



Peel Investments (North) Limited

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# **GMALLOCATION 31 - LAND EAST OF BOOTHSTOWN, SALFORD**

Site Appraisal - Drainage and Flood Risk





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Site Appraisal - Drainage and Flood Risk

**TYPE OF DOCUMENT (VERSION) CONFIDENTIAL**

**PROJECT NO. 70032760**

**OUR REF. NO. 70032760-GMALLOCATION31**

**DATE: MARCH 2019**

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# QUALITY CONTROL

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Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft for Client comments	Final for Draft Allocation	Update to Final for Draft Allocation	
Date	7th April 2017	13th April 2017	14 <sup>th</sup> Feb 2019	
Prepared by	D Percival	D Percival	C Metcalfe	
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Checked by	S Spaine	S Spaine	M Quinnell	
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Authorised by	C Patmore	C Patmore	C Patmore	
Signature				
Project number	70032760	70032760	70032760	
Report number	70032760-001-OA18	70032760-001-OA18	70032760-GMALLOCATION31	
File reference	\\uk.wspgroup.com\central data\Projects\700327xx\70032760 - GMSF Peel Reps			



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# 1 PROJECT BACKGROUND

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## 1.1 APPOINTMENT AND BRIEF

1.1.1 WSP have been instructed by Peel Investments (North) Limited (hereafter referred to as 'the Client') to undertake a high-level drainage appraisal to support the draft allocation of the site located at Land East of Boothstown in Salford, for residential development within the Greater Manchester Spatial Framework (referenced as GMAllocation 31).

## 1.2 AIM OF STUDY

1.2.1 The purpose of this study is to provide an overview of the drainage opportunities and constraints on the development site from a drainage and flood risk perspective. The study is entirely desk based and is predominantly our interpretation of publicly available information. Flood risk mapping data, including fluvial, tidal, surface water and reservoir flood maps were obtained from the Environment Agency webpage. The key sources of information are noted below, namely:

- The Greater Manchester Strategic Flood Risk Assessment;
- Manchester, Salford and Trafford Strategic Flood Risk Assessment;
- The Environment Agency webpage; and
- The British Geological Survey (BGS Online) Geology of Britain Viewer.

## 1.3 REFERENCE

1.3.1 The scope of this Flood Risk Appraisal has been developed based on the requirements of the Client and a review of all relevant policy information.

1.3.2 It is anticipated that this report will fulfil the required criteria and provides a preliminary appraisal of flood risk within the proposed site. As the site exceeds 1 hectare in area and will be subject to a change of use, there will be a requirement to provide a detailed Flood Risk Assessment, including a Drainage Strategy, to support any future planning application for the site.

## 1.4 LIMITATIONS

1.4.1 This report is based on the interpretation and assessment of data provided by third parties.

1.4.2 Whilst every care has been taken to ensure this information is accurate and up-to-date, WSP cannot guarantee the accuracy of third party data, and the findings of this report may change if the data is amended or updated after consultation.

## 2 PLANNING POLICY AND CONSULTATION

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### 2.1 RELEVANT LOCAL PLANNING POLICY AND STRATEGY DOCUMENTS

2.1.1 The following documents were reviewed as part of this Flood Risk Assessment:

- Defra Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015)
- Environment Agency Climate Change Guidance (February 2016 – updated February 2017)
- Flood and Water Management Act (April 2010)
- National Planning Policy Framework (July 2018) and Planning Practice Guidance (March 2014)
- Sustainable Drainage Systems Written Statement HCWS161 (December 2014)
- The Greater Manchester Strategic Flood Risk Assessment; and
- Manchester, Salford and Trafford Strategic Flood Risk Assessment (2011)

### 2.2 NATIONAL PLANNING POLICY

#### National planning policy framework

2.2.1 The National Planning Policy Framework (NPPF) ensures that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest flood risk.

2.2.2 Where new development is exceptionally necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and, where possible, reducing flood risk overall.

2.2.3 On the 6th March 2014 the Department for Communities and Local Government launched the Planning Practice Guidance web resource to supplement the framework. On this date, PPS 25 (Development and Flood Risk) was cancelled and replaced by the Flood Risk and Coastal Change Planning Practice Guidance.

#### DEFRA Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015)

2.2.4 This document sets out non-statutory technical standard for sustainable drainage systems. It should be used in conjunction with the National Planning Policy Framework and Planning Practice Guidance.

2.2.5 For developments which were previously developed, the peak run-off rate from the development to any drain, sewer or surface water body for the 1 in 1year rainfall event and the 1 in 100year rainfall event must be as close as reasonably practicable to the greenfield run-off rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

2.2.6 Where reasonably practicable, for developments which have been previously developed, the run-off volume from the development to any highway drain, sewer or surface water body in the 1 in 100year, 6hour rainfall event must be constrained to a value as close as is reasonably practicable to the Greenfield run-off volume for the same event, but should never exceed the run-off volume from the development site prior to re-development for that rainfall event.



- 2.2.7 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30-year rainfall event,
- 2.2.8 The drainage system must be designed so that, unless an area is designate to hold and/ or convey water as part of the design, flooding does not occur during a 1 in 100year rainfall event in part of: a building (including a basement); or in any utility plan susceptible to water (e.g. Pumping Station or Electricity Sub-station) within the development.
- 2.2.9 The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100year rainfall event is managed in exceedance routes that minimise the risks to people and property.

#### **Sustainable Drainage Systems Written Statement HCWS161 (December 2014)**

- 2.2.10 The Secretary of State for Communities and Local Government laid a Written Ministerial Statement in the House of Commons on 18<sup>th</sup> December 2014 setting out changes to planning that will apply for major development from 6<sup>th</sup> April 2015. This confirms that in considering planning applications, local planning authorities should consult the relevant Lead Local Flood Authority on the management of surface water; satisfy themselves that the proposed minimum standards of operation are appropriate and ensure through the use of planning conditions or obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development.
- 2.2.11 Therefore, from 6<sup>th</sup> April 2015, local planning policies and decisions on planning applications relating to major development are required to ensure that sustainable drainage systems (SuDS) are used for the management of surface water.
- 2.2.12 A “Major Development” is a development involving any one or more of the following:
- The winning and working of minerals or the use of land for mineral-working deposits;
  - Waste development;
  - The provision of 10 dwellings or more;
  - The provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or
  - Development carried out on a site having an area of 1 hectare or more.

