
Development at Lady Ann Road Soothill Batley

Flood Risk Assessment

Client:

D. Noble Ltd
Noble House
Perseverance Street
Castleford
WF10 1LD

Prepared by:

joc consultants ltd

Park Farm House
Leathley Lane
Leathley
Otley
LS21 2JU

REVISION HISTORY

Revision	Date	Details
00	12 th August 2020	Draft for comment
01	19 th August 2020	Minor amendments
02	10 th September 2020	Report updated
03	16 th February 2021	Report updated
04	9 th September 2021	Report updated following meeting with Environment Agency
05	20 th April 2022	Flood levels re-estimated following Teams meeting with Environment Agency on 5 th April 2022; floodplain compensation updated.
06	21 st December 2022	First Issue

CONTENTS

1.0	INTRODUCTION.....	6
2.0	OBJECTIVES.....	7
3.0	PLANNING POLICY ON FLOOD RISK	7
3.1	National Policy	7
3.2	Local Policy	7
3.3	Planning Practice Guidance.....	8
4.0	LOCATION AND DESCRIPTION OF THE SITE	8
5.0	THE PROPOSED DEVELOPMENT	9
6.0	FLOOD RISK	10
6.1	Assessment methodology	10
6.2	Flood data	11
6.3	Existing flood defences	11
6.4	History of Flooding	12
6.5	Risk to the development from fluvial flooding	12
6.6	Effect of the development on fluvial flood risk	13
6.7	Risk of surface water flooding.....	14
6.7	Risk of sewer flooding.....	15
6.8	Risk of groundwater flooding	16
6.9	Risk of flooding from reservoirs and canals.....	16
6.10	Effects of climate change.....	16
7.1	FLOOD RISK MANAGEMENT	19
7.1	Fluvial flood risk	19
7.2	Surface water flood risk.....	20
7.3	Sewer flooding risk.....	21
7.4	Groundwater flood risk.....	21
7.5	Residual risks.....	21
7.6	Safe access and egress.....	22

8.0	CONCLUSIONS AND RECOMMENDATIONS.....	22
8.1	Conclusions.....	22
8.2	Recommendations	24
9.0	REFERENCES.....	25

APPENDICES

APPENDIX A:	Environment Agency letter dated 28 th April 2022
APPENDIX B:	Topographical Survey Plan
APPENDIX C:	Site Layout Plan
APPENDIX D:	Flood Map overlay
APPENDIX E:	Environment Agency flood data
APPENDIX F:	Plan of cross sections 1 to 8
APPENDIX G:	Cross sections 1 to 8: existing and post-development
APPENDIX H:	Floodplain volume calculations
APPENDIX I:	Surface Water Flood Maps
APPENDIX J:	REFH2 estimates of peak runoff rates and volumes
APPENDIX K:	Not used
APPENDIX L:	Tables L1 and L2

ABBREVIATIONS

AEP:	Annual exceedance probability
AOD:	Above Ordnance Datum
CCA:	Climate change allowance
FFL:	Finished floor level
FRA:	Flood risk assessment
PPG:	Planning Practice Guidance
REFH2:	Revitalised flood hydrograph model version 2.3
SFRA:	Strategic Flood Risk Assessment

1.0 INTRODUCTION

- 1.1. JOC Consultants Ltd is instructed by D. Noble Building and Civil Engineering Contractors (the Client), to prepare a site specific flood risk assessment (FRA) for a proposed housing development at Lady Ann Road, Soothill, Batley. The development is the subject of a planning application to Kirklees MBC. The planning application number is 2020/93071.
- 1.2. This revision of the report includes the latest development proposals and a review of the floodplain compensation storage provisions. The latest revisions to the report are shown in blue for ease of reference.
- 1.3. Following the submission of revision 05 of this report, the Environment Agency, by its letter dated 28th April 2022 to the planning authority, confirmed that its previous objections to the development were withdrawn and requested the inclusion of planning conditions in any grant of permission to ensure the safety of the development in a flood and to avoid increasing the risk of flooding elsewhere. A copy of the Environment Agency's letter is provided in Appendix ??.
- 1.4. References in this report to "the site" are references to the site to which the planning application applies. Specific references to sources of information used in the report are shown in square brackets and are listed in section 9. Figures 1 to 6 are presented immediately following page 25 and the appendices follow thereafter.
- 1.5. This report is prepared specifically for the Client for the purpose of the aforementioned planning application and the report may not be used for any purpose other than for the purpose for which it was commissioned, and it may not be assigned to any third party without our written permission.
- 1.6. In the preparation of this FRA report, JOC Consultants Ltd has relied on published information and on information provided by the Client and accepts no liability for the accuracy or adequacy of that information or for the consequences of any changes to or re-assessment of that information in the future.

2.0 OBJECTIVES

- 2.1. The objectives of this flood risk assessment are to:
1. establish whether the proposed development is likely to be affected by current or future flooding from any source;
 2. establish whether the proposed development will increase flood risk elsewhere; and
 3. recommend, as appropriate, measures for managing flood risk.

3.0 PLANNING POLICY ON FLOOD RISK

3.1 National Policy

- 3.1.1. National Planning Policy in relation to flood risk is set out in the National Planning Policy Framework (NPPF) [1].

3.2 Local Policy

- 3.2.1. Local policy is defined in the Kirklees Local Plan Strategy and Policies Document, adopted in February 2019 [2]. Policy LP 27 sets out the Council's policy on flood risk.
- 3.2.2. Local policy on development and flood risk is informed by the Calder Catchment SFRA [3]. Reference to the SFRA is made in subsequent sections of this report.
- 3.2.3. Policy LP 27 states that proposals within flood zone 3ai will be assessed in accordance with national policies relating to flood zone 3a but no new highly vulnerable or more vulnerable uses will be permitted. Flood zone 3ai is defined in the SFRA as:
- 'developed land within Flood Zone 3b where water would flow or be stored in times of flooding if not already constrained by development.'*
- 3.2.4. More vulnerable development in flood zone 3a is not contrary to Policy LP 27, provided it passes the Sequential Test and Exception Test.

3.3 National Planning Practice Guidance

- 3.3.1. In addition to national and local policy, the National Planning Practice Guidance for Flood Risk and Coastal Change [4] provides advice to planning authorities to assist them when considering planning applications in areas at risk of flooding. The Environment Agency Standing Advice [5] also provides guidance to assist local planning authorities when considering planning applications in areas at risk of flooding.
- 3.3.2. This report has been prepared with reference to the Planning Practice Guidance and the Standing Advice.

4.0 LOCATION AND DESCRIPTION OF THE SITE

- 4.1. The site is situated in the Soothill area of Batley between Primrose Hill and Lady Ann Road, as shown outlined in red in Figure 1. The NGR coordinates at the approximate centre of the site are approximately 424980E, 424575N. The area of the site within the red line boundary in Figure 1 is approximately 3.23ha.
- 4.2. Access to the site is from Lady Ann Road.
- 4.3. The site is currently vacant land with a natural permeable surface. The topographical survey shows the land to slope steeply from west to east, having a gradient of approximately 1 in 7 and there are also secondary gradients towards the north-east and south-east. Ground levels in the range 71.40m to 57.09m AOD. The topographical survey plans and additional LiDAR data are provided in Appendix B.
- 4.4. At the north end of the site there is a raised earth bund, which is evident on the topographical survey plan. It is not clear when or why this was constructed.
- 4.5. The British Geological Survey database [6] shows:
- Superficial geology: None recorded;
 - Bedrock: Thornhill Rock – Sandstone.
- 4.6. The site is not within an Environment Agency Flood Warning Area.
- 4.7. Howley Beck flows south, adjacent to the eastern boundary of the site. The beck is an Ordinary Watercourse until it emerges at the west side of the railway culvert, south of the site, at which point it becomes a Main River. The site is not therefore, within 20m of a Main River.

4.8. The site is allocated for housing under reference HS74. The allocation details states:

'No residential development to take place in flood zone 3'.

4.9. This statement goes beyond what is stated in Policy LP 27, which precludes more vulnerable development only in flood zone 3ai.

5.0 THE PROPOSED DEVELOPMENT

5.1. A development of 65 houses is proposed, (plots 68 and 69 having been removed and the layout revised), as shown on the Site Layout Plan in Appendix C. Proposed finished ground levels and finished floor levels are also shown on the Site Layout Plan (in mm above ordnance datum). Finished floor levels are at or above the minimum finished floor levels recommended in the previous revision of this FRA report.

5.1.1. The overlay of the site layout plan on the flood map is provided in Appendix D. This identifies the housing plots in flood zones 2 and 3, as shown in Table 5.1 below.

	Flood Zone 2	Total in Flood Zone 2	Flood Zone 3	Total in Flood Zone 3
Plot numbers	45 to 47	3	37 to 44	8
	49 to 51	3	48*	1
			52 to 53*	2
Totals:		6		11

* gardens only.

5.2. Most of the development is within flood zone 1 but 11 housing plots are in flood zone 3 and 6 plots are in flood zone 2. At plots 48, 52 and 53 however, it is only the rear gardens that enter flood zones 2 or 3. The houses on these plots are in flood zone 1.

5.3. Following development, all plots will effectively be in flood zone 1, insofar as the annual probability of fluvial flooding will be reduced to less than 0.1%.

- 5.4. The development is classified as **More Vulnerable** in accordance with Table 2 of the NPPF Technical Guidance.
- 5.5. In addition to the housing, the development also includes landscaping works to improve habitat in the floodplain area. This includes the collection of water from an existing spring into the [proposed](#) drainage system and discharging it to a swale, [as shown on the Site Layout Plan leading to](#) the wetland area in order to improve the habitat for water voles. The swale discharges to Howley Beck approximately opposite plot 63. The effect of this on flood risk is discussed in section 6.6.
- 5.6. It is also proposed to remove the raised earth bund as part of the site re-profiling works for the development.

6.0 FLOOD RISK

6.1 Assessment methodology

- 6.1.1. The risk of flooding to the development and the effect of the development on flood risk elsewhere has been assessed against the Design Flood, as defined in PPG paragraph 054 [4], taking into account existing flood defences. [The Design Flood is the 1% AEP flood level, including climate change effects over the lifetime of the development.](#)
- 6.1.2. Events which exceed the Design Flood and breach events are assessed as residual risks.
- 6.1.3. The Environment Agency model data for Batley Beck is provided in Appendix E. This data shows a falling water surface as the beck flows from north to south past the site. In a relatively flat landscape it would be appropriate to base the design flood level on the modelled flood level at the upstream boundary of the site but at the development site this would not be a realistic owing to the falling elevation, which is evident on the topographical survey plan in Appendix B and in Figure 6. The Design Flood Level was therefore determined with reference to the nearest upstream model node and interpolated according to the water surface gradient and the downstream distance. Water surface gradients vary according to the event under consideration, as shown in Table L1 in Appendix L.
- 6.1.4. Table L2 in Appendix L provides interpolated flood levels for the following events:
- 1% AEP;

- 1% AEP_23%CCA (the Central allowance for the Aire and Calder Management Catchment); and
- 0.1% AEP.

6.1.5. The 1% AEP_23% CCA flood levels at model nodes 1085; 0846 and 0680 were determined from the best-fit trend line of the stage discharge curve at each node, as shown in Figures 2 to 5.

6.1.6. Table L2 determines the required minimum FFL based on 600mm above the 1% AEP_23% CCA flood level. Where the required minimum FFL is higher than the FFL proposed on the [Site Layout Plan](#), Table L2 shows the required increase in the FFL.

6.1.7. Table L2 also shows the freeboard above the required minimum FFL in the 0.1% AEP event.

6.1.8. The effect of the development on floodplain storage was determined by comparing cross sectional areas in the existing and post-development conditions. The storage volume was calculated between eight cross sections located between the northern boundary of the site and [the open space south of plot 54](#). The cross sections were spaced at intervals of 25.0m and the mean of the cross sectional areas upstream and downstream was used to compute the volume between sections. The calculations include the floodplain volume in the overland flow path to the west of the raised bund which separates the flow path from the Howley Beck channel.

6.1.9. The cross sections are provided in Appendix G and the floodplain volume calculations are provided in Appendix H.

6.1.10. The risk of surface water flooding was assessed using the current surface water flood maps.

6.2 Flood data

6.2.1. Current flood data was requested from the Environment Agency and was received on 2nd July and 27th July 2020. Relevant extracts from the data are provided in Appendix E.

6.3 Existing flood defences

6.3.1. There are no flood defences on Howley Beck upstream of the railway.

6.4 History of Flooding

- 6.4.1. The Environment Agency Flood History Map shows the site to have been unaffected by the flood event of November 2019 and the Environment Agency has no records of flooding at the site.

6.5 Risk to the development from fluvial flooding

- 6.5.1. The Calder Catchment SFRA Map EE confirms that no part of the site is in the Functional Floodplain, flood zone 3b.
- 6.5.2. The online Flood Map for Planning shows the extent of flooding associated with Howley Beck. It is evident from this map that overland flow progresses from the north and develops into two distinct streams when it crosses the northern boundary. The main stream follows the course of Howley Beck, but a separate stream crosses the northern boundary further to the west and flows overland through the northern part of the site. This is caused by restricted capacity in the watercourse where it flows beneath the lane adjacent to the northern boundary of the site. Water levels upstream of the lane will rise when the flow rate exceeds the capacity under the bridge and there will be flooding which spills over into the lane and enters the site. Examination of the topographical survey plan suggests that this occurs where the ground level is approximately 61.6m AOD.
- 6.5.3. This western flow path is prevented from immediately returning to the main channel of Howley Beck by a raised earth bund parallel to the beck, but this tapers out further south, allowing the overland flow to return to the beck.
- 6.5.4. The Environment Agency has provided flood data from its Batley Beck Model Study 2015, which is the most recent available data. Howley Beck was modelled past the site at 5 node points which are shown on the Node Point Map in Appendix E.
- 6.5.5. The 1% AEP and 0.1% AEP flood levels (representing the limits of flood zones 1 and 2 respectively) were compared at each node with the adjacent ground levels, or 'threshold levels', which would need to be exceeded by the flood before it could enter the site. This comparison is shown in Table 6.1 below.
- 6.5.6. It is evident from Table 6.1 that direct fluvial flooding of the site in its existing condition occurs only at nodes 0846 and 0680 in the 1% AEP event, and at these nodes plus nodes 0837 and 0424 in the 0.1% AEP event. It is of course possible that there may be some ingress into the site at points between nodes if there are low spots, but the data verifies that the flooding in the

northern part of the site is shallow overland flow, from ingress at the northern boundary and at node 0846 which is approximately 80m south of the northern boundary.

Node	Threshold level m AOD	1% AEP flood level m AOD	Depth at overtopping m	0.1% AEP flood level m AOD	Depth at overtopping m
0846	61.00	61.06	0.06	61.15	0.15
0838	61.20	60.99	0.00	61.11	0.00
0837	61.00	60.81	0.00	61.01	0.01
0680	58.94	59.11	0.17	59.21	0.27
0424	57.20	56.23	0.00	57.66	0.46

6.5.7. The modelled flood depth maps in Appendix E indicate the separate overland flow path at the northern end of the site to have a depth in the range 0.0m to 0.25m in a 1% AEP event. This does not imply that a depth of 0.25m was achieved; it is merely a range within which the modelled depth occurs. At the northern limit of the site, the depth is likely to be just above 0.0m but it increases to around 170mm at the point where the eastern boundary turns due east.

6.5.8. It is important to emphasise that the above assessment applies to the site in its *existing condition*. Following development, finished ground levels will exceed the 0.1% AEP flood level, as stated in paragraph 5.3 and indicated on the [site layout plan](#) in Appendix C.

6.6 Effect of the development on fluvial flood risk

6.6.1. Raising ground levels will obstruct the existing flood flow path which crosses the northern boundary and flows through the site. It will also result in a loss of floodplain storage. The development to the south of plot 53 is in flood zone 1 and therefore there is no loss of floodplain in this area.

6.6.2. The original topographical survey was unable to determine ground levels in the northern part of the site where the vegetation was too dense to penetrate. LiDAR data was therefore used on a 1.0m grid, in order to provide sufficient ground level data for the purposes of this FRA.

- 6.6.3. The loss of floodplain volume is mitigated by reducing ground levels between the development and Howley Beck as indicated on the cross sections in Appendix G. This will result in a net gain in floodplain volume of approximately 53m³ as shown in the table in Appendix H.
- 6.6.4. The routing of the flow from the existing spring to Howley Beck will have no effect on flood risk. The spring water currently flows into Howley Beck and there will not therefore, be any increase in the flow rate entering the beck from this source. The issue from the spring will be captured in a perforated manhole surrounded by porous stone (the reverse of a soakaway chamber) and conveyed in a land drain to a swale, as shown on the site layout plan in Appendix C. The swale will provide a source of water to the wetland area which will attenuate the flow entering the beck.
- 6.6.5. Removing the raised bund will restore the natural floodplain and will allow overland flow to follow its natural route to Howley Beck. It will also remove the obstacle to fluvial overspill at the north end of the site which currently prevents it from returning to the beck immediately downstream of the bridge at the northern boundary. The re-profiling of the site will create increased cross sectional area, as shown in the cross sections in Appendix G and this will ensure there will be no adverse effect to Howley Beck or increase in flood risk elsewhere.
- 6.6.6. The Environment Agency has questioned whether there could be trapped flood waters at the southern end of the site caused by rising ground levels. If so, this would render the method of estimating flood levels by interpolation invalid. The topographical survey and LiDAR data however, show that there is no rise in ground levels that could create a raised threshold, trapping flood water. It is also evident from the Flood Map for Planning that the flood zones taper to a narrow margin either side of Howley Beck as the beck approaches Primrose Hill. If there were raised ground levels creating impounding of flood waters, the flood map would show a wider expanse to the flood zones.
- 6.6.7. The development at the southern end of the site is in flood zone 1 and any ground raising in this area would have no effect on flood levels.

6.7 Risk of surface water flooding

Risk to the site in its existing condition

- 6.7.1. The Surface Water Flood Map in Appendix I, shows most of the site to be at a very low risk, but a high risk of surface water flooding is indicated in the eastern margin of the southern half of the site. Some isolated flooding also occurs in the northern part of the site. The likelihood of flooding in these areas is greater than once in 30 years and depths are mainly indicated to

be in the range 300mm to 900mm. In the south east part of the site however, depths exceeding 900mm are indicated.

- 6.7.2. For rainfall events occurring on average between once in 30 years and once in 100 years, the extent of deep water flooding increases towards the north and west and in events occurring less than once in 100 years, depths exceeding 900mm are indicated along the eastern margin of the southern half of the site which, at the south, occupies the full width of the site. Approximately halfway between the northern and southern extents of the site, deep water flooding, exceeding 900mm is indicated to occupy approximately one third of the width of the site and the limit of the low risk flooding, where the depth is 0.0m, occurs approximately half way across the site.
- 6.7.3. Comparison of the surface water flood depth map with the topographical survey suggests that the deep water flooding which exceeds 900mm depth reaches the 59.0m contour. The limit of the low risk flooding approximately reaches the 60.0m contour. Following development however, surface water runoff will be managed in the drainage system for the development and in overland flow routes which will ensure that the houses are not at risk of flooding from surface water.

