HIVE AGGREGATES

Retford Circular Economy Project Environmental Statement Addendum – Volume 3 Technical Appendices

Technical Appendix 9.4: Environment Agency Flood Risk Slide Deck

January 2024

Project No.: 0695864

ERM

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Author	Environmental Resources Management
Client Name	Lound Hive Limited

Retford Circular Economy Project

Hive response to flood risk matters raised by the Environment Agency

January 2024

Introduction

This presentation relates to the application for the extraction and working of minerals and associated development to allow for the extraction of pulverised fuel ash ('PFA') from former ash disposal lagoons located north of Retford, and their progressive restoration along with associated development referred to as the 'Proposed Development' or the 'Retford Circular Economy Project' or 'RCEP'. The application was submitted to Nottinghamshire County Council ('NCC') (Application reference: ES/4518) on 10 March 2023.

The presentation should be read in conjunction with:

- **Environmental Statement Appendices, ES Vol3 Appendix 9.2, Flood Risk Assessment, Version 1.2, February 2022.**
- **RCEP PFA Lagoons, Bund Stability Analysis, Revision 4, SLR 23 November 2023**

Purpose of the presentation

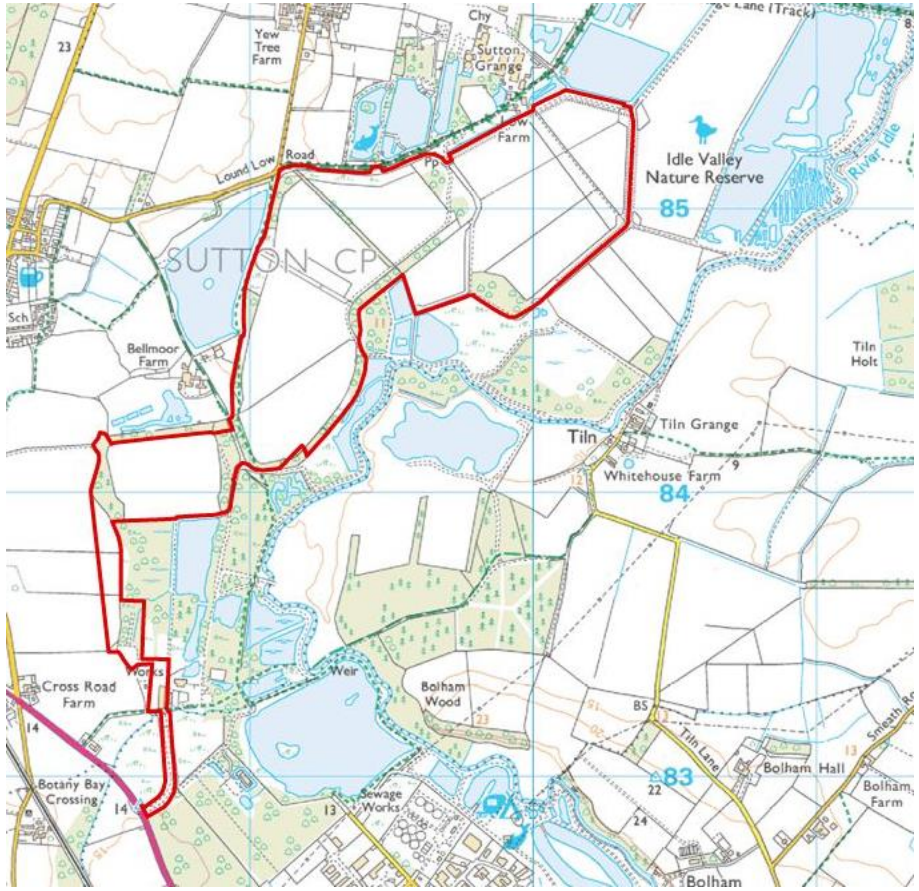
In response to specific flood risk matters raised by the Environment Agency's ('EA') letter, submitted on 2 May 2023[1], its revised submission dated 19 May 2023[2], and subsequent clarification meetings with the EA held between August and December 2023; a desktop analysis of the proposed restoration scheme has been undertaken to establish whether removing the existing embankments has the potential to introduce new flow pathways to neighbouring third party receptors during a 1 in 100 year + 30%CC flood event.

The analysis is split into three sections:

Section 1: Background providing clarification and supplementary information including additional topographic data and a plan showing which embankments are to be retained, and which embankments will be removed during progressive excavation and restoration of the RCEP Site;

Section 2: Site specific analysis of the results of the EA's updated catchment scale hydraulic model in the immediate vicinity of the RCEP Site; and

Section 3: Conclusions summarising the key points arising from Section 2.

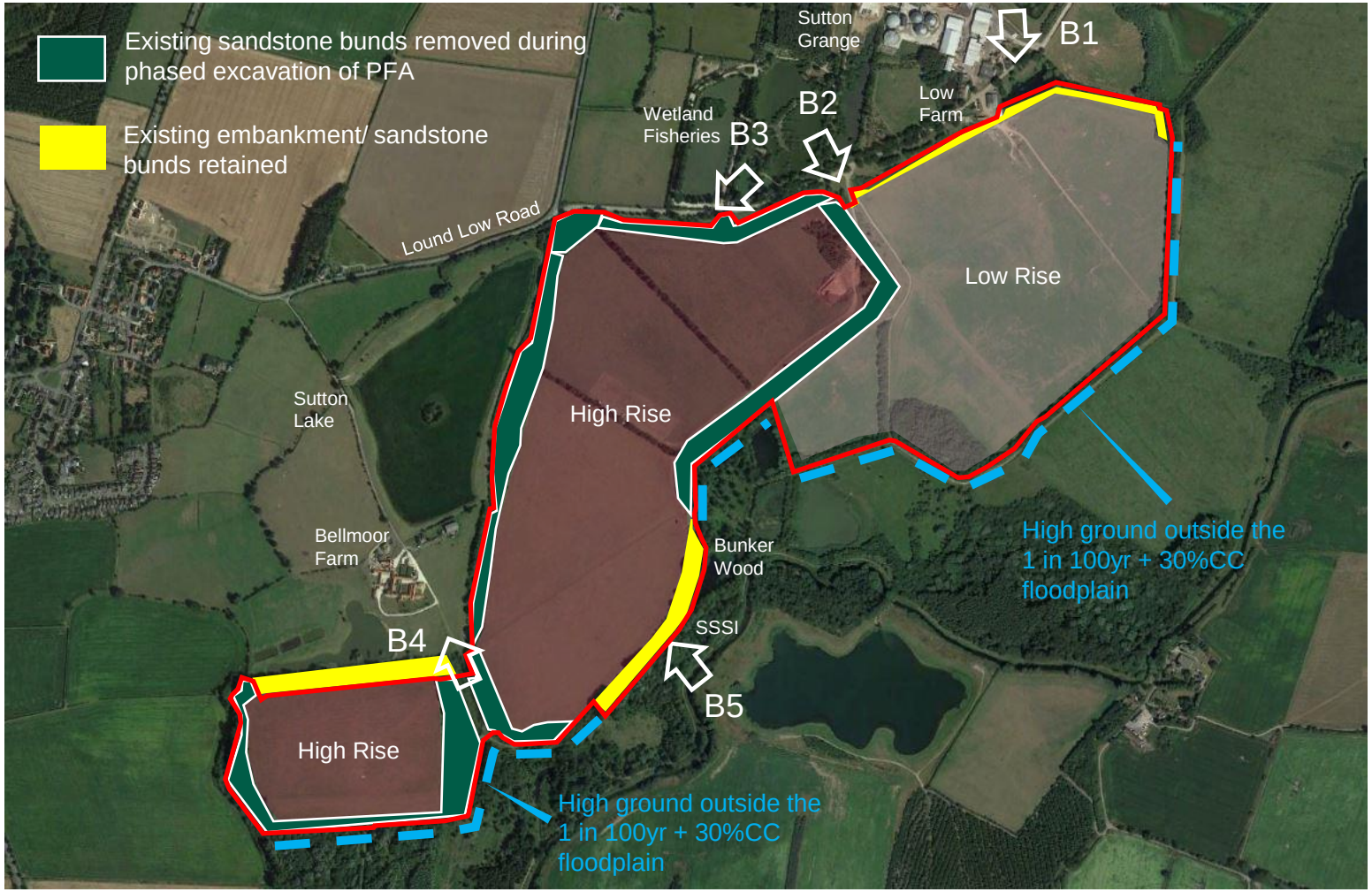


1. EA letter ref: LT/2023/127709/01-L01
2. EA letter ref: LT/2023/127709/02-L01

1. Background

Clarifying aspects of the proposed development that are pertinent to specific flood matters raised by the EA