#### **Environment Agency Climate Change Allowances (February 2016)**

- 2.2.13 On the 19<sup>th</sup> February 2015, the Environment Agency updated the Climate Change Allowances for rainfall, rivers flows and sea level rises for Flood Risk Assessments. This revised guidance came into effect immediately and is applicable to proposed development sites in England and Wales. The changes apply to all new planning applications within the NPPF. Further information regarding the allowances applicable to the proposed development herein is provided within Section 8.
- 2.2.14 It should also be noted that on 3<sup>rd</sup> February 2017 the guidance was further updated to clarify the climate change considerations for increased flood levels in relation to Flood Zone 1 site (low risk).

## **2.3 LOCAL PLANNING POLICY**

#### **Salford City Council Unitary Development Plan (June 2006)**

- 2.3.1 The Salford Unitary Development Plan was adopted in June 2006 and contains the following saved policy relating to flood risk and drainage.

## **“Policy EN 19**

*Development, including the alteration of land levels, will not be permitted where it would:*

- i. be subject to an unacceptable risk of flooding;*
- ii. materially increase the risk of flooding elsewhere; or*
- iii. result in an unacceptable maintenance liability for the city council or any other agency in terms of dealing with flooding issues.*

*Any application for development that is considered likely to be at risk of flooding, or to increase the risk of flooding elsewhere materially, will need to be accompanied by a formal flood risk assessment that should accurately assess the level of flood risk involved. Where appropriate, it should clearly identify the mitigation or other measures to be incorporated into the development or undertaken on other land which are designed to reduce that risk of flooding to an acceptable level.*

*In determining the potential impact of the proposed development on the risk of flooding elsewhere, particular regard will be given to the extent to which the development:*

- a. is located within or impacts upon a functional floodplain or flood zone;*
- b. incorporates protection, attenuation or mitigation measures, and the use of source control techniques and sustainable drainage systems; and*
- c. provides adequate access to watercourse for maintenance purposes.*

*Where development would be subject to a significant flood risk, including on allocated sites, and it is not possible to reduce the risk to an acceptable level through design solutions or other measures secured through development, it will be allowed to proceed only in co-ordinate with the completion of those elements of the River Irwell Flood Control Scheme which are necessary to mitigate the identified satisfactorily.*

*Development will not be permitted unless adequate provision is made for the discharge of foul and surface water associated with the proposal.*

### 3 EXISTING SITE

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#### 3.1 SITE LOCATION

- 3.1.1 The site is situated east of Boothstown in Salford.
- 3.1.2 An approximate postcode for the site is M28 1FG with approximate Ordnance Survey Co-ordinates for the centre of the site of: (373139 Easting, and 400453 Northing). A site location plan has been included in Appendix A of this report.

#### 3.2 SITE DESCRIPTION

- 3.2.1 The site is currently entirely Greenfield land.
- 3.2.2 Table 3-1 below, describes the general site characteristics.

**Table 3-1 – General Site Characteristics**

Characteristic		Description
Area		The overall site area is approximately 26.80 hectares in size, with draft allocation for 300 residential dwellings.
Existing Usage		As noted above, the site is currently occupied by Greenfield land.
Boundaries	North	The site is immediately bounded to the north by the A572 Leigh Road and residential areas of Boothstown.
	South	The site is immediately bounded to the south by the Bridgewater Canal beyond which lies further Greenfield land.
	East	The site is bounded to the east by the Worsley Hall Garden Centre and surrounding Greenfield land.
	West	The site is bounded to the west by the urban area of Boothstown.
General Topography		Reference to Ordnance Survey contours indicates that levels within the site range between approximately 20 – 45m AOD.

#### 3.3 EXISTING WATERCOURSES

- 3.3.1 Shaw Brook, an Environment Agency defined Main River, is identified to flow in a southerly direction through the site. The Brook appears to be culverted beneath Leigh Road. Beyond Leigh Road, the Brook flows adjacent to the north-western boundary of the site prior to meandering into the site. The Brook then flows centrally through the southern portion of the site prior to passing through a “discharge well”, beneath the Bridgewater Canal, before exiting the site via the southern boundary.
- 3.3.2 Aerial imagery indicates that Shaw Brook is partially culverted within the site to allow access to the surrounding fields.

### 3.4 EXISTING DRAINAGE

- 3.4.1 Due to the predominantly Greenfield nature of the site, the presence of an existing private drainage network within the footprints of the site is unlikely. The existing watercourses and field drains are likely to provide some outlet for offsite discharge of anticipated surface runoff from the proposed development. The interconnection of these features will need to be confirmed via a full topographical survey.
- 3.4.2 Based on the site’s setting adjacent to the urban area of Boothstown the presence of a network of public sewers serving the existing properties located in the immediate vicinity of the site is highly likely. There will be a requirement to confirm the presence and existing condition of the existing public sewers as part of a Detailed Flood Risk Assessment for the site.

### 3.5 GEOLOGY AND HYDROGEOLOGY

- 3.5.1 The British Geological Survey (BGS) Geology of Britain Viewer<sup>1</sup> indicates that the site is predominantly underlain by superficial deposits of Glacial Till. The southernmost area of the is shown to be underlain by superficial deposits of Peat.
- 3.5.2 BGS mapping indicates the presence of various bedrock strata within the site. This is summarised below.

