

Goldthorpe – A635 and Access Roundabout

Barnsley Metropolitan Borough Council

Level 2 Flood Risk Assessment

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Prepared by



Edward Yeamans
Graduate Consultant

Checked by



Heather Wells
Consultant

Verified by



Ruth Goodall
Technical Director

Approved by



Helen Graham
Principal Consultant

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N/A	1	Barnsley Metropolitan Borough Council

Prepared for:

Barnsley Metropolitan Borough Council
Westgate Plaza One
Barnsley
S70 9FD

Prepared by:

AECOM Limited
1 New York Street
Manchester
M1 4HD
United Kingdom

T: 0161 907 3500

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Abbreviations

AEP	Annual Exceedance Probability
AOD	Above Ordnance Datum
BMBC	Barnsley Metropolitan Borough Council
BGS	British Geological Society
EA	Environment Agency
CC	Climate Change
DS	Drainage Strategy
FmFP	Flood Map for Planning
FRA	Flood Risk Assessment
FRMP	Flood Risk Management Plan
Ha	Hectares
IDB	Internal Drainage Board
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
LFRRMS	Local Flood Risk Management Strategy
LPA	Local Planning Authority
NGR	National Grid Reference
NPPF	National Planning Policy Framework Guidance
OS	Ordnance Survey
PPG	Planning Practice Guidance
PFRA	Preliminary Flood Risk Assessment
RoFfSW	Risk of Flooding from Surface Water
SFRA	Strategic Flood Risk Assessment
SoP	Standard of Protection
SuDS	Sustainable Drainage Systems

Glossary

Flood Zone	Environment Agency defined zone of flood risk used for planning.
Main River	Main rivers are usually larger rivers and streams. The EA carries out maintenance, improvement or construction work on main rivers to manage flood risk.
Ordinary Watercourse	Ordinary watercourses include every river, stream, ditch, drain, cut, dike/dyke, sluice, sewer (other than a public sewer) and passage through which water flows and which does not form part of a Main River.

1. Introduction

AECOM has been commissioned by Barnsley Metropolitan Borough Council (BMBC) to produce a Level 2 Flood Risk Assessment (FRA) in support of a planning application for a Proposed Development. The Proposed Development comprises carriageway improvements along the A635 which will facilitate a new access roundabout which also forms part of the proposals. The Proposed Development site is approximately 410 metres (m) in length and 1.2 hectares (ha) in area.

The proposed roundabout will provide access to a proposed commercial development site, immediately south of the roundabout; hereby referred to as ES10 site. The ES10 site has been identified within the 2019 Barnsley Local Plan as a key strategic development site, playing a fundamental role in helping the Borough meet their economic regeneration and growth targets. However, it should be noted that this FRA is associated with the access roundabout and highway improvements (the Proposed Development) only. Any works associated with the ES10 development site itself are subject to a separate planning application and are outside of the scope of this FRA.

The Proposed Development is situated to the west of Goldthorpe town centre, approximately 9.9 km east of Barnsley town centre. The site has a National Grid Reference (NGR) SE 44261 04069. The revised National Planning Policy Framework 2021 (NPPF)¹ and associated Planning Practice Guidance (PPG)² specify that any planning permission for a new development located within an area susceptible to flooding from local sources and / or located within Flood Zone 1 and greater than 1 ha, should be supported by a site-specific FRA.

This FRA is intended to assess the level of flood risk posed to and from the Proposed Development during its operational phase. Appropriate mitigation measures to offset flood risk will be outlined where necessary. The flood risk has been assessed in accordance with the NPPF and the associated PPG. This FRA is based on the best available flood risk information available at the time of writing. Data has been provided by online Environment Agency (EA) resources and other publicly available external sources.

1.1 Description of the Proposed Site

The Proposed Development is located within the BMBC administrative area and lies approximately 1.2 kilometres (km) west of Goldthorpe town centre. BMBC acts as the Local Planning Authority (LPA) and the Lead Local Flood Authority (LLFA), responsible for managing local flood risks and ensuring co-operation between the Risk Management Authorities in the area.

The site is situated along the A635, south of Billingley Village and extends to the east towards Carr Dike Ordinary Watercourse, which is maintained by the Danvm Drainage Commissioners Internal Drainage Board (IDB). New carriageway improvements are proposed within the existing public highway boundary and involve a minor realignment of the existing highway to accommodate the proposed new access roundabout and the creation of a 3 m wide multi-use pedestrian and cycling route, which will link into the existing pedestrian pavement running north of the A635; refer to **Figure 1**. The site is currently a combination of brownfield and greenfield land, comprising the existing carriageway and agricultural land.

A review of LiDAR Digital Terrain Model (DTM) of 2 m grid resolution, derived from the EA Open Data³ suggests the A635 gradually falls towards the Carr Dike, where existing levels from the west of the site boundary to the lowest point along the A635 at the crossing of Carr Dike are shown to fall from approximately 27.6 m AOD to 25 m AOD. Once the carriageway crosses the Carr Dike culvert, the topography begins to rise to approximately 26 m AOD. Immediately north of the site, the ground is significantly elevated at 30 m AOD, relative to the existing levels of the carriageway. South of the site, the land falls to the south to approximately 22 m AOD. This is shown in **Figure 2**.

¹ Ministry for Housing, Communities and Local Government (2021) *National Planning Policy Framework*. London. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf. Accessed on: 25/10/2021

² Ministry for Housing, Communities and Local Government (2021) *Planning Practice Guidance: Flood Risk and Coastal Change*. London. Available from: [Flood risk and coastal change - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/PPG_Flood_Risk_and_Coastal_Change.pdf). Accessed on: 25/10/2021.

³ Environment Agency Open Data. Available from: <https://data.gov.uk/dataset/002d24f0-0056-4176-b55e-171ba7f0e0d5/lidar-composite-dtm-2017-2m>. Accessed on: 25/10/21

The closest watercourse with Main River status is the River Dearne which is situated approximately 1.9 km south of the Proposed Development. The closest Ordinary Watercourse to the site is the Carr Dike which flows under the existing highway in the east of the site boundary. It should be noted that the name of this watercourse changes approximately 440 m upstream of the site, where two tributaries converge. Upstream of the confluence both tributaries are referred to as the Thurnscoe Dike. The Carr Dike is maintained by Danvm Drainage Commissioners IDB. Based on a review of OS Ordnance Survey data and aerial imagery, there are also several land drainage ditches within the surrounding area.

Figure 1 shows the site location, with the site boundary highlighted in red.

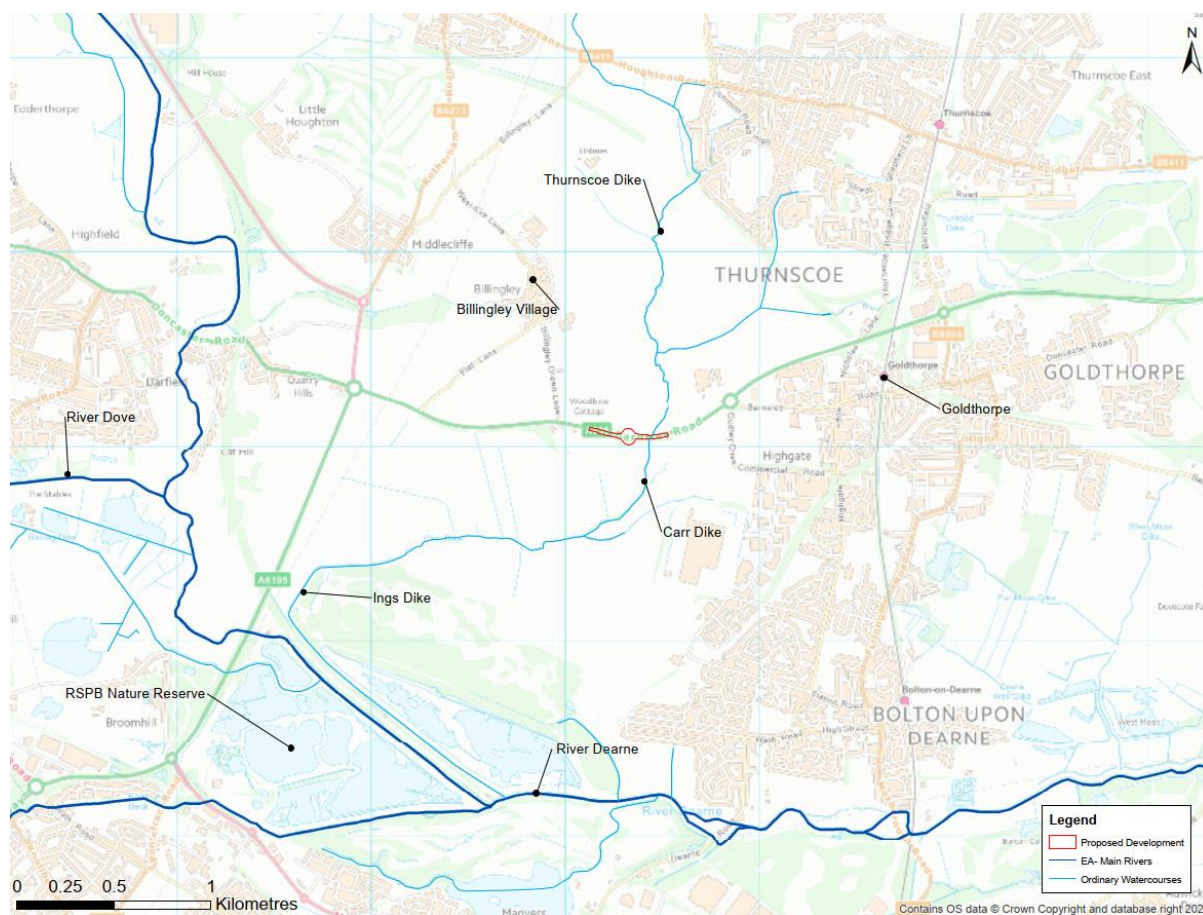


Figure 1. Site Location Plan

1.2 Description of the Proposed Works

The Proposed Development would involve the construction of the following infrastructure:

- New access roundabout and accompanying embankment earthworks/ landscaping;
- Carriageway improvements which include a new 3 m wide pedestrian and cycle access route;
- 2 m wide grass verge spanning alongside the southside of the carriageway; and
- Surface water drainage network capable of attenuating up to and including the 1 in 100 year plus 40% CC event with discharge control limited to the greenfield runoff rate if the existing highway drainage is proven*.

An indicative site layout plan, Drawing Ref '100-SK-001 RevD' for the Proposed Development is presented in **Appendix A**. A Drainage Strategy (DS) has also been prepared and should be read in conjunction with the FRA.

*Note: In accordance with National Guidance⁴, for greenfield developments, the peak runoff rate for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event. As the site is relatively small in nature, restricting discharges rate to greenfield rates may be difficult to achieve. In this event, liaison with Danvm IDB, the EA and the LLFA will be undertaken to discuss and agree a suitable discharge rate. Meeting minutes from Danvm Drainage

⁴ Department for Environment, Food and Rural Affairs (2015) *Non-statutory technical standards for sustainable drainage systems*. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf. Accessed on:26/10/2021.

Commissioners IDB are shown in **Appendix D**. Current discussions with Danvm IDB have agreed that the peak discharge rates to the Carr Dike will be limited to a storm event with a 1 in 30 year event for the brownfield catchment or lower if the system surcharges. The greenfied rate will be added to the brownfield if the existing drainage is proven. This will be outlined in the accompanying Drainage Strategy.

