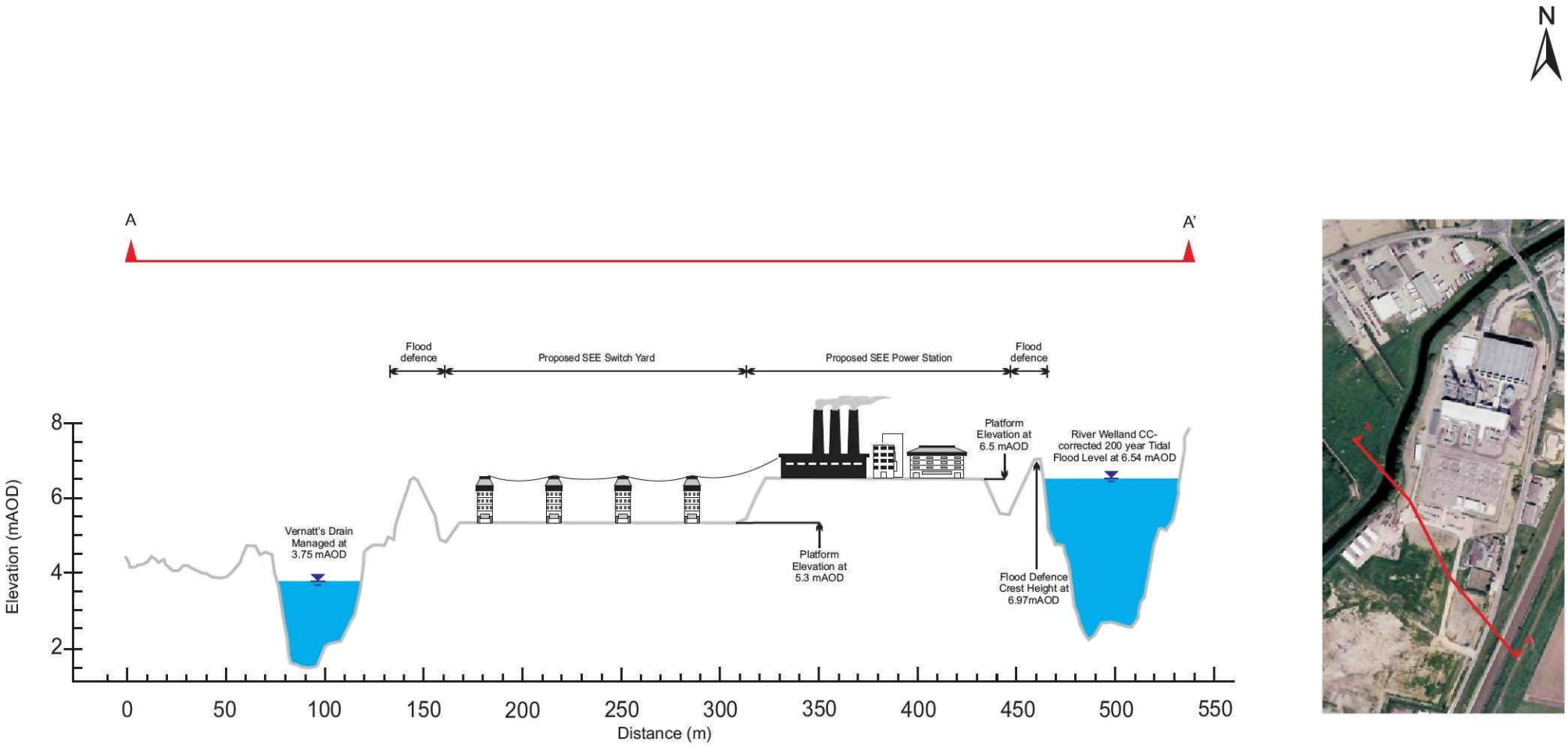
Client	**Spalding Energy Expansion Limited**		
Project No.	**UK12-14701**	Issue	**1**
Date	**July 2009**	Drawn by	**KJ/NS**

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APPENDIX B

Cross Section of SEE Site and Flood Levels

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Scale **As Shown**

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Title **Figure 1: Cross Section of SEE Site and Flood Levels**

Site **Spalding Energy Expansion, Spalding, Lincolnshire**

Client	**Spalding Energy Expansion Limited**		
Project No.	**UK12-12701**	Issue	**1**
Date	**July 2009**	Drawn by	**KJ/NS**

APPENDIX C

NOTE ON DRAINAGE ASSESSMENT

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The purpose of the Drainage Assessment provided within the FRA (refer to Volume 3 of the Environmental Statement, Technical Appendix 12.1 Water Resources and Flood Risk, Section 6 Drainage Assessment) is to demonstrate that:

- potential issues associated with changes to the sites runoff characteristics have been appropriately considered in line with PPS25;
- measures to mitigate these issues, principally through the use of SUDS, have been identified; and
- the proposed mitigation measures are readily achievable and fit into the overall strategy for development at the site.