**Table 3-2 – General Geology and Hydrogeology Site Characteristics**

Site Area	Strata	description	Aquifer designation
Northern	Worsley Delf Rock	Sandstone	Secondary A
Central	Pennine Upper Coal Measures	Mudstone, Siltstone and Sandstone	Secondary A
Southern	Collyhurst Sandstone Formation	Sandstone	Principal
	Manchester Marls Formation	Mudstone	Secondary B

- 3.5.3 Based on the published geology, the potential for the use of infiltration based Sustainable Urban Drainage (SuDS) is limited. However, the presence of Sandstone within the site indicates that these areas may be suitable. There will be a requirement for Infiltration Tests to confirm the suitability of these types of SuDS on the site.
- 3.5.4 The Land Information System Soilscales Map<sup>2</sup> classifies the soil beneath the site as “slowly permeable seasonally wet acid loamy and clayey soils”.
- 3.5.5 The Environment Agency Groundwater Maps indicate that the superficial deposits of Glacial Till are classified as a Secondary (undifferentiated) Aquifer. The deposits of Peat are classified as

<sup>1</sup> [mapapps.bgs.ac.uk/geologyofbritain](http://mapapps.bgs.ac.uk/geologyofbritain)

<sup>2</sup> [landis.org.uk/soilscales](http://landis.org.uk/soilscales)



unproductive strata. The site lies outside of a Groundwater Source Protection Zone.

3.5.6 Copies of relevant Geotechnical Maps have been included in Appendix B of this report.

## 4 DEFINITION OF FLOOD RISK

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- 4.1.1 The risk of flooding to the site from all current and future potential sources of flooding has been assessed in accordance with NPPF and BS 8533 2011 - assessing and managing flood risk in development - code of practice
- 4.1.2 Table 4-1 summarises the findings of the assessment. A more detailed explanation of the flood risk issues on the site and determination of flood risk ratings are presented in Sections 4.2 to 4.7 below.
- 4.1.3 It should be noted that the designation of risk outlined below is prior to the inclusion of any mitigation measures, which may subsequently act to reduce the risk.

**Table 4-1 – Degree of risk from each source of flooding**

Source		Risk
Fluvial		Low
Tidal		Not at risk
Groundwater		Low
Surface Water		Variable (low to high)
Sewer		Low
Artificial Sources	Reservoir	Not at risk
	Canal	Medium

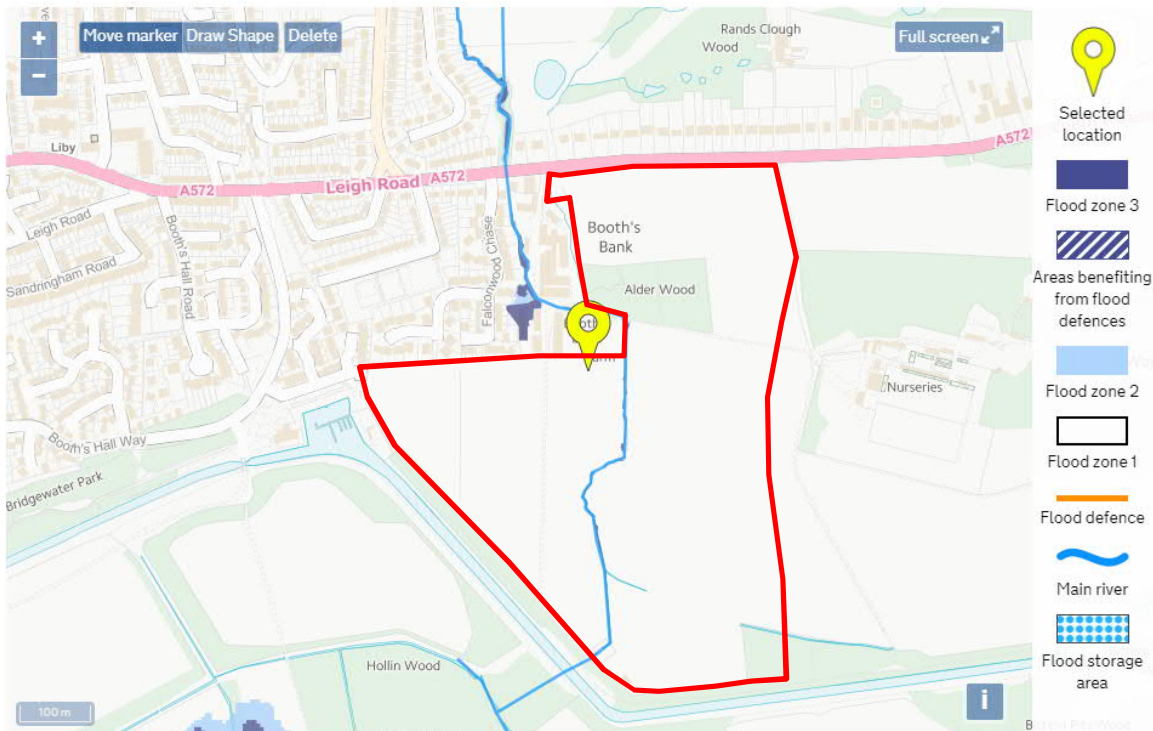
### 4.2 FLUVIAL FLOOD RISK

#### Flood maps

- 4.2.1 The National Planning Policy Framework (NPPF) categorises flood risk as follows:
- Zone 1 (low probability) is assessed as having less than a 1 in 1,000 annual probability of river or sea flooding (<0.1%);
  - Zone 2 (medium probability) is assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year; and
  - Zone 3 (high probability) is assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- 4.2.2 The Environment Agency Flood Map for Planning indicates that the site lies within Flood Zone 1. An extract of the flood map is included in Figure 4-1 below. Whilst the site is identified to be located within Flood Zone 1, consultation should be undertaken with the Environment Agency as part of a detailed Flood Risk Assessment to confirm the nature of fluvial flooding.
- 4.2.3 On the basis of the above, the proposed development site can therefore be assessed to have a low

risk of fluvial flooding.