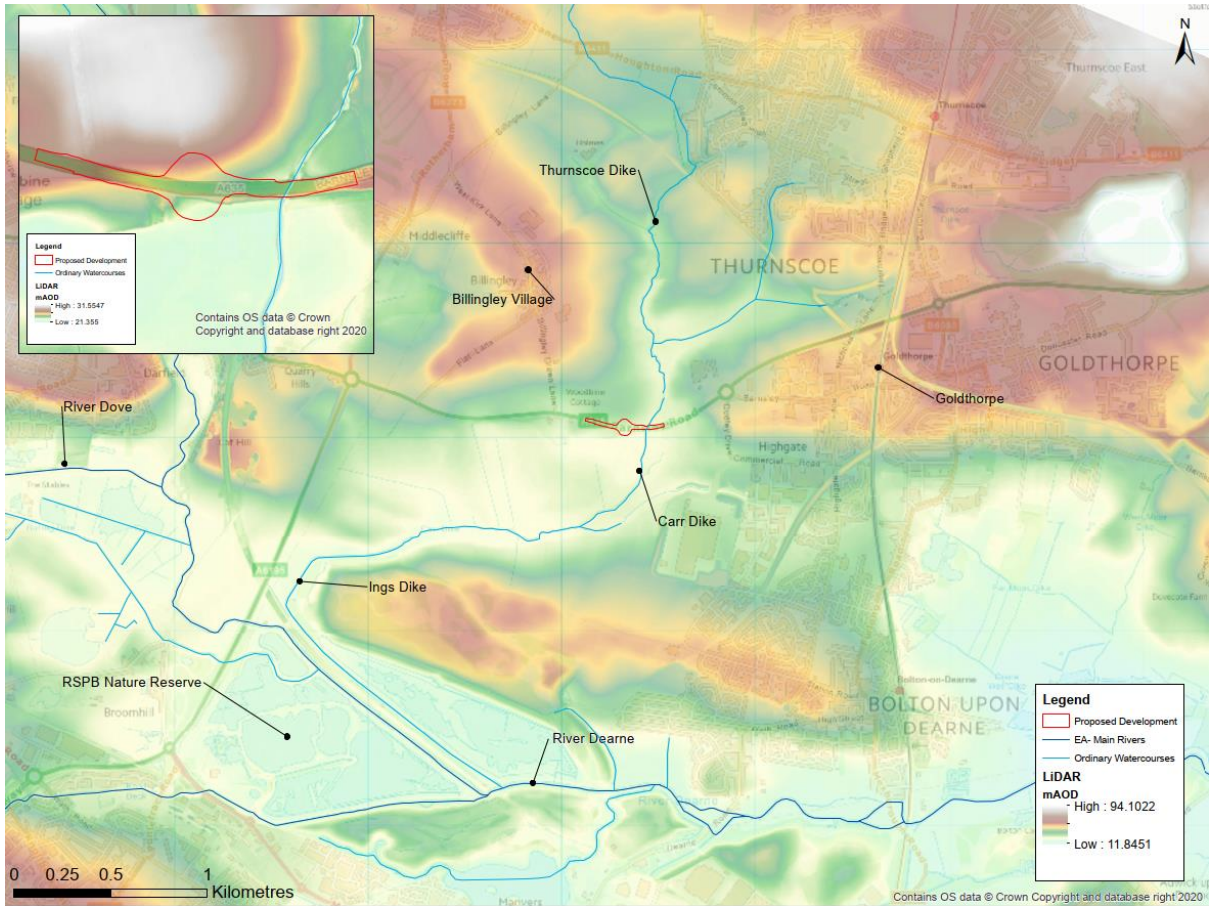


Figure 2. Topography of the Site and the Surrounding Area

2. Evaluation of Flood Policy

The aim of this section of the report is to introduce the main aspects of the national and local planning policies that are relevant to the Proposed Development in terms of flood risk.

2.1 National Planning Policy

Section 14 of the 2021 updated NPPF and the 2021 Flood Risk and Coastal Change PPG both advise how the planning process can take account of the risks associated with flooding. The main sources of flooding that are used to steer development at the planning stage are Main Rivers and the Sea. The predicted flood risk from these sources are shown on the EAs Fluvial and Coastal Flood Map, also known as the Flood Map for Planning (FMfP) which outlines three main zones of risk. These zones are as follows:

- **Flood Zone 1 'low probability of flooding'** – This zone comprises land assessed as having a less than 1 in 1,000 chance of river or sea flooding in any year (<0.1% annual exceedance probability).
- **Flood Zone 2 'medium probability of flooding'** – This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 chance of river flooding in any year (1% - 0.1% AEP), or between a 1 in 200 and 1 in 1,000 chance of sea flooding in any year (0.5% - 0.1% AEP).
- **Flood Zone 3a 'high probability of flooding'** – This zone comprises land assessed as having a 1 in 100 year or greater chance of river flooding in any year (>1% AEP), or a 1 in 200 year or greater chance of flooding from the sea in any year (0.5% AEP).
- **Flood Zone 3b 'functional floodplain'** – A sub-part of Zone 3, this zone comprises land where water has to flow or be stored in times of a flood. This zone is not usually included within the FMfP and is assessed where necessary using detailed hydraulic modelling.

It should be noted that flood risk from coastal sources has not been assessed in this FRA, as the site is located approximately 99 km from the sea.

The NPPF dictates what development is suitable within each Flood Zone based upon the level of vulnerability of the development. This is shown in **Table 1**. The vulnerability classifications suggest the proposed access roundabout and subsequent carriageway improvements are considered to be 'Essential Infrastructure'.

Table 1. Flood Risk Vulnerability and Flood Zone Compatibility

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception Test Required	✓	✓
Zone 3a	Exception Test Required	✓	✗	Exception Test Required	✓
Zone 3b	Exception Test Required	✓	✗	✗	✗

In accordance with **Table 1**, the construction of Essential Infrastructure is permitted in Flood Zones 1, 2 and an exception test is required for Flood Zones 3a and 3b. The Proposed Development mostly lies within land classified as being within Flood Zone 1, however, the southern extent of the access roundabout marginally infringes upon Flood Zone 2 and the eastern extent of the development remains in Flood Zone 2 and Flood Zone 3. Where the carriageway crosses Flood Zone 2 and 3, works are limited to resurfacing works only within the existing highway boundary, there are no proposals to change the levels of the existing carriageway. To be acceptable however the development must still satisfy the requirements of the Exception Test.

For the Exception Test to be passed, the following points must be satisfied:

1. It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk.

2. A site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime, taking account of the vulnerability of its users, without increasing flood risk elsewhere, and where possible will reduce flood risk overall.

Both elements of the test will have to be passed for development to be allocated or permitted.

Point 1 - The Proposed Development will support the delivery of the ES10 Commercial Development Site which is identified within Barnsley's Local Plan. The ES10 proposed development will provide sustainability benefits including positively impacting the economic growth within the area.

Point 2 - The FRA will focus on ensuring the level of flood risks both to and from the development are reduced to the lowest possible level and that the Proposed Development remains safe throughout its lifetime. The FRA identifies mitigation measures where required and provides appropriate consideration of the impacts of climate change. It should be noted that the proposed access roundabout has been positioned outside of Flood Zone 3, and the eastern section of the A635, which currently resides in Flood Zone 3, is limited to resurfacing works only.

It is considered that the Proposed Development has satisfied both Points 1 & 2, and as such, has passed the requirements outlined in the Exception Test.

This FRA will be used to consider the flood risk to and from the Proposed Development. As well as fluvial and tidal flooding, it is also necessary to consider flood risk from all other sources, including surface water, groundwater, Ordinary Watercourses, artificial drainage systems and infrastructure failure.

2.2 Regional & Local Planning Policy

The Proposed Development lies within the boundary of BMBC, which holds the role of Lead Local Flood Authority (LLFA) and LPA. Therefore, BMBC has the responsibility for the preparation of local plans and policies to manage flooding in their role as LLFA and LPA.

2.2.1 Barnsley Local Plan

The Barnsley Local Plan⁵ was adopted Jan 2019 and sets out a long- term strategy for guiding new development within the borough, until 2033 with the exception of the Peak District National Park. The local plan demonstrates a strategic cross boundary with ongoing engagement with neighbouring authorities. This includes Sheffield City Region which has identified long term spatial areas of growth including the provision of commercial properties. Key policies relating to the Proposed Development and / or flood risk have been identified.

A list of proposed employment land allocations has also been identified in the local plan. This includes Site ES10 which the Proposed Development will provide access to. In relation to site allocations on the local plan, Site ES10 states:

'The development will be expected to [...] avoid locating any built development in Flood Zones 2 and 3, give consideration to Carr Dike and the connecting un-named Ordinary Watercourse which run through the site [...].'

⁵ Barnsley Local Plan (2019). Available from: <https://www.barnsley.gov.uk/media/9924/local-plan-adopted.pdf>. Accessed on:26/10/2021

Policy CC1 – Climate Change

'We will seek to reduce the causes of and adapt to the future impacts of climate change by [...] locating and designing development to reduce the risk of flooding, promoting the use of Sustainable Drainage Systems [...].'

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 [...]*
- Requiring developers with proposals in Flood Zone 2 and 3 to provide evidence of the sequential and exception test where appropriate;*
- Requiring site-specific FRAs for proposals over 1 ha in Flood Zone 1 and all proposals in Flood Zone 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.'*

'In cases where development would increase the risk of flooding by increasing surface water, developers will have to take action to reduce flooding so the development can go ahead, for example, by creating balancing ponds and other facilities for holding water'

Policy CC4 – Sustainable Drainage Systems

'All major development 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.'

'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'

'Infiltration type SuDS may not be appropriate in all cases due to ground conditions. Where this is the case alternative SuDS must be considered. [...] Developers must show that infiltration SuDS will not pose a risk to the quality of underlying groundwater.'

Neighbourhood plans are currently being prepared, which will form part of the statutory development plan for Barnsley, once adopted, and will inform decisions on planning applications within the neighbourhood. They will conform to strategic policies outlined in the Local Plan. The Neighbourhood Plans currently being prepared in Barnsley are Oxspring, Penistone, Silkstone and Cawthorne. At the time of writing, November 2021, there are no current Neighbourhood Plans which cover the geographical region of Goldthorpe and therefore do not apply to the Proposed Development.

Following the adoption of the Local Plan, BMBC have produced and updated supplementary planning documents (SPDs) which contain advice for those obtaining planning permission. This includes the 'Section 278 Agreements' which outlines the agreements related to works within the highway.

Section 278 Agreements

'Provision of SuDS (such as flow-attenuation devices, swales and storage areas) [are an example which may increase the Councils future maintenance liability]. Developers should discuss their requirements with the Council, ideally during pre-planning application discussions, in advance of a formal Planning Application being submitted'

2.2.2 Preliminary Flood Risk Assessment

The purpose of a Preliminary Flood Risk Assessment (PFRA) document is to provide a high-level summary of significant flood risk based on available and derivable information describing both the probability and harmful consequences of past and future flooding. The PFRA forms part of the local flood risk management strategies that the LLFA is required to prepare by the Flood and Water Management Act 2010.

As the LLFA, BMBC prepared a PFRA⁶ in July 2011, which provides a high-level overview of flood risk from local sources, including collating and evaluating historical and future flood events. Historical records of flooding in Barnsley show the main sources of flooding include, Main River, surface water and groundwater.

The PFRA did not indicate that the area surrounding the site was at high risk of flooding. A historic sewer flood incident was identified within the village of Goldthorpe, as identified by Yorkshires Water DG5 records, however this incident was not located within close proximity to the Proposed Development.

Future locally significant flood events were also predicted within Barnsley. The Proposed Development was shown outside the predicted areas within the borough that are most likely to suffer from flooding in the future.

It should be noted an addendum of the PFRA was completed in 2017 where a review of flood risk within the Borough was updated using relevant current flood risk data. Following the review, there were no significant changes to flood risk identified within Barnsley's administrative area, with the exception of detailed modelling within Low Valley, where the potential for flooding has been subsequently considered reduced.

2.2.3 Strategic Flood Risk Assessment

A Level 1 Strategic Flood Risk Assessment (SFRA)⁷ was completed by JBA Consulting in September 2010 on behalf of BMBC. A SFRA is a required evidence document for the Local Plan which collates information on all known sources of flooding that may affect existing or future development within the area.

The purpose of the Level 1 SFRA enabled an updated high-level assessment and mapping of flood risk, providing recommendations of appropriate land uses that will not place people or property at risk of flooding. Where flood risk has been identified as a potential constraint to future development, the SFRA has identified possible flood mitigation solutions that may be integrated into the design by the developer.

Barnsley is primarily situated within the River Dearne Catchment, and as such this watercourse represents the most significant source of risk across the Borough. Flood defences bound both the River Dearne and River Dove which have a 1 in 30 year standard or protection (SoP). Historical flooding from the River Dove (Main River) has been identified south of Darfield in June 2007 and Autumn 2000 however there are no historical flood events identified within the SFRA that are within close proximity to the Proposed Development. Modelling of surface water flooding has been undertaken for the 1 in 100 year rainfall event which has informed surface water flood risk maps within the SFRA. A review of these outputs indicates that the area immediately south of the proposed site could be at moderate risk of surface water flooding, with flood depths predicted to reach between 0.5 m and 1 m.

Localised areas of groundwater flooding within Barnsley have also been observed and are thought to potentially be associated with the re-emergence groundwater following the cessation of mine de-watering regimes in the

⁶ Barnsley Metropolitan Borough Council (2011) *Preliminary Flood Risk Assessment*. Available from: <https://www.barnsley.gov.uk/media/16269/barnsley-pfra-report.pdf> Accessed on: 26/10/2021

⁷ Barnsley Metropolitan Borough Council (2010) *Strategic Flood Risk Assessment*. Available from: [://www.barnsley.gov.uk/media/18125/barnsley-strategic-flood-risk-assessment-level-1-report-sept-2010.pdf](https://www.barnsley.gov.uk/media/18125/barnsley-strategic-flood-risk-assessment-level-1-report-sept-2010.pdf). Accessed on: 26/10/2021

area. The Coal Authority is working in partnership with the EA to manage groundwater levels to minimise the risk of re-emerging mine waters and water quality issues in major aquifers.

