

FLOOD RISK ASSESSMENT (FRA)

PROPOSED NURSERY

FORMER HONLEY BRIDGE DEPOT

OLD TURNPIKE

HONLEY

WEST YORKSHIRE

HD9 6PA

REF: 19022-FRA

DATE: March 2020

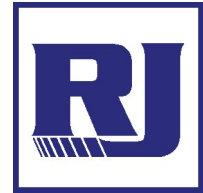
RUTTER JOHNSON IS THE TRADING NAME OF CREWSYGMA

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Portland Nurseries Ltd.



1.0 INTRODUCTION

1.1 Rutter Johnson are instructed by Portland Nurseries Ltd to prepare a Flood Risk Assessment (FRA) to accompany the planning submissions for the proposed new Nursery at the former Honley Bridge Depot, Eastgate, Honley, Holmefirth, HD9 6PA.

1.2 The site is a vacant former Local Authority (LA) maintenance Depot. The site has an overall area of 0.2ha [0.49acres]. The National Planning Policy Framework (NPPF) requires sites in excess of 1.0ha to have a FRA submitted with any Planning Application; although this site is less than 1.0ha in area the EA have requested a FRA be submitted due to the proximity of the site to the River Holme. The Technical Guidance to NPPF at para. 5 Table 1 states:-

Flood risk assessment requirements

For development proposals on sites comprising one hectare or above the vulnerability of flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on the surface water run-off, should be incorporated in a flood risk assessment. This need only be brief unless factors above or other local considerations require particular attention.

2.0 SITE DETAILS

2.1 Site Location

The rectangular 0.2ha site is situated 6km south of Huddersfield Centre, 43km southwest of Leeds City Centre and 52km east of Manchester City Centre.

The site is located directly alongside Eastgate and Old Turnpike in the village of Honley, West Yorkshire

Refer to Appendix A

The OS grid reference of this development site is SE 1406711977, (414067.550 E, 411977.250 N).

The local planning authority is Kirklees Council.

2.2 Site Description

This vacant rectangular development site is some 0.20ha in plan area and is bounded to the west by Old Turnpike, a narrow public highway rising steeply to the south. The east boundary abounds Woodhead Road (A6024), the south boundary is currently a development site for residential properties. The north boundary is formed by River Holme directly alongside the site with Eastgate located parallel to and along the north bank of the river.

The site area is a vacant former maintenance depot and as such is fully hard paved with buildings and impermeable surfacing.

The main site area varies in level from 100.45AoD to 101.80m AoD however the surroundings differ considerably in relative level.

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The River Holme bed level along the north boundary is set at circa 96.51m AoD some 3.95m lower than the general site area; a 1.2m high stone river wall above general site level exists along the north boundary.

Old Turnpike along the west boundary rises from 101.54m AoD at its junction with Eastgate and rises steeply to the south such that at the south site boundary the relative level is some 109.23m AoD resulting in a highway gradient in the order of 1 in 9 (11%).

The south boundary is set at 109.50m AoD.

The east boundary formed by Woodhead Road is elevated above the general site level and varies from 101.51m AoD at its junction with Eastgate to 103.04m AoD at the site south boundary; this represents a gradient of 1 in 44 (2.25%).

Reference to the Environment Agency (EA) local flood maps shows that the whole of the application site is located within an area designated Flood Zone 1.

2.3 Site Topography

The general topography of the site is best described as generally flat to the main central area with steep side to the south, east and west boundaries.

A deep river channel set some 3.95m below the general site level forms the north boundary alongside the River Holme.

The highest point is at the SW corner at 109.23m AoD, the lowest point is at the north boundary at 100.88m AoD.

The changes in level to the site boundaries are generally formed by masonry retaining walls or building structures.

At the northeast corner a bridge abutment from the road bridge carrying the Woodhead Road over the River Holme projects slightly into the site.

2.4 Site Geology

Reference to the British Geological Survey (BGS) published maps gives an indication of the ground strata below this site, this is summarised below:-

Superficial Deposit (Sediments)

The BGS 1:50,000 geological map for the area indicates that the Site is directly underlain by Alluvium consisting clay, silt sand and gravel.

Bedrock Geology

The BGS maps indicate the bedrock geology to consist of Sandstone of the Rossendale Formation.

Geohydrology

From published information there is a secondary undifferentiated Secondary A aquifer within the superficial deposit.



The site is generally underlain by a classified Secondary A Aquifer within the lower sandstone bedrock.

2.5 Access and Egress

The existing vehicle and pedestrian access to the site are is off Old Turnpike at the northwest corner of the site.

2.6 Development Proposals

The proposal supported by this FRA is for the development of a new Children's Nursery with associate access, car parking and grassed play area.

The pre-development impermeable area of the overall 0.20ha site area:-

Existing area of developed site = 0.19ha impermeable area

Overall % development of the pre-development site = 95% impermeable.

The post development paved area of the overall 0.20ha site area:-

Proposed building, car park, paving and road, = 0.11ha impermeable area

Overall % development of the post-development site = 55% impermeable area.

Thus after completion of the proposed development there is a 40% reduction in the positively drained impermeable area.

Refer to Appendix C

3.0 FLOOD RISK

3.1 Historical Flooding & Strategic Flood Risk Assessment

Enquiries made with the EA show there has been no recorded past flooding on this development site; the records include the severe storms of October 2019.

Flooding from Rivers and Seas

The EA flood map indicates that the whole of this site lies within an area designated as Zone 1 flood risk.

It is a requirement of NPPF that the development proposals do not result in any increase in flood risk on site or downstream of the site and the proposals should seek to reduce flood risk overall.

The existing surface run-off water from this agricultural field flows overland following the existing ground contours to the existing drainage ditch along the northern boundary.



Flooding from Surface Water

The primary source of surface water flooding on this site is the River Holme along the northern boundary.

Currently all the existing site drains directly into the adjacent river via numerous open pipes discharging through the river wall.

Reference to available government produced Surface Water Flood Risk maps shows that the flood risk from Surface Water is:-

High Risk period 3.3% (1 in 30 year) – Slight low level flooding along the northern edge of the existing site, this area relates to existing site levels in the region of 100.45m – 100.60m AoD.

Medium Risk period 1% - 3.3% (1 in 30yrs to 100yrs) – Slight low level flooding along the northern edge of the existing site, this area relates to existing site levels in the region of 100.45m – 100.60m AoD.

Low Risk period 0.1% - 1% (1 in 100yrs to 1000yrs) - Low level flooding along the northern edge of the existing site and a low area in the central section of the site around yard gullies and drains, this area relates to existing site levels in the region of 100.45m – 100.80m AoD.

Flooding from Reservoirs

Reference to EA maps show that there is a potential for flooding on this site area in the event of a reservoir failure or overtopping; reference to published maps show that in the event of reservoir failure a significant area of the Honley village including this site will be subject to flooding at depths up to 2m water depth.

