



## **FLOOD RISK ASSESSMENT**

**FOR**

**A RESIDENTIAL DEVELOPMENT**

**AT**

**WOOLLEY COLLIERY, WOOLLEY COLLIERY ROAD, DARTON**

**HBL Ref:**

**10701-HBL-XX-XX-RP-D-0001**

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## 1 INTRODUCTION

### Scope of Appraisal

- 1.1. HBL Associates Ltd has been instructed to prepare a Flood Risk Assessment in support of a full planning application for a development at land at the former Woolley Colliery, Woolley Colliery Road, Darton, S75 5RR (existing site layout included in Appendix A). The project proposes 114 residential dwellings (Proposed Site Plan included in Appendix B), with associated landscaping and infrastructure works.
- 1.2. Table 1.1 below shows details of the proposed development.

Table 1.1 Existing Site Details.

Project Name	Proposed residential development at the former Woolley Colliery, Woolley Colliery Road, Darton, S75 5RR
Project Description	The project involves civil infrastructure design, with associated landscaping and infrastructure works
Location	Land at the former Woolley Colliery, Woolley Colliery Road, Darton, S75 5RR
NGR (Approximate)	431189, 410810
Application Site Area (HA) – Red Boundary Line	122,700m <sup>2</sup> = 12.27Ha
Development Type	“Brownfield” –the site is a former colliery, currently derelict with remnants of previous development
Local Planning Authority	Barnsley Metropolitan Borough Council
Lead Local Authority	Barnsley Metropolitan Borough Council
Sewerage Undertaker	Yorkshire Water

### Methodology

- 1.3. This Flood Risk Assessment (FRA) report will apprise the risk of flooding to development at a site-specific scale and provides recommendations/ mitigation measures to reduce the impact of flooding to both the site and the surrounding area.
- 1.4. A proposed drainage strategy drawing will be provided as part of the planning application, including associated hydraulic calculations.
- 1.5. This document is to be read in conjunction with all associated drawings, supported reports and documentation.
- 1.6. This report has been prepared to supplement a full planning application and has been prepared in accordance with the requirements of both national and local planning policy.
- 1.7. References have been also made to Ciria Report 753 “the SuDS Manual” and other industry guidance.

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## Limitations

- 1.8. This report has been prepared as part of an application for full planning permission for the proposed residential development at Woolley Colliery as described in the proposed plan included in Appendix B only and should not be relied upon or used for any other purpose.
- 1.9. This report is based on the interpretation and assessment of data provided by third parties and is to be read in conjunction with all associated drawings, supported reports and documentation.
- 1.10. HBL Associates has endeavoured to obtain and assess all information available to them during this appraisal, however, as the report summarises information from number of external sources HBL Associates Limited cannot offer any guarantees or warranties for the completeness or accuracy of the information relied upon.
- 1.11. In the preparation of this report, HBL Associates Limited has followed accepted procedure, however, given the residual risk associated with any predictions and variability of data which can be experienced in flood conditions, we take no liability for and give no warranty against actual flooding of any property (client's or third party), or the consequence of the flooding in relation to the performance of this service.

## National Planning Policy

### *National Planning Policy Framework*

- 1.12. The National Planning Policy Framework (NPPF) ensures that flood risk is considered 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.
- 1.13. Where new development is necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and, where possible, reducing flood risk overall.

### *Consideration of Climate Change*

- 1.14. As explained in the Climate Change Adaptation Sub-Committee Progress Report 2014, increased flood risk is the greatest threat to the UK from climate change.
- 1.15. More frequent short-duration, high intensity rainfall and more frequent periods of long-duration rainfall could be expected. Sea levels are also expected to continue to rise.
- 1.16. New Environment Agency guidance "Flood risk assessments: climate change allowances" issued in August 2022 provides up to date information on expected changes in rainfall, river flows and sea level rise as a consequence of climate change based on a 1981-2000 baseline.

1.17. The contingency allowances for climate change that are potentially applicable to this site are:

- **Peak River Flows** – Don and Rother Management Catchment

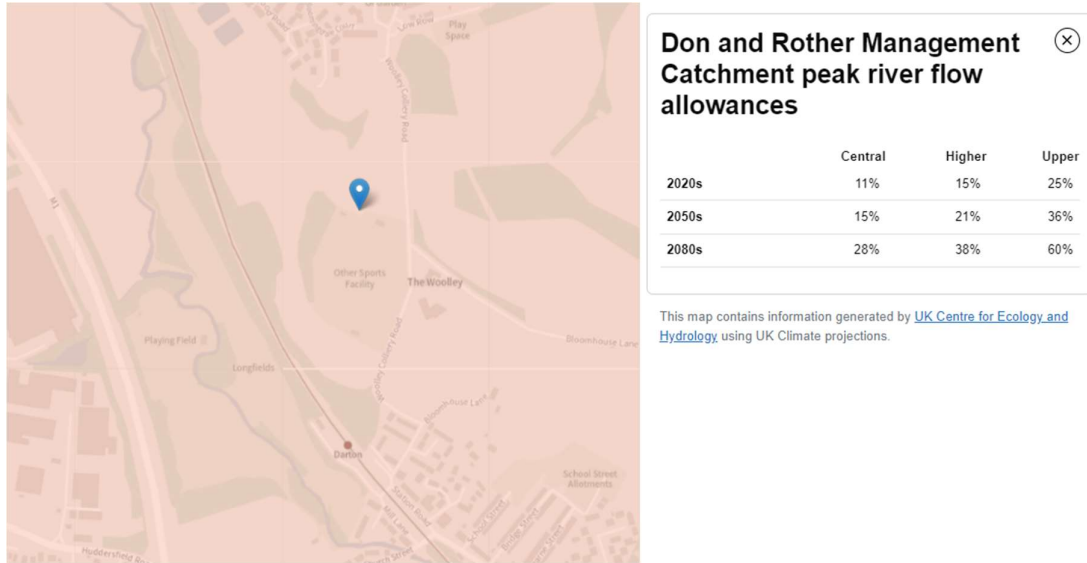


Figure 1.1 Peak River flow allowance for the catchment.

- **Peak Rainfall** – Don and Rother Management Catchment

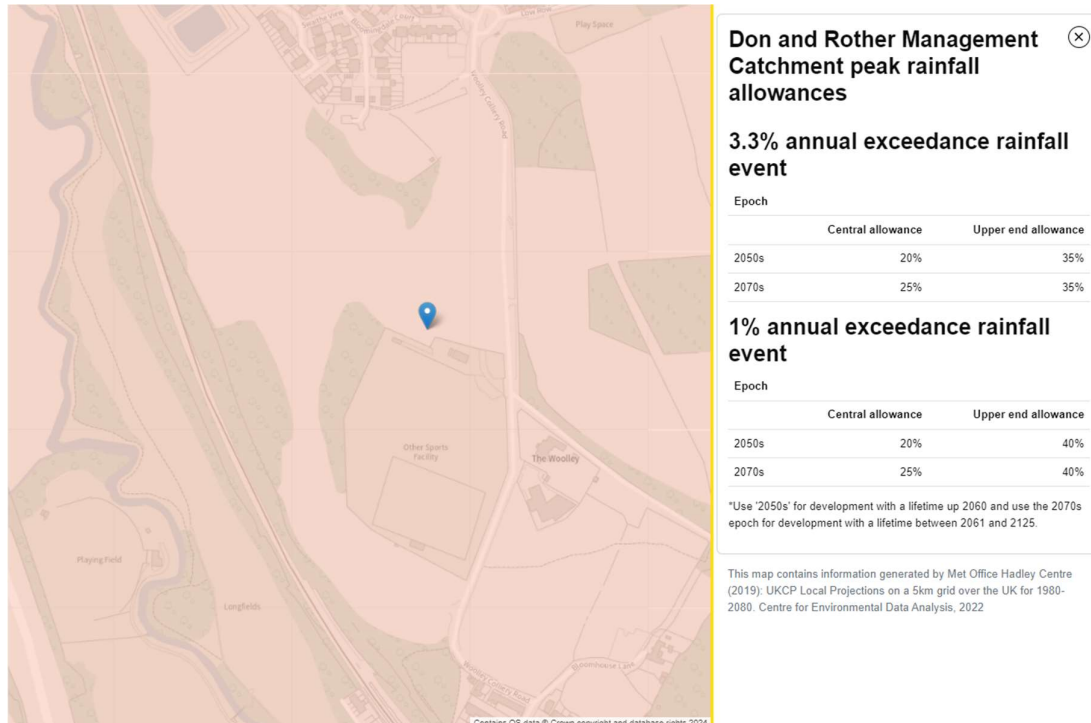


Figure 1.2 Peak Rainfall allowance for the catchment.

## 2 EXISTING SITE CONTEXT

### Site Location

- 2.1. The application site is at land at the former Woolley Colliery, which is situated to the west of Woolley Colliery Road, Darton, S75 5RR as indicated in Figure 2.1 below.



Figure 2.1 Site Location Plan – (Source: Google maps)

- 2.2. Figure 2.2 shows the aerial image of the site and the immediate surrounding area.



Figure 2.2 Satellite imagery – (Source: Google maps)

- 2.3. Figures 2.1 and 2.2 above show that the site is open land, which has been cleared from the former land use as a colliery. It is considered unlikely that this is currently formally drained. The whole site area is therefore considered to be greenfield/ permeable.
- 2.4. The proposed development is split across two parcels of land within the wider former Woolley Colliery site with an application boundary that links the two developable areas.
- 2.5. The parcels are located to the north and south of Woolley Colliery Miners Cricket Club. It is proposed that the site is developed to provide 114 new residential dwellings across the two land parcels, with associated open space, landscaping and new highway infrastructure.
- 2.6. This report will refer to the “northern parcel” as Northern Development/ Parcel A, and the “southern parcel” as Southern Development / Parcel B.
- 2.7. The Northern Development is irregular in shape. It is bounded by Woolley Colliery Road to the east and a sports pitch to the south (which separates the northern parcel from the southern parcel). The northern boundary is residential development and vegetated land, and the western boundary is open land.
- 2.8. The Southern Development is irregular in shape. It is bounded by Woolley Colliery Road to the east and a sports pitch to the north. A railway line is present to the south of the site. To the west of the site, the land is open land.
- 2.9. The existing permeable/ impermeable areas plan is included in Figure 2.3 and **Appendix A** with existing site areas summarised in Table 2.1 below.

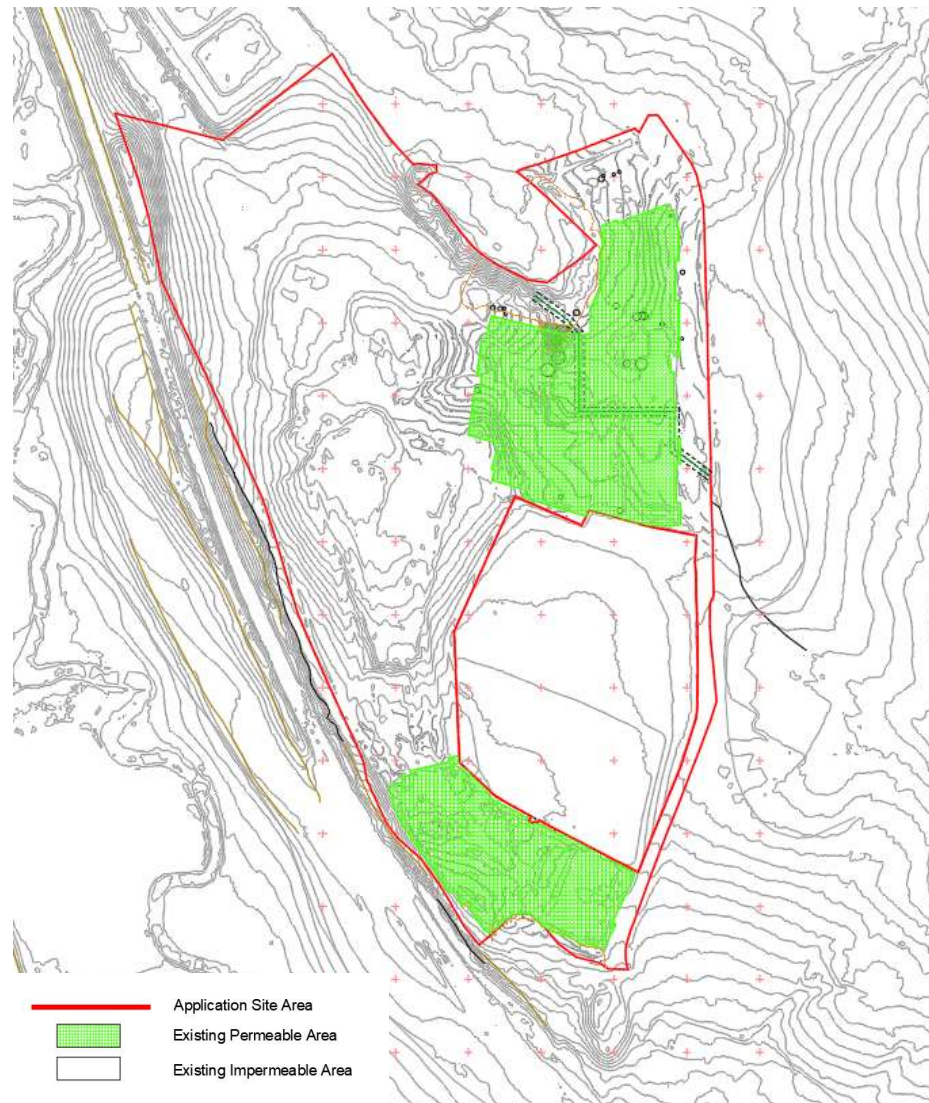


Figure 2.3 Total application Site Area showing existing permeable/ impermeable areas.

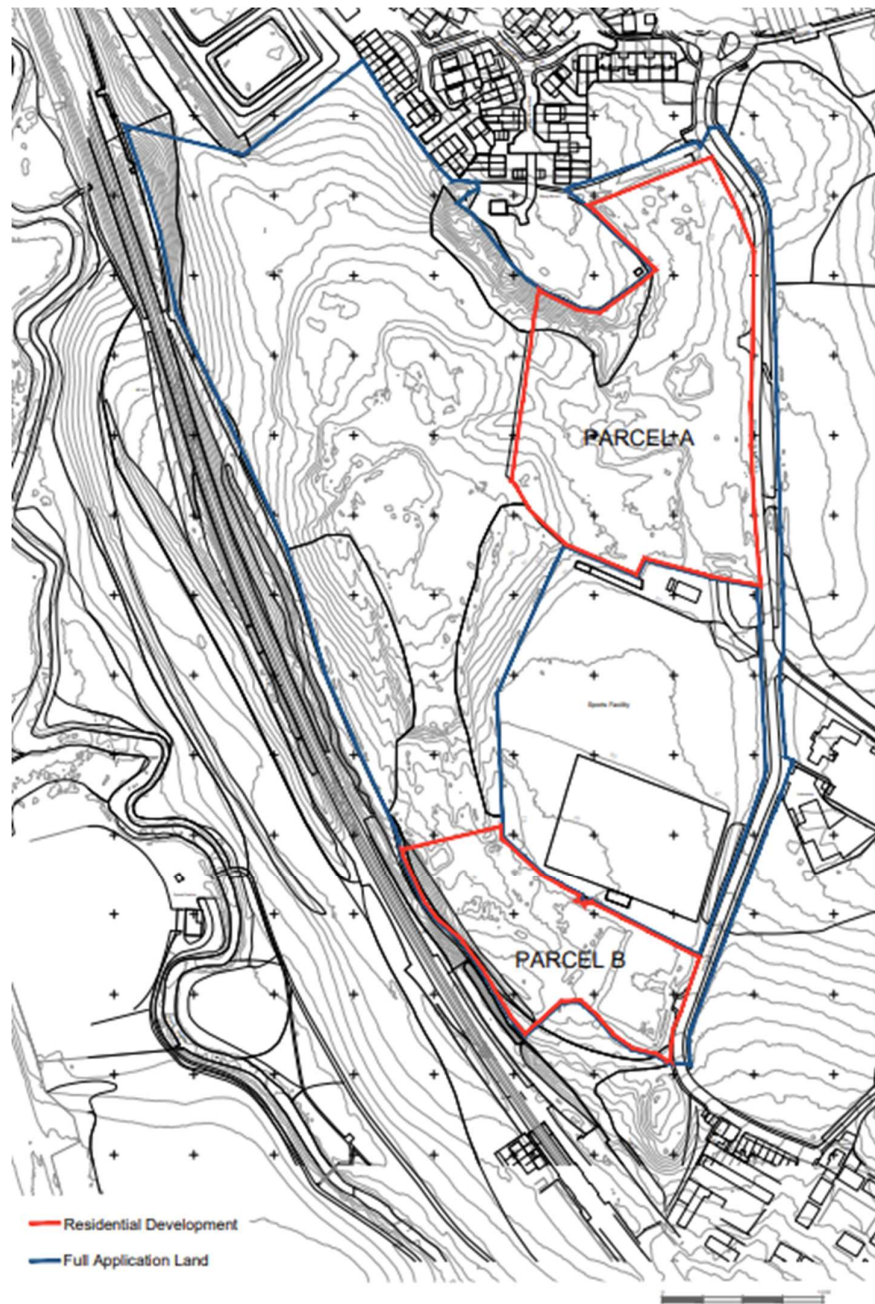


Figure 2.3.1 Residential Site Area and Full application area.

Table 2.1 Existing site areas.

Area	m <sup>2</sup>	ha
Application Site Area Total	122,700 m <sup>2</sup>	12.27
Existing Impermeable Areas.	0 m <sup>2</sup>	0
Percentage of Impermeable (PIMP) within application site	0%	

### Site Topography

- 2.10. The site can be identified by approximate National Grid Reference 431189, 410810.
- 2.11. A topographical survey has been undertaken and a copy is included in Appendix A. A summarised version of the survey is below in Figure 2.4.



Figure 2.4 Topographical Survey Extract

- 2.12. The topographical survey shows substantial level difference across parts of the site, including bunds, manufactured batter slopes and plateaus within the site.
- 2.13. The northern development is around 82.10m AOD in the southeast, 80.80m AOD in the southwest and drops to approximately 76.50m AOD in the north. The land parcel includes bunds and plateaus, and lower levels are present in the middle of the site.
- 2.14. The southern development has banded plateaus present. Generally, levels are higher in the east close to Woolley Colliery Road, and become progressively lower towards the west. The site is approximately 78.50m AOD in the southeast, 80.50m AOD in the northwest and drops to approximately 78.00m AOD in the north and west of the land parcel.
- 2.15. The land drops down along the southern boundary towards the railway as a steep embankment is present.

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### 3 EXISTING GROUND CONDITIONS

#### Geology Hydrogeology

- 3.1. A watercourse is present close to the northern boundary of the site, flowing towards the west. The watercourse is culverted and is thought to discharge into The River Dearne to the west of the site.
- 3.2. There are no other known watercourses within the site.
- 3.3. The LLFA advise a culvert crosses the northern site from east to west. The culvert is thought to be orientated to the north west however the precise alignment of the culvert is not known accurately. The landowner has confirmed its existence. It is reported that the culvert flows down into the low-lying area joining the watercourse along the northern edge of the site and eventually discharging below the railway lines and into the River Dearne. There is a reported collapse in the pipe approximately 30m into the site from Woolley Colliery Road.

#### Groundwater

- 3.4. The EA's Flood Risk summary for the area states that 'flooding from groundwater is unlikely in this area' (Appendix E).
- 3.5. A site investigation was undertaken by Sirius Consulting in 2019 and no groundwater was encountered within any of the trial pits within the southern parcel.
- 3.6. In the northern parcel groundwater was encountered in 6 of the sample locations at depths varying from 1.0m to 4.6m. The groundwater was perched within the made ground fill which accounts for its variable depth. It is expected that the groundwater will be at varying depths across the site dependant on the nature of fill material, its compaction and other factors.
- 3.7. The site will be regraded as part of the proposed development and this is likely to alter/disturb any perched groundwater.

#### Soil infiltration rates

- 3.8. Phase 2 site investigations were produced by Sirius Geoenvironmental and note that the site was cleared in the 1990's and has been used for storage of colliery spoil since that date. The reports state that made ground is present across both parcels of varying depth (from 2.0m to 9.40m) and nature. The made ground is predominantly colliery spoil which is cohesive and granular in nature and includes coal washings and reworked natural material within the matrix. Below the made ground is a mix of soft/firm clays and sandstone bedrock with occasional mudstone and siltstone.
- 3.9. Existing soil infiltration rates are not known.
- 3.10. However, the ability of any development to discharge to infiltration drainage is wholly reliant on the ground conditions across the site. The site ground conditions across both sites comprise deep made ground colliery spoil and are not suitable for infiltration drainage.

#### Hydrology

- 3.11. The nearest watercourse is close to the northern boundary of the site, flowing towards the west. The watercourse is culverted at the northwestern extent of the site and is thought to discharge into The River Dearne to the west.

3.12. The watercourse is not shown on the online Flood Map for Planning, as below within Figure 3.2 and 3.3. It is, however, parallel to the northern boundary indicated on by the redline boundary of the northern parcel of land.