Location of existing perimeter embankments/ bunds

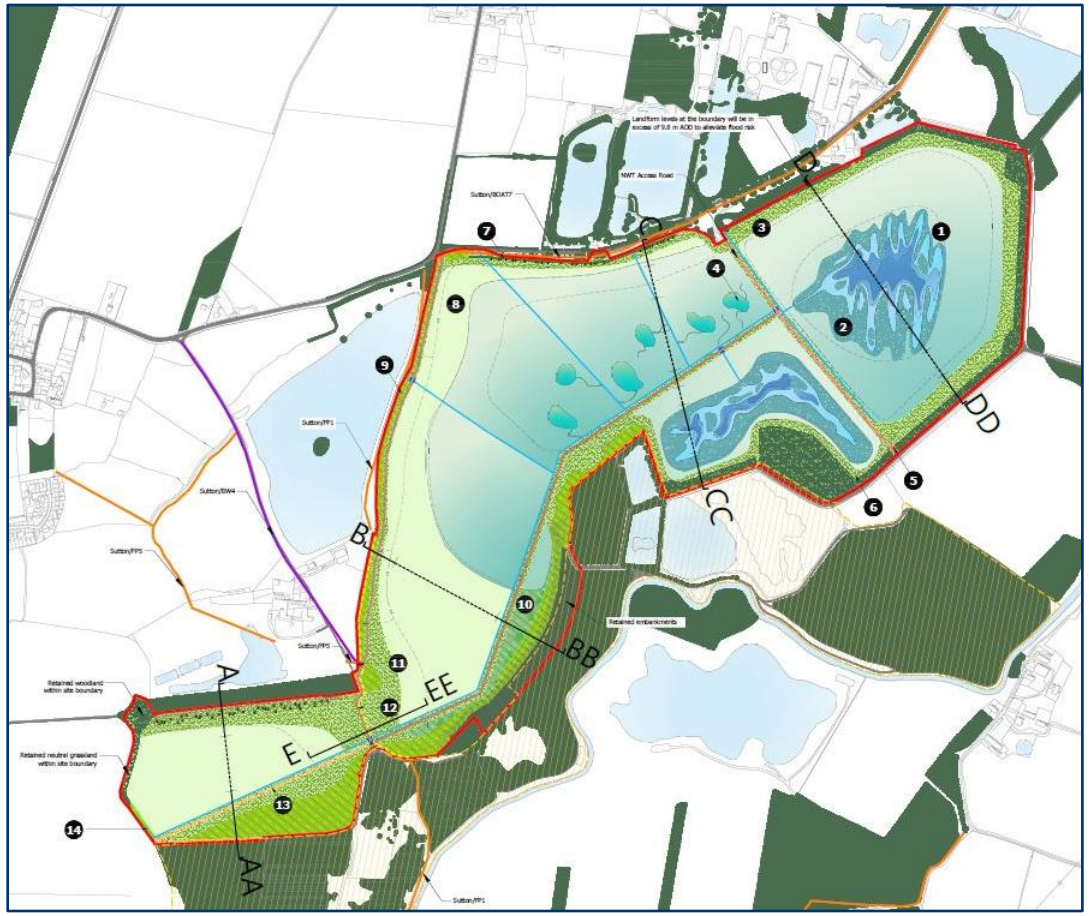


Perimeter bunds

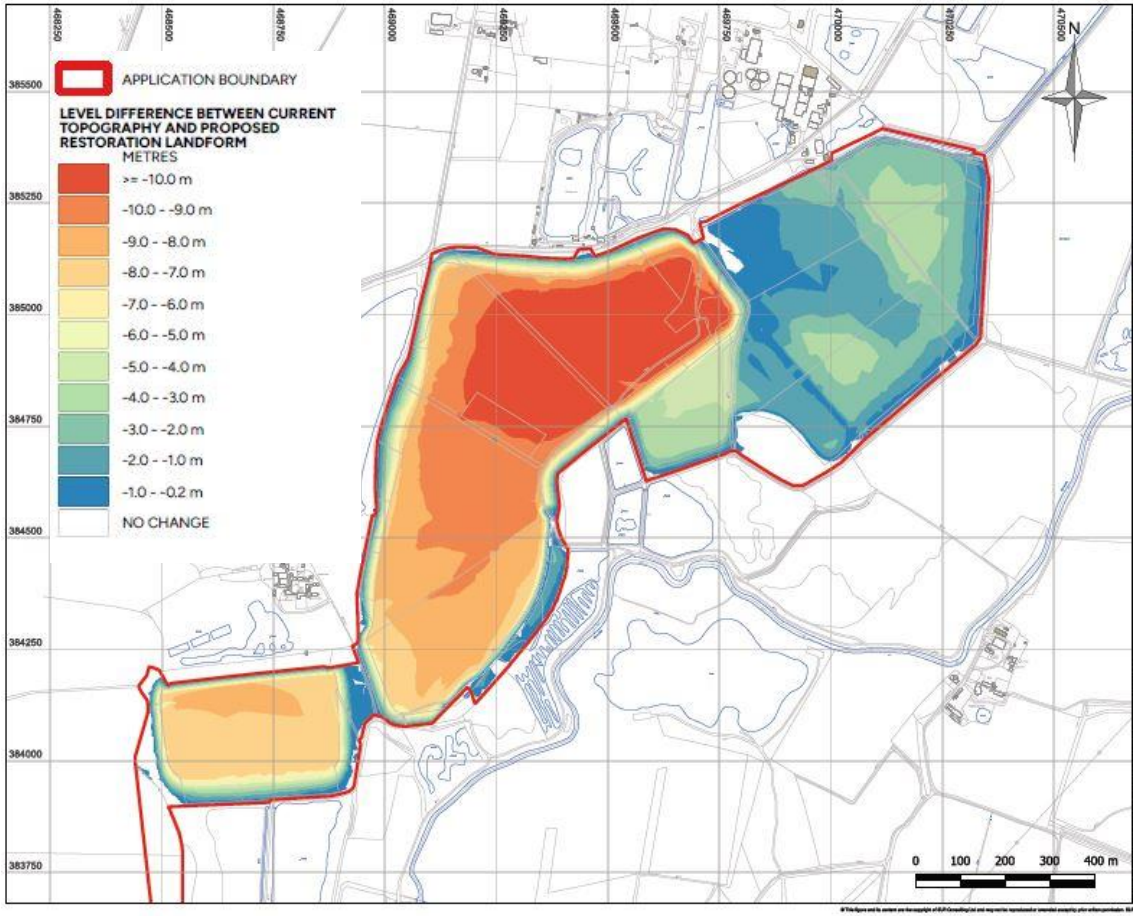
Perimeter bunds - SSSI

The embankment at this location is approximately 65m wide at the base and is currently retaining 15m of PFA, approximately 6m of which is below water table. It forms part of the Idle Valley Nature Reserve SSSI, and as such will be fully retained in its present condition. The “as-built/ works complete” scenario will therefore be identical to the baseline condition.