Flooding from Sewers

There is a public combined water sewer crossing within the site flowing from Woodhead Road to Old Turnpike, a sewer flood risk therefore exists on the site but there are no records of past flooding within the site boundary.

3.2 Environment Agency Flood Map

The EA is the statutory legislative authority having, as part of their wider role, responsibility for flooding issues. Within their current documentation they categorise land areas into 3 distinct Flood Zones, as follows:-

- Zone 1
- Zone 2
- Zone 3a
- Zone 3b

These zones relate to the following:-

Zone 1 land areas – Land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%) – LOW PROBABILITY

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Zone 2 land areas – Land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) in any one year – MEDIUM PROBABILITY

Zone 3a land areas – Land assessed to have a 1 in 100 or greater annual probability of river flooding (>1%) in any year – HIGH PROBABILITY

Zone 3b land areas – Land areas where water has to flow or to be stored in times of flood – FUNCTIONAL FLOODPLAIN.

Reference to the published EA Flood Map for this locality establishes the whole of the proposed development site is designated **Flood Zone 1 – LOW PROBABILITY** i.e. less than 1 in 1000 annual probability of river flooding in any one year.

Refer to Appendix B

3.3 Sequential Approach and Exception Tests

Sequential Approach

The NPPF requires a risk-based approach to be applied to determine the suitability of land for development in flood risk areas and where possible development should be located in areas of lowest flood risk i.e. Flood Zone 1.

NPPF Technical Guidance Table 1 requires that all development sites of 1.0ha area or larger and any sites or part of site which lie in land at risk of flooding i.e. Zones 2 & 3, must be subject to a FRA.

This site is <1.0ha in area and is located completely within Flood Zone 1 designation therefore there is no requirement to carry out a Sequential Test.

Exceptions Test

This site is located totally within **Flood Zone 1**, thus no exceptions test is required.

3.4 River Holme EA modelling predicted water levels relative to development

The very close proximity of the River Holme requires a more detailed assessment of the potential development levels relative to “high water” conditions in the river.

Following a direct request the EA have provided the latest available river model and water levels for the River Holme at locations close to the proposed development.

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Information received dated 25th February 2020 shows modelling node points along the River Holme. There are 2 node points in close proximity to the development site, these are Node 5837 located 56m downstream and Node 5991 located 96m upstream of the site.

The following predicted river water level results have been derived for these two locations.

	Node 5837	Node 5837	Node 5991	Node 5991	
Storm Event	Water Level (m AoD)	Flow M3/sec	Water Level (m AoD)	Flow M3/sec	Remarks
10% AEP (1 in 10yr)	97.62	57.18	98.74	57.19	EA Data
4% AEP (1 in 25yr)	97.91	69.88	99.00	69.89	EA Data
2% AEP (1 in 50yr)	98.19	82.79	99.24	82.80	EA Data
1.33%AEP (1 in 75yr)	98.33	90.02	99.36	90.02	EA Data
1% AEP (1 in 100yr)	98.40	93.31	99.38	99.31	EA Data
0.1% AEP (1 in 1000yr)	98.93	128.00	100.15	128.00	EA Data
Projected 1% +CCA (1:100+40%)	98.68	111.77	99.91	119.17	Projected

The downstream Node 5837 is nearest to the development side. Topographical survey levels of the river bed show a gradient of 1 in 125 thus by interpolation between the two known node points gives the estimated 1% + CCA water level at the development site as:-

Node 5837

Predicted 1%AEP + 40% CCA = $98.68 + (52\text{m} / 125) = 99.095\text{m AoD}$

Node 5991

Predicted 1%AEP + 40% CCA = $99.91 - (96\text{m} / 125) = 99.10\text{m AoD}$

Based on the above assessment the 1%AEP + 40%CCA river level at the development site is assessed as **99.10m AoD**

Based on the above assessment the minimum Finished Floor Level for the proposed new building should be set at +600mm above 1%AEP + 40%CCA, thus minimum Finished Floor Level = $99.10 + 0.60 = \mathbf{99.70\text{m AoD}}$.

Refer to Appendix E

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4.0 SURFACE WATER RUN OFF

4.1 Requirements for Surface Water Drainage of the Developed Site

The NPPF recommends that surface water generated by a developed site should be managed by a sustainable surface drainage management system.

Technical guidance to NPPF at Table 1:footnote 2 states:-

Sustainable drainage systems cover the whole range of sustainable approaches to surface drainage management. They are designed to control surface water run off close to where it falls and to mimic natural drainage as closely as possible.

In general, the aim should be to discharge surface water run off as high up the following hierarchy of drainage options as is reasonably practicable:-

- 1 into the ground (infiltration);
- 2 to a surface water body;
- 3 to a surface water sewer, highway drain, or another drainage system;
- 4 to a combined sewer.

Undeveloped sites generally rely on natural drainage to convey or absorb rainfall, the water either soaking into the ground or flowing across the ground surface contours into watercourses, providing a natural water flow to the benefit of the environment and local ecology. Sites used for agricultural purposes often have underground land drainage pipe networks discharging to open ditches and watercourses.

The effect of development is generally to reduce the permeability of parts of the site after development. These development changes often result in an alteration to the site's response to rainfall and in particular can lead to an increase in the volume of rainfall that runs off the developed site and can increase the rate at which peak storm rainfall flows from the site.

It is important that surface water drainage proposals ensure that volumes and peak flow rates of surface water discharging from the site are no greater after development than those that exist prior to development and where possible developments should seek to reduce surface water run-off where ever possible.

The proposals should demonstrate that after development there will be no increased flood risk to any areas beyond the site boundary and by implementing the recommendations of NPPF that flood risk overall is, where possible, reduced and due allowance should be made for the effects of climate change.



4.2 Site Areas

The pre-development site is a vacant brownfield site that has an existing impermeable paved area = 0.19ha.

4.3 Existing Surface Water Run Off from Pre- Development Site

The surface water run-off from the existing site area is via existing open-ended pipes discharging through the river wall.

4.4 Surface Water Run Off from Proposed Development Site

The surface water run-off from the proposed development should mimic the method and route of pre-development surface water discharge.

In assessing the hierarchy of preferred methods of surface water discharge listed in 4.1 above, the use of infiltration drainage technique is deemed unsuitable for this site; the soil strata established in recent site investigation shows that the underlying shallow soils consist of firm to stiff clay with very limited and zero permeability.

The second preferred method is to discharge surface water to existing streams and watercourses.; given that the existing site currently drains onto the adjacent River Holme the proposed development surface water drainage will likewise discharge directly to the river.

Using MicroDrainage modelling software the discharge from the existing brownfield site has been estimated for the 0.19ha impermeable area and the results show that the pre-development 1 in 100year storm event discharge is 76.4l/sec.

The EA guidance document “Flooding and coastal change” dated February 2016, a climate change allowance for the region for 100 year or greater lifetime of the development gives a +40% climate change allowance to be applied.

