

ADDENDUM TO  
FLOOD RISK ASSESSMENT FOR  
HECKINGTON FEN WIND FARM

*Ecotricity Group Ltd*

Job Number 3513842A-SSR

***Final***



# **Addendum to Flood Risk Assessment for Heckington Fen Wind Farm**

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**CONTENTS**

		<b>Page</b>
<b>1</b>	<b>Background Information</b>	<b>3</b>
<b>2</b>	<b>Site Location and Brief Description</b>	<b>3</b>
<b>3</b>	<b>Proposed Development</b>	<b>3</b>
<b>4</b>	<b>Proposed Amendments to the Original Site Layout</b>	<b>4</b>
<b>5</b>	<b>Consultation</b>	<b>4</b>
<b>6</b>	<b>Existing Flood Risk</b>	<b>5</b>
<b>7</b>	<b>Post Development Flood Risk</b>	<b>6</b>
<b>8</b>	<b>Sequential Test and Exception Test</b>	<b>10</b>
<b>9</b>	<b>Conclusions</b>	<b>10</b>

**APPENDICES**

Appendix A - Details of Network of Drainage Channels

Appendix B - Comparison of the Original and the Amended Site Layouts

Appendix C - Amended Site Layout

Appendix D - Consultation with EA

Appendix E - Consultation with Black Sluice IDB

Appendix F - Existing Ground Levels at Sub-Station Area



## **1 BACKGROUND INFORMATION**

- 1.1.1 A site specific Flood Risk Assessment (FRA) was prepared for Heckington Fen Wind Farm<sup>1</sup> by Parsons Brinckerhoff Ltd (PB) in 2011 in support of a planning application for the development. The planning application was granted consent in February 2013. The proposed site layout has since been changed slightly and this Addendum Report highlights the proposed amendments to the development and updates the assessment accordingly to support variations to the consent application.
- 1.1.2 The FRA undertaken in 2011 was prepared in accordance with Planning Policy Statement 25: Development and Flood Risk (PPS25), which was superseded by the National Planning Policy Framework (NPPF) in March 2012.
- 1.1.3 This Addendum Report should be read in conjunction with the original Heckington Fen Wind Farm FRA (2011).

## **2 SITE LOCATION AND BRIEF DESCRIPTION**

- 2.1.1 The site is located approximately 6km to the east of Heckington in Lincolnshire at approximate OS Grid Reference TF205450. The site is bound to the west, north and east by drainage channels and by the A17 to the south.
- 2.1.2 The development site covers an area of approximately 600ha, and is currently used for agricultural purposes. A network of open drainage channels crosses the site ranging from small field drains to larger open channels.
- 2.1.3 The Labour in Vain Drain, the drainage channels which form the northern and western boundaries of the site, and an unnamed drain that runs north-south through the site are under jurisdiction of Black Sluice Internal Drainage Board (IDB).
- 2.1.4 Head Dyke-Skerth Drain that flows parallel to the north and east site boundaries is designated as a 'main river' under jurisdiction of the Environment Agency (EA).
- 2.1.5 Details of the network of drainage channels are shown in **Appendix A**.

## **3 PROPOSED DEVELOPMENT**

- 3.1.1 The amended Heckington Fen Wind Farm development proposals consist of the following:
- The construction of up to 22 no. wind turbines, with a base diameter of 4.3m and 1m flange (i.e. 6.3m total diameter). *This represents no change in the consented scheme, only the rotor diameter is amended;*
  - The construction of a network of permeable access tracks (to be raised up to 150mm above existing ground levels), including amendments to existing culverts and the construction of new culverts where required; and,
  - The construction of a 132kV electricity substation comprising a compound with a footprint of approximately 2609m<sup>2</sup> and a sub-station control building with a footprint of approximately 135m<sup>2</sup>.

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<sup>1</sup> Heckington Fen Wind Farm, July 2011, Parsons Brinckerhoff on behalf of Ecotricity Group Ltd

## **4 PROPOSED AMENDMENTS TO THE ORIGINAL SITE LAYOUT**

4.1.1 The proposed amendments to the development proposals that could have an impact on flood risk and drainage include:

- Realignment of the onsite access track and increase in track levels (the original FRA did not take into account a 150mm raise in the access tracks);
- Relocating and increasing the footprint of the onsite substation, and moving from Flood Zone 1 to Flood Zone 3a; and
- Relocating the temporary construction compound approximately 200m to the west of its proposed original location (both locations are in Flood Zone 3) and increasing the compound footprint.

4.1.2 The site layout with highlighted amendments is shown in **Appendix B**. A separate drawing showing the amended site layout is shown in **Appendix C**.

## **5 CONSULTATION**

5.1.1 Consultation with the following authorities has been undertaken to discuss the proposed amendments to the development and requirements regarding the Variation of Consent. Details of consultations are provided in **Appendix D** and **Appendix E** for the EA and Black Sluice IDB respectively with a summary provided below:

- Environment Agency:
  - Email to Greg Smith dated 19 December 2014. The EA confirmed that the flood risk should be considered over the lifetime of the development, and the proposed mitigations should consider a flood level predicted for the 1 in 1000 year with climate change. The EA also confirmed that the proposed minimum level of 3.04m AOD for the sensitive equipment is acceptable;
  - Email from Greg Smith dated 20 January 2015. The EA confirmed that if through a volume comparison it can be demonstrated that the potential increased loss of floodplain storage does not significantly increase risk of flooding at the site or elsewhere then floodplain compensation is not required.
- Black Sluice Internal Drainage Board:
  - Meeting with Andy Scott (Black Sluice IDB representative) on 23 September 2014. Black Sluice IDB clarified that it would be up to the contractor to derive a proposal for the private drain culverts and then submit to the Board for approval. The Board confirmed that the track materials, cross sections of the tracks and soil infiltration rates will have to be submitted to them along with the approach to private drains and proposal for the drains managed by Black Sluice IDB as part of an application to be made to the Drainage Board along with the culvert design, prior to construction. Black Sluice IDB also confirmed that the Board is unlikely to consider the proposed amendments as significant, however did indicate that raising the ground levels along the access tracks was not a preferred option. The Board advised that they are content for Ecotricity Group Ltd to apply for the Variation of Consent prior to submitting draft culvert designs and drainage proposal;
  - Email correspondence with Andy Scott between 13 and 14 January 2015. The Board confirmed that surface water runoff from the development should be discharged via infiltration wherever feasible. Otherwise, the surface water runoff can be discharged to the watercourses with flows limited to the greenfield rate of 1.4 l/s/ha. If such rate cannot be achieved the Board will

charge a one-off fee based on the rate of flow and impermeable area. This requirement also implies for any temporary flows. A formal written consent will be required. The Board also confirmed that any new culvert design, amendments to the existing culverts or temporary culverts whether in Board-maintained watercourses or private drains will require prior consent from the Board. All culvert works must be to the Board specifications. Applications must be submitted and consent received prior to any works taking place. Black Sluice IDB also states that usage of plastic drains would be appropriate at regular intervals under any raised surfaces to allow rainfall runoff to drain into nearby watercourses. The consent will be required if the installed plastic drains are permanent. If any raised tracks are removed at the end of the construction phase, then the Board will allow temporary pipes to be installed for the duration of works via a temporary consent. Black Sluice IDB confirms that any structures, including any raised surfaces, within 9m of the drains managed by the Board, must have prior written consent.

