



Penistone Station

Car Park Flood Risk Assessment & Drainage Strategy

P01 PNS-SLC-XX-REP-DGE-0001

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Document Control

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1 Introduction

1.1 Purpose & Scope

This Flood Risk Assessment and Drainage Strategy report has been prepared by SLC on behalf of Barnsley Metropolitan Borough Council (BMBC) to support a planning application for development of an at-grade car park at land adjacent to Penistone railway station, and to support the outline drainage design for the car park. This report will:

- Introduce the scheme and set out relevant information sources and policies (Section 1)
- Describe the site and project scope (Section 2)
- Provide an overview of flood risk associated with the site (Section 3)
- Describe the proposed drainage strategy associated with the scheme (Section 4)

1.2 Scheme Overview

The site area comprises circa 0.8 hectares, located approximately 10km west of Barnsley and 500m east of Penistone town centre. The site is bound by Lairds Way to the east, Sheffield Road to the north, Penistone station to the west and a plot of brownfield land to the south. The site co-ordinates are E425122, N403333, Grid Reference 25122 03333. The site location plan is shown in Figure 1. The site is located approximately 75m south of the nearest watercourse, River Don. Based on Environment Agency (EA) online flood mapping information, the site is located within Flood Zone 1.

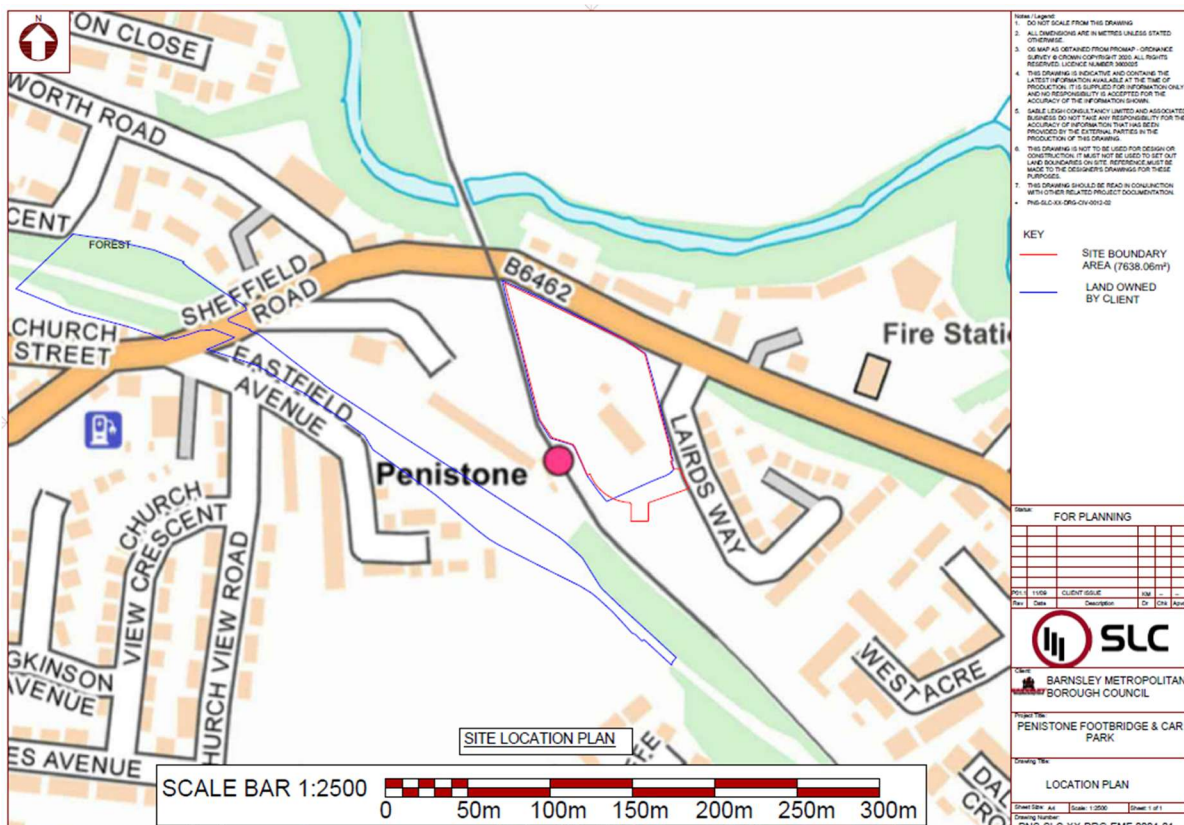


Figure 1 site location plan (source: SLC drawing PNS-SLC-XX-DRG-EMF-0001 P01, 2026)

1.3 Information Sources

This report has been prepared based on the following sources of information:

- EA Flood Map for Planning (2026)
- FEH Web Service rainfall point data (2026)
- National Planning Policy Framework (2026)
- Barnsley Metropolitan Borough Council Local Plan (2019)
- Barnsley Metropolitan Borough Council Strategic Flood Risk Assessment, Level 1 (2010)

1.4 Policy

This section provides a brief overview of the planning context considered within this report, and associated requirements in relation to flood risk and drainage proposals.

1.4.1 National Planning Policy Framework (NPPF)

The NPPF (August 2026) Chapter 18 Managing flood risk and coastal change sets out policies relevant to the management of flood risk.

Policies F1 (assessing flood risk for plan-making) and F2 (planning for effective flood risk management) will be considered and adhered to. Policies F3 (managing coastal change) and F9 (development in coastal change management areas) are not applicable to this development. Considerations associated with other Policies within Chapter 18 are outlined in detail below.

