

Project

Wordsworth Crushing, Vehicle Maintenance Building

Title

Flood Risk Assessment

Client

Wordsworth Excavations

MSJ Job No
221062

Document No
221062 GEN 0001-P1 [Flood Risk Assessment]

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Issue Record

Status	Rev	Description	By	Chk		Date
	P1	First Issue	MH	AB		11-10-2021

Proposed Vehicle Maintenance Facility Off Whaley Road, Barugh Green, Barnsley

Flood Risk Assessment

1. Introduction

Melia Smith & Jones have been instructed by Martin Walsh Architectural on behalf of Wordsworth Excavations to prepare a Flood Risk Assessment (FRA) in support of a Planning Application for the construction of a Proposed Vehicle Workshop together with associated infrastructure at the Wordsworth Business Park, Whaley Road, Barugh Green, Barnsley, S75 1HT.

2. Scope

The site is classified as Zone 1 by the Environment Agency Flood Maps (low probability of river and sea flooding). The proposed site development area totals approximately 1.1 hectares, which is within the ownership of Wordsworth Excavations site which covers an area of approximately 4.16Ha. Planning Practice Guidance ID7 Flood Risk and Coastal Change states that a site specific FRA is required for all proposals for new development in Flood Zone 1 of 1 hectare or greater.

The FRA should consider vulnerability to flooding from other sources as well as from river and sea flooding, and also the potential for any increased risk of flooding elsewhere resulting from the development. As such a FRA is required in accordance with the National Planning Policy Framework (NPPF) and associated National Planning Practice Guidance (NPPG). This FRA also includes an assessment of surface water drainage requirements.

3. Site Details

3.1. Site Location

The site is located at NGR Ref SE 321 083, to the West of Barnsley. It is located within a large Industrial Estate and is surrounded by roads and industrial units. The nearest housing is approximately 400m to the west and 450m to the south east. There is open rural area to the north east. The Barnsley branch railway line passes the north east side of the industrial estate boundary, some 50m from the edge of the proposed development site.

Refer to Appendix A for the site location plan.

3.2. Site Description

The proposed site development area totals approximately 1.10 hectares. It has in the past been used to store building demolition waste and is currently used to crush and sort aggregates. The plot is predominately a compacted stone hardstanding with a single storey metal clad shed to the north side approximately 14m by 23m on plan. Part of the plot is used to sort and stockpile aggregates with the remaining used for general storage related to earthmoving vehicle maintenance. An existing entrance road with turning heads has been built to the south of the site.

The site falls approximately 1m from west to east and approximately 2.75m from south to north. The site has a maximum level of approximately +71.0m AOD and a minimum of approximately +66.5m AOD.

An existing culverted watercourse (>50m long) passes the site approximately 300m to the north of the site. There is an abandoned canal 600m north beyond the rail lines and the River Dearne is approximately 1km north and east of the site.

There is an existing ditch on site which appears to flow North towards the railway line. The ditch does not appear to have a dedicated outfall.

There are no recorded Yorkshire Water sewers in the immediate vicinity of the site. Private foul and surface water sewers have been built in the entrance road and drainage tails have been built to accommodate the site. It is understood that these sewers connect into the adopted network further downstream and that they have been provided to service this site and adjoining plots. The surface water sewer has been built with oversized pipes and a hydrobrake flow control device. It is not known however if these sewers have the capacity to accept surface water flow from this development.

3.3. Development Proposals

It is proposed to construct a Vehicle Workshop and associated roads and parking. The workshop consists of a single industrial building approximately 45m by 33m on plan and 13.2m high. The remaining plot area will remain paved for vehicle movements and wash down facilities.

Refer to Appendix B

4. Flood Risk

4.1. River & Tidal Flooding

Under PPS25, all new planning applications must undergo a Sequential Test. This test must be implemented by local planning authorities with a view to locating particularly vulnerable new developments (e.g. residential, hospitals etc.) outside of the floodplain. The test refers to the EA Flood Zones noted below:-

Flood Zone	Probability	Explanation	Appropriate Land use
Zone 1	Low	Less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)	All development types generally acceptable
Zone 2	Medium	Between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% 0.1%) in any year	Most development type are generally acceptable
Zone 3a	High	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	Some development types not acceptable

Zone 3b	'Functional Floodplain'	Land where water has to be flow or be stored in times of flood. SFRA's should identify this zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1% flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes)	Some development types not acceptable
---------	-------------------------	---	---------------------------------------

Reference to published EA flood maps for this locality shows the whole site to be within Zone 1. In accordance with the Sequential test described in PPS 25, all development types are compatible with this zone. The Exception test is not required in this case, and the proposed development is suitable in terms of river & tidal flood risk.