**6 EXISTING FLOOD RISK**

6.1.1 In accordance with the NPPF, the following sources of flooding should be considered as part of a FRA:

- Fluvial flood risk from nearby watercourses;
- Surface water flooding from within the site and adjacent land;
- Surcharging of sewers;
- Groundwater flooding; and
- Manmade flood risk from canals and impounded reservoirs.

6.1.2 The original Heckington Fen Wind Farm FRA includes assessment of flood risk from all the sources mentioned above and therefore complies with the requirements of the NPPF.

6.1.3 The greatest risk of flooding to the proposed development has been identified as fluvial flood risk from the Head Dyke-Skerth Drain which borders the north and east of the site. The EA confirmed that the site is located in the high risk Flood Zone 3a, that is described as land having a 1 in 100 or greater annual probability of river flooding (>1%) in any year.

6.1.4 The original FRA includes information on the flood levels for a range of flood events including the 1 in 100 year with climate change allowance and 1 in 1000 year event with climate change allowance predicted for the development area. This information was provided by the EA, and remains the best available information. The flood levels provided by the EA are summarised in **Table 1**.

**Table 1: Predicted Flood Levels (EA South Forty Foot Drain Model, 2009 - Node HD107000)**

<b>1 in 100 year + Climate Change</b>	<b>1 in 1000 year + Climate Change</b>
2.90m AOD	3.04m AOD

6.1.5 The ground levels throughout the site vary from approximately 0.6m AOD in the north-east to approximately 4.0m AOD in the south. Considering this information flood depths of approximately 2.3m and 2.44m can be expected in the lowest part of the site during the 1 in 100 year and 1 in 1000 year event including allowance for climate change respectively.

- 6.1.6 The original FRA identifies no significant flood risks from groundwater, canals and reservoirs, overland flow from the site and adjacent land, and surcharging of sewers.
- 6.1.7 A residual flood risk to the site was identified in the original FRA where flow within the adjacent ditches exceeds capacity of the pumping stations located close to the site, or if there is mechanical or electrical failure of the pumping stations. Whilst it is not possible to quantify the likely depth of flood waters, it is considered unlikely that the resultant flood depth would be greater than the predicted fluvial flood depths.

## **7 POST DEVELOPMENT FLOOD RISK**

### Flood Storage

- 7.1.2 The vast majority of the proposed development is located in the high risk Flood Zone 3, and construction of the sub-station compound, wind turbine towers and access track could reduce the capacity of the existing floodplain.
- 7.1.3 It is proposed that the access track will be raised by 150mm along its entire length. The total area of the proposed access track is approximately 61,750m<sup>2</sup> based on 5.5m width along straight sections and 6.5m width on bends. Increasing ground levels by up to 150mm along the track would result in a reduction in floodplain capacity of approximately 9,263m<sup>3</sup>.
- 7.1.4 Each wind turbine base has a diameter of 4.3m plus a 1m flange (6.3m total diameter) and will displace 31.2m<sup>3</sup> per metre of flood depth, totalling 686m<sup>3</sup> per metre flood depth for all 22 turbines.
- 7.1.5 The sub-station compound is proposed to be located partially in Flood Zone 2 and partially in Flood Zone 3. Ground levels in the area of the proposed sub-station vary between approximately 2.2m AOD and 2.9m AOD. This area will be levelled at 2.6m AOD in alignment with the levels of the adjacent 600 Hundreds Drove track. Lowering the ground levels of the area of the sub-station to 2.6m AOD will locate this area within the 100 year flood extent. The threshold level of the sub-station control building will be raised 0.5m above the predicted 1000 year with climate change flood level (3.54m AOD) and will have a footprint of 135m<sup>2</sup>. The bounded area of the transformer will have a footprint of approximately 100m<sup>2</sup>. Construction of the sub-station building and the bounded area will displace approximately 70.5m<sup>3</sup> of the existing floodplain. A drawing showing the existing ground levels throughout the proposed sub-station area is shown in **Appendix F**.
- 7.1.6 Construction of the original site layout would displace approximately 1,538m<sup>3</sup> of the existing floodplain storage during the 100 year event. It has been accepted as part of the original planning application due to the size of the floodplain in the vicinity of the site this would not have significant impact on flood risk in the area or elsewhere.
- 7.1.7 With the changes to the proposed development there would be an increase in the displaced flood volume to approximately 11,000m<sup>3</sup>. In order to quantify the potential impact of the proposed ground raising the flood area and volume within the site pre-development has been estimated using LIDAR data and compared to the proposed displaced volume in order to calculate the approximate flood level increase. For this assessment the predicted flood levels at the eastern boundary of the site have been used (EA South Forty Foot Drain Model - node SD103500). By considering a slightly lower flood level across the site the area over which the displaced volume will be distributed is smaller and therefore provides a more conservative approach.

7.1.8 The findings of this assessment are shown in **Table 2**. This indicates a nominal 2mm increase in water levels across the site. It should be noted that this impact is likely to be smaller as this assessment has only considered the floodplain within the site due to the availability of ground level data for the assessment; however the size of the floodplain within the vicinity of the site is far greater. These calculations also do not take into consideration the lowering of ground at the substation. Therefore this impact is deemed negligible.

**Table 2: Increase in Flood Depth Caused by Loss of Floodplain**

Return Period (1 in X years)	Water Level at Node SD103500 (mAOD)	Flood Area (m <sup>2</sup> )	Flood Volume (m <sup>3</sup> )	Max Depth (m)	Reduction in Floodplain Storage (m <sup>3</sup> )	Approx. Increase in Flood Depth (m)
10	2.27	5,322,116	4,704,285	1.67	10,550	0.0020
20	2.55	5,573,557	6,230,423	1.95	10,742	0.0019
100	2.79	5,835,672	7,600,756	2.19	10,907	0.0019
100 + CC	2.92	5,932,556	8,364,582	2.32	10,996	0.0019
1000	2.83	5,872,558	7,834,469	2.23	10,934	0.0019
1000 + CC	2.95	5,946,402	8,542,237	2.35	11,017	0.0019

CC – Climate Change

Flood Flow Conveyance

7.1.9 The amendments proposed to the original development do not introduce any new significant size structures. Therefore, the original assessment of the conveyance of flood flows remains applicable to the amended site layout. Summary of the assessment and Black Sluice IDB general requirements related to consent applications are provided in further paragraphs.