Restoration plan and level difference map

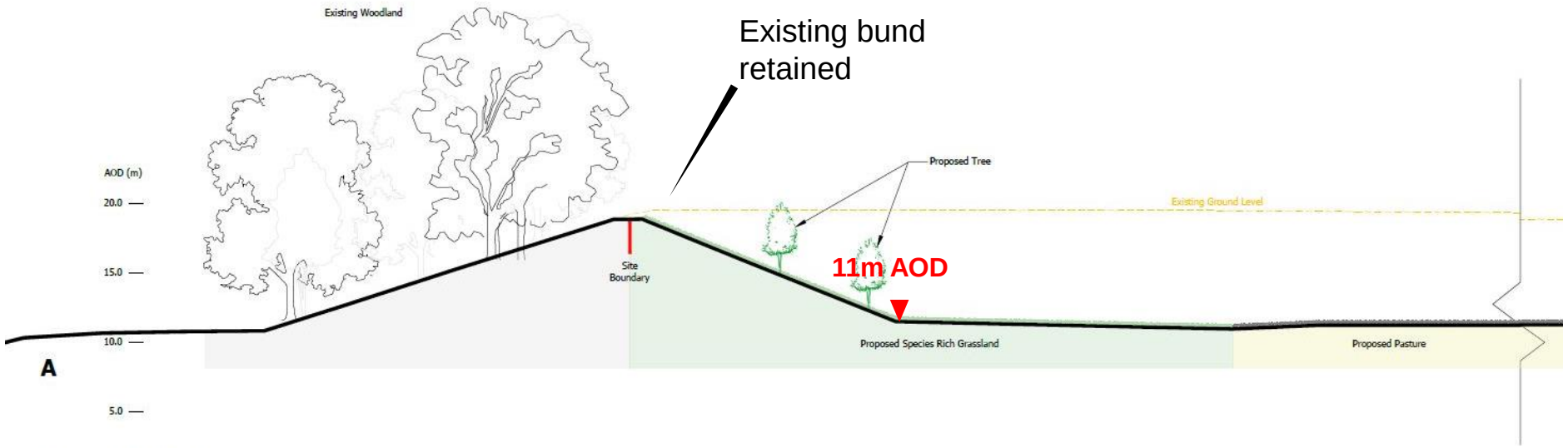


Proposed landscape restoration plan

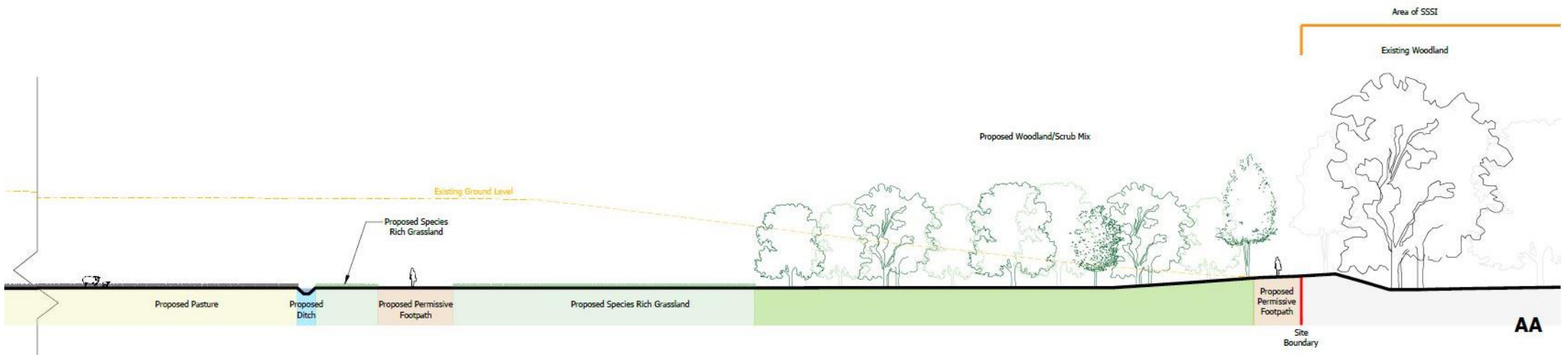


Level difference between current topography and proposed restoration landform (excluding wetland features, details of which are to be confirmed) based on a combination of the DEFRA LiDAR 1m resolution DTM data and a site-specific GPS survey commissioned by Hive, showing no development and no change to existing ground levels outside the red line boundary of the site.