Refer to Appendix C

4.2. Surface Flooding

Information obtained from the Environment Agency shows that there is some minor surface water flooding on site. There is a low risk of surface flooding located at the existing on site ditch and a small area located in the Southern Corner of the site. The flooding at the ditch appears to be constrained to the ditch itself. The surface flooding at the Southern Corner is remote from any proposed building and if it were to flood, water would generally flow in a North Easterly direction towards the existing ditch. A secondary surface water flood map has been obtained from the EA. This shows surface flooding off site on Claycliffe Lane. This is approximately 350m away from the site and is not considered to present a surface flooding risk. There is no flood risk generated from artificial water bodies and reservoirs. The overall surface water flood risk to the site is considered to be low.

See Appendix D

4.3. Groundwater

The Groundsure Map shows the site to be located in an area at negligible risk of groundwater flooding

The risk of flooding from ground water sources is considered to be low.

See Appendix E

4.4. Sewer

Yorkshire Water has no sewers in the immediate vicinity of the site. Any flooding from Yorkshire Waters sewers would pose no risk to the site. The private sewers in the access road have a flow control located downstream. Whilst it is reasonable to assume that these sewers have been designed to accommodate storms with a return period of 30 years without flooding, storms with a return period in excess of this may cause flooding on the access road. The development site lies at a lower level than the access road but floodwaters on the access road would be constrained by the kerbs and would tend to flow in a North Easterly direction away from the development site towards the railway line. Similarly any floodwater that escaped from manholes located on Whaley Road would be constrained by the kerbs and would flow down the access road away from the development site. Flood risk from existing sewers is therefore considered to be low.

See Appendix F

4.5. Surface Water Run-Off

PPS25 recommends that surface water generated from a development site should be managed in a sustainable manner to closely resemble the surface water flows generated by the site prior to development.

A surface water management strategy for the development will be required to manage and reduce the flood risk posed by the surface water runoff from the site. The developer will be required to ensure that any scheme for surface water should build in sufficient capacity for the entire site.

There are three possible options to discharge the surface water runoff in accordance with requirement H3 of the English Building Regulations 2000. Rainwater must discharge to one of the following, listed in order of priority:

- An adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable;
- A watercourse; or where that is not reasonably practicable;
- A sewer.

An assessment of the surface water runoff rates has been undertaken in order to determine the surface water options and attenuation requirements for the Site.

The surface water drainage arrangements should be such that the volume and peak flow rates of surface water leaving the developed site is no greater than the rates prior to the proposed development, unless specific off-site arrangements are made and result in the same net effect.

Existing Run-Off

The existing plot is not connected to a drainage system and is presumed to drain largely by infiltration through the stone hardstanding. The ditch that runs across the site will intercept some surface flow that falls on the site during heavy rain. The topographical survey does not show it to be an active water course but it appears to flow towards the railway. There is evidence that the ditch has no outfall and that water soaks away at the low end.

In order to ensure that the proposed development does not increase flood risk off site, the surface water discharge off site should be limited to the pre -development rate. The existing rate of run off should be considered to be the Greenfield run off rate.

UKSuDS Greenfield runoff calculation printouts are attached in Appendix G. Runs using both the FEH and IH124 methods are shown. HOST classification is taken from National Soils Resources Institute (Cranfield University) soil description. The table below shows the calculated runoff rates.

Annual Probability (Return Period, years)	Greenfield Runoff (l/s) IH124*	Greenfield Runoff (l/s) FEH*
Q _{BAR}	1.94	3.04
1 in 1 yr	1.67	2.61
1 in 30 yr	3.39	5.32
1 in 100 yr	4.03	6.32

* Note: UKSuDS recommends that values below 5 l/s should not be used since flow

restriction devices are prone to clogging/blockage at this flow rate.

Proposed Run-Off

100% of the proposed development will be drained buildings or hardstandings.

As far as surface water is concerned, use of Suds components, such as soakaways should be given priority over disposal off site to sewer. The performance of Suds components rely on favorable ground conditions to enable them to work effectively. At the time of writing, the permeability of the ground at this site has not been checked. It is also unknown if the existing ditch has an appropriate outfall. For the purpose of this FRA, it is assumed that off site surface water disposal is the only viable method of draining the site. The rate of restriction for the 1.1 ha drained area should be 5.0 l/sec.

