

Grey Towers Phase 9

Flood Risk Assessment

Fordy Farms (Ingleby) Ltd

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-	10/02/2022	Planning Issue
A	13/04/2023	Revised Layout
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Executive Summary

Cundall have prepared this Flood Risk Assessment (FRA) as part of the planning application for the proposed Grey Towers Phase 9 residential development of 8 no. houses located in Nunthorpe, Middlesbrough.

A previous FRA had been submitted on the 5th of July 2019 for a total development of 450 houses.

The 10 house development is less than 1 hectare. However; the site is situated within the larger development of more than 1 hectare and therefore the planning application must be supported by a site-specific FRA.

This FRA has been prepared in accordance with the National Planning Policy Framework (NPPF). The proposed development lies within National Flood Zone 1.

All forms of flood risk to and from the proposed development have been considered and the risk found to be low to medium. These include tidal, fluvial, existing drainage, proposed drainage, infrastructure failure, overland/surface water flooding and groundwater. The development has been deemed acceptable from a flood risk perspective as the proposed drainage design will mitigate potential risk factors, and surface water flood risk from medium to low.

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1.0

Introduction

1.0 Introduction

1.1 Reason for Report and Planning Context

Cundall have prepared this Flood Risk Assessment to support the planning application for the proposed Grey Towers residential development of 8 houses and is located in Nunthorpe, Middlesbrough. See **Figure 1** for a site location plan.

A previous FRA had been submitted on the 5th of July 2019 for a total development of 450 houses.

1.2 Scope of Report

This report has been written to meet the requirements of a site-specific flood risk assessment in accordance with the National Planning Policy Framework (NPPF) and includes the following:

- An appraisal of the availability and adequacy of existing information.
- An appraisal of the flood risk posed to the site, and potential impact of the development on flood risk elsewhere.
- An appraisal of the scope of possible measures to reduce the flood risk to acceptable levels if required.

1.3 Existing Site

1.3.1 Site

The existing site within the planning boundary is approximately 0.7ha and consists of open greenfield areas. The site's approximate national grid reference is NZ530138, and is located south west of the Dixons Bank - A172 highway. The site slopes from the North with levels in the region of 88.5m to the south with levels around 87.0m AOD. See **Figure 1** for site location.