7.1.10 Both the EA and Black Sluice IDB do not permit development to be undertaken within 9m of watercourses that are under their jurisdiction to ensure that there is sufficient distance to access the drains for maintenance. The lowest height the blade tip will reach is 22m above ground level, which will only occur at the point directly above the turbine base and not near any drain. No part of the turbine structure will be located within 9m of Head Dyke-Skerth Drain or any other EA managed drains; therefore, the EA requirement is fulfilled. Construction of the access tracks at some locations would require works undertaken at a distance less than 9m to Black Sluice IDB managed or private drains. It has been agreed in principle with Black Sluice IDB that Ecotricity are likely to be granted byelaw consent for any works within 9 metres of a Black Sluice IDB managed drain, subject to agreement of the detailed design. This will be agreed following the outcome of this variation of consent application. Black Sluice IDB advised that consent applications for such works must be submitted, and consent received, prior to any works taking place. The Board is allowed 8 weeks to process application, hence it is recommended that this timescale is considered when the applications are submitted to Black Sluice IDB.

7.1.11 The construction of new access tracks would require the construction of approximately 14 new culverts and amendments to two existing culverts. The proposed alignment of the access tracks and location of the culverts are shown in **Appendix C**. One additional culvert will be required to that included in the original proposals however the overall length of the culverting will be reduced as the length of six culverts (C8, C10 to C12, C14 and C15) has been reduced in comparison with the

original proposal. All the new culverts and amendments to the existing culverts will be designed in accordance with the guidance of Black Sluice IDB.

#### Management of Surface Water Runoff

- 7.1.12 In accordance with the draft National Standards for Sustainable Drainage the drainage strategy should incorporate the use of Sustainable Drainage (SUDS) where possible. The approach promotes the use infiltration features in the first instance. If drainage cannot be achieved solely through infiltration due to site conditions or contamination risks, the preferred options are (in order of preference): (i) a controlled discharge to a local watercourse, or (ii) a controlled discharge into the public sewer network (depending on availability and capacity).
- 7.1.13 A review of the site geology indicates that it is underlain by Ampthill Clay Formation – Mudstone with superficial deposits in form of Tidal Flat Deposits – Clay and Silt. Landis Soilscales map<sup>2</sup> indicates naturally wet soils throughout the site and suggests very low soil permeability. Therefore infiltration techniques are unlikely to be feasible. However it is recommended that soil infiltration tests are undertaken throughout the site to confirm any potential for infiltration techniques.
- 7.1.14 Within the revised proposals the total impermeable area for 22 turbine towers remains unchanged. As accepted in the original FRA the impermeable area of each tower (31m<sup>2</sup>) is insignificant in comparison to 600ha site; hence the proposal that the surface water generated in each tower base shed to the surrounding grounds remains unchanged.
- 7.1.15 The proposed new tracks will be constructed of permeable material to mimic the existing drainage patterns. However, following heavy traffic the tracks may compact and become less permeable. Black Sluice IDB suggests provision of a plastic drainage pipe along the access tracks to collect surface water runoff and to prevent water ponding along the tracks. The surface water runoff would be discharged via infiltration techniques – subject to soil percolation rates, or the drainage system could discharge to the nearby field drains. Black Sluice IDB have confirmed that if there is a need to discharge surface water runoff to any watercourse, the Board will require flows to be restricted to the greenfield runoff rate of 1.4l/s/ha. If this rate cannot be achieved, then the Board will charge a one-off fee based on the rate of flow and impermeable area. This requirement also implies to any temporary flows during construction. A formal written consent will be required.
- 7.1.16 Black Sluice IDB also confirms that the following information will have to be submitted as part of an application to the Black Sluice IDB:
- Track materials;
  - Cross-sections of the tracks;
  - Results of soil infiltration tests; and
  - Approach to private drains and drains managed by Black Sluice IDB.
- 7.1.17 The revised development proposals include an increase in the size of the sub-station compound. The vast majority of the compound will be made of permeable crushed aggregate. Construction of the sub-station building, bounded area for a transformer and concrete bases for electrical equipment will introduce approximately 450m<sup>2</sup> of impermeable area. The surface water runoff generated in these areas will be either

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<sup>2</sup> Cranfield University Land Information System (Landis) Soilscales map:  
<http://www.landis.org.uk/soilscales/> (accessed January 2015)

discharged to the surrounding grounds (subject to soil infiltration rates) or discharged to the nearby drains in line with the aforementioned discharge rates. The bounded area will be served by a pump equipped with an oil detector. In a case of leakage from transformer, the pump will not activate and an alarm will be sent to ensure no contaminated water is discharged from the bounded area into the ground or drains.

- 7.1.18 During construction of the development temporary structures such as construction compound, turning heads and auxiliary crane pads will be required. They will be built of compacted hardcore to remain permeable and will be removed post construction. Therefore will not increase amount of surface water runoff generated within the site boundary.

#### Flood Risk During Construction

- 7.1.19 The vast majority of the site is located in the high risk Flood Zone 3. It is recommended that the construction site signs up to the EA Floodline Warnings Direct to receive updates on issued flood warnings. In addition, the contractor has to prepare a Flood Evacuation Plan for the site, and all workers have to be made aware of evacuation procedures. A Flood Evacuation Plan should be prepared in consultation with the Emergency Team of Lincolnshire County Council.

#### Flood Risk During Operation

- 7.1.20 The wind farm will be an unmanned site with access required only for routine testing and maintenance. It is recommended that information on whether a flood warning has been issued for this area is checked prior any site visit.
- 7.1.21 The proposed development is a nationally significant infrastructure project which needs to remain operational during flood events. In accordance with 'Overarching National Policy Statement for Energy (EN-1)' and with Western Power Distribution guidance<sup>3</sup> essential energy infrastructure which has to be located in flood risk areas should be designed to remain operational during flood events. To fulfil this requirement, all the sensitive equipment will be located above the predicted flood level for the 1 in 1000 year event with allowance for climate change, which in this case is a level of 3.04m AOD.
- 7.1.22 The sensitive elements of the development consist of the sub-station control building, transformer and electrical infrastructure. In accordance with Western Power Distribution guidelines<sup>3</sup> all the sensitive elements of the sub-station will be established at a minimum of 500mm above the flood level predicted for the 1 in 1000 year event with climate change:
- The finished floor level of the sub-station building will be established at level of 3.6m AOD (including 560mm freeboard);
  - The transformer will be located within a bounded area, with the bund crest level established at 3.6m AOD, (including 560mm freeboard);
  - Electrical infrastructure within the sub-station area will be located at level of 3.6m AOD (including 560mm freeboard) on higher stanchions.
- 7.1.23 In the event that the substation requires maintenance during a flood event the station can be reached via the existing access track that runs north to south from the A17 and past the substation. As commented above this area of the site would be subject to flooding during an event with flood depths of up to 0.44m on the access road.

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<sup>3</sup> Western Power Distribution Company Directive Policy Document: SP/2 Substation Flood Risk Planning and Mitigation

However it is anticipated that the substation would remain accessible via vehicular access.

## **8 SEQUENTIAL TEST AND EXCEPTION TEST**

8.1.1 The original FRA provides information on Sequential Test and Exception Test. This information remains applicable to the amended site layout.