Using the same MicroDrainage model, a re-run of the post development site having a reduced impermeable area = 0.11ha BUT including +40% CCA shows a reduced discharge for the 1 in 100 year + 40% CCA to be 58.5l/sec.

Thus the reduced development as proposed significantly reduces the surface water discharge to the River Holme even when a +40% CCA is applied; it is therefore proposed to discharge surface water directly to the adjacent river without any flow attenuation. Where practical existing discharge pipes through the river wall will be re-used providing they remain serviceable after site clearance.

Refer to Appendix D



4.5 Foul Water discharge from the Existing Site

The existing site currently has a 225mm diameter Combined Water Sewer (CWS) crossing the site, existing toilets and waste water discharges currently connect to this existing sewer.

4.6 Proposed Foul Water disposal system for the developed site

The proposed development will have all wastewater discharge points connected to the existing 225mm diameter CWS; a CCTV survey of this sewer shows a number of defects and the sewer will be repaired or replaced as necessary as part of the works.

Refer to Appendix F

5.0 CONCLUSIONS

- 5.1 This FRA has identified that the whole of the proposed development site is located in an area designated Flood Zone 1 as defined by the EA Flood Map and is therefore in a location which has less 1 in 1000 annual probability of river flooding in any year ($< 0.1\%$) which is classified as **low flood risk**.
- 5.2 Finished floor level of the proposed development is to be set at 101.270m AoD to suit access gradients from Old Turnpike. This provides a 2.170m freeboard above the predicted 1%AEP +40%CCA river level (99.1m AoD) derived from EA river modelling data issued February 2020.
- 5.3 The small localised “low lying” areas shown as having low risk surface water/ground water flooding will be addressed during the site earthworks and development as levels are in general raised above existing levels to suit access gradient requirements.
- 5.4 The proposed surface water drainage system will follow SUDS guidelines and will incorporate the final discharge from the development roof, access road, car park impermeable areas and will discharge directly to the River Holme and will thus mimic the existing surface water drainage system. The reduced impermeable surfacing of the proposed development include +40% climate change allowances shows a reduction on the existing pre-development flow to the river thus there is no requirement to attenuate surface water within the site. This direct discharge to river satisfies of the second highest method of drainage hierarchy and is in line with the governments SUDS guidelines.
- 5.5 The existing river wall circa 1.2m high along the north boundary is to be retained, the section of the north boundary where limited demolition of existing buildings is proposed shall have a 1.2m high wall retained or new wall formed to provide an effective additional barrier and maintain the defences already in place and used in the EA modelling.

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- 5.6 The foul water/wastewater from the development will connect to the existing public CWS crossing the site, this mimics the existing wastewater discharge from the existing site.
- 5.7 There is a LOW residual risk of the site flooding in the event of reservoir failure or overflowing; such an event will affect much of the surrounding area of Honley not just this site.
- 5.8 In conclusion the submitted development proposals that are the subject of this FRA do not result in any negative flood impact or increased flood risk on the site or on its direct surroundings; the proposals reduce the flood risk by reducing surface water discharge to the River Holme and produces a drainage system that aligns with and fully satisfy the core aims of NPPF. Thus there are no increased flood risk, sewerage or drainage reasons why the proposed development on this site should not proceed.

Report prepared by
Lindsay Rutter B Sc., C Eng., M.I. Struct E

A handwritten signature in dark ink, appearing to read 'Lindsay Rutter', with a stylized flourish at the end.

Signed

March 2020

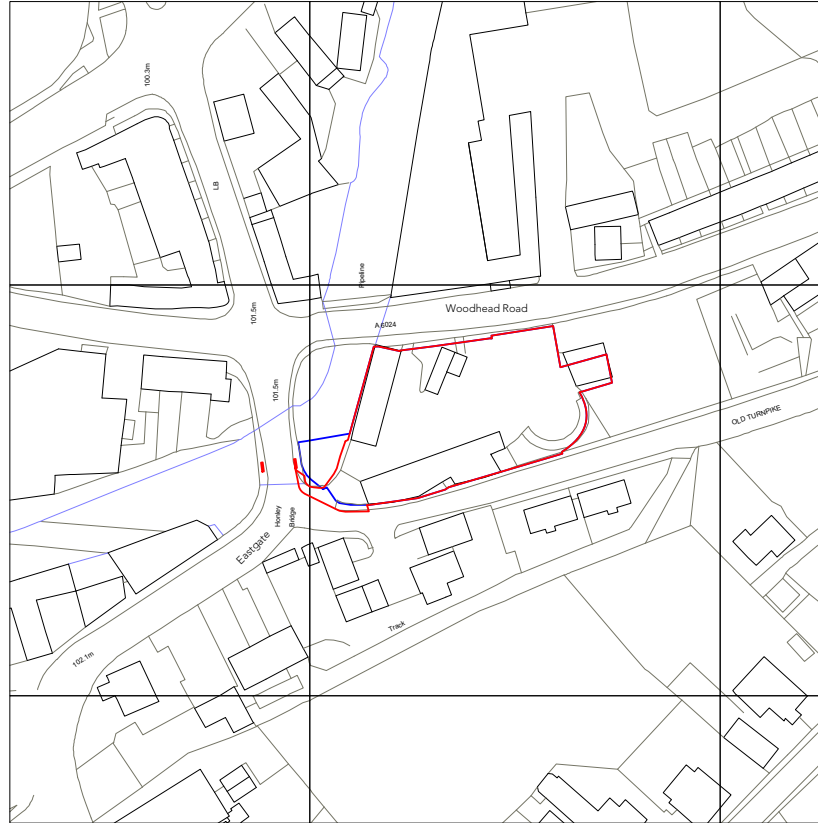
Date.....

APPENDIX A
SITE LOCATION PLAN



Ownership Boundary

Development Boundary



1

Existing Location Plan
Scale: 1:1250

0 50 60 70 80 90 100 M

date revision
15/11/19 B Issued for planning JM
08/11/19 A Issued for client approval prior to planning JM

Do not scale from drawings
Confirm all dimensions on site prior to manufacture
Confirm discrepancies with Architect prior to proceeding
Refer to all Engineers' documentation notes

job no.	Portland Nurseries		job title
611	Honley Bridge Depot, Eastgate, Honley, Holmfirth, HD6 6PA		
date	Existing Location Plan		diag. title
08.11.19			
Client: Portland Nurseries			
JM	drawn	Scale: 1:1250 @ A3 /	
	diag. no.	rev. no.	
	611_E000	B	

PLANNING

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APPENDIX B
FLOOD MAP EXTRACTS