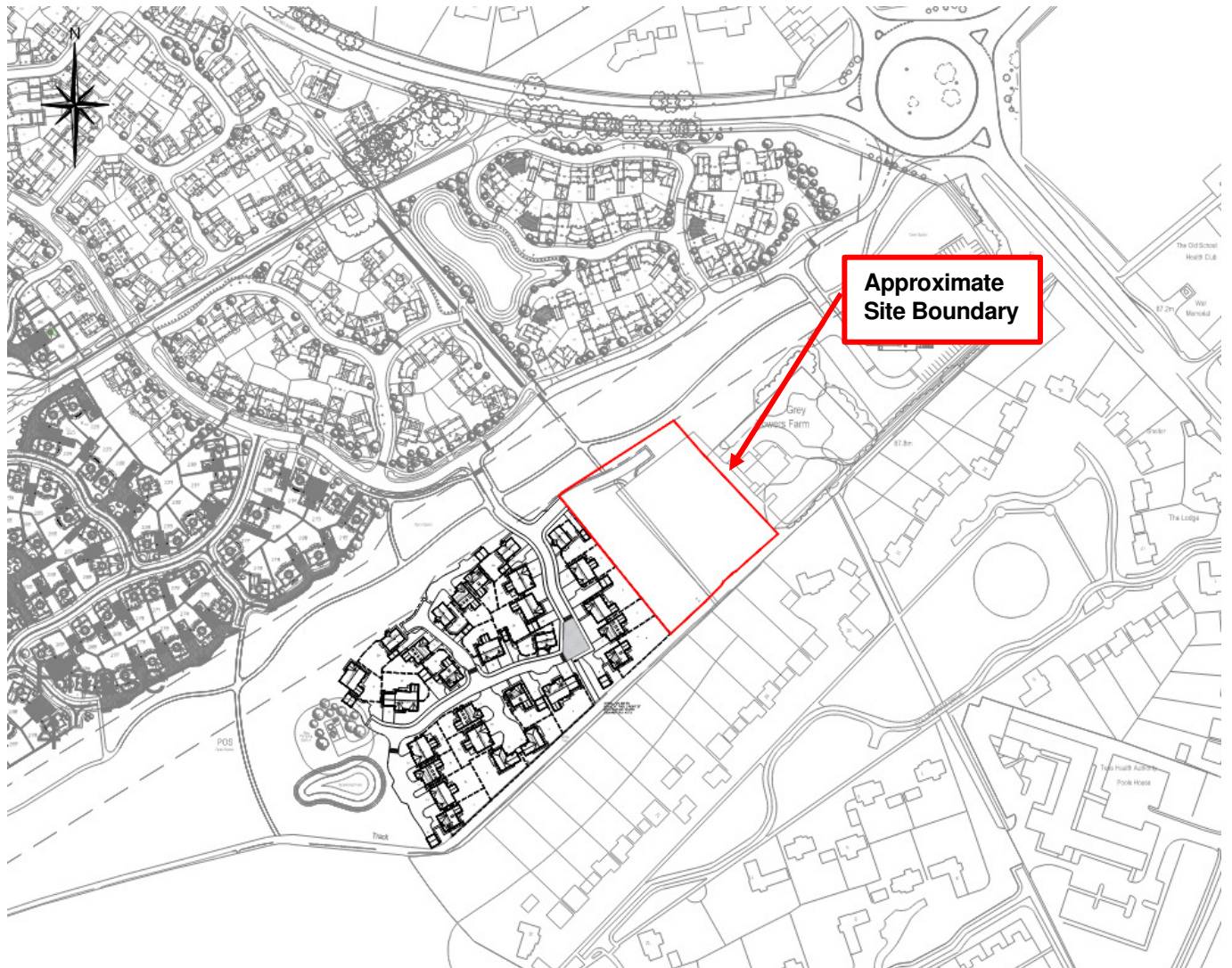


Figure 1 - Site Location

1.3.2 Surrounding Area

The site is bounded to the North by Phases 2a and 2b, to the West by Phase 4 and to the South by existing houses. The existing Grey Towers farm is located to the East of the development.

1.4 Proposed Development

1.4.1 Development

The proposed development includes the provision of 8 houses with associated roads and parking. The proposed site plan can be seen in **Figure 2** and **Appendix 1**.