Policy F4 states that a site-specific flood risk assessment should inform and accompany all development proposals in Flood Zone 1 if the development involves land identified in a strategic flood risk assessment or the Flood Map for Planning as being at risk of flooding from any source, whether now or in the future. This applies to the proposed development, as the site is at risk of surface water flooding based on Flood Map for Planning information (see Section 3 for detail).

This report constitutes the site-specific flood risk assessment required under Policy F4.

Policy F5 sets out the applicability of the sequential test. This report will demonstrate that the site is at risk of surface water flooding only, and that the proposed layout, design and mitigation measures would ensure that occupiers and users will remain safe from current and future surface water flood risk for the lifetime of the development without increasing flood risk elsewhere in accordance with Policy F7.

The development therefore does not require use of the sequential test under Policy F5, and will provide evidence for meeting the requirements of Policy F7.

The development site is located within Flood Zone 1, and is therefore not subject to the exception test and other criteria set out in Policy F6.

Policy F8 sets out considerations in relation to sustainable drainage systems and watercourses. This report will set out the approach to sustainable drainage systems relative to the site constraints and development proposals. The development does not propose to enclose any existing watercourses.

1.4.2 BMBC Local Plan

The BMBC Local Plan sets out considerations in relation to Flood Risk in Policy CC3, and to Sustainable Drainage Systems in Policy CC4, extracts of both are provided in Figure 2 and Figure 3, respectively. Details of how the proposed development will meet the requirements of both policies are provided in the following sections of this report.

The scheme does not constitute “major development” in accordance with Policy CC4.

Policy CC3 Flood Risk

The extent and impact of flooding will be reduced by:

Not permitting new development where it would be at an unacceptable risk of flooding from any sources of flooding, or would give rise to flooding elsewhere;

Ensuring that in the Functional Floodplain (Flood Zone 3b), only water compatible development or essential infrastructure (subject to the flood risk exception test) will be allowed. In either case it must be demonstrated that there would not be a harmful effect on the ability of this land to store floodwater;

Requiring developers with proposals in Flood Zones 2 and 3 to provide evidence of the sequential test and exception test where appropriate;

Requiring site-specific Flood Risk Assessments (FRAs) for proposals over 1 hectare in Flood Zone 1 and all proposals in Flood Zones 2 and 3;

Expecting proposals over 1000 m² floor space or 0.4 hectares in Flood Zone 1 to demonstrate how the proposal will make a positive contribution to reducing or managing flood risk; and

Expecting all development proposals on brownfield sites to reduce surface water run-off by at least 30% and development on greenfield sites to maintain or reduce existing run-off rates requiring development proposals to use Sustainable Drainage Systems (SuDS) in accordance with policy CC4; and

Using flood resilient design in areas of high flood risk.

Figure 2 extract of Policy CC3 Flood Risk (source: BMBC Local Plan, Jan 2019)

Policy CC4 Sustainable Drainage Systems (SuDS)

All major development⁽¹²⁾ will be expected to use Sustainable Drainage Systems (SuDS) to manage surface water drainage, unless it can be demonstrated that all types of SuDS are inappropriate.

The Council will also promote the use of SuDS on minor development.

To enable the Council to determine the suitability of a proposed SuDS scheme:

Outline Planning applications must be supported by a conceptual drainage plan and SuDS design statement; and

Detailed Planning applications must be supported by a detailed drainage plan and SuDS design statement, which should contain information on how the SuDS will operate, be managed and maintained for the lifetime of the development.

Figure 3 extract of Policy CC4 Sustainable Drainage Systems (source: BMBC Local Plan, Jan 2019)

1.4.3 BMBC Strategic Flood Risk Assessment (SFRA), Level 1

The BMBC SFRA makes no specific assessment or recommendations in relation to the proposed development site.

2 Site Overview

2.1 Topography

The site is predominantly relatively flat, with existing levels falling from west to east (indicative fall of 2.5%) and south to north (indicative fall of 0.5%), with levels between 214.0m AOD and 212.0m AOD. To the north and east of the site, there are steep slopes of between 1:3 and 1:1 gradients, and several retaining walls. These elevate the site above Sheffield Road and Lairds Way.

Lairds Way is rising from around 206.0m AOD at the junction with Sheffield Road, to around 212.0m AOD at the point where the existing highway currently ends, and which will become the access point into the proposed development.

A full topographical survey of the site has been undertaken in July 2026.