Effect of the proposed development on rapid-response run-off

- 6.7.4. Within the gross site area there will be undeveloped open space amounting to approximately 0.42ha, so the developed area is approximately 2.81ha. For the purposes of this FRA it is assumed that 50% of the developed area will have an impervious surface.
- 6.7.5. Surface water runoff rates and volumes have been estimated using the REFH2 model and FEH point data for the site and the results are provided in Appendix J.
- 6.7.6. The results show that the development will increase surface water runoff rates and volumes by an average of 62% and 57% respectively.

6.7 Risk of sewer flooding

- 6.8.1. [The risk of sewer flooding is assessed to be low.](#)
- 6.8.2. The sewers for the new development may surcharge in rare events but any exceedance flows will be managed in the overland flow routes to which reference is made in paragraph 6.7.3 above.

6.8 Risk of groundwater flooding

6.9.1. Groundwater flooding occurs when the water table rises above the ground surface or enters basements. It is typically associated with highly permeable rock such as chalk and highly fissured limestone, but these conditions are not present at the site. At times of high saturation within the soil mass however, there could be some emergence of sub-surface water in the low lying ground at times when Howley Beck is at a high level. This is unlikely to affect the site following development which will be on raised ground in the lower parts of the site.

6.9 Risk of flooding from reservoirs and canals

6.10.1. The Environment Agency flood map for reservoirs shows the site is not within an area at risk from the uncontrolled release of water from reservoirs and the site is not at risk of flooding from canals.

6.10 Effects of climate change

6.11.1. The effects of climate change must be assessed over the lifetime of the development which, for residential development, a minimum of 100 years is recommended in paragraph 026 of the Planning Practice Guidance.

6.11.2. For the purposes of this assessment, climate change effects are considered up to the year 2120. Current guidance on climate change, updated on 27th July 2021, [7] provides the anticipated changes to peak river flow and rainfall intensity for different scenarios of carbon dioxide emissions over future epochs up to the 2080s. Climate change allowances are provided for each management catchment within the relevant river basin district in England.

Peak river flow allowances

6.11.3. For 'more vulnerable' developments in flood zones 2 or 3a, the central climate change allowance is recommended which, for the Aire and Calder management catchment is 23%.

6.11.4. Climate change effects have been considered at each model node between 1085 and 0424 inclusive.

6.11.5. The Batley Beck model provides predicted flood levels for the 1% AEP_ 20% CCA scenario. Comparison of the flow rates in the model however, reveals that the 1% AEP peak flow rates are not increased by 20%, as shown in Table 6.3.

Model Node	1% AEP flow rate	1% AEP 20% CCA flow rate	Increase	% increase
	m ³ /s	m ³ /s	m ³ /s	
1085	1.850	1.854	0.004	0.22%
0846	4.886	5.142	0.256	5.24%
0838	5.496	7.788	2.292	41.70%
0837	5.496	7.788	2.292	41.70%
0680	4.080	6.174	2.094	51.32%
0424	6.059	6.902	0.843	13.91%

6.11.6. A conservative estimation method of estimating the 1% AEP_23% CCA flood levels is to apply the CCA uplift to the 1% AEP flow rates at the respective nodes and estimate the flood level from the stage-discharge curve. The Environment Agency has requested that this method is used in the FRA. Table 6.4 shows the flow rates at each node with 20% and 23% CCA increases and these are plotted in Figures 2 to 5 which show the best fit trend lines for the stage-discharge curves.

Model Node	1% AEP flow rate	1% AEP 20% CCA flow rate	1% AEP 23% CCA flow rate
	m ³ /s	m ³ /s	m ³ /s
1085	1.850	2.220	2.276
0846	4.886	5.863	6.010
0680	4.080	4.896	5.018
0424	6.059	7.271	7.453

6.11.7. The estimated flood levels with 20% and 23% CCAs are shown in Table 6.5, together with the modelled 20% CCA flood levels for comparison.

Model Node	Modelled 1%_20% CCA flood level	Stage-Discharge 1%_20% CCA flood level	Stage-Discharge 1%_23% CCA flood level
	m AOD	m AOD	m AOD
1085	62.896	63.28	63.36
0846	61.059	61.18	61.21
0680	59.140	59.21	59.22
0424	56.617	56.67	56.75

6.11.8. It is evident from Table 6.5 that at every node, the estimated 20% CCA flood level is higher than the modelled 20% CCA level by between 53mm at node 0424 and 384mm at node 1085. This demonstrates that the estimated flood levels are conservative compared with the model.

Peak rainfall intensity

6.11.9. Current climate change guidance requires the Central and Upper End allowances to be used when assessing the effects of increases to peak rainfall intensities. The allowances apply across the whole of England and are shown in Table 6.4 for the period 2070 to 2115.

Allowance Category	Climate change effect
Central	20%
Upper end	40%

6.11.10. The REFH2 results in Appendix J show the 1% AEP peak runoff rates to increase in the range 76.69 l/s to 89.96 l/s, based on the above climate change allowances. The runoff volumes are in the range 962.70m³/s to 1,133.92m³/s.

6.11.11. The effects of climate change on surface water run-off should be taken into account in the detailed design of the drainage system for the development.

7.1 FLOOD RISK MANAGEMENT

7.1 Fluvial flood risk

7.1.1. Current Environment Agency Standing Advice on preparing a flood risk assessment was updated on 8th February 2022. The advice for vulnerable developments states:

'Finished floor levels should be a minimum of whichever is higher of 300mm above the:

- *average ground level of the site;*
- *adjacent road level to the building;*
- *estimated river or sea flood level'*

7.1.2. The Standing Advice also recommends the use of low permeability construction materials up to the same level as the finished floor level.

7.1.3. The Advice goes on to state:

'If you cannot raise floor levels to meet the minimum requirement, you will need to:

- *Raise them as much as possible;*
- *Consider moving vulnerable uses to upper floors;*
- *Include extra flood resistance and resilience measures.'*

7.1.4. The Environment Agency has previously stated that finished floor levels should be based on the flood level at the upstream model node. Whereas this is an appropriate methodology in the case of a relatively flat site, it is not a reasonable approach for a site which is on a hill. The Batley Beck model predicts flood levels in Howley Beck at the model nodes and calculates the energy loss between nodes and this results in a water surface gradient which is influenced by the bed gradient of the channel. If the FFLs were to be based on the flood level at the upstream model node, this would result in very large step-changes at subsequent downstream nodes as shown in the Figure 6. The drop in level would be:

- 2.15m at node 0846;
- 2.27m at node 0680; and
- 2.47m at node 0424.

- 7.1.5. It is not therefore realistic to base FFLs on the flood level at the upstream model node. There is a transition in flood levels between nodes and FFLs are therefore based on the falling water surface gradient between nodes. The estimated flood levels at each property are based on the modelled flood level at the upstream node and the distance downstream to each property multiplied by the water surface gradients for the respective events. The water surface gradient differs according to the event under consideration, as shown in Table L1 in Appendix L.
- 7.1.6. The interpolated flood levels at the dwellings adjacent to Howley Beck are shown in Table L2 in Appendix L, from which it is evident that the proposed FFL at all plot numbers have at least 600mm freeboard above the 1% AEP flood level including 23% CCA.
- 7.1.7. In order to minimise the risk of obstruction caused by floating debris at the road bridge across Howley Beck, it is recommended that the soffit of the bridge is at least 600mm above the 1% AEP_23% CCA flood level which Table L2 shows to be 58.25m AOD. The soffit level of the bridge should therefore be at least 58.85m AOD in order to achieve 600mm of freeboard.
- 7.1.8. The residual risk of a 0.1% flood level is discussed in section 7.5 below.
- 7.1.9. As stated in paragraph 6.6.3, it is recommended that ground levels are lowered as indicated in the cross sections in Appendix G in order to ensure no loss of floodplain storage.

7.2 Surface water flood risk

- 7.2.1. Provision needs to be made to accommodate the overland flow path through the development. This could be achieved by creating a designed route, such as the main spine road, to convey the surface water safely through the developed site.
- 7.2.2. The Building Regulations require surface water to be discharged according to the following preference hierarchy:
1. to ground by infiltration; or
 2. to a watercourse; or
 3. to a sewer, if options (1) and (2) are not reasonably practicable.
- 7.2.3. The underlying geology suggests that infiltration drainage may be feasible but, given the slope of the site, the risk of sub-surface water emerging further down the hill must be considered. Should this limit the use of infiltration drainage, surface water should be discharged to Howley

Beck at a controlled rate not exceeding the mean annual greenfield runoff rate (Qbar). From the REFH2 results, Qbar is estimated to be 13.88 l/s, as shown in Appendix J.

7.2.4. The volume of runoff discharged from the site in a 1% AEP event should not exceed the greenfield runoff volume in the same event. This is usually achieved if the discharge rate is limited to 2 l/s per ha. As the site area is 3.23ha, the discharge rate may need to be limited to 6.5 l/s in order to achieve the required volume control.

7.2.5. Attenuation storage will be required and the form that this takes will need to be determined in the detailed design of the drainage system. The preliminary estimate of storage, assuming a discharge rate of 6.5 l/s is approximately 1,052m³ based on the REFH2 results. As a comparison, the UK SuDS storage estimate is 1,062m³.

7.2.6. It is recommended that a detailed drainage design is prepared for the development to ensure:

- no surface water flooding resulting from a rainfall event having an A.E.P. of 33% (1 in 30 years);
- only “tolerable” flooding resulting from a rainfall event having an A.E.P. of 1% (1 in 100 years); and
- no increase in off-site flood risk. This will be achieved by complying with the technical standards for sustainable drainage.

7.2.7. “Tolerable” flooding is flooding to a depth that does not result in flooding of buildings and which does not prevent safe access and egress to and from the site.

7.3 Sewer flooding risk

7.3.1. No flood risk management measures are necessary in respect of sewer flooding.

7.4 Groundwater flood risk

7.4.1. No flood risk management measures are necessary in respect of groundwater flooding.

7.5 Residual risks

7.5.1. In a 0.1% AEP event, the freeboard, based on the required FFL, would be in the range 780mm to 300mm. It is worth noting from Table L2 that the estimated 1% AEP_23% CCA flood level exceeds the extreme 0.1% AEP flood level at plots 37 to 52. As this seems unlikely in reality, it further demonstrates that the methodology used in this FRA produces conservative results.

7.6 Safe access and egress

- 7.6.1. The recommended finished floor levels in Appendix L Table L2 demonstrate that dry access to the houses will be possible in all flood events, up to and including the 0.1% AEP event.
- 7.6.2. It is evident from the cross sections plan in Appendix F and the cross sections in Appendix G that the spine road through the development, to the west of plots 37 to 57 will be on high ground, well above the 1% AEP_23% CCA flood level. There will therefore dry access to the spine road.
- 7.6.3. The private drive serving plots 64 and 65 runs along the edge of the outlines of flood zones 2 and 3. The finished ground levels along this road are in the range 59.63m to 60.01m AOD and the minimum road level at the junction with the access road is 59.00m AOD. Table L1 shows the 1% AEP_23% CCA flood level at plot 64 is 58.70m AOD, so there is at least 300mm freeboard in this event.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

- 8.1.1. The development is classified as More Vulnerable major development. It is not within 20m of a Main River.
- 8.1.2. Most of the development of 65 dwellings is in flood zone 1, but 6 plots are in flood zone 2 and 11 plots are in flood zone 3. As it is proposed to raise ground levels in order to achieve the required finished floor levels, the annual probability of fluvial flooding would be reduced to less than 0.1%.
- 8.1.3. The risk of fluvial flooding is from Howley Beck which enters the site at the northern and eastern boundaries. This results in overland flow towards the south of the site. Existing ground levels are generally above the estimated 1% AEP flood levels in Howley Beck except at the northern end of the site between plot numbers 37 and 45 where overland flow occurs. This flow is prevented from returning to the beck by a raised earth bund in the northern part of the site. Removal of this bund will restore natural flow paths and will have no adverse effect on Howley Beck or on flood risk elsewhere. Following removal of the bund and re-profiling of the restored floodplain as recommended in this report, the development will result in a net gain in floodplain storage of approximately 66m³ based on the 1% AEP_23% CCA flood level.

- 8.1.4. The site has no recorded history of flooding, but given the proximity of Howley Beck and the topography, it is likely that there will have been flooding in the low lying eastern margin at several times in the past.
- 8.1.5. The site is at a generally very low risk of surface water flooding but there is a high risk in the eastern margin of the site and an overland flow path develops which reflects the path taken by fluvial flooding. This risk will be mitigated following development, by managing surface water in the drainage system and in safe exceedance flow paths through the site.
- 8.1.6. There is no risk to the site from the uncontrolled release of water from reservoirs or from canals and the risk from sewer flooding is low. There is a potential risk of groundwater emergence in the low lying parts of the site, but only when water levels in Howley Beck are high as, at other times, the beck will draw down the sub-surface water. This risk will be mitigated by the proposed raising of ground levels.
- 8.1.7. Conveying water from the existing spring through a land drain and into a swale which discharges to the wetland habitat area and ultimately to Howley Beck will attenuate peak flow rates and will improve the wetland habitat adjacent to Howley Beck. This will have no adverse effect on flood risk as peak flow rates will be attenuated as the flow passes through the wetland area.
- 8.1.8. The development is estimated to increase surface water runoff rates and volumes, on average, by 62% and 57% respectively.
- 8.1.9. The effects of climate change have been assessed using the current recommended allowance of 23% for vulnerable development. The estimated 1% AEP_23% CCA flood levels exceed the 1% AEP flood levels by 110mm to 300mm, as shown in Table L2.
- 8.1.10. The recommended flood risk management measures in section 7.0 of this report will ensure that dry access to the development will be possible in the design flood event and will minimise the risk of flooding to the development.

8.2 Recommendations

- 8.2.1. It is recommended that the flood risk management measures proposed in section 7.0 of this report are implemented in the design and construction of the development.

- 8.2.2. It is recommended that a sustainable surface water drainage scheme is prepared for the development and submitted to Kirklees MBC and Yorkshire Water for approval, prior to construction.

9.0 REFERENCES

1. National Planning Policy Framework. Department for Communities and Local Government. February 2019.
2. Kirklees Local Plan: Strategy and Policies - Adopted 27th February 2019.
3. Calder Catchment Strategic Flood Risk Assessment. July 2016.
4. National Planning Practice Guidance: Flood Risk and Coastal Change. Updated 15th April 2015. Department for Communities and Local Government.
5. Environment Agency Standing Advice to local planning authorities. April 2015.
6. British Geological Survey Geology of Britain database.
7. Flood risk assessments: climate change allowances. Environment Agency, 19th February 2016, updated 6th October 2021.