Flood map for planning

Your reference
19022-Honley

Location (easting/northing)
414071/412007

Created
2 Mar 2020 21:35

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

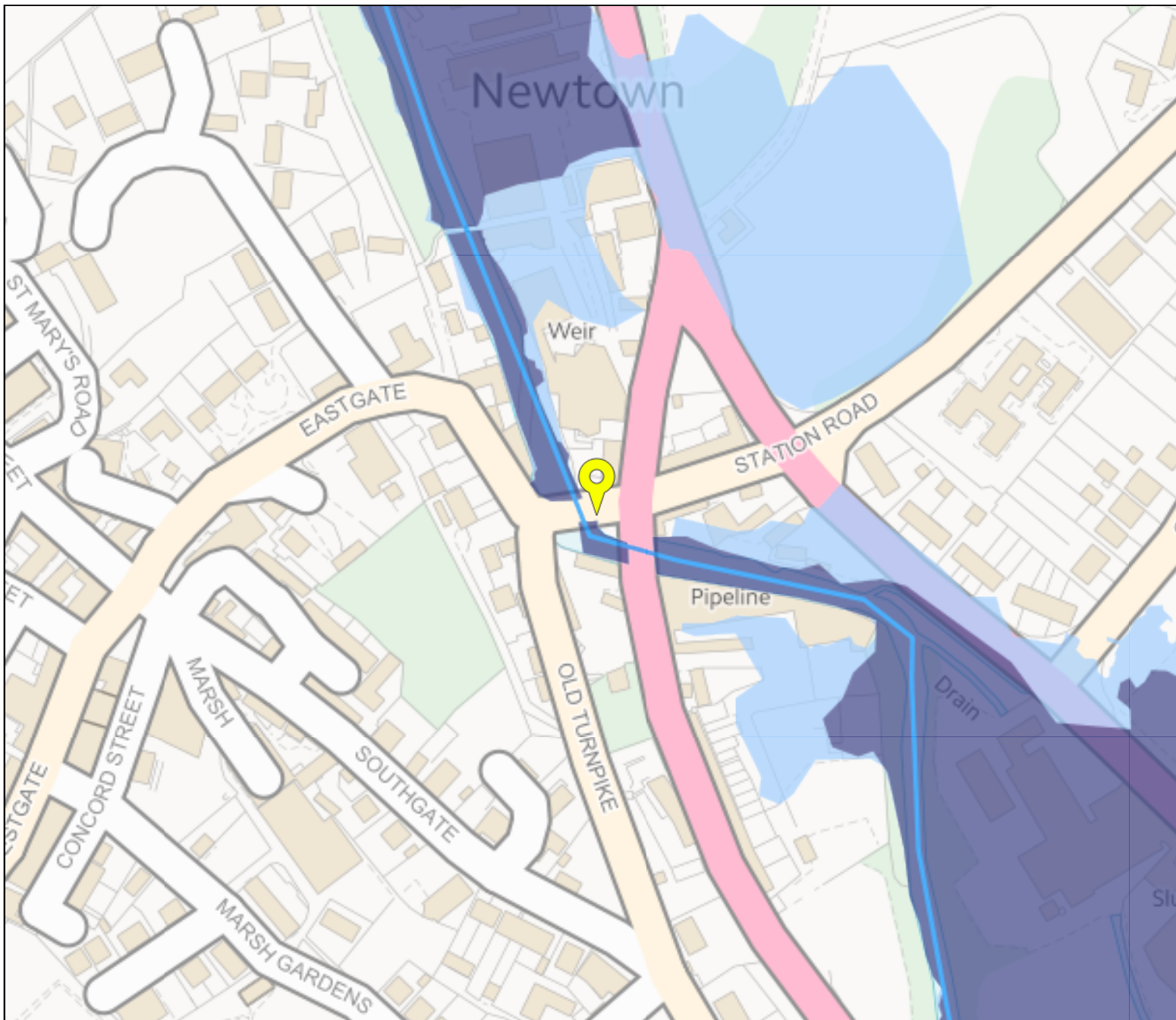
- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

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.

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



Flood map for planning

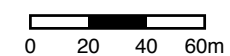
Your reference
19022-Honley

Location (easting/northing)
414071/412007

Scale
1:2500

Created
2 Mar 2020 21:35

-  Selected point
-  Flood zone 3
-  Flood zone 3: areas benefitting from flood defences
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Flood storage area



[◀ Back](#)

Learn more about this area's flood risk

Select the type of flood risk information you're interested in. The map will then update.

High risk: depth



Surface water flood risk: water depth in a high risk scenario
Flood depth (millimetres)

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

[◀ Back](#)

Learn more about this area's flood risk

Select the type of flood risk information you're interested in. The map will then update.

Medium risk: depth



Surface water flood risk: water depth in a medium risk scenario
Flood depth (millimetres)

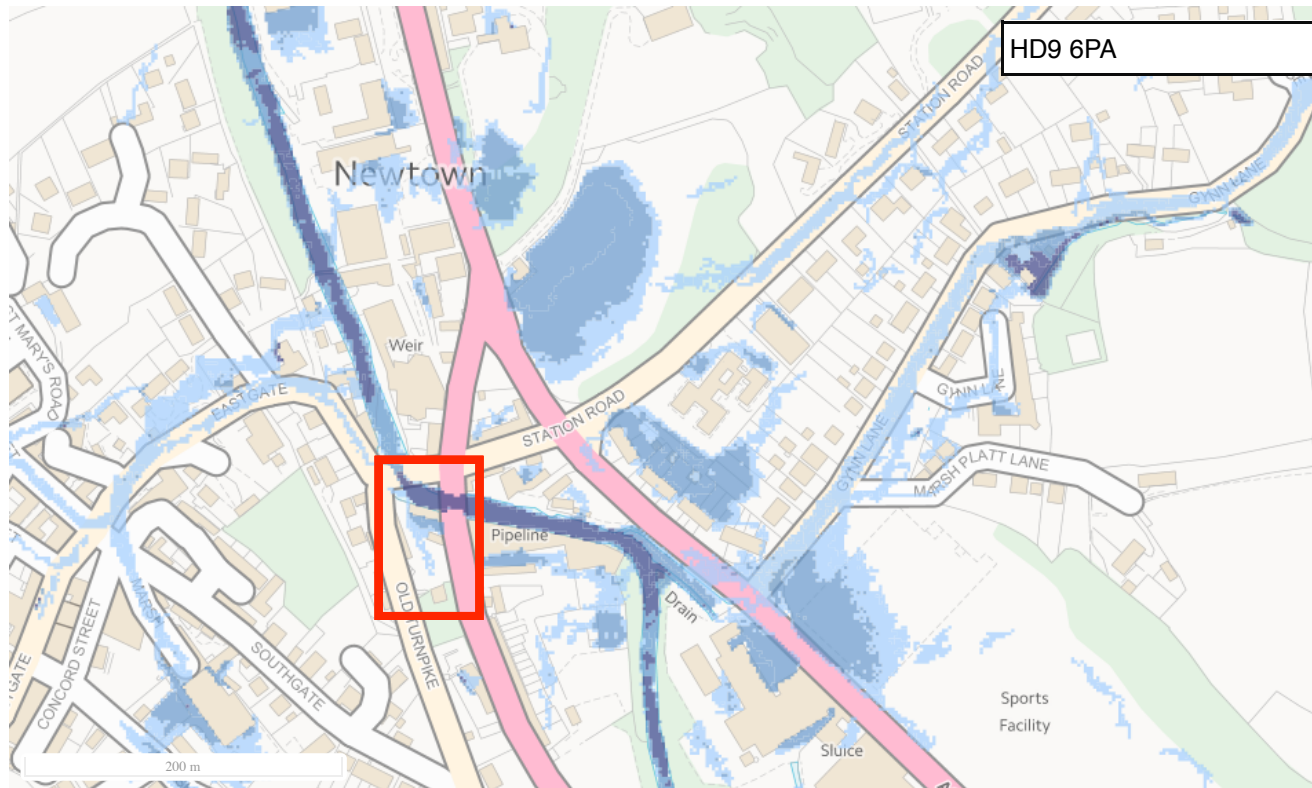
Over 900mm 300 to 900mm Below 300mm Location you selected

[◀ Back](#)

Learn more about this area's flood risk

Select the type of flood risk information you're interested in. The map will then update.