## **9 CONCLUSIONS**

9.1.1 The amendments to the layout include relocating the substation compound from Flood Zone 1 as it was proposed in the original site layout to an area located in Flood Zone 3. The proposed change will have no impact on functionality of the development itself as all the sensitive equipment will be located above the flood level predicted for the 1 in 1000 year event with climate change to ensure that the development will remain operational during flood events. On top of that level, freeboard of a minimum 500mm will be provided to fulfil the requirements of Western Power Distribution. In the event of failure during an event it is anticipated that access to the substation will remain possible via vehicular access.

9.1.2 The volume of the existing floodplain displaced by the construction of the amended site layout will be larger than that assumed in the original FRA. However this assessment has demonstrated that considering the volume in relation to the extent and depth of the floodplain across the site and surrounding areas, this loss of storage is not considered to pose any significant increase in flood risk to the development or to people and property elsewhere. The revised plans also do not introduce any significant change that would impact overland flow conveyance through the site.

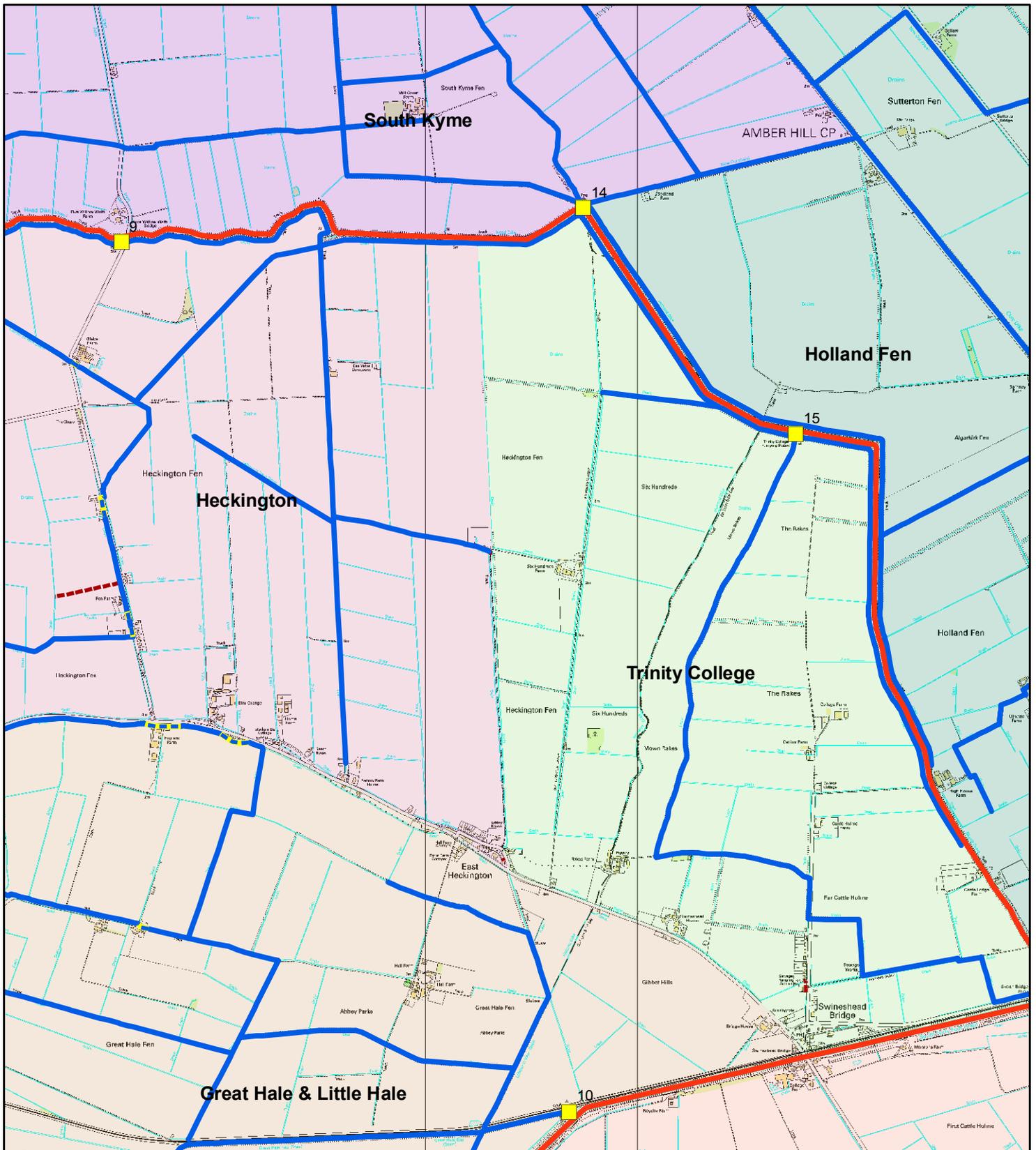
9.1.3 The amendments to the development proposals will increase the impermeable area within the site from approximately 736m<sup>2</sup> to approximately 1,136m<sup>2</sup>. Considering the geology of the site, soil infiltration rates are likely to be very low. However it is recommended that soil infiltration tests are undertaken throughout the site to check any potential for infiltration. Surface water runoff generated on the sub-station building, concrete bases and from the bounded area will be discharged either to the surrounding grounds, subject to soil infiltration rates, or to nearby drains, with discharge rate agreed with Black Sluice IDB. The proposed surface water drainage for additional runoff generated on the turbine tower bases remains unchanged from the original FRA.

9.1.4 In line with original FRA it is proposed that the access tracks will be constructed from permeable material and as such the drainage pattern along these routes will remain unchanged. However, to mitigate any potential increase in surface water runoff from the tracks and to prevent water ponding on the tracks it is recommended that a plastic drainage pipe with outfall to the surrounding grounds or to the existing land drains is provided along the access tracks. The discharge rate will be agreed with Black Sluice IDB.

9.1.5 As highlighted in the original FRA, it is recommended that the construction site signs up to the EA Floodline Warnings Direct to receive updates on flood warning issued for the development area. The contractor has to prepare a Flood Evacuation Plan and all construction workers have to be made aware of evacuation procedures.