Land off Lady Ann Road, Soothill, Batley

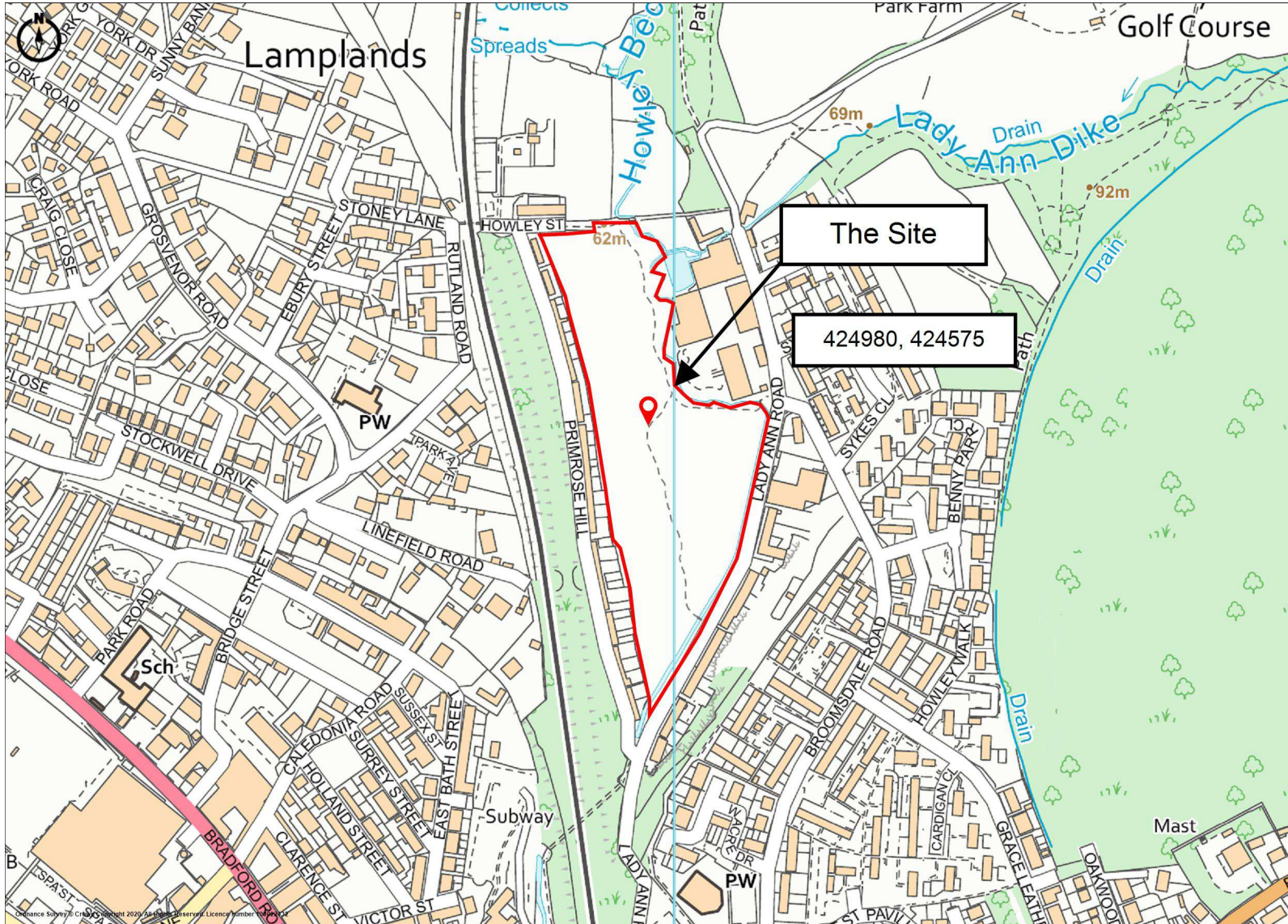


Figure 1: Location Plan

Figure 2: Flow rate -v- flood level at HOW_1085

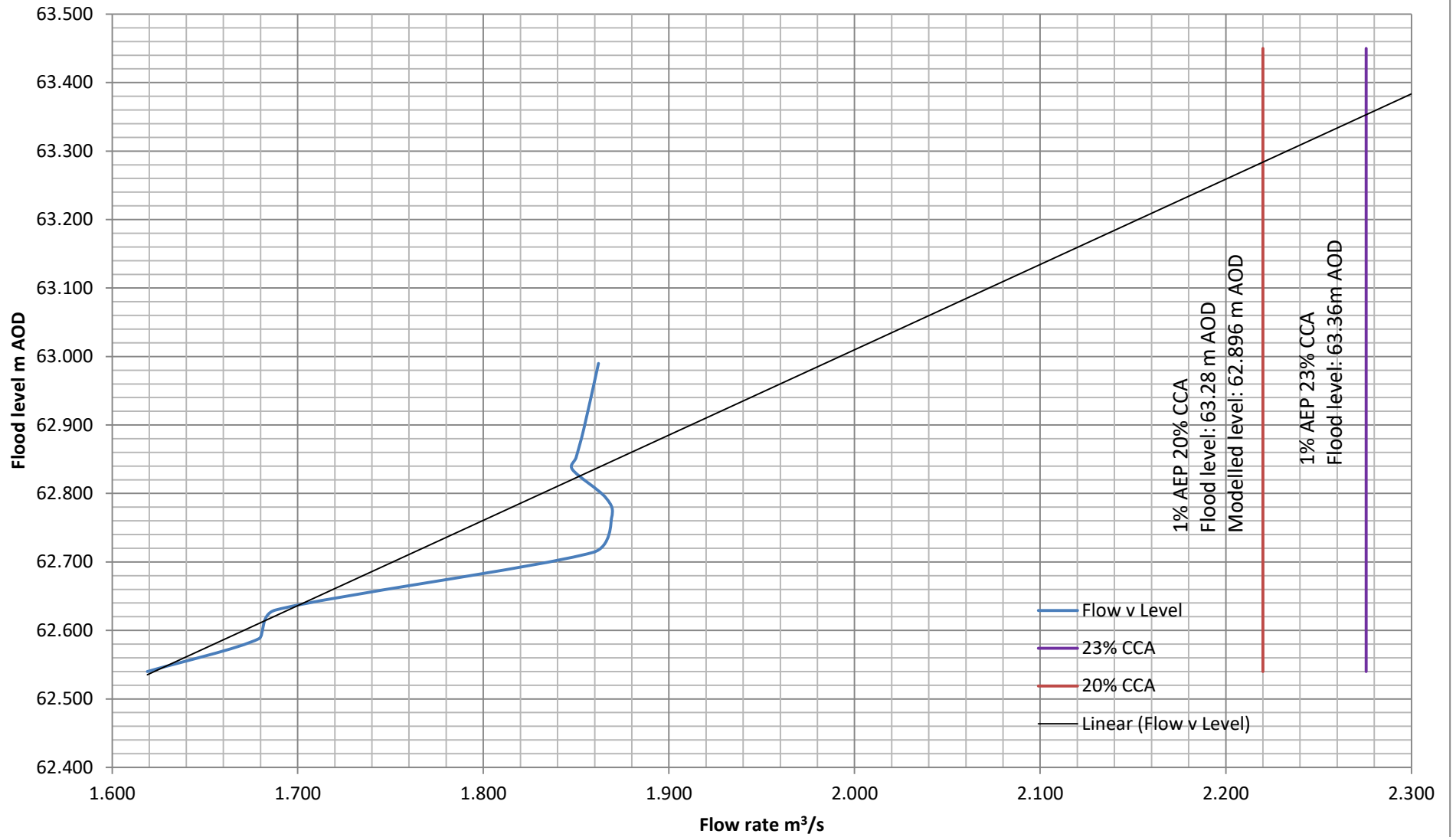


Figure 3: Flow rate -v- flood level at HOW_0846

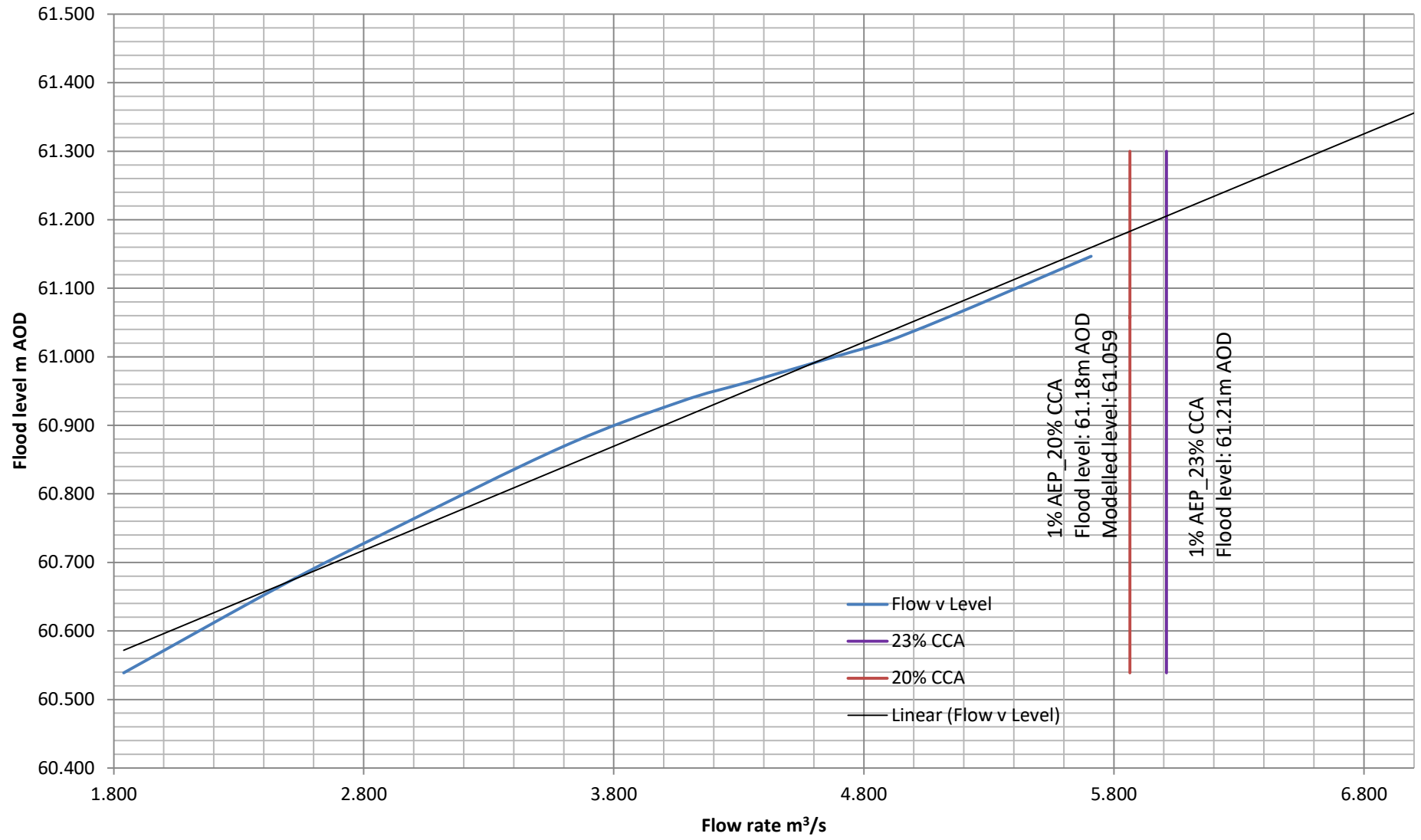


Figure 4: Flow rate -v- flood level at HOW_0680

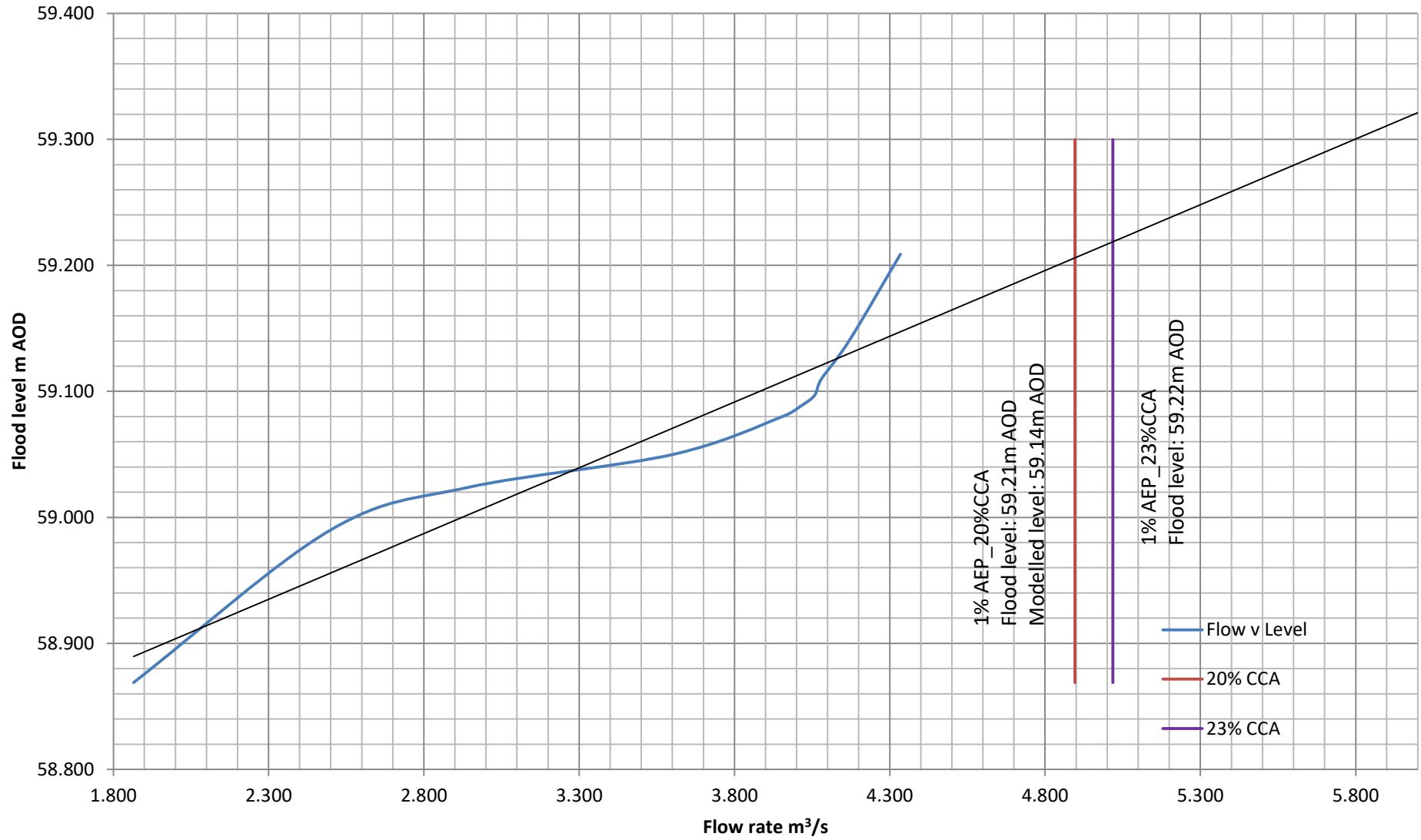


Figure 5: Flow rate -v- flood level at HOW_0424

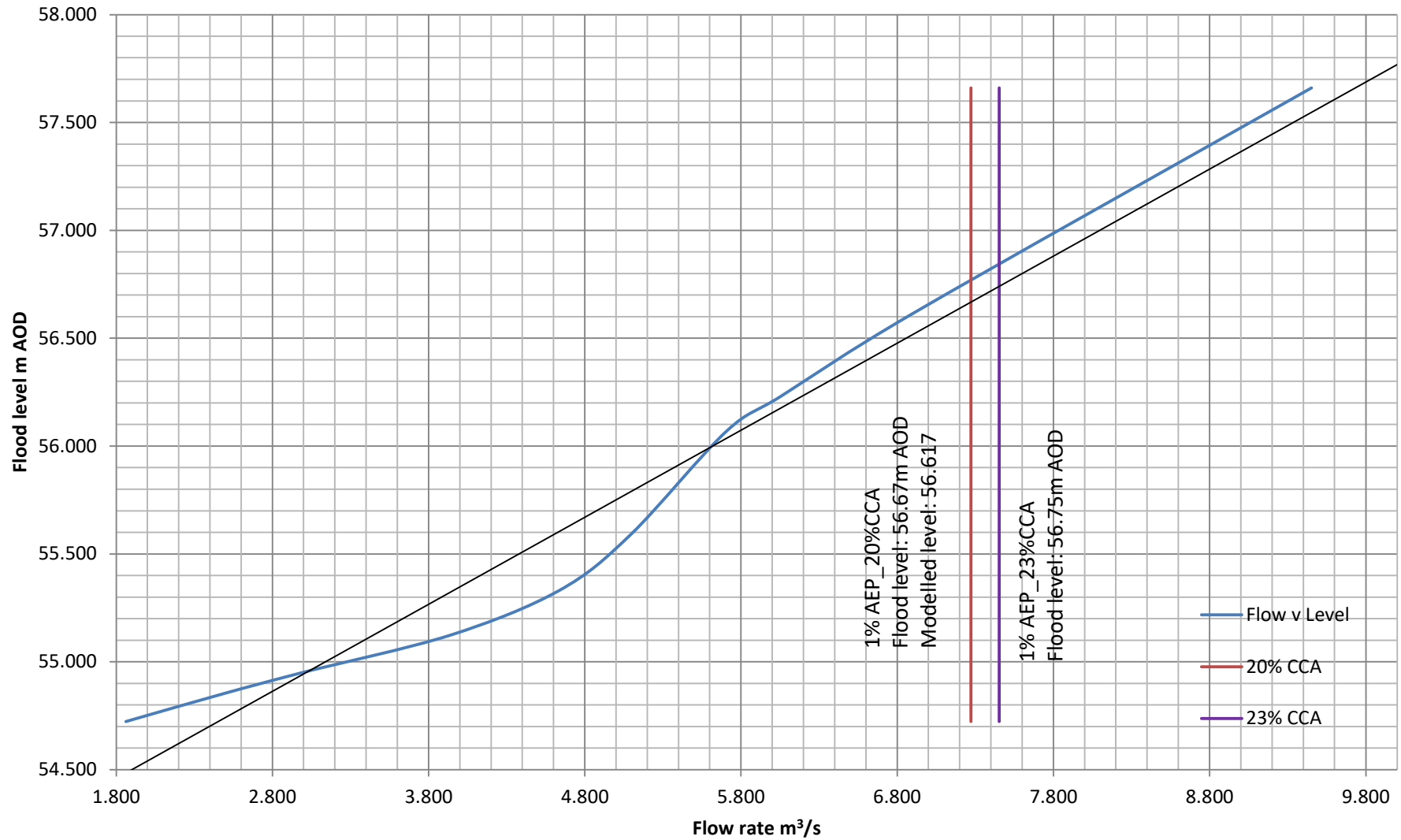
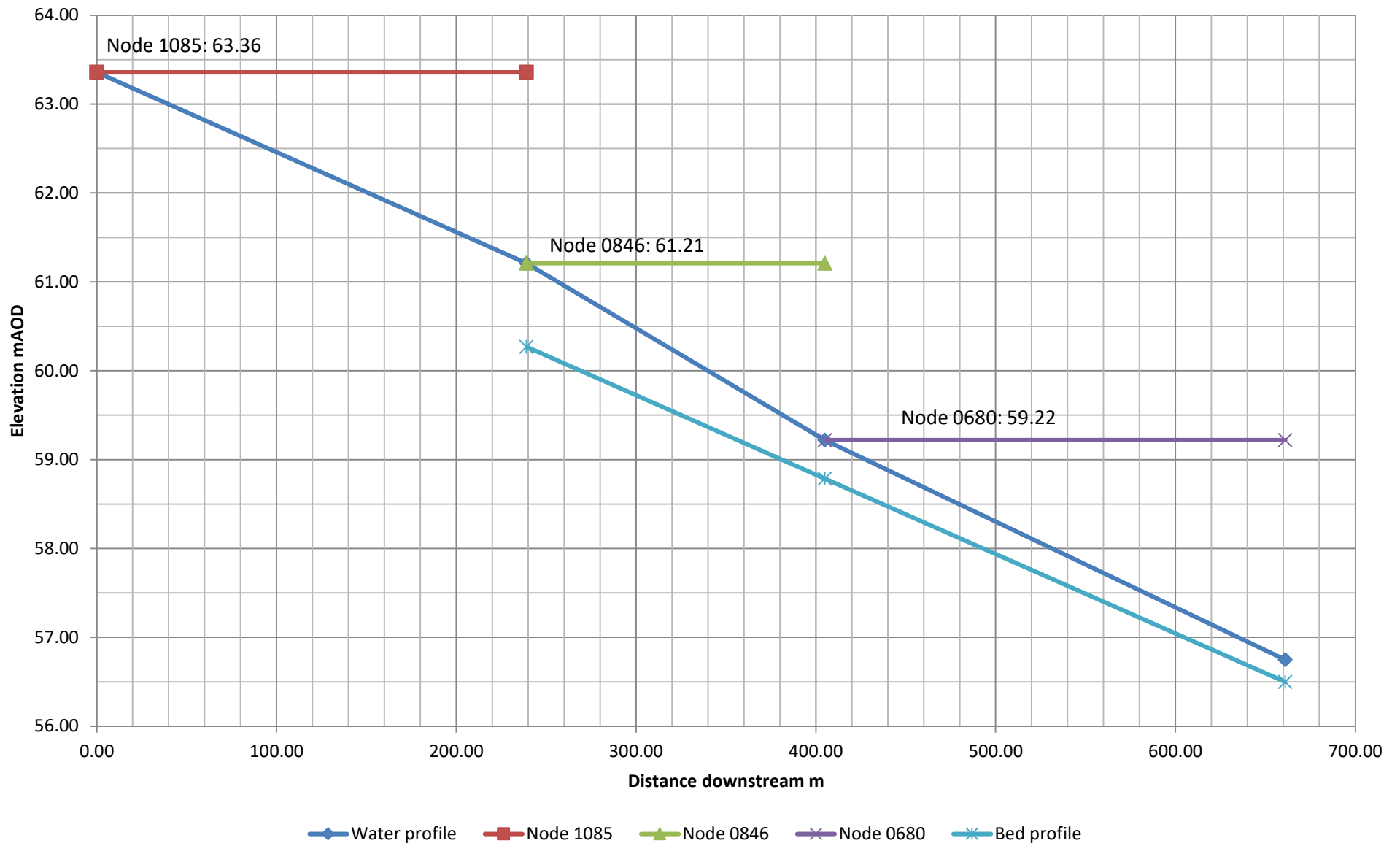


Figure 6: Longitudinal profiles



APPENDIX A

Environment Agency letter dated 28th April 2022

Mr Nick Hirst
Kirklees Metropolitan Borough Council
Development Management
PO Box B93
Huddersfield
West Yorkshire
HD1 2JR

Our ref: RA/2021/143906/04-L01
Your ref: 2021/94280
Date: 28 April 2022

Dear Nick

ERECTION OF 67 DWELLINGS WITH ASSOCIATED WORKS – LAND AT, LADY ANN ROAD, SOOTHILL, BATLEY, WF17 0PY

Further to our previous response we received a revised FRA from JOC Consultants on 20 April 2022, which I understand was forwarded to yourself on 21 April 2022.