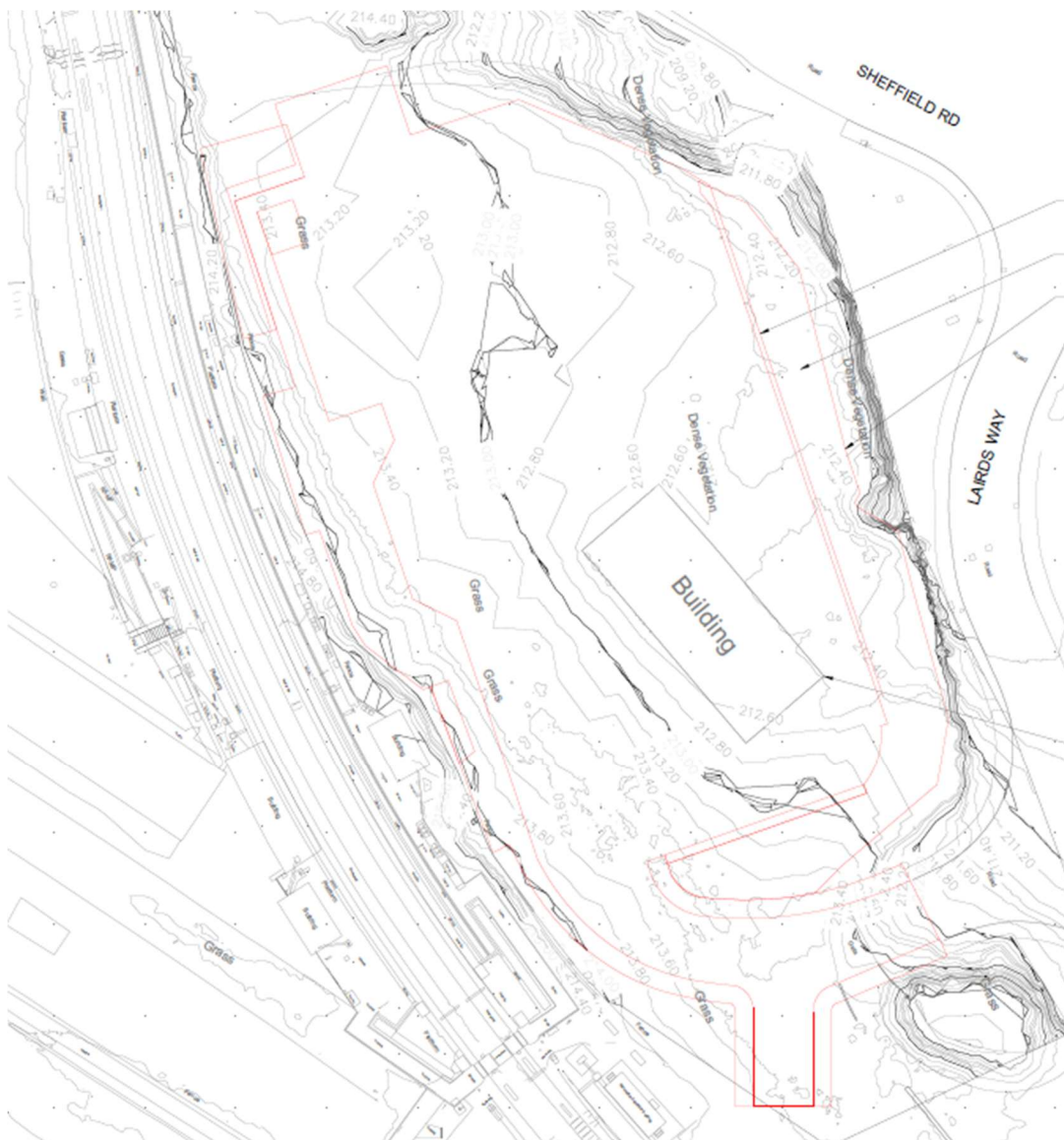


Figure 4 existing site topography (source: Skeye topographical survey, July 2026)

2.2 Ground Conditions

Geotechnical record data was reviewed and Ground Investigation (GI) surveys undertaken to inform the proposed development design and drainage strategy. Findings are recorded in Ground Investigation Report (GIR) SGL-1002-SLC-REP-GI-001, provided as supporting documentation to the planning application. The GI proved a general sequence of Made Ground over Pennine Lower Coal Measures, comprising weathered mudstone over interbedded mudstone, siltstone and sandstone.

Key findings and recommendations in relation to the flood risk assessment and drainage strategy:

- Infiltration drainage is not recommended as the primary drainage solution, due to the variability in measured infiltration rates, alternative solutions should be adopted;
- The risk to controlled waters is assessed as low.

2.3 Local Watercourses

There are no watercourses, open or culverted, within or in the direct vicinity of the site and its boundaries. The River Don is approximately 75m north of the site, separated from the site by the local highway network and various developments.

2.4 Existing Drainage

Yorkshire Water (YW) records, obtained in February 2026, confirmed that there are no existing YW assets within the proposed site extents, illustrated in Figure 5.