**Figure 4-1 - Extract from the Environment Agency Flood map for planning**



### 4.3 TIDAL / COASTAL FLOOD RISK

- 4.3.1 The site is located a significant distance away from the coast and is therefore not considered to be at risk from tidal or coastal flooding.
- 4.3.2 The site is therefore not considered to be at risk of tidal/coastal flooding

### 4.4 GROUNDWATER FLOODING

- 4.4.1 The Manchester, Salford and Trafford Strategic Flood Risk Assessment (SFRA) identifies that the site is not at risk from groundwater flooding.
- 4.4.2 Based on the above, the risk of groundwater flooding has been assessed to be low.

### 4.5 SURFACE WATER FLOODING

- 4.5.1 The Environment Agency’s Surface Water Flood map indicates that significant areas of the site have a very low risk of surface water flooding. Notwithstanding this, the map also shows areas of the site which are at a variable risk of surface water flooding (low to high). These areas are located along and within close proximity to Shaw Brook. The surface water mapping provides an indication of the extent of flooding from the Brook. In addition, a significant area within the southern portion, which is considered the lowest point of the site, is identified to have a variable risk of surface water flooding (See Figure 4-2 below).

Figure 4-2 - Extract from the Environment Agency surface water mapping



## 4.6 SEWER FLOODING

- 4.6.1 The Manchester, Salford, Trafford SFRA does not provide any site-specific information relating to sewer flooding. Consultation will be required with the Local Authority and United Utilities to confirm any local flood risk issues as a result of sewer flooding.
- 4.6.2 As the draft allocation for the site is for future housing development within the Greater Manchester Spatial Framework, United Utilities have an obligation to provide offsite sewerage facilities for the development site. Further consultation with United Utilities will be required during the planning stage. In addition, discharge rates from the proposed development site to the existing public sewer network will have to be agreed where appropriate to ensure that there is no increase in the risk of sewer flooding to the site or downstream of the site.
- 4.6.3 Based on the information above, the potential risk of sewer flooding is considered to be low.

## 4.7 RESERVOIR/ ARTIFICIAL SOURCES FLOODING

- 4.7.1 Non-natural or artificial sources of flooding can include reservoirs, lakes, canals etc. The potential effects of flood risk management infrastructure and other structures needs to be considered.

### Reservoirs

- 4.7.2 Following the June 2007 floods and the incident at Ulley Reservoir, Sir Michael Pitt was asked by the government to carry out a review of the emergency services' response. He called for reservoir flood maps to be made available to the public and to local emergency planners to allow them to respond quickly to a reservoir flood.



- 4.7.3 As a result, reservoir flood maps have been created for over 2000 reservoirs in England and Wales. These maps show the likelihood of flooding from large reservoirs that retain at least 25,000 cubic meters of water above natural ground level. The maps show the largest area that might be flooded if a reservoir were to fail in a credible worst-case scenario.
- 4.7.4 The Environment Agency's Online Reservoir Flooding Map shows that the site is outside the extent of any reservoir flooding. As a result, the proposed development site is considered not to be at risk from reservoir flooding.

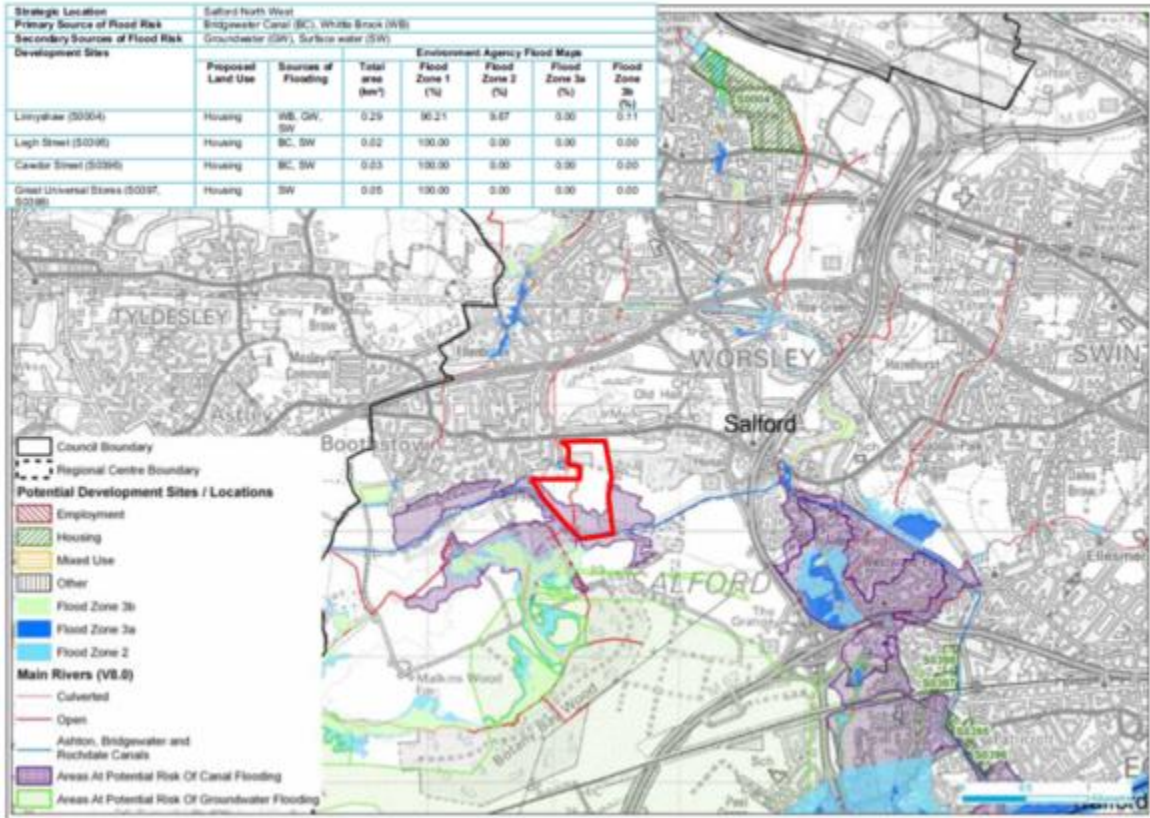
**Figure 4-3 - Extract from Environment Agency reservoir mapping**



### Canals

- 4.7.5 The Bridgewater Canal is located adjacent to the southern and south west boundaries of the site. Mapping contained within the SFRA identifies the southern and western portions of the site to be located within areas at potential risk of canal flooding. The extent of canal flooding, and an appropriate form of mitigation, should be considered further within a detailed Flood Risk Assessment.
- 4.7.6 Based on above, the site is considered to have medium risk of flooding from a canal.