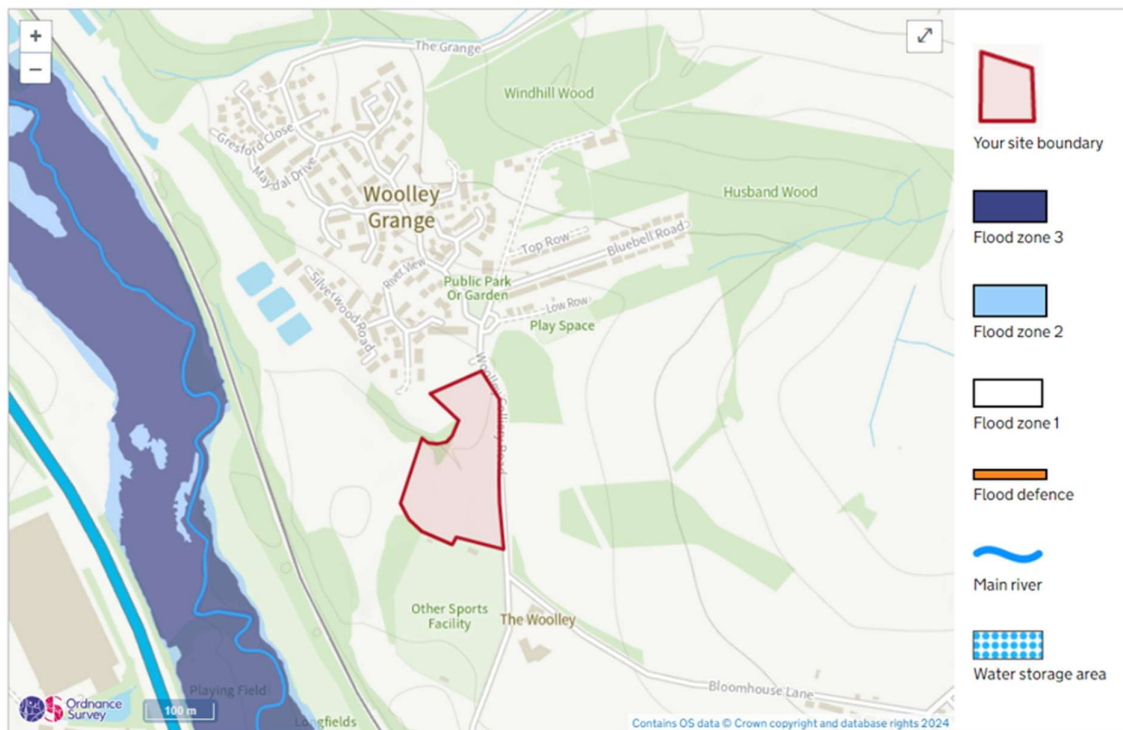


Figure 3.2 Extract from Flood Map for Planning. Source Environment Agency online mapping.



Figure 3.3 Extract from Flood Map for Planning. Source Environment Agency online mapping.

#### Existing culvert

- 3.13. There is an existing 450mm culvert thought to run between Woolley Colliery Road at the east of the site in the north-westerly direction towards the northwest of northern parcel. This is based on 3<sup>rd</sup> party information and the locations are approximate only. The line, location, depth and condition of the culvert is to be verified.
- 3.14. The maintenance of ordinary watercourses is the responsibility of the landowner. Local Lead Authority has a power to regulate i.e., powers associated with the prevention, mitigation and remedying of flood damage associated with ordinary watercourses.
- 3.15. Further discussions on the routing of this culvert as part of the development works are noted within the Proposed Surface Water Drainage section.
- 3.16. There are no other watercourses within the immediate vicinity of the Site.

#### Existing Flood Defence Infrastructure

- 3.17. The Environment Agency Flood Map for Planning shows there is no known flood defence infrastructure in the vicinity of the site.

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## 4 EXISTING DRAINAGE DETAILS

### *Public sewers*

- 4.1. Public sewer records have been obtained from Yorkshire Water and are included in Appendix D, with excerpts below in Figures 4.1. The public sewer records show that there are public sewers located within the Site's near vicinity.
- 4.2. The records show:
  - Yorkshire Water's records show that there are no surface water sewers within the site. The nearest surface water sewer is approximately 80m north of the site.
  - There is a public sewer rising main within Woolley Colliery Road, parallel to the eastern boundary of both land parcels, rising northwards to the northeast corner of the site. It then changes course and flows westwards, parallel to the watercourse just north of the northern parcel northern boundary. The rising main discharges into a public foul water pump station, which is located just beyond the northwest corner of the northern land parcel.
  - There is a 150mm diameter public foul water sewer recorded slightly beyond the northern boundary of the northern land parcel. This foul water sewer commences at the foul water pumping station, and flows initially eastwards, parallel to the watercourse, and then flows northwards to the wider public sewer system north of the site.
  - A 225mm diameter combined water public sewer is present to the east of the southern land parcel, which flows south-eastwards, within Woolley Colliery Road.

### *Existing highway drainage*

- 4.3. The highway drainage is within the verge present close to the eastern boundary of the site, parallel to Woolley Colliery Road. It is expected to flow towards the north, and outfall into the watercourse beyond the northern extent of the site.
- 4.4. The existing highway drainage system is based on 3rd party information and the locations are approximate only. The line, location, depth and condition of the highway drainage is to be verified.
- 4.5. Manholes are recorded on the topographical survey which indicate the likely route of the highway drainage.

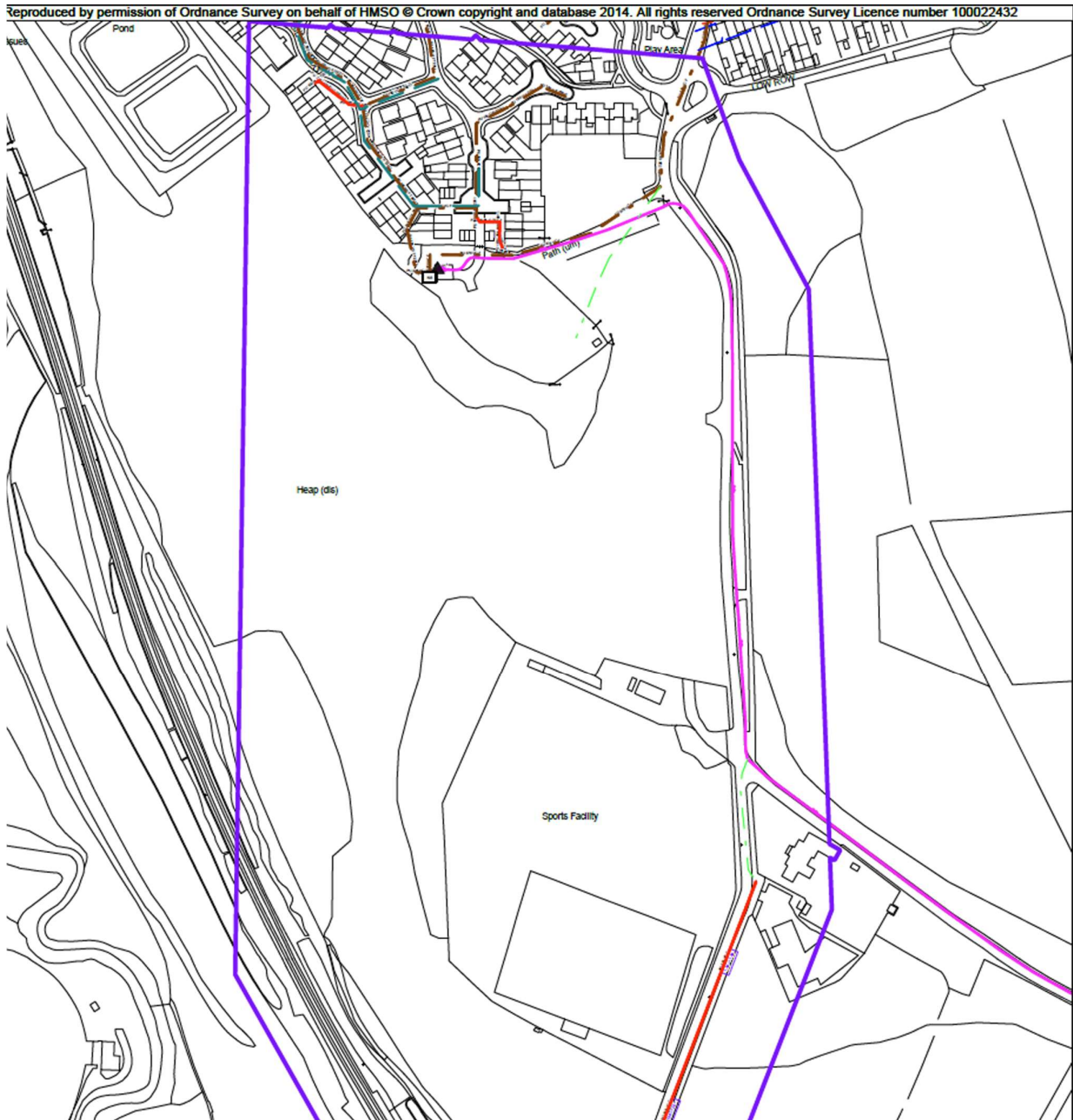


Figure 4.1 Extract from Yorkshire Water Sewer Records

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### Site Drainage

- 4.6. The site was previously a working colliery and a drainage system may have been present, however, detailed records are not known at this time.
- 4.7. The extent of existing private drainage present on site is therefore not known.
- 4.8. The site has been demolished and cleared, and substantial earthworks have been undertaken leaving plateaus and earth bunds on site. Consequently, no functioning existing drainage system is expected to remain on site.
- 4.9. Therefore, although the site is a historic brownfield site, due to its expected undrained nature, the site is effectively greenfield in terms of its runoff characteristics.
- 4.10. The presence of existing field drains or other drainage infrastructure cannot be ruled out. Further investigation would be required to determine the extent of any existing drainage.
- 4.11. Liaison with the LLFA has established that the LLFA will accept a greenfield calculation based on IOH124 methodology.

### Foul Drainage

- 4.12. No existing private foul drainage is expected on site. However, as above, further investigation would be required to determine the extent of existing drainage.

## 5 CONSULTATIONS

### The Environment Agency

- 5.1. Consultation with the Environment Agency has been undertaken however at the time of this report a response has not been received. The latest environmental agency online flooding resources have been referred to as part of preparing this report. Data from their online resources is included within Appendix E. Additionally, the EA response confirms that the site is located in an area classified as Flood Zone 1 by the Environment Agency.

### Barnsley Metropolitan Borough Council LLFA

- 5.2. The Lead Local Flood Authority for the area is Barnsley Metropolitan Borough Council. A consultation response has not been received from the LLFA at the time of writing this report however previous guidance and reference to the LLFA guidance is provided within the report. Further consultation will be acquired at planning, and the general principles will be followed from their standard guidance and consultation responses in due course.

### Internal Drainage Board District,

- 5.3. The Site is not located within an Internal Drainage Board (IDB) District.

### Yorkshire Water

- 5.4. A pre-planning consultation has been undertaken with the Water Authority, Yorkshire Water, at the time of writing this report. The following below response has been provided alongside a copy of the latest sewer records, a copy of these are provided in Appendix D.
- 5.5. *"It is understood that a culverted watercourse is located through the site and all surface water for the north site will discharge here."*

- 
- 5.6. *“Surface water may discharge to the 225 mm diameter public combined sewer recorded in Woolley Colliery Road, at a point to the east of the site. The surface water discharge from the site is to be restricted to not greater than 3.5 (three point five) litres/second. This permission is not an acceptance in respect to any planning conditions imposed under the Grant of Planning Permission.”*
  - 5.7. *“Foul water domestic waste can discharge to the 225 mm diameter public combined sewer recorded in the northern part of the site”*
  - 5.8. *“Foul water domestic waste can discharge to the 375 mm diameter public foul sewer recorded in the northern part of the site”*

## 6 DEFINITION OF POTENTIAL FLOOD RISK

- 6.1. The potential sources of flooding which could affect the site have been identified in this section. Their influence on the proposed development and any mitigation measures will be discussed within this report.
- 6.2. Fluvial Flood Risk – This type of flooding can occur through the inundation of the flood plain, overtopping and breaching of defences and blockages of culverts or flood channels.
- 6.3. Tidal/Coastal Flood Risk – This flooding is due to the accumulation of water along the coast caused by rising sea water above normal levels. Coastal flooding can result from a combination of high tides, stormy weather conditions and tidal surges in times of low atmospheric pressure.
- 6.4. Canal Flood Risk - Flooding can occur from man-made channels such as canals. This is usually due to the failure of canal embankment.
- 6.5. Flooding from Artificial Waterbodies - Identifies areas that are most likely to flood following the sudden catastrophic failure of a reservoir. The EA states that the possibility of reservoir flooding is extremely unlikely and there has been no loss of life in the UK from reservoir flooding since 1925. Since then, reservoir safety legislation has been introduced to make sure reservoirs are well maintained.
- 6.6. Flooding from Local Sewers - Extreme rainfall events may overwhelm sewer systems and cause local flooding. This is not something that can be predicted/modelled.
- 6.7. Ground Water Flooding - Occurs when the water table rises above normally expected and anticipated levels and intersects with the surface, this is usually after long periods of sustained rainfall. This is most likely to occur in low lying areas that are underlain by permeable rock such as chalk or sandstone and are classified as regional aquifers. Groundwater flooding may also rise from localised sands and gravels in valley bottoms underlain by less permeable rocks. Generally, the water table rises in wet winter months and falls in summer months as the water migrates to the surface water courses. Datasets show the susceptibility indication, which identifies areas where geological conditions may result in flooding and where groundwater may come close to the surface. It is not an indication of flood risk, i.e., an indication of likelihood of such flooding occurring (it doesn't provide information on the depth of the flood or the likelihood of occurrence of an event of a particular magnitude). It does show if the area is susceptible to groundwater flooding occurring based on the geological conditions. Properties with basements are more likely to be affected by groundwater flooding.
- 6.8. Surface Water Flooding - Also known as pluvial flooding results from overland flow before the runoff enters a watercourse or sewer. Surface water flooding occurs when drainage systems have insufficient capacity to deal with the volume of rainfall. The critical factors in surface water flooding are the volume and intensity of rainfall and the topography and permeability of the surface that the rainfall falls onto (PPS25 Practice Guidance). It is usually the result of high intensity rainfall but can occur with lower intensity rainfall when the land has a low

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permeability and/or is already saturated, frozen, or developed. As a result, surface water flooding can occur quickly and is often difficult to predict. In urban areas, rainwater is often drained into combined sewers. Combined sewers accept foul water and surface water. It should be noted that if the capacity of drainage systems is exceeded. Flood water will be contaminated with raw sewage. In addition, sudden and intense rainfall cannot drain away freely due to the impermeable surfaces of roads, footpaths, and car parking. Therefore, surface water can also arise from sheet run-off from adjacent land.

## 7 PROBABILITY OF FLOODING

### Fluvial Flood Risks - flooding from Main Rivers and Sea.

- 7.1. The online Environmental Agency Flood Map for Planning, shown in Figures 7.1 and 7.2 below, places the site in Flood Zone 1, which is an area with very low probability of flooding representative of land having less than 1 in 1000 (0.1% AEP) of river or sea flooding in any year.

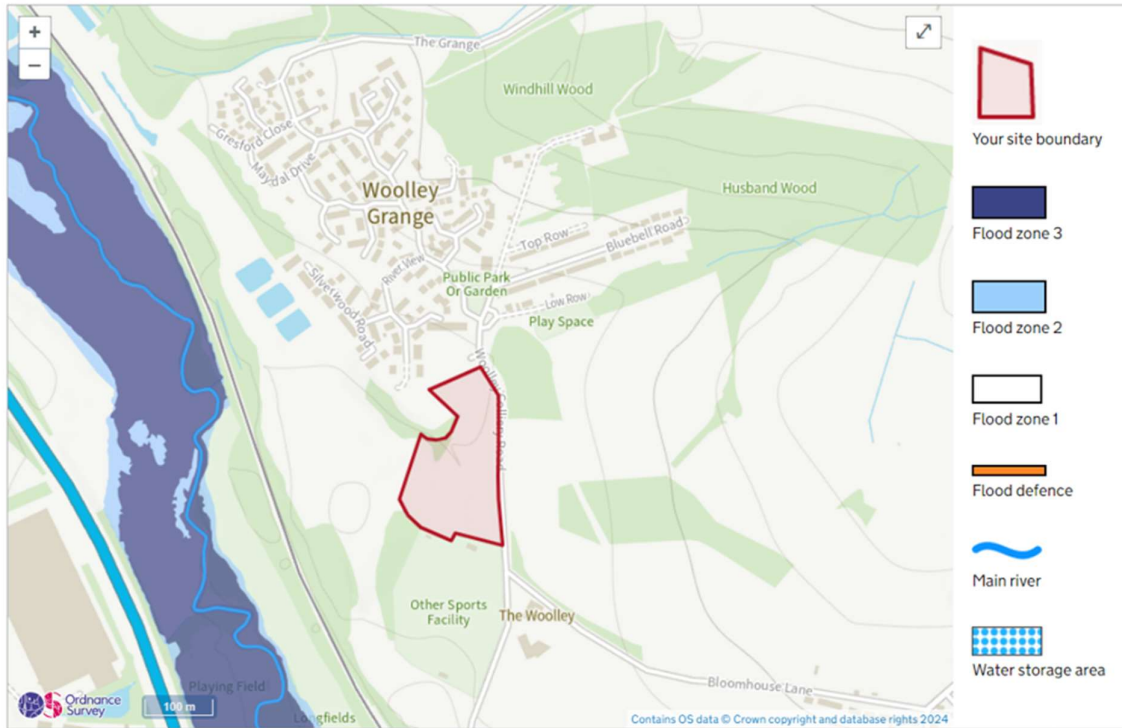


Figure 7.1 Environmental Agency –Flood Map for Planning (Gov.uk)



## Canal Flood Risk

7.10. Canal failure mapping includes two types of failure:

- Breach of raised canal embankments - failure of the embankment due to weaknesses; these are typically caused by erosion or animal burrowing but can also arise from poor maintenance.

7.11. • Aqueduct failure - an aqueduct is where the canal passes over infrastructure such as roads, railways and subways, or over other canals and rivers. Failures of these are typically caused by the collapse of the underlying culvert.

7.12. Local Waterway map provided by Canal and River Trust in figure 7.3, shows that the nearest waterway to the application site is the Calder and Hebble Navigation canal. This is present some 6.5km north of the application site.

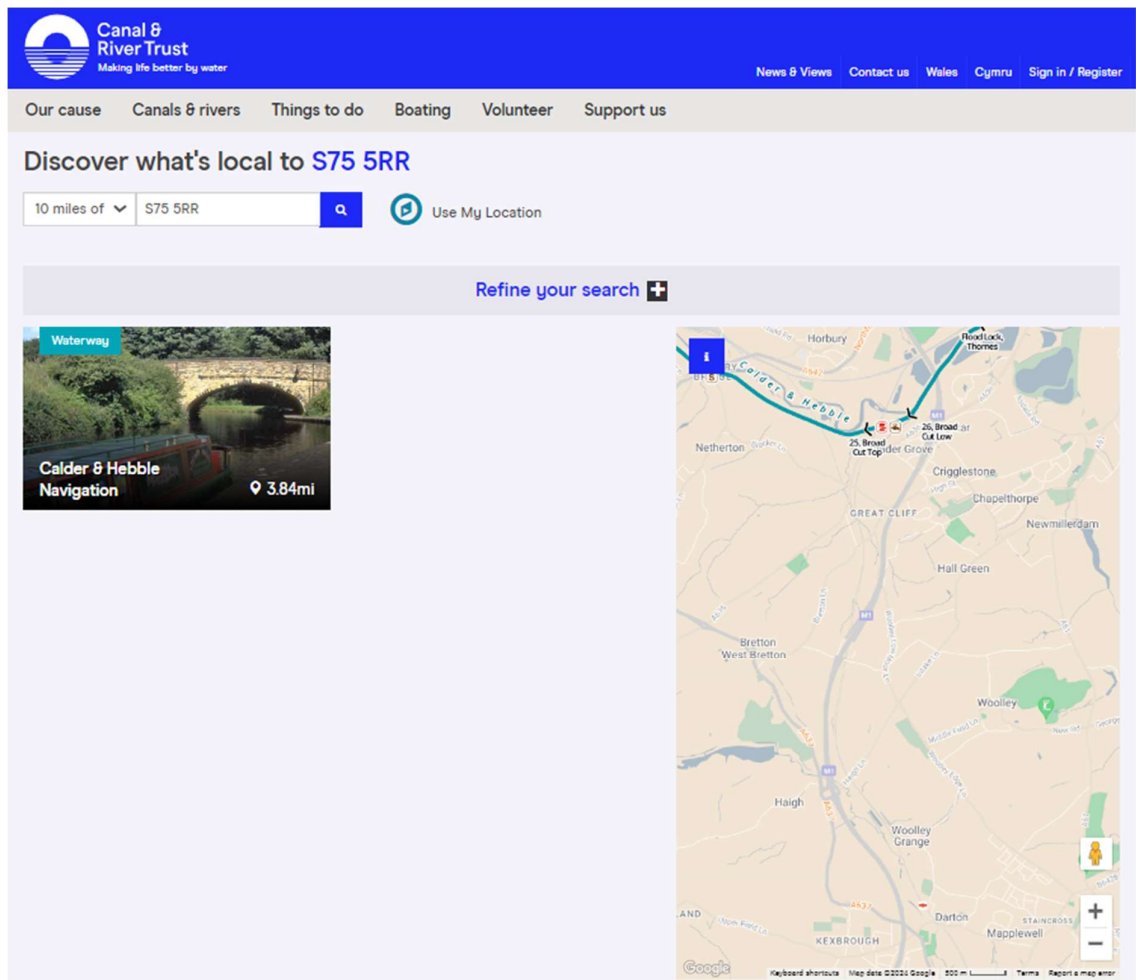


Figure 7.3. Local Waterway map – Canal and River Trust

## Artificial Waterbodies – Reservoirs

7.13. The EA 'Flood Risk from Reservoirs' map in figure 7.4 shows that the Site is not at risk of flooding from reservoirs. Therefore, the risk from reservoirs is considered to be **Negligible**.