Our comments are based on the following document:

- Development at Lady Ann Road, Soothill, Batley, Flood Risk Assessment, Report No: 20/013.01, Revision: 05, Dated: 20th April 2022.

Based on the above, revised FRA, we are able to remove our previous objection, subject to the inclusion of the following planning condition on the decision notice if permission is granted.

Environment Agency Position

The proposed development will only meet the National Planning Policy Framework's requirements in relation to flood risk if the following planning condition is included.

Condition

The development shall be carried out in accordance with the submitted flood risk assessment: Development at Lady Ann Road, Soothill, Batley, Flood Risk Assessment, Report No: 20/013.01, Revision: 05, Dated: 20th April 2022 (The approved FRA) and the following mitigation measures it details:

- Finished floor levels for plots 36 – 52 and 63 - 71 shall be set no lower than the corresponding "Required minimum FFL" for each plot stated in Table L2 (10th column) of Appendix L of the approved FRA.
- Finished floor levels for plots 1 – 35 and 53 – 62 shall be set no lower than the FFL specified in: Constraints Site Plan, Drawing No: 4206 271, Rev: D, 25/10/2019 in Appendix B of the approved FRA.
- Reprofilling of land shall be completed in line with the details provided in Appendices F, G and H of the approved FRA, resulting in no net loss of floodplain storage volume, on site, during the 1% AEP flood event, taking the impacts of climate change into account.

These mitigation measures shall be fully implemented prior to occupation and subsequently in accordance with the scheme's timing/phasing arrangements (as is relevant). The measures detailed above shall be retained and maintained thereafter throughout the lifetime of the development.

Reasons

- To ensure that the development and its users are safe from flooding for the lifetime of the development.
- To prevent increased flooding elsewhere by ensuring that there is no overall loss of fluvial flood water storage on site.

Should you require any further information or clarification, please contact me.

Yours sincerely

Mrs Bev Lambert
Sustainable Places - Planning Advisor

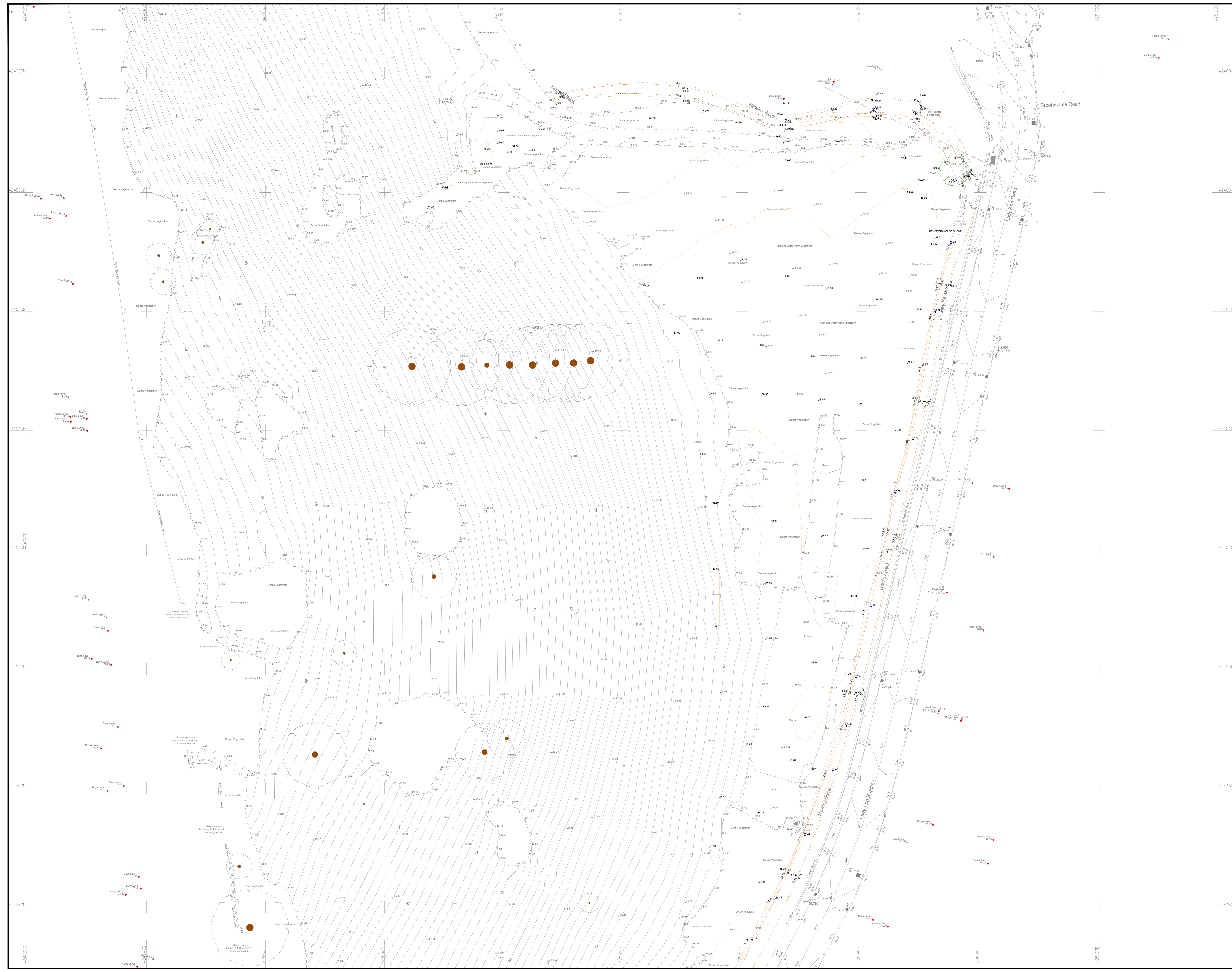
Direct dial 020 302 57982

Direct e-mail bev.lambert@environment-agency.gov.uk

Team e-mail sp-yorkshire@environment-agency.gov.uk

APPENDIX B

Topographical survey plan



↑
N
↓

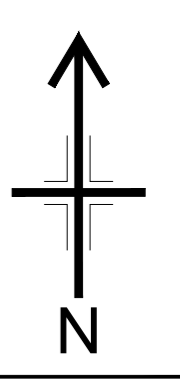
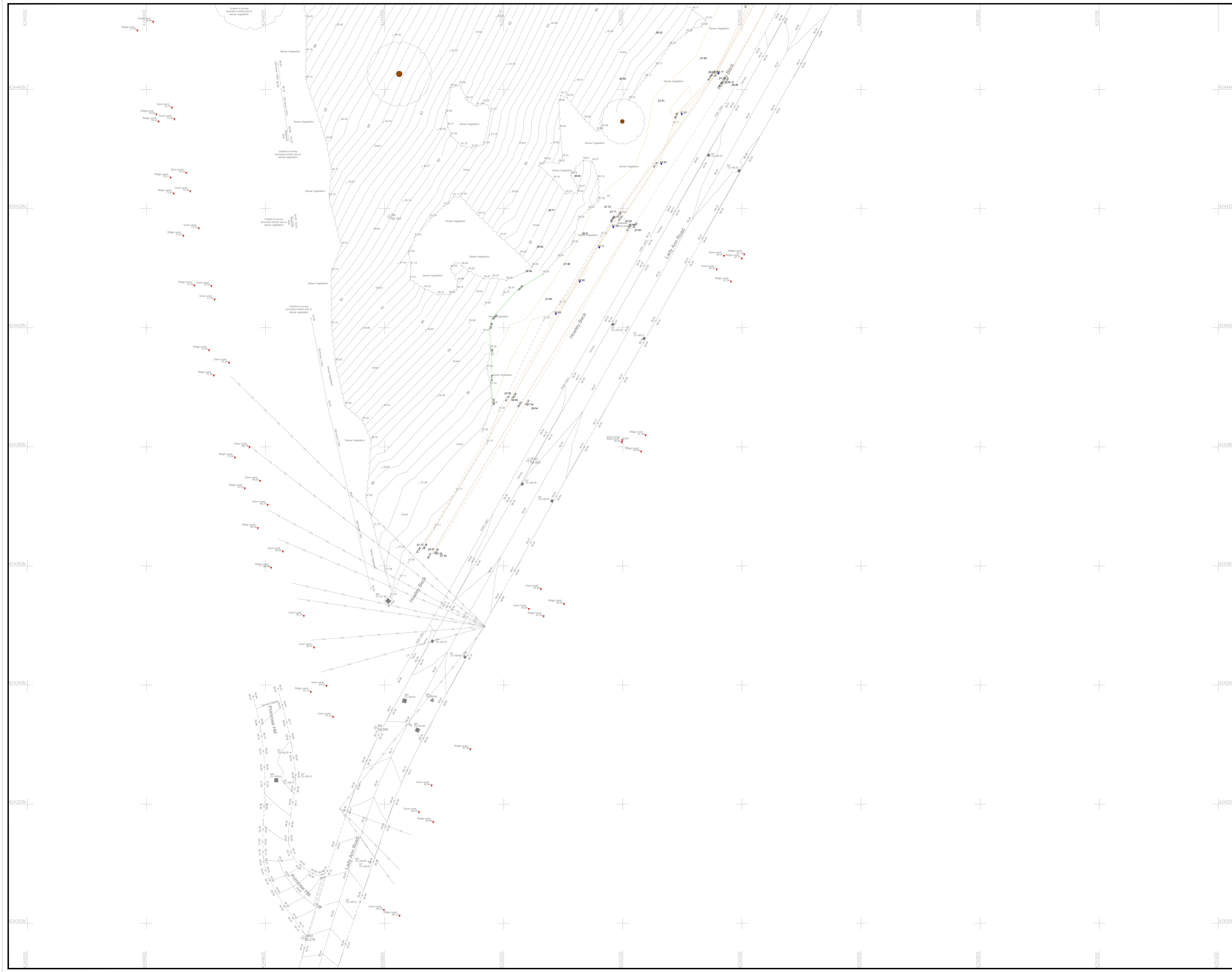
GRID: OS NATIONAL GRID
Using the OS GPS Network and applying OSTN15 Transformation and then removing the scale factor for true distances with a one-step transformation centred on ZH01
DATUM: OS LEVEL DATUM
Using the OS GPS Network and applying OSGM15 National Geoid Model to obtain local area corrections

- Topographic Legend**
- Bottom of Bank
 - Top of Banking
 - Building
 - Building Canopy
 - Concrete Base
 - Contour Major
 - Contour Minor
 - Fences
 - General
 - Kerb Bottom
 - Kerb Drop
 - Kerb Top
 - OH Electric
 - Railway Line
 - Road Centre
 - Road Markings
 - SC Hard/Hard
 - SC Hard/Soft
 - SC Soft/Soft
 - Steps
 - Tree Canopy
 - Vegetation
 - Visible Trench
 - Walls
 - Water Edge

- Topographic Abbreviations**
- | | | | |
|-------|-----------------------|-------|-------------------------|
| AV | Air Valve | PB | Pedestrian Beacon |
| BH | Borehole | PGR | Post Box |
| BO(L) | Bollard (Illuminated) | PM | Parking Meter |
| BS | Bus Stop | PO | Post |
| Cab | Cabinet | RE | Rodding Eye |
| CL | Cover Level | RS(L) | Road Sign (Illuminated) |
| COL | Column | RWP | Rain Water Pipe |
| CONC | Concrete | SP(L) | Sign Post (Illuminated) |
| DC | Drainage Channel | SPCam | Speed Camera |
| DFBin | Dog Poul Bin | ST | Stop Tap |
| DP | Down Pipe | SV | Sluice Valve |
| EP | Electricity Pole | SVP | Soil Vent Pipe |
| ER | Earth Road | TBox | Telephone Box |
| FLL | Finished Floor Level | TL | Traffic Light |
| FL | Flag | TOP | Top of Fence Level |
| FP | Flag Pole | TOW | Top of Wall Level |
| GP | Gate Post | VP | Telecoms Pole |
| GV | Gas Valve | VP | Vent Pipe |
| GY | Gully | WB | Waste Bin |
| IC | Inspection Cover | WBM | Window Bottom Level |
| KO | Kerb Outlet | WM | Water Meter |
| LP | Lamp Post | W/O | Wash Out |
| MH | Manhole | W/T | Window Top Level |
| Mkz | Marker | WV | Water Valve |
| MP | Marker Post | MW | Monitoring Well |

Notes
THIS DRAWING SHOULD ONLY BE USED FOR ITS ORIGINAL PURPOSE. CENTARA LTD. ACCEPTS NO RESPONSIBILITY FOR THIS DRAWING IF SUPPLIED TO ANY PARTY OTHER THAN THE ORIGINAL CLIENT.
ALL DIMENSIONS SHOULD BE VERIFIED ON SITE PRIOR TO CONSTRUCTION.
ALL HATCHING IS FOR PRESENTATIONAL PURPOSES ONLY.

Client	D NOBLE
Site Location:	LADY ANN ROAD BATLEY
Purpose of Drawing	TOPOGRAPHICAL SURVEY
Surveyed:	DH
Checked:	SH
Date:	23/11/20
Drawn:	DH
Authorised:	NB
Scale:	1:200@A0
Office 10, Ripley Drive, Normanton Business Park, Wakefield, WF6 1QT, info@centara-ld.com	
Project Number:	106180
Sheet Number:	1 of 2



GRID: OS NATIONAL GRID
 Using the OS GPS Network and applying OSTN15 Transformation and then removing the scale factor for true distances with a one-step transformation centred on ZHD
 DATUM: OS LEVEL DATUM
 Using the OS GPS Network and applying OSGM15 National Geoid Model to obtain local area corrections

Topographic Legend

- Bottom of Bank
- Top of Banking
- Building Canopy
- Concrete Base
- Contour Major
- Contour Minor
- Fences
- General
- Kerb Bottom
- Kerb Top
- Kerb Drop
- OH Comms
- OH Electric
- Railway Line
- Road Centre
- Road Markings
- SC Hard/Hard
- SC Hard-Soft
- SC Soft-Soft
- Steps
- Tree Canopy
- Vegetation
- Visible Trench
- Walls
- Water Edge

Topographic Abbreviations

- | | | | |
|-------|-----------------------|-------|-------------------------|
| AV | Air Valve | PB | Pedestrian Beacon |
| BH | Borehole | PGR | Post Box |
| BO(L) | Bollard (Illuminated) | PM | Pedestrian Guard Rail |
| BS | Bus Stop | PO | Parking Meter |
| Cab | Cabinet | RE | Post |
| CL+ | Cover Level | RE | Rodding Eye |
| COL | Column | RS(L) | Road Sign (Illuminated) |
| Conc | Concrete | RWP | Rain Water Pipe |
| DC | Drainage Channel | SP(L) | Sign Post (Illuminated) |
| DFBin | Dog Foul Bin | SPCam | Speed Camera |
| DP | Down Pipe | ST | Stop Tap |
| EP | Electricity Pole | SV | Soil Vent Pipe |
| ER | Earth Rod | SV | Sluice Valve |
| FFL | Finished Floor Level | TLP | Traffic Light |
| FH | File Hydrant | TOP | Top of Fence Level |
| FP | Flag Pole | TOW | Top of Wall Level |
| GP | Gate Post | TP | Telecoms Pole |
| GV | Gas Valve | VP | Vent Pipe |
| GY | Gully | WB | Waste Bin |
| IC | Inspection Cover | WBM | Window Bottom Level |
| KO | Kerb Outlet | WM | Water Meter |
| LP | Lamp Post | WO | Wash Out |
| MH | Manhole | WTT | Window Top Level |
| Mkr | Marker | WV | Water Valve |
| MP | Marker Post | MW | Monitoring Well |

Notes

THIS DRAWING SHOULD ONLY BE USED FOR ITS ORIGINAL PURPOSE. CENTARA LTD. ACCEPTS NO RESPONSIBILITY FOR THIS DRAWING IF SUPPLIED TO ANY PARTY OTHER THAN THE ORIGINAL CLIENT.
 ALL DIMENSIONS SHOULD BE VERIFIED ON SITE PRIOR TO CONSTRUCTION.
 ALL HATCHING IS FOR PRESENTATIONAL PURPOSES ONLY.

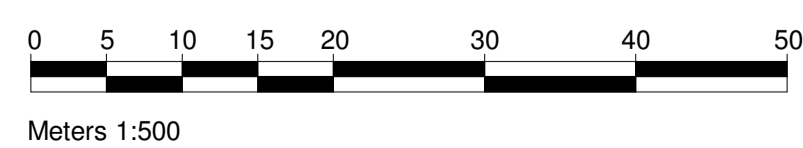
Client	D NOBLE
Site Location:	LADY ANN ROAD BATLEY
Purpose of Drawing	TOPOGRAPHICAL SURVEY
Surveyed:	DH
Checked:	SH
Date:	23/11/20
Drawn:	DH
Authorised:	NB
Scale	1:200@A0
Office 10, Ripley Drive, Normanton Business Park, Wakefield, WF6 1QT, info@centara-ltd.com	
Project Number:	106180
Sheet Number:	2 of 2

APPENDIX C

Site Layout Plan



PROPOSED SITE PLAN



PLANNING

Client: D Noble Ltd
Project: Lady Anne Road, Batley
Scales@A1 1:500
Drawn: AJB
Date: 11/10/22
Checked: NB

Client: D Noble Ltd
Project: Lady Anne Road, Batley
Scales@A1 1:500
Drawn: AJB
Date: 11/10/22
Checked: NB

Drawing no: 10703-SELF-P-ZZ-A-M3- 001
Rev: B

Rev	Date	Drawn	Description
B			

APPENDIX D

Flood map overlay

Flood map for planning

Your reference
20/013

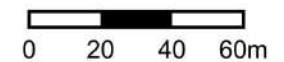
Location (easting/northing)
424983/424546

Scale
1:2500

Created
14 Dec 2022 14:27



-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area



APPENDIX E

Environment Agency flood data

Flood map for planning

Your reference
20/013

Location (easting/northing)
424983/424546

Created
14 Dec 2022 14:27

Your selected location is in flood zone 3, an area with a high probability of flooding.