It is not known if the existing private surface water drains that exist in the access road have sufficient capacity to accept additional flow into them. Given that these drains form part of attenuation system it will assumed that they do not have spare capacity to accept surface water flow from this development. The closest public surface water sewer is located approximately 300m from the site at the bend in Whaley Road next to the Zenith Park Industrial Estate. It is likely that a pumped main will be required to be able to discharge at this location.

It is likely that the attenuated surface water will be held in some form of underground tank on site. For a storm with a return period of 100 years, approximately 580m³ would be required. This figure is only an estimate and the exact details, including the flow restriction, need to be confirmed at detailed design stage.

See Appendix H

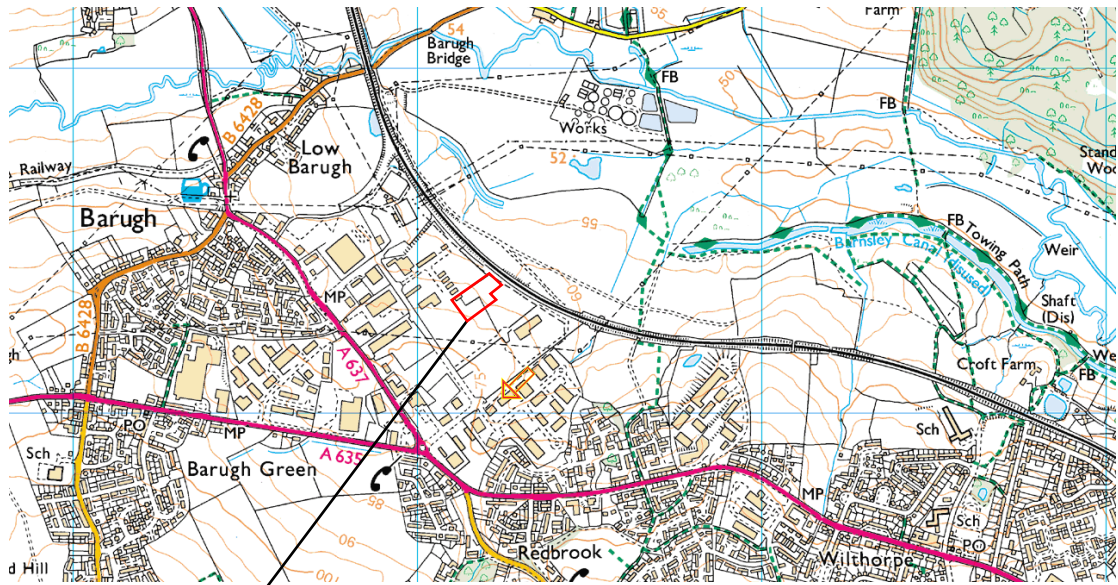
Designed this way, the risk of flooding off site as a result of the development will not be increased.

5. Conclusions

This FRA has identified that the whole of the development site is located within an area designated as Zone 1 as defined by the EA Flood Map and is therefore in a location which has less than a 1:1000 annual probability of river flooding, which is a low risk. The site is also considered to be at low risk from ground water flooding and from other off site sources.

Off site flows will be restricted to 5.0l/sec which whilst this is nominally higher than the 1 year greenfield rate, will not significantly increase off site flood risk and will reduce off site flood risk for the 30 and 100 year events.