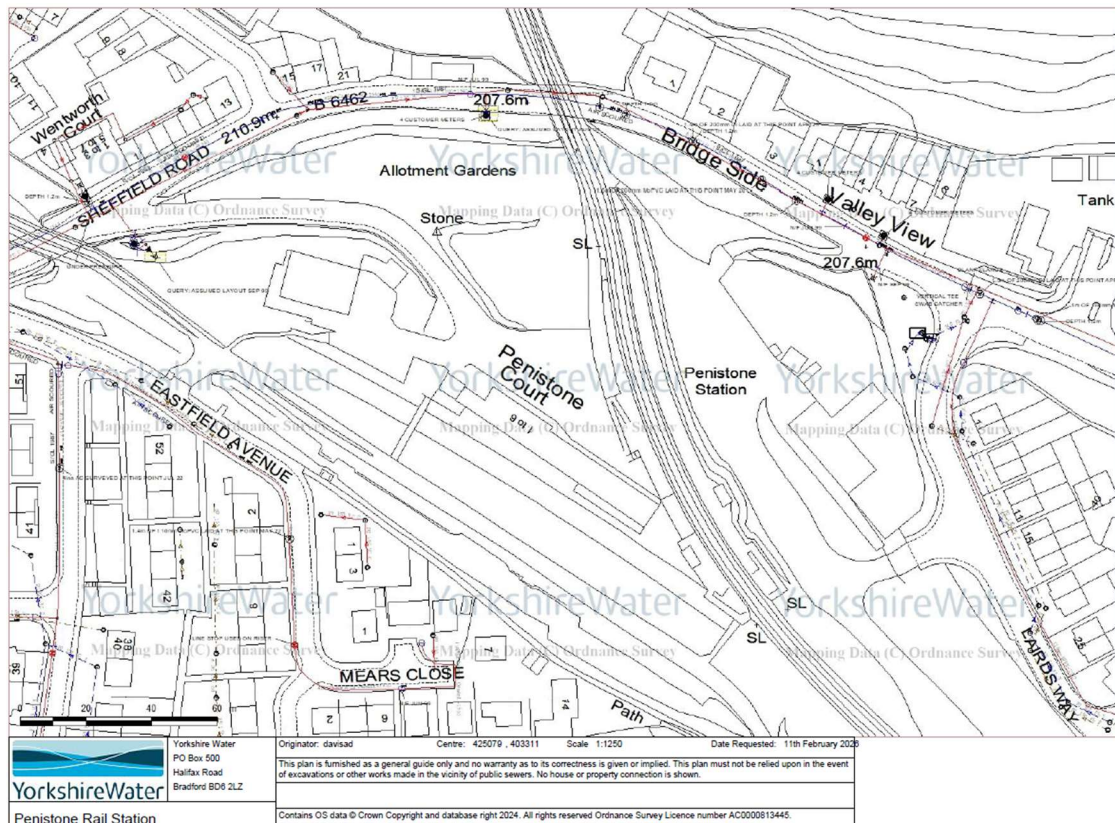


Figure 5 existing Yorkshire Water assets (source: Yorkshire Water, 2026)

The YW records show the presence of an existing surface water network within Lairds Way, which connects on to a combined sewer network along Sheffield Road.

Utility mapping surveys have been undertaken at previous scheme development stages in February 2023 by MetGeoenvironmental. These confirm the absence of existing artificial drainage on site, with exception of a localised drainage channel at the back of an existing derelict building, and two manholes which were inaccessible to the survey team, illustrated in Figure 6. The site landowner, BMBC, confirmed that no works or changes were made to the site since February 2023. The utility mapping survey is deemed to remain valid and representative of actual site conditions.



Figure 6 utility survey mapping (source: MetGeoenvironmental, 2023)

BMBC confirmed in previous scheme development stages that the Council is not aware of any flooding issues associated with the site, and that the site is not affected by any flood plains from major watercourses. It is therefore assumed that the site currently drains to the ground, and no positive drainage connection to an outfall outside of the site boundaries exists.

3 Flood Risk

3.1 Risk of Flooding (Fluvial)

The site is located fully within Flood Zone 1, as shown on the Environment Agency (EA) *Flood map for planning*, illustrated in Figure 7. The site is therefore at a low risk of fluvial flooding.