The SFRA also identifies the Dearne and Dove IDB, which has since been renamed to Danvm Drainage Commissioners, has the statutory responsibility to maintain selective land drainage and Ordinary Watercourses across parts of Barnsley Metropolitan Borough Council, and specifically within the surrounding area of the Proposed Development. Typically, IDB watercourses have up to a 30 year SoP and any development within a IDB area will require restriction of surface water discharge rates to greenfield levels.

2.2.4 Local Flood Risk Management Strategy

The Local Flood Risk Management Strategy⁸ (LFRMS) sets out how BMBC intend to work with organisations, businesses and communities to manage the local risk of flooding and increase flood resilience in the borough. The LFRMS was formally adopted by the council in September 2017.

BMBC have outlined a four-step strategic approach which includes:

- *Prevent flooding occurring through development;*
- *Effective management of our drainage systems through repairs and maintenance programs;*
- *Prioritise our response and recovery operations during flood events; and*
- *Acting on the lessons identified when reviewing our flood risk management activities.*

A review of the LFRMS will take place on a six-yearly basis in consultation with key stakeholders and linking with the cycles of the review of Barnsley's PFRA.

2.2.5 River Don Catchment Flood Management Plan

A Catchment Flood Management Plan (CFMP)⁹ for the Don catchment was completed by the EA in December 2010. The CFMP outlines the overview of flood risk in the catchment and sets out a preferred plan for sustainable flood risk management over the next 50 to 100 years.

The Don Catchment is further divided into seven sub-areas. The Proposed Development is located within the 'Barnsley and Mexborough' sub area which highlights the River Dearne is the main watercourse, before joining the River Don at Conisborough. The sub-area adopts 'Policy 6' which is as follows:

Policy 6 – Areas low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits

'The policy will tend to be applied where there may be opportunities in some locations to reduce flood risk locally or more widely in a catchment by storing water or managing run-off. The policy has been applied to an area (where the potential to apply the policy exists) but would only be implemented in specific locations within the area, after more detailed appraisal and consultation'.

The key following actions are proposed to implement Policy 6:

- *Produce community flood plans for locations that acutely need them e.g. Low Valley, Barnsley;*
- *Determine in greater detail the risk of flooding to utilities [..];*
- *Work in partnership with the LLFA to reduce the risk of flooding from surface water;*
- *Produce a multi-agency approach to registering culverts and outfalls; and*
- *Install telemetry on the Don Navigation to enable effective flood forecasting and warning of imminent canal overtopping.*

⁸Barnsley Metropolitan Borough Council (2017) *Local Flood Risk Management Strategy*. Available from: <https://www.barnsley.gov.uk/media/17940/flood-risk-management-strategy.pdf>. Accessed on: 26/10/2021

⁹ Environment Agency (2010) *Don Catchment Flood Management Plan*. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/289379/River_Don_Catchment_Flood_Management_Plan.pdf Accessed on: 26/10/2021

3. Climate Change

3.1 Context

The NPPF requires site specific FRAs accompanying planning applications to assess the risk of all sources of flooding to and from the development and to demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account.

The EA published updated climate change guidance in October 2021¹⁰. The guidance indicates that climate change is likely to increase river flows, sea levels, rainfall intensity, waver height and wind speed.

3.2 Peak River Flow Allowances by River Basin District

The peak river flow allowances show the anticipated changes to peak flow by management catchment. The range of climate change allowances are based on percentiles. A percentile is a measure used in statistics to describe the proportion of possible scenarios that fall below an allowance level. The 50th percentile is the point at which half of the possible scenarios for peak flows fall below it and half fall above it.

- Central allowance is based on the 50th percentile;
- Higher central is based on the 70th percentile;
- Upper end is based on the 90th percentile;

The Proposed Development lies within the Humber River Basin District and Don and Rother Management Catchment. **Table 2** shows the climate change allowances for the Don and Rother Management Catchment.

Table 2. Peak River Flow Allowances for the Proposed Development

Allowance Category	Total Potential Change Anticipated for '2020s' (2015 to 2039)	Total Potential Change Anticipated for '2050s' (2040 to 2069)	Total Potential Change Anticipated for '2080s' (2070 to 2115)
Upper End	25%	36%	60%
High Central	15%	21%	38%
Central	11%	15%	28%

3.3 Peak River Flow Allowances for the Proposed Development

For Developments located in Flood Zone 2 or Flood Zone 3a the EA guidance for climate change allowance state: *'In Flood Zone 2 or 3a, use the Higher Central allowance for essential infrastructure'*

The design lifetime of the Proposed Development is assumed to be 100 years and based upon the EA guidance, the peak river flow climate change allowances for the lifetime of the Proposed Development should be assessed as shown in **Table 3**.

¹⁰ Environment Agency (2021) Flood risk assessments: climate change allowances [online]. Available from: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#history>. . Accessed on: 26/10/2021

Table 3. Proposed Development Climate Change Assessment Criteria

Proposed Development	
River Basin District	Humber
Management Catchment	Dom and Rother
Flood Zone	1, 2 and 3a
Flood Risk Vulnerability	Essential Infrastructure
Lifetime of Development	100
Climate Change Allowance to be Assessed	38%

3.4 Peak Rainfall Intensity Allowances for the Proposed Development

The predicted increase in the frequency and intensity of storm events could increase greater volumes of rainfall to enter the surface water and foul drainage network. **Table 4** shows the anticipated changes in peak rainfall intensity in small catchments less than 5 km².

Table 4. Peak Rainfall Intensity Allowances for the Proposed Development

Applies across all of England	Total Potential Change Anticipated for '2020s' (2015 to 2039)	Total Potential Change Anticipated for '2050s' (2040 to 2069)	Total Potential Change Anticipated for '2080s' (2070 to 2115)
Upper End	10%	20%	40%
Central	5%	10%	20%

To ensure there is no increase in the rate of runoff discharged from the site, current guidance provided by the EA indicates that the proposed drainage network must demonstrate there is no increase in the rate of runoff discharged from the site for the upper allowance. As such, the proposed drainage network must be designed to accommodate up to and including the 1 in 100 year plus 40% CC. This would also meet the highway drainage standards set out in the DMRB CG 501¹¹ guidance.

3.5 Impact of Climate Change

3.5.1 Fluvial Flooding

The Proposed Development will include a surface water drainage network which will be sized to attenuate up to and including the 1 in 100 year + 40% CC event. However, in the event that discharge to a nearby watercourse is proposed, as agreed with Danvm Drainage Commissioners IDB, the discharge rate will be limited to a storm with 1 in 30 year return period event for the brownfield catchment, or lower if the system surcharges. The greenfield runoff rate will be added to the brownfield if the existing drainage system is proven. Assuming this is adopted, climate change will not significantly increase the risk of fluvial flooding from the site.

As a result of climate change, the frequency and intensity of storm events are likely to increase in future, which could lead to elevated water levels along the Carr Dike, increasing the depth and extent of flooding locally. The A635 is considered as 'Essential Infrastructure' and the works proposed are associated with the existing highway (the vulnerability of which is considered low). It is assumed that this potential increase in flood risk to the

¹¹ Standards for Highways (2020) *DMRB CG 501 – Design of highway drainage systems (version 2)*. Available from: <https://www.standardsforhighways.co.uk/dmrb/search/ada3a978-b687-4115-9fcf-3648623aaff2> Accessed: 26/10/2021

development is accepted, given this risk will occur to the existing highway and there would be no change to future flood risk as a result of the Proposed Development.

3.5.2 Surface Water Runoff Generation and Overland Flow

The predicted increase in the frequency and intensity of storm events could increase the volumes of surface water on the site. As will be discussed in **Section 4.2**, the proposed surface water drainage network will attenuate all surface water generated by the Proposed Development up to and including the 1 in 100 year plus 40% CC event. Therefore, despite the anticipated increase in rainfall intensity, climate change will unlikely increase the risk of surface water flooding to and from the site.

3.5.3 Groundwater

The direct impact of climate change on groundwater resources is dictated by the changes in rainfall intensity and soil infiltration. During drier seasons, there may be reductions in groundwater recharge that may cause a long-term decline in groundwater storage. Alternatively, groundwater recharge may be stabilised or even increased by frequent and prolonged periods of rainfall.

As a precautionary measure, all below ground elements associated with the Proposed Development should be designed in such a way as to withstand any upward hydraulic pressure, in the event groundwater levels rise as a result of climate change. Assuming this is the case, any anticipated increase in groundwater levels, as a result of climate change will unlikely increase the risk of groundwater flooding to the Development.

3.5.4 Sewer Flooding

As will be discussed in **Section 4.4**, a review of Yorkshire Water Drainage Plans (**Appendix B**) shows one combined sewer pipe to the east of the Carr Dike, outside the site boundary and a potable water main which bounds the site to the south along the A635. Yorkshire Water, as a designated Risk Management Authority have a legislative responsibility to undertake adequate maintenance and inspection regimes, and as such the risk of pipe breach or surcharge is considered low. As such the risk of increased sewer and water main flooding to the site as a result of climate change is considered to be low.

4. Assessment of Flood Risk

This section of the report considers the potential risks posed to the Proposed Development from all sources of flooding. Where a flood risk is identified, mitigation measures may be required.

4.1 Flood Risk from Fluvial Sources and Land Drainage Infrastructure

Fluvial flooding occurs when the capacity of a river is exceeded either due to high flows from the catchment draining into the river or a combination of high flows and high tides which causes the river to overflow or overtop the banks.

There are two EA Main Rivers, one Ordinary Watercourse and one land drain within close proximity to the Proposed Development, which include:

- The River Dearne Main River, which originates near village of Birdsedge in West Yorkshire and flows in an easterly direction through the town of Barnsley, before continuing eastwards, and passing the site approximately 1.86 km to the south. The Main River ultimately discharges into the River Don approximately 7.2 km east of the Proposed Site.
- The River Dove Main River extends through the Low Valley in Barnsley, starting at the outfall of Worsbrough Reservoir to its confluence with the River Dearne, approximately 2.3 km upstream of the Proposed Development.
- The Carr Dike Ordinary Watercourse flows southwards through the eastern section of the Proposed Site passing directly under the existing A635 highway. The Carr Dike flows in a south-westerly direction for 1.9 km before ultimately discharging into the River Dearne. It should be noted that the downstream sections of this watercourse are referred to as the Ings Dike Ordinary Watercourse. The watercourse also holds another name upstream of the site, where two Ordinary Watercourses both referred to as the Thurnscoe Dike converge. The watercourse is maintained by Danvm Drainage Commissioners IDB.
- A small land drainage ditch is located within the agricultural land immediately south of the site. This feature joins the Carr Dike, approximately 350 m to the south of the Proposed Development.

A review of the EA FMfP shows that the Proposed Development is primarily situated within Flood Zone 1, which comprises land assessed as having less than a 1 in 1000 annual probability of river flooding (AEP <0.1%) in any one year. However, the eastern section of the A635 where the carriageway crosses the Carr Dike resides within Flood Zones 2 and 3, which is defined as land which has between a 1 in 100 year and 1 in 1000 year (1% - 0.1%) annual probability of river flooding and land which has a 1 in 100 year or greater (>1%) annual probability of river flooding respectively. Furthermore, the southern extent of the proposed roundabout marginally infringes upon Flood Zone 2, refer to [Figure 3](#).

The FMfP is based on a national scale assessment of fluvial flood risk and following a review of the flood extents surrounding the site, these outlines have been produced by JFLOW techniques, for which detailed flood depth information is not available. Consultation was undertaken with the EA in October 2020 to determine whether any further information was available on the depth and extent of flooding from the Carr Dike Ordinary Watercourse, however this was confirmed as negative, refer to [Appendix C](#). Additional correspondence with Danvm Drainage Commissioners IDB was also undertaken in February 2021, refer to [Appendix D](#).

As described, the existing highway to the east of the development is shown to be at potential risk from fluvial flooding from the 1 in 100 year fluvial event, where the highway crosses the Carr Dike. A review of the site layout plan in [Appendix A](#) suggests that the only works proposed within this area will be resurfacing of the existing highway, and no changes to the layout or level of the existing carriageway and culvert beneath the highway have been proposed. Whilst this area is considered to be at risk of fluvial flood risk, it is not practicable to raise the level of the highway in this location, as levels along this section need to tie in with the existing highway. Given, there is no change to the level of risk as a result of the proposals and the development itself, the vulnerability of the development to flooding is unaltered and considered to be low.

However, there remains a residual risk of highway flooding and consequently remedial works could be required in the event of flood damage to the highway. This could be further exacerbated in the event of poor maintenance or blockages at the culvert crossing of the Carr Dike. Given however, that this risk currently exists, and the proposed development involves no works which would further exacerbate the risk of flooding from this watercourse, it is assumed that Barnsley Metropolitan Borough Council as the riparian owner already accepts this and has an efficient ongoing maintenance regime for this structure. However, to reduce the residual risk of highway flooding to road users, flood warning signage will be installed along the highway and the multi-use route, informing road users, pedestrians and cyclists, the road could be liable to flooding.

