

Ian Pick Associates Ltd
Station Farm Offices
Wansford Road
Nafferton
Driffield
East Yorkshire, YO25 8NJ

Ref: K0776A

19th June 2019

Dear Ian,

**FLOOD RISK ASSESSMENT AND SURFACE WATER MANAGEMENT PLAN:
11 BIOMASS BOILERS ASSOCIATED WITH FARM BUILDINGS AT BARR FARM,
DEEPING ST NICHOLAS, SPALDING, LINCOLNSHIRE PE11 3BW**

Thank you for instructing Hydro-Logic Services (International) Ltd to undertake an assessment of the implications on flood risk and surface water runoff due to the installation of 11 biomass boilers. These boilers have been installed to create a sustainable source of heating for a series of agricultural buildings. Following commentary by the EA to the planning authority this letter has been updated to revision 1. Our findings are given below:

- 1) The South Holland SFRA (2016) contains new hydraulic modelling results for the district, which include the flood hazard maps associated with the site. The implications of this updated SFRA on the flood risk at Barr Farm were assessed by HLSI in report K0776/2 dated June 2017 and entitled Flood Risk Assessment and Surface Water Management Plan for residential development at Barr Farm, Deeping St. Nicholas, Spalding, Lincolnshire, PE11 3BN. This report is attached for ease of reference, with the relevant sections being Section 2b and section 3b;
- 2) The South Holland DC (SHDC) SFRA (Royal Haskoning, 2010) provided the following information which is likely to be current at the location of the site:
 - The site is outside the Rapid Inundation Zone of flooding from the River Welland for the present day up to 2115 (SHDC SFRA Map 16);
- 3) Report K0776/2 determined the following key points, specifically in relation to the proposed agricultural dwelling.

The site is protected by flood defences, which are shown to generally have sufficient freeboard to protect the site from the 1:1,000 year fluvial flood. Flood risk at the site is therefore considered a residual risk, providing the flood defences are adequately maintained and upgraded.

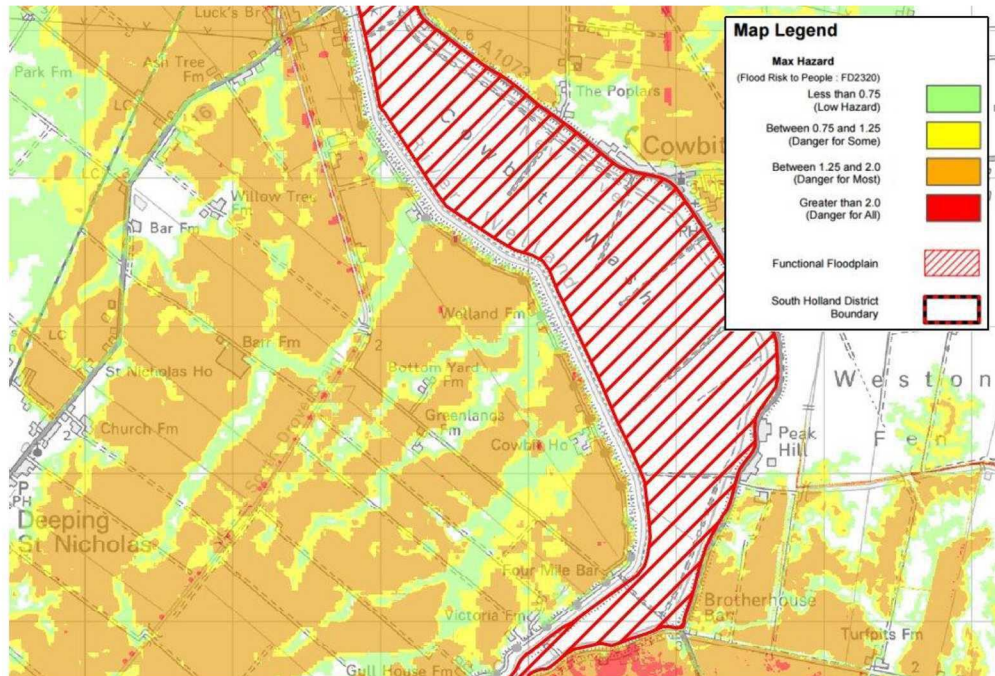
New hydraulic model outputs show the residual risk of flooding at the site associated with the 1:100 year+CC fluvial flood event, including the presence of the flood defences. The model results are considered to show a worse-case scenario as they show the residual risk of the flood defences being overtopped. Model results show the site:

- Could have flood depths of up to 1 m.
- Have flood velocities of 0 m/s to 0.3 m/s.



Unit 6, Commerce Park, Brunel Way, Theale, Reading, Berkshire, RG7 4AB
t:+44(0)1189 331325 f:+44(0)1189 331486 e: enquiries@hydro-int.com www.hydro-logic.co.uk
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- Be predominantly categorised as posing a 'danger for most' due to flooding.
- To be a small area in a much wider zone subject to flooding in this scenario, as below;



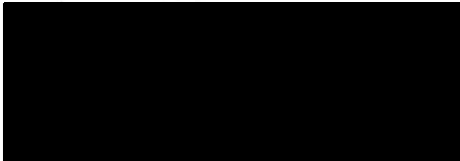
- 4) The site is protected by flood defences, which are shown to generally have sufficient freeboard to protect the site from the 1:1,000 year fluvial flood. Flood risk at the site is therefore considered a residual risk, providing the flood defences are adequately maintained and upgraded;
- 5) There are no historic records of flooding occurring at the site;
- 6) It is possible that the site may flood – with water depths of up to 1m in a flood defence breach scenario, but this water will be slow moving with a velocity of between 0 and 0.3m/s;
- 7) The biomass boilers are mechanical/electrical pieces of equipment. They are mounted on a 500mm high support frame, therefore even 1m deep flood water will only impact the lower portion of the boiler, which is a robust sealed item. Possible damage could occur to the electrics of the boiler and it is recommended that the electrical system is assessed to determine if it can be made more resilient to water;
- 8) The pellet stores are bulk bins and at a depth of 1m there would be no issue with these items. Therefore, they will not be affected by up to 1m of flood water;
- 9) Flood risks at the site are considered a residual risk, associated with a breach scenario, and therefore flood risk is considered to be low or very low for all sources;
- 10) As the 11 biomass boilers have been installed on existing concrete slabs there is no change in the rate or amount of runoff across the site and therefore there is no need to amend the surface water management strategy;

- 11) As the biomass boilers are considered to be essential to the efficient and sustainable operation of the farm, they are appropriate to be located adjacent to the farm buildings.

In summary there is no change in surface water runoff at the site and thus no need to change the current surface water management plan. The entire site, plus a much wider area of South Holland, would be flooded up to 1m deep in the event of a breach of flood defences. The biomass boilers and the pellet stores would not be affected by this depth of flood water. The electrical systems on the boilers may be affected and they will be assessed to determine if they can be made more resilient.

As each of the boilers is associated with an agricultural building, they must be located close to the buildings and as the building have planning permission the erection of the boilers next to them is deemed appropriate.

Yours sincerely,



Alan Corner
Head of Water Engineering

Limitation of liability and use

The work described in this report was undertaken for the party or parties stated; for the purpose or purposes stated; to the time and budget constraints stated. No liability is accepted for use by other parties or for other purposes, or unreasonably beyond the terms and parameters of its commission and its delivery to normal professional standards.