7.14. It can therefore be concluded that there is **Low to Negligible** risk of flooding from artificial sources.

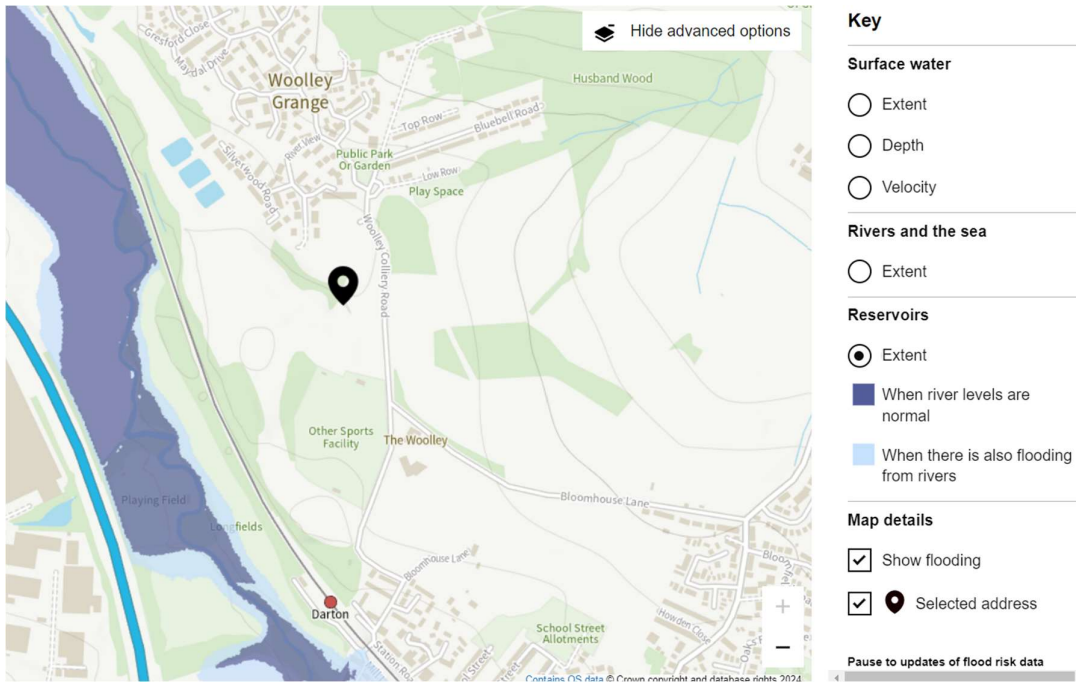


Figure 7.4 Flood risk from reservoirs (Gov.uk) – Northern Parcel.

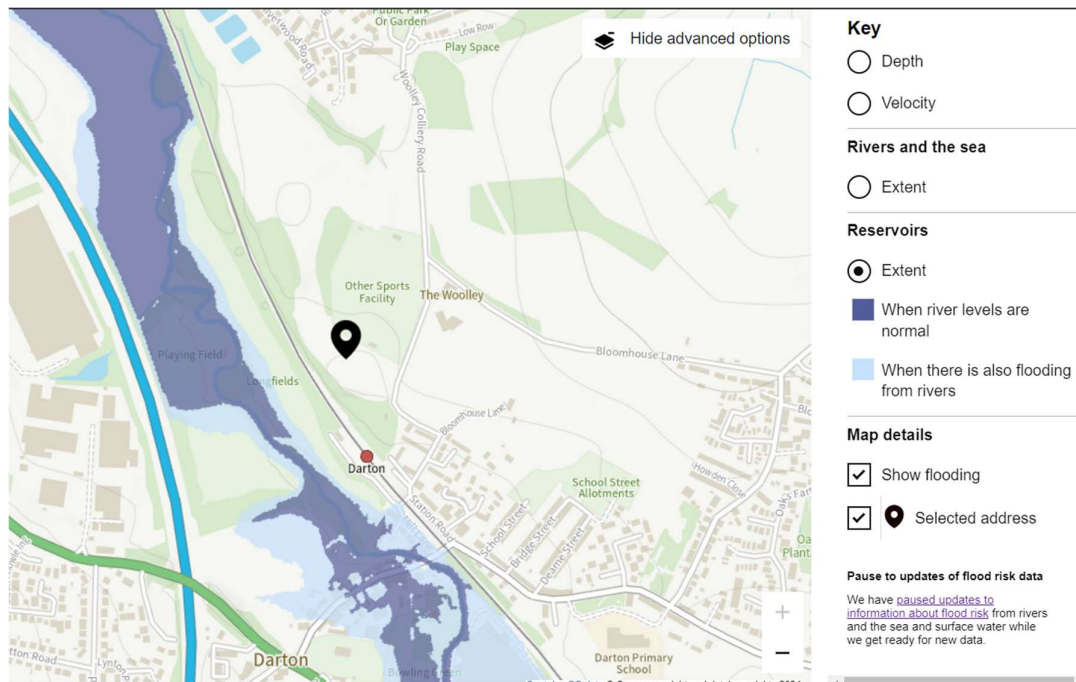


Figure 7.5 Flood risk from reservoirs (Gov.uk) – Southern Parcel.

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### Flooding from Local Sewers

- 7.15. Yorkshire Water sewer records indicate that there are no public sewers within the site. The records show there are public sewers adjacent to the site, therefore there is an associated risk from this source.
- 7.16. There is no information within third party reports regarding sewer flooding within the Site's area.
- 7.17. The topography of the site and surrounding area is such that, in the event flooding did occur from any of these drains/sewers, it is likely to flow along the roads and remain shallow. These flows are generally falling towards the north near the northern parcel, and southward close to the southern site parcel.
- 7.18. Additionally, Yorkshire Water is responsible for the maintenance of the existing local public sewer systems, and the Highway Authority is responsible for maintenance of the highway drainage infrastructure; they would be expected to undertake proactive and reactive maintenance as necessary to minimise the risk of flooding from their assets.
- 7.19. There is a small diameter combined sewer in Woolley colliery Road. In a blockage scenario, flooding from that system will remain in the highway and flow past the site.
- 7.20. On the above basis, it can therefore be concluded that the risk of sewer flooding is Low.
- 7.21. A new surface water drainage system will be provided to manage surface water runoff from the development site itself, without causing an unacceptable risk of flooding on site, and without increasing flood risk elsewhere. The principles of the proposed sustainable surface water drainage strategy are set out below. There is a residual risk that any blockage of the new on-site drainage system will result in flooding from manholes or gullies. However, this can be adequately mitigated by measures as set out below.

### Ground Water Flooding Risk

- 7.22. The underlying geology of the Site is detailed in Section 2.0 above.
- 7.23. The EA's Flood Risk summary for the area states that 'flooding from groundwater is unlikely in this area'.
- 7.24. A site investigation was undertaken by Sirius Consulting in 2019 and no groundwater was encountered within any of the trial pits within the southern parcel.
- 7.25. In the northern parcel groundwater was encountered in 6 of the sample locations at depths varying from 1.0m to 4.6m. The groundwater was perched within the made ground fill which accounts for its variable depth. It is expected that the groundwater will be at varying depths across the site dependant on the nature of fill material, its compaction and other factors.
- 7.26. The site will be re-graded as part of the proposed development and this is likely to alter/disturb any perched groundwater. The creation of a development platform will regularise the groundwater depths. In addition, the installation of a drainage system across the site will manage the surface water falling on the site and would direct it to the surface water storage facility.
- 7.27. Based on the above information, it can therefore be concluded that the risk of groundwater flooding is likely to be generally Low, however, the risk is variable across different parts of the site. Redevelopment of the site, including provision of a robust surface water drainage and level design, would be expected to mitigate the risk of flooding, and it is not therefore considered a risk to the proposed development.

7.28. Exceedance flow path design and a robust surface water drainage and level design is recommended to mitigate the risk of flooding from this source.

### Pluvial Flooding

7.29. Flooding from overland flows can occur if a significant volume of intercepted rainfall or surface runoff does not reach any drainage channel or permeable ground and is able to form significant surface accumulations.

7.30. It is usually associated with high intensity rainfall events but can also occur during low-intensity events when the ground is saturated / frozen or has low permeability.

7.31. The EA 'Flood Risk from Surface Water' maps are shown below. Figures 7.6, 7.7 and 7.8 below relate to the northern site) and each indicate the risk of surface water flooding to the Site in a range of likelihood, discussed further, below.

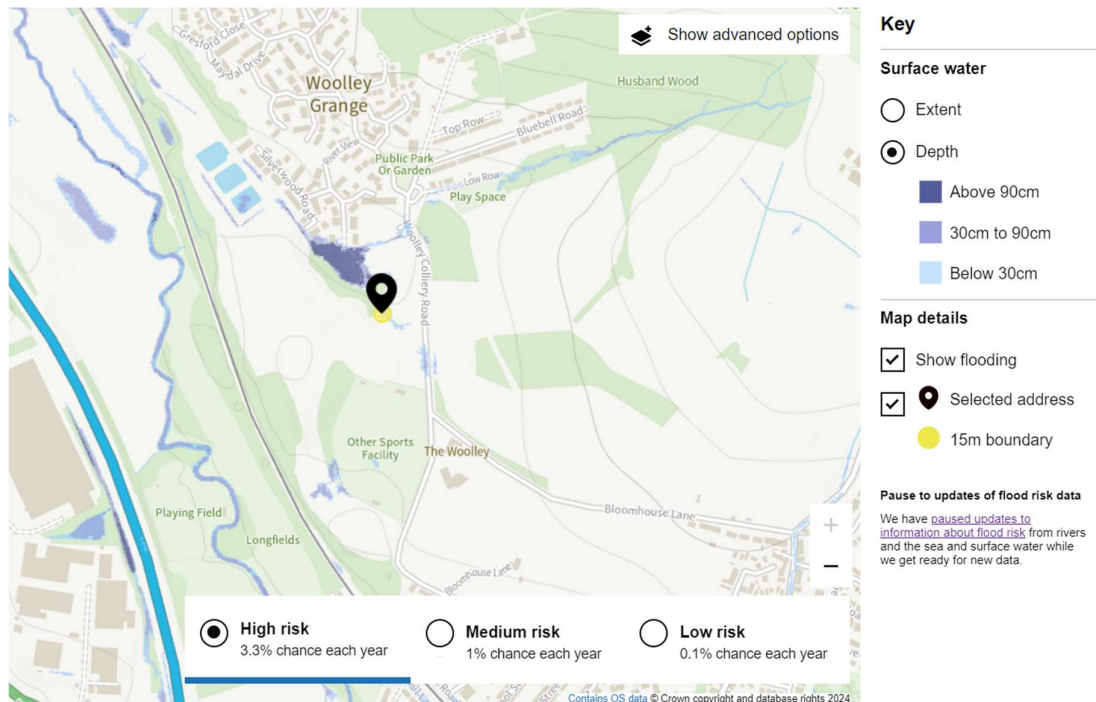


Figure 7.6 Flood risk from Surface Water (Gov.uk) – High Risk - Northern Site.

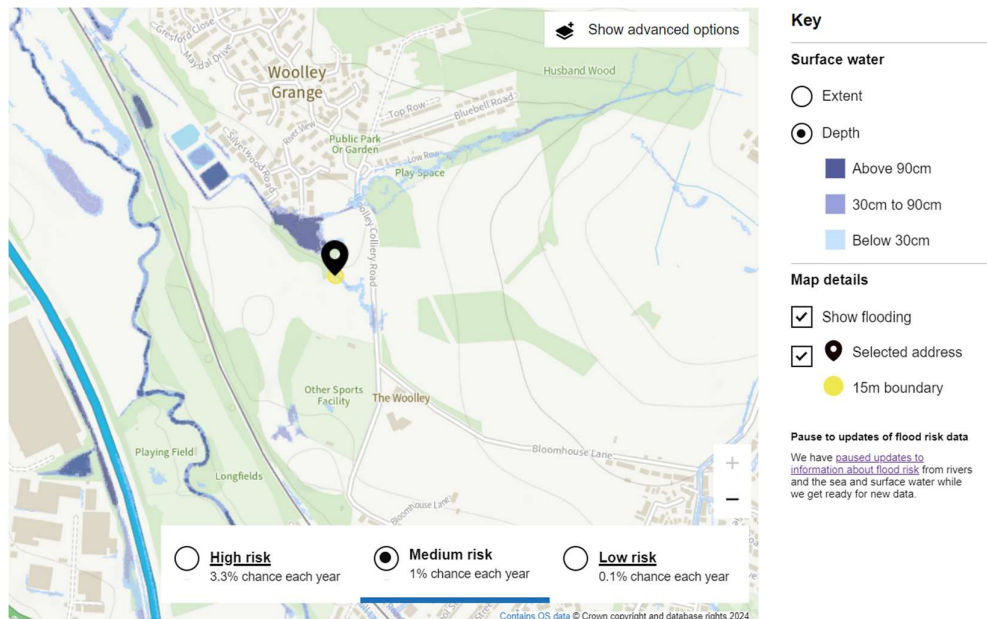


Figure 7.7 Flood risk from Surface Water (Gov.uk) – Medium Risk - Northern Site.

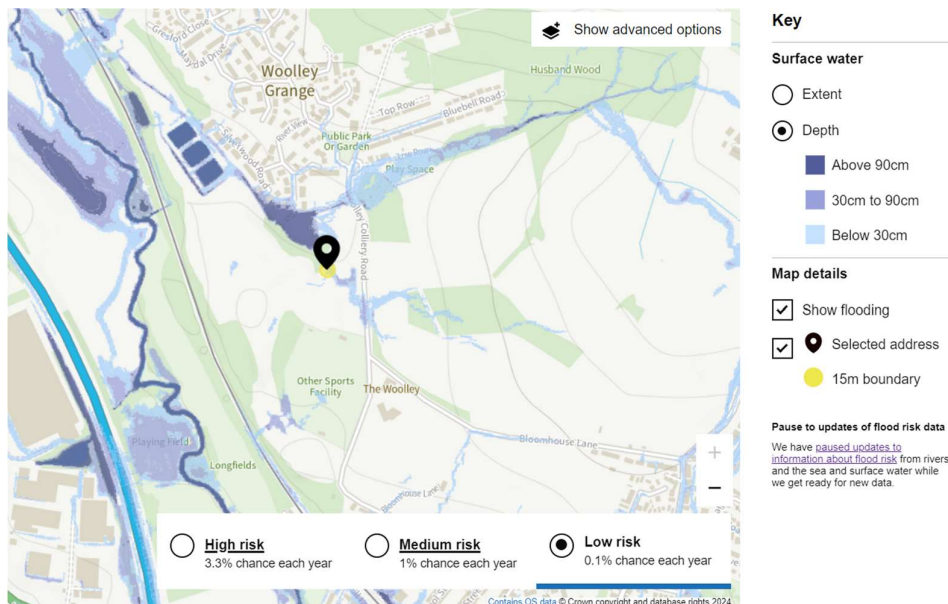


Figure 7.8 Flood risk from Surface Water (Gov.uk) – Low Risk - Northern Site.

7.32. Figures 7.9, 7.10 and 7.11 below relate to the southern site, and each indicates the risk of surface water flooding to the Site in a range of likelihood, discussed further, below.

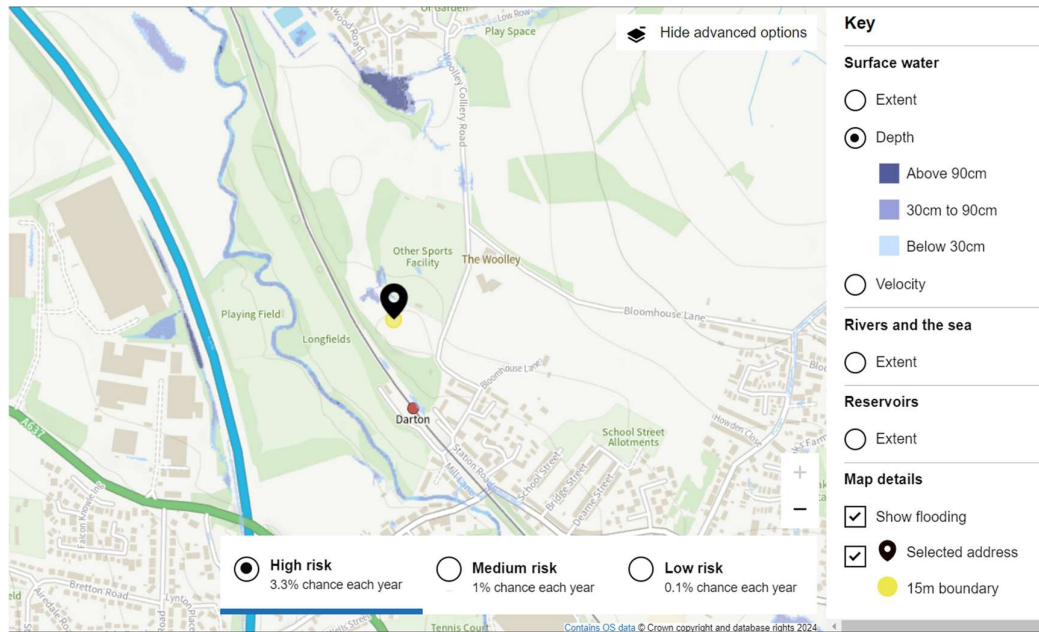


Figure 7.9 Flood risk from Surface Water (Gov.uk) – High Risk - Southern Site.

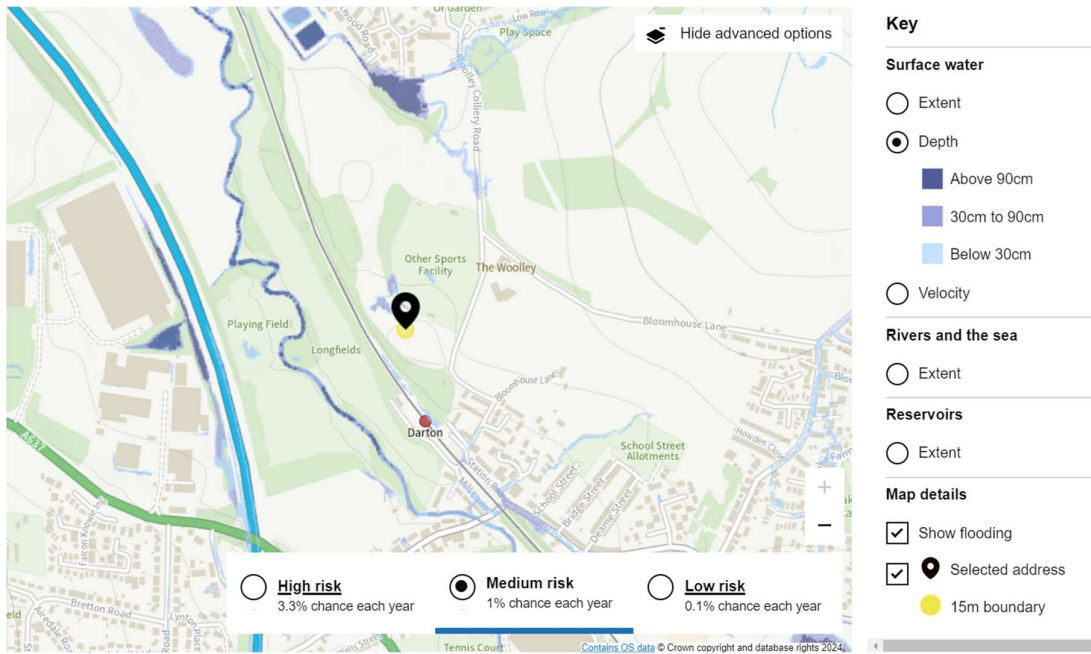


Figure 7.10 Flood risk from Surface Water (Gov.uk) – Medium Risk - Southern Site.