Figure 4-4 - Extract from Manchester, Salford and Trafford SFRA mapping



## 5 DRAINAGE

5.1.1 Surface water arising as a result of development will be contained within the site via an appropriately designed surface water management strategy developed in accordance with NPPF and national and local surface water management strategies.

5.1.2 Based on the current Greenfield nature of the site it is likely that surface water run-off from future development will be restricted to the Greenfield run-off rate in accordance with the Non-statutory technical standards for sustainable drainage systems and The Manchester, Salford and Trafford Strategic Flood Risk Assessment which states:

**“Development should aim to deliver Greenfield run-off on Greenfield sites up to a 1 in 100-year storm event, considering climate change.”**

5.1.3 The existing Greenfield run-off rate for a range of rainfall return periods has been calculated using the Interim Code of Practice for Sustainable Drainage Systems method (ICP SuDS). The results are summarised in Table 5-1 below.

5.1.4 In addition, indicative storage requirements have been calculated using the Quick Storage Module in WinDES Micro-Drainage 2016 Software. Implementing the indicative storage requirements will ensure that anticipated surface runoffs from the proposed development site will be maintained at existing Greenfield run-off rates in accordance with the SFRA. The calculations have been based on the following assumptions namely:

- Surface runoff from all rainfall events, up to and including the 1 in 100year rainfall event plus a 40% allowance for climate change, is managed safely on the site; and
- Development on the site (total area 24.24 ha) has been assessed in this review based on the 450 units with a 30dph basis and the remaining elements of its draft allocation as POS and informal open space. This has been estimated to equate to approximately 15ha of developable area. For the preliminary calculations below WSP has assumed that 65% of the developable area would be classed as impermeable (9.75 ha).

**Table 5-1 – Indicative attenuation volumes for existing Greenfield runoff rates.**

Rainfall Return Period	Greenfield Run-off rate (l/s)	Indicative Surface Water Storage Requirement (m3)
1 in 1	137.4	260 – 527
1 in 2.2 (QBAR)	158.0	361 – 686
1 in 30	267.9	361 – 686
1 in 100	328.6	1727 - 2913

5.1.5 There will be a requirement to develop a suitable surface water drainage strategy as part of any Flood Risk Assessment to support a planning application for the site. This will ensure that the above surface runoff rates and indicative storage volumes are validated in consultation with the Lead Local Flood Authority and United Utilities.

- 5.1.6 The drainage strategy should consider discharging surface water using the following hierarchy:
- Infiltration to the ground, if not possible then;
  - Discharge to a watercourse, if not possible then;
  - Connection to a surface water sewer, if not possible then;
  - Connection to a combined sewer.
- 5.1.7 The presence of Sandstone within the site should ensure that the use of infiltration based SuDS techniques have potential to be used on the site. However, there will be a requirement to undertake further site investigations to confirm the permeability of the underlying strata on the site and the site-specific design criteria that would be used.
- 5.1.8 For this site consideration will also need to be given to discharging surface water at a controlled rate to Shaw Brook that flows through the site towards the south. Some additional consideration must be given to the existing flooding that occurs on site to maintain the current hydrology and not increase flood risk downstream.
- 5.1.9 The provision of an appropriately designed drainage strategy will ensure that there is no increase in surface water flooding downstream as a result of the proposed development. Surface water arising from the proposed development will be retained on site prior to discharging to the receiving body at an appropriate rate. Consultation will be undertaken with the Lead Local Flood Authority, United Utilities and the Environment Agency to confirm an appropriate discharge rate.
- 5.1.10 A high level indicative SuDS Plan is included as Appendix C. This indicates areas of the site that could be used for the provision of attenuation. Further design and consideration will be required during the production of a Flood Risk Assessment and Drainage Strategy.
- 5.1.11 By controlling run-off, the downstream areas can be better protected from the variability of rainfall events.

## **6 NPPF SEQUENTIAL AND EXCEPTION TEST**

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### **6.1 THE SEQUENTIAL TEST**

- 6.1.1 The Sequential Test, as defined in the National Planning Policy Framework, aims to steer all new developments to areas at the lowest risk of flooding and to ensure that the development type proposed is appropriate by reference to the flood risk.
- 6.1.2 According to the records maintained by the Environment Agency, the site is noted to be located within Flood Zone 1 area, and therefore a Sequential Test is not required and residential development would be appropriate on this site in flood risk terms.

### **6.2 THE EXCEPTION TEST**

- 6.2.1 Table 2 of the Flood Risk and Coastal Change Chapter of the Planning Practice Guidance (2014) classifies different types of development depending upon their vulnerability. It classes the proposed development as “More Vulnerable”.
- 6.2.2 Table 3 of the Flood Risk and Coastal Change Chapter of the Planning Practice Guidance (2014) shows that “More Vulnerable” land uses are appropriate development in Flood Zone 1 areas and that no Exception Test is required.