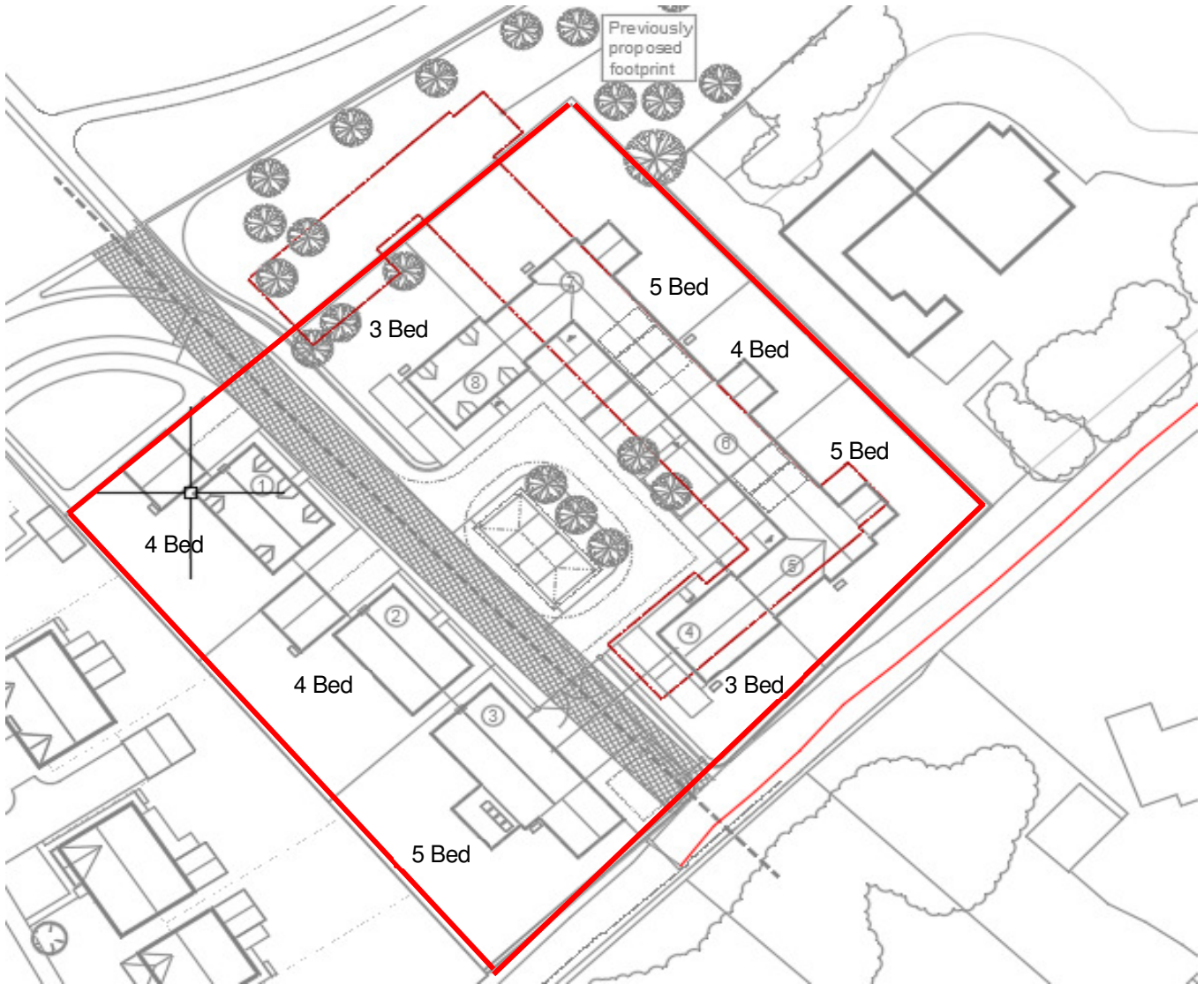


Figure 2 - Proposed Grey Towers Phase 9

1.4.2 Development Vulnerability Classification

The proposed development lies within a National Flood Zone 1, land with a low probability of flooding, less than 1 in 1000 annual probability of a river or sea flooding (<0.1%). All flood risk vulnerability classifications, in accordance with Table 2 of the NPPF which can be found in **Appendix 2**, are considered compatible with Flood Zone 1. Therefore, the proposed development is deemed appropriate based on Table 3 of the NPPF Technical Guidance.

1.5 Policy and Information Review

This section reviews Policy, Strategic Flood Risk Assessment (SFRA) documents and guidance and includes relevant extracts for consideration in the flood risk assessment sections.

1.5.1 Technical Guidance to the National Planning Policy Framework

The government's national policy on development and flood risk is covered by the NPPF and its associated technical guidance. The principal aim of the NPPF for flood risk is that:

“Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere.”

1.5.2 Strategic Flood Risk Assessment

Middlesbrough Council published a Preliminary Flood Risk Assessment (PFRA) in 2007, a Strategic Surface Water Flooding Study (SSWFS) in March 2010 and a Strategic Flood Risk Assessment – Update to 2007 SFRA in October 2013. These reports have been prepared to meet the Council's statutory duty under Section 10 of the Flood Risk Regulations (2009) and provide information on any risks posed by tidal, fluvial, surface water and groundwater flooding. They also highlight if the site is subject to flood risk management measures.

The Middlesbrough Council PFRA, SSWFS and SFRA have the following findings and historical maps for Middlesbrough;

5. Surface water flood risk in Middlesbrough

5.1 Introduction

Middlesbrough is predominantly urban, though there is a belt of open countryside to the south. There are also some undeveloped pockets of land in the central and north parts of the borough. Compared to predominantly rural areas, this means surface water runoff will be high and it will take a short time for the runoff to pass through the catchment. In general, this means Middlesbrough will be susceptible to surface water flooding as the surrounding catchment will not attenuate much rainfall during a heavy storm event. The majority of the rainfall will pass through the surface water sewer infrastructure and watercourses very quickly (rather than having some storage in the ground and a slower movement of rainfall through baseflow).