**APPENDICES**

**APPENDIX A**  
**Details of Network of Drainage Channels**



**Key:** 1:25,000



-  Pumping Stations
-  EA Drains
-  Open Drains
-  Piped Drains



**Black Sluice Internal Drainage Board**  
**72 Carlton Road Boston Lincs PE21 8PB**  
**Tel 01205 361061**  
**Fax 01205 360657**

**PLAN SHOWING BOARD DRAINS IN HECKINGTON FEN**

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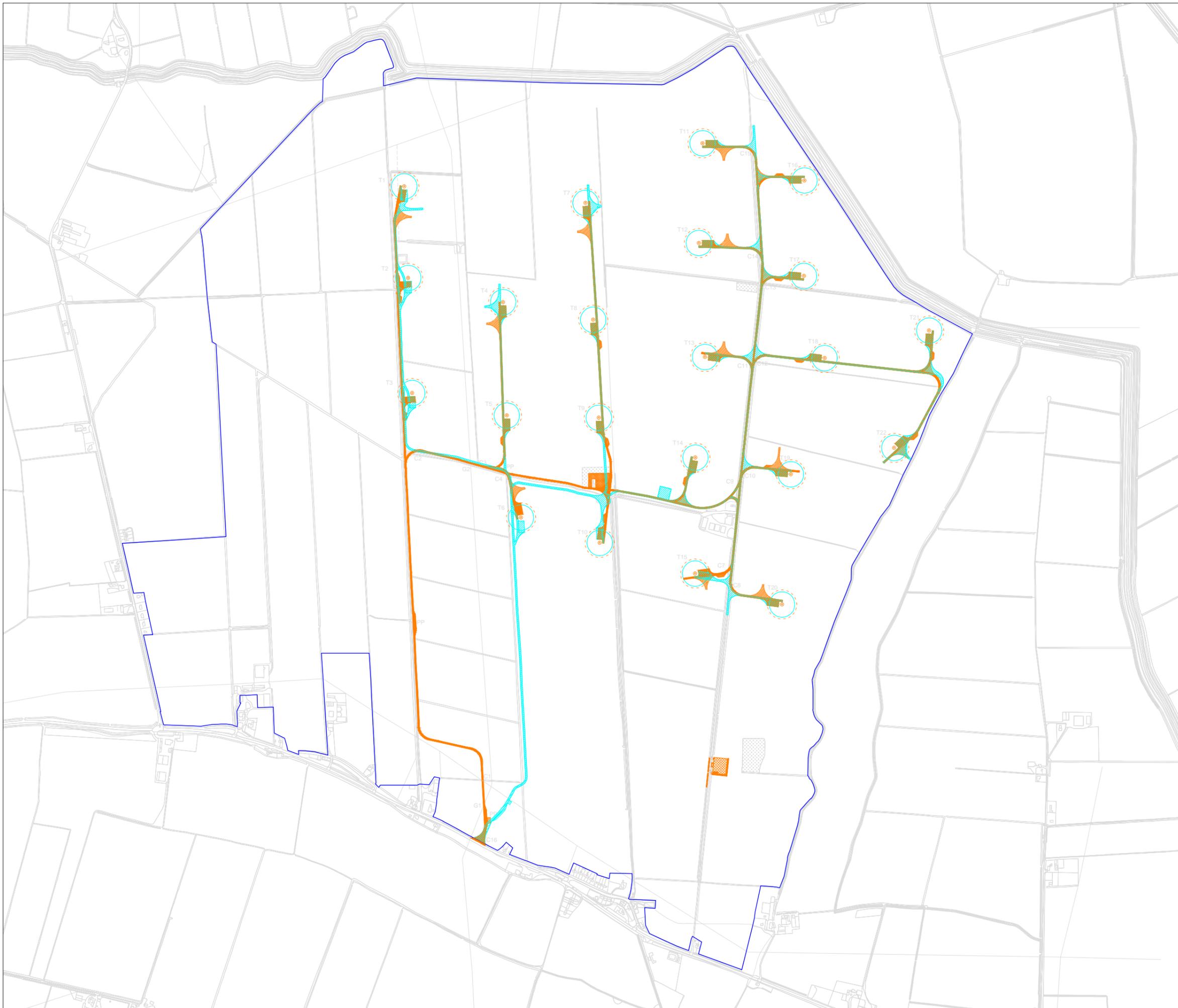
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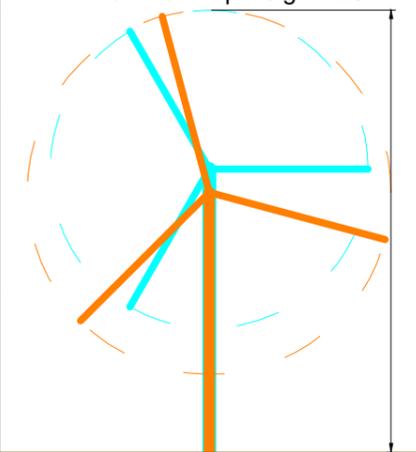
**APPENDIX B**  
**Comparison of the Original and the Amended Site Layouts**

**Legend**

- Consented Layout (Original ES Figure 4.1)
- Layout Proposed for Variation of Consent (VOC Figure 3.2)



Maximum Tip Height 125m



**Notes:**

1. Consented Layout based on Figure 4.1: Site Layout of the original ES
2. Temporary surfaces will be removed after construction period and stored onsite.

**Figure: 3.3**

**Title: Site Layout Comparison**



0m 500m

Scale: 1: 12,500 @ A3

Drawn by:

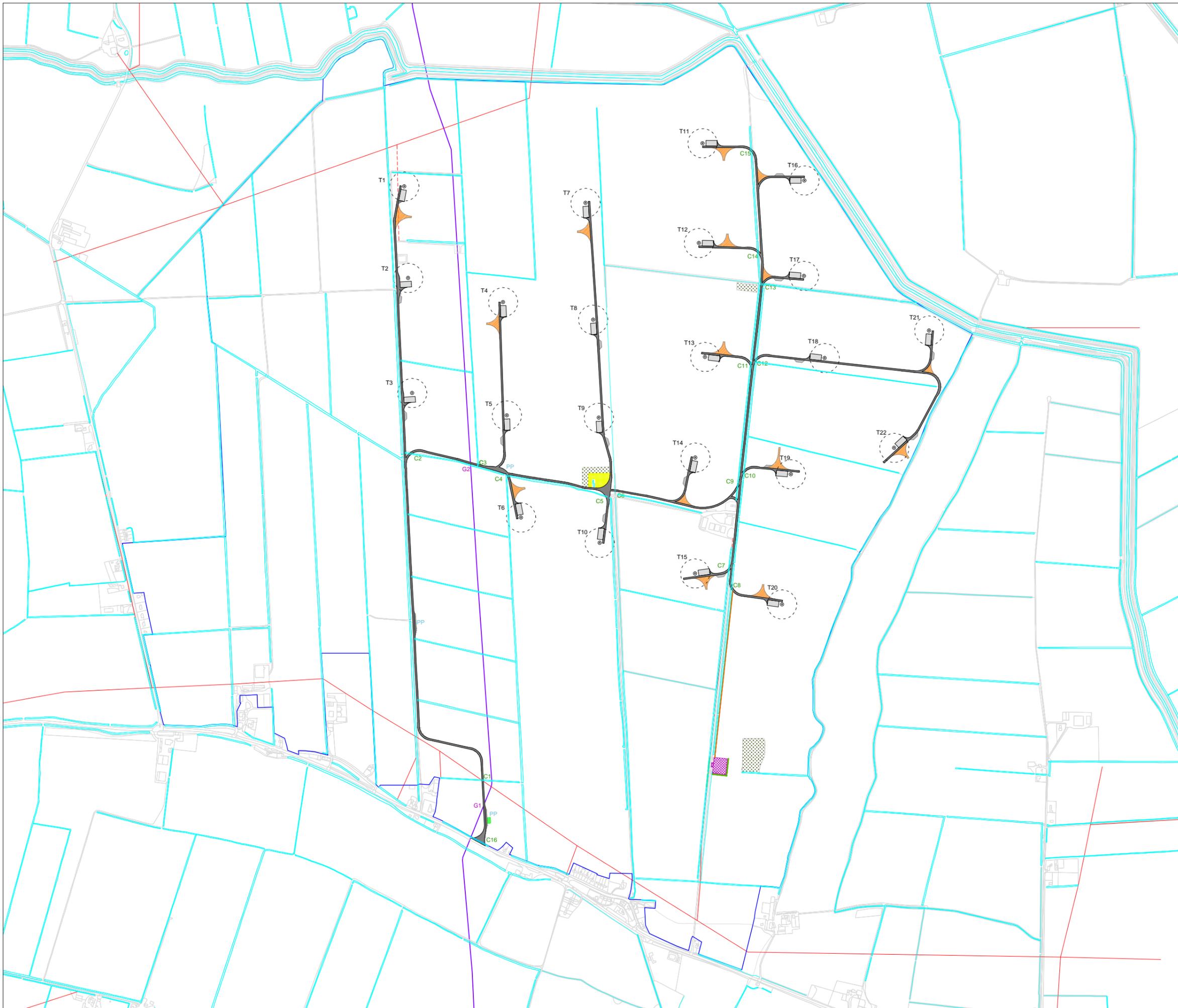
Checked by:

Approved by:

**Ref: 4038\_T0444\_04 Date: Jan 2015**

**Heckington Fen Variation of Consent**

**APPENDIX C**  
**Amended Site Layout**



### Legend

-  Wind turbine
-  Turbine swept area (103m diameter)
-  Site boundary
-  Crane pad
-  Temporary auxiliary crane pad
-  New access track
-  Temporary access track/turning heads to be removed after construction phase
-  Substation and control building
-  Construction compound
-  Temporary security compound
-  Existing woodland
-  New woodland / hedgerow
-  C1 Culvert
-  PP Passing place
-  G1 Gas crossing slab
-  Existing overhead line
-  Overhead line to be buried
-  High pressure gas pipeline
-  Underground cable route to substation

Notes:  
 1. Consented Layout based on Figure 4.1: Site Layout of the original ES  
 2. Temporary surfaces will be removed after construction period

**Figure: 3.2**  
**Title: Indicative Site Layout**



 Scale: 1: 12,500 @ A3  
 Drawn by: *MW*    Checked by:    Approved by:

Ref: 4038\_T0445\_03    Date: Jan 2015

**Heckington Fen Variation of Consent**

**APPENDIX D**  
**Consultation with EA**

**From:** Smith, Greg <greg.smith1@environment-agency.gov.uk>  
**Sent:** 19 December 2014 10:11  
**To:** Jamie Baldwin  
**Cc:** Millbank, Rob  
**Subject:** RE: Heckington Fen Variation of Consent application

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Hi Jamie,

I have had a quick look through the FRA and have the following comments:

When considering the flood risk to the site it should be over the lifetime of the development which requires the CC figures to be quoted rather than the present day. The proposed final mitigation takes into account the 0.1% plus CC figure therefore the final proposed development level of the substation is acceptable. This would place the sensitive equipment above the 3.04m ODN as recommend in the FRA fractionally higher than 3m ODN indicated in your e mail below.

I note that the surface water is to be agreed with the IDB which again is acceptable.

There is a statement about not developing within 9 metres of a watercourse. For the Main river on the Northern Boundary this would extend from the landward toe of the raised defence and would need to consider the 'safe' working distance from the turbine rather than the turbine itself to ensure we can operate plant within the area. As the turbines have increased in size I assume that this will increase the zone around them which might then require T16 and T21 location to be amended as these appear to be the closet ones to the River and there sweep paths look to fall within the Byelaw Distance.

I go on leave after today so if you have any questions please give me a call today or after the 5<sup>th</sup> Jan when I am back.

Regards

Greg

**Greg Smith**  
Partnership and Strategic Overview Advisor (Lincolnshire)

**Environment Agency**  
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☎ 7 50 5328 (internal)  
📧 [greg.smith1@environment-agency.gov.uk](mailto:greg.smith1@environment-agency.gov.uk)



**NEW: charging for planning advice**  
From 3 February 2014 we will be charging for some of our planning advice. Please contact us if you have any questions about this.

## Szostak, Elzbieta

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**From:** Smith, Greg <greg.smith1@environment-agency.gov.uk>  
**Sent:** 20 January 2015 09:15  
**To:** Szostak, Elzbieta  
**Subject:** RE: Heckington Fen Wind Farm - flood risk

**Categories:** Orange Category

Dear Elizabeth,

If through simple calculation ((total flood plain volume-loss of flood plain)/area = minor depth change) you are able to demonstrate the proposed development would not impact the flood plain then flood plain compensation is not required. I do wonder how you reached 11,000m<sup>3</sup> as generally it is only the turbines and the switch gear/sensitive equipment which are raised above the flood level.

If you require a further detailed response we will need enter into pre application charging discussions but hopefully the above is sufficient for now.

Regards

Greg

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**From:** Szostak, Elzbieta [mailto:SzostakE@pbworld.com]  
**Sent:** 19 January 2015 13:21  
**To:** Smith, Greg  
**Subject:** Heckington Fen Wind Farm - flood risk

Greg,

I work on an addendum to a flood risk assessment prepared for Heckington Fen Wind Farm in 2011. I contact you as I was advised that you were consulted regarding flood risk and drainage issues at the site in the past. I tried to contact you few time last week with no luck. Today I was told that you work in different office, and your colleagues were not aware of your contact details at that office, so I thought that I will send you an email.

I am aware that the proposed development is located within the existing floodplain, which is part of much larger floodplain that extent for hundreds or even thousands of hectares along the coast. The site layout has been recently amended and I calculated roughly how much of the existing floodplain may be displaced by the construction of the amended development. The preliminary calculations indicate that storage volume of approximately 11,000m<sup>3</sup> may be lost as a result of the development. That figure seems to be massive. However, in our opinion when considering this volume of lost flood storage in relation to the extent and depth of the floodplain across the site and surrounding areas which are flat and mainly rural, this loss is not considered to pose any significant increase in flood risk to the development or to people and properties elsewhere.

We would like to find out your opinion on that matter.

I would be thankful if you could reply to me as soon as possible.

I look forward to hearing from you.