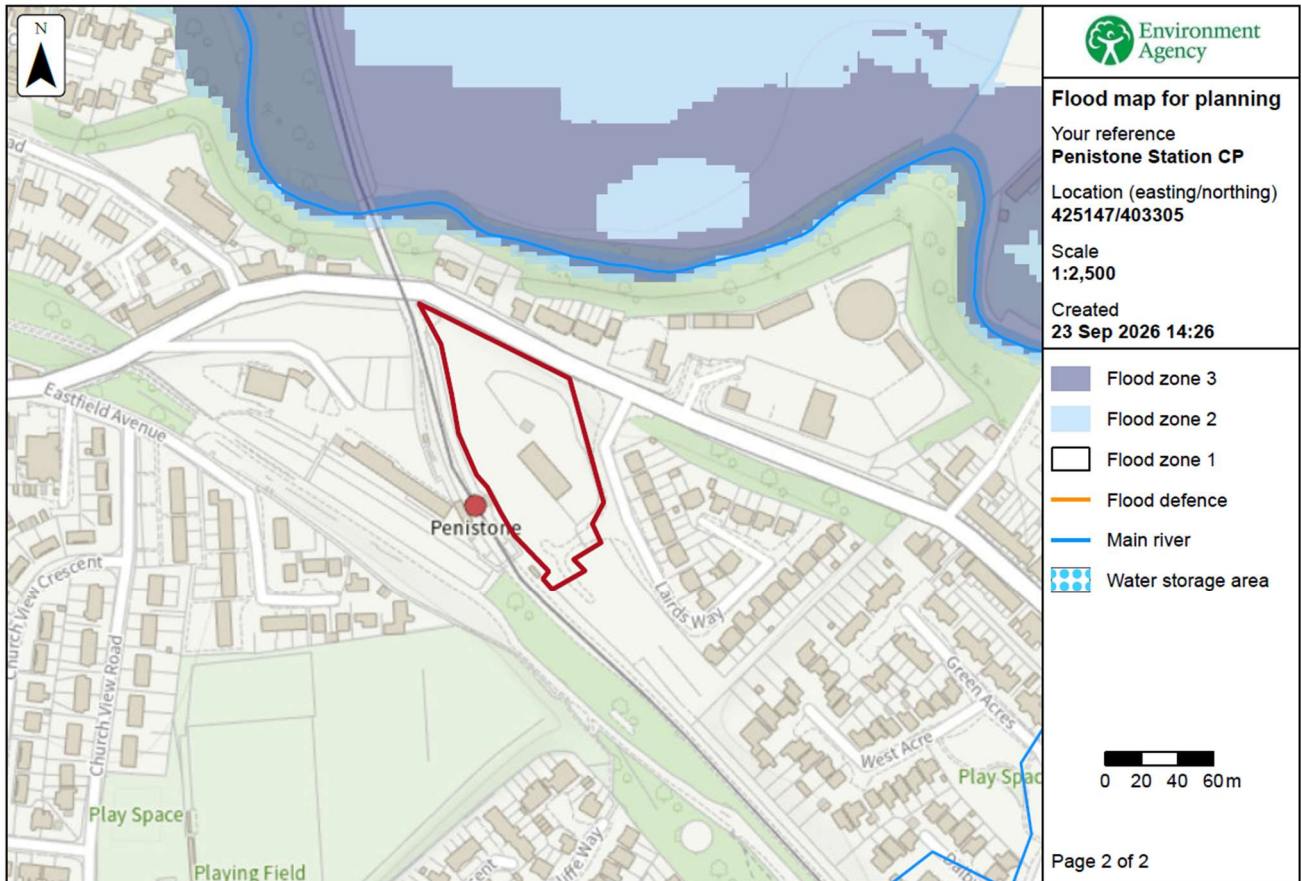


Figure 7 map showing site in relation to flood risk zones (source: Environment Agency, 2026)

3.2 Risk of Flooding (Surface Water)

The site is currently predominantly at very low risk of surface water flooding, based on EA flood risk mapping information, as illustrated in Figure 8 (present day EA dataset). Localised areas at the centre of the site are at low risk of surface water flooding, with an Annual Exceedance Probability (AEP) of 1% and surface water depths of 150-300mm.

The area at risk from surface water flooding expands, but is still localised, once future climate change is considered, as illustrated in Figure 9 (2061 to 2125 EA dataset), with surface water depths of 150-300mm through most areas at risk, and localised areas of 300-600mm water depth. It is noted that areas at risk are generally confined to an existing area of hardstanding, associated with a redundant structure of which only an open structural frame and foundation slab remain on site.



Figure 8 map showing site in relation to present day surface water flooding (source: EA, 2026)



Figure 9 map showing site in relation to future (2061 to 2125) surface water flooding (source: EA, 2026)

Based on available records, no artificial drainage systems have been identified or are known to exist and provide drainage for the site. Surface water is therefore assumed to infiltrate directly into the ground and to drain naturally.

3.3 Risk of Flooding (Reservoirs)

The EA flood maps for reservoir-related flooding have been consulted and indicates, as illustrated in Figure 10, that the site (shown in red indicatively) is not at risk from flooding due to reservoir failure.



Figure 10 map showing site in relation to reservoir flood risk (source: EA, 2026)

3.4 Risk of Flooding (Groundwater)

Risk of flooding due to groundwater has been reviewed and considered as part of the Ground Investigation Report (GIR) SGL-1002-SLC-REP-GI-001, provided as supporting documentation to the planning application. The site and surrounding 50m of land are classified as being at Negligible risk of groundwater flooding, with no specific mitigation measures being required.

3.5 Flood History

No information is available in relation to historical flooding on the development site. Engagement with BMBC at the previous development stage of the scheme confirmed that the Council is not aware of any flooding issues associated with the site, and that the site is not affected by any flood plains from major watercourses.

3.6 BMBC Strategic Flood Risk Assessment (SFRA), Level 1 (September 2010)

No information is listed in relation to historical flooding events occurring at the site within the SFRA. Map C-4 within Appendix B of the SFRA, shown below as Figure 11, highlights sites where surface water (derived from rainfall only) will naturally flow towards and possibly pond as a result of a 100-year rainfall event. The proposed development site does not fall within any of these areas.