This means:

- you must complete a flood risk assessment for development in this area
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (see www.gov.uk/guidance/flood-risk-assessment-standing-advice)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2022 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>


Flood map for planning

Your reference
20/013

Location (easting/northing)
424983/424546

Scale
1:2500

Created
14 Dec 2022 14:27

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area



John O'Connor

From: France, Debbie [Debbie.France@environment-agency.gov.uk]
Sent: 02 July 2020 15:08
To: john@jocconsultants.co.uk
Subject: Your Enquiry: RFI/2020/171394
Attachments: Planning advice for developers.pdf; Supporting Information 171311.pdf

Our Ref: RFI/2020/171394

Dear John

**RE: Provision of Product 4 for Lady Ann Road, Batley
Request for information under the Freedom of Information Act 2000 (FOIA) / Environmental
Information Regulations 2004 (EIR)**

Thank you for your enquiry which was received on 20 May 2020. Apologies for the delay in responding

We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 and the associated Environmental Information Regulations 2004.

The requested Product 4 data is too large to send by email but is available on the following link: <https://ea.sharefile.com/d-s6abf9a7fd1a4c64b> Please also see the attached 'Supporting Information' document which should be read in conjunction with this data.

Please note the above link will expire in 30 days so we strongly recommend downloading the files and saving these to your computer as soon as this email is received. Any request for a link to be remade after it has expired will be considered as a new enquiry and will be subject to a response within 20 working days.

I can also confirm that there are no planned defences in this area.

This information is provided subject to the Open Government Licence ([here](#)). Please read for details of permitted use.

If you are using our data to inform a development proposal, we encourage you to contact our Sustainable Places team for pre-application advice. Their advice can help you solve key environmental issues early, reduce the chance of an objection and help you design a more sustainable development. To take advantage of this service and gain further details, together with estimated costs, please email sp-yorkshire@environment-agency.gov.uk.

For general enquiries relating to your development or our role within the planning system, please refer to the attached 'Planning advice for developers' document.

I hope that we have correctly interpreted your request. If you are not satisfied with our response to your request for information you can contact us within 2 calendar months to ask for our decision to be reviewed.

Yours sincerely

Debbie France
Customers and Engagement Team
Environment Agency | Lateral, 8 City Walk, Leeds, LS11 9AT

debbie.france@environment-agency.gov.uk
External: 0203 0254731 | Internal :54731

Enquiries Team Tel: 020 847 48174
Email: neyorkshire@environment-agency.gov.uk

Working days: Monday to Friday

CORONAVIRUS PROTECT YOURSELF & OTHERS	For the latest guidance: - INTRANET.EA.GOV - NHS.UK/coronavirus - GOV.UK/coronavirus	 Environment Agency
--	---	--



Creating a better place
for people and wildlife



Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else. We have checked this email and its attachments for viruses. But you should still check any attachment before opening it. We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes.

The Flood Map for Planning

The Flood Map for Planning (Rivers and Sea) can be viewed and downloaded as a PDF file on GOV.UK by following this link: <https://flood-map-for-planning.service.gov.uk> or downloaded in GIS format under an open data licence from the following address: <https://data.gov.uk/publisher/environment-agency>

Please type Flood Map for Planning in the search box.

What is the Flood Map for Planning?

The Flood Map for Planning provides information on flooding from rivers and the sea for England and Wales. The Flood Map also has information on flood defences and the areas benefiting from those flood defences.

The Flood Map for Planning shows the following:

1. Flood Zone 3 (dark blue area on the enclosed map): natural flood plain area that could be affected by flooding from rivers and/or the sea – not taking into account the presence of any flood defences
 - For flooding from rivers the map indicates the extent of a flood with a 1% (1 in 100) chance of happening each year;
 - For flooding from the sea the map shows the extent of a flood with a 0.5% (1 in 200) chance of happening each year.
2. Flood Zone 2 (light blue area): natural flood plain area that could be affected by flooding from rivers and/or the sea – not taking into account the presence of any flood defences. Flood Zone 2:
 - indicates the extent of a flood with a 0.1% (1 in 1000) chance of happening each year.
 - and/or indicates the greatest recorded historic flood, whichever is greater.
3. Flood defences built in the last five years to protect against river floods with a 1% (1 in 100) chance of happening each year, together with some natural or constructed entities which retain, store or channel water and which may protect against smaller floods.
4. Areas benefiting from flood defences - areas that benefit from the flood defences shown, in the event of a river flood with a 1% (1 in 100) chance of happening each year, or a flood from the sea with a 0.5% (1 in 200) chance of happening each year. If the defences were not there, these areas would flood.

Flood History

To the best of our knowledge there is no known flood history for this site. However, in close proximity to this location we do have some flood history available (see enclosed map). The extent of flooding, and/or flood level information is only shown for those watercourses surveyed after the flood. Other flooding may have occurred which is not shown. This is the best information currently available.

Name	Start Date	End Date	Flood Source	Flood Cause	Source of data
2019 November Flood Incident	07/11/2019	08/11/2019	main river	channel capacity exceeded (no raised defences)	Visual

Water causing flooding can come from different places, for example from rivers or the sea; surface water (i.e. rainwater flowing over or accumulating on the ground before it is able to enter rivers or the drainage system); overflowing or backing up of sewers or drainage systems which have been overwhelmed or from groundwater rising up from underground aquifers.

Please note that this record doesn't include any flood extents that may have occurred since December 2019. Given the process of recording, verifying and updating our record from major floods is extensive and may take a considerable amount of time.

Assets

Asset Location Map

Please find attached asset map(s) showing location of all (Agency and non Agency maintained) flood defences and channels.

Description of Works

See attached table with description of the defences and structures shown on the above drawing, including condition ratings, upstream and downstream crest levels, where available.

Risk of Flooding – Environment Agency Defences

The risk of flooding in this area is now reduced by the presence of flood defences that we maintain, but there still is a residual risk of flooding if these were to breach or be overtopped by a flood greater than that for which they were designed.

Risk of Flooding – Privately Maintained Defences

You will see that the Environment Agency does not maintain any of those defences. However we undertake regular risk based visual inspections. We do not hold design levels and have no height information on these defences or structures.

Asset Condition Ratings

The performance of a flood defence asset is recorded as the condition of the asset. Our asset inspectors subjectively assess the conditions of assets (during visual inspection site visits) with reference to a national standard template. Each asset is given a rating between one and five with one being very good condition and five being very poor. A condition rating of 3, or 'fair' is the minimal acceptable standard for a critical asset, such as a defence wall that protects properties. We are striving to improve all assets below 'fair' to an acceptable standard.

Asset inspections are done on average every six months, although some critical assets are assessed on a more regular basis. It is possible that adjacent assets are inspected on different dates, which may result in two assets of a similar state of repair having different condition ratings.

Condition ratings of assets may also be affected by the time of year the surveys are conducted, as vegetation may obscure the asset in the summer months, or accessibility may be an issue during winter months. These factors would not usually affect the recorded condition rating of an asset unless the asset is on a borderline between two ratings.

Asset Standard of Protection

Please note that the provided Design Standard of Protection is an estimate and should not be relied on. Please note that where available the defended flood extents provide more reliable information relating to the protection offered by the defence (i.e. at which return period the water levels are likely to overtop the defence). If available and required the defended flood extents can be provided on request.

Modelling

Batley Beck model study 2015

A new study to improve our existing Flood Mapping in the area has been completed in 2015.

Modelled flood levels are available. Please find attached:

- Results for peak water levels and flows for the 0.1% (1 in 1000), 0.5% (1 in 200), 1% (1 in 100), 1.3% (1 in 75), 2% (1 in 50), 3.33% (1 in 30), 5% (1 in 20), 10% (1 in 10), 20% (1 in 5) and 50% (1 in 2) Annual Exceedance Probabilities (AEP) for the defended scenario.
- Results for peak water levels and flows for the 1% (1 in 100), 1.3% (1 in 75), 2% (1 in 50), 3.33% (1 in 30), 5% (1 in 20), 10% (1 in 10), 20% (1 in 5) and 50% (1 in 2) Annual Exceedance Probabilities (AEP) for the undefended scenario.
- Results for peak water levels and flows for the 1% (1 in 100) plus 20% climate change Annual Exceedance Probabilities (AEP), for both the defended and undefended scenarios.
- an associated map showing the location of the model node points.
- Defended depth grid maps (in PDF) format for the 1% (1 in 100), 1% (1 in 100) plus 20% Climate Change and 0.1% (1 in 1000) Annual Exceedance Probabilities (AEP)

There are defended depth grid maps (in PDF format) available for all the Annual Exceedance Probabilities (AEP). They can be provided on request. Please note the grids in ascii format are not currently available due to they are being investigated.

Climate Change

Updated guidance on how climate change could affect flood risk to new development - '[Flood risk assessments: climate change allowances](#)' was published on gov.uk on 19 February 2016. You should confirm the flood risk vulnerability classification and lifetime of your proposed development in line with NPPF and apply the appropriate climate change allowances.

Bespoke Flood Risk Assessment (FRA) advice:

If the pre-application advice is required with regards the preparation of a site-specific Flood Risk Assessment, this can be requested via the Yorkshire Sustainable Places team (email: sp-yorkshire@environment-agency.gov.uk). Charges may apply for any advice that is provided, this currently stands at £100 per hour per person. The [.gov.uk](#) pages provide a good starting point on what to include within a site-specific Flood Risk Assessment and can be accessed via <https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>. A site-specific Flood Risk Assessment will need to consider flood risks from all sources, including those associated with defence failure (e.g. breach) and accounting for the predicted impacts as a result of climate change. Please contact the Sustainable Places team if you require advice on how to include these within a Flood Risk Assessment.

Other

Surface Water Map

Lead Local Flood Authorities (LLFA) are responsible for managing local flood risk from surface water flooding and groundwater flooding. You should check with the LLFA as they may have more up to date information regarding this type of flooding.

The Risk of Flooding from Surface Water Flood Map can be viewed and downloaded as a PDF file on GOV.UK by following this link: <https://flood-warning-information.service.gov.uk/long-term-flood-risk>

Surface Water Drainage

The Lead Local Flood Authority is the statutory consultee for planning matters relating to surface water drainage, therefore it is recommended they should be consulted separately regarding this.

Surface water discharge from new development should ideally 'mimic' the pre-development situation using a sustainable drainage system so that the flow and volume of water in watercourses is not increased.

A permit may be required, under the Environmental Permitting Regulations 2016 from the Environment Agency for any proposed works or structures in, under, over or within eight metres of a 'main river' (e.g. a new outfall). A permit is separate to and in addition to any planning permission granted. Further details and guidance are available on the GOV.UK website: <https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>

Risk of Flooding from Reservoirs Map

Outlines and simplified depth and velocity maps can be viewed on our website:

<https://flood-warning-information.service.gov.uk/long-term-flood-risk/#x=438988&y=406600&scale=2>

Please, zoom into the location of interest, and then click on the inundated location for details. As a result a list of reservoirs will be provided with supporting information and a links to other data, such as estimated depths and speed of flooding, at the bottom of the result page.

A map showing the outlines can also be provided on request.

Flood Warning

The site is not covered by a Flood Warning.

LIDAR Data

Please note that our LiDAR data is now available free of charge (Open Data) from <http://environment.data.gov.uk/ds/survey/index.jsp#/survey> (once zoomed to the relevant location the available LiDAR products will be listed below the map).

Two LIDAR products are available:

1. Tiled LIDAR data - The full tiled dataset consists of historic LIDAR data which has been gathered since 1998. For some areas we have carried out repeat surveys and data is available in a range of resolutions.
2. Composite LIDAR data - The composite dataset is derived from a combination of our full tiled dataset which has been merged and re-sampled to give the best possible spatial coverage.

Light Detection and Ranging (LIDAR) is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground. This technique results in the production of an accurate, cost-effective terrain model suitable for assessing flood risk and other environmental applications.

The Environment Agency owns two LIDAR systems, which are installed in a survey aircraft along with its other operational remote sensing instruments.

The aircraft is positioned and navigated using Global Positioning System (GPS) corrected to known ground reference points. The aircraft typically flies at a height of about 800 metres above ground level and a scanning mirror allows a swath width of about 600 metres to be surveyed during a flight.

The Rights & Responsibilities of a Riverside Owner

The owner of property adjacent to a watercourse is usually deemed to be the riparian owner and, as such, has both riparian rights and responsibilities with regard to the watercourse within their ownership.

For more information on Rights and Responsibilities of a riverside owner, you can visit our website at:

<https://www.gov.uk/guidance/owning-a-watercourse>

Ordnance Survey Data

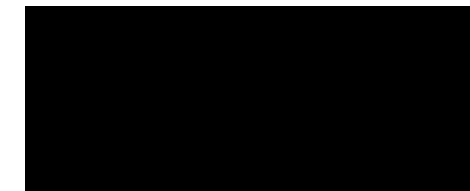
Under the terms of our licence agreement with the Ordnance Survey, we are unable to supply the OS data. Under this agreement we can only supply OS data to consultants/contractors carrying out work on our behalf.

Flood Portal

It's a new 'one-stop shop' web portal providing guidance and information on flood risk management in the UK. Arup have written and designed the site, in conjunction with CIRIA, the Local Government Association, the EA and Defra, primarily as a resource for local authority officers, flood risk management professionals, and others with an interest in flood risk. It's a part of the Capacity Building Strategy. <http://www.local.gov.uk/floodportal>

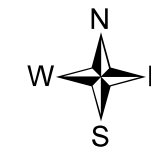
RFI/2020/171394 Flood History Map centred on Land off Lady Ann Road, Soothill, Batley, WF17 0QA.

Date created: 01/07/2020

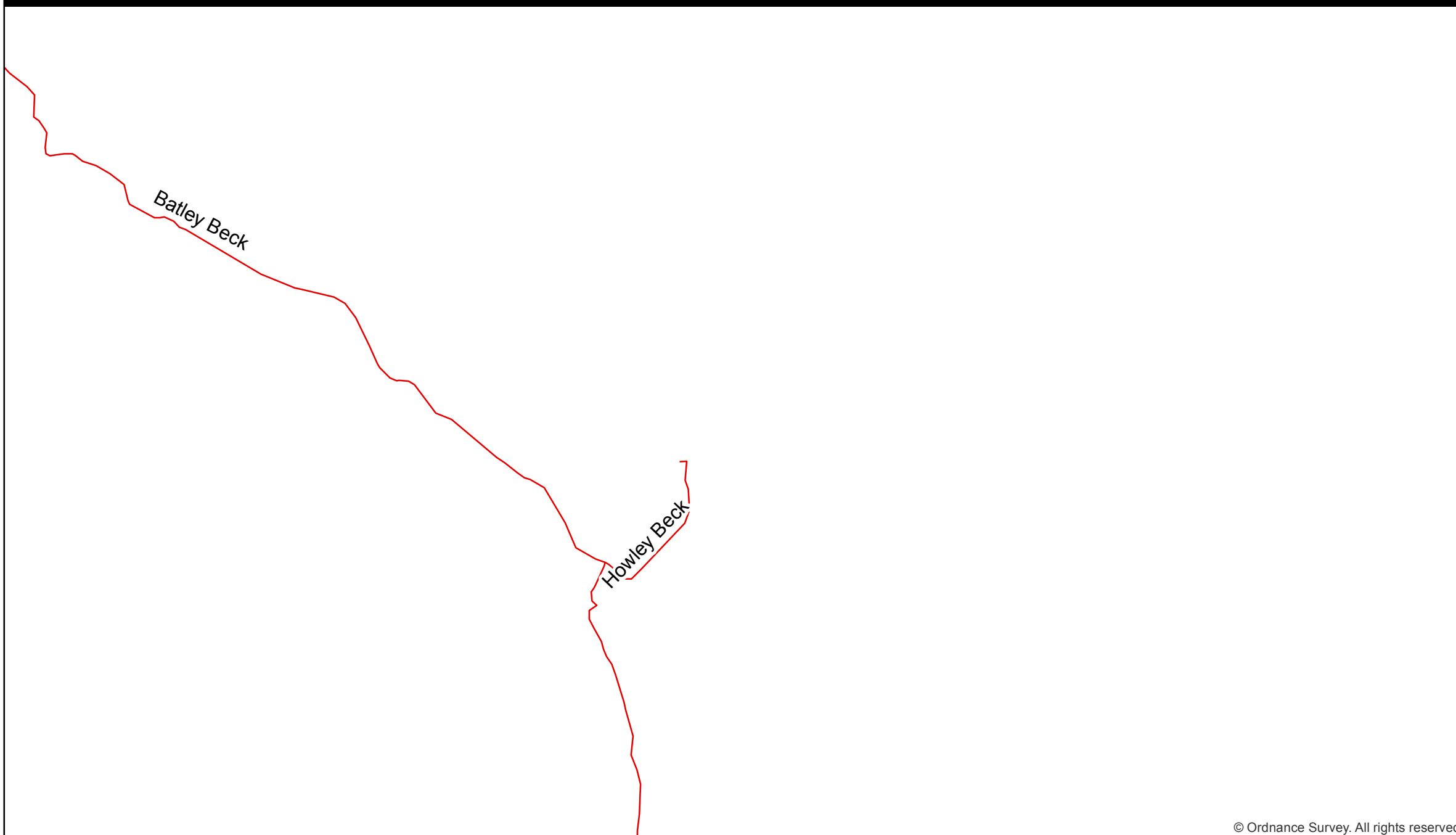


www.environment-agency.gov.uk

Scale: 1:8,000



when reproduced @ A3



LEGEND

— Main River

Recorded Flood Outlines

■ 2019 November Flood Incident

© Ordnance Survey. All rights reserved.

RFI/2020/171394 Assets Map centred on Land off Lady Ann Road, Soothill, Batley, WF17 0QA.