The southern peninsular of the proposed roundabout marginally infringes upon Flood Zone 2. A review of Ordnance Survey and aerial imagery has identified an existing land drain located within the agricultural land immediately south of the Proposed Development. The flood extents associated with the land drainage ditch are not known as national mapping of their predicted flood extents are not available. Given, that this feature is situated adjacent to the proposed access roundabout and at this location the development is elevated above the 1 in 1000 year to the 1 in 100 year flood level associated with the Carr Dike Ordinary Watercourse, it is considered that the Proposed Development will be located above the flooding connected to Flood Zone 2. Whilst there is the potential for shallow ponding at the base of the embankment, scour protection will be included as a precaution within the design to maintain its structural stability should this occur.

In addition, a number of land drainage features and wetlands are shown within RSPB Dearne Valley, Old Moor Nature Reserve, approximately 2.1 km south of the proposed site. A review of the topography suggests that the Proposed Site is elevated by approximately 8 m above these features and as such, there is unlikely to be a plausible flow route from these features to the site.

The majority of the Proposed Development has been assessed as being at low risk of fluvial flooding, however small parts of the development are assessed to be at moderate risk of flooding from fluvial sources. Given the type of development proposed and the fact there is no substantial change in the current level of risk given this is an established highway, this is considered to be a residual risk and no further mitigation than listed above is proposed.

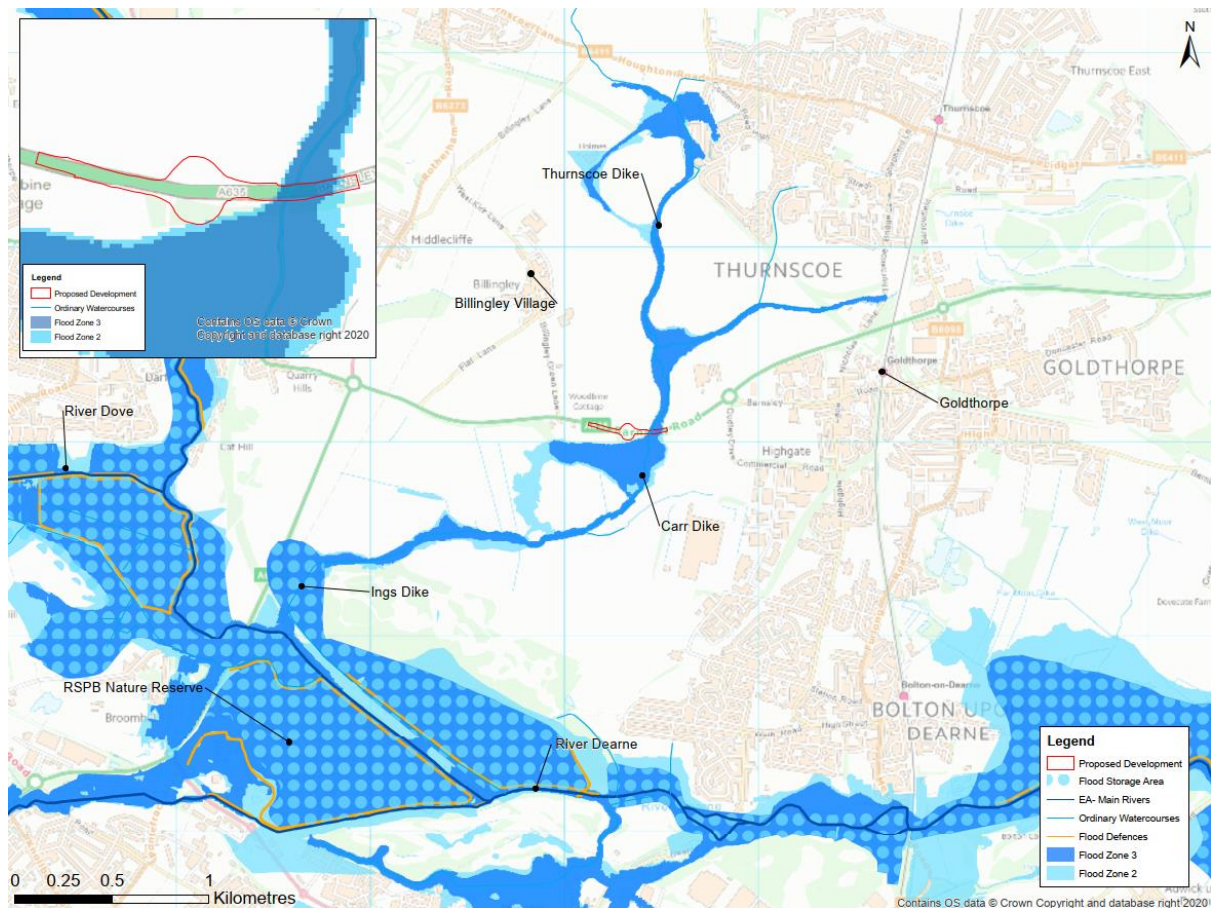


Figure 3. Environment Agency Flood Map for Planning

4.2 Flood Risk from Surface Water

Surface water runoff is defined as water flowing over the ground that has not yet entered a drainage channel or similar. An intense period of rainfall which exceeds the infiltration capacity of the ground usually results in surface water runoff. Typically, runoff occurs on sloping land or where the ground surface is relatively impermeable. The ground can be impermeable, either naturally through the soil type or geology, or unnaturally due to development, which places large areas of impervious material over the ground surface (e.g. paving and roads).

As defined by the EA, the following levels of surface water flood risk can be classified as follows:

- High Risk – the area has a chance of flooding of greater than 1 in 30 year (3.33% AEP).
- Medium Risk – the area has a chance of flooding of between 1 in 100 year (1% AEP) and 1 in 30 year (3.33% AEP).
- Low Risk – the area has a chance of flooding of between 1 in 1000 year (0.1% AEP) and 1 in 100 year (1% AEP).

The EA RoFfSW dataset predicts that surface water may pond within a low-lying topographical depression south of the Proposed Development, with flooding predicted from the 1 in 30 year (3.33% AEP) event onwards. Within this event, flood depths potentially reach up to 900 mm. The extent of flooding is shown to potentially increase further within the 1 in 100 year return period (1% AEP) however the depth of flooding primarily remains between 300 mm and 900 mm. However, ponding does potentially reach over 900mm depth within a localised area, approximately 130 m south of the Proposed Development, associated with a small pond. The extent and depth of flooding shown on the RoFfSW map significantly increases within the 1 in 1,000 year (0.1% AEP) event, with widespread flood depths estimated to exceed 900 mm, refer to [Figure 4](#). In this event, it is likely that ponding within this topographic depression is worsened due to the presence of an overland flow route, channelling flows from the agricultural land south of Billingley Village towards this low-lying topographical depression, west of the Proposed Development site.

Within the 1 in 1,000 year event, surface water flooding is predicted along the south of the Proposed Site boundary, where the access roundabout and eastern carriageway are located. Whilst this could pose a risk to the development, the 1 in 1,000 year is an extreme event and the proposed roundabout and carriageway will be raised above the existing ground level by the embankment. As such, the development is likely to be situated above the predicted extent of surface water flooding. However, as a precautionary measure, scour protection will be implemented along the embankment to protect this feature in the event that ponding against the embankment occurs.

As a result of the possible surface water flow route from Billingley Village, shallow flooding, with depths predicted below 300 mm on the highway is also observed in this event situated outside of the site boundary. A review of LiDAR shows a gradual rise in topography along the A635 immediately east of the road junction at Billingley Green Lane, before levels fall towards the Carr Dike. Furthermore, it is likely that flows of which cross the highway would likely be intercepted by the existing highway drainage network. As such, the predicted surface water flood extents near Billingley Green will unlikely be channelled towards the Proposed Development.

A potential flow route is shown by the mapping from the existing A635 near the crossing of the Carr Dike, although this is only shown in the 1 in 1,000 year event, and no flooding of the highway is predicted within the 1 in 30 year and 1 in 100 year events. Within the 1,000 year event, flood depths at this location are predicted by the surface water map to be shallow, potentially reaching depths to 300 mm, and given the fall in topography along the highway to the east, it is likely that any flow routes will be routed back towards the Carr Dike, even with proposed embankment works associated from the carriageway. It should be noted that the proposed embankment works are situated outside of Flood Zone 3 and outside of the 9 m byelaw distance of the Carr Dike. The proposed embankment works to the east of the roundabout do marginally infringe upon an area predicted to flood from surface water during the 1 in 30 year event. Although flood depths are predicted to remain shallow, below 300 mm, given the embankment works may be subject to surface water ponding, potentially heightened by fluvial sources, scour protection is also recommended to the east of the roundabout to ensure structural integrity whilst remaining outside the 9 m byelaw distances of the IDB. Where scour protection is not implemented, BMBC has accepted to undertake any remedial works if necessary, as a result from a flood event. A cut off filter drain is also proposed along the northern perimeter of the roundabout to intercept any surface water flows given the roundabout is situated in cutting at this location.

As a result of the above, it is considered that there is a moderate risk of surface water flooding to the highway up to and including the 1 in 100 year plus climate change event. However, the Proposed Development will include a surface water drainage network capable of attenuating the 1 in 100 year (1% AEP) plus 40% climate change event. As such, the risk to the development is considered to be low with the implementation of mitigation measures stipulated above. However, there is still a residual risk of surface water flooding to the highway in larger events. To protect road users, flood warning signage will be installed along the highway and the multi-use route to inform road users the highway could be liable to flooding.

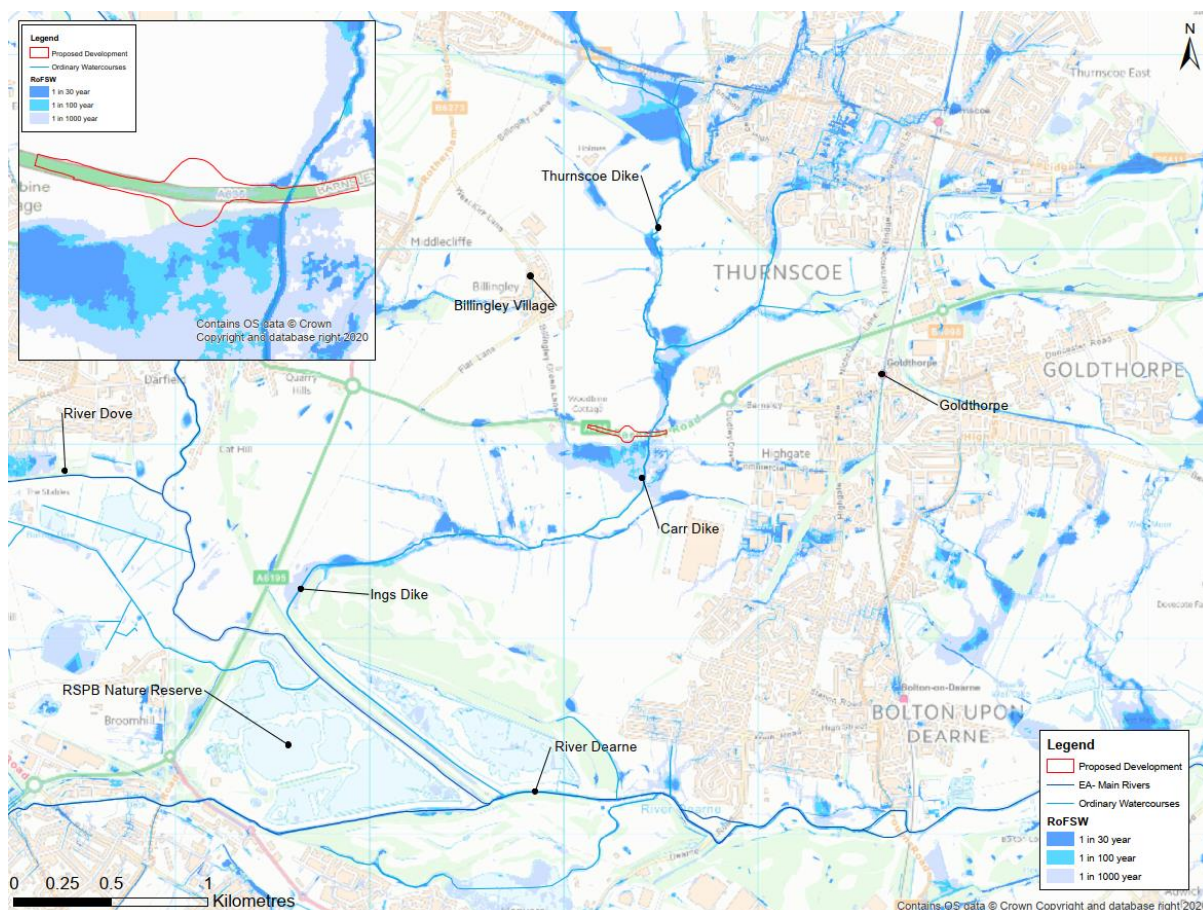


Figure 4. Environment Agency Long Term Flood Risk: Flood Risk from Surface Water Flooding Map

4.3 Flood Risk from Ground Water

Groundwater flooding occurs when the natural level of water stored within the ground rises above local ground level. This can result in deep and long-lasting flooding of low lying or below ground areas such as underpasses and basements. It tends to occur after long periods of sustained high rainfall, and the areas at most risk are often low-lying where the water table is more likely to be at shallow depth. Groundwater flooding is most likely to occur in areas underlain by major aquifers, although it is also associated with more localised floodplain sands and gravels.