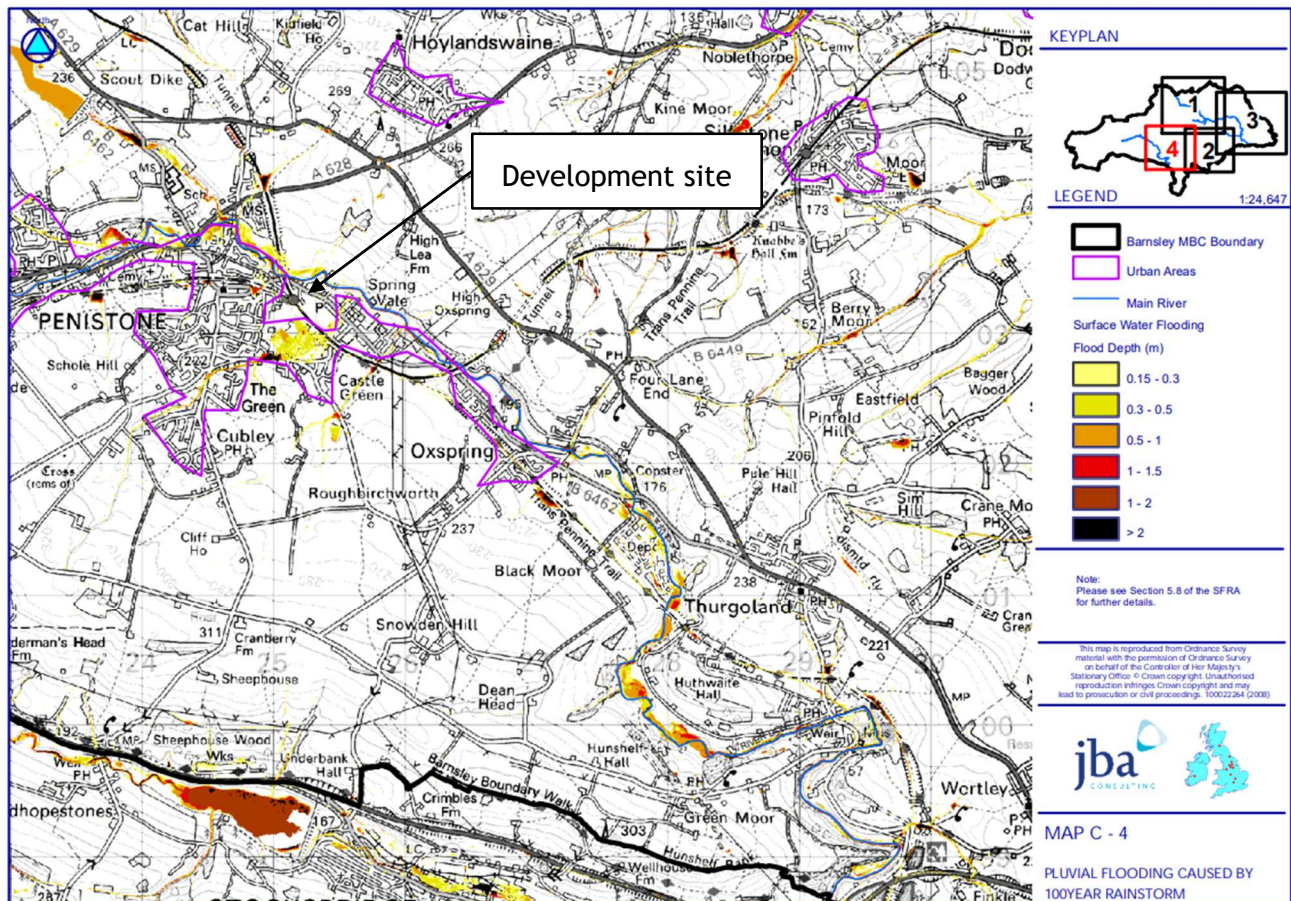


Figure 11 map showing pluvial flooding caused by 100-year storm event (source: BMBC SFRA, 2010)

4 Drainage Strategy

This section will summarise the proposed drainage strategy and outline the drainage infrastructure requirements associated with the proposed scheme design.

4.1 Proposed Development

The proposed development covered by this Drainage Strategy comprises an at-grade car park of circa 100 space capacity, a pick-up/drop-off point, waiting and cycle shelters and motorcycle parking, to serve the existing Penistone railway station. The car park will be accessed from a newly constructed access road via Lairds Way, utilising the existing junction into the site off Lairds Way. The proposed development is illustrated on drawing PNS-SLC-XX-DRG-CIV-9012 P01, provided as supporting documentation to the planning application.

The proposed development interfaces with delivery of a new passenger footbridge with lifts and stairs at the station. These station-specific proposals are outside of the scope of the planning application, and associated drainage considerations are therefore documented separately, within the relevant engineering documentation associated with the footbridge elements of the scheme.

4.2 Discharge Hierarchy

Surface water run-off shall be collected, conveyed, treated (where relevant) and discharged in accordance with the Building Regulations Part H and SuDS Manual (C753) 2015 hierarchy:

1. Infiltration to ground - not possible

Geotechnical record data was reviewed and Ground Investigation (GI) surveys undertaken to inform the proposed development design and drainage strategy, findings are recorded in Ground Investigation Report (GIR) SGL-1002-SLC-REP-GI-001, provided as supporting documentation to the planning application. The GIR concludes that infiltration drainage is not recommended due to the variability in measured infiltration rates.

2. Discharge to watercourse - not possible

The nearest watercourse is River Don, located approximately 75m north of the site. However, the watercourse is separated from the site by existing development, therefore provision of an outfall for surface water runoff is not deemed feasible.

3. Discharge to surface water sewer - proposed strategy

An existing surface water network has been identified within Lairds Way, this connects on to a combined sewer network along Sheffield Road. The proposed drainage strategy is to connect the site drainage into the existing surface water drainage network within Lairds Way, subject to approval from Yorkshire Water.

4. Discharge to combined water sewer - N/A

4.3 Existing Drainage Catchments and Run-off Rates

Existing permeable and impermeable catchment areas, shown in Figure 12 below, comprise:

- 0.634 ha total site area, of which
- 0.549 ha are existing permeable areas draining naturally through infiltration
- 0.063 ha are existing impermeable areas comprising buildings and foundation slabs
- 0.022 ha are existing impermeable areas draining into existing highways drainage off site

There are no known artificial drainage systems providing drainage for the site. Surface water is assumed to infiltrate directly into the ground and to drain naturally. The area has therefore been considered to be 'greenfield'.