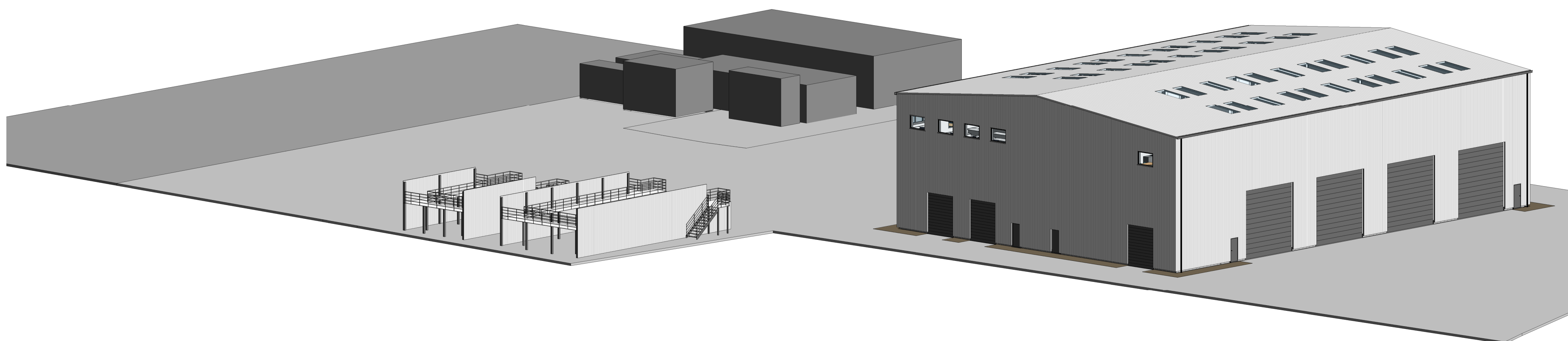
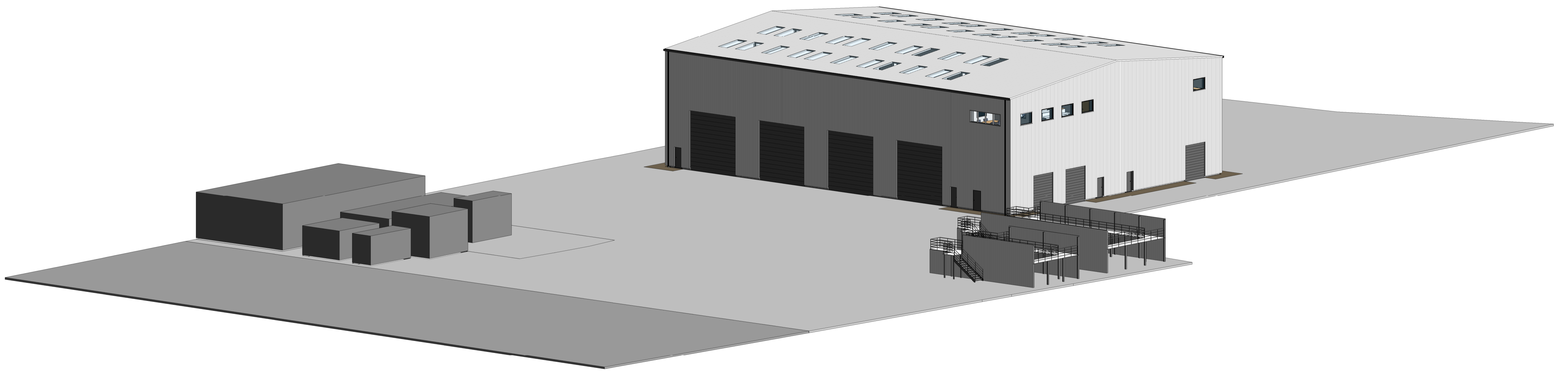