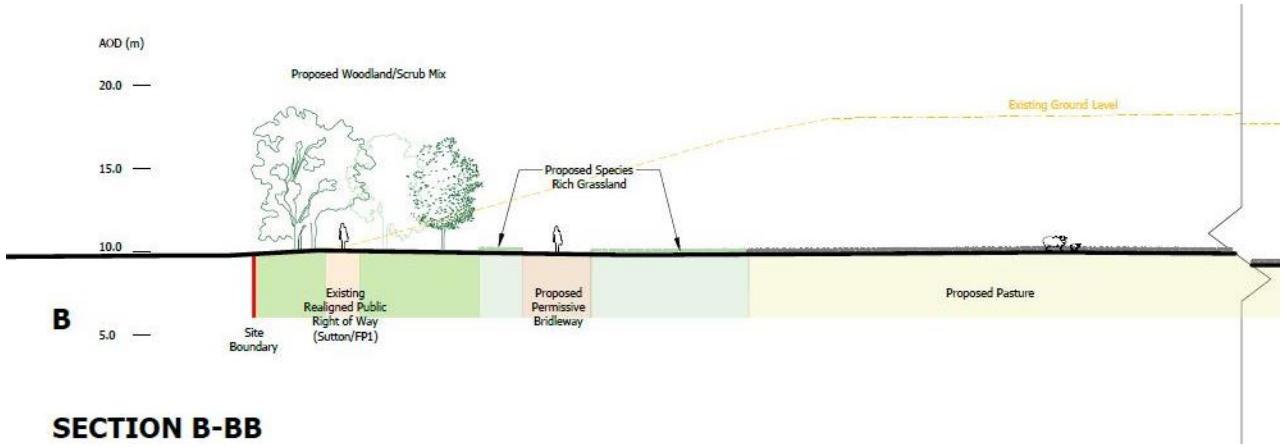
As-built/ works complete scenario



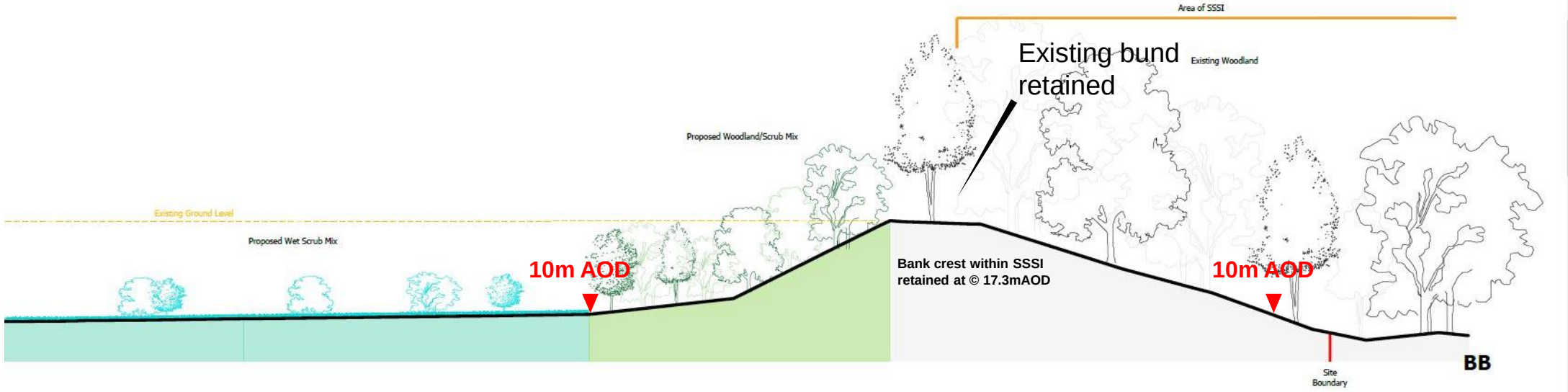
SECTION A-AA



As-built/ works complete scenario

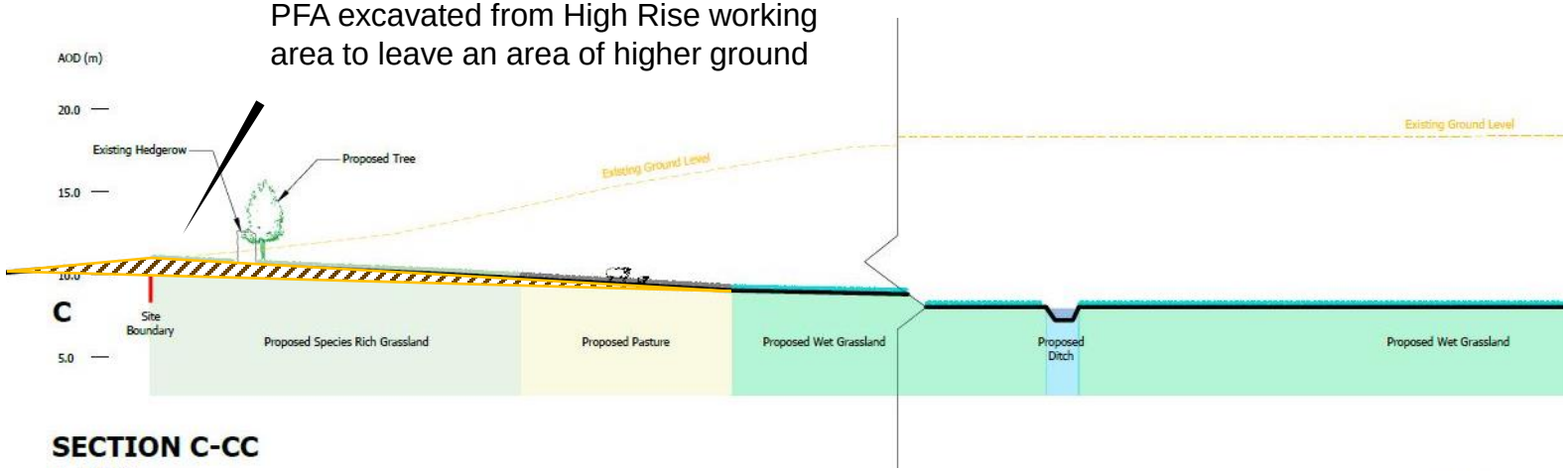


SECTION B-BB

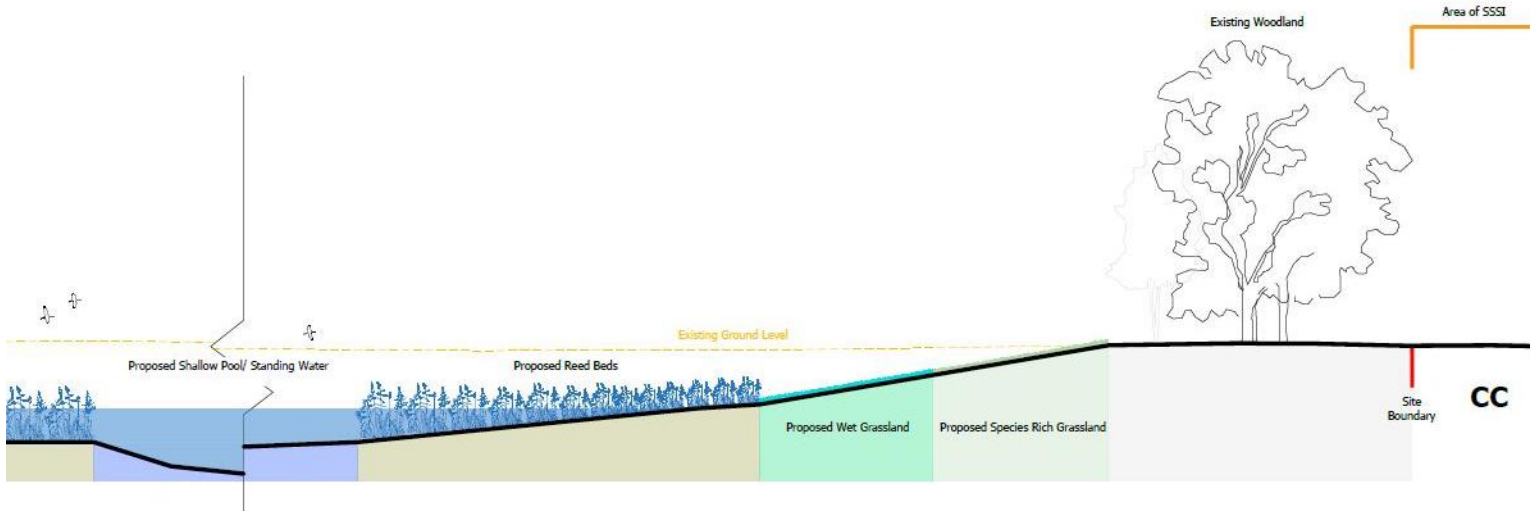


As-built/ works complete scenario

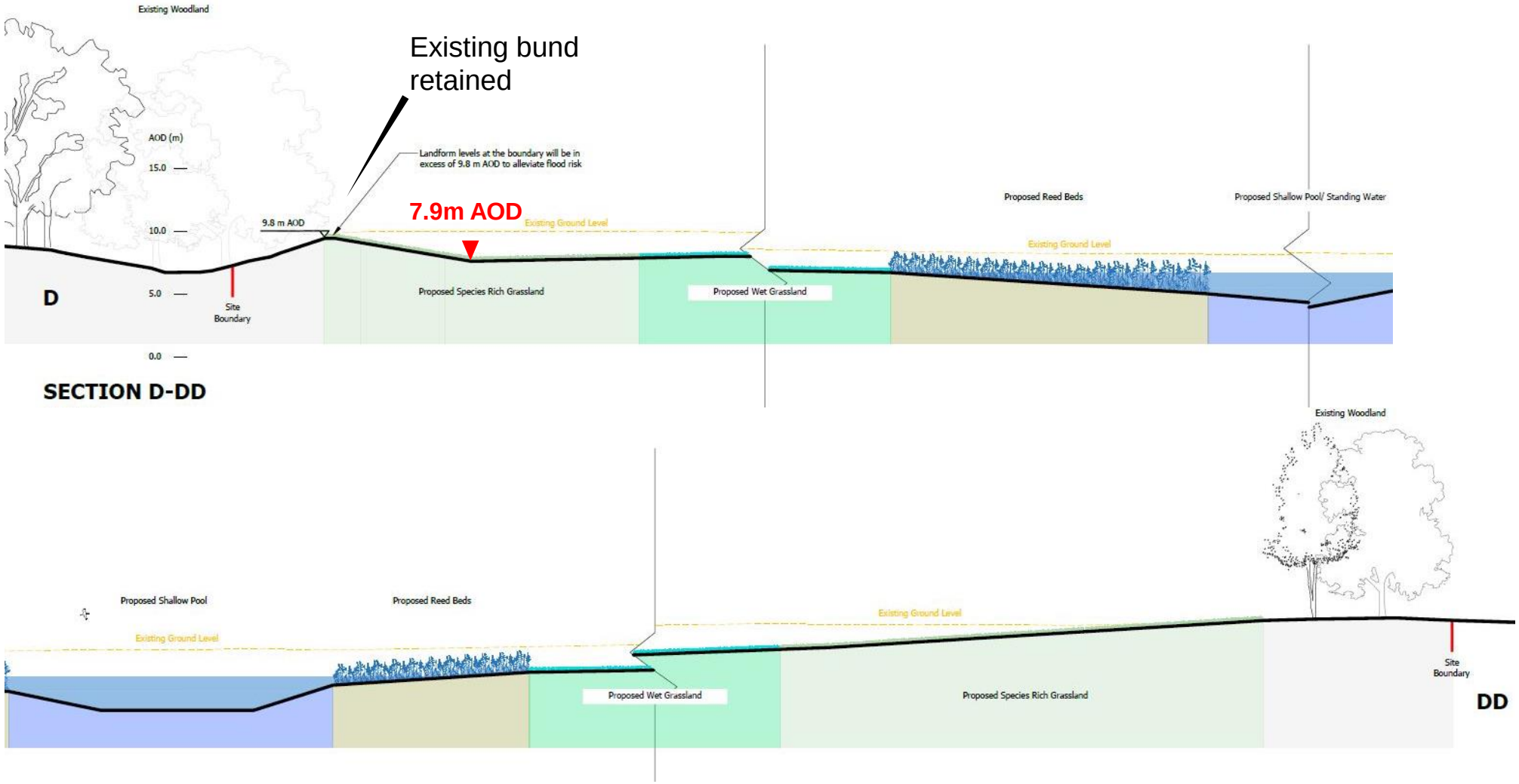
PFA excavated from High Rise working area to leave an area of higher ground