Date created: 01/07/2020



www.environment-agency.gov.uk

Scale: 1:8,000

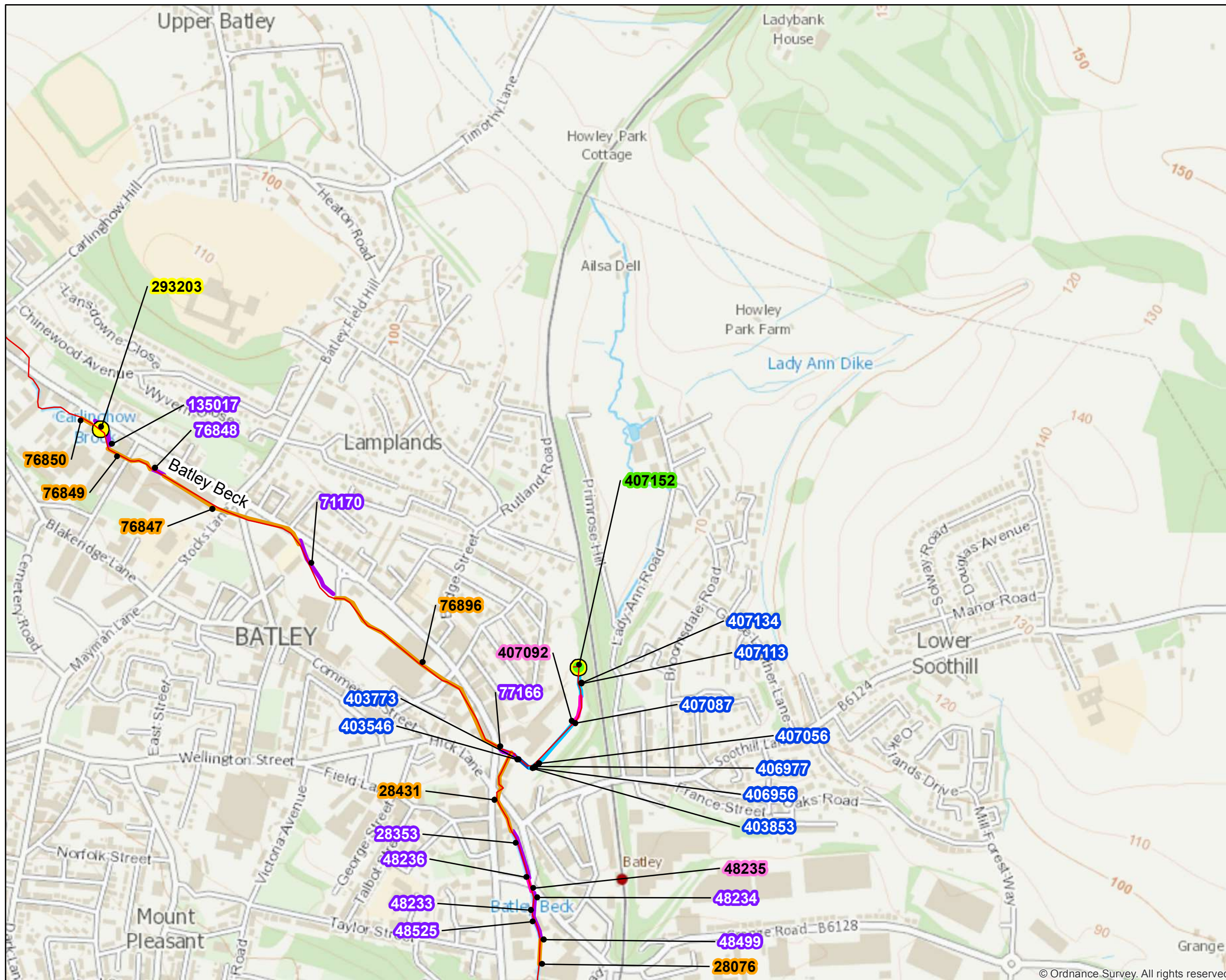


when reproduced @ A3



LEGEND

- Main River
- Structures (3rd party maintained)
- Structures (EA maintained)
- Channels (3rd party maintained)**
- SUB_TYPE
- simple_culvert
- Channels (EA maintained)**
- SUB_TYPE
- simple_culvert
- Defences (3rd party maintained)**
- SUB_TYPE
- high_ground
- Defences (EA maintained)**
- SUB_TYPE
- high_ground
- wall



© Ordnance Survey. All rights reserved.

RFI/2020/171394 Node Point Map centred on Land off Lady Ann Road, Soothill, Batley, WF17 0QA.

Date created: 01/07/2020



www.environment-agency.gov.uk

Scale: 1:8,000

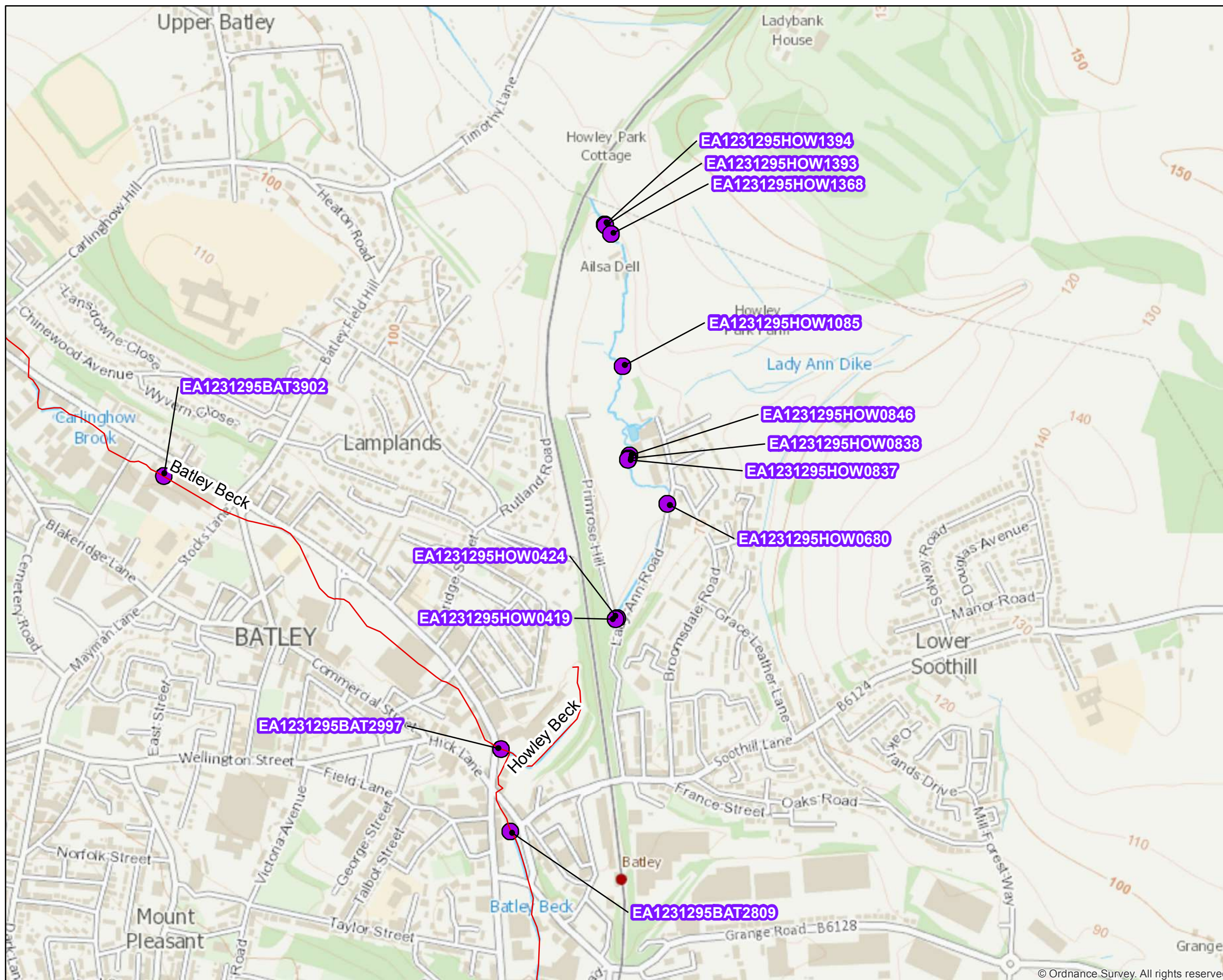


when reproduced @ A3



LEGEND

- Main River
- 2015 Batley Beck Node Points



© Ordnance Survey. All rights reserved.

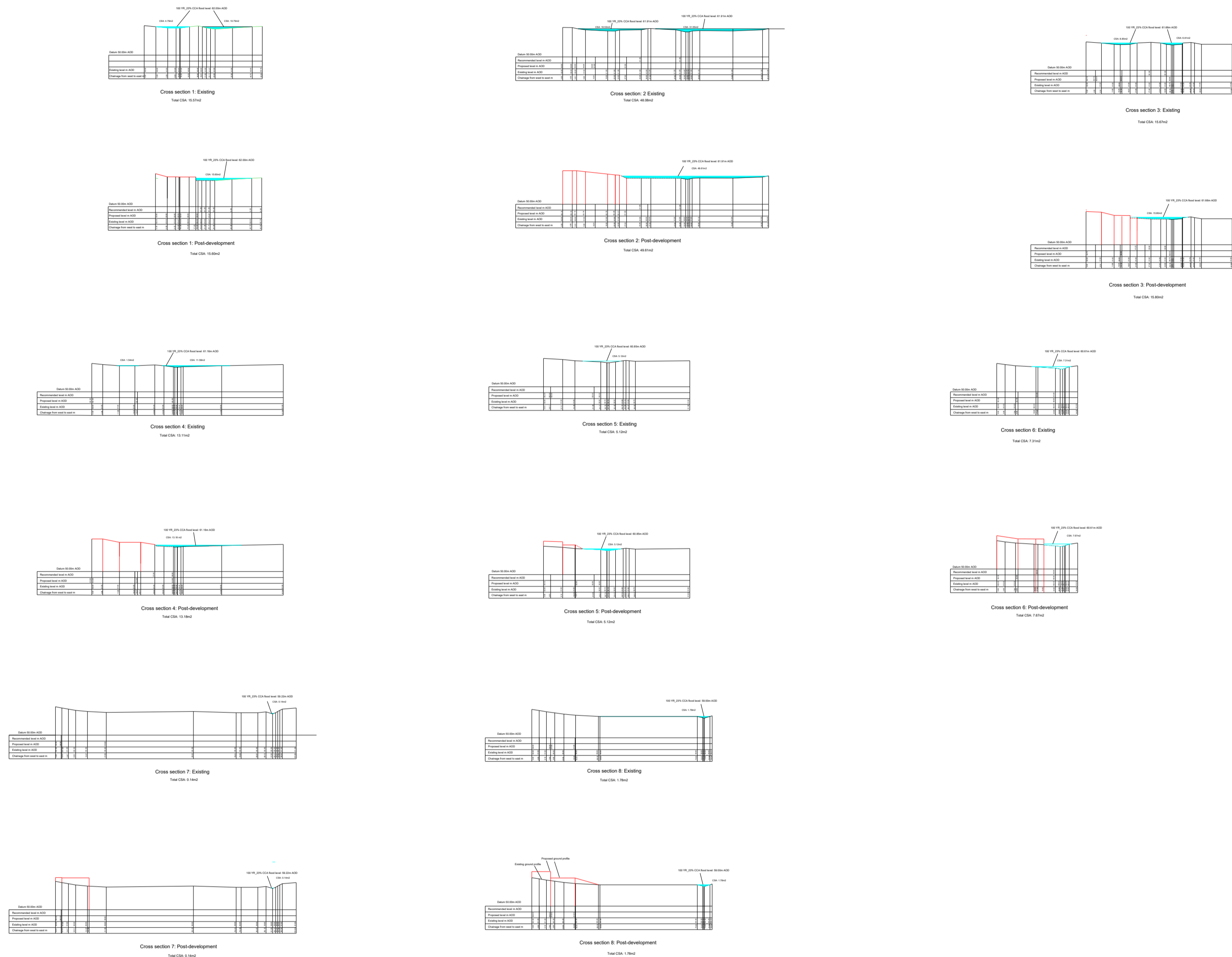
2015 Batley Beck Model - Defended Scenario Results (Level - mAOD, Flow - m³/s)

Node Point	Annual Exceedance Probability (AEP)											
	50% AEP (1 in 2)		20% AEP (1 in 5)		10% AEP (1 in 10)		5% AEP (1 in 20)		3.33% AEP (1 in 30)		2% AEP (1 in 50)	
	2		5		10		20		30		50	
	Max Level	Max Flow	Max Level	Max Flow	Max Level	Max Flow	Max Level	Max Flow	Max Level	Max Flow	Max Level	Max Flow
EA1231295HOW1394	65.921	1.864	66.036	2.542	66.142	3.123	66.653	3.856	66.695	3.936	66.737	4.184
EA1231295HOW1393	65.842	1.864	65.947	2.542	66.062	3.123	66.291	3.856	66.327	3.936	66.357	4.184
EA1231295HOW1368	65.394	1.863	65.545	2.542	65.802	3.123	66.187	4.003	66.211	4.309	66.226	4.649
EA1231295HOW1085	62.54	1.619	62.588	1.679	62.63	1.688	62.714	1.859	62.764	1.869	62.794	1.866
EA1231295HOW0846	60.539	1.84	60.665	2.464	60.747	2.906	60.869	3.596	60.934	4.059	60.964	4.344
EA1231295HOW0838	60.512	1.839	60.642	2.464	60.726	2.938	60.842	3.844	60.904	4.453	60.931	4.821
EA1231295HOW0837	60.351	1.839	60.459	2.464	60.55	2.938	60.676	3.844	60.746	4.453	60.762	4.821
EA1231295HOW0680	58.869	1.865	58.99	2.499	59.024	2.945	59.05	3.601	59.08	3.954	59.088	4.011
EA1231295HOW0424	54.724	1.862	54.853	2.489	54.948	2.978	55.124	3.937	55.331	4.634	55.591	5.094
EA1231295HOW0419	54.737	1.862	54.87	2.489	54.967	2.978	55.147	3.937	55.352	4.633	55.607	5.093
EA1231295BAT3902	58.463	5.413	58.656	7.226	58.796	8.705	58.96	10.549	59.074	11.648	59.171	12.799
EA1231295BAT2997	51.908	5.785	52.23	7.721	52.476	9.316	52.764	11.367	52.944	12.58	53.121	14.182
EA1231295BAT2809	50.07	7.39	50.352	9.976	50.613	12.067	51.361	14.601	51.529	16.319	51.599	18.037

Node Point	Annual Exceedance Probability (AEP)									
	1.33% AEP (1 in 75)		1% AEP (1 in 100)		1% AEP (1 in 100)+ 20 % CC		0.5% AEP (1 in 200)		0.1% AEP (1 in 1000)	
	75		100		101		200		1000	
	Max Level	Max Flow	Max Level	Max Flow	Max Level	Max Flow	Max Level	Max Flow	Max Level	Max Flow
EA1231295HOW1394	66.784	4.449	66.803	4.559	66.844	4.826	66.843	4.813	66.955	5.819
EA1231295HOW1393	66.397	4.449	66.413	4.559	66.447	4.826	66.446	4.813	66.523	5.819
EA1231295HOW1368	66.242	5.064	66.249	5.234	66.268	5.596	66.267	5.582	66.297	6.639
EA1231295HOW1085	62.835	1.848	62.853	1.85	62.896	1.854	62.894	1.854	62.99	1.862
EA1231295HOW0846	61.002	4.699	61.022	4.886	61.059	5.142	61.057	5.13	61.147	5.709
EA1231295HOW0838	60.966	5.268	60.986	5.496	61.022	5.788	61.021	5.777	61.114	6.383
EA1231295HOW0837	60.792	5.268	60.812	5.496	60.864	5.788	60.862	5.777	61.005	6.383
EA1231295HOW0680	59.097	4.058	59.11	4.08	59.141	4.174	59.141	4.171	59.209	4.334
EA1231295HOW0424	56.071	5.708	56.233	6.059	56.617	6.902	56.612	6.892	57.661	9.451
EA1231295HOW0419	56.081	5.71	56.244	6.058	56.626	6.902	56.621	6.892	57.669	9.446
EA1231295BAT3902	59.278	14.235	59.355	15.331	59.447	16.757	59.445	16.714	59.523	18.008
EA1231295BAT2997	53.359	14.291	53.482	14.688	53.634	15.185	53.629	15.17	54.534	15.385
EA1231295BAT2809	51.647	19.2	51.675	19.681	51.705	20.521	51.705	20.479	51.821	23.322

APPENDIX F

Plan of cross sections 1 to 8



REV: A	50% CCA flood levels added	JOC	10/08/21
REV: 1	DESCRIPTION:	BY:	DATE:
STATUS:	PLANNING		

Joc consultants Ltd
 Park Farm House
 Leathley Lane
 Leathley
 Olley
 LS21 2JU
 Tel/fax: 0113 284 2838
 www.jocconsultants.co.uk

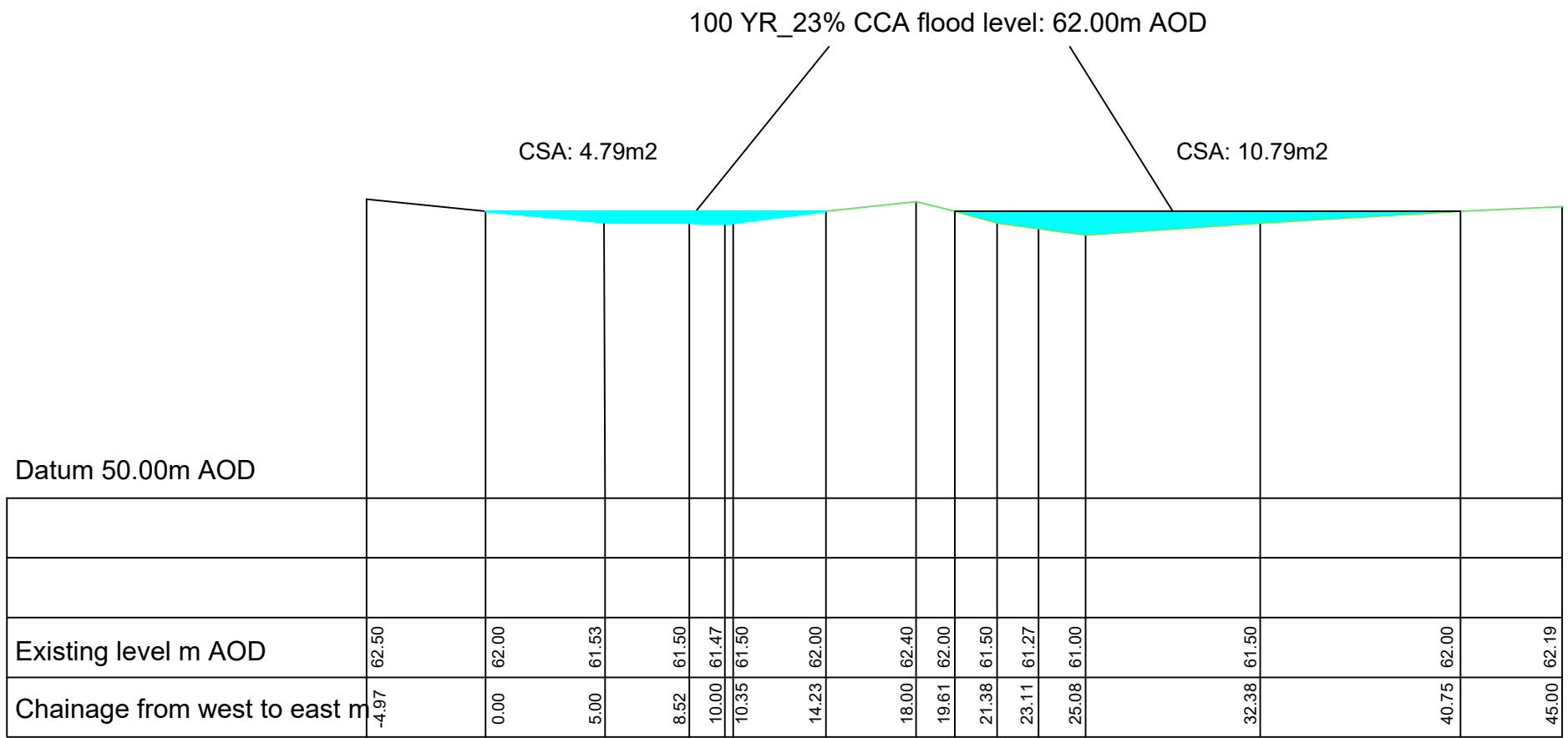
CLIENT:
 D. Noble Ltd

SITE:
 LADY ANN ROAD
 BATLEY

TITLE: CROSS SECTIONS 1 TO 8			
SCALE AT AS:	DATE:	DRAWN:	CHECKED:
Not to scale	16-02-21	JOC	JOC
PROJECT NO:	DRAWING NO:	REVISION:	
20/013	20-013-001	A	