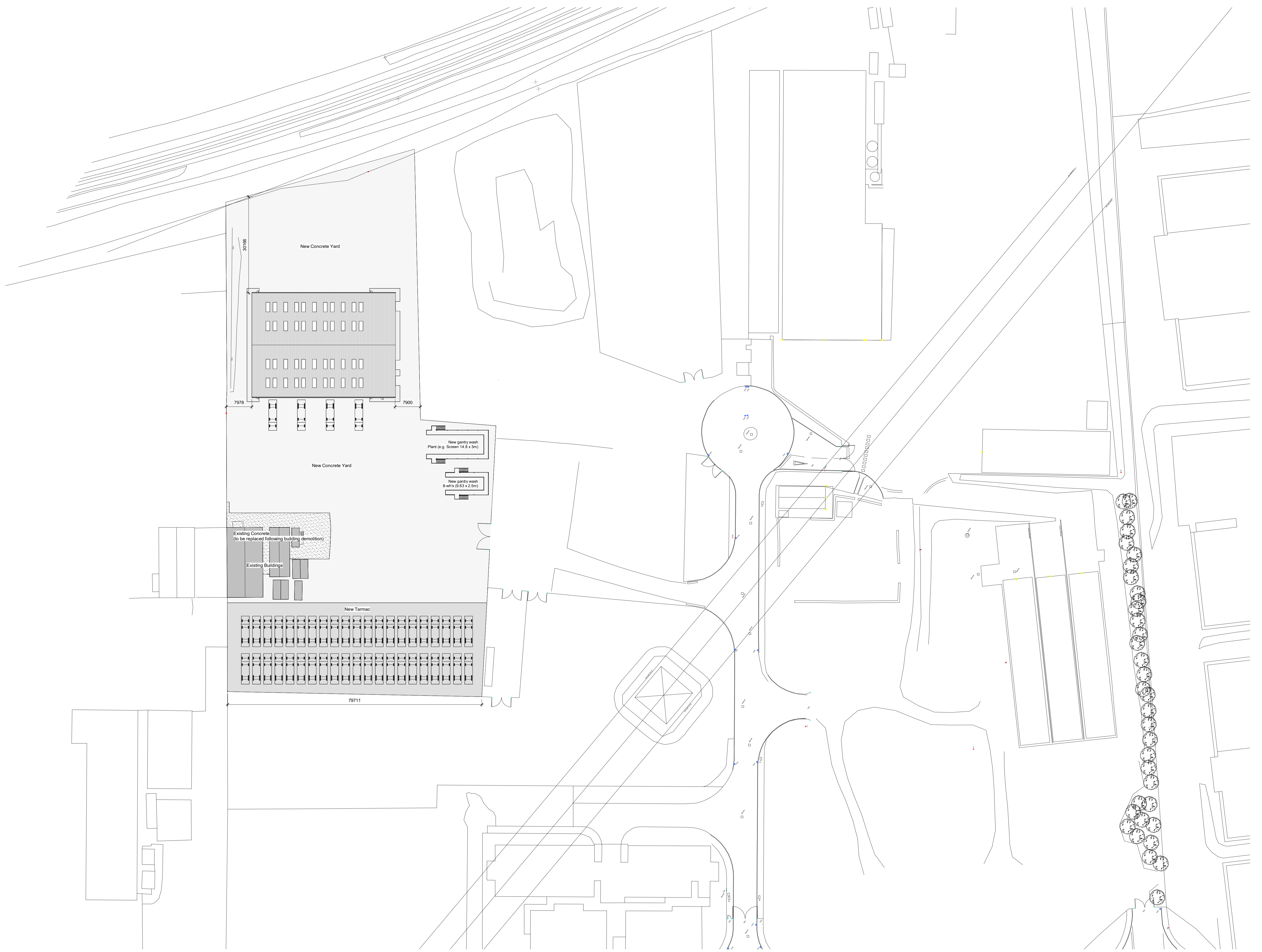
Appendix A