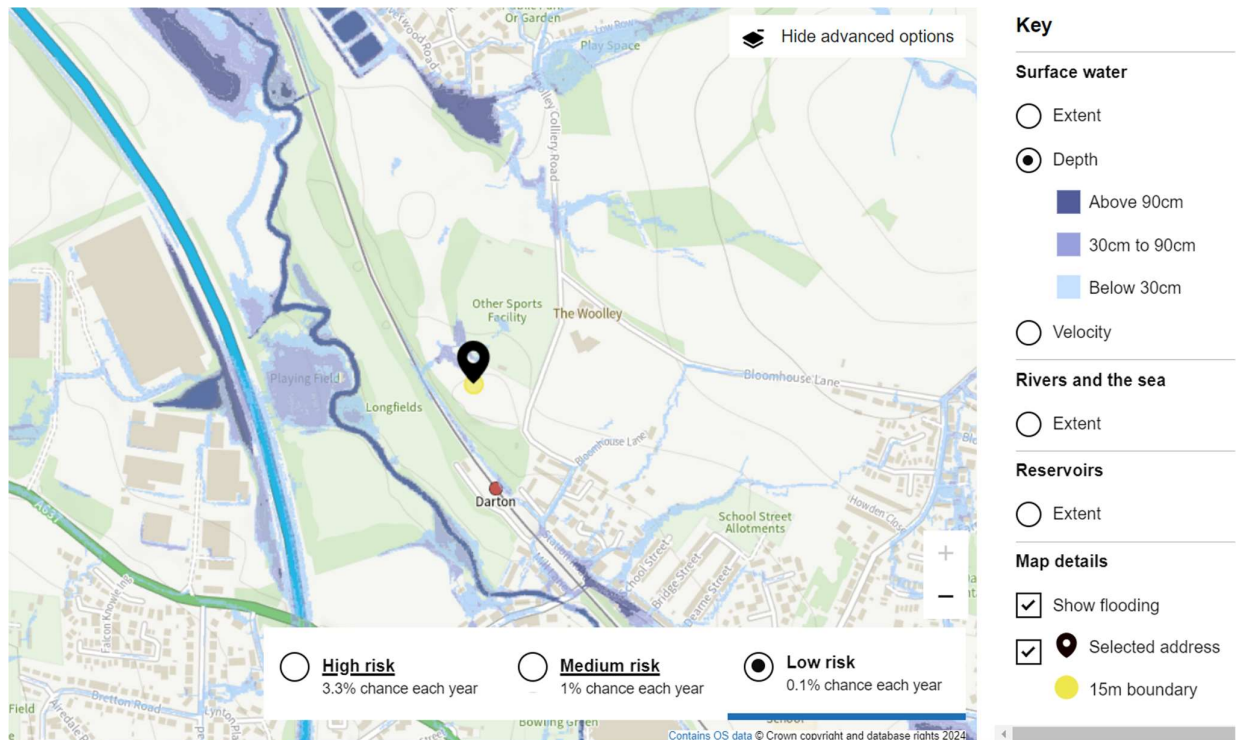


Figure 7.11 Flood risk from Surface Water (Gov.uk) – Low Risk - Southern Site.

- 7.33. Figures 7.6 – 7.11 above show the EA flood risk from surface water plans indicate a low risk across the majority of both parcels of land, however, indicate a medium to high risk of flooding across part of both parcels of land.
- 7.34. The northern parcel is shown to have a medium to high risk of surface water flooding across a narrow band of the site, which follows a path from Woolley Colliery Road across the site in a north-westerly direction to the low area in the north west. The flooding is modelled based on the existing culvert being blocked, and is based on LIDAR topographical levels.
- 7.35. It is known from site visits that the culvert to the northwest for the site has been partially submerged at times and that there is a low spot in the road which would direct surface water onto the site. This culvert will be diverted and renewed as part of the redevelopment of the site, and will be relocated on a new alignment replacing the existing blocked culvert.
- 7.36. The watercourse to the north will be cleared of silt which is partially restricting the outflow from the culvert crossing to the east and will also be regraded in part to remove the large existing step in bed levels caused by works from the former colliery.
- 7.37. It is expected, therefore, that redevelopment of the site, including provision of a robust surface water drainage and level design, would be expected to mitigate the risk of flooding in this location, during these events, and it is not therefore considered a risk to the proposed development.
- 7.38. The southern parcel is shown to have a high risk of surface water flooding across the western part of the site. The topographical survey and site walkover observations suggest this represents a low spot in the site topography between embankments to the north and south.

- 7.39. The surface water flood risk is modelled based on existing topography and given this area is low compared to its surroundings it is liable to flood. This site will be regraded to provide a development platform and remove the embankments and low spots to provide a positive drainage system with attenuation. As part of any regrading proposals, areas can be designed to hold water if required.
- 7.40. It is expected, therefore, that redevelopment of the site, including provision of a robust surface water drainage and level design, would be expected to mitigate the risk of flooding in this location, during these events, and it is not therefore considered a risk to the proposed development.
- 7.41. Based on the information available to date, parts of the application site are considered to be at medium - high risk from surface water flooding, therefore, exceedance flow path design and a robust surface water drainage and level design is recommended to mitigate the risk of flooding.

**Flood Risk Overview**

- 7.42. The potential sources of flooding identified above have been summarised in Table 7.1.
- 7.43. Categories of risk have been qualitatively defined as:

- High - flooding is likely to result in considerable damage to property and pose a significant risk to life,
- Medium – flooding may result in possible minor damage to property, but flood progress would allow adequate time for residents to be warned and safety evacuated to higher ground or appropriate places of safety,
- Low – flooding is unlikely to result in any damage to property and pose little or no risk to life.

Sources of Flooding	Potential Flood Risks					Comments
	High	Medium	Low	Not at risk	No information	
Fluvial			•			Flood Zone 1
Canal				•		No waterways in proximity of the site
Artificial Waterbodies				•		
Sewers			•			
Ground Water		•	•			Range of risk across the site
Pluvial			•			

Table 7.1 Potential Sources of Flooding - Overview

- 
- 7.44. The probability of a flood event from sources of flooding accessed where flood data information was available at time of writing the report are considered to be low. See Table 7.1. for reference.
  - 7.45. However, in accordance with Building Regulations, finished floor levels of the properties should be set 150mm above surrounding ground levels.
  - 7.46. Potential overland flows should be mitigated through the design of surface water management strategy incorporating Sustainable Drainage Systems.
  - 7.47. Flows in excess of the design standard (exceedance flows) would flow down the slope across the site in an approximate northerly direction and should be contained safely on site (as reasonably practicable) or allowed to pass safely through the site.

## 8 APPROPRIATE LAND USE - NPPF SEQUENTIAL AND EXCEPTION TESTS

### Flood Zone Requirements

- 8.1. This report has been prepared in support of a full planning application for a development at land at the former Woolley Colliery, Woolley Colliery Road, Darton, S75 5RR (existing site layout included in Appendix A). The project proposes 114 residential dwellings (Proposed Site Plan included in Appendix B), with associated landscaping and infrastructure works.
  - 1.1 The National Planning Policy Framework (NPPF) encourages a sequential risk-based approach to determine the suitability of land for development in flood risk areas. It advises local planning authorities to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development or land use proposed.
- 8.2. The Environment Agency (EA) 'Flood Map for Planning – Rivers and Sea', included in **Appendix E**, shows that the site is wholly located within **Flood Zone 1** – an area outside of the extreme flood extent and considered to have a less than 1 in 1,000 annual probabilities of flooding from rivers or the sea.
- 8.3. NPPF advises that all land uses are appropriate in Flood Zone 1. Therefore, the proposed overall development is considered appropriate in terms of the sequential and exception tests.
- 8.4. There are no Finished Floor Requirements in the Flood Zone 1 for the proposed Development. Raised door threshold approx. 150mm above DPC is recommended to minimize the risk to people and property in exceedance events.

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	✗	✗	✗

**Key:**     ✓ Development is appropriate.  
               ✗ Development should not be permitted.

Table 8.1 Flood Risk Vulnerability Classification (from Table 2 of online Planning Practice Guidance)

**Identified Flood Risk – Drainage Strategy Mangement/Mitigation Measures.**

- 8.5. Initial flood risk overview identified low flood risk to the application site, although the risk of groundwater flooding ranges across the site in certain flooding scenarios.
- 8.6. New development has a potential to increase the rate at which surface water runoff is discharged from a site and if unmanaged, this can increase the risk of flooding. In general, this risk can be mitigated by ensuring that the rate of discharged is not increased by the development through the use of Sustainable Drainage systems (SuDS).
- 8.7. The following sections of this report will consider a strategy for the management of surface water runoff for the proposed development, to ensure that via sustainable drainage design and construction the proposed development will seek to improve the local run-off profile, therefore satisfying the requirements of the National Planning Policy Framework and the Local Policy of Barnsley Metropolitan Borough Council.

**9 PROPOSED DEVELOPMENT DETAILS**

- 9.1. This report has been prepared in support of a full planning application for a development at land at the former Woolley Colliery, Woolley Colliery Road, Darton, S75 5RR (existing site layout included in Appendix A).
- 9.2. The project proposes 114 residential dwellings (Proposed Site Plan included in Appendix B), with associated landscaping and infrastructure works. Excerpts are provided below in Figures 9.1 and 9.2.

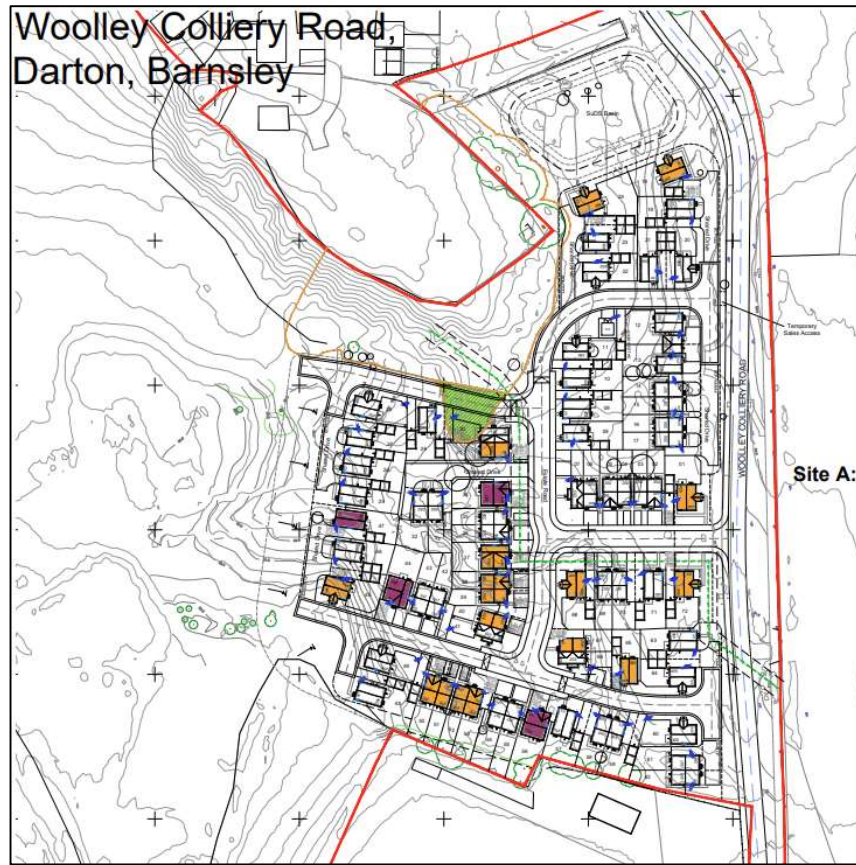


Figure 9.1 Northern Site - Proposed site plan NTS (Source: PRA Architecture Proposed Sketch Layout, dated 31.07.2024)

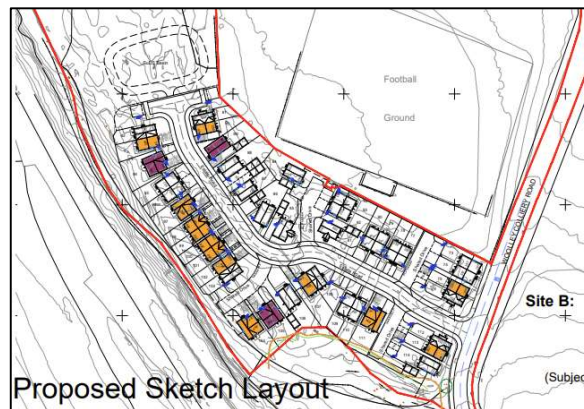


Figure 9.2 Southern Site - Proposed site plan NTS (Source: PRA Architecture Proposed Sketch Layout, dated 31.07.2024)

9.3. There will be an increase in impermeable areas because of the proposed development. The current assumed proposed impermeable areas are summarised in Table 9.1 for reference.

Table 9.1 Proposed site areas.

Area	m <sup>2</sup>	ha
Application Site Area Total	122,700	12.27
Total Existing impermeable areas	0	0.00
Percentage of Impermeable (PIMP) within application site pre-development	0 %	
Total proposed impermeable areas.	19,410	1.94
Percentage of Impermeable (PIMP) within application site post-development	16%	
Increase in impermeable areas post development	19,410	1.94

## 10 SUSTAINABLE URBAN DRAINAGE STANDARDS

10.1. In accordance with the National Planning Policy Framework (NPPF) and Non-statutory Technical Standards for SuDS (NTSS), it is preferable to provide a drainage design management for proposed development which replicated surface water runoff under greenfield conditions.

## 11 EXISTING RUNOFF RATE

### Greenfield Runoff Rate

11.1. An assessment of the greenfield runoff rates has been undertaken using online HR Wallingford IH124 Methodology and the results are summarised in Table 11.1 below. Calculations are included within Appendix C.

Table 11.1. Greenfield run off rate for range of return periods

Return Period	Run-off Rates	
	Greenfield based on 50 Ha (l/s)	Development Platform (per ha)
Qbar	233.74	4.67
1 in 30	409.05	8.18
1 in 100	486.19	9.72

## 12 SURFACE WATER MANAGEMENT

12.1. It should be acknowledged that the satisfactory collection, control, and discharge of storm water is now a principal planning and design consideration. This is reflected in implemented guidance and the National SuDS Standards.

12.2. Part H of the Building Regulations 2015 also recommends that surface water run-off shall 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 surface water sewer,
- Combined sewer (as a last resort).

12.3. It is necessary to identify the most appropriate method of controlling and discharging surface water.

#### Discharge into the ground - infiltration expectations

- 12.4. The first consideration for the disposal of surface water is infiltration (soakaways and permeable surfaces).
- 12.5. The ability of any development to discharge to infiltration drainage is wholly reliant on the ground conditions across the site.
- 12.6. The site ground conditions across both parcels of land comprise deep made ground colliery spoil, which is not suitable for infiltration drainage, so this option has been discounted.
- 12.7. Therefore, discharge via soakaway systems are not considered feasible and the use of infiltration has not been considered further.

#### Discharge to surface water body

- 12.1. Where soakaways are not suitable a connection to watercourse is the next consideration.
- 12.2. A watercourse is present close to the northern boundary of the northern land parcel, flowing towards the west. The watercourse is culverted and is thought to discharge into The River Dearne to the west of the site.
- 12.3. There are no other known watercourses within the site.
- 12.4. Therefore, the development on the northern land parcel shall be designed for surface water to discharge to the watercourse just to the north of the northern boundary.
- 12.5. However, it is unfeasible for the southern site to drain to this watercourse, therefore an alternative discharge arrangement is required for the southern site.

#### Discharge to surface water sewer

- 12.6. Where disposal of surface water to watercourse is not possible, a connection to the public sewer system is the next consideration.
- 12.7. There are no surface water sewers near to the site, therefore this option has been discounted.

#### Discharge to combined water sewer

- 12.8. A 225mm diameter combined water public sewer is present to the east of the southern land parcel, which flows south-eastwards, within Woolley Colliery Road.
- 12.9. Surface water from the southern parcel development is therefore proposed to discharge into the existing sewer to the site.
- 12.10. Yorkshire Water have stated that the discharge rate to the combined sewer is to be restricted to 3.5l/s. This is lower than the existing greenfield rate.
- 12.11. A pumped solution is not expected to be required to allow discharge of surface water from the majority of the application site to the drainage system of the adjacent development.

## 13 FOUL WATER DRAINAGE STRATEGY

### Proposed outfall

- 13.1. The Yorkshire Water Sewer Plans (Appendix D) show sewers are present in the vicinity of the site.
- 13.2. Yorkshire Water has advised that foul water from the northern development can discharge to the 375mm diameter public foul sewer recorded to the north of the site.
- 13.3. For the southern site, Yorkshire Water state that a connection can be made to the 225mm diameter combined sewer in Woolley Colliery Road.
- 13.4. On this basis, a pumped solution is not expected to be required to allow discharge of foul water from the application site to the existing public drainage system, however existing levels will need to be confirmed to ensure this is the case.

## 14 CLIMATE CHANGE ALLOWANCE

- 14.1. It is widely recognized that climate change will bring an increase in rainfall intensity and more frequent periods of long duration rainfall in the future.
- 14.2. To ensure that any mitigation measures are sustainable and effective throughout the lifetime of the development an allowance for climate change should be included within drainage calculation to help minimise vulnerability and provide resilience to flooding. Both the 'central' and 'upper end' allowance should be assessed to understand the range of impact.
- 14.3. The 'Central' allowance should be applied to the surface water drainage network/design to assess its performance and ability to contain critical events. The 'Upper End' allowance should be applied to assess the potential flood risk implications to the site and to ensure that flooding is wholly contained onsite.
- 14.4. The Environment Agency Guidance in Table 14.1 shows anticipated changes in extreme rainfall intensity across the country.

Table 14.1 Peak rainfall intensity allowance in small and urban catchments.

Applies across all of England	Total potential change anticipated for the 2050s (2040-2069)	Potential Change anticipated for the 2080s (2070 – 2115)
Upper End	+40%	<b>+40%</b>
Central	+20%	<b>+25%</b>

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-2>

- 14.5. The National Planning Policy Framework (NPPF) and supporting Planning Practice Guidance (NPPG) states that the residential development should be considered for a minimum of 100 years, but that the lifetime for a nonresidential development depends on the characteristics of the development.
- 14.6. With an estimated design life 100 years for residential development, drainage design methods limiting surface water disposal flows should incorporate rainfall intensities that have been increased by 40% to take account of the effects of climate change until the year 2115.
- 14.7. It is recommended that for the proposed development the drainage is designed to make sure there is no increase in the rate of runoff discharge from the site for the upper end allowance of 40% CC (Climate Change).

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## 15 PROPOSED SURFACE WATER DRAINAGE STRATEGY

- 15.1. It is a requirement of the NPPF to ensure that surface water run-off from any proposed development has negligible consequence on downstream areas either in terms of impact upon downstream sewer capacity or flood risk impacts due to discharge to a watercourse. The NPPF also requires all major development to include sustainable drainage systems.
- 15.2. An allowance to account for the effects of Urban Creep is not anticipated to be required by the LLFA
- 15.3. It is proposed that surface water from the northern part of the development will be discharged to the watercourse just to the north of the northern boundary, restricted to the greenfield rate. It is anticipated that this connection can be achieved by gravity, subject to confirmation of existing sewer depths. Surface water storage will be provided within a pond, to manage surface water up to the 1 in 100-year rainfall event, including an additional 40% allowance for the projected impacts of climate change.
- 15.4. It is proposed that surface water from the southern part of the development will be discharged to the 225mm diameter combined water public sewer within Woolley Colliery Road to the east of the site, at a maximum rate of 3.5l/s. It is anticipated that this connection can be achieved by gravity, subject to confirmation of existing sewer depths. Surface water storage will be provided within a pond, to manage surface water up to the 1 in 100-year rainfall event, including an additional an additional 40% allowance for the projected impacts of climate change.
- 15.5. As discussed in chapter 3, further investigations will be carried out with regards to the noted chamber in the south of the site on the survey information with 225 diameter and 300 diameter pipes recorded. Following these investigations if it is determined that the outfall is suitable for connections based on levels and it's condition preference will be made to utilise this on site connection for Surface Water discharge. Status of the ownership of the sewer and it's outfall will be determined prior to forming any new connections.
- 15.6. As the surface water discharge is to be attenuated to a low rate, the proposed development is not expected to lead to a significant increase in surface water flows into the local surface water public sewers. On this basis, the development would not be expected to lead to an increase in flood risk downstream. The strategy is subject to agreement with the Regulatory Authorities.
- 15.7. As with any new drainage system, there is a residual risk of flooding from all drainage systems in the event of siltation or blockage. The above will need to be considered as part of the detailed external works design for the proposed development, with potential exceedance flows directed away from property to be contained in less vulnerable areas of the site as far as practicable. It is also essential that drainage systems are subject to periodic inspection and maintenance, so that the design standard is not compromised, and to reduce the risk of blockage/failure.
- 15.8. As noted in chapter 3 there is an existing culvert known to be within the site boundary:
- There is an existing 450mm culvert thought to run between Woolley Colliery Road at the east of the site in the north-westerly direction towards the northwest of northern parcel. This is based on 3<sup>rd</sup> party information and the locations are approximate only. The line, location, depth and condition of the culvert is to be verified.*
- 15.9. It is the intention for the 450mm culvert to be diverted through the proposed development. As part of this further investigation work will take place on the existing culvert to confirm it's exact position, depths and condition prior to commencing with the diversion works.
- 15.10. The diversion is intended to re-route the culvert through private areas of the site with a 6m easement provided around the culvert to ensure no impact from the proposals will impact the future functionality. The relevant approvals will be obtained from the statutory authority as part of diversion proposals.