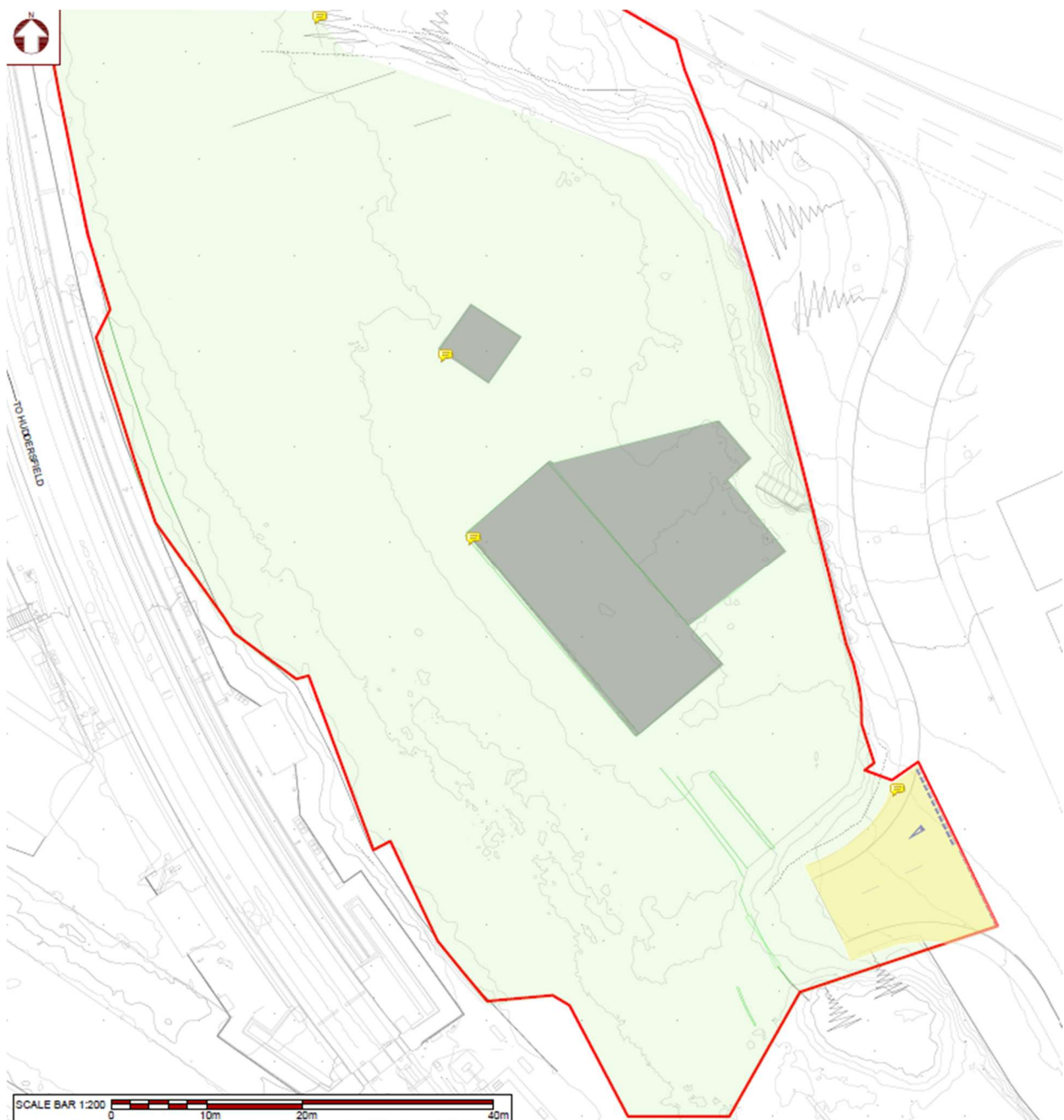


Figure 12 Existing permeable (green) and impermeable (grey) catchments and existing non-contributing impermeable catchment (yellow, Lairds Way bellmouth draining into existing highways drainage off site)

4.4 Proposed Drainage Catchments and Discharge Rates

Proposed permeable and impermeable catchment areas, illustrated in Figure 13 below, comprise:

- 0.435 ha proposed impermeable area with run-off to be discharged
- 0.177 ha existing permeable area to be maintained
- 0.022 ha existing non-contributing impermeable area to be maintained