Site

Site Location

Appendix B



Rev	Description	Date
01	Issue for information	18/02/21
02	Issue for information	18/02/21
03	Issue for information	18/02/21
04	Issue for information	18/02/21
05	Issue for information	18/02/21
06	Issue for information	18/02/21
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Project: Proposed Vehicle Workshop at Whaley Road, Baragh Green, S75 1FJ

Title: Proposed Site Plan & 3D images

Client: Wordsworth Properties Ltd.

Version	Project	Scale	Original Paper Size	Print Orientation	Client
0384	1: 500	@A0	Portrait	RL	

File Identifier	Originator	Volume	Level	Type	Role	Number	Revision
WPWR - MWA - XX - XX - DR - A - 0101	P5						

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Appendix C

Flood map for planning

Your reference
Wordsworth

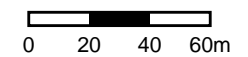
Location (easting/northing)
432153/408315

Scale
1:2500

Created
13 Aug 2021 10:15



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



Appendix D

RFI/2021/228165 Flood History Map Centred on Your Site at Barugh Green, Barnsley

Date created: 29/09/2021

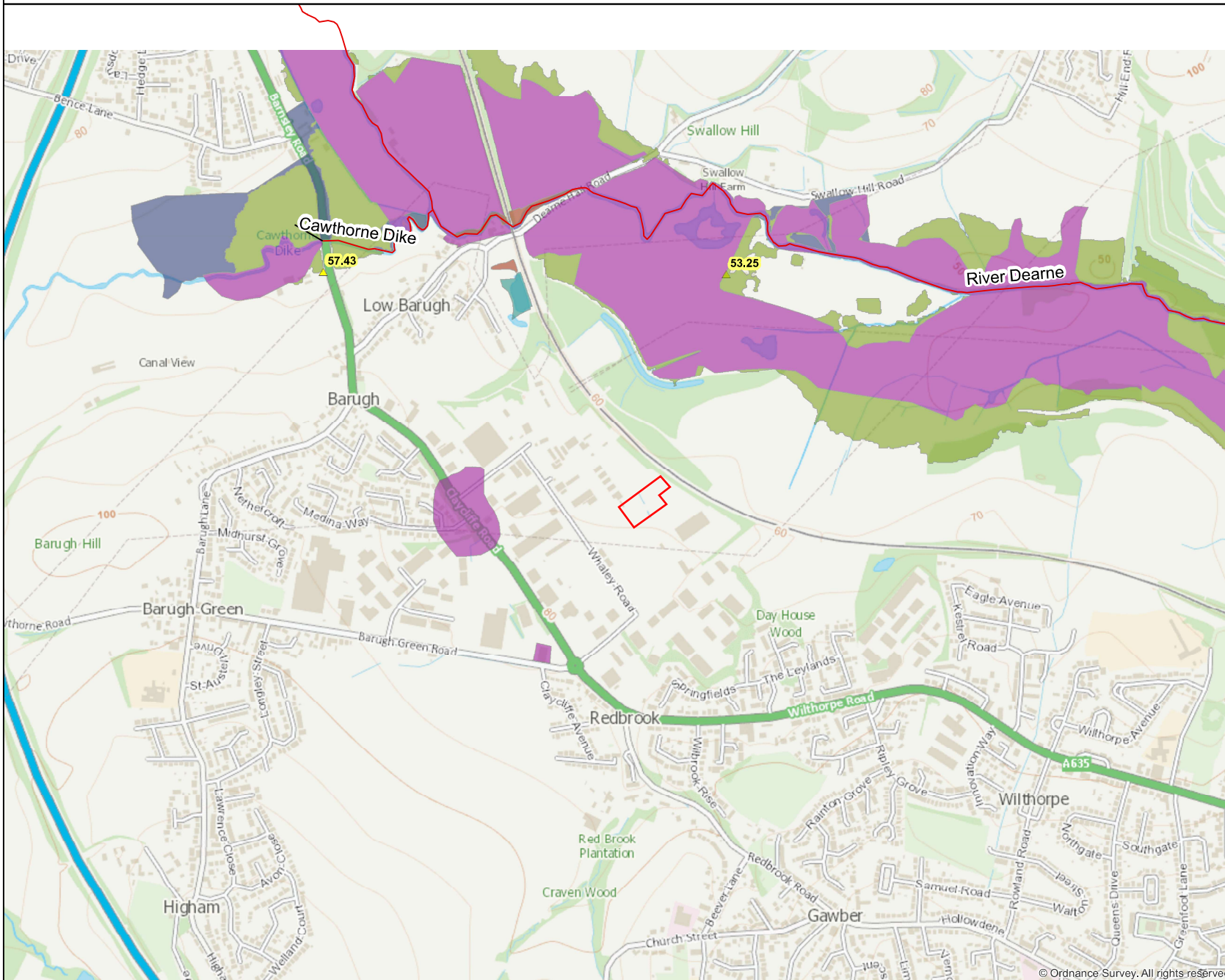
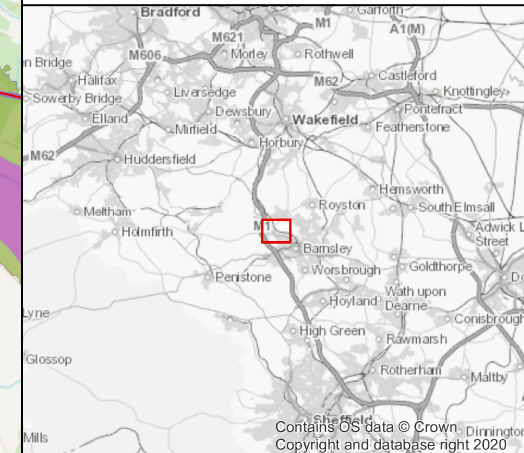


www.environment-agency.gov.uk

Scale: 1:10,000



when reproduced @ A3



LEGEND

- Main River
- RECORDED FLOOD OUTLINES**
- 2019 November Flood Incident
- June 2007 Flood Event (Ridings Area)
- June 2007 Surface Water Flooding Yorkshire
- 123 Autumn 2000
- 123 March 1947
- ▲ Autumn 2000 Flood Level (mAOD)

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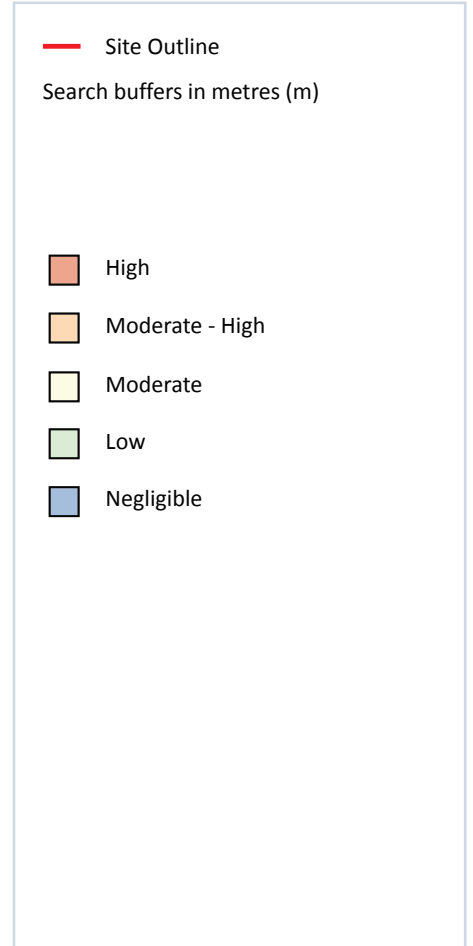
Surface water flood risk: water depth in a low risk scenario