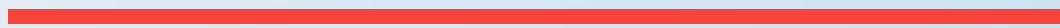
## 7 CONCLUSIONS

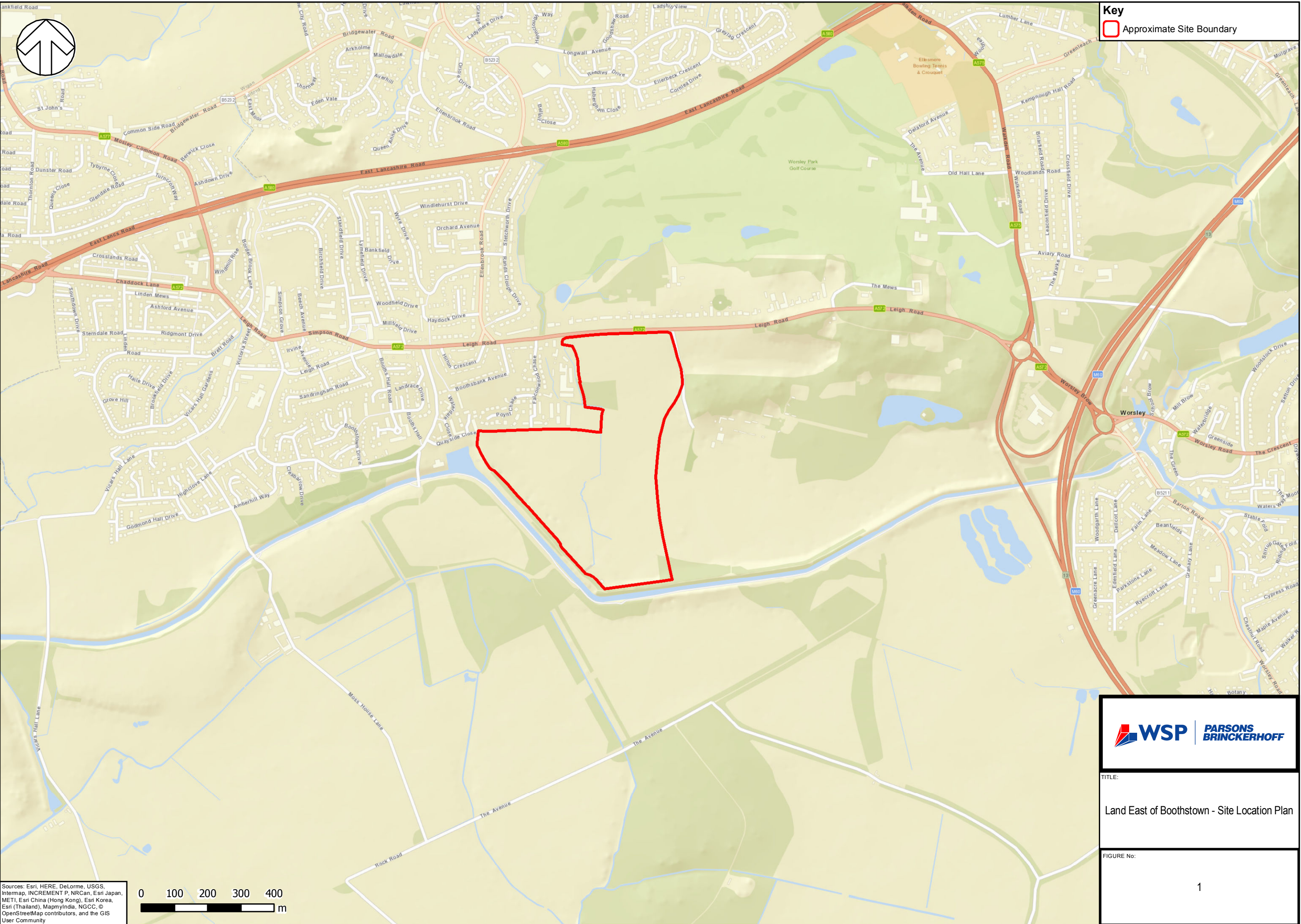
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- 7.1.1 This Flood Risk Appraisal has been produced to support the Client's draft housing allocations within the Greater Manchester Spatial Framework.
- 7.1.2 The Environment Agency Flood Map for Planning locates the site within Flood Zone 1 (low risk). Land located in Flood Zone 1 is assessed as having less than a 1 in 1,000 annual probability of flooding from river or sea flooding.
- 7.1.3 The site is identified to have a predominantly very low risk of surface water flooding. However, areas of variable risk (low to high) are observed along the routes of the existing watercourses in addition to areas of topographic depressions.
- 7.1.4 The Environment Agency Online Reservoir Flooding Map shows that the site is outside the extent of reservoir flooding. It is therefore not at risk from reservoir flooding
- 7.1.5 The site is located within an area that is considered to potentially be at risk from canal flooding. This will be assessed fully in a detailed Flood Risk Assessment.
- 7.1.6 As the site is greater than 1 hectare in area and will be subject to a change in use, a detailed Flood Risk Assessment and supporting Drainage Strategy will also be required to support a planning application for the site.
- 7.1.7 The Flood Risk Assessment will consider in detail the risk of surface water flooding within the site. In addition, consultation will be undertaken with the Environment Agency, United Utilities and the Lead Local Flood Authority in order to ensure early statutory authority involvement and to secure any necessary agreements.
- 7.1.8 Surface water management for future development will ensure that surface water run-off rates do not exceed existing greenfield rates, as stipulated within the SFRA.
- 7.1.9 The Flood Risk Assessment and Drainage Strategy will be produced in accordance with National and Local Planning Policies.
- 7.1.10 Based on the above, the site is considered suitable for residential development. It is recommended that development is sequentially located within Flood Zone 1.