British Geological Survey¹² (BGS) information suggests the geology below the site is Pennine Middle Coal Measures Formation comprising mudstone, siltstone and sandstone, with no evidence of superficial deposits. North of the A635, there is a localised linear region of bedrock comprising sandstone. Coal measures and sandstone are typically characterised by high permeability which is likely to lead to a rapid increase in the level of the water table following an extreme event. Mudstone is typically characterised by low permeability. According to the EA Aquifer Designation Map¹³ the site is underlain by a Secondary A bedrock aquifer, suggesting that there could be permeable layers that are capable of supporting water supplies beneath the site. The presence of this aquifer could be indicative of elevated groundwater levels within the surrounding area. The groundwater vulnerability maps also classify the surrounding area and the site to be at 'High' risk from groundwater flooding.

¹² British Geological Survey (2021) Geology of Britain Viewer. [Online] Available from: <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>. Accessed on: 27/10/2021

¹³ Environment Agency (2021) Aquifer Designation Map. Available from: <https://magic.defra.gov.uk/MagicMap.aspx>. Accessed on: 27/10/2021.

The Coal Authority has identified the site is situated above a former colliery within Yorkshires Coalfield.¹⁴ Yorkshire Area 2 (Dearne Valley) mine block covers the geographical area of the site, where the Coal Authority has identified deep groundwater in parts of the mining block to be recovering (rebounding). As outlined in the SFRA, The Coal Authority are working in partnership with the EA to manage groundwater levels to minimise the risk of re-emerging mine waters and water quality issues in major aquifers. As a precautionary measure the risk from groundwater flooding is considered to be moderate. Mitigation measures may therefore be required.

To prevent the 'floatation' of sub-surface elements (e.g. below ground drainage) as a consequence of increased groundwater levels, all below ground elements of the Proposed Development will be designed to withstand any upward hydraulic pressure. Any below ground development such as attenuation tanks should be designed to prevent groundwater ingress e.g. 'dry-proofing' the external face of the asset.

4.4 Flood Risk from Sewer and Water Supply Infrastructure

4.4.1 Water Supply Infrastructure

Given potable water mains are pressurised systems, significant flooding could occur in the event of a pipe burst scenario. A review of Yorkshire Water Drainage Plans (**Appendix B**) show a potable water main within the site boundary which bounds the site to the south along the existing A635. Given the potable water main is a pressurised system, this infrastructure could pose a residual risk in the event of a pipe burst scenario.

Yorkshire Water, as a designated Risk Management Authority have a legislative responsibility to undertake adequate maintenance and inspection regimes, such that the risk of pipe breach is considered low. As such, the risk of flooding from water supply has been considered as a residual risk and no mitigation is required.

4.4.2 Sewer Infrastructure

Sewer and surface water flooding are often interconnected especially in combined sewer systems; insufficient drainage capacity in the sewer network can result in surface water flooding and, by the same rationale, large volumes of surface water can overload the public sewers, causing the sewer network to back up, surcharge and ultimately cause flooding above ground level.

Following a review of Yorkshire Water Drainage Plan (**Appendix B**), no sewer infrastructure has been identified within the site boundary. However, a combined sewer pipe with an internal diameter of 675 mm has been observed to the east of the Carr Dike. Where the sewer pipe crosses the A635, the topography of the highway falls to the west towards the Carr Dike, and therefore in the unlikely event of a sewer surcharge, flows would be expected to be channelled westwards towards the Carr Dike. Given the A635 begins to rise to the west of the Carr Dike, there are no likely plausible flow routes to the Proposed Development. The PFRA indicates there are no records of sewer flooding near the site.

The risk of flooding from sewerage infrastructure has been considered as low and no mitigation is required.

4.5 Flood Risk from Canal Systems

Canals rarely pose a direct flood risk given they are regulated water bodies with controlled water levels; however, flooding can still occur through a breach or overtopping.

A review of the Canal and River Network Mapping from the Canal and River Trust shows the closest canal to the Proposed Development is the River Don Navigation which is part of the Sheffield and South Yorkshire Navigations which passes between Doncaster and Sheffield. The Don Navigation is situated approximately 6.15 km south-west of the Proposed Development. Given the distance between the site and canal infrastructure, the risk of flooding from canal systems is considered to be low and no mitigation is required.

¹⁴ The Coal Authority, Available from: [file:///C:/Users/welish/Downloads/CA-2311Instr121-Yorkshire%20Rising%20MW%20Study-Scope%20\(1\).pdf](file:///C:/Users/welish/Downloads/CA-2311Instr121-Yorkshire%20Rising%20MW%20Study-Scope%20(1).pdf). Accessed on: 2/11/20

4.6 Flood Risk from Reservoirs

Reservoir failure can be particularly dangerous as it causes the release of large volumes of water at a high velocity, which can result in deep and widespread flooding. However, reservoir inspection and design procedures are very rigorous such that the probability of failure is generally regarded as extremely low.

The EA's flood map showing 'Risk of Flooding from Reservoirs', indicates that the site is not located within the extent of potential reservoir flooding. However, approximately 1.7 km south of the Proposed Development, the predicted extent of reservoir flooding is shown to follow the topographical valley of the River Dearne whereby the site location is elevated by 6 m relative to the River Dearne. It is likely the predicted flood extents are associated with Worsbrough Reservoir, approximately 10 km to the west of the site and a large waterbody situated adjacent to Grimethorpe Nature Reserve, approximately 4 km to the north of the site.

It is assumed that regular inspections and maintenance regimes are carried out, however given the Proposed Development is located outside the predicted extent of reservoir flooding, the risk to the site due to reservoir failure is considered to be low and no mitigation is required.

4.7 Flood Risk from Flood Risk Management Infrastructure

There is no Flood Risk Management Infrastructure such as flood storage areas or flood defences recorded within 250m of the site. However, flood storage areas are shown within the predicted flood extents associated with the River Dearne. The closest flood storage areas are approximately 1.7 km to the west and 1.6 km to the south of the Proposed Development.

A review of Asset Management Data from the EA shows the closest flood defences to be an embankment and / or high ground bordering the River Dearne, through the town of Darfield and RSPB Nature Reserve, approximately 1.7 km west and 1.8 km south of the Proposed Development respectively.

The Proposed Development is located outside the area considered to benefit from the EA flood defences and significantly higher than the River Dearne wetlands and therefore, the risk from flood risk management infrastructure is considered to be low and no mitigation is required.

4.8 Summary of Flood Risks to the Proposed Development

Flood Risk	Summary of Risk to Development Site (High / Moderate / Low)	Notes	Mitigation Required
Fluvial - Main Rivers, Ordinary Watercourses and Land Drainage Systems	Moderate	<p>The Proposed Development lies in close proximity to the River Dearne Main River, approximately 1.86 km to the south of the site and the River Dove Main River, approximately 2.3 km upstream of the site. The closest Ordinary Watercourse to the site is the Carr Dike which is culverted at the eastern extent of the existing A635.</p> <p>A review of the EA FMfP shows that the Proposed Development is primarily situated within Flood Zone 1, however the most southernly peninsular of the roundabout marginally infringes on Flood Zone 2 associated with the Carr Dike. As the roundabout is raised by an embankment and above Flood Zone 2, the risk has therefore been categorised as low. The existing highway crossing over the Carr Dike currently resides in Flood Zone 3. However, as the development is limited to resurfacing only, the risk of flooding has not been altered as a result of the development.</p> <p>Based on LiDAR and approximation of the 1 in 100 year flood level derived from JFLOW, the embankment associated with the southern stub of the proposed access roundabout is partially situated within Flood Zone 2. However, the surface of the roundabout is elevated above the estimated flood level and as such is likely that the development will be elevated above the level of any fluvial flooding which may occur. Whilst the embankment itself may potentially be subject to flooding at its base, scour protection will be implemented along the embankment to mitigate the risk of scour due to out of bank flood flows.</p> <p>The existing highway to the east of the development is also potentially at risk from fluvial flooding based on the estimated 1 in 100 year fluvial event. Proposed works at this location are limited to resurfacing of the existing highway and no changes to the layout or level of the existing carriageway at this location are proposed. As such, there is no change to the proposed level of existing flood risk to the highway. However, there remains a residual risk of flooding to the highway in this location and as such flood warning signage will be installed along the highway and the multi-use route, informing users the road could be liable to flooding.</p>	Yes
Surface Water	Moderate	<p>Surface water is predicted to pond south of the Proposed Development on the EA RoFfSW Flood Maps, with flooding predicted from the 1 in 30 year (3.33% AEP) event onwards. The flood extent is shown to largely increase in a 1 in 100 year return period (1% AEP) and 1 in 1000 year return period (0.1% AEP) event. A review of LiDAR shows the catchment to fall steeply to the south, and as such, surface water flows within the topographical depression will likely be channelled away from the Proposed Development. The access roundabout will also be elevated above surrounding land and likely to be above the predicted extent of surface water flooding.</p> <p>A flow path along the existing A635 near the crossing of Carr Dike exists in the 1 in 1000 year (0.1% AEP) event. Given the fall in topography to the east, surface water will likely be routed back towards the Carr Dike, with flood depths predicted to reach less than 300 mm. Nonetheless scour protection is recommended along the embankment works to the east of the roundabout given potential fluvial and surface water mechanisms. Where</p>	Yes

		<p>scour protection is not implemented, BMBC will undertake the appropriate remedial works in the event of a flood.</p> <p>Mitigation is proposed to manage the risk of surface water flooding to the development, including the installation of:</p> <ul style="list-style-type: none"> • A surface water drainage network capable of attenuating the 1 in 100 year (1% AEP) plus 40% climate change event; • Flood warning signage along the highway and the multi-use route; and, • Scour protection along the highway embankment excluding a distance of 9 m either side of the Carr Dike. Areas of scour protection include the southern perimeter of the access roundabout and carriageway, and the embankment works along the northern perimeter, east of the roundabout. <p>Assuming the above mitigation measures are implemented, the risk of surface water flooding to the development is considered to be low and no further mitigation is required.</p>	
Ground water	Moderate	<p>The site is located within a region of Pennine Middle Coal Measures Formation comprising mudstone, siltstone and sandstone, with no evidence of superficial deposits. The site is underlain by a Secondary A bedrock and Secondary A superficial drift aquifer, suggesting that there could be permeable layers that are capable of supporting water supplies beneath the site. The groundwater vulnerability maps also classify the surrounding area and the site to be at 'High' risk from groundwater flooding.</p> <p>The Coal Authority (CA) has identified the site is situated above a former colliery within Yorkshires Coalfield. Within the mine block, Dearne Valley, the Coal Authority have identified deep groundwater in parts of the mining block is recovering (rebounding). The CA are working in partnership with the EA to manage groundwater levels to minimise the risk of re-emerging mine waters and water quality issues in major aquifers.</p> <p>As a precautionary measure the risk from groundwater flooding is considered to be moderate. The following mitigation measures are required.</p> <ul style="list-style-type: none"> • To prevent the 'floatation' of sub-surface elements (e.g. below ground drainage) as a consequence of increased groundwater levels, all below ground elements of the Proposed Development should be designed to withstand any upward hydraulic pressure. • Any below ground development such as attenuation tanks should be designed to prevent groundwater ingress e.g. 'dry-proofing' the external face of the asset. 	Yes
Sewer and Water Supply Infrastructure	Low	<p>A review of Yorkshire Waters Drainage Plans shows a potable water main that bounds the site to the south along the A635. Yorkshire Water, as a designated Risk Management Authority have a legislative responsibility to undertake adequate maintenance and inspection regimes, such that the risk of pipe breach is considered low</p> <p>A combined public sewer pipe with an internal diameter of 675 mm is shown the east of the Proposed Development. In the event of a sewer breach, flows would likely be channelled westwards by the topography towards Carr Dike.</p>	No
Canal	Low	There are no canal systems within close proximity of the Proposed Development.	No
Reservoir	Low	The site is not located in the extent of potential reservoir flooding. However, approximately 1.7 km south of the Proposed Development, the predicted	No

		<p>extent of reservoir flooding is shown to follow the topographical valley which is likely associated with Worsbrough Reservoir, approximately 10 km to the west of the site and / or a large waterbody situated adjacent to Grimethorpe Nature Reserve, approximately 4 km to the north of the site.</p> <p>It is assumed that regular inspections and maintenance regimes are carried out and as such the risk of failure has considered to be low.</p> <p>Therefore, the risk to the site from flooding due to reservoir failure is considered to be low and no mitigation is required.</p>	
Flood Risk Management Infrastructure	Low	<p>The site is not located within an area considered to benefit from EA flood defences. The closest flood defences are 'embankment' and 'high ground' which border the River Dearne, approximately 1.8 km to the south of the site. Flood Storage Areas are also located within the flood extents of the River Dearne.</p> <p>The risk from flood risk management infrastructure is considered to be low and no mitigation is required.</p>	No

5. Impacts of the Development on Flood Risk

5.1 Impact of Fluvial Flooding

It is possible that the Proposed Development could have an impact on fluvial flooding due to an alteration of flood mechanisms and flows and through an increase in the amount of surface water runoff generated by the site. As such, the development has been assessed in relation to these two potential issues.