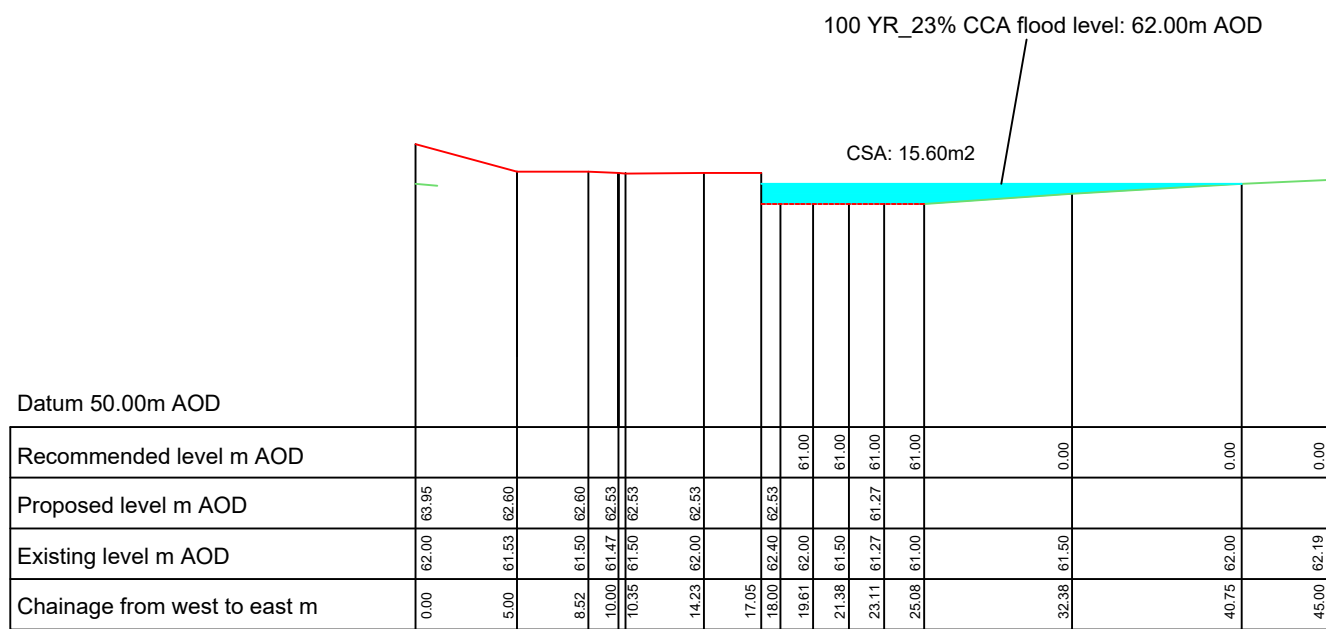
APPENDIX G

Cross sections 1 to 8: existing and post-development



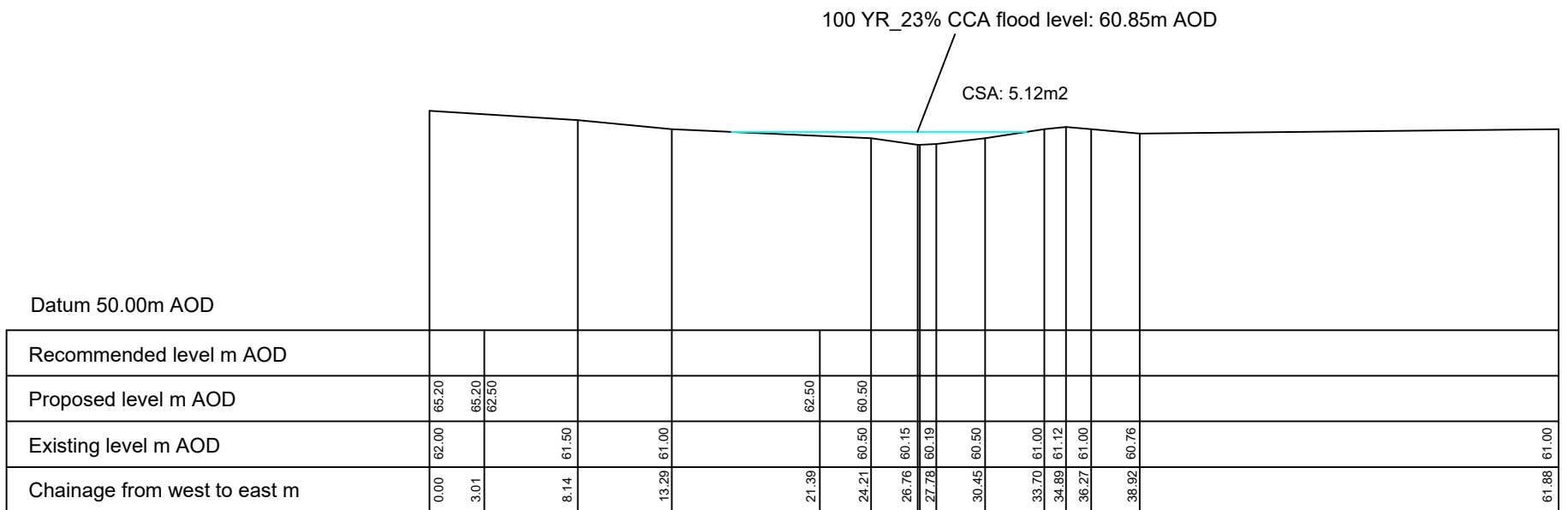
Cross section 1: Existing

Total CSA: 15.57m²



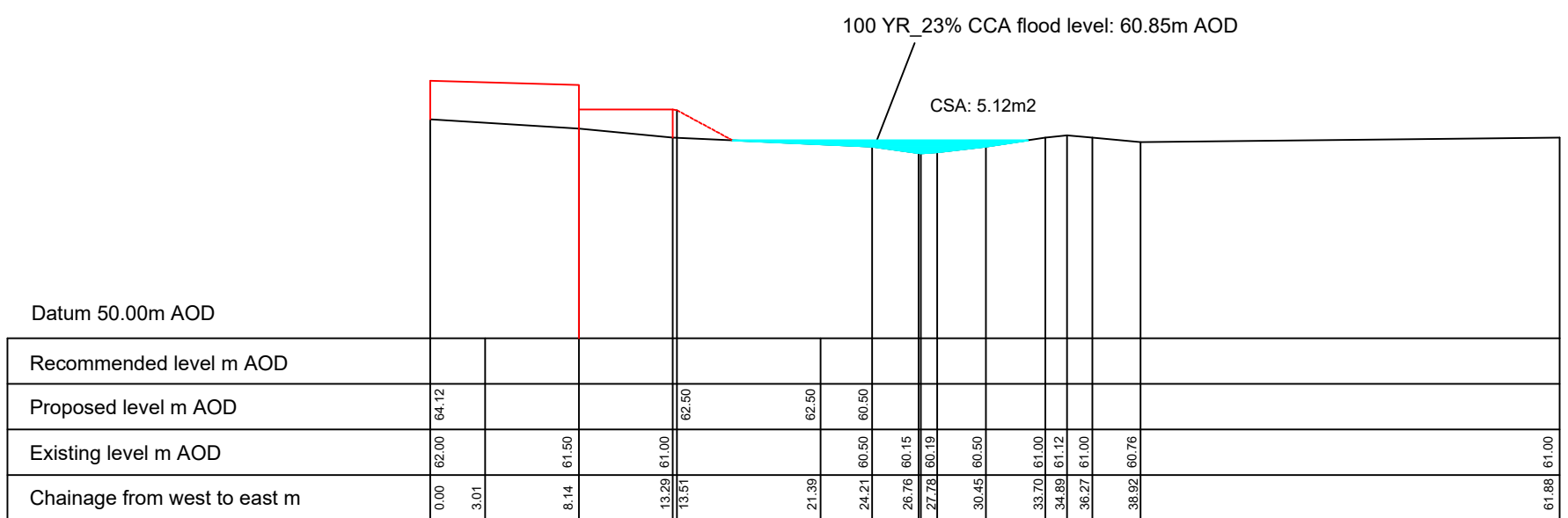
Cross section 1: Post-development

Total CSA: 15.60m²



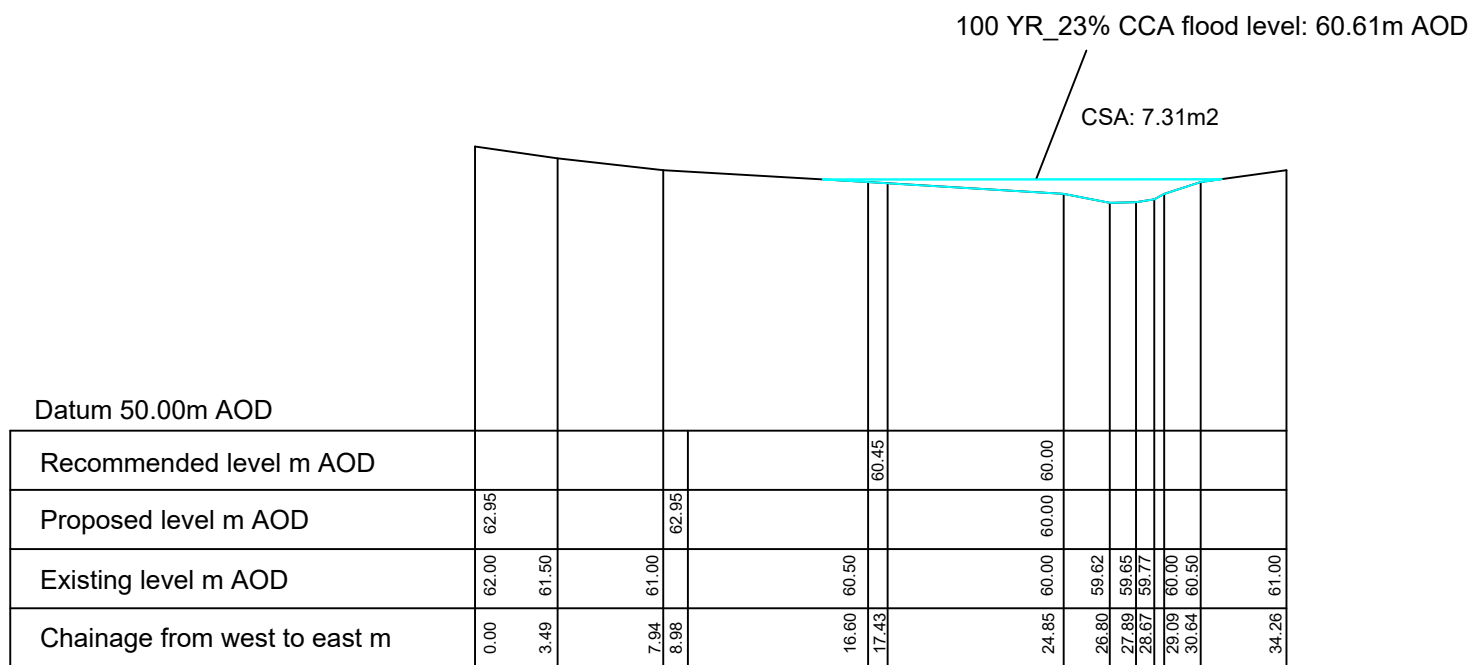
Cross section 5: Existing

Total CSA: 5.12m²



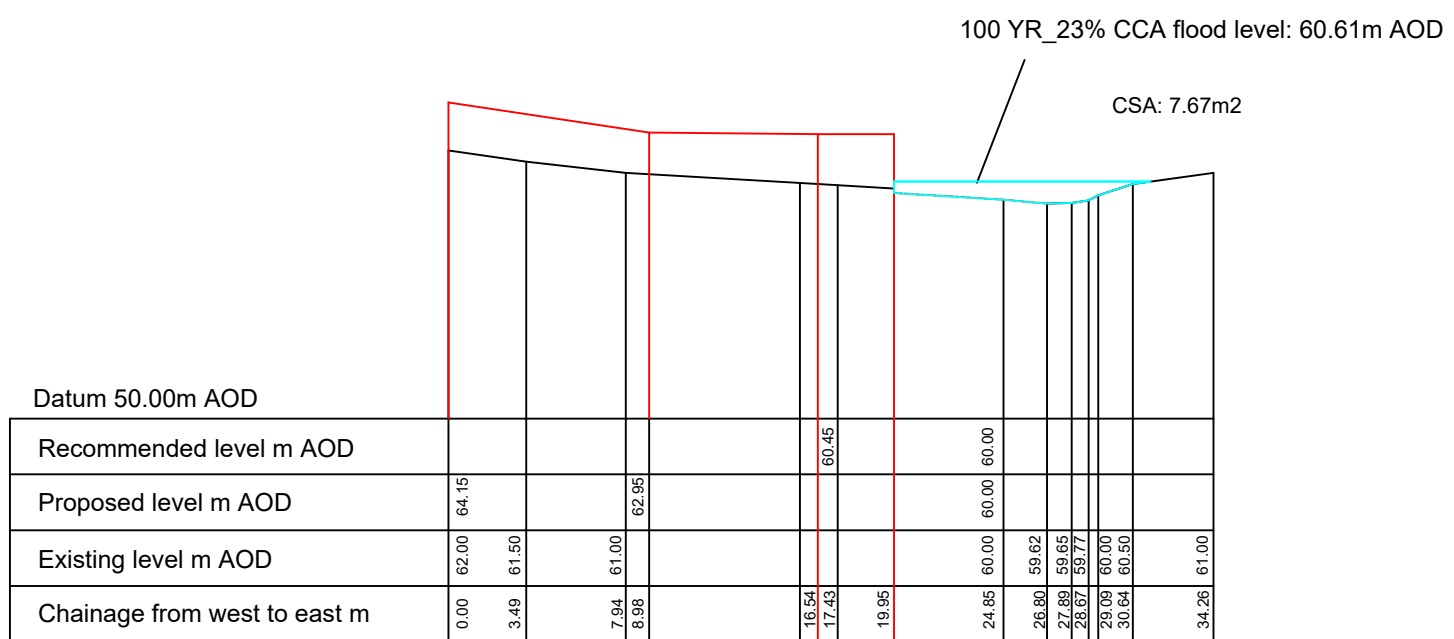
Cross section 5: Post-development

Total CSA: 5.12m²



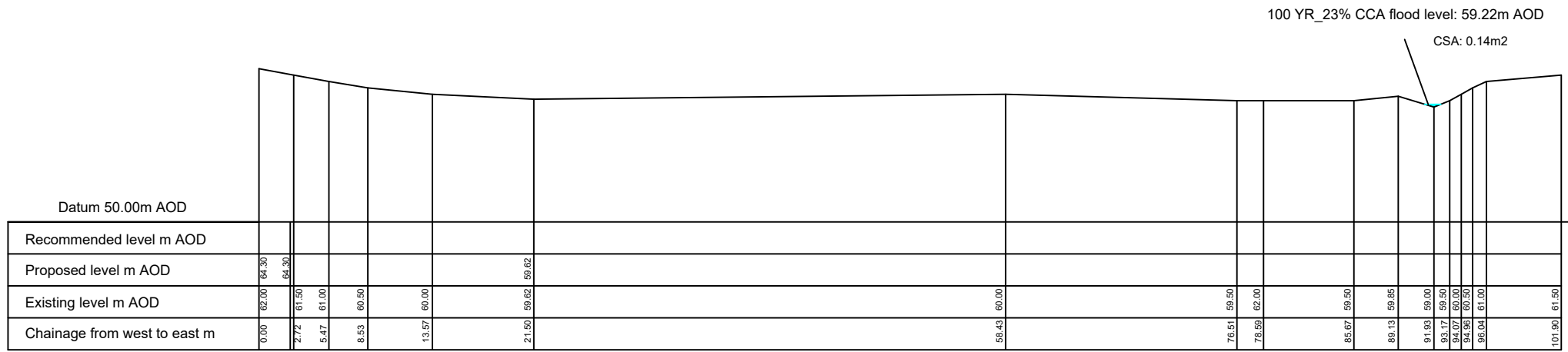
Cross section 6: Existing

Total CSA: 7.31m²



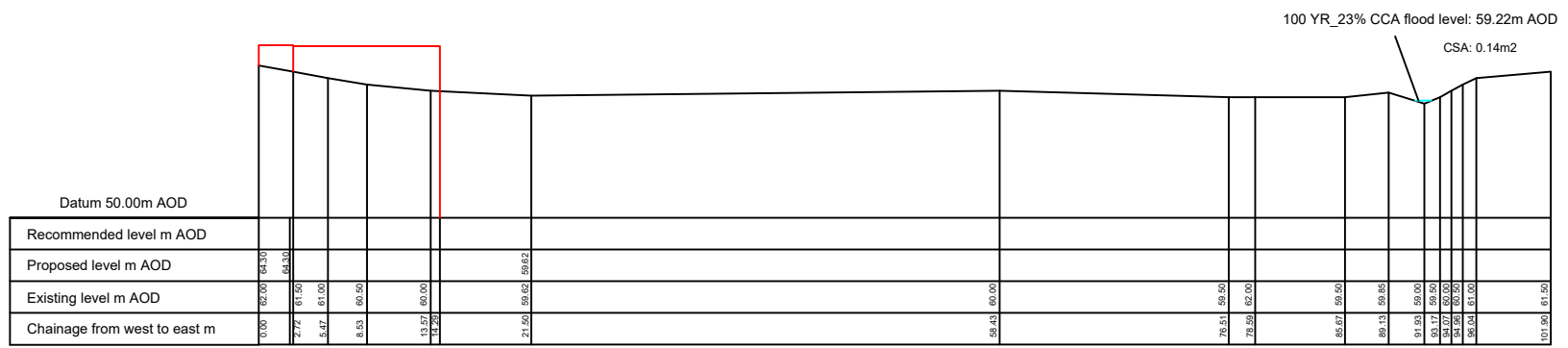
Cross section 6: Post-development

Total CSA: 7.67m²



Cross section 7: Existing

Total CSA: 0.14m2



Cross section 7: Post-development

Total CSA: 0.14m2

APPENDIX H

Floodplain volume calculations

APPENDIX H: Floodplain volume calculations: 1%AEP_23% CCA flood level

revised 20-Dec-22

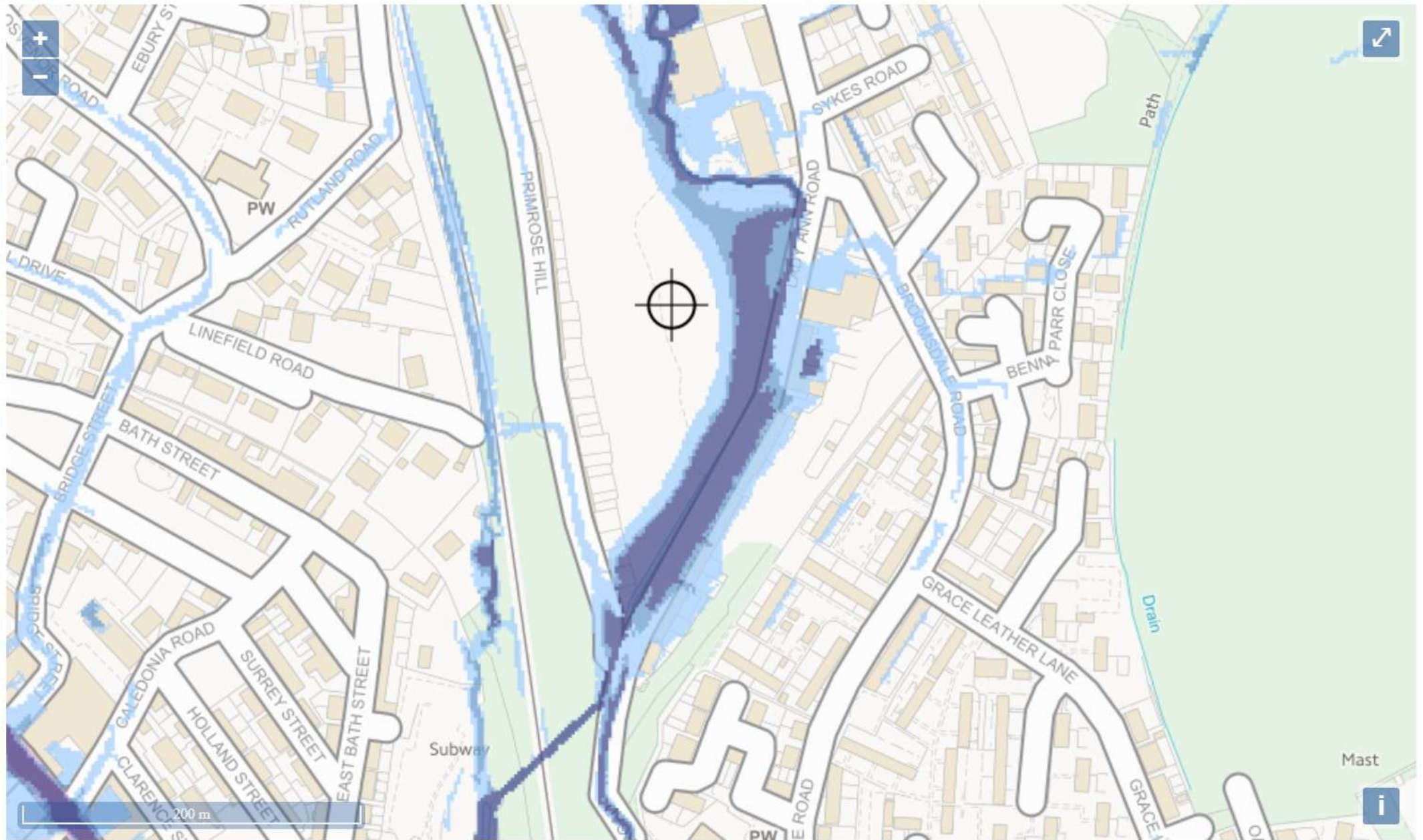
Cross section	Distance m	Existing CSA m ²	Mean CSA m ²	Proposed CSA m ²	Mean CSA m ²	Existing volume m ³	Proposed volume m ³	CSA loss m ²	Proposed CSA revised m ²	Revised CSA loss m ²	Revised mean CSA m ²	Revised proposed volume m ³
1	25.00	15.57	31.83	15.60	32.60	795.64	815.06	-0.03	15.60	-0.03	32.60	815.06
2	25.00	48.08	31.87	49.61	32.70	796.80	817.58	-1.53	49.61	-1.53	32.70	817.58
3	25.00	15.67	14.39	15.80	14.49	359.63	362.21	-0.14	15.80	-0.14	14.49	362.21
4	25.00	13.11	9.11	13.18	9.15	227.86	228.75	-0.07	13.18	-0.07	9.15	228.75
5	25.00	5.12	6.22	5.12	6.40	155.39	159.91	0.00	5.12	0.00	6.40	159.91
6	25.00	7.31	3.72	7.67	3.90	93.09	97.61	-0.36	7.67	-0.36	3.90	97.61
7	25.00	0.14	0.96	0.14	0.96	23.96	23.96	0.00	0.14	0.00	0.96	23.96
8		1.78		1.78								
						2,452.36	2,505.09					2,505.09
						Net gain:	52.72				Net gain:	52.72

APPENDIX I

Surface Water Flood Maps

Extent of flooding

Enter a place or postcode

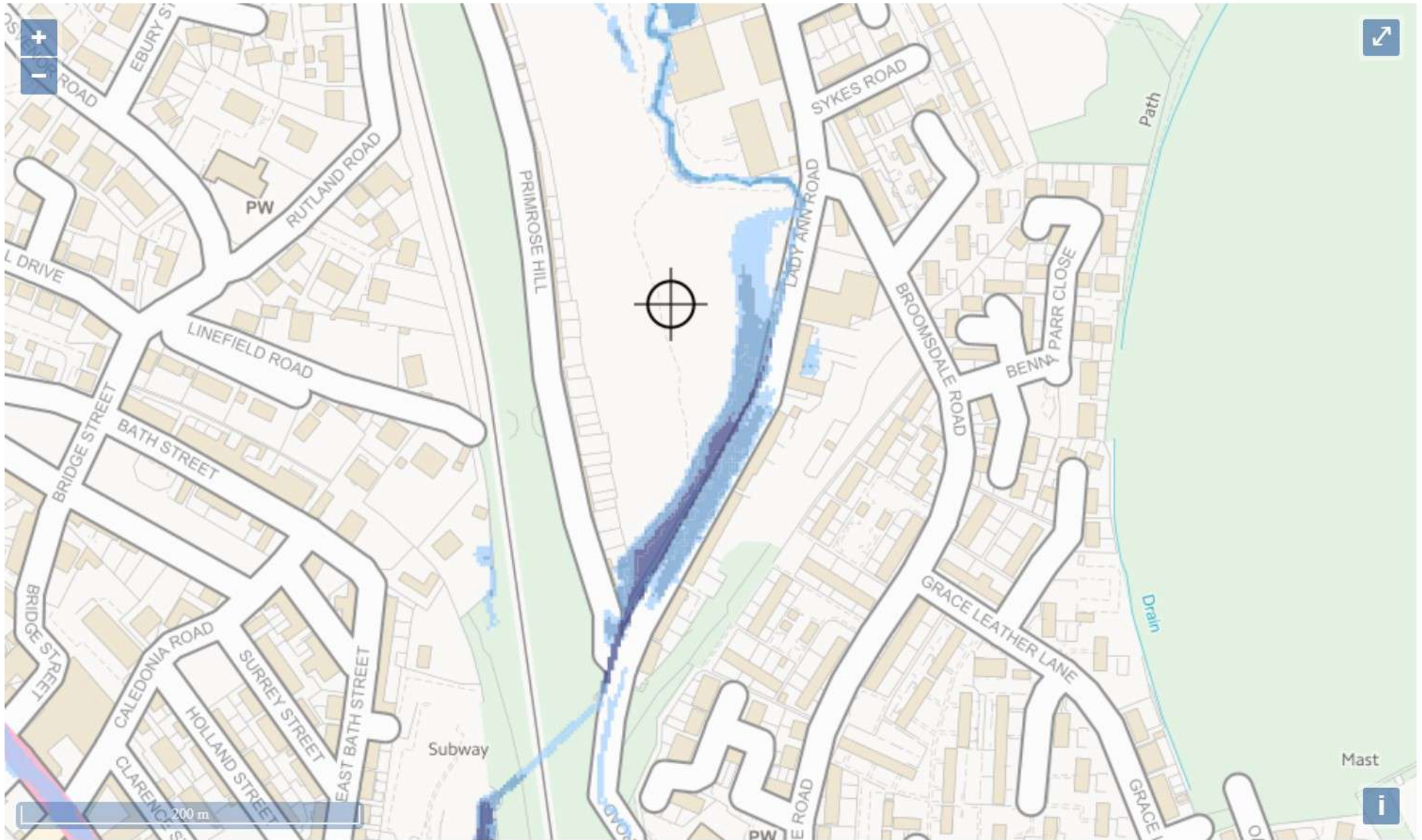


Extent of flooding from surface water

● High ● Medium ● Low ○ Very low ⊕ Location you selected

High risk: depth

Enter a place or postcode



Surface water flood risk: water depth in a high risk scenario

Flood depth (millimetres)

Over 900mm 300 to 900mm Below 300mm Location you selected

Flood risk

Medium risk: depth

Location

Enter a place or postcode



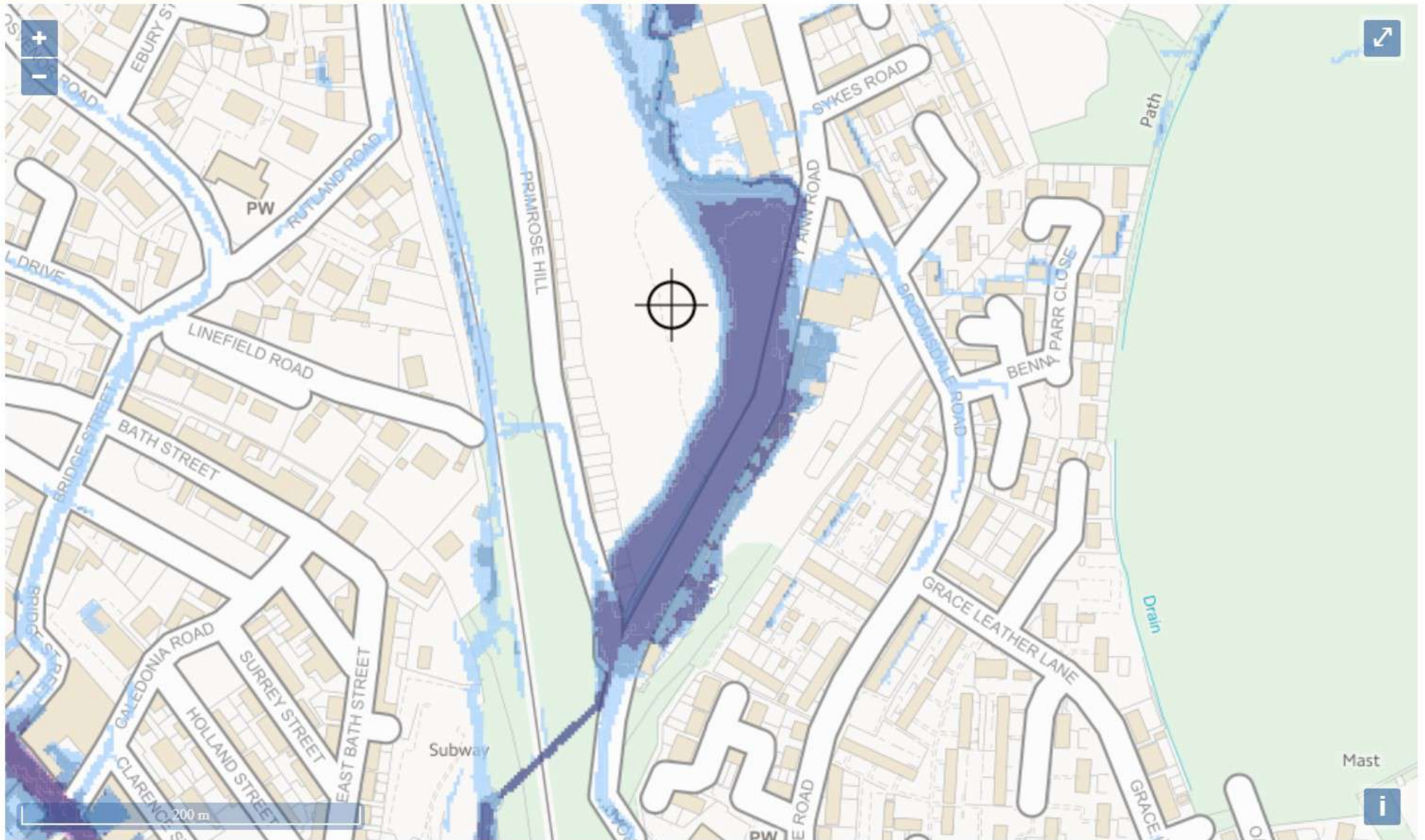
Surface water flood risk: water depth in a medium risk scenario

Flood depth (millimetres)

- Over 900mm
- 300 to 900mm
- Below 300mm
- Location you selected

Low risk: depth

Enter a place or postcode



Surface water flood risk: water depth in a low risk scenario

Flood depth (millimetres)

● Over 900mm ● 300 to 900mm ● Below 300mm ⊕ Location you selected

APPENDIX J

REFH2 estimates of peak runoff rates and volumes

APPENDIX J: ReFH2 results

Gross area	3.23 ha
Impervious	1.405 ha
Hydrological area	3

Return period (yrs)	Urbanised peak flow (l/s)	Urbanised direct runoff (m ³)	As-rural peak flow (l/s)	As-rural direct runoff (m ³)	% increase in peak flow rate	% increase in volume
1	18.92	228.56	11.47	138.47	65%	65%
2	21.62	262.41	13.05	159.64	66%	64%
5	30.60	375.40	18.41	231.48	66%	62%
10	37.20	458.72	22.43	285.59	66%	61%
30	48.35	600.17	29.38	379.56	65%	58%
50	54.31	676.09	33.18	431.05	64%	57%