Flood depth (millimetres)

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

Appendix E

9 Groundwater flooding



9.1 Groundwater flooding

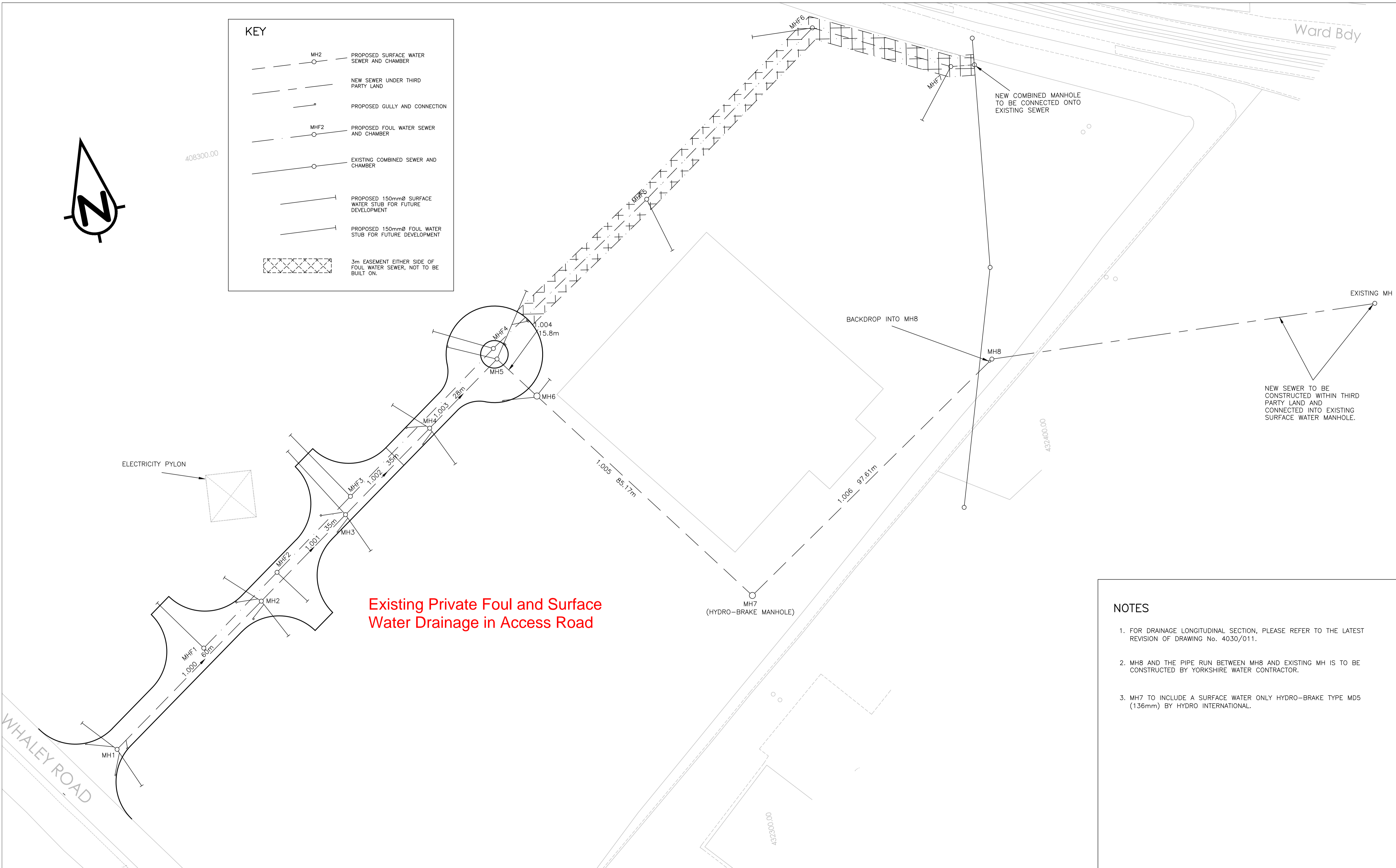
Highest risk on site	Negligible
Highest risk within 50m	Negligible

Groundwater flooding is caused by unusually high groundwater levels. It occurs when the water table rises above the ground surface or within underground structures such as basements or cellars. Groundwater flooding tends to exhibit a longer duration than surface water flooding, possibly lasting for weeks or months, and as a result it can cause significant damage to property. This risk assessment is based on a 1 in 100 year return period and a 5m Digital Terrain Model (DTM).