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## 16 FLOOD MITIGATION SUMMARY

16.1. The site falls within Flood Zone 1, and the risk from the majority of sources has been assessed as being low. However, there is a need to consider the topography of the site in terms of the residual risk of surface water flooding from outside of the site during an extreme rainfall event, and the residual risk of surface water flooding on site due to blockage, exceedance of drainage system capacity or pumping station failure. The following precautionary mitigation measures are, therefore, recommended:

- Finished Floor Levels should be set a minimum of 150mm above external levels around the building.
- External levels should be designed with falls to direct overland flows away from the building entrances where possible, so that any flooding remains in less vulnerable areas such as landscaped areas, car parks, or roads, where the consequences of surface water flooding would be less significant. Where falls towards buildings are unavoidable, additional cut-off drainage and gullies/channel drains should be provided to prevent water entering buildings during extreme events.
- All exceedance flows beyond those for which the drainage system is designed will be directed thought the site, away from buildings and other sensitive areas and contained on site as reasonably practicable.
- The proposed ground floors shall comprise solid concrete slabs or beam and block floors with screed construction.
- The proposed dwellings should not include basements.
- Incoming electricity supplies shall be raised above lower ground floor level (after the meter) and lower ground floor electric sockets shall be served by loops from upper levels.
- A sustainable surface water drainage system shall be provided to manage surface water run-off from the site itself up to the 1 in 100 year plus climate change event.
- Any mitigation measures, including drainage systems, will require suitable maintenance systems to be implemented, so that the design standard is maintained over the lifetime of the development and the risk of blockage/failure is minimised.

## 17 EXECUTIVE SUMMARY

- 17.1. This report has been prepared in support of a full planning application for a development at land at the former Woolley Colliery, Woolley Colliery Road, Darton, S75 5RR (existing site layout included in Appendix A).
- 17.2. The project proposes 114 residential dwellings (Proposed Site Plan included in Appendix B), with associated landscaping and infrastructure works.
- 17.3. The application site is located in Flood Zone 1 – an area outside of the extreme flood extent and considered to have a less than 1 in 1,000 annual probabilities of flooding from rivers or the sea. The site is at Low risk of flooding from most other identified sources, although the risk of groundwater flooding is likely to range across different parts of the site.
- 17.4. NPPF advises that all land uses are appropriate in Flood Zone 1. Therefore, the proposed residential development is considered appropriate in terms of the sequential and exception tests.
- 17.5. There are no Finished Floor Requirements in Flood Zone 1 for the proposed Development.

- 
- 17.6. Raised door threshold approx. 150mm above DPC is recommended to minimize the risk to people and property in exceedance events.
- 17.7. With an estimated design life of 100 years for residential development, drainage design (including SuDS elements) should incorporate rainfall intensities that have been increased by 40% to take account of the effects of climate change until the year 2115.
- 17.8. The application site limiting discharge rate has been set to greenfield rates for the northern site, and 3.5l/s for the southern site.
- 17.9. The proposed development should not therefore exceed the agreed discharge rates for all return period events up to and including 100yr +40% climate change allowance.
- 17.10. The proposed development will increase the area of impermeable surfaces from 0.0ha to approximately 1.94ha. The surface water runoff will be managed by use of Sustainable Drainage Systems providing attenuation within the application site boundary.
- 17.11. All impermeable areas will be drained to meet the Statutory Requirements as follows:
- Drainage system will be designed for the critical 100-year (1%) rainfall event with climate change allowance, therefore there will be no risk of uncontrolled flooding off site for all rainfall events up 100-year return +40% CC.
  - All exceedance flows beyond those for which the drainage system is designed will be directed thought the site, away from buildings and other sensitive areas and contained on site as reasonably practicable.
- 17.12. Discharging proposed surface water by infiltration methods is considered to be unfeasible.
- 17.13. It is proposed that surface water from the northern part of the development will be discharged to the watercourse just to the north of the northern boundary, restricted to the greenfield rate. It is anticipated that this connection can be achieved by gravity, subject to confirmation of existing sewer depths. Surface water storage will be provided within a pond, to manage surface water up to the 1 in 100-year rainfall event, including an additional 40% allowance for the projected impacts of climate change.
- 17.14. It is proposed that surface water from the southern part of the development will be discharged to the 225mm diameter combined water public sewer within Woolley Colliery Road to the east of the site, at a maximum rate of 3.5l/s. It is anticipated that this connection can be achieved by gravity, subject to confirmation of existing sewer depths. Surface water storage will be provided within a pond, to manage surface water up to the 1 in 100-year rainfall event, including an additional an additional 40% allowance for the projected impacts of climate change.
- 17.15. Further investigations will be carried out with regards to the noted chamber in the south of the site on the survey information with 225 diameter and 300 diameter pipes recorded. Following these investigations if it is determined that the outfall is suitable for connections based on levels and it's condition preference will be made to utilise this on site connection for Surface Water discharge
- 17.16. It is the intention for the existing 450mm culvert to be diverted through the proposed development. As part of this further investigation work will take place on the existing culvert to confirm it's exact position, depths and condition prior to commencing with the diversion works.
- 17.17. The application of a SuDS based system has been considered as the primary measures for surface water management for the proposed development. These will be shown on the proposed drainage strategy drawing to be provided as part of the planning application, including associated hydraulic calculations.

- 
- 17.18. The strategy will provide required quantity controls in respect of proposed runoff rates but also provide water quality, amenity and biodiversity gains.
- 17.19. Yorkshire Water has advised that foul water from the northern development can discharge to the 375mm diameter public foul sewer recorded to the north of the site.
- 17.20. For the southern site, Yorkshire Water state that a connection can be made to the 225mm diameter combined sewer in Woolley Colliery Road.
- 17.21. On this basis, a pumped solution is not expected to be required to allow discharge of foul water from the application site to the existing public drainage system, however existing levels will need to be confirmed to ensure this is the case.
- 17.22. The proposed peak flow rates and outfall locations are subject to statutory Approvals and agreement with Yorkshire Water.
- 17.23. Proposed site drainage will be designed and constructed in accordance with current best practice, Building Regulations, and standards.
- 17.24. All drainage network elements, including SuDS features, will be designed, and installed with full consideration to long term maintenance.
- 17.25. Maintenance of systems during construction and for agreed period after the development is complete will be the responsibility of the developer. Site owners will be responsible for drainage maintenance including SuDS features for the longevity of the development.
- 17.26. Detailed maintenance schedule based on as built drainage plans, post construction CCTV surveys with supporting information from manufacturers of drainage components/proprietary systems, should be incorporated within the Operation and Maintenance (O&M) manual for the site and should be accessible to those who undertake maintenance.
- 17.27. HBL Associates Ltd recommends that the Local planning Authority accept this Flood Risk in support of the Full Planning Application for the proposed development at the former Woolley Colliery, Woolley Colliery Road, Darton, S75 5RR.

## APPENDIX A – EXISTING SITE PLANS





Google



## APPENDIX B – PROPOSED SITE PLAN

# Woolley Colliery Road, Darton, Barnsley



**Site A:**

House type: M4(2)		Sqft:	No:
250	Greystones 2B 2St	753	09
253	Tallow 2B 2St	753	03
350	Glin 3B 2St	904	13
351	Cranford 3B 2St	904	01
357	Rosemount 3B 2St	904	10
359	Clifden 3B 2St	984	02
360	Milford 3B 2St	919	07
362	M4(3) 3B 2St		01
363	M4(3) 3B 2St		02
450	Dalkey 4B 2St	1156	11
454	Blessington 4B 2St	1149	01
455	Bantry 4B 2St	1138	11
456	M4(3) 4B 2St		01
<b>Total:</b>		<b>72</b>	

Nett Developable:  
2,075Ha / 5.13 Acres  
(34.70 DPH)

House type: M4(2)		Sqft:	No:
250	Greystones 2B 2St	753	07
253	Tallow 2B 2St	753	03
350	Glin 3B 2St	904	07
351	Cranford 3B 2St	904	03
357	Rosemount 3B 2St	904	08
359	Clifden 3B 2St	984	01
360	Milford 3B 2St	919	03
362	M4(3) 3B 2St		01
450	Dalkey 4B 2St	1156	03
454	Blessington 4B 2St	1149	03
455	Bantry 4B 2St	1138	01
456	M4(3) 4B 2St		02
<b>Total:</b>		<b>42</b>	

Nett Developable:  
1,093Ha / 2.70 Acres  
(38.43 DPH)

House type: M4(2)		Sqft:	No:
250	Greystones 2B 2St	753	16
253	Tallow 2B 2St	753	06
350	Glin 3B 2St	904	20
351	Cranford 3B 2St	904	04
357	Rosemount 3B 2St	904	18
359	Clifden 3B 2St	984	03
360	Milford 3B 2St	919	10
362	M4(3) 3B 2St		02
363	M4(3) 3B 2St		02
450	Dalkey 4B 2St	1156	14
454	Blessington 4B 2St	1149	04
455	Bantry 4B 2St	1138	12
456	M4(3) 4B 2St		03
<b>Total:</b>		<b>114</b>	

Gross Site Area:  
12,27Ha / 30.32 Acres  
Nett Developable:  
3,168Ha / 7.83 Acres  
(35.98 DPH)

Rev	By	Note	Date
C	SH	Sales Arena amend following client review and feedback.	18.09.24
B	PB	Plot 114 moved away from RPA.	18.08.24
A	SH	Tree survey information overlaid, layout amended to reduce impact on tree group to northernmost boundary.	12.08.24

Status	Planning	Tender	Construction	As Built
	✓			

- M4(2) Compliant Plot
- M4(3) Compliant Plot

**Site B:**

(Subject to Tree Survey & Planning)

## Proposed Sketch Layout

**PRA** Architecture

55 The Tannery, Lawrence Street, York, YO10 3WH T: 01904 653772  
Email: pra@pr-architecture.com W: www.pr-architecture.com

PROJECT Woolley Colliery Road, Darton, Barnsley

TITLE Proposed Sketch Layout

CLIENT Gleeson

DATE 31.07.24 SCALE 1:500@A0

DRAWING 1329.05 REVISION C

DRAWN SH CHECKED SH

Do not scale from this drawing except for planning purposes. This drawing and any designs thereon are the copyright of PRA Architecture Ltd.

## APPENDIX C – INDICATIVE GREENFIELD CALCULATIONS

Calculated by:

Site name:

Site location:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Cris, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

### Site Details

Latitude:

Longitude:

Reference:

Date:

Runoff estimation approach

### Site characteristics

Total site area (ha):

### Methodology

Q<sub>BAR</sub> estimation method:

SPR estimation method:

Soil characteristics:

SOIL type:

HCST class:

SPR/SPRHCST:

Hydrological characteristics:

SAAR (mm):

Hydrological region:

Growth curve factor 1 year:

Growth curve factor 30 years:

Growth curve factor 100 years:

Growth curve factor 200 years:

### Notes

#### (1) Is Q<sub>BAR</sub> < 2.0 l/s/ha?

When Q<sub>BAR</sub> is < 2.0 l/s/ha then limiting discharge rates 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 consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

#### (3) Is SPR/SPRHCST ≤ 0,3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates:














Q <sub>BAR</sub> (l/s):	<input type="text" value="233,74"/>	<input type="text" value="233,74"/>
1 in 1 year (l/s):	<input type="text" value="201,02"/>	<input type="text" value="201,02"/>
1 in 30 years (l/s):	<input type="text" value="409,05"/>	<input type="text" value="409,05"/>
1 in 100 year (l/s):	<input type="text" value="486,19"/>	<input type="text" value="486,19"/>
1 in 200 years (l/s):	<input type="text" value="553,97"/>	<input type="text" value="553,97"/>

## APPENDIX D – WATER AUTHORITY RECORDS

## Property Identifier









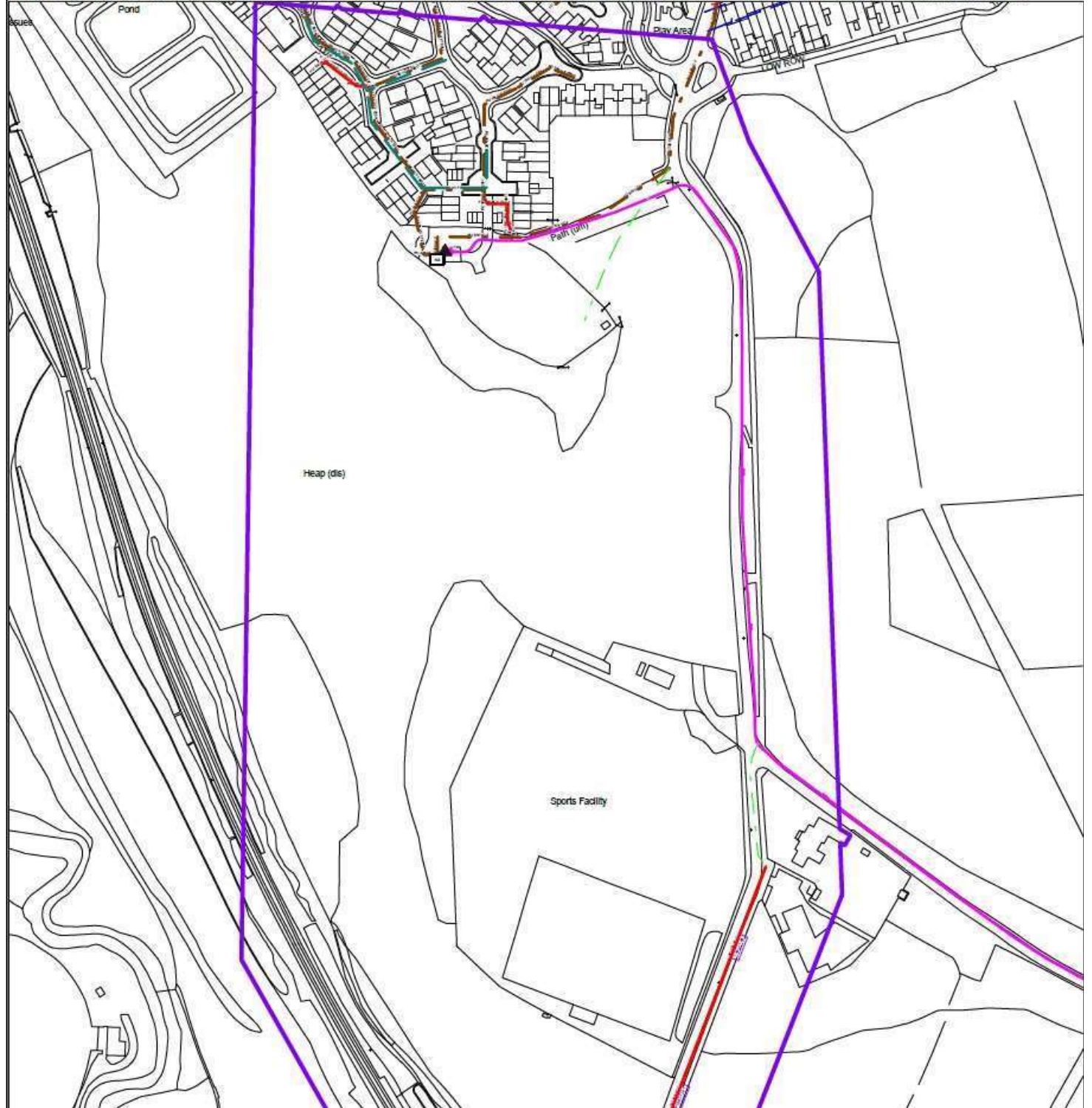
## Sewer Legend

	Combined Sewer		S24 Combined Sewer
	Surface Water Sewer		S24 Surface Water Sewer
	Foul Sewer		S24 Foul Sewer
	Section 104 Sewer		Rising Main
	Overflow Sewer		Abandoned Sewer
		Syphone Sewer & Vacuum Sewer	
	Pumping Station		Public Sewer Treatment Works

Please note that the direction of flow arrows may not always appear depending on the scale of the map.

## Water Legend

	Water Main 4" and below
	Water Main 4" and above
	Raw Water Main
	Private Water Main
	Fire Hydrant
	Pumping Station
	The assets in this area are the responsibility of another Water Undertaker



## APPENDIX E - ENVIRONMENT AGENCY RECORDS

# Flood map for planning

Your reference  
<Unspecified>

Location (easting/northing)  
431177/410789

Created  
16 Jul 2024 2:32

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

You will need to do a flood risk assessment if your site is **any of the following:**

- bigger than 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

## Notes

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

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

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

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










# Flood map for planning

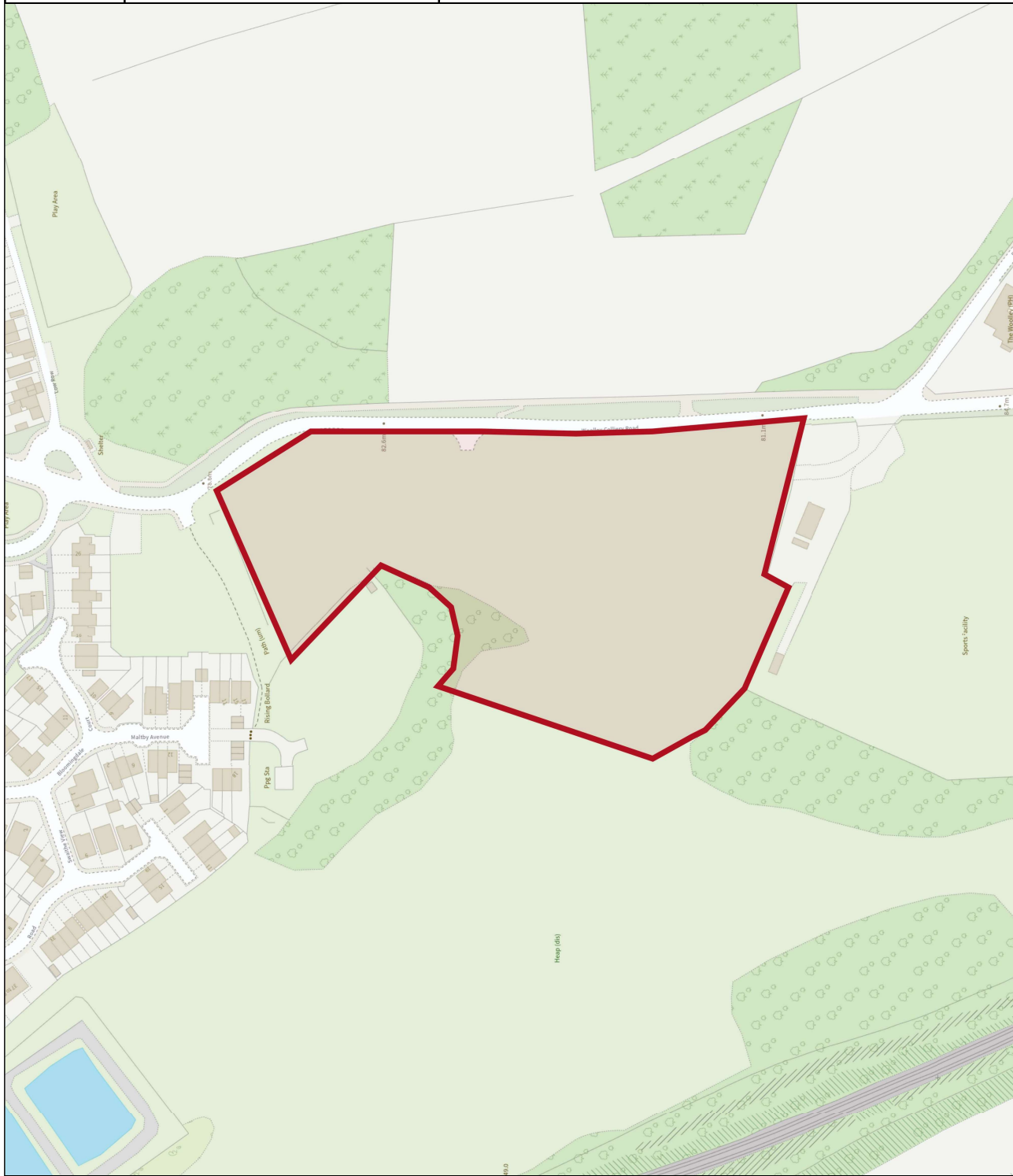
Your reference  
**<Unspecified>**

Location (easting/northing)  
**431177/410789**

Scale  
**1:2500**

Created  
**16 Jul 2024 2:32**

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



# Flood map for planning

Your reference  
<Unspecified>

Location (easting/northing)  
431118/410433

Created  
16 Jul 2024 2:44

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

You will need to do a flood risk assessment if your site is **any of the following:**

- bigger than 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

## Notes

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

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

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

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# Flood map for planning

Your reference  
**<Unspecified>**  
Location (easting/northing)  
**431118/410433**