5.1.1 Impact on Floodplain Storage

As discussed in [Section 4.1](#), although accurate flood levels are not available for the Carr Dike, the embankment associated with the proposed southern stub of the access roundabout is situated outside of Flood Zone 3 and therefore the ability of the Proposed Development to impact on floodplain storage is very low.

Whilst in Flood Zone 3, works associated with the highway improvements near Carr Dike Ordinary Watercourse are limited to resurfacing of the existing highway only. As such, there are no proposals to widen the existing highway nor change the road levels at this location. As such, these works are not anticipated to result in a loss of floodplain storage volume. As such, the risk of an off-site increase in fluvial flooding due to loss of floodplain storage is considered to be low and no mitigation is required.

5.1.2 Impact on additional surface water runoff entering watercourses and Land Drainage Infrastructure and surface water

The Proposed Development could lead to a small increase in the amount of impermeable surfaces at the site, primarily associated with the construction of the access roundabout. If left unmitigated, there is the potential that the Proposed Development could lead to an increase in the amount of surface water runoff generated by the site. Embankment works have been set out in the design towards the east of the proposed roundabout heading towards the Carr Dike along the A635. The embankment on the northern side of the highway marginally infringes upon the 1 in 30 year surface water event, however as outlined in the Drainage Strategy a cut off filter drain will be located at the toe of the embankment to accommodate any surface water flows before being discharged to the Carr Dike. As a precautionary measure, as outlined in [Section 4.2](#), scour protection will be implemented along the embankment to mitigate the risk of scour due to the interaction of fluvial out of bank flood flows and surface water ponding.

The Proposed Development will also include a surface water drainage system, which will intercept and attenuate all runoff generated by the site up to and including the 1 in 100 year plus 40% climate change event. The peak discharge rate from this system will also be limited to a storm with a return period of 1 in 30 year for the brownfield catchment, or lower if the system surcharge, and the greenfield runoff rate will also be added to the brownfield if the existing highway system is proven. Please refer to the accompanying Drainage Strategy for further information. Assuming discharges are limited to the storm with a return period of 1 in 30 year return period event, the impact of the Proposed Development on fluvial flood risk as a result of increased surface water entering nearby watercourses and surface water flood risk to other areas is considered to be low.

5.2 Impact on Groundwater

The Proposed Development will include the installation of a surface water drainage network. All below ground elements such as attenuation tanks must be designed to prevent water ingress and withstand hydrostatic ground water pressures. Given the size of this surface water drainage network relative to the surrounding groundwater catchment, the ability of the Proposed Development to impact sub-surface flow regimes or groundwater storage capabilities is considered to be low.

Therefore, the Proposed Development is likely to have a negligible impact on groundwater and no further mitigation is required.

5.3 Impact on Sewers and Water Supply Infrastructure

As discussed in [Section 4.4](#), a review of Yorkshire Water Drainage Plans shows a potable water main that bounds the site to the south along the A634. Whilst no sewer infrastructure has been identified within the site boundary, a combined public sewer network, with an internal diameter of 675 mm is situated approximately 100 m to the east.

The Proposed Development will not include provision for a new foul sewer drainage network and there are no new connections to the public sewer network which have been considered in the Drainage Strategy.

As such, the risk of increased sewer flooding as a result of the Proposed Development is considered to be low and no mitigation is required.

5.4 Impact on Flooding from Reservoirs, Canals and Flood Risk Management Infrastructure

As discussed in **Section 4.5, 4.6 and 4.7**, there are no reservoir or canal systems in close proximity of the Proposed Development. The closest canal system is the Don Navigation which is situated approximately 6.15 km south-west of the Proposed Development and the closest reservoir a large waterbody at Grimethorpe Nature Reserve, approximately 4 km to the north of the site. The closest flood defence is an 'embankment' and 'high ground' along the River Dearne, approximately 1.8 km south of the site.

There would be no works associated with the Proposed Development that could affect the structural integrity of the flood defences, canal or reservoir infrastructures. Therefore, the impact of the Proposed Development on these features is considered to be low and no mitigation is required.

5.5 Summary of Flood Risks from the Development

Flood Risk	Summary of Risk to Development Site (High / Moderate / Low)	Notes	Mitigation Required
Fluvial – Floodplain Storage	Low	The embankment associated with the southern stub of the access roundabout is marginally infringes upon Flood Zone 2. Although accurate flood levels for the Carr Dike are not available, the access roundabout and embankment are situated outside of Flood Zone 3, therefore the ability of the Proposed Development to reduce floodplain storage is considered low. Works proposed near Carr Dike Ordinary Watercourse also fall within Flood Zone 3, however, these works are limited to resurfacing of the existing highway and will not lead to a loss of floodplain storage volume.	No
Fluvial and Surface Water	Low	There will also be no increase in runoff from the Proposed Development site to fluvial Ordinary Watercourses, land drainage infrastructure and surface water flood risk to other areas. Surface water flows will be attenuated up to and including the 1 in 100 year + 40% CC event and the discharge rate will be restricted to storm with a 1 in 30 year return period event for the brownfield catchment, or less lower if the system surcharges. The greenfield rate will also be added to the brownfield rate as accepted by the IDB if the existing highway system is proven. To the east of the proposed roundabout, the embankment supporting the roundabout on the north side of the highway, infringes upon a 1 in 30 year event. Therefore, scour protection will be incorporated at the embankment works to maintain structural integrity, whilst outside of IDBs 9 m byelaw distance. A land drainage channel will also be located at the toe of the embankment to convey surface water flows.	Yes
Groundwater	Low	The Proposed Development will include the installation of a surface water drainage network. All below ground elements such as an attenuation tanks must be designed to prevent water ingress and withstand hydrostatic ground water pressures. Given the size of this surface water drainage network relative to the surrounding groundwater catchment, the ability of the Proposed Development to impact sub-surface flow regimes or groundwater storage capabilities is considered to be low.	No
Sewer and Water Supply Infrastructure	Low	A review of Yorkshire Water Drainage Plans shows a potable water main that bounds the site to the south along the A634 and a combined public sewer network, with an internal diameter of 675 mm, situated approximately 100 m to the east of the site. The Proposed Development will not include provision for a new foul sewer drainage network and there are no new connections to the public sewer network which have been considered in the Drainage Strategy. As such, the risk of increased sewer flooding as a result of the Proposed Development is considered to be low and no mitigation is required.	No
Reservoir	Low	The site is not located near any reservoirs, therefore the impact of the Proposed Development on these features is considered to be limited and no mitigation is required.	No
Canal	Low	There are no canal systems in close proximity to the Proposed Development, therefore the impact of the Proposed Development on these features is considered to be limited and no mitigation is required.	No
Flood Risk Management Infrastructure	Low	There would be no works associated with the Proposed Development that could affect the structural integrity of flood defences at the River Dearne or the River Dove, nor the flood storage areas at the River Dearne.	No

6. Summary and Conclusions

This FRA has been completed in accordance with the NPPF and the accompanying Technical Guidance.

6.1 Summary of Flood Risk

- The Proposed Development comprises a new access roundabout and carriageway improvements along the A365 to provide access to a proposed commercial development site, referred to as ES10.
- The Proposed Development is primarily situated in Flood Zone 1, however towards the eastern extent of the Proposed Development, near the Carr Dike, the carriageway is situated within Flood Zone 2 and 3. The works at this location are restricted to resurfacing only. The southern peninsular of the roundabout marginally infringes upon Flood Zone 2, although the flood depth associated with the Carr Dike cannot be determined, the embankment and associated highway roundabout will be elevated above the Flood Zone.
- Where the carriageway resides in Flood Zone 3 and crosses the Carr Dike, the Proposed Development is limited to resurfacing works only. As agreed with BMBC, there will be no localised embankment works nor changes to the road level at this location. Any embankment works associated from the Proposed Development will be situated outside of the IDBs 9 m byelaw distance from the Carr Dike and outside of Flood Zone 3.
- A review of the NPPF and local planning policies suggests the Proposed Development is considered as 'Essential Infrastructure'. In accordance with Table 3 of the PPG, 'Essential Infrastructure' is permitted in Flood Zones 1 and 2. However, an exception test is required for Flood Zone 3a and 3b. Given the development provides wider sustainability benefits and will be safe from flood risk for the duration of its lifetime, the exception test has been satisfied.
- The risk to the Proposed Development from fluvial sources has been assessed as moderate, however this is considered a residual risk where the existing highway within the east of the site boundary crosses the Carr Dike Ordinary Watercourse. The proposed development involves no works which could further exacerbate the risk of flooding from this watercourse.
 - It is assumed that Barnsley Metropolitan Borough Council have efficient ongoing maintenance regime for the existing and unaltered culvert crossing of the Carr Dike.
 - Flood warning signage will be installed along the highway and the multi-use route, informing road users the road could be liable to flooding.
- The risk of surface water flooding to the Proposed Development has been assessed as moderate. Whilst flooding occurs in extreme events only, as a precautionary measure scour protection will be implemented along the embankment to mitigate for the risk of scour, whilst maintaining a 9 m distance from the Carr Dike. Where scour protection is not implemented, BMBC will undertake remedial works if necessary, as a result of a flood event. A cut off filter drain will be implemented along the northern perimeter of the roundabout where the roundabout is within cutting.
- The risk to the Proposed Development from groundwater flooding has been considered as moderate. Any below ground development such as attenuation tanks should be designed to prevent ground water ingress.
- The risk to the Proposed Development from sewer and water supply infrastructure, canal, reservoir and flood risk management infrastructure are considered to be low.
- The impact of the Proposed Development on flood risk from all sources e.g. fluvial, surface water, groundwater, canals, reservoirs, sewer and water supply infrastructure are considered to be low.
- There is potential for a limited amount of runoff and rainfall to reach the Proposed Development and therefore, a surface water drainage system capable of attenuating the 1 in 100 year (1% AEP) plus 40% climate change is proposed. The discharge rate will be restricted to a storm with a 1 in 30 year return period event for the brownfield catchment, and lower should the system surcharge. The greenfield runoff rate will also be added to the brownfield if the existing highway drainage system is proven. Therefore, the risk to other areas as a result of increased surface water runoff generation is considered to be low.

6.2 Conclusion

This study has demonstrated that it will be possible to manage flood risks to and from the Proposed Development in compliance with the NPFF and PPG, and a strategy has been developed to control and discharge surface water runoff and foul discharge in an acceptable, conventional and sustainable manner.

Appendix A – Layout Plan of Proposed Development

- GENERAL NOTES**
1. THE TOPOGRAPHICAL SURVEY IS BASED ON INFORMATION PRODUCED BY HIS SURVEYS, DRAWING NO. 040/18/19/10, DATED 14 SEPTEMBER 2021. THE INFORMATION USED IN PREPARATION OF THIS AND ALL OTHER FORE CONSULTING DESIGNS AND DRAWINGS IS NOT GUARANTEED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL SURVEY INFORMATION PROVIDED AND REPORT ANY ANOMALIES TO FORE CONSULTING.
- DESIGN NOTES**
- ALL DESIGN AND WORKS TO COMPLY WITH CURRENT VERSION OF THE FOLLOWING DOCUMENTS:
 - DESIGN MANUAL FOR ROADS AND BRIDGES (DMRB);
 - SPECIFICATION FOR HIGHWAY WORKS (SHW);
 - MANUAL FOR STREETS (MFS); AND
 - BARNSLEY METROPOLITAN BOROUGH COUNCIL (BMBBC) DESIGN GUIDE AND SPECIFICATION.
 - FOOTPATH GRADIENT AT TACTILE PAVING TO BE A MAXIMUM OF 1:12.
 - EXISTING FENCES, VERGES/SHUBBERY, FOOTWAY, AND OTHER PHYSICAL FEATURES TO BE REMOVED WITHIN THE AREA OF WORKS.
 - ALL KERBS TO BE 182, EXCEPT DROPPED KERBS AT PEDESTRIAN CROSSING.
 - ALL IRONWORK WITHIN EXTENT OF WORKS TO BE LOWERED / RAISED AS REQUIRED.
 - ALL PROPOSED ROAD MARKINGS TO BE IN ACCORDANCE WITH THE FOLLOWING:
 - TRAFFIC SIGNS REGULATIONS AND GENERAL DIRECTIONS (TSRGD); AND
 - TRAFFIC SIGNS MANUALS CHAPTER 5 - ROAD MARKINGS.
 - A635 DESIGN SPEED: 60mph
 - EARTHWORKS SLOPES TO BE MAXIMUM 1:3.
 - CHANNEL BLOCKS TO BE INSTALLED ALONG ALL THE NEW KERBS.