5.1.1 Topography

In terms of topography, Middlesbrough can be split into two areas. The southern part (separated from the north by the A174) is on higher ground which has a downward gradient going south to north. However, the highest part of Middlesbrough is only in the region of 100m AOD which is relatively low compared to the surrounding North Yorkshire Moors above Redcar and Cleveland BC which are over 300m high in places. The watercourses and therefore main sources of surface water flood risk originate in this higher part of Middlesbrough.

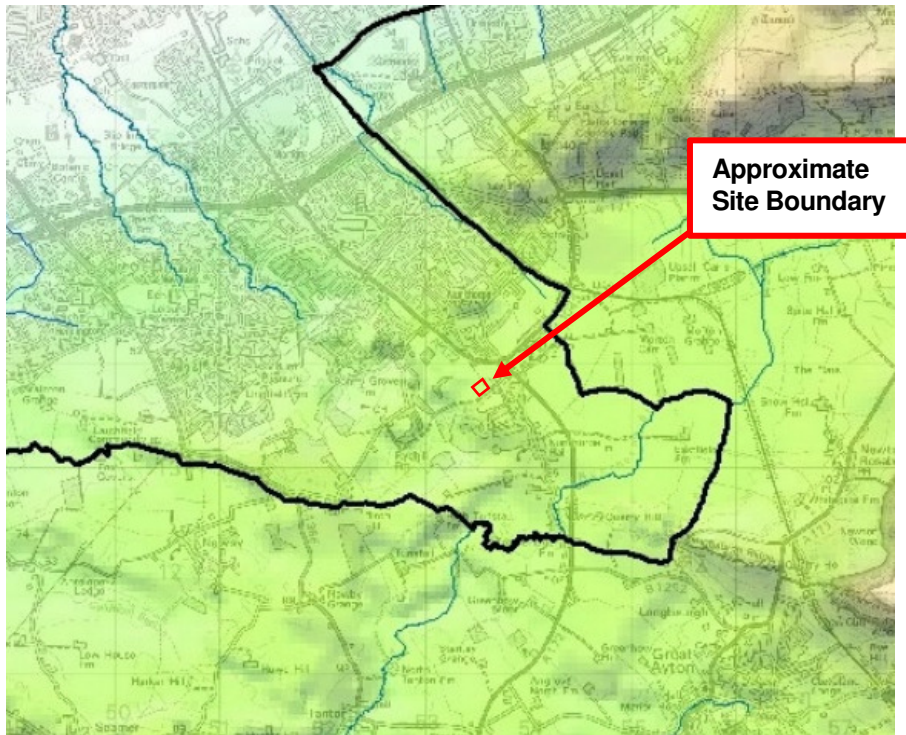


Figure 3 - Middlesbrough Council Topography and Watercourses

5.1.2 Historic flooding

Middlesbrough has been subject to extensive flooding in recent years. In November 2000, Middlesbrough suffered record levels of sustained rainfall. This resulted in widespread flooding as watercourses and surface and foul sewer systems became overwhelmed.

In June, July and August 2002, 40 locations in Middlesbrough were subject to flooding. Short periods of high intensity rainfall led to the surface water drainage systems becoming overwhelmed and backing up. This included foul sewer flooding in some properties.

5.1.3 Risks from other sources of flooding

The SFRA process should look at the risk of flooding from all sources. This SFRA update is based on readily available data, and based on this data focuses primarily on fluvial/tidal flooding, surface water flooding, and sewer flooding. Other sources of flood risk exist as follows:

- *Groundwater flooding*

No readily available data has been found to inform the risk assessment from ground flooding and this has not been considered further in the site-specific assessments

- *Breach and/or overtopping of flood defences*

The review of flood defence data from the Environment Agency indicates no areas at immediate risk from breach and/or overtopping of flood defences and this has not been considered further in the site-specific assessments. Where available, information on other sources of flooding should be included in any site-specific flood risk assessment carried out.



Figure 4 - Surface Water Management Plan and Historic Flooding - Site 6a