Scale  
**1:2500**

Created  
**16 Jul 2024 2:44**

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

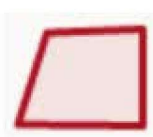


Page 2 of 2





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Your site boundary



Flood zone 3



Flood zone 2



Flood zone 1



Flood defence

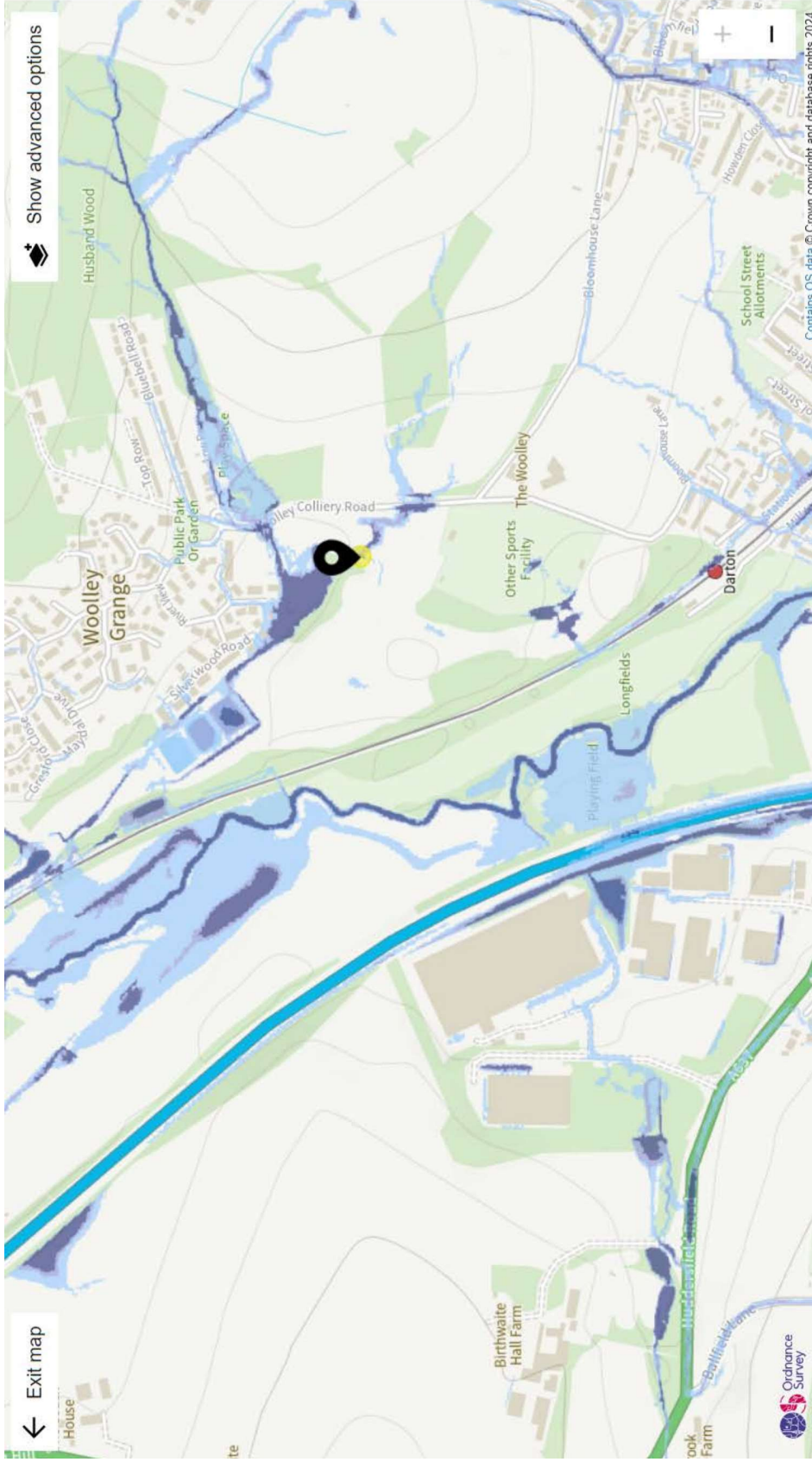


Main river







Water storage area






**Key**

**Surface water**

-  Extent
-  High risk  
More than 3.3% chance each year
-  Medium risk  
Between 1% and 3.3% chance each year
-  Low risk  
Between 0.1% and 1% chance each year

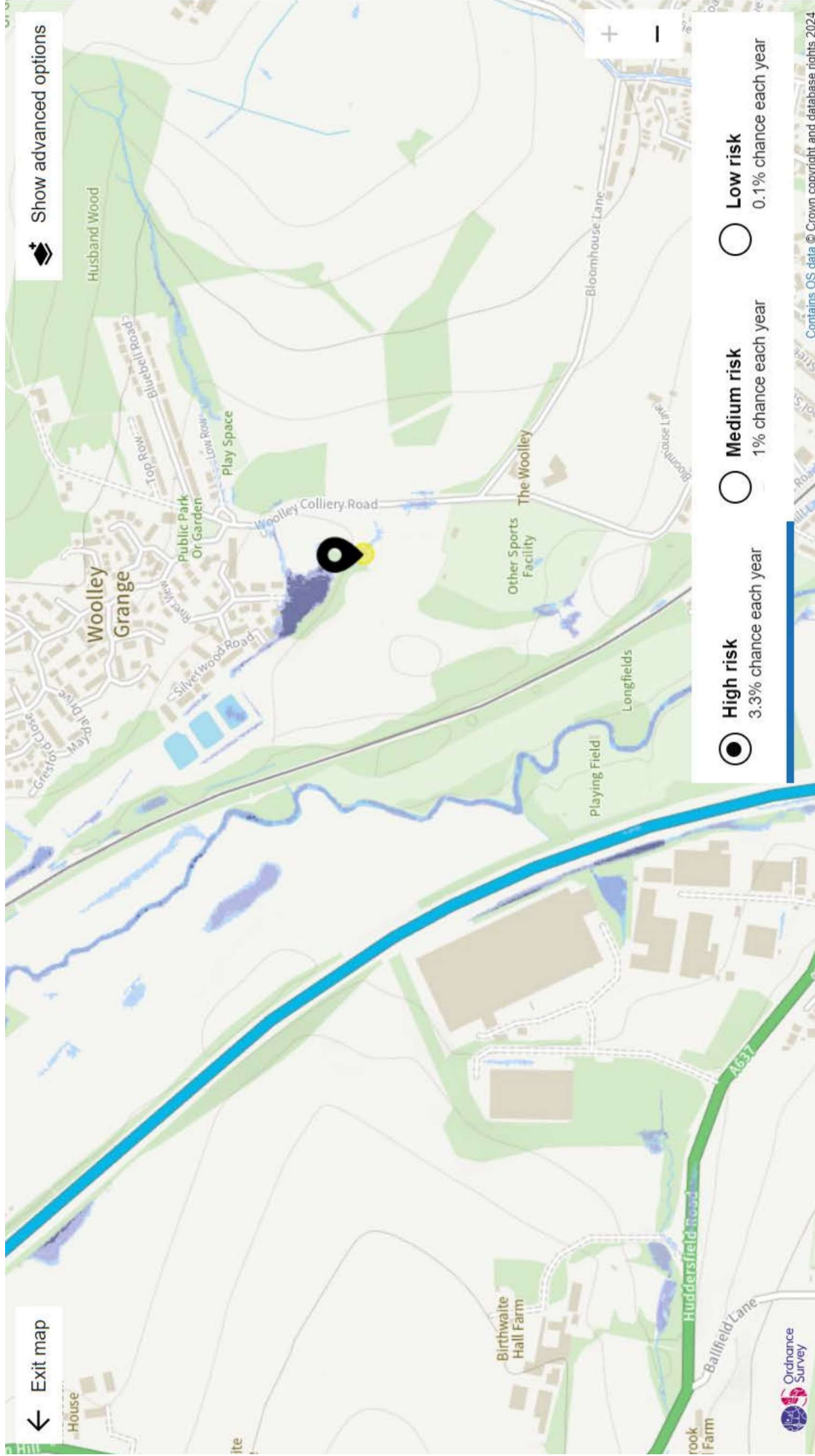
-  Depth

**Map details**

- Show flooding
- Selected address
-  15m boundary

**Pause to updates of flood risk data**

We have paused updates to information about flood risk from rivers and the sea and surface water while



**Key**

**Surface water**

- Extent
- Depth
- Above 90cm
- 30cm to 90cm
- Below 30cm

**Map details**

- Show flooding
- Selected address
- 15m boundary

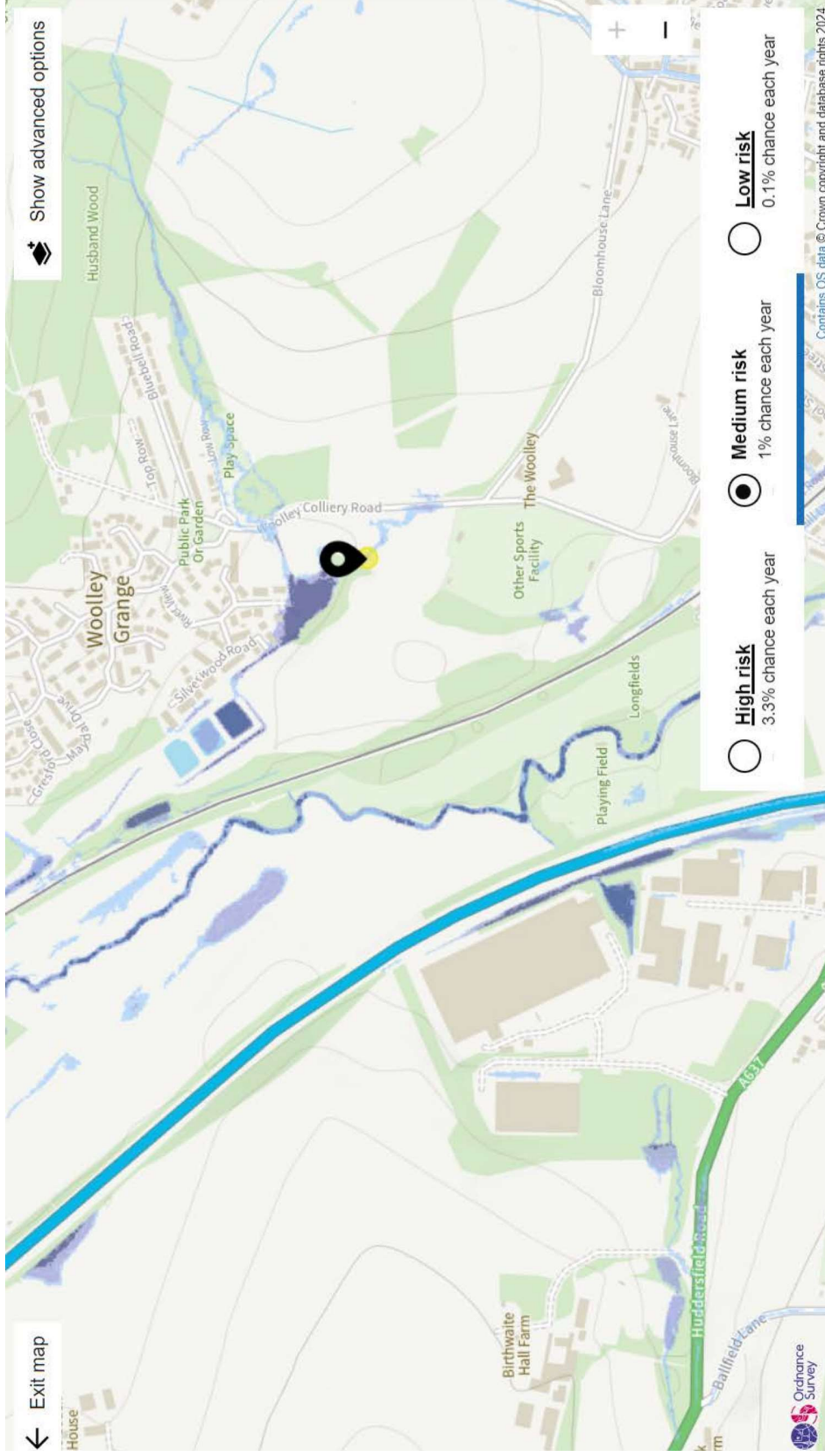
**Pause to updates of flood risk data**

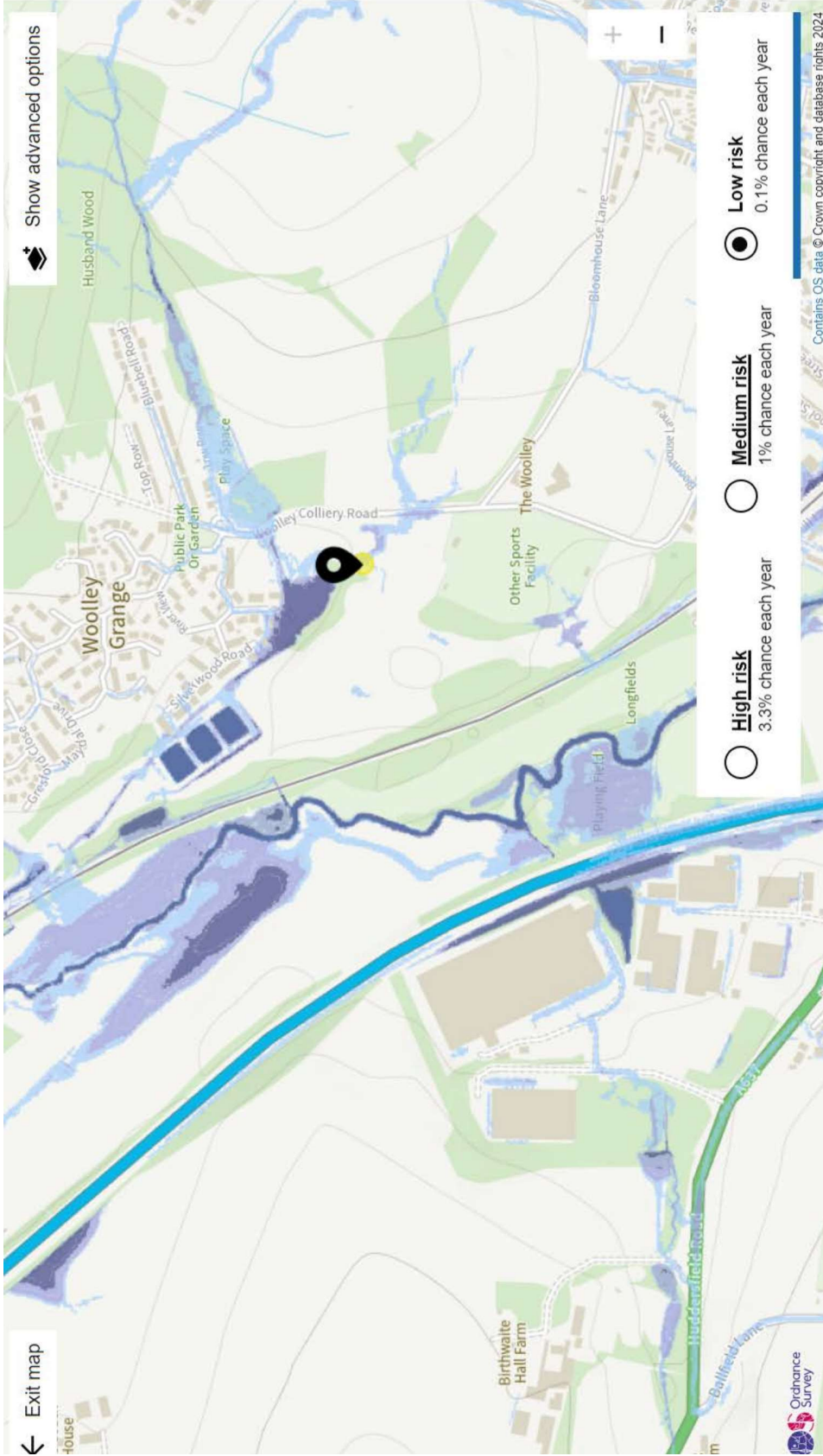
We have paused updates to information about flood risk from rivers and the sea and surface water while we get ready for new data.

Show advanced options

Exit map

- High risk**  
3.3% chance each year
- Medium risk**  
1% chance each year
- Low risk**  
0.1% chance each year





**Key**

**Surface water**

- Extent
- Depth
  - Above 90cm
  - 30cm to 90cm
  - Below 30cm

**Map details**

- Show flooding
- Selected address
- 15m boundary

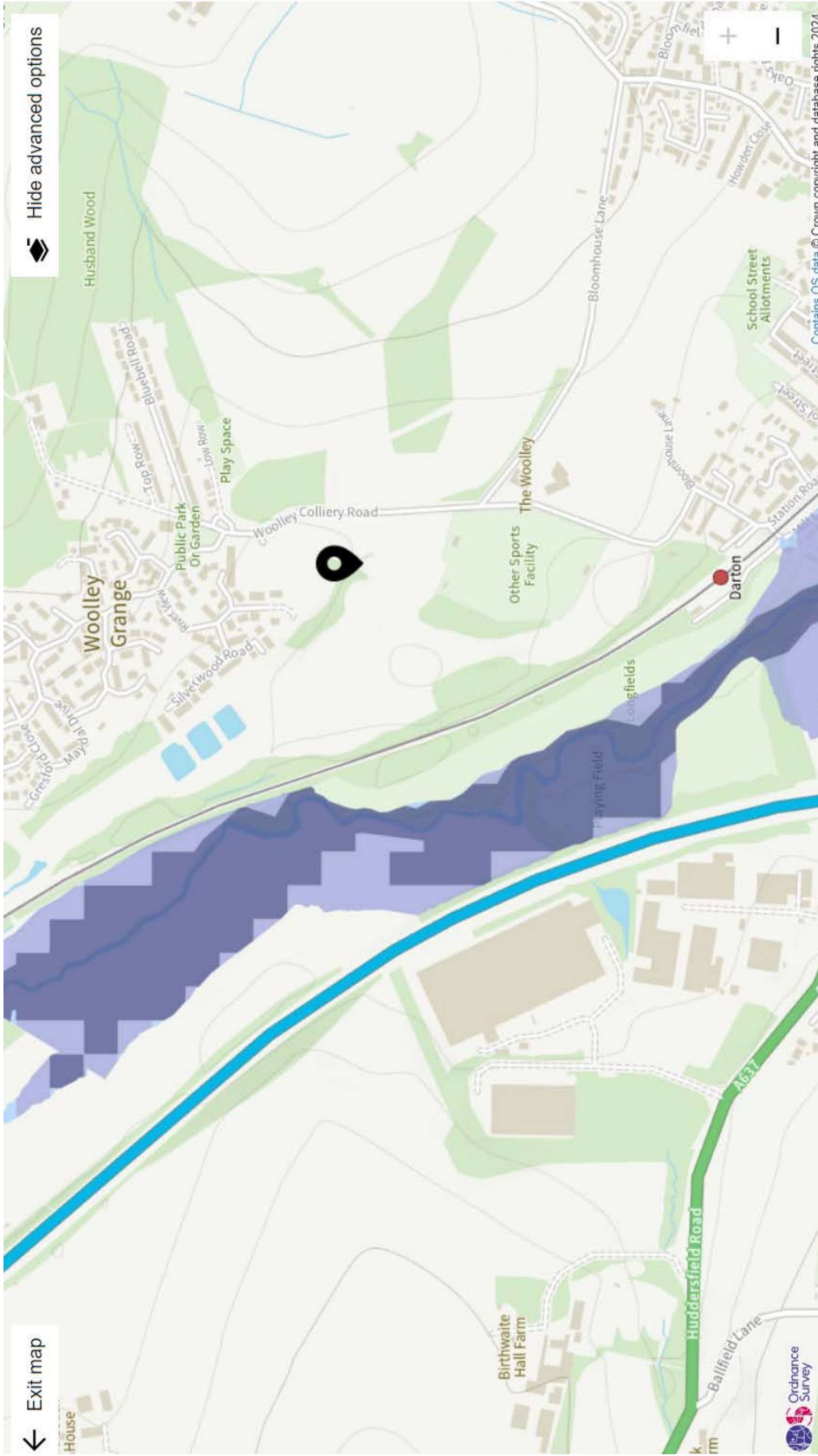
**Pause to updates of flood risk data**

We have paused updates to information about flood risk from rivers and the sea and surface water while we get ready for new data.