SECTION C-CC



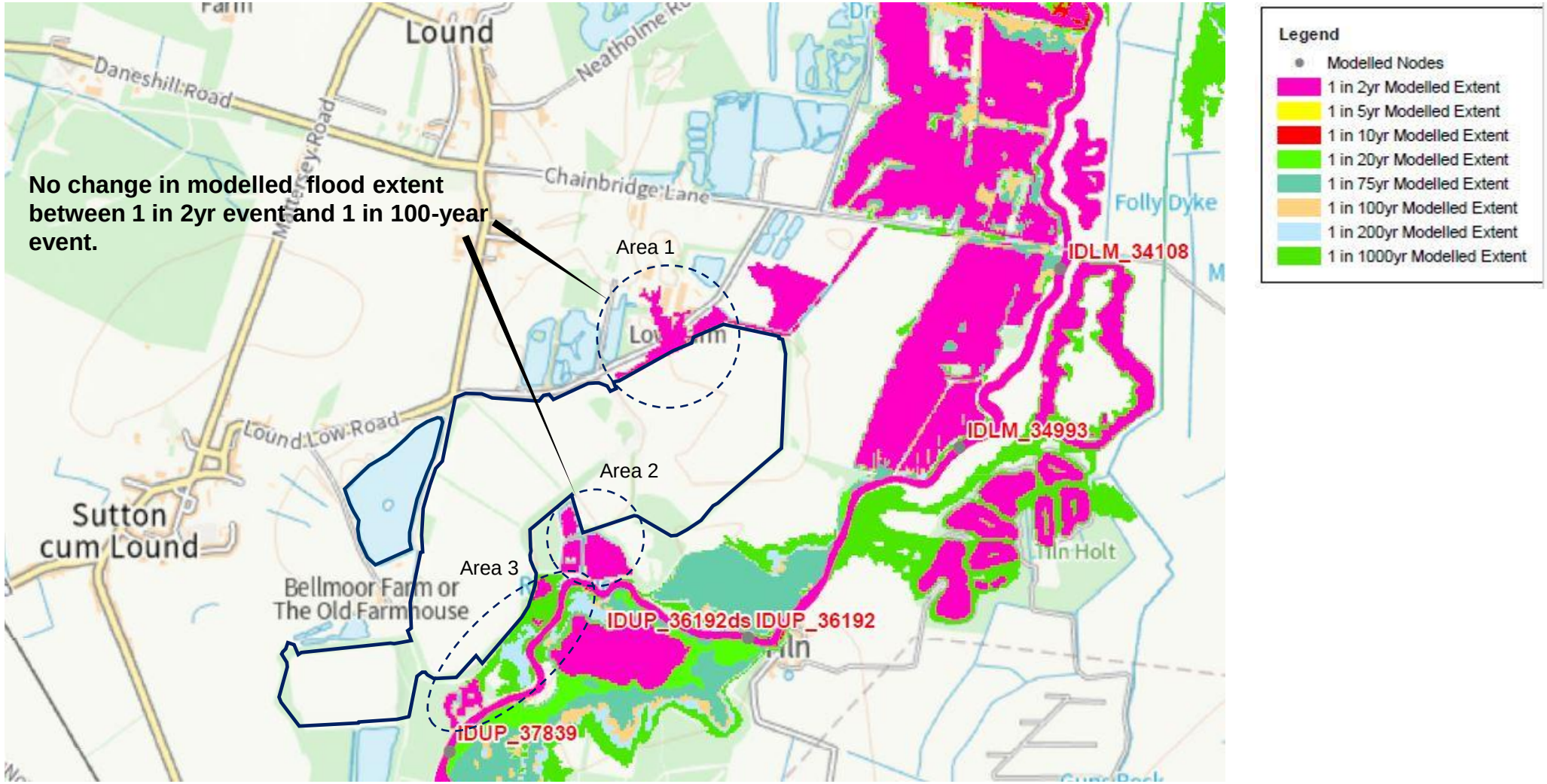
As-built/ works complete scenario



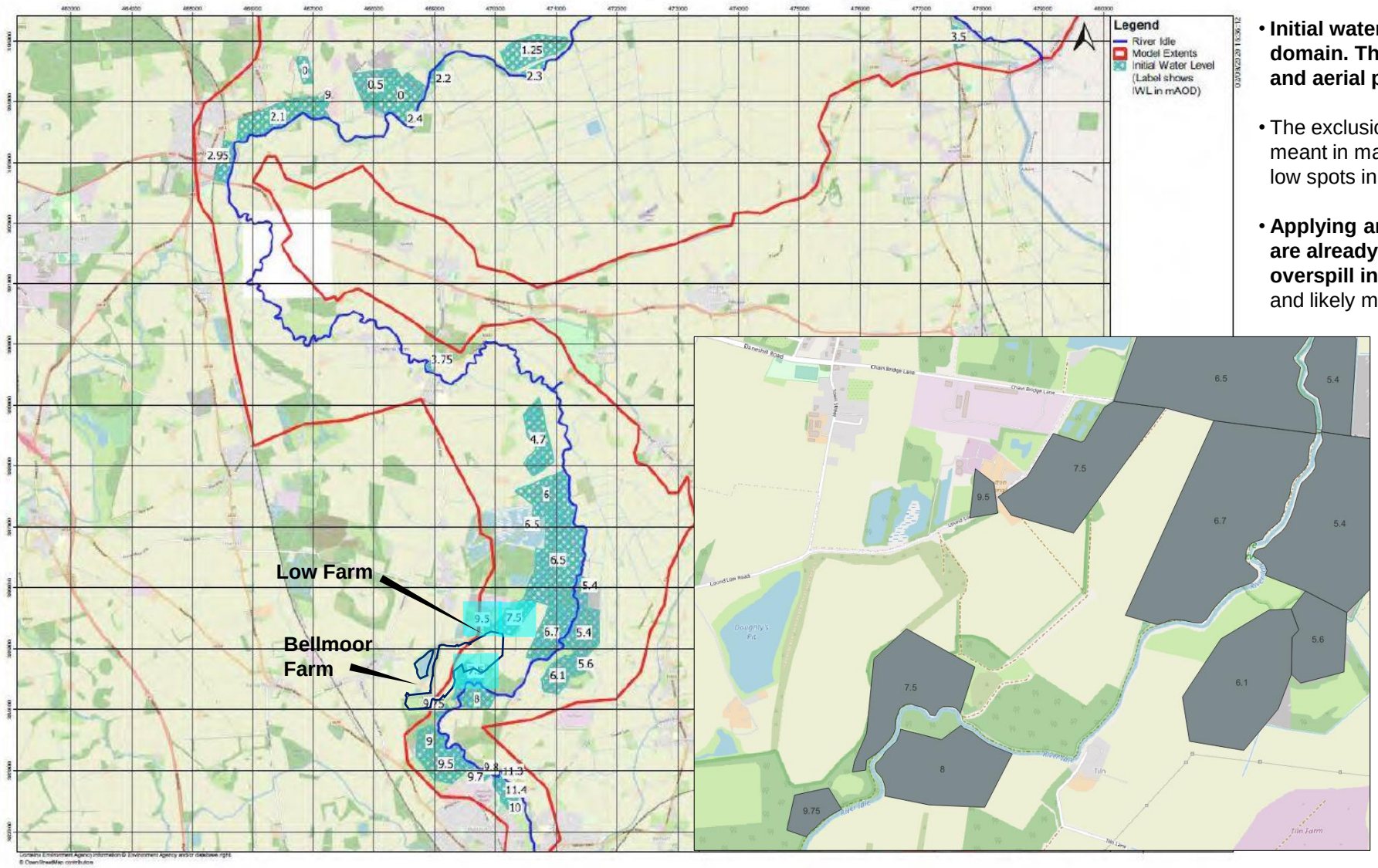
2. Response to specific matters raised by the EA

Demonstrating that there is no pathway for floodwater to enter the site, or to bypass the site in the direction of Bellmoor Farm.