Low risk: depth



Surface water flood risk: water depth in a low risk scenario
Flood depth (millimetres)

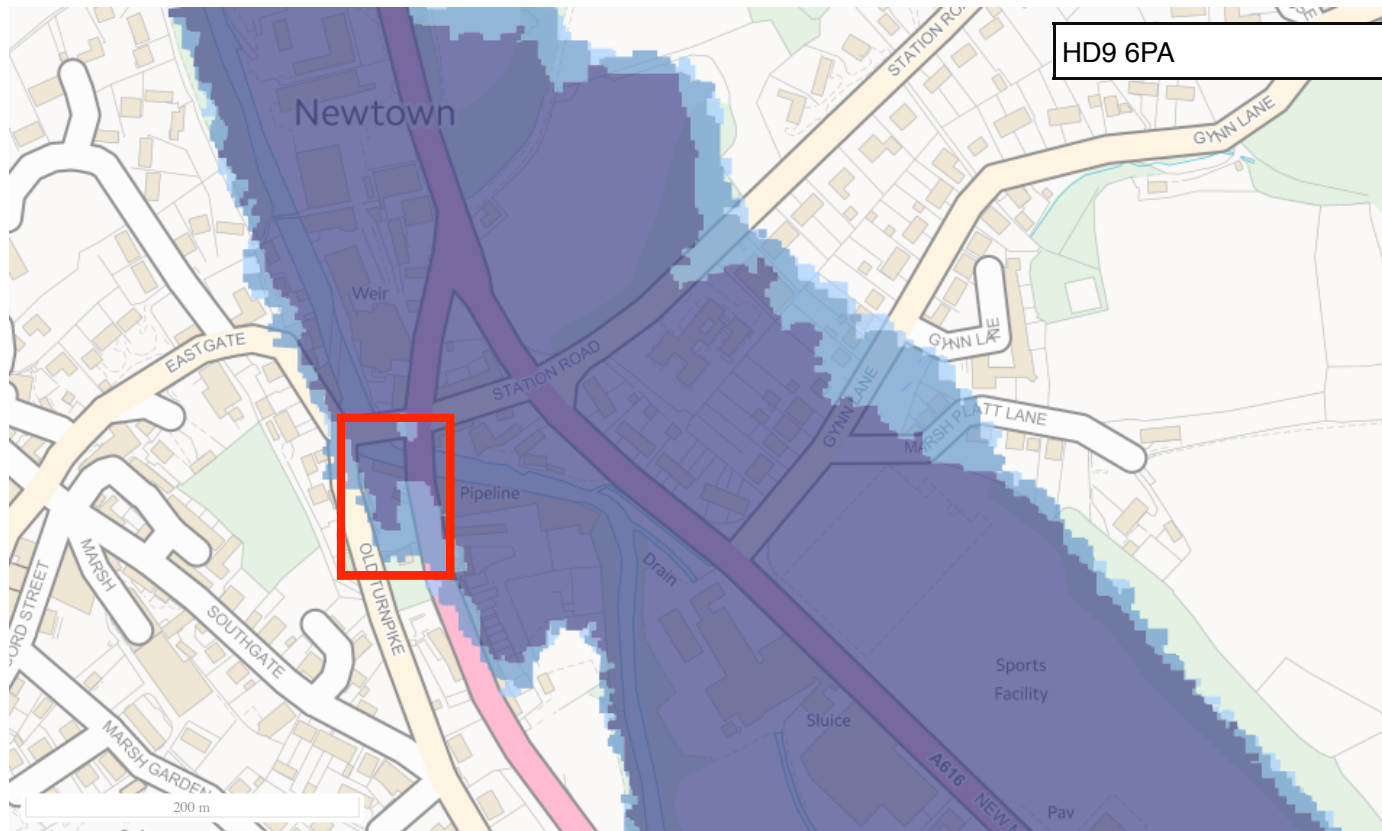
Over 900mm 300 to 900mm Below 300mm Location you selected

[◀ Back](#)

Learn more about this area's flood risk

Select the type of flood risk information you're interested in. The map will then update.