A detailed drainage design will be provided post-consent and, prior to the development itself being designed in detail, the drainage strategy will remain conceptual. Nevertheless, runoff calculations and a SUDS appraisal were provided in the FRA. Approximately 2,300 m^3 of attenuation was proposed to be provided in the final drainage strategy via a range of measures including the following:

- balancing pond or ponds of approximately 1,000 m^3 in aggregate;
- permeable paving with a porous sub-base;
- filter drains; and
- non-infiltration swales.

Although the precise location of these measures cannot be confirmed until the site has been designed in detail, Figure 6.1 Drainage Parameters Plan of the FRA illustrates areas that are currently considered to be the most likely positioning. The objective of SUDS implementation at this site is to reduce flood risk to the site itself and elsewhere. This will be achieved by reducing peak runoff rates. The strategy used in the FRA was to determine the highest peak runoff rates from the critical duration storm for the site. This was calculated using methods outlined in the Wallingford Procedure. Peak runoff rates for longer or shorter duration storms were considered to present lower risk as these peak runoff rates would be less. The highest peak runoff rates for the site were determined to be those that occur during the 30 minute storm as presented in Table C1:

Table C1 – Pre-development peak run-off rates for 30 minute storm

Return Period (Years)	Peak Flow Rate (l/s)
2	44.3
5	63.8
10	81.2
30	116.4
50	137.5
100	171.9

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In order to test the strategy and provide further support for the measures proposed in the FRA, as requested by the EA, additional runoff calculations have been undertaken. Rainfall for storms varying between 30 minutes and 6 hours and between return periods of 2 years and 100 years have been extracted from the Flood Estimation Handbook (FEH) (refer to Table C2). The critical storm duration was determined to be less than 30 minutes, but the FEH Depth Duration Frequency (DDF) modelling should not be used for durations lower than 30 minutes.

Table C2 – Pre-development rainfall (mm) for range of storm durations and rainfall return periods

	Storm Duration (Minutes)							
Rainfall return period	30	60	90	120	180	240	300	360
	Rainfall (mm)							
2 years	10.7	13.5	15.3	16.7	18.8	20.6	22	23.2
5 years	15.4	19.2	21.5	23.3	26.1	28.3	30.1	31.6
10 years	19.6	24.3	27	29.1	32.4	34.9	37	38.8
30 years	28.1	34.6	38.1	40.8	44.8	48	50.6	52.8
50 years	33.2	40.7	44.5	47.5	52	55.5	58.3	60.7
100 years	41.5	50.6	55	58.4	63.6	67.5	70.7	73.4

To allow for the potential impact of climate change on peak rainfall rates in accordance with PPS25, rainfall has been increased by 20% for the post-development runoff scenarios as presented in Table C3.

Table C3 – Predicted post development rainfall (mm) for range of storm durations and rainfall return periods, with climate change allowance

	Storm Duration (Minutes)							
Rainfall return period	30	60	90	120	180	240	300	360
	Rainfall (mm)							
2 years	12.8	16.2	18.4	20.0	22.6	24.7	26.4	27.8
5 years	18.5	23.0	25.8	28.0	31.3	34.0	36.1	37.9
10 years	23.5	29.2	32.4	34.9	38.9	41.9	44.4	46.6
30 years	33.7	41.5	45.7	49.0	53.8	57.6	60.7	63.4
50 years	39.8	48.8	53.4	57.0	62.4	66.6	70.0	72.8
100 years	49.8	60.7	66.0	70.1	76.3	81.0	84.8	88.1

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Runoff volumes in m^3 and peak runoff rates in l/s have been derived from the data in Tables A2 and A3 using the same methods as described in the FRA (i.e. the Wallingford Procedure). The results for the existing site are presented in Tables C4 & C5.