← Exit map

Show advanced options

- High risk**  
3.3% chance each year
- Medium risk**  
1% chance each year
- Low risk**  
0.1% chance each year



**Key**

**Surface water**

- Extent
- Depth
- Velocity

**Rivers and the sea**

- Extent
- High risk  
More than 3.3% chance each year
- Medium risk  
Between 1% and 3.3% chance each year
- Low risk  
Between 0.1% and 1% chance each year
- Very low risk  
Less than 0.1% chance each year

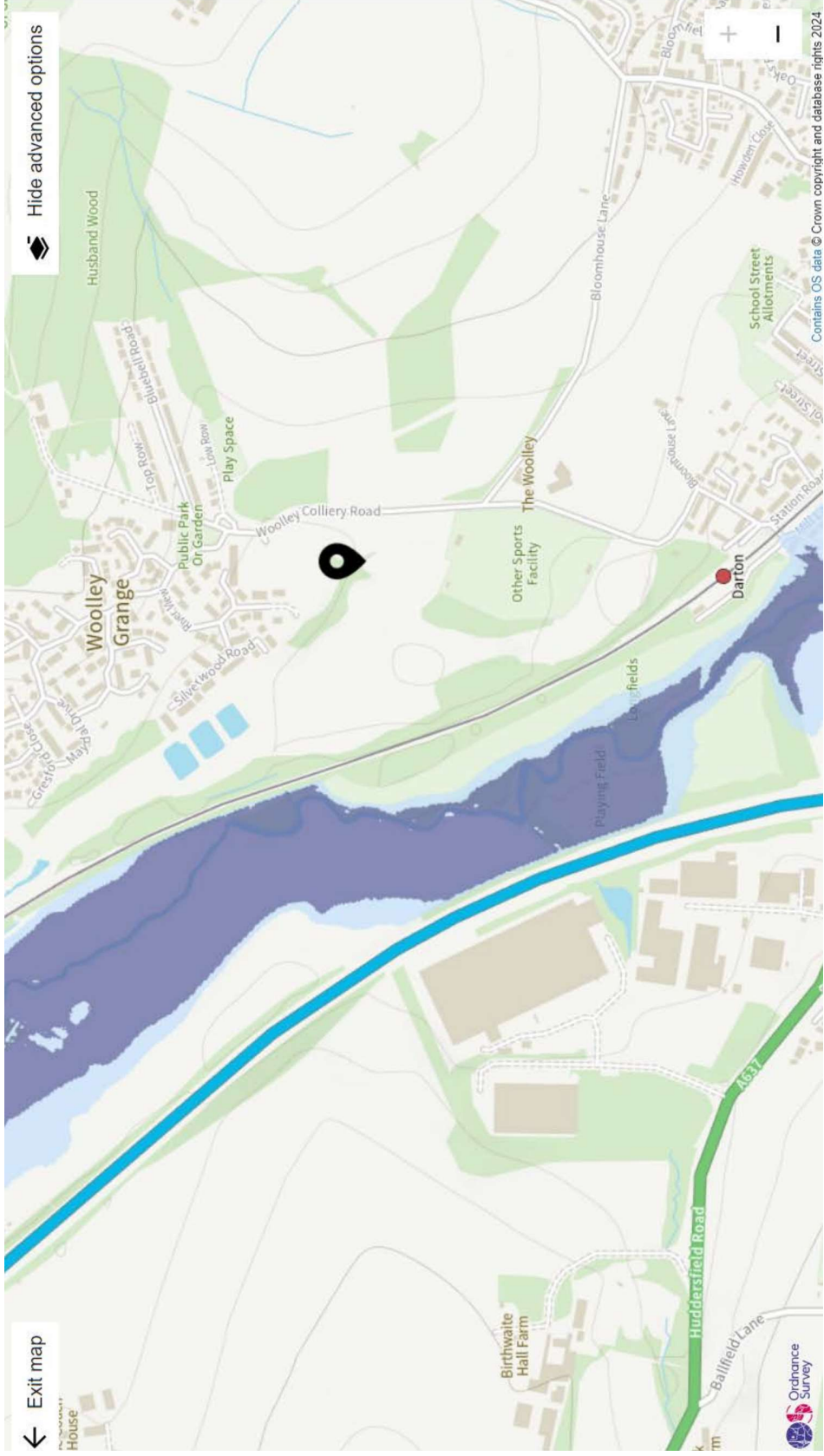
**Reservoirs**

Hide advanced options

Exit map

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**Key**

**Surface water**

- Extent
- Depth
- Velocity

**Rivers and the sea**

- Extent

**Reservoirs**

- Extent

When river levels are normal

When there is also flooding from rivers

**Map details**

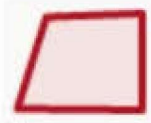
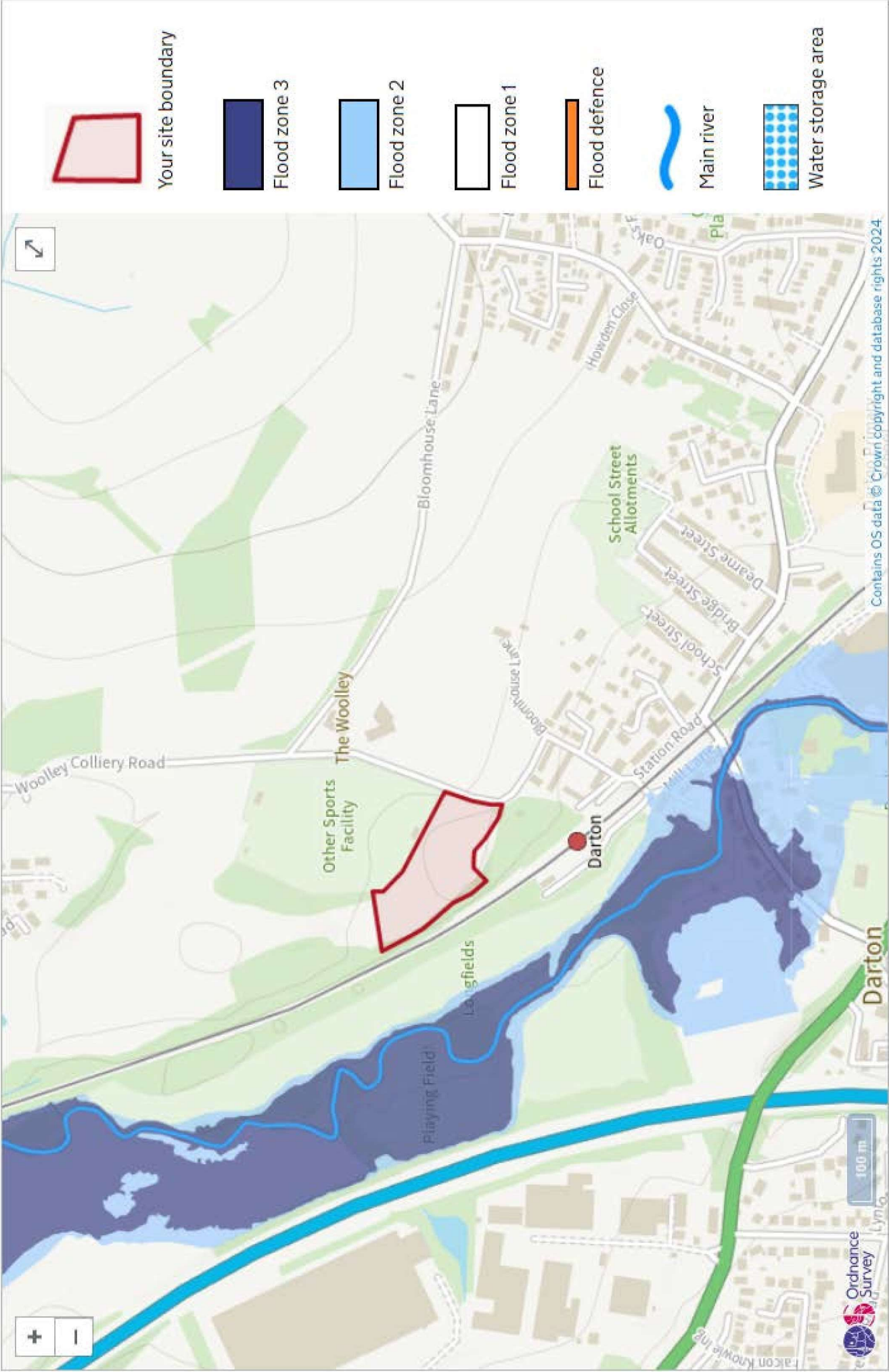
Show flooding

Selected address

Pause to updates of flood risk data

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Your site boundary



Flood zone 3



Flood zone 2



Flood zone 1



Flood defence



Main river



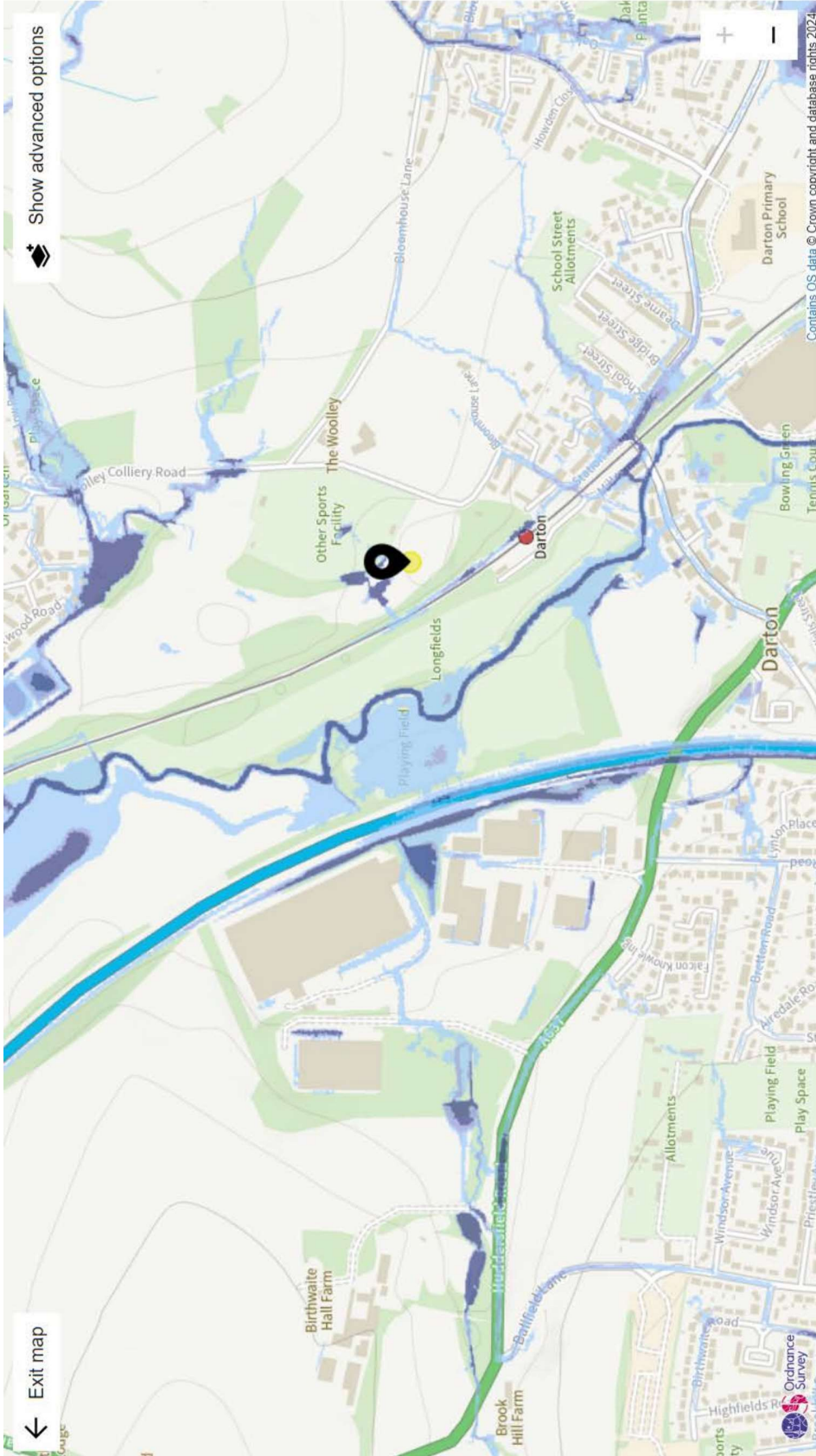
Water storage area

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100 m





**Key**

**Surface water**



More than 3.3% chance each year



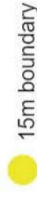
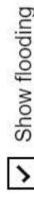
Between 1% and 3.3% chance each year



Between 0.1% and 1% chance each year



**Map details**



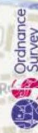
**Pause to updates of flood risk data**

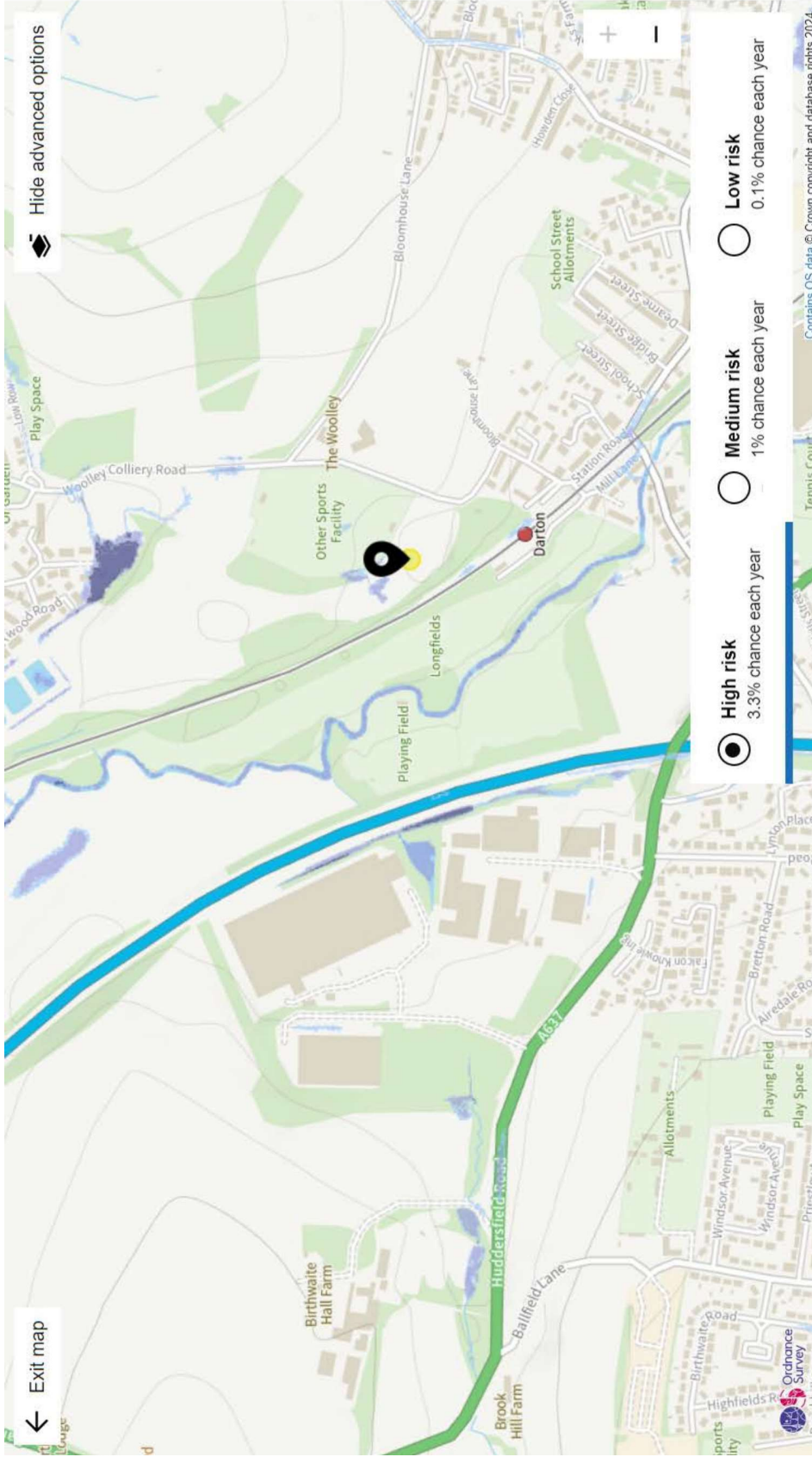
We have paused updates to information about flood risk from rivers and the sea and surface water while

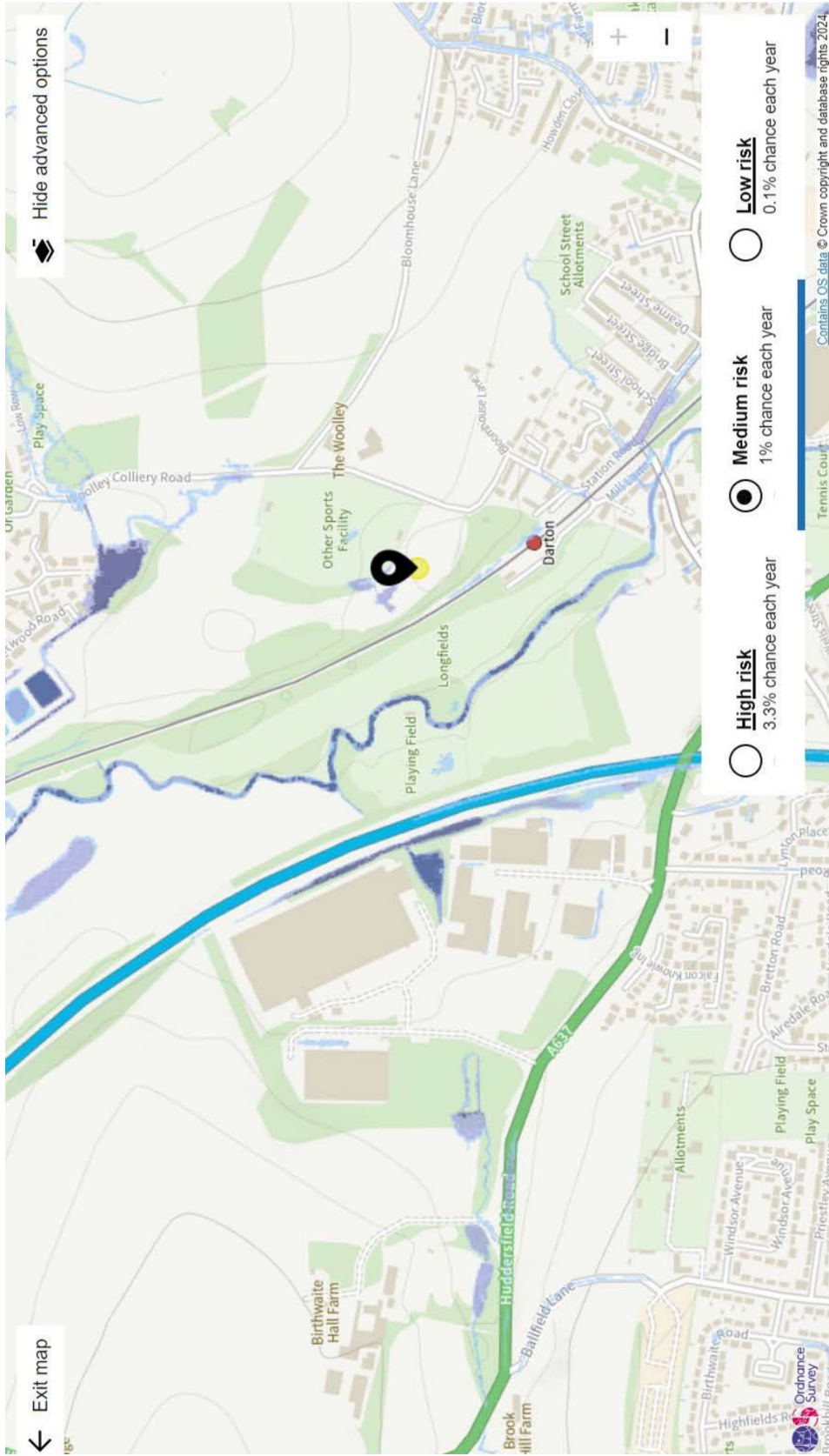
Show advanced options

Exit map

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← Exit map

Hide advanced options

Ordnance Survey

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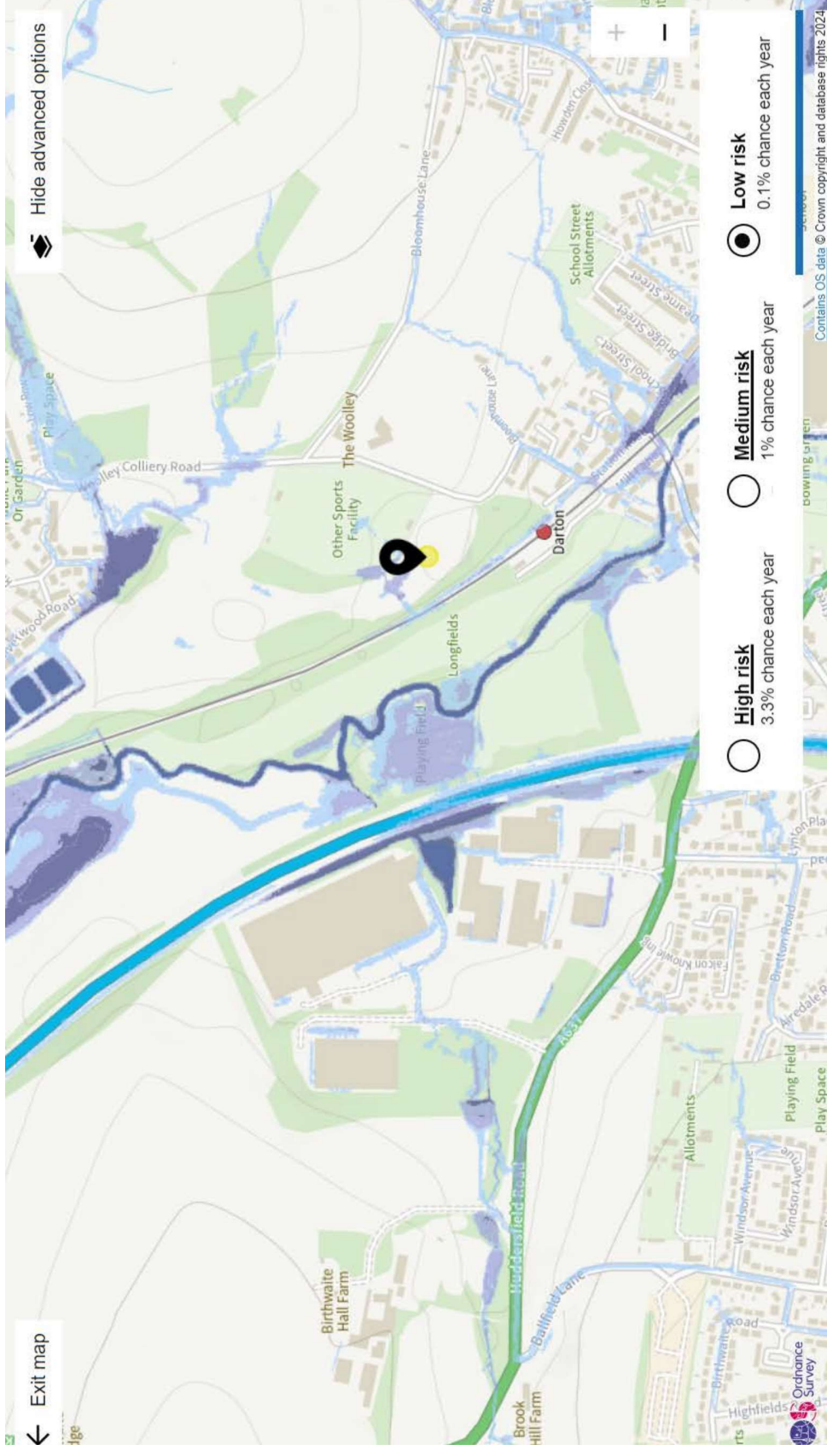
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**Key**