75	59.54	742.75	36.56	476.86	63%	56%
100	63.59	794.55	39.20	512.82	62%	55%
100_20% CCA	76.69	962.70	47.92	631.73	60%	52%
100_40% CCA	89.96	1133.92	57.01	756.09	58%	50%
200	75.05	941.63	46.82	616.65	60%	53%
1000	112.29	1423.91	72.84	973.76	54%	46%
				Average:	62%	57%

Q MED greenfield:	13.05 l/s
Growth curve factor	0.94 FSSR 14
Q bar	13.88 l/s

Estimate of attenuation storage

Proposed discharge rate	6.50 l/s
Storm duration	03:30:00
Duration in seconds	12600
Volume discharged m ³	81.90
20% CCA storage m ³	880.80
40% CCA storage m ³	1052.02

APPENDIX K

Not used

APPENDIX K

Not used

TABLE L1: Water surface gradients					
	Node	HOW_1085	HOW_0846	HOW_0680	HOW_0424
Distance			239	166	256
1% flood level mAOD		62.853	61.022	59.110	56.233
Gradient			0.008	0.012	0.011
1% flood level mAOD_ 23% CCA		63.360	61.210	59.220	56.750
Gradient			0.009	0.012	0.010
0.1% flood level mAOD		62.990	61.147	59.209	57.661
Gradient			0.008	0.012	0.006

TABLE L2: Estimated flood levels through the site and required minimum finished floor levels

				Interpolated flood levels								Interpolated flood levels			
Plot No	Node	Distance d/s of node	Proposed FFL	1% AEP FL	1%_23% CCA FL	Freeboard	Is Proposed FFL acceptable?	Required minimum freeboard	Required minimum FFL	Required increase	0.1% AEP FL	Freeboard with required FFL	Cross section		
			m AOD	m AOD	m AOD	mm		m	m AOD	m	m AOD	m			
37	1085	150.9	62.60	61.70	62.00	0.60	OK	0.60	62.60	Nil	61.83	0.77	CS 1		
38	1085	160.8	62.60	61.62	61.91	0.69	OK	0.60	62.51	Nil	61.75	0.76	CS 2		
39	1085	170.7	62.45	61.55	61.82	0.63	OK	0.60	62.42	Nil	61.67	0.75			
40	1085	181.3	62.45	61.46	61.73	0.72	OK	0.60	62.33	Nil	61.59	0.74			
41	1085	188.9	62.45	61.41	61.66	0.79	OK	0.60	62.26	Nil	61.53	0.73	CS 3		
42	1085	190.7	62.45	61.39	61.64	0.81	OK	0.60	62.24	Nil	61.52	0.73			
43	1085	198.0	62.45	61.34	61.58	0.87	OK	0.60	62.18	Nil	61.46	0.72			
44	0846	4.5	62.45	60.97	61.16	1.29	OK	0.60	61.76	Nil	61.09	0.66	CS 4		
45	0846	12.0	62.52	60.88	61.07	1.45	OK	0.60	61.67	Nil	61.01	0.66			
46	0846	23.1	62.52	60.76	60.93	1.59	OK	0.60	61.53	Nil	60.88	0.66			
47	0846	29.7	62.54	60.68	60.85	1.69	OK	0.60	61.45	Nil	60.80	0.65	CS 5		
48	0846	41.9	62.54	60.54	60.71	1.83	OK	0.60	61.31	Nil	60.66	0.65			
49	0846	49.7	62.80	60.45	60.61	2.19	OK	0.60	61.21	Nil	60.57	0.65	CS 6		
50	0846	65.7	62.80	60.27	60.42	2.38	OK	0.60	61.02	Nil	60.38	0.64			
51	0846	77.2	63.05	60.13	60.28	2.77	OK	0.60	60.88	Nil	60.25	0.64			
52	0680	0.0	63.05	59.11	59.22	3.83	OK	0.60	59.82	Nil	59.21	0.61	CS 7		
53	0680	8.9	63.05	59.01	59.13	3.92	OK	0.60	59.73	Nil	59.16	0.58			
53	0680	16.6	63.60	58.92	59.06	4.54	OK	0.60	59.66	Nil	59.11	0.55			
54	0680	23.0	63.60	58.85	59.00	4.60	OK	0.60	59.60	Nil	59.07	0.53	CS 8		
65	0680	45.0	62.28	58.60	58.79	3.49	OK	0.60	59.39	Nil	58.94	0.45	CS9		
64	0680	54.0	61.68	58.50	58.70	2.98	OK	0.60	59.30	Nil	58.88	0.42			
63	0680	76.5	61.08	58.25	58.48	2.59	OK	0.60	59.08	Nil	58.75	0.34			
62	0680	79.0	60.48	58.22	58.46	2.02	OK	0.60	59.06	Nil	58.73	0.33			
												Freeboard with required minimum soffit level			
									Required minimum soffit level	Interpolated 0.1% AEP FL					
									m AOD						
Access Road	0680	100.3		57.98	58.25			0.60	58.85		58.60	0.25			

End of Report