Features are displayed on the Groundwater flooding map on **page 61**

This data is sourced from Ambiental Risk Analytics.

Appendix F



E	FOUL SYSTEM AMENDED.	ATF	03/07	
D	FOUL SYSTEM AMENDED.	ATF	03/07	PJM
C	FOUL SYSTEM ADDED.	ATF	03/07	DT
B	225mmØ STUBS ADDED, MH6 RELOCATED	TSH	02/07	PJM
A	BACKDROP & HYDRO-BRAKE LOCATIONS REVISED. MH8 POSITION AMENDED.	ATF	12/06	PJM
Rev	Amendment	Drawn	Date	Checked

Scale	1:500	Drawn By	ATF
Drawing Size	A1	Checked By	PJM
Date	11/06	Approved By	PJM
Drawing Number	4030/010	Rev	E



Appendix G

Calculated by:

Site name:

Site location:

Site coordinates

Latitude:

Longitude:

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference:

Date:

Methodology	FEH Statistical
-------------	-----------------

Site characteristics

Total site area (ha)	1.1
----------------------	-----

Methodology

Qmed estimation method	Calculate from BFI and SAAR
BFI and SPR estimation method	Calculate from dominant HOST
HOST class	17
BFI / BFIHOST	0.514
Qmed (l/s)	2.86
Qbar / Qmed Conversion Factor	1.06

Hydrological characteristics

	Default	Edited
SAAR (mm)	680	680
Hydrological region	3	3
Growth curve factor: 1 year	0.86	0.86
Growth curve factor: 30 year	1.75	1.75
Growth curve factor: 100 year	2.08	2.08

Notes:

(1) Is $Q_{BAR} < 2.0$ l/s/ha?
(2) Are flow rates < 5.0 l/s?
Where flow rates are less than 5.0 l/s consents are usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements
(3) Is $SPR/SPRHOST \leq 0.3$?

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	3.04	3.04
1 in 1 year (l/s)	2.61	2.61
1 in 30 years (l/s)	5.32	5.32
1 in 100 years (l/s)	6.32	6.32

Calculated by:

Site name:

Site location:

Site coordinates

Latitude:

Longitude:

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference:

Date:

Methodology	IH124
-------------	-------

Site characteristics

Total site area (ha)	1.1
----------------------	-----

Methodology

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
SOIL type	2	2
HOST class	---	---
SPR/SPRHOST	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm)	680	680
Hydrological region	3	3
Growth curve factor: 1 year	0.86	0.86
Growth curve factor: 30 year	1.75	1.75
Growth curve factor: 100 year	2.08	2.08

Notes:

- (1) Is $Q_{BAR} < 2.0$ l/s/ha?
Normally limiting discharge rates which are less than 2.0 l/s/ha are set at 2.0 l/s/ha.
- (2) Are flow rates < 5.0 l/s?
Where flow rates are less than 5.0 l/s consents are usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements
- (3) Is $SPR/SPRHOST \leq 0.3$?
Where groundwater levels are low enough the use of soakaways to avoid discharge offsite may be a requirement for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	1.94	1.94
1 in 1 year (l/s)	1.67	1.67
1 in 30 years (l/s)	3.39	3.39
1 in 100 years (l/s)	4.03	4.03

Appendix H

Proposed Attenuation Volumes

The screenshot shows the 'Quick Storage Estimate' dialog box with the 'Variables' tab selected. The interface includes a sidebar with navigation options: Variables, Results, Design, Overview 2D, Overview 3D, and Vt. The main area contains the following input fields:

Parameter	Value
FSR Rainfall	FSR Rainfall
Return Period (years)	100
Region	England and Wales
M5-60 (mm)	19.000
Ratio R	0.354
Cv (Summer)	0.750
Cv (Winter)	0.840
Impemeable Area (ha)	1.100
Maximum Allowable Discharge (l/s)	5.0
Infiltration Coefficient (m/hr)	0.00000
Safety Factor	2.0
Climate Change (%)	0

Buttons at the bottom: Analyse, OK, Cancel, Help.

Footer text: Select required Rainfall Model from the list

The screenshot shows the 'Quick Storage Estimate' dialog box with the 'Results' tab selected. The sidebar navigation options are the same as in the previous screenshot. The main area displays the following results:

Global Variables require approximate storage of between 479 m³ and 679 m³.

These values are estimates only and should not be used for design purposes.

Buttons at the bottom: Analyse, OK, Cancel, Help.

Footer text: Select required Rainfall Model from the list