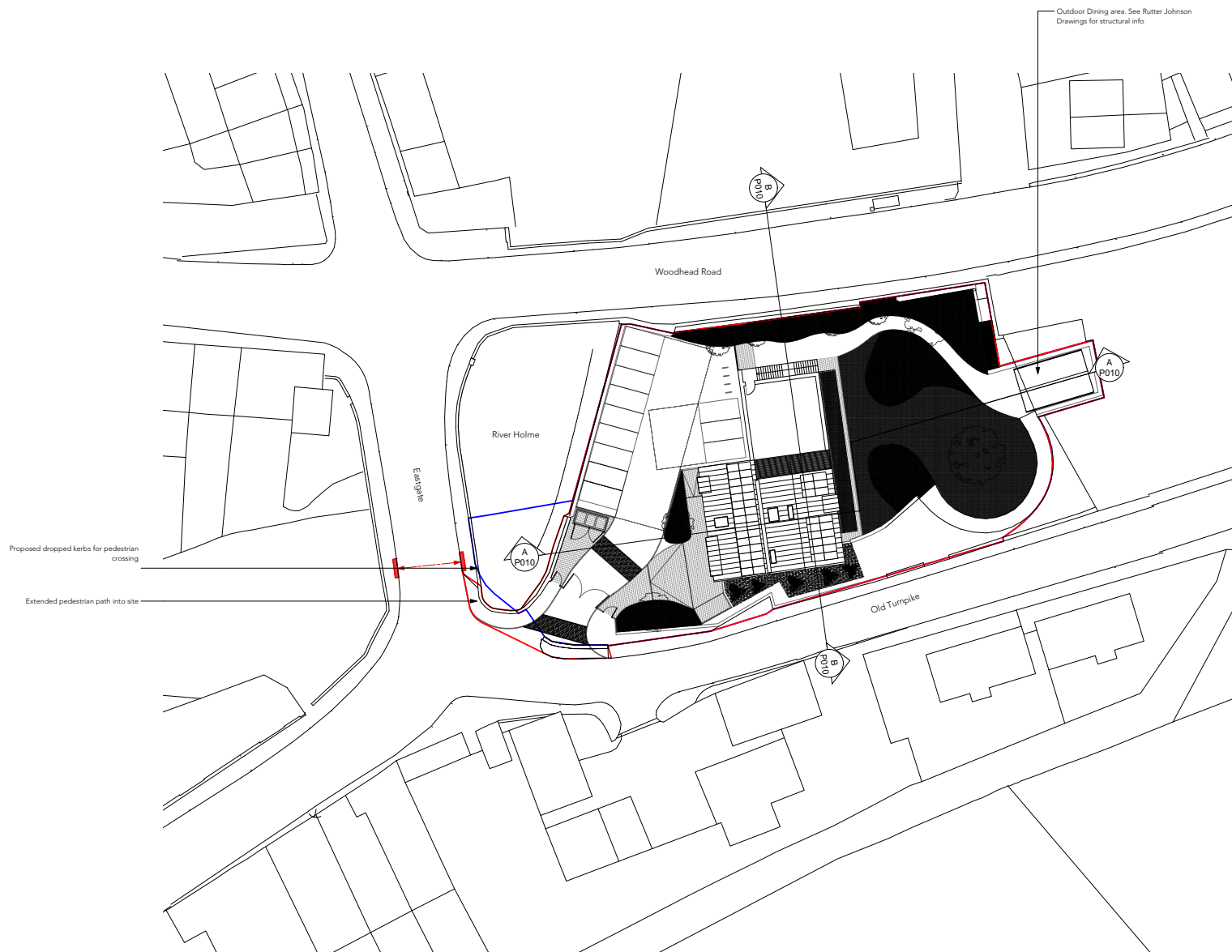
Flood depth



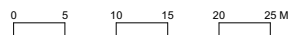
Reservoir flood risk: flood water depth

☐ Over 2m ☐ Between 0.3 and 2m ☐ Below 0.3m ☐ Location you selected

APPENDIX C
DEVELOPMENT PROPOSALS



1 611 Proposed Site Plan



— Ownership Boundary
— Development Boundary
+XXX.XX Existing Levels

date	revision	
15/11/19	B	Issued for planning .JM
08/11/19	A	Issued for client approval before planning .JM

Do not scale from drawings
Confirm all dimensions on site prior to manufacture
Confirm discrepancies with Architects prior to proceeding
Refer to all Engineers' documentation

job no.	job title
611	Portland Nurseries Honley Bridge Depot, Eastgate, Honley, Holmfirth, HD6 6PA
date	drawn by
20.09.19	
BB checked	Client: Portland Nurseries
JM	Scale: 1:500 @ A3 / 1:250 @ A1
	drawn by
	611_P002 B

PLANNING

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APPENDIX D

MICRODRAINAGE CALCULATIONS

Pre-development discharge

Rutter Johnson		Page 1
Link House 273 Crown Lane Horwich BL6 5HY		
Date 03/03/2020 12:56 File 19022-Pre_development f...	Designed by Lindsay Rutter Checked by	
Innovyze Network 2017.1.2		

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.300	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	10.000	0.100	100.0	0.080	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	10.000	0.100	100.0	0.110	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	46.72	5.17	99.100	0.080	0.0	0.0	0.0	1.00	17.8	10.1
1.001	46.27	5.29	98.925	0.190	0.0	0.0	0.0	1.31	52.0	23.8

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.001		101.000	98.825	0.000	0	0

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Link House 273 Crown Lane Horwich BL6 5HY		
Date 03/03/2020 12:56 File 19022-Pre_development f...	Designed by Lindsay Rutter Checked by	
Innovyze	Network 2017.1.2	
<u>Simulation Criteria for Storm</u> Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 0.000 Hot Start (mins) 0 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Flow per Person per Day (l/per/day) 0.000 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60 Foul Sewage per hectare (l/s) 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Storage Structures 0 Number of Online Controls 0 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> Rainfall Model FSR Profile Type Summer Return Period (years) 1 Cv (Summer) 0.750 Region England and Wales Cv (Winter) 0.840 M5-60 (mm) 20.000 Storm Duration (mins) 30 Ratio R 0.300		
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 0
 Number of Online Controls 0 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.300
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 20.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
 Analysis Timestep Fine Inertia Status ON
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600,
 720, 960, 1440, 2160, 2880, 4320, 5760,
 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 0

	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level
1.000	1	15 Winter	100	+0%	30/15 Summer				99.780
1.001	2	15 Winter	100	+0%	30/15 Summer				99.371

	US/MH	Depth	Volume	Flow / Overflow	Pipe		Level
PN	Name	(m)	(m³)	Cap. (l/s)	Flow (l/s)	Status	Exceeded
1.000	1	0.530	0.000	2.04	32.3	SURCHARGED	
1.001	2	0.221	0.000	1.76	76.4	SURCHARGED	

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Innovyze	Network 2017.1.2	

Rainfall Hyetograph for 15 minute 100 year Winter I+0%
for Pipe 1.000 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	21.244	4	51.112	7	190.512	10	133.854	13	40.376
2	38.766	5	82.731	8	221.294	11	82.731	14	38.767
3	40.376	6	133.854	9	190.512	12	51.112	15	21.244

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Innovyze	Network 2017.1.2	

Rainfall Hyetograph for 15 minute 100 year Winter I+0%
for Pipe 1.001 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	21.244	4	51.112	7	190.512	10	133.854	13	40.376
2	38.766	5	82.731	8	221.294	11	82.731	14	38.767
3	40.376	6	133.854	9	190.512	12	51.112	15	21.244

Post Development Discharge

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Innovyze Network 2017.1.2		

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.300	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	10.000	0.100	100.0	0.040	5.00	0.0	0.600	o	100	Pipe/Conduit	
1.001	10.000	0.100	100.0	0.070	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

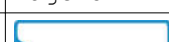
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	46.54	5.22	99.100	0.040	0.0	0.0	0.0	0.77	6.0	5.0
1.001	46.09	5.34	98.950	0.110	0.0	0.0	0.0	1.31	52.0	13.7

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.001		101.000	98.850	0.000	0	0

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Innovyze		Network 2017.1.2
<u>Simulation Criteria for Storm</u> Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 0.000 Hot Start (mins) 0 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Flow per Person per Day (l/per/day) 0.000 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60 Foul Sewage per hectare (l/s) 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Storage Structures 0 Number of Online Controls 0 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> Rainfall Model FSR Profile Type Summer Return Period (years) 1 Cv (Summer) 0.750 Region England and Wales Cv (Winter) 0.840 M5-60 (mm) 20.000 Storm Duration (mins) 30 Ratio R 0.300		
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Link House 273 Crown Lane Horwich BL6 5HY		
Date 03/03/2020 13:01 File 19022-Post_development ...	Designed by Lindsay Rutter Checked by	
Innovyze	Network 2017.1.2	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

```
Margin for Flood Risk Warning (mm) 300.0      DVD Status ON
      Analysis Timestep   Fine Inertia Status ON
      DTS Status          ON
```