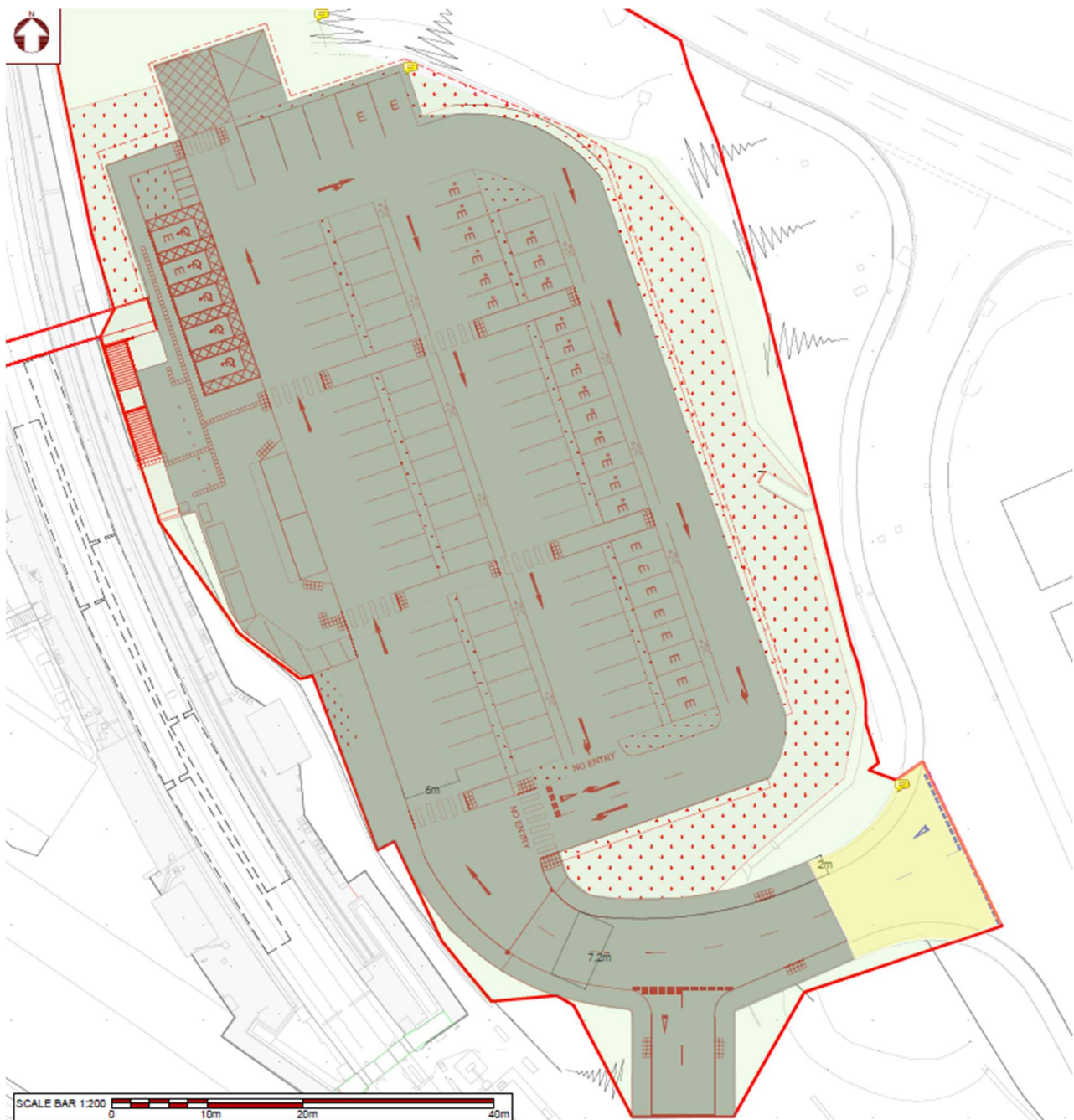


Figure 13 existing and proposed (green) permeable, proposed impermeable (grey) and existing non-contributing impermeable (yellow) catchments

Based on engagement with Yorkshire Water in 2024, undertaken as part of the previous stage of scheme development, it is proposed to limit the discharge rates to 5.0l/s, this is subject to confirmation with Yorkshire Water.

4.5 Drainage Strategy Overview

The proposed drainage strategy is summarised below:

- Surface water runoff from impermeable areas (footways, car park aisles and parking spaces) will be directed through appropriate gradients into a series of channels and gullies
- Runoff will be routed, via a positive drainage network comprising non-permeable pipes, towards the outfall point, which will comprise a new connection into the existing YW surface water drain within Lairds Way
- A flow control device will be provided at the development site boundary, to ensure that flows into the YW network are restricted to an agreed discharge rate
- Attenuation provision will be made upstream of the flow control device, to ensure that excess runoff in a storm event is retained on-site and discharged in a controlled manner, and at the agreed discharge rate

4.6 Design Parameters

4.6.1 Design Method & Standards

The Rational Method has been used to size the attenuation crates and to check proposed pipe sizes are adequate. Pipe gradients and maximum lengths have been checked against Specification for Highway Works (SHW) CC 500 - Drainage. The rainfall intensity has been obtained from FEH22. A conservative storm duration of 60 minutes has been adopted. Detailed hydraulic modelling at the next stage may reduce the required attenuation volume.

4.6.2 Design Return Periods

The surface water network shall be designed to ensure no flooding off site up to a 1 in 100-year event, with a Climate Change allowance of 40%, derived from the site-specific value for 1% annual exceedance rainfall event upper value as per the Department for Environment Food & Rural Affairs hydrology data explorer.

4.6.3 Climate Change

A 40% upper end allowance for climate change shall be considered, corresponding to the 2070s Epoch for the Don and Rother Management Catchment 1 in 100-year rainfall event.

4.6.4 Impermeability Factors

The network shall be modelled based on a run-off coefficient of 0.9 (90% impermeable) for any hardstanding car park and footway surfaces.

Localised areas of the car park are proposed to contain SUDS planting features, as illustrated on the proposed development drawing PNS-SLC-XX-DRG-CIV-9012 P01. These areas have been

conservatively assumed to have the same run-off coefficient of 0.9 as the hardstanding and footway surfaces, for the purposes of the attenuation sizing.

4.6.5 Self-cleansing Velocity

The pipe gradients have been checked using Manning's equation to ensure self-cleansing and adequate speeds. The gradients have been set to:

- 1 in 100 for 150mm pipes
- 1 in 150 for 225mm pipes
- 1 in 200 for 300mm pipes

4.6.6 Exceedance Run-off

For all events up to and including the 1 in 100-year event, stormwater shall be contained within the proposed drainage network.

4.7 Proposed Design

The proposed network consists of gullies connecting to carrier pipes (diameters 150mm, 225mm and 300mm), connecting to a crate attenuation system of 25m x 12m x 1m deep, with a 95% void ratio. Manholes are 1200mm in diameter and D400 rated to BS 124:2015.

Petrol interceptors are proposed upstream of the attenuation tank for each incoming pipe. A flow control device (Hydro-brake or similar approved) is proposed at the manhole downstream of the attenuation tank.

The land on which the car park development is proposed is currently owned by BMBC, however it is intended to transfer the ownership of this land to Network Rail in future. A manhole, referenced MH08, is proposed on this land, by the boundary between the car park land (which is subject to the ownership transfer) and the highway (which will remain owned by BMBC), to enable a clear definition of maintenance responsibilities and to facilitate future repair or maintenance works.

A Proposed Drainage Plan, drawing reference PNS-SLC-XX-DRG-DGE-9001 P01, provided as supporting documentation to the planning application, illustrates the drainage design for the proposed car park development.

There is an existing soakaway and an adjacent manhole at the site, which are proposed to be removed. The records suggest the manhole may connect to the existing attenuation tank east of the site, in which case the connection is proposed to be capped off at the boundary of the proposed car park. A survey at detailed design stage is required to confirm the presence and route of any connections from the aforementioned manhole.