Regards

Ela Szostak

**Elzbieta Szostak**

MEng  
Environmental Engineer, Water Engineering  
Civils, Structures and Ground Engineering

**Parsons Brinckerhoff**

Queen Victoria House  
Redland Hill, Bristol BS6 6US, UK  
tel 44-(0)117-933-9369; fax 44-(0)117-933-9250  
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*Think before you print*

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**APPENDIX E**  
**Consultation with Black Sluice IDB**

## Heck Fen – Variation of Consent Application – Black Sluice IDB

Date: 15:00, 23<sup>rd</sup> September 2014 (Heckington Fen)

Attendees:

Eco:	Jamie Baldwin (Project Manager)	JB
	Bill Brimacombe (Construction Project Manager)	BB
BSIDB:	Andy Scott	AS

Agenda

Item		Action
1	<p>Private Drains</p> <p>AS explained that BSIDB would need an agreement with the landowner over the ownership and maintenance of any additional culverts. Consent for new culverts is likely to go to the landowner rather than Ecotricity. BSIDB would look to provide block consent. AS explained that consent usually goes to the landowner even though it is often the 'tenant' who applies.</p> <p>BSIDB would not specify dimensions for private drain culverts. BB clarified that it would be up to the civil contractor to come up with a proposal and then submit to BSIDB for approval.</p> <p>AS said that BSIDB would prefer the culvert work to be done in the summer time, although BSIDB tend to do their culvert replacements in winter as summer is weed control.</p> <p>AS asked what Lincolnshire County Council's requirements would be for the culvert next to the A17. JB and BB said they did not know but would find out.</p> <p>AS asked whether the landowner was considering replacing any of the tile drains as this would need to be done before construction started. BB explained that we would consult with the landowner's land drainage consultants now on any plans.</p>	<p>JB to contact LCC about culvert closest to A17 and LCC's requirements here.</p> <p>JB to ask Tony Bramall for land drainage consultants contact and enquire on tile drains.</p>
2	<p>BSIDB-managed Drains</p> <p>AS said that BSIDB would strongly recommend a single ~20m culvert at C2 to cover both branches of the access track. They would not want two separate culverts close to each other as this would increase the risk of blockages. AS confirmed that the existing culvert at C2 is concrete/Armco and is 11m long. And that it is likely to be replaced</p>	

	<p>soon anyway.</p> <p>BSIDB stated that C2 would need replacing with a new pipe and C5 would probably need replacing but could be kept if it can be justified. The culvert design specification would form part of the submission. BB explained that in all likelihood all the culverts we went over we would replace, and it would be easier if all the culverts were the same length and material.</p>	
3	<p>Slope stability on Labour in Vain Drain</p> <p>Initial judgement from BB is that a 1-3m strip between the top of the bank slope and the outside edge of the access track will be required to ensure that the drain slope is not damaged. BB explained to TB that the access track would be 5m-5.5m in width with a 1.2m offset before the cable trench of 0.6m width. A temporary spoil heap between 5-7m would be required.</p>	
4	<p>Access Tracks</p> <p>BSIDB don't really want the access track to be raised as it potentially increases run-off into the drains although they accepted the track was to be made of permeable materials. BB stated that Ecotricity would seek a raise of 150mm. However BB did also say that though in practice the track would be made from permeable materials, following heavy traffic the track would compact and become less permeable in reality.</p> <p>Plastic drainage along length of access track would assist drainage into Labour in Vain drain. BSIDB proposed this to mitigate any 'damming' effect by raising up the access track and crane pads.</p> <p>The track materials, cross-sections of the tracks and infiltration tests will all need to be presented to BSIDB along with approach to private drains and proposal for BSIDB-managed drains as part of a consent application.</p> <p>The access tracks adjacent to the Labour in Vain Drain and stretch between C2 and C5 would require bye-law consent but that this could be given at the same time as the consent for new culverts.</p>	<p>BB to arrange for civil design contractors to try and reduce the track elevation if possible.</p>
5	<p>Variation of Consent</p> <p>AS said that BSIDB are unlikely to consider any of the proposed changes as significant. There may be a requirement to carry out percolation tests.</p>	

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6	<p>Next Steps</p> <p>AS advised us to come to BSIDB with some proposals for culvert design. BSIDB were happy for Ecotricity to apply for the Variation of Consent before submitting draft culvert design and proposals. BSIDN could advise on proposals before a formal application was made.</p>	
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**From:** Andrew Scott <Andrew.Scott@blacksluiceidb.gov.uk>  
**Sent:** 14 January 2015 10:37  
**To:** Jamie Baldwin; Szostak, Elzbieta  
**Subject:** RE: Heckington Fen Wind Farm

**Categories:** Orange Category

Thanks, Jamie.

Whilst the 9m byelaw issue appears to be sorted, I think the issue of our excavators operating close to working turbines is an issue we need clarification over with regard to turbulence. I suspect it's probably a non-issue, but we'll need some formal assurances that the will be no hazard to our drivers or machines, just to be on the safe side please.

Ela, with regard to your original email, I have the following comments:

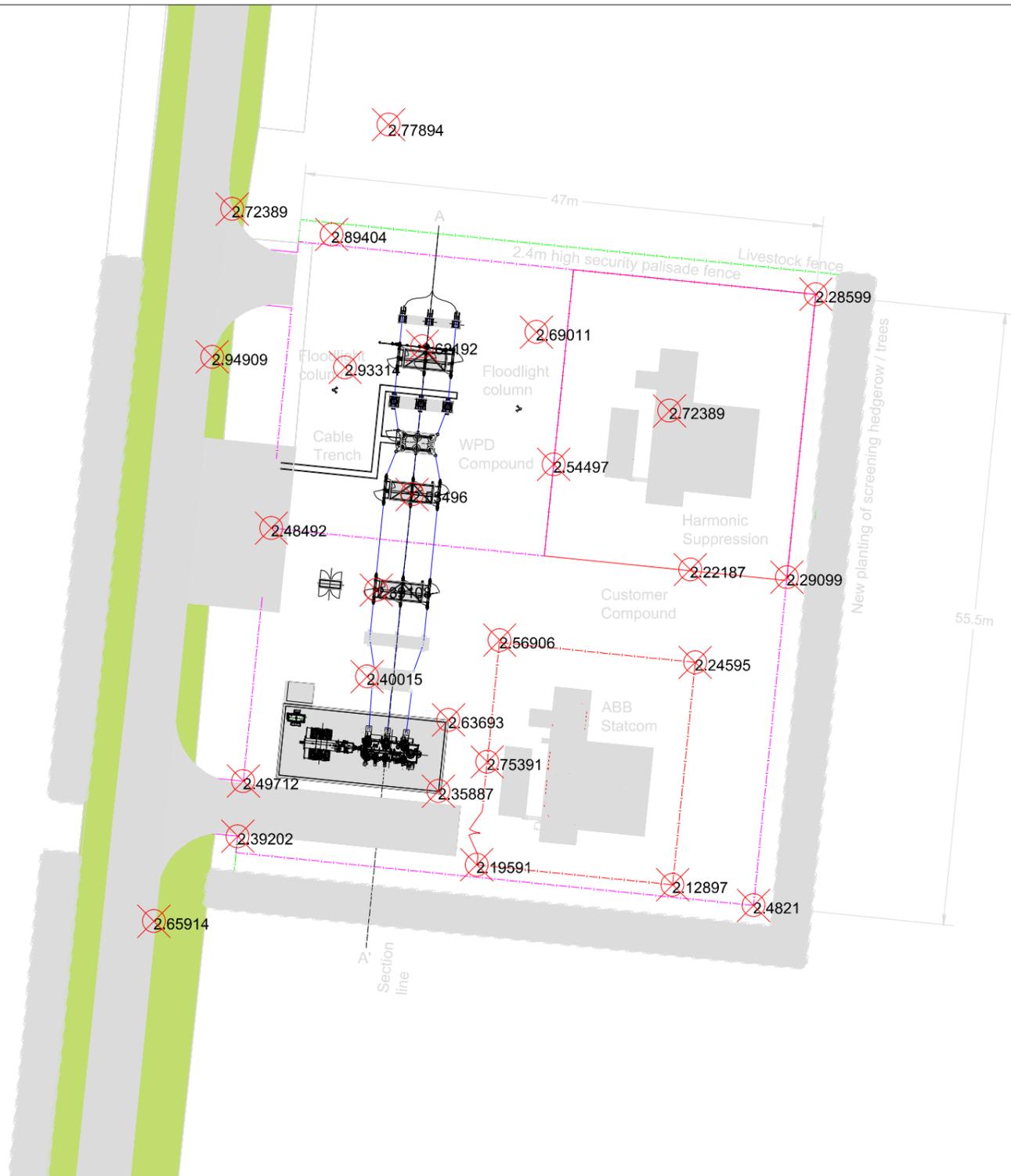
1. It is my understanding that surface water is likely to be discharged via infiltration direct into the surrounding ground across the site (subject to the results of percolation tests). Where there is a need to discharge to any watercourse, the Board will require flows to be restricted to the greenfield run-off rate of 1.4 ltrs/sec/Ha. If this rate cannot be achieved, then the Board will charge a one-off fee based on the rate of flow and the total impervious area, and formal written consent will be required. This will also apply to any temporary flows, for instance from the temporary works compound.
2. Culverts – any new build, replacement of existing, extensions to existing, or temporary culverts, whether in Board-maintained watercourses or any of the multitude of private watercourses across the site, will require prior consent from the Board. All culvert works must be to Board specifications. Applications must be submitted, and consent received, prior to any works taking place. Under the Land Drainage Act 1991, the Board is allowed 8 weeks to process applications. Whilst the Board endeavours to process applications on a priority basis, it is in receipt of various applications from all over its district and extended area, so please ensure your client applies in sufficient time (ie. don't send applications if your client is looking to start works the following week – the Board is not going to issue consent in that sort of timeframe, and if your client starts work before consent is issued, the Board has enforcement powers to remove unconsented structures and charge your client costs incurred – sorry if that sounds a bit blunt).
3. As per the discussion with myself and young Master Baldwin at our office at the back end of last year, the use of plastic field drains would be appropriate at regular intervals under any raised surfaces to allow rainfall run-off to drain into any watercourse, not just Board-maintained. Where these pipes discharge into Board watercourses, and the pipes installed are likely to be permanent, then consent is required. If any raised tracks are removed at the end of the construction phase, then the Board will allow temporary pipes to be installed for the duration of the works via a temporary consent.
4. The Board would appreciate copies of the Method Statement and risk assessments regarding any works in the vicinity of watercourses for its records. Any outstanding issues should be discussed and resolved prior to works commencing on site. Where issues regarding watercourses or drainage arise during construction, the Board should be notified as soon as practicable. If necessary, works should be stopped until the issue is resolved with the Boards officers.
5. Any structures, including any raised surfaces, within the Boards 9m byelaw distance, must have prior written consent. See my comments in point 2 above regarding timeliness of applications.

I think that covers everything, but if I've missed something or you have any other questions, please let me know.

Kind regards.

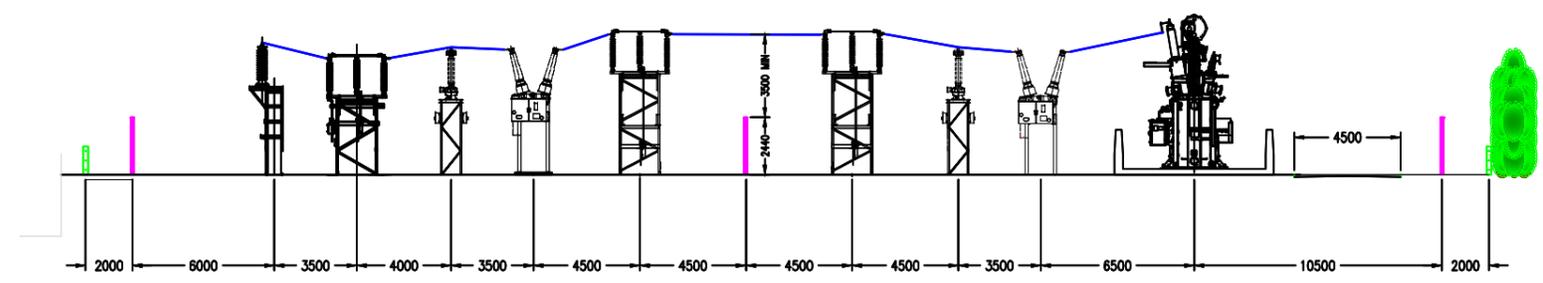
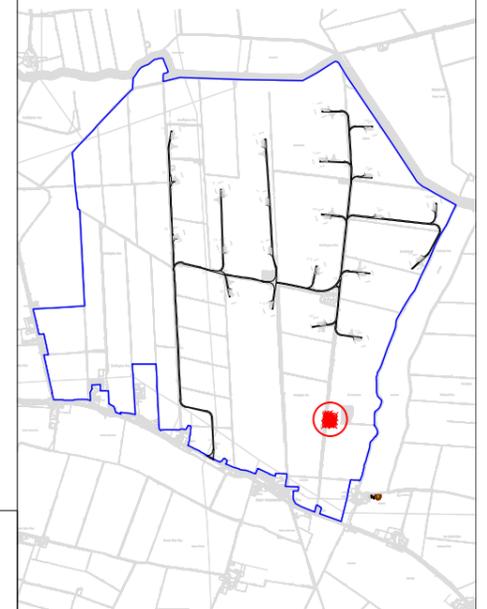
*Andy Scott*  
*Planning & Enforcement Officer*  
*Black Sluice IDB*  
*Tel: 01205 821440*  
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**APPENDIX F**  
**Existing Ground Levels in Area of Sub-Station**



-  Existing Access Track
-  Existing Roadside Verge
-  New Access Track
-  New woodland / hedgerow
-  Hardstanding

Notes:  
 Final design of substation to be agreed with WPD  
 Indicative maximum dimensions 55.5m x 47m  
 8m maximum height  
 Screening hedgerow to be mixture of native species approximately 5m height  
 Height Data from EA LIDAR 2m data



SECTION A-A

Title: Indicative Substation Levels



Drawn by: *MW*      Checked by:      Approved by:

Ref: 4038\_T0490\_02      Date: Jan 2015

**Heckington Fen Variation of Consent**