- KEY**
- CARRIAGEWAY
 - FOOT/CYCLEWAY
 - TACTILE PAVING (UNCONTROLLED CROSSING)
 - BLOCK PAVING
 - GRASS VERGE
 - EARTHWORKS/LANDSCAPING



REV	DESCRIPTION	DATE	BY
E	CHANGES FOLLOWING COMMENTS	12.10.21	ML
D	TOPO SURVEY UPDATED	28.09.21	ML
C	CHANGES FOLLOWING COMMENTS	31.08.21	ML
B	CHANGES FOLLOWING COMMENTS	22.07.21	ML
A	CHANGES FOLLOWING COMMENTS	19.07.21	ML

Client:
BARNSLEY METROPOLITAN BOROUGH COUNCIL

Project:
PROPOSED ROUNDABOUT A635 GOLDTHORPE

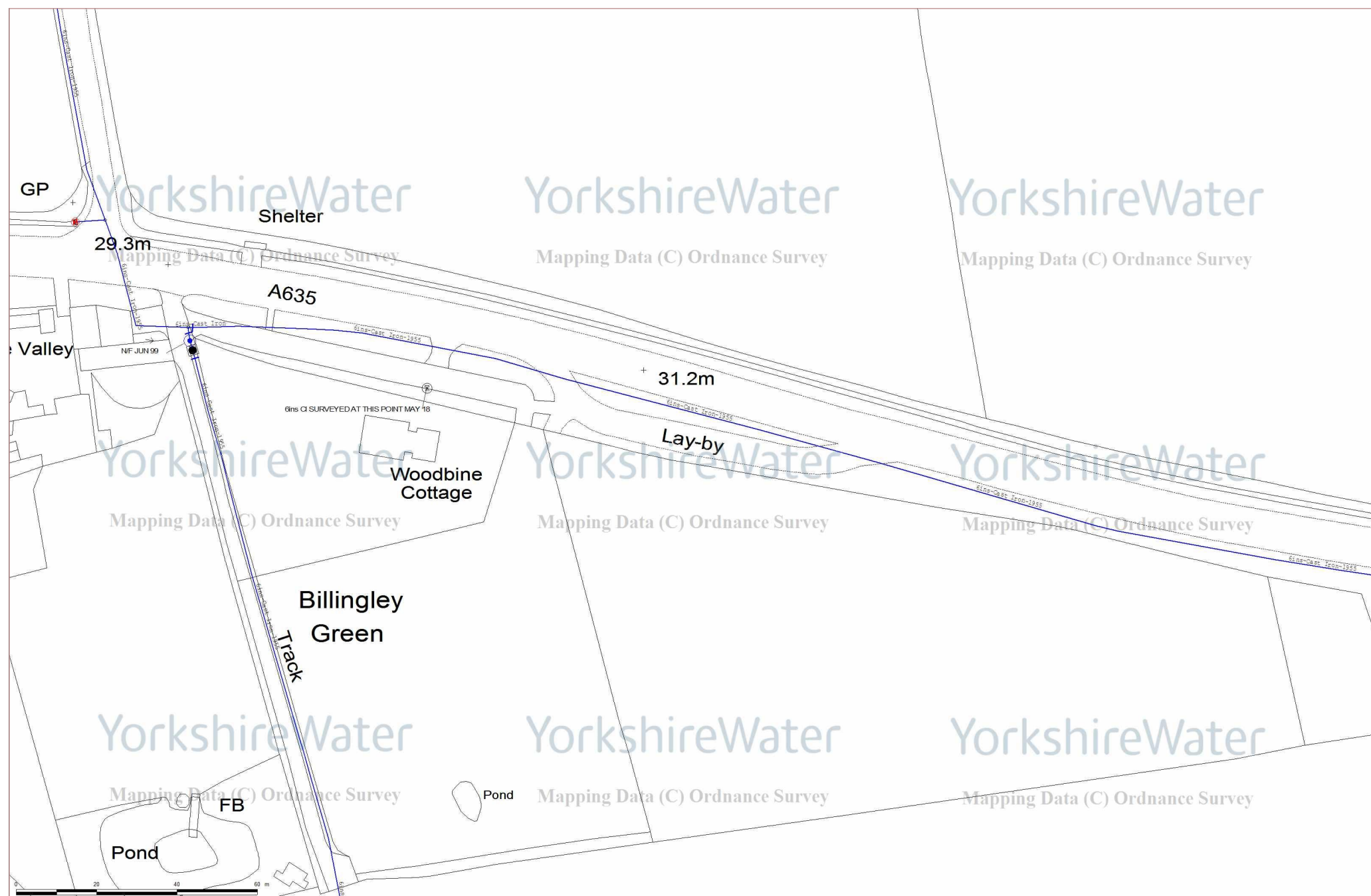
Drawing Title:
GENERAL ARRANGEMENT

PRELIMINARY

Fore Consulting Limited
1st Floor, 15 St Paul's Street
Sleeds
LS1 2SD
0113 2460204
enquiries@foreconsulting.co.uk
www.foreconsulting.co.uk

Rev No	Drawn By	Checked By	Date	Scale	Sheet No	Total
ML	PI	ML	01.07.2021	1:500	3465	100-SK-001

Appendix B – Yorkshire Water Sewer Records



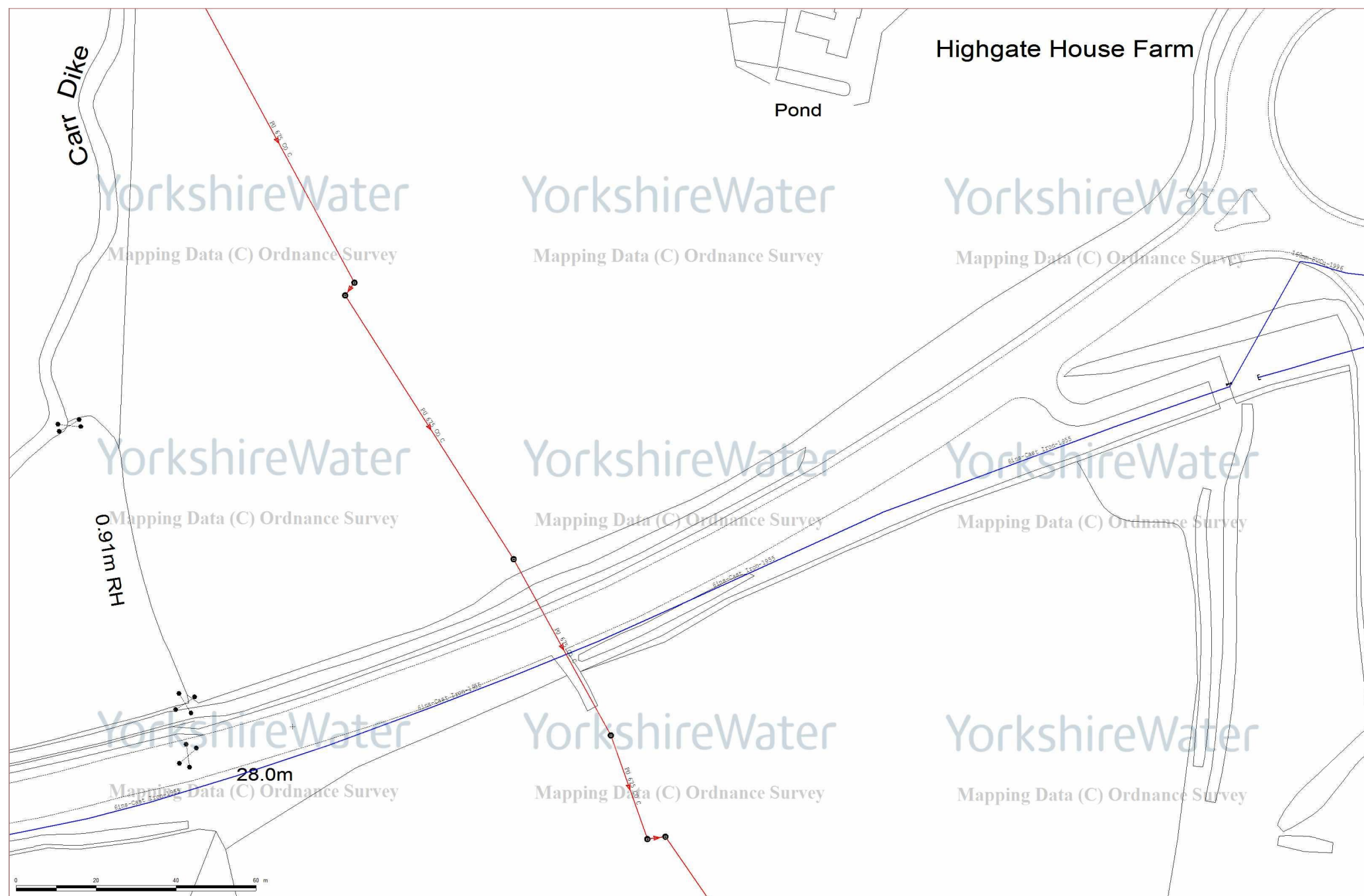

 Yorkshire Water
 PO Box 500
 Halifax Road
 Bradford BD6 2LZ

Originator: CAMPBELLE Centre: 444116 , 404076 Scale 1:1250 Date Requested: 31st July 2020

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A635 GOLDTHORPE-ES10



Yorkshire Water
 PO Box 500
 Halifax Road
 Bradford BD6 2LZ

Originator: CAMPBELLE Centre: 444674 , 404146 Scale 1:1250 Date Requested: 31st July 2020

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A635 GOLDTHORPE-ES10

YorkshireWater

YorkshireWater

YorkshireWater

+ 31.2m Mapping Data (C) Ordnance Survey

Mapping Data (C) Ordnance Survey

Mapping Data (C) Ordnance Survey

Lay-by

YorkshireWater

YorkshireWater

YorkshireWater

+ 26.6m BARNSELEY

Mapping Data (C) Ordnance Survey

Mapping Data (C) Ordnance Survey

Mapping Data (C) Ordnance Survey

Track

YorkshireWater

YorkshireWater

YorkshireWater

Mapping Data (C) Ordnance Survey

Mapping Data (C) Ordnance Survey

Mapping Data (C) Ordnance Survey



Yorkshire Water
PO Box 500
Halifax Road
Bradford BD6 2LZ

Originator: CAMPBELLE Centre: 444263 , 404046 Scale 1:1250 Date Requested: 31st July 2020

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A635 GOLDTHORPE-ES10

YorkshireWater

Mapping Data (C) Ordnance Survey

YorkshireWater

Mapping Data (C) Ordnance Survey

YorkshireWater

Mapping Data (C) Ordnance Survey

0.91m RH

YorkshireWater

Mapping Data (C) Ordnance Survey

YorkshireWater

Mapping Data (C) Ordnance Survey

YorkshireWater

Mapping Data (C) Ordnance Survey

28.0m

+ 26.6m

BARNSELY ROAD

Billingley Bridge

Track

YorkshireWater

Mapping Data (C) Ordnance Survey

YorkshireWater

Mapping Data (C) Ordnance Survey

YorkshireWater

Mapping Data (C) Ordnance Survey

Path (um)



Yorkshire Water
PO Box 500
Halifax Road
Bradford BD6 2LZ

Originator: CAMPBELLE

Centre: 444437 , 404072

Scale 1:1250

Date Requested: 31st July 2020

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A635 GOLDTHORPE-ES10

Appendix C – EA Correspondence – Available Modelled Outputs

Wells, Heather J

From: NE Yorkshire, Customer Contact <neyorkshire@environment-agency.gov.uk>
Sent: 23 October 2020 08:53
To: Wells, Heather J
Cc: France, Debbie; Street, Felicity; Graham, Helen L
Subject: [EXTERNAL] RE: Your Enquiry: RFI/2020/184436

Hi Heather,

I passed your question back to the technical team and they have sent through this:

National Generalised Modelling (NGM) 2004

The Flood Zones in this area were produced by using National Generalised Modelling that was produced in 2004. Neither water depths nor water levels were outputs that were specified when we commissioned this generalised modelling for Flood Zones. Whilst the modelling process does provide some information on depth of water, it would have been possible to produce the flood extents without storing the water depth values, since water depth is only a 'by-product' of the calculation process.

As the JFLOW modelling method was developed, tested and reviewed for production of the Flood Zone extents only, we currently have no information on the accuracy of the water depth data.