**Surface water**

- Extent
- Depth
  - Above 90cm
  - 30cm to 90cm
  - Below 30cm
- Velocity

**Rivers and the sea**

- Extent

**Reservoirs**

- Extent

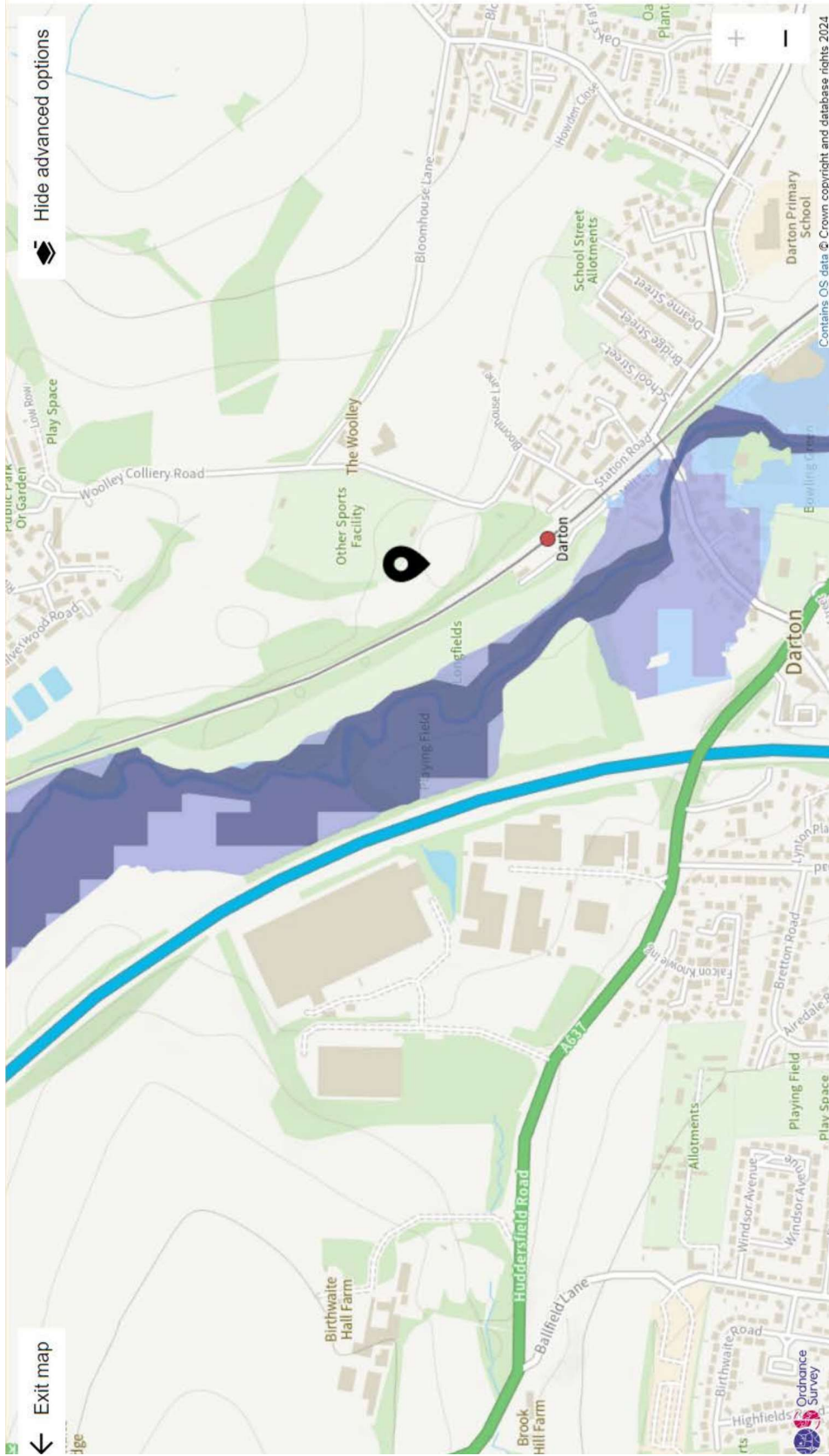
**Map details**

- Show flooding
- Selected address
- 15m boundary

Hide advanced options

Exit map

- High risk**  
3.3% chance each year
- Medium risk**  
1% chance each year
- Low risk**  
0.1% chance each year



**Key**

**Surface water**

- Extent
- Depth
- Velocity

**Rivers and the sea**

- Extent
- High risk  
More than 3.3% chance each year
- Medium risk  
Between 1% and 3.3% chance each year
- Low risk  
Between 0.1% and 1% chance each year
- Very low risk  
Less than 0.1% chance each year

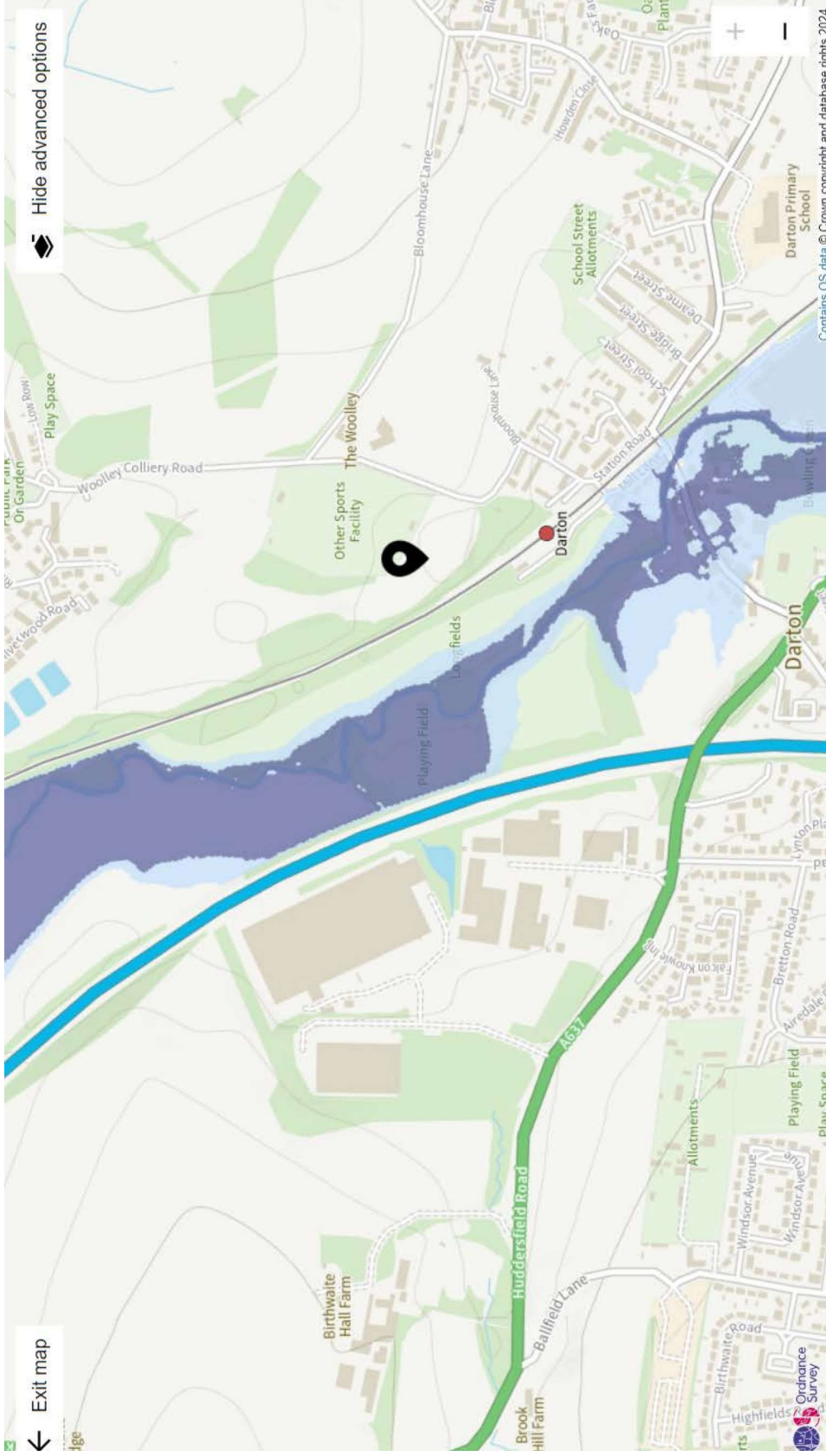
**Reservoirs**

Hide advanced options

Exit map

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**Key**

- Depth
- Velocity

**Rivers and the sea**

- Extent

**Reservoirs**

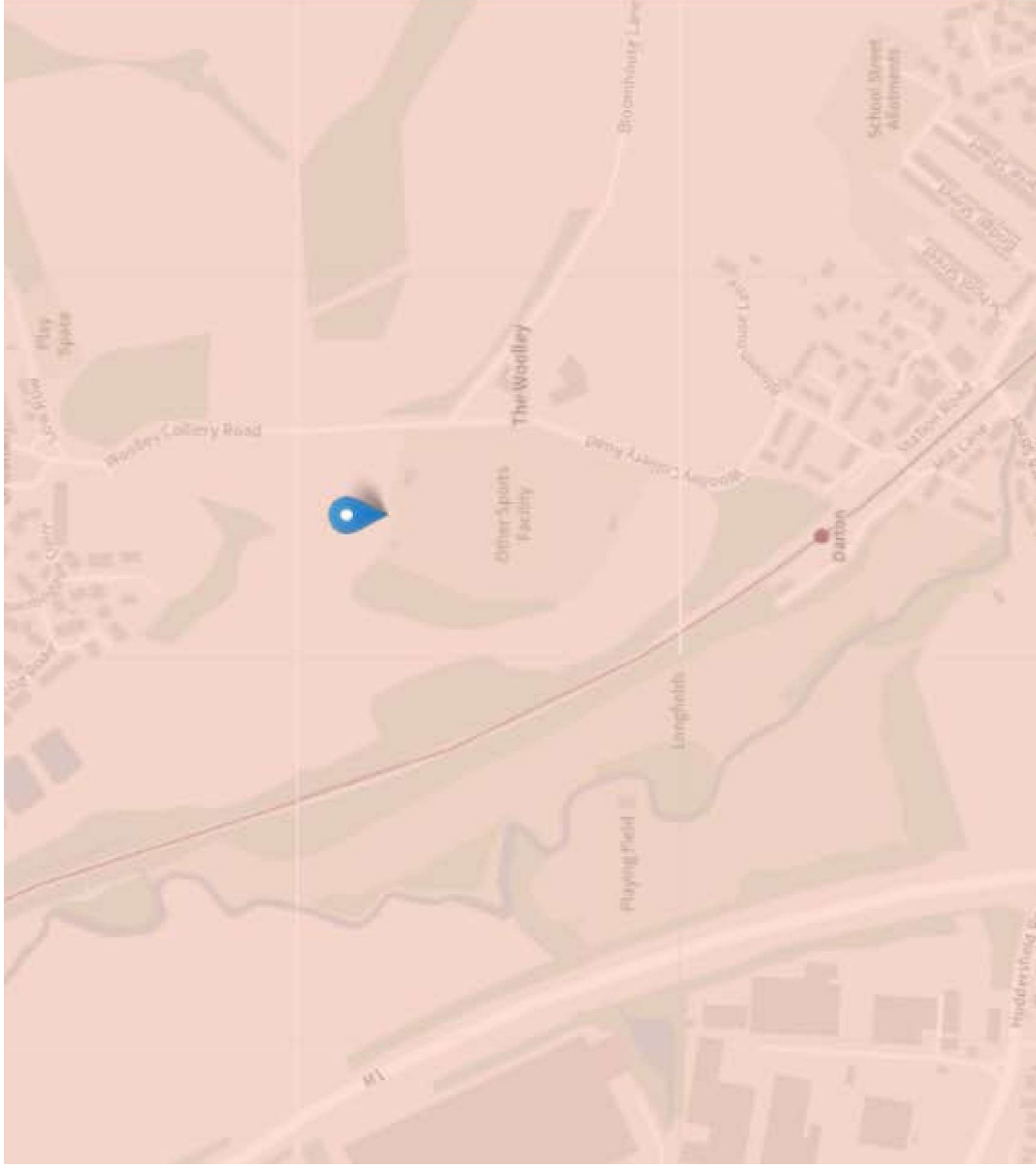
- Extent
- When river levels are normal
- When there is also flooding from rivers

**Map details**

- Show flooding
- Selected address

**Pause to updates of flood risk data**

We have paused updates to information about flood risk from rivers and the sea and surface water while we get ready for new data.

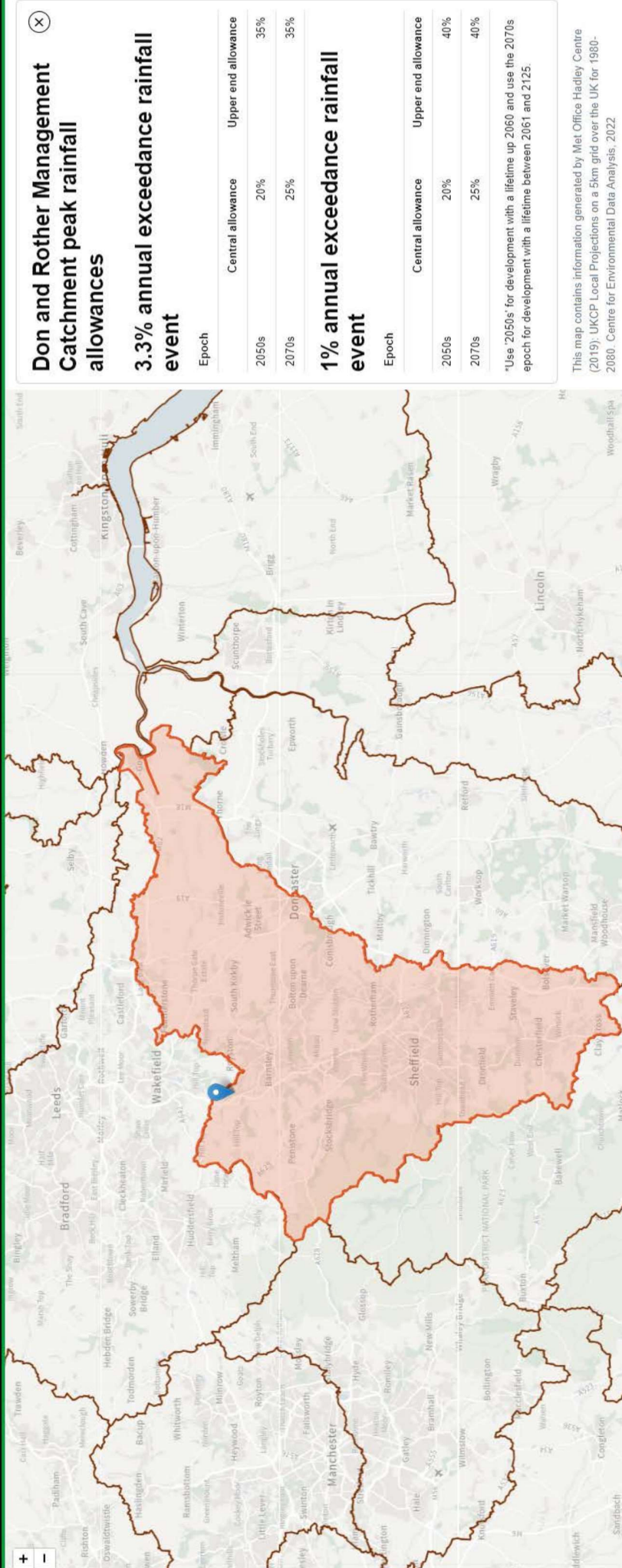


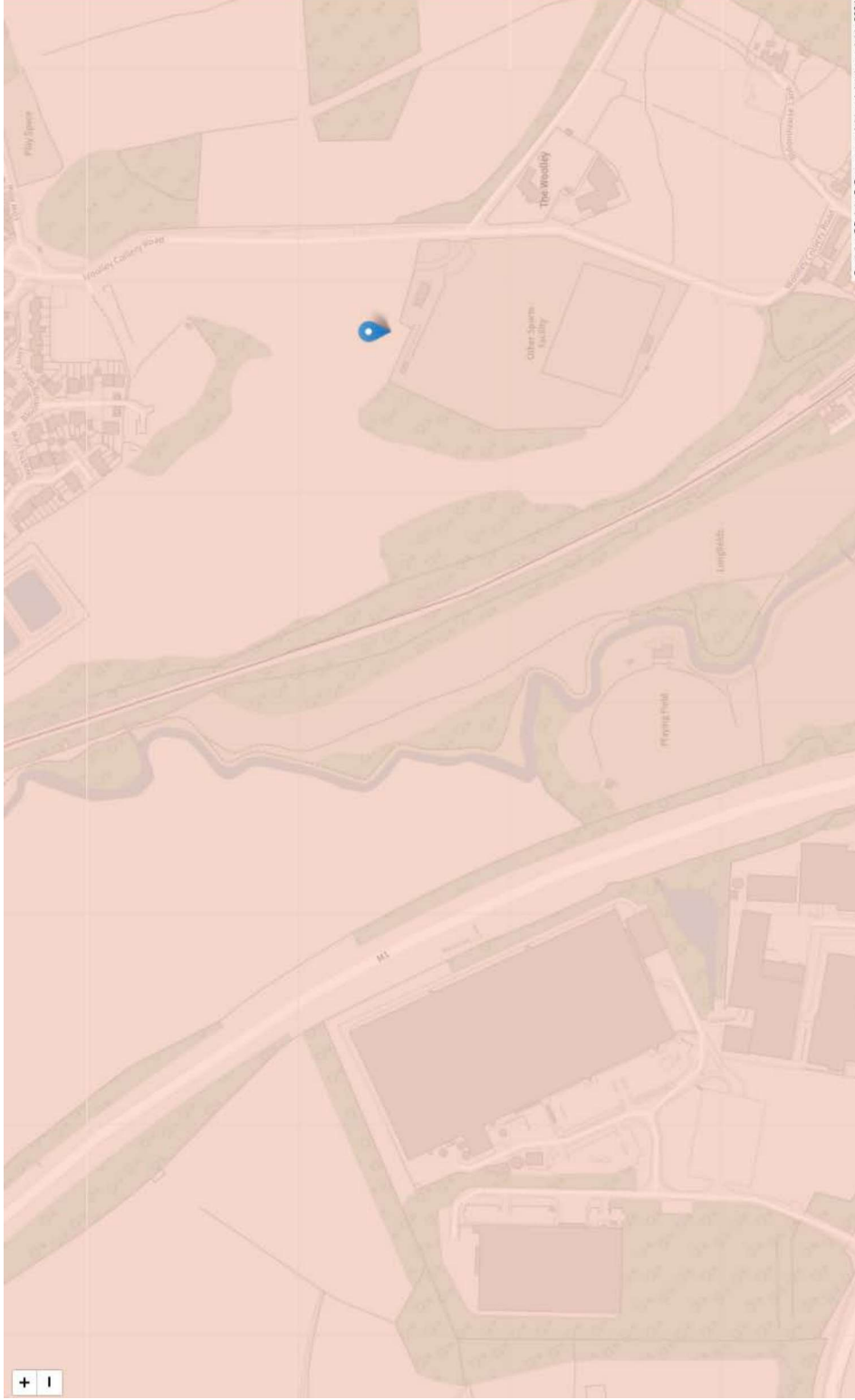
## Don and Rother Management Catchment peak river flow allowances



	Central	Higher	Upper
<b>2020s</b>	11%	15%	25%
<b>2050s</b>	15%	21%	36%
<b>2080s</b>	28%	38%	60%

This map contains information generated by [UK Centre for Ecology and Hydrology](#) using UK Climate projections.





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⊗

## Don and Rother Management Catchment peak rainfall allowances

### 3.3% annual exceedance rainfall event

Epoch	Central allowance	Upper end allowance
2050s	20%	35%
2070s	25%	35%

### 1% annual exceedance rainfall event

Epoch	Central allowance	Upper end allowance
2050s	20%	40%
2070s	25%	40%

\*Use '2050s' for development with a lifetime up to 2060 and use the 2070s epoch for development with a lifetime between 2061 and 2125.

This map contains information generated by Met Office Hadley Centre (2019): UKCP Local Projections on a 5km grid over the UK for 1980-2080. Centre for Environmental Data Analysis, 2022