# Appendix A

SITE LOCATION PLAN





**Key**  
 Approximate Site Boundary

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community



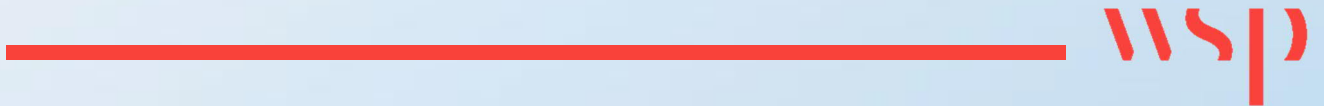
TITLE:  
 Land East of Boothstown - Site Location Plan

FIGURE No:  
 1



# Appendix B

COPIES OF RELEVANT  
GEOTECHNICAL MAPS



# Appendix B.1

ENVIRONMENT AGENCY WATER  
ABSTRACTION LICENSES MAP



**Map legend**

Click on the map to see a list of water abstraction licences within that catchment

Water Abstraction Licences within a Catchment ⓘ

River Catchment

Water Abstraction from Groundwater Sources ⓘ

★ Small size of abstraction  
 ★ Medium size of abstraction  
 ★ Large size of abstraction

Water Abstraction from Surface Water Sources ⓘ

● Small size of abstraction  
 ● Medium size of abstraction  
 ● Large size of abstraction

Water Abstraction from Tidal Water Sources ⓘ

▲ Small size of abstraction  
 ▲ Medium size of abstraction  
 ▲ Large size of abstraction

Other national environmental organisations ⓘ

■ Natural Resources Wales Area of responsibility  
 ■ Scottish Environment Protection Agency Area of responsibility

Map of X: 373,222.26; Y: 400,331.95 at scale 1:10,000

Other maps [Data search](#) [Text only version](#)

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**More about Water Abstraction Licences**

**Water Abstraction Licences:**

Water can be abstracted (taken) from groundwater, surface water, or tidal water. An abstraction licence details of what is permitted such as how much water is allowed to be abstracted and at what times. Read more about water abstraction licences and how to apply for a licence.

# Appendix B.2

ENVIRONMENT AGENCY NITRATE  
VULNERABLE ZONES



**Map legend**

Enter your Postcode to find your location then click within the Nitrate Vulnerable Zone to see more details about that designation

Proposed 2017 Nitrate Vulnerable Zones [i](#)

- Surface Water NVZ Area
- ▨ Groundwater NVZ Area
- Eutrophic NVZ Area

**G8** **ET4** NVZ Number  
**S221**

Existing Nitrate Vulnerable Zones [i](#)

- ▨ Surface Water NVZ Area
- ▨ Groundwater NVZ Area
- ▨ Eutrophic NVZ Area

Designation Notice Tranche [i](#)

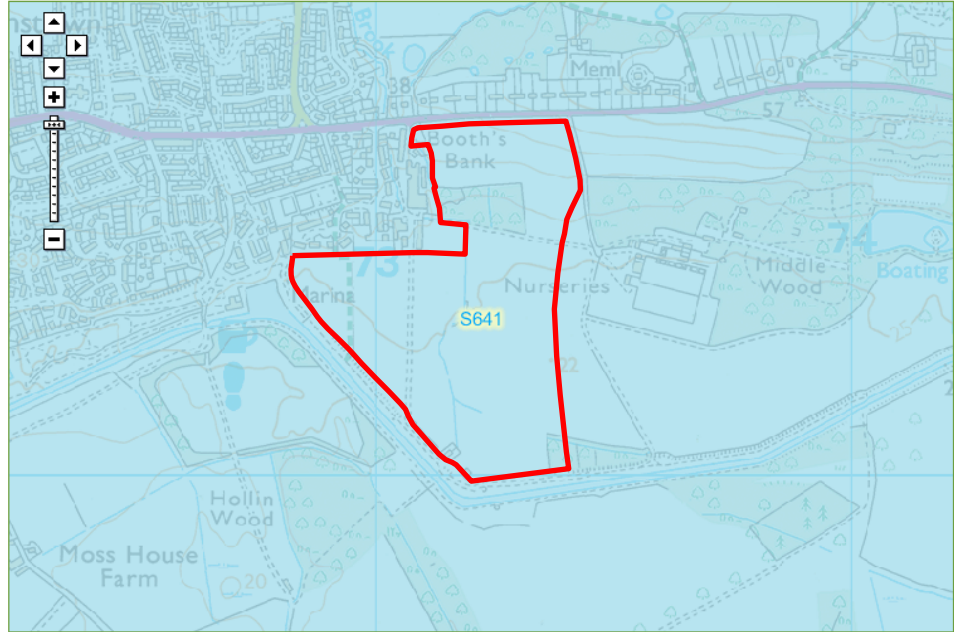
- Tranche 1
- Tranche 2
- Tranche 3

Other national environmental organisations [i](#)

- Natural Resources Wales Area of responsibility
- Scottish Environment Protection Agency Area of responsibility

Map of X: 373,222.26; Y: 400,331.95 at scale 1:10,000

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**Nitrate Vulnerable Zones**

Nitrate Vulnerable Zones (NVZs) are designated areas of land that drain into nitrate polluted waters, or waters which could become polluted by nitrates

**Proposed 2017 NVZ designations**

The map shows Nitrate Vulnerable Zones (England) 2017 to 2020, published on 1 December 2016 by the Environment Agency on behalf of the Secretary of State for Environment, Food and Rural Affairs.  
[How to appeal](#)  
 Information on how the NVZs were designated is provided in Designation method documents