They are not suitable for use in site specific Flood Risk Assessments or Strategic Flood Risk Assessments and must not normally be used for these studies.

Not sure how much it might help you, as it seems to mean that we do not have modelled data for that site.

Kind regards,

Kristina Dunning | Customers and Engagement Team
Environment Agency | Lateral, 8 City Walk, Leeds, LS11 9AT
Mobile: 07443 291376 | Internal: 21556
Email: kristina.dunning@environment-agency.gov.uk

From: Wells, Heather J [mailto:Heather.Wells@aecom.com]
Sent: 22 October 2020 15:52
To: NE Yorkshire, Customer Contact <neyorkshire@environment-agency.gov.uk>
Cc: France, Debbie <Debbie.France@environment-agency.gov.uk>; Street, Felicity <felicity.street1@aecom.com>; Graham, Helen L <Helen.Graham@aecom.com>
Subject: FW: Your Enquiry: RFI/2020/184436

Hi there,

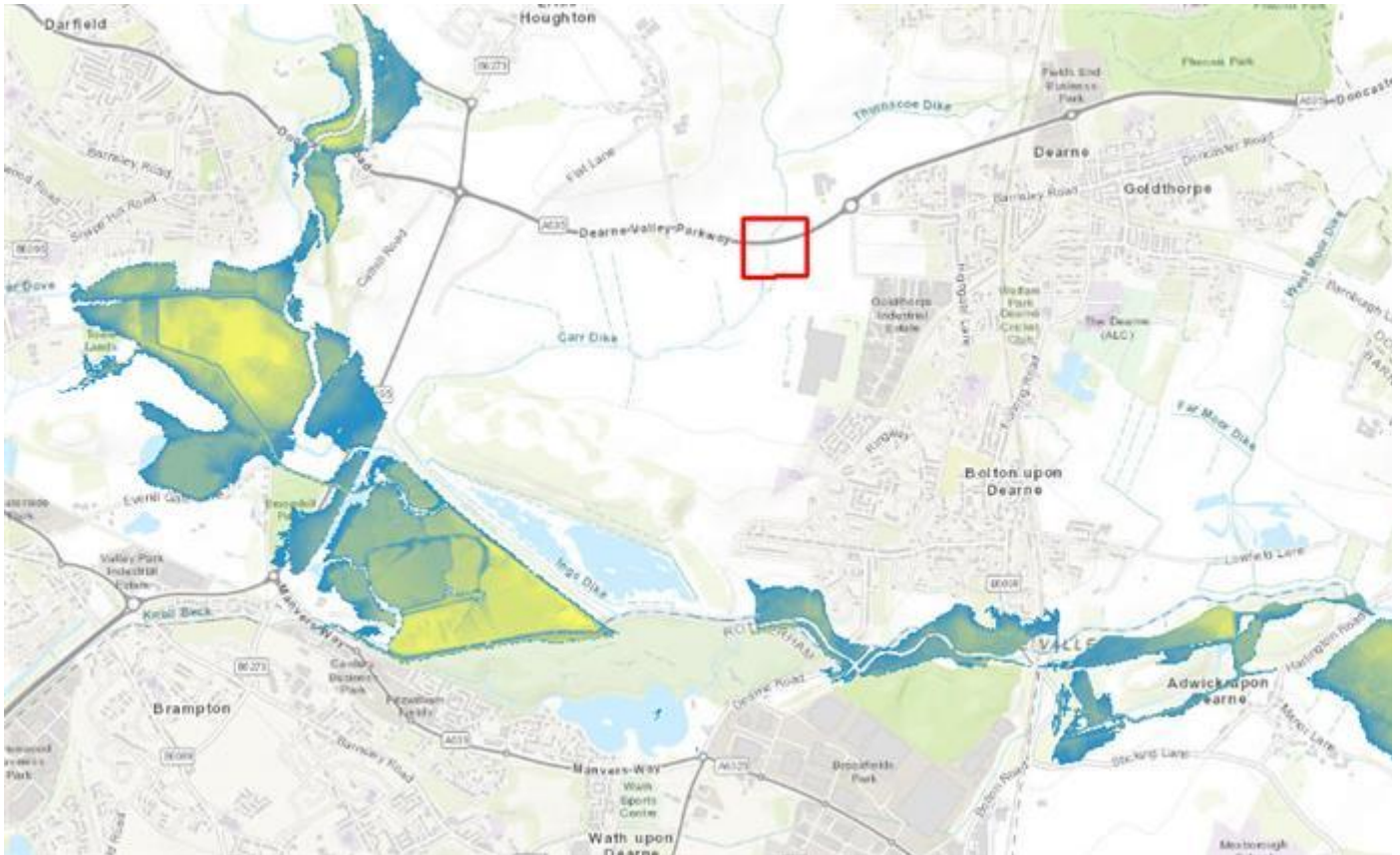
I sent an email to Debbie, however I have noticed she's on leave until Tuesday 27th October. I was just wondering would anyone be available to address my query in the email below in Debbie's absence?

Thanks,
Heather

Thank you for providing the model data to inform Goldthorpe FRA. I appreciate how busy you've been.

We've had a look through the model outputs, however as shown below, the model has been truncated, and therefore we do not have a model outline for the location of our site (as shown in red).

Please can you confirm whether you have a model for Carr Dyke where our site is located? If so, please could you send the model outputs as soon as possible?



Thanks,
Heather

From: France, Debbie <Debbie.France@environment-agency.gov.uk>
Sent: 21 October 2020 16:25
To: Street, Felicity <felicity.street1@aecom.com>
Subject: [EXTERNAL] FW: Your Enquiry: RFI/2020/184436

Hi Felicity

Further to the below

I understand the Sustainable Places team may have been in touch regarding pre-application advice. My apologies for not mentioning it again

Debbie France
Customers and Engagement Team
Environment Agency | Lateral, 8 City Walk, Leeds, LS11 9AT

debbie.france@environment-agency.gov.uk
External: 0203 0254731 | Internal :54731

Enquiries Team Tel: 020 847 48174
Email: neyorkshire@environment-agency.gov.uk

Working days: Monday to Friday

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From: France, Debbie
Sent: 21 October 2020 16:12
To: felicity.street1@aecom.com
Subject: Your Enquiry: RFI/2020/184436

Our Ref: RFI/2020/184436

Your Ref:

Dear Felicity

RE: Provision of Product 4, 5, 6 & 7 data for Goldthorpe FRA
Request for information under the Freedom of Information Act 2000 (FOIA) / Environmental Information Regulations 2004 (EIR)

Thank you for your enquiry which was received on 7 September 2020. Apologies for the delay in responding.

We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 and the associated Environmental Information Regulations 2004.

The requested Product 4 data is attached.

The requested Product 5, 6 & 7 data is too large to send by email but is available on the following link:

<https://ea.sharefile.com/d-sb4533b360f345a48>

Please also see the attached 'Supporting Information' document which should be read in conjunction with this data.

Please note: we do not have any Breach scenario information in this location therefore we have been unable to provide the product 8 part of this request.

Please note the above link will expire in 30 days so we strongly recommend downloading the files and saving these to your computer as soon as this email is received. Any request for a link to be remade after it has expired will be considered as a new enquiry and will be subject to a response within 20 working days.

The Product 4 information is provided subject to the Open Government Licence ([here](#)). Please read for details of permitted use.

RE: Hydraulic Model (for Product 7) Outputs (for Product 6) Report (for Product 5) for 2018 Middle and Lower Don Mapping Study

This information is not available with the Open Government Licence but we may be able to license it to you under the [Environment Agency Conditional Licence](#) : Please refer to the attached conditional licence for details of permitted use

If you are using our data to inform a development proposal, we encourage you to contact our Sustainable Places team for pre-application advice. Their advice can help you solve key environmental issues early, reduce the chance of an objection and help you design a more sustainable development. To take advantage of this service and gain further details, together with estimated costs, please email sp-yorkshire@environment-agency.gov.uk.

For general enquiries relating to your development or our role within the planning system, please refer to the attached 'Planning advice for developers' document.

I hope that we have correctly interpreted your request. If you are not satisfied with our response to your request for information you can contact us within 2 calendar months to ask for our decision to be reviewed.

Yours sincerely

Debbie France

Customers and Engagement Team

Environment Agency | Lateral, 8 City Walk, Leeds, LS11 9AT

debbie.france@environment-agency.gov.uk

External: 0203 0254731 | Internal :54731

Enquiries Team Tel: 020 847 48174

Email: neyorkshire@environment-agency.gov.uk

Working days: Monday to Friday

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Appendix D – IDB Correspondence

Note: This meeting was undertaken during a previous revision of the highway alignment and therefore some of this information has been superseded by a more recent updated design (Oct 2021). However, there has been no change to the design in close proximity to the Carr Dike, and therefore point 05 in the meeting minutes remains valid.

Danvm Drainage Commissioners IDB – Drainage Meeting Minutes

Meeting name Pre-application Meeting with Danvm Drainage Commissioners IDB	Subject Discharge Consent to Carr Dike	Attendees Andrew McLaughlin (AM), CEO, Danvb Internal Drainage Board (Danvb IDB) Liam Plater (LP), Senior Development Control Officer, Danvb IDB Helen Graham (HG), Principal Consultant, AECOM Heather Wells (HW), Consultant, AECOM Fainos Muzondo (FM), Principal Engineer, AECOM	Apologies Suzanne Brough, Senior Major Projects Officer, Barnsley Metropolitan Borough Council (BMBC) Andy Jones, Project Manager, BMBC
Meeting date 24/02/2021	Time 14:30		
Location MS Teams	Project name MHA PSP3 A635 Goldthorpe access		
Project number 60647775	AECOM project number 60647775		
Prepared by Fainos Muzondo			

REF	DISCUSSION POINT	ACTION by
01	Meeting was called to discuss the application to discharge surface water runoff from the proposed A635 Goldthorpe access project to the Carr Dike. The discharge consent is being sought from Danvm IDB. HW described the project including its location and the Flood Risk Assessment work that have been carried out to date.	
02	HG explained that the southern tip of the access roundabout marginally infringes upon Flood Zone 3 by 19m ³ , however agreements with the EA have been made and agreed not to provide flood compensatory storage given how small the area is.	
03	HG discussed that the access roundabout will have scour protection at its southern location to protect the structures integrity.	
04	HW explained that where the A635 crosses the Carr Dike there will be no change to the bridge crossing, only limited to resurfacing works only. There will be no change to the existing culvert structure and the proposed access roundabout is approximately 130 m to the west of the Carr Dike and therefore outside Danvm IDB byelaw distances from the watercourse.	
05	After HW presentation, AW said that Danvm IDB have no concerns from a flood risk perspective.	
06	FM explained that no sub-surface drainage could be found on site when the last survey was carried out. The Yorkshire Water information also showed no records of a sub-surface system. However, he said that the existing road gullies indicate that there is a positive drainage system on the road. AM concurred and said other methods of locating the existing system can be employed.	AECOM
07	FM mentioned that the existing drainage system is assumed to start at the east of the junction of the A635 Road with Billingley Green lane. This is due to the presence of a crest (watershed) on the existing alignment in this area which indicate two separate catchments flowing in opposite directions. AM agreed but said this would need	AECOM

REF	DISCUSSION POINT	ACTION by
	investigating to confirm that the existing drainage is not taking flows from a wider catchment area to the east of the junction.	
08	FM explained that the current design is proposing a storage tank (Box culvert) in the central island of the roundabout. The design is based on limiting the discharge to the Carr Dike to 64.1 l/s representing peak flow for a storm with a return period of 1 in 1 years. This has been assessed using MicroDrainage software assuming brownfield runoff for the existing impermeable carriageway within the scheme extents.	
09	AM said they need evidence to prove the existing highway drainage currently works and discharges to the assumed outfall shown downstream of EXMH05 (Drawing 6064775-ACM-HDG-DR-004 REV P02). He suggested use of dye testing, Ground Penetrating radar and use of CCTV to locate the existing drainage system.	AECOM/BM BC
10	AM said that If the existing sub-surface drainage system and outfall are proven, then they will allow a peak proposed discharge to the Carr Dike for a storm with a return period of 1 in 30 years for the brownfield catchment or lower if the system surcharges. Danvm IDB would also agree to 'stack' the greenfield rate on top of the brownfield rates if the existing drainage system is proved.	AECOM
11	AM stated that if the existing drainage system is not proved then the proposed drainage should be restricted to greenfield runoff.	AECOM
12	AM stated that IDB will not accept the FRA without the supporting Drainage Strategy which includes evidence of drainage discharge calculations, evidence that the existing system works and attenuation sizing.	AECOM
13	IDB agreed that the proposed flow attenuation should be up to 1 in 100 including a 40% uplift to the peak rainfall intensity for climate change.	
14	IDB agreed with FM that SUDS solutions are not feasible due to lack of space and the high groundwater table.	
15	IDB currently have no policy for monthly charges to allow for an increase in discharge rates.	