Table C4 – Pre-development runoff volumes (m^3)

	Storm Duration (Minutes)							
Rainfall return period	30	60	90	120	180	240	300	360
	Rainfall Volume (m^3)							
2 years	79.7	100.5	114.0	124.4	140.0	153.4	163.9	172.8
5 years	114.7	143.0	160.1	173.5	194.4	210.8	224.2	235.4
10 years	146.0	181.0	201.1	216.7	241.3	259.9	275.6	289.0
30 years	209.3	257.7	283.8	303.9	333.7	357.5	376.9	393.3
50 years	247.3	303.1	331.4	353.8	387.3	413.4	434.2	452.1
100 years	309.1	376.9	409.6	435.0	473.7	502.7	526.6	546.7

Table C5 – Pre-development peak runoff rates (l/s)

	Storm Duration (Minutes)							
Rainfall return period	30	60	90	120	180	240	300	360
	Rainfall peak runoff rate (l/s)							
2 years	44.3	28.0	21.1	17.3	13.0	10.7	9.1	8.0
5 years	63.8	39.8	29.7	24.1	18.0	14.6	12.5	10.9
10 years	81.2	50.3	37.3	30.1	22.4	18.1	15.3	13.4
30 years	116.4	71.6	52.6	42.2	30.9	24.8	21.0	18.2
50 years	137.5	84.3	61.4	49.2	35.9	28.7	24.1	20.9
100 years	171.9	104.8	75.9	60.5	43.9	34.9	29.3	25.3

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As previously determined in the FRA, peak runoffs for longer duration storms are lower than those for the 30 minute storm.

Post-development runoff volumes and flow rates, minus 2,311 m^3 of attenuation, are presented in Tables C6 - C7.

Table C6 – Post development net rainfall volumes (m^3) allowing for attenuation storage

	Storm Duration (Minutes)							
Rainfall return period	30	60	90	120	180	240	300	360
	Net Rainfall Volume (m^3)							
2 years	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 years	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 years	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30 years	0.0	0.0	0.0	0.0	194.7	372.9	517.6	640.2
50 years	0.0	0.0	178.0	345.0	595.6	790.5	946.4	1080.1
100 years	0.0	517.6	762.7	952.0	1241.6	1458.7	1636.9	1787.3

Table C7 – Post development peak runoff rates (l/s)

	Storm Duration (Minutes)							
Rainfall return period	30	60	90	120	180	240	300	360
	Rainfall peak runoff (l/s)							
2 years	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 years	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 years	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30 years	0.0	0.0	0.0	0.0	18.0	25.9	28.8	**29.6**
50 years	0.0	0.0	33.0	47.9	**55.1**	54.9	52.6	50.0
100 years	0.0	**143.8**	141.2	132.2	115.0	101.3	90.9	82.7

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The above Tables demonstrate that the majority of storm runoffs will be entirely contained within the attenuation volume of 2,311 m^3. The detail of the drainage design including agreement of discharge rate to the River Welland is yet to be developed however it is proposed that under extreme circumstances that flows in excess of the attenuation measures will overflow via engineered pipework to the receiving watercourse, the River Welland, or back up and create surface ponding at strategic low-lying areas of the site at low risk.

The attenuation measures act to change the runoff characteristics of the site post-development such that the highest peak runoff rates will occur during different storm durations as highlighted above.

The highest post-development peak runoff rates, taking into consideration the attenuation measures, compare with the highest pre-development rates as follows:

Table C8 – Comparison of Pre and Post Development Peak Runoff Rates (l/s)

Return Period	Pre-Development Peak Flow Rate (l/s)	Post Development Peak Flow Rate (l/s)	Change (l/s)
2 years	44.3	0.0	-44.3
5 years	63.8	0.0	-63.8
10 years	81.2	0.0	-81.2
30 years	116.4	29.6	-86.8
50 years	137.5	55.1	-82.4
100 years	171.9	143.8	-28.1

These represent a significant reduction in peak runoff rates compared to the pre-development rates presented in Table C1. This fits in with the strategy for the site, which is to reduce the rate of peak runoff events.

For each of the above calculations, the potential for infiltration from permeable paving has been discounted, therefore post-development runoff rates are considered to be conservative. In any case, these outline calculations are not intended to define the detailed drainage design for the site but are provided here to set drainage parameters to demonstrate that the drainage strategy has been given due consideration as appropriate to the application for Section 36 consent. Further consideration of drainage issues will be made at the detailed design stage with the intention that the site's overall strategy meets regulatory requirements that post-development flows will not exceed pre-development flows at peak times.

It is noted that the River Welland adjacent to the site is tidal. The principal local flood risks have been determined in the FRA to be from tidal rather than fluvial flooding. As catchment runoff plays a relatively minor role in tidal flood levels compared with fluvial flooding, it is not considered that the receiving watercourse is at the same level of risk were it fluvial in this area. As such, the measures proposed at this stage are considered conservative and appropriately address the issues identified in PPS25.

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