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

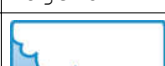
									Water
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)
1.000	1	15 Winter	100	+40%	30/15 Summer				100.472
1.001	2	15 Winter	100	+40%	100/15 Summer				99.259

PN	US/MH	Surcharged	Flooded			Pipe	Status	Level Exceeded
	Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (1/s)	Flow (1/s)		
1.000	1	1.272	0.000	3.53		19.8	SURCHARGED	
1.001	2	0.084	0.000	1.35		58.5	SURCHARGED	

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Innovyze	Network 2017.1.2	

Rainfall Hyetograph for 15 minute 100 year Winter I+40%
for Pipe 1.000 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	29.741	4	71.556	7	266.717	10	187.396	13	56.527
2	54.273	5	115.824	8	309.812	11	115.824	14	54.273
3	56.527	6	187.396	9	266.717	12	71.556	15	29.741

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Link House 273 Crown Lane Horwich BL6 5HY		
Date 03/03/2020 13:01 File 19022-Post_development ...	Designed by Lindsay Rutter Checked by	
Innovyze	Network 2017.1.2	

Rainfall Hyetograph for 15 minute 100 year Winter I+40%
for Pipe 1.001 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	29.741	4	71.556	7	266.717	10	187.396	13	56.527
2	54.273	5	115.824	8	309.812	11	115.824	14	54.273
3	56.527	6	187.396	9	266.717	12	71.556	15	29.741

APPENDIX E
EA RIVER HOLME MODELLING

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. 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. For local drainage information please contact your water utility company and your local council.

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 October 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

River Colne & Holme - Flood Modelling

The River Colne & Holme Flood Mapping Study, Flood Estimation, Modelling and Floodplain Mapping report was produced by Jeremy Ben Associates in March 2006. It was updated in 2010 to incorporate bank level data surveyed in 2009.

See enclosed:

- Model Nodes Location Map.
- Table showing modelled water levels and flows for the 1% (1 in 100), 1.3% (1 in 75), 2% (1 in 50), 4% (1 in 25) and 10% (1 in 10) Annual Exceedance Probabilities (AEP).
- Model Summary Sheets showing the results for the 0.1% Annual Exceedance Probabilities (AEP), as calculated in 2006. These were not updated in 2010.

Please note there are no depth grids currently available for this model.

Please note no breach scenarios were modelled for this study.

Please note that we are planning to update our modelling in this area. We are expecting results from our study to be available in March 2020, however please note that this is an estimate timescale and therefore subject to change.

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](https://www.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 of 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>

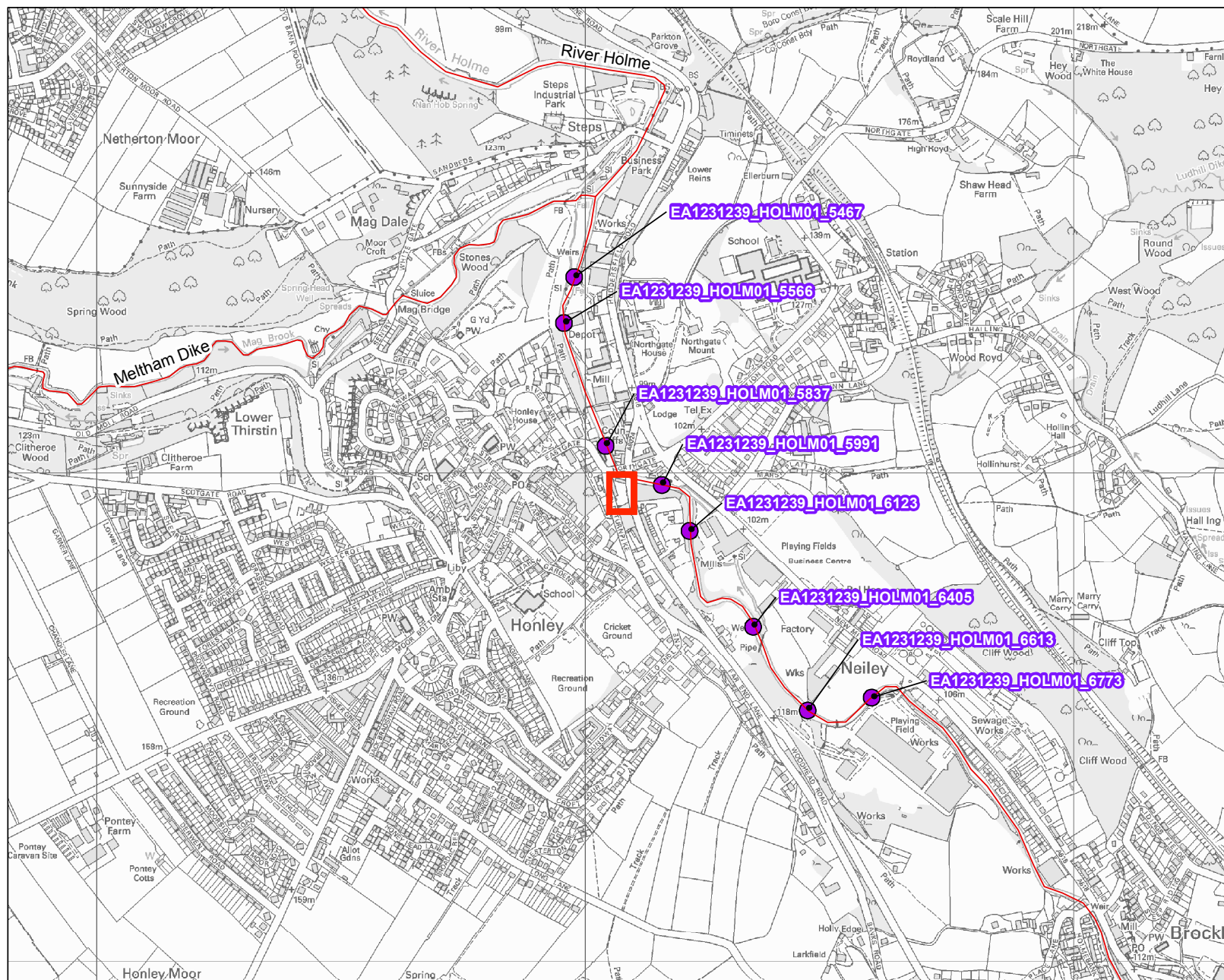
Ordnance Survey Data

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/2020/159766 Node Point Map centred on Former Eastgate Depot, Honley, Holmfirth, HD9 6PA. Date created: 25/02/2020