# Appendix B.3

ENVIRONMENT AGENCY LANDFILL  
MAPPING



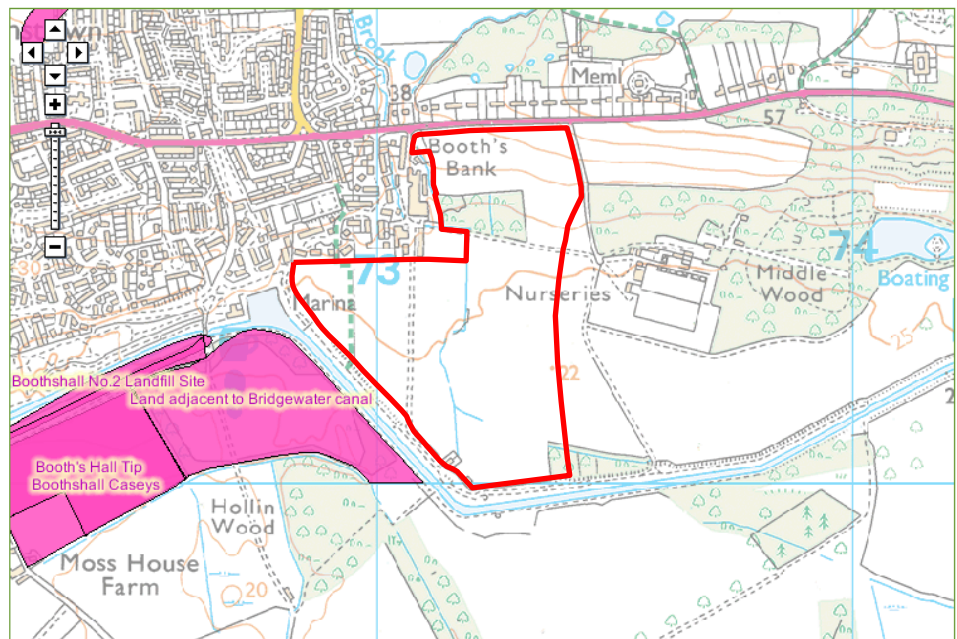
**Map legend**

Click on a feature for details of that site

- Authorised Landfill ⓘ
- Site boundary
- Historic landfill ⓘ
- Site boundary
- Mining Waste ⓘ
- Closed Mining Waste Sites
- Other national environmental organisations ⓘ
- Natural Resources Wales Area of responsibility
- Scottish Environment Protection Agency Area of responsibility

Map of X: 373,222.26; Y: 400,331.95 at scale 1:10,000

Other maps ⓘ Data search ⓘ Text only version ⓘ



# Appendix B.4

ENVIRONMENT AGENCY POLLUTION  
MAPPING





**Map legend**

Click on a feature for details of that site

Pollution Incidents ⓘ

- ▲ Major
- ▲ Significant

Industrial Pollution ⓘ

- Fuel & Power
- Metal
- Mineral
- Chemical
- Waste
- Water
- Radioactive
- Associated
- Other
- Not Classified

Industrial Operator Scores (OPRA) 2011 ⓘ

- ★ Band A
- ★ Band B
- ★ Band C
- ★ Band D
- ★ Band E
- ★ Band F

Compliance Rating Scores ⓘ

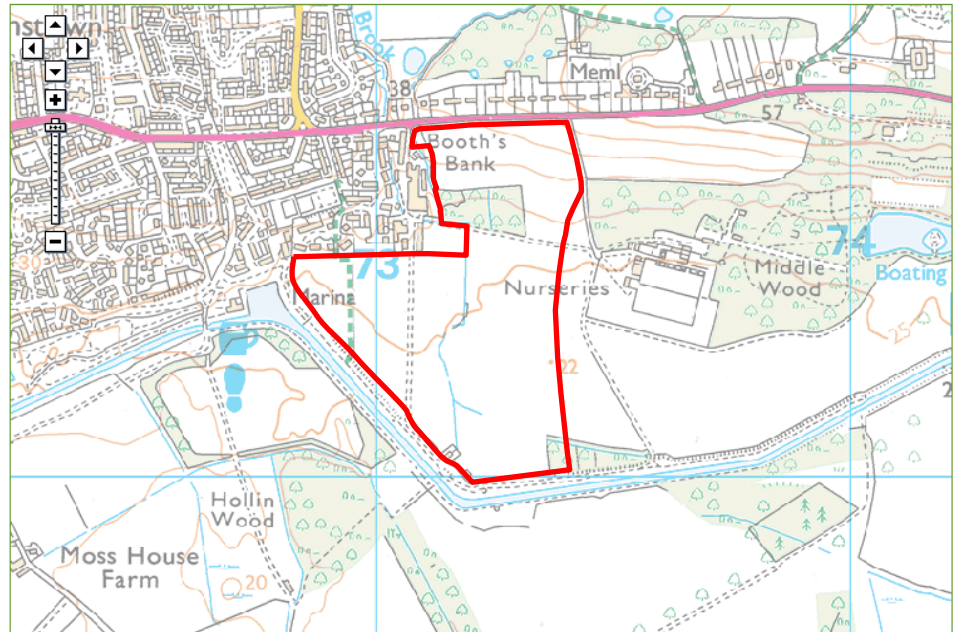
- Very Good
- Good
- Moderate
- Fair
- Poor
- Bad

Other national environmental organisations ⓘ

- Natural Resources Wales Area of responsibility
- Scottish Environment Protection Agency Area of responsibility

Map of X: 373,222.26; Y: 400,331.95 at scale 1:10,000

Other maps ⓘ Data search ⓘ Text only version ⓘ



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**Tell me more about Pollution:**

**Pollution Incidents**

Find out how we categorise incidents and their possible effects on health and the environment

**Industrial Pollution**

Every industrial process could theoretically pose a risk to human health and the environment. Find out how we measure this risk and how we score operators on their potential to impact the environment.

**Industrial Operator Scores (OPRA)**

Industrial Operator Scores reflect two of the five attributes that make a site's Operational risk appraisal (Opra) profile. The Compliance Rating band reflects the number of non-compliances with permit conditions we have recorded at the site over the course of a year. The Operator Performance band is influenced by the type of management system the operator has in place and any formal enforcement action we have taken at the site.

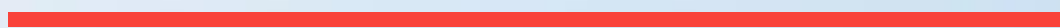
[More information about OPRA](#)

**Compliance Rating Scores**

Compliance Rating Scores is our report of the level of permit breaches we've recorded at sites during the year.

# Appendix C

INDICATIVE SUDS PLAN







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