Plan showing modelled flood extents

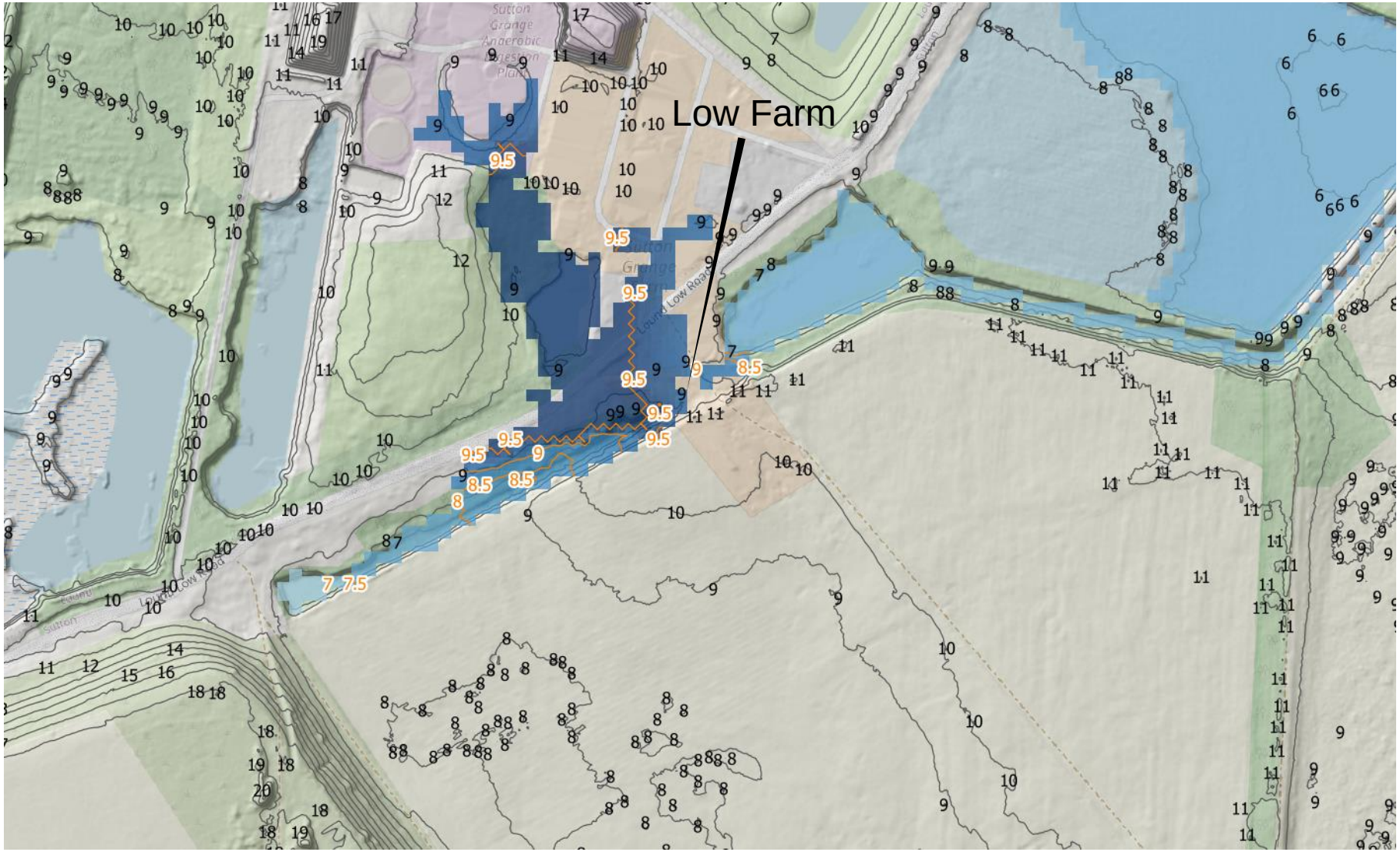


Plan showing location and level of initial water levels

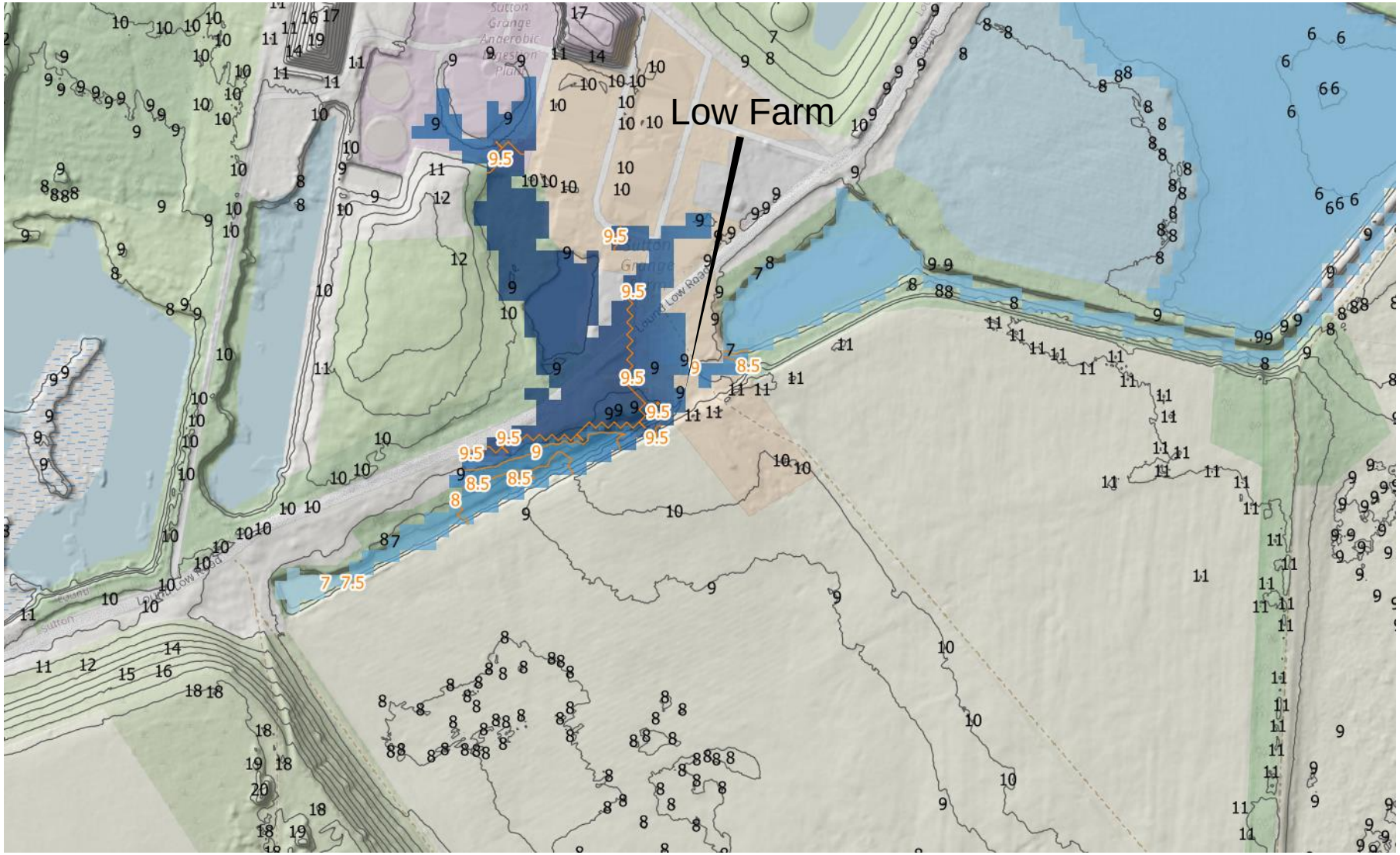


- **Initial water levels have been introduced into the 2D domain. The water levels have been based off LiDAR and aerial photography.**
- The exclusion of initial water levels in the original model meant in many locations flooding from the river filled up low spots in the topography representing ponds etc.
- **Applying an initial water level means these low spots are already full of water, and therefore cause further overspill in a flood event.** This is a more conservative and likely more accurate method of representation.

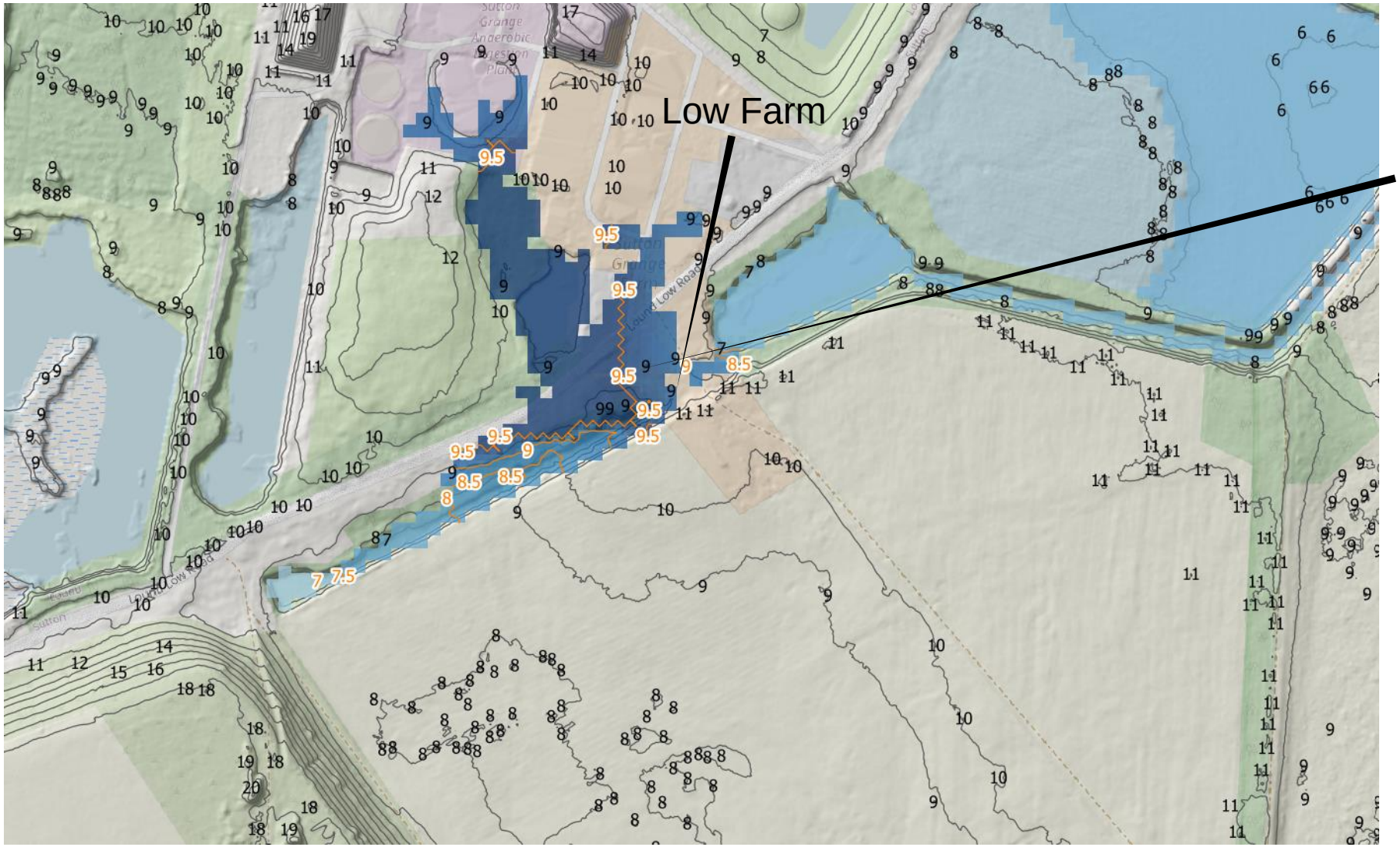
1%AEP + 30%CC peak water levels - Area 1