www.environment-agency.gov.uk

Scale: 1:8,000



when reproduced @ A3

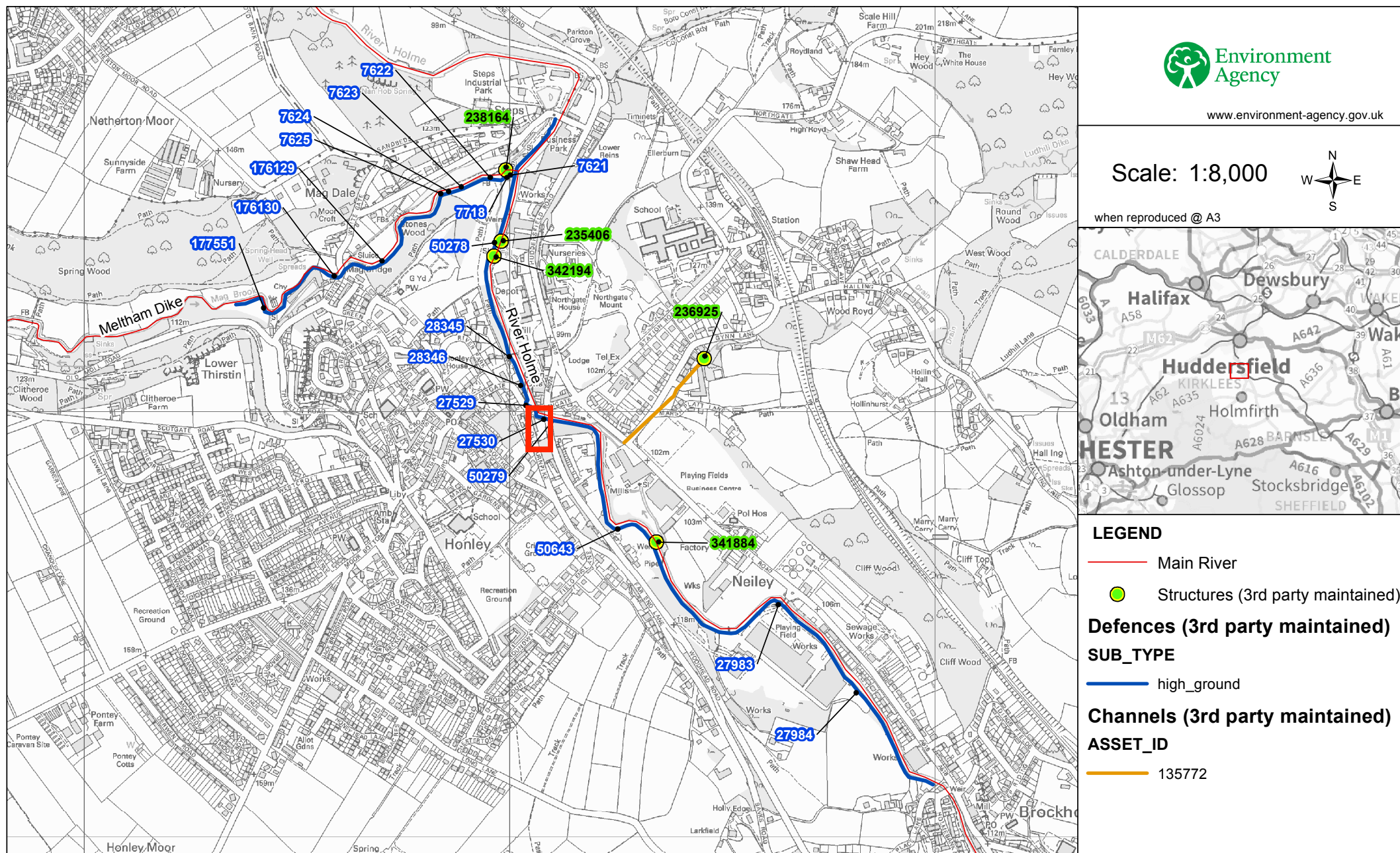


LEGEND

- Main River
- 2012 ASM Colne & Holme Node Points

RFI/2020/159766 Assets Map centred on Former Eastgate Depot, Honley, Holmfirth, HD9 6PA.

Date created: 24/02/2020



2010 ASM Colne and Holme Undefended Model Results – RFI/2020/159766 (Level - mAOD, Flow - m³/s)

Node Point	Annual Exceedance Probability (AEP)									
	10% AEP (1 in 10)		4% AEP (1 in 25)		2% AEP (1 in 50)		1.33% AEP (1 in 75)		1% AEP (1 in 100)	
	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow
HOLM01_5467	94.23	56.88	94.55	69.29	94.84	82.32	94.99	89.49	95.04	92.41
HOLM01_5566	96.27	56.88	96.38	69.29	96.48	82.33	96.53	89.50	96.56	92.40
HOLM01_5837	97.62	56.87	97.90	69.30	98.18	82.34	98.32	89.49	98.38	92.44
HOLM01_5991	98.74	56.88	98.98	69.30	99.23	82.34	99.35	89.51	99.37	92.45
HOLM01_6123	99.94	56.89	100.23	69.30	100.51	82.33	100.63	89.51	100.63	92.45
HOLM01_6405	102.24	56.89	102.34	69.33	102.49	82.38	102.55	89.55	102.58	92.46
HOLM01_6613	103.22	55.05	103.32	61.98	103.38	68.12	103.40	71.21	103.41	72.47
HOLM01_6773	104.17	56.17	104.27	66.61	104.33	77.06	104.35	82.42	104.36	84.57

2010 ASM Colne and Holme Defended Model Results – RFI/2020/159766 (Level - mAOD, Flow - m³/s)

Node Point	2010 model										2005 Model	
	Annual Exceedance Probability (AEP)											
	10% AEP (1 in 10)		4% AEP (1 in 25)		2% AEP (1 in 50)		1.33% AEP (1 in 75)		1% AEP (1 in 100)		0.1% AEP (1 in 1000)	
	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow
HOLM01_5467	94.24	57.16	94.56	69.87	94.85	82.79	95.00	90.00	95.06	93.28	96.16	128.00
HOLM01_5566	96.28	57.16	96.38	69.87	96.49	82.79	96.54	90.02	96.56	93.29	96.90	128.00
HOLM01_5837	97.62	57.18	97.91	69.88	98.19	82.79	98.33	90.02	98.40	93.31	98.93	128.00
HOLM01_5991	98.74	57.19	99.00	69.89	99.24	82.80	99.36	90.02	99.38	93.31	100.15	128.00
HOLM01_6123	99.95	57.18	100.25	69.89	100.52	82.81	100.63	90.02	100.63	93.31	100.62	128.00
HOLM01_6405	102.24	57.20	102.35	69.92	102.49	82.85	102.56	90.07	102.58	93.33	102.77	128.00
HOLM01_6613	103.23	55.30	103.32	62.26	103.38	68.25	103.40	71.40	103.41	72.79	104.22	128.00
HOLM01_6773	104.17	56.50	104.28	67.04	104.33	77.16	104.35	82.59	104.36	84.97	105.48	128.00

APPENDIX F
SEWER RECORDS