5% AEP peak water levels - Area 1



20% AEP peak water levels - Area 1

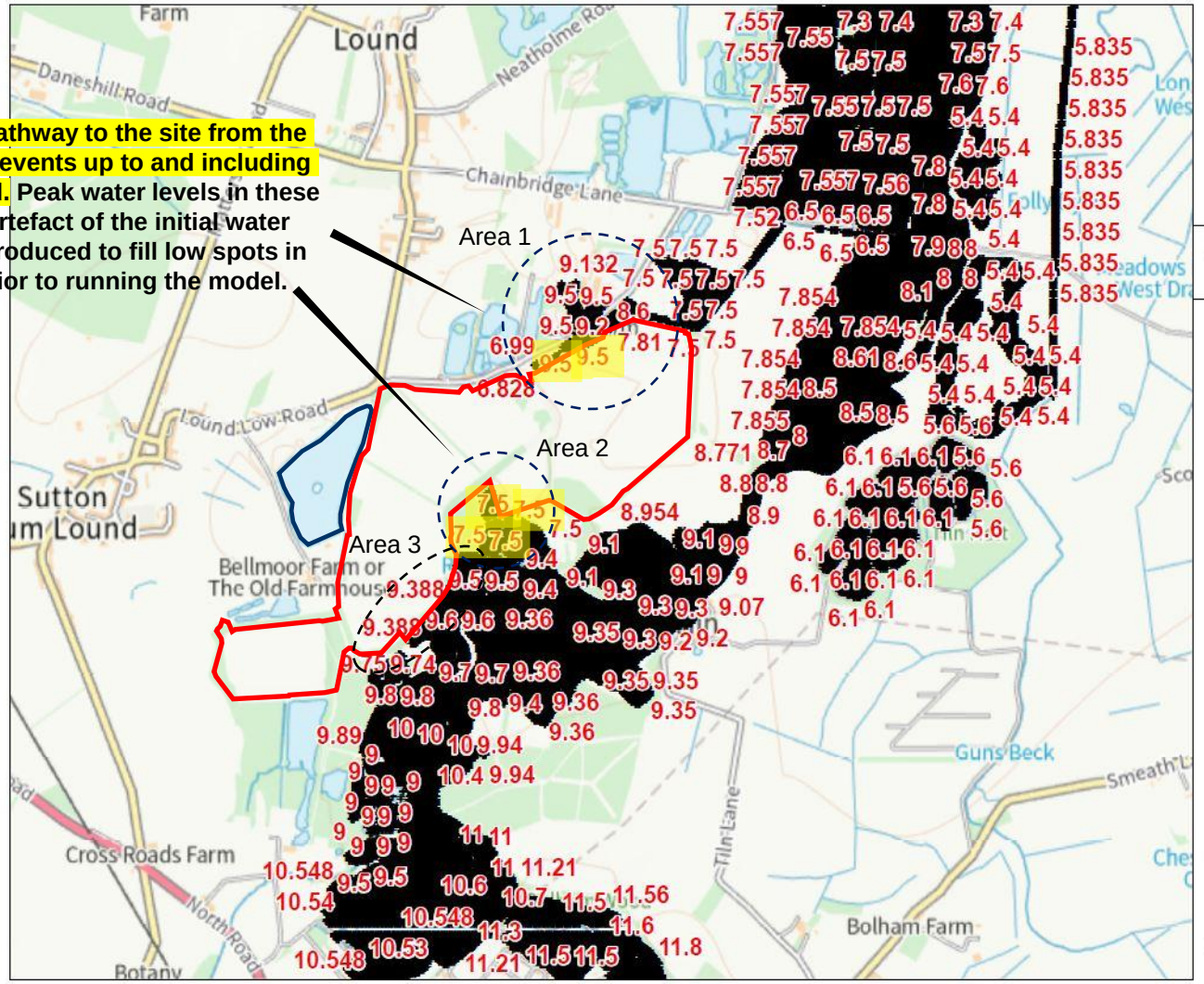


- MODEL RESULTS SHOW NO CHANGE across the full range of flood events in the River Idle.
- There is no flow pathway to the Proposed Development from the River Idle in flood events up to and including the 0.1%AEP flood
- Water levels are an artefact of the initial water level condition introduced to fill low spots in the topography prior to running the model.

Modelled 1%AEP + 30%CC floodplain (existing)

There is no flow pathway to the site from the River Idle in flood events up to and including the 0.1%AEP flood. Peak water levels in these two areas are an artefact of the initial water level condition introduced to fill low spots in the topography prior to running the model.

Floodplain Heights Map centred on SK6988484983
Ref: [EMD289448]



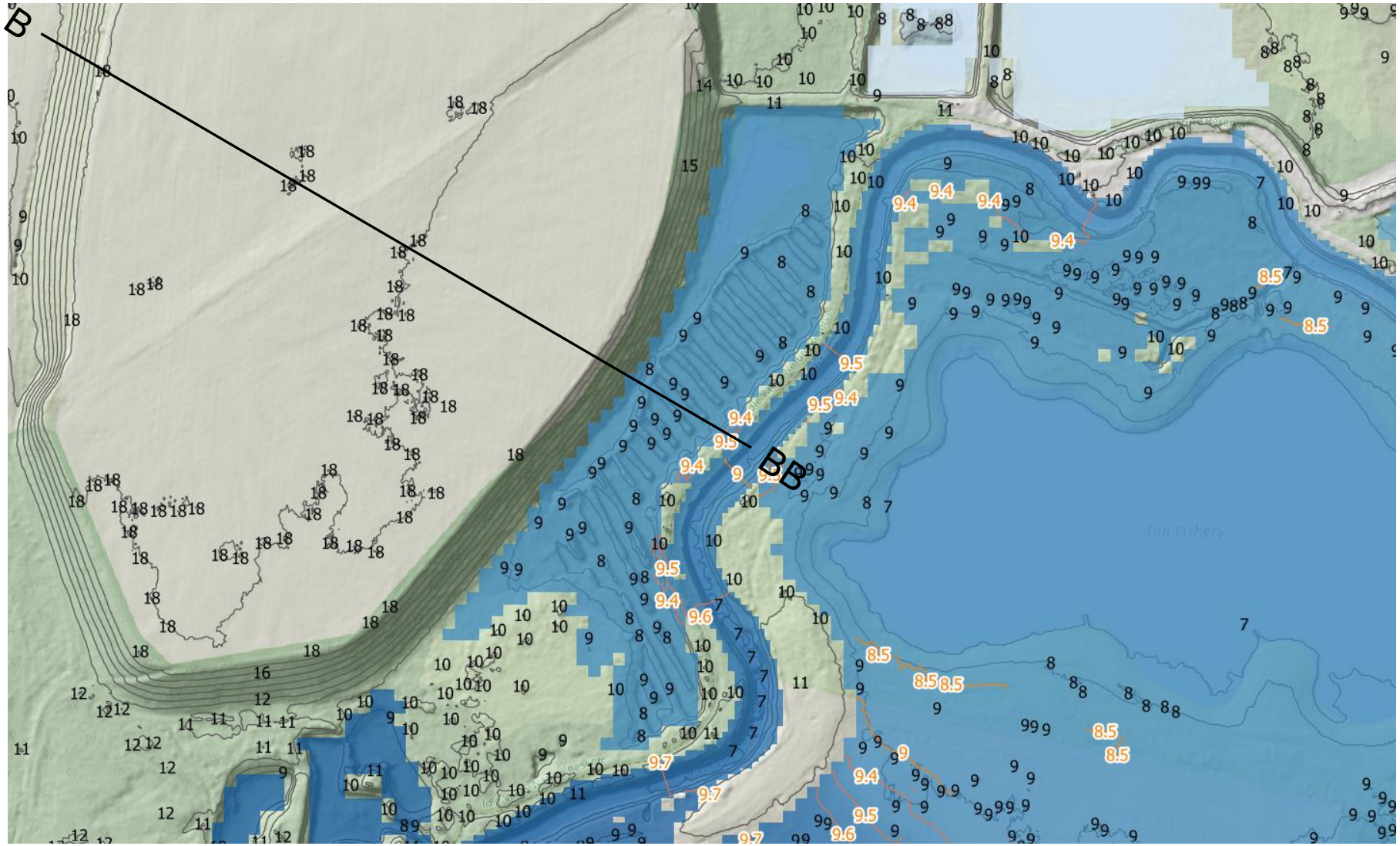
Environment Agency

Scale 1:20,000
Date created: 02 December 2022

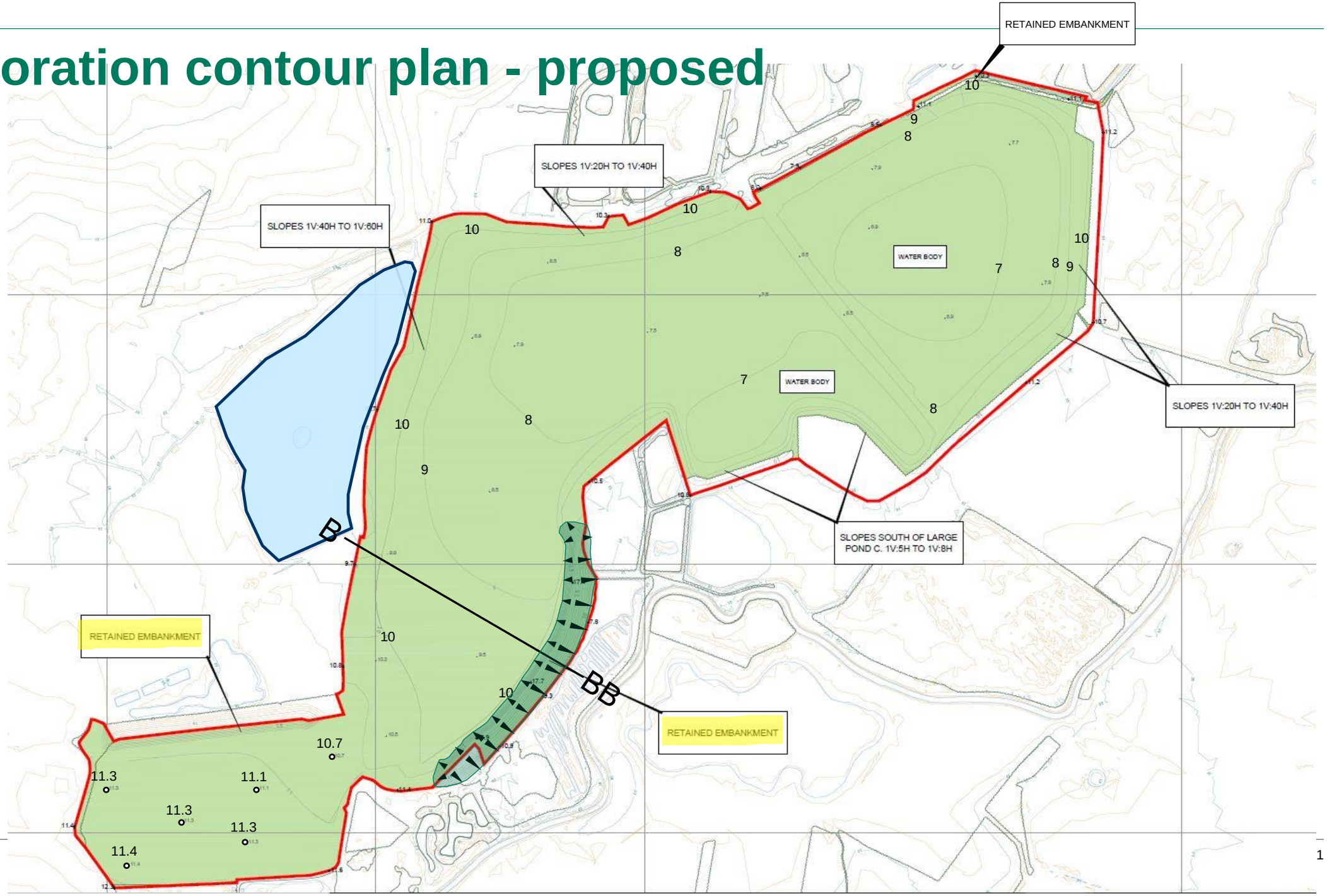
Legend
+ 1 in 100yr + 30%CC Floodplain Level (mAOD)

SOURCE
River Idle revision, EA, 2021

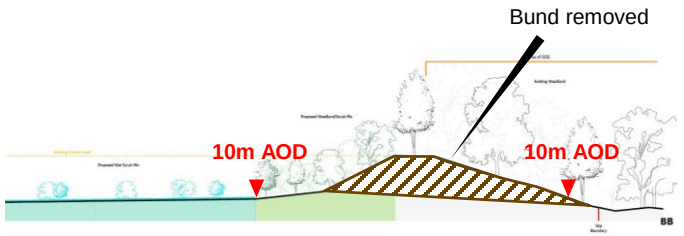
1%AEP + 30%CC peak water levels - Area 3



Restoration contour plan - proposed



Removing existing SSSI embankment from Area 3



High ground at 10.0m AOD prevents inundation of the site from the River Idle if SSSI embankment is removed.

Restoration 10m AOD contour

3. Conclusions

Conclusions

A desktop analysis of the proposed restoration scheme has been undertaken to establish whether removing the existing embankments has the potential to introduce new flow pathways to neighbouring third party receptors during a 1 in 100 year + 30%CC flood event.

The analysis considered three areas where results of the hydraulic modelling undertaken by the EA indicate that there is the potential for floodwater from the River Idle to interact with the Proposed Development.

Conclusions are as follows:

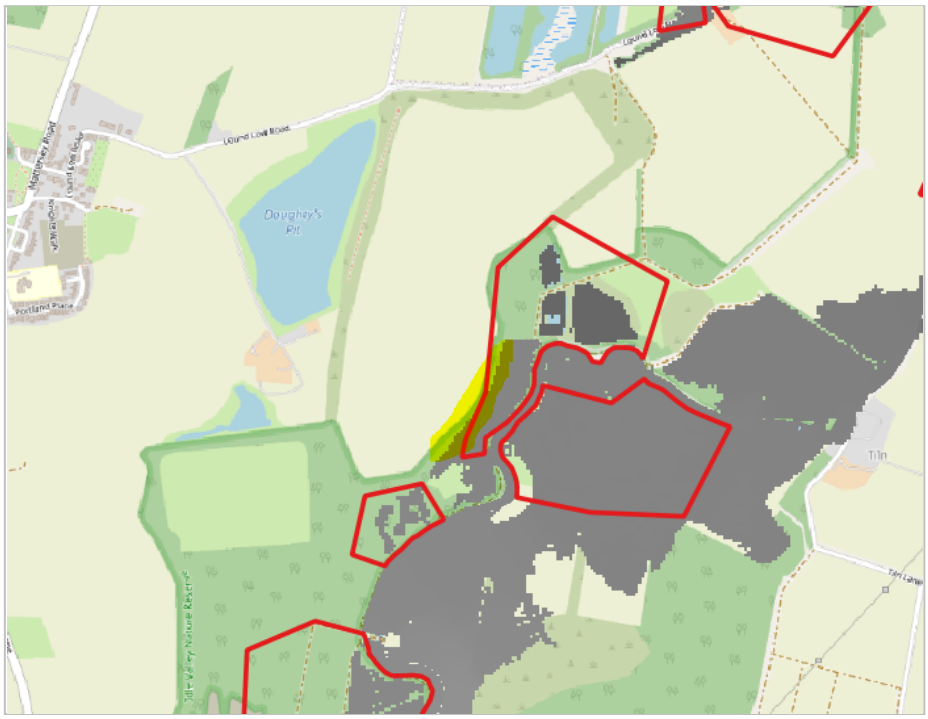
1) A close inspection of the model results files in conjunction with the River Idle 2020 Model Update Report revealed that there is no flow pathway to the Proposed Development from the River Idle via Areas 1 and 2 in flood events up to and including the 0.1%AEP flood. Peak water levels in Areas 1 and 2 are an artefact of the initial water level condition introduced to fill low spots in the topography prior to running the model.

2) The Proposed Development will fully retain the embankment in Area 3, which forms part of the Idle Valley Nature Reserve SSSI. A more detailed inspection of ground levels within the restored landform relative to the simulated peak flood level in the River Idle floodplain shows conclusively that even if the embankment is removed there is no pathway for floodwater to enter the site, or to bypass the site in the direction of Bellmoor Farm.

From:	Street, Sarah
To:	Brian Dunlop
Cc:	
Subject:	RE: RCEP - River Idle hydraulic model
Date:	18 December 2023 11:46:33
Attachments:	image001.png image002.png

Hello

Apologies for the delay responding to you. We have examined the PowerPoint presentation and we broadly agree with the points, having looked into the modelling in some detail. Going forward, for the planning application we will therefore need to condition the location and dimensions of the "SSSI bund" shown highlighted yellow on the map below.



You will therefore need to submit to the LPA the cross sections of this bund from the presentation (slide 6) along with a plan showing the location of the cross-section B-BB and additionally a plan showing the length and location of the bund which will remain post-works, shown on a map (perhaps an annotation to slide 16 which isn't clear on the length of the raised SSSI embankment remaining after works are complete and restored).

One this information is part of the Flood Risk Assessment, or submitted as an addendum to the FRA, we can suggest a suitable condition to the LPA

If you have any further questions please contact us (the primary contacts at present being me in flood risk and Huda Al-Tahhan in planning liaison)

Kind regards

Sarah

Sarah Street
Flood Risk Management Advisor
East Midlands Partnership and Strategic Overview Team, Nottinghamshire & Tidal Trent

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From: Brian Dunlop
Sent: Monday, December 11, 2023 3:38 PM
To: Street, Sarah
Subject: RE: RCEP - River Idle hydraulic model

Good afternoon Sarah.

Have you had any feedback from your modelling team on the information that we sent through on 24th November?

Kind regards

Brian

ERM

Brian Dunlop
Technical Director
He/Him/His

London

erm.com

From: Street, Sarah
Sent: Thursday, November 30, 2023 4:41 PM
To: Brian Dunlop

Subject: RE: RCEP - River Idle hydraulic model

Hi Brian

Just to update you – we are looking into the information you've sent through. We've involved our modelling team as it is quite technical, we'll get back in touch as soon as possible.

Thank you

Sarah

Sarah Street
Flood Risk Management Advisor
East Midlands Partnership and Strategic Overview Team, Nottinghamshire & Tidal Trent

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From: Brian Dunlop
Sent: 24 November 2023 16:28
To: Street, Sarah

Subject: RCEP - River Idle hydraulic model

Dear Sarah.

We received a link to download the River Idle model last week and have been carrying out some initial QA/QC checks the findings of which are presented in the attached slide deck (along with some additional information about which perimeter bunds are being retained and those that will be removed as works progress).

What stands out from our initial inspection of the model files and supporting River Idle 2020 Model Update Report is that an initial water level condition was introduced in the 2D model to fill low spots in the topography, so that any available storage is removed at the start of each model

run. You can see from slide 9, that in Areas 1 and 2 peak flood extents don't change between the 1 in 2 and the 1 in 1000-year scenarios. To confirm this, we have superimposed the peak flood levels and flood extents for the 1 in 100+30%CC, 1 in 20-year and 1 in 5-year flood events on top of the LIDAR data in the vicinity of Low Farm; and as you will see from flicking between the results the peak water levels are not influenced at all by water levels in the river or the adjacent floodplain.

WSP have looked closely at the initial water level polygons in the GIS layer that was introduced to establish the initial water level condition in the 2D model domain, and this confirms that the flood levels reported for Areas 1 and 2 in all flood events up to and including the 1 in 1000-year flood event are an artefact of the initial water level condition set prior to running the model. There is no flow pathway from the River Idle to the Proposed Development, other than along the section of embankment (identified as Area 3) which lies within the Idle Valley Nature Reserve SSSI and as such will be fully retained in its present condition.

You will also note from the available LIDAR corresponding to section B-BB through the restoration plan that in the hypothetical scenario with this embankment removed entirely there is no route for water to enter the site in a 1 in 100-year +30%CC event, or to bypass the site towards Bellmoor Farm, due to existing high ground at 10m AOD (the peak flood level being 9.6mAOD).

I think before we go any further it would be useful to have a call to discuss the validity of the baseline flood extents, and based on this, whether there is reasonable justification for additional hydraulic modelling.

Looking ahead to next week, we are available in the afternoon of Wednesday 29th November or any time on Friday 1st December if either of those dates work for you?

Kind regards

Brian

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Brian Dunlop
Technical Director
He/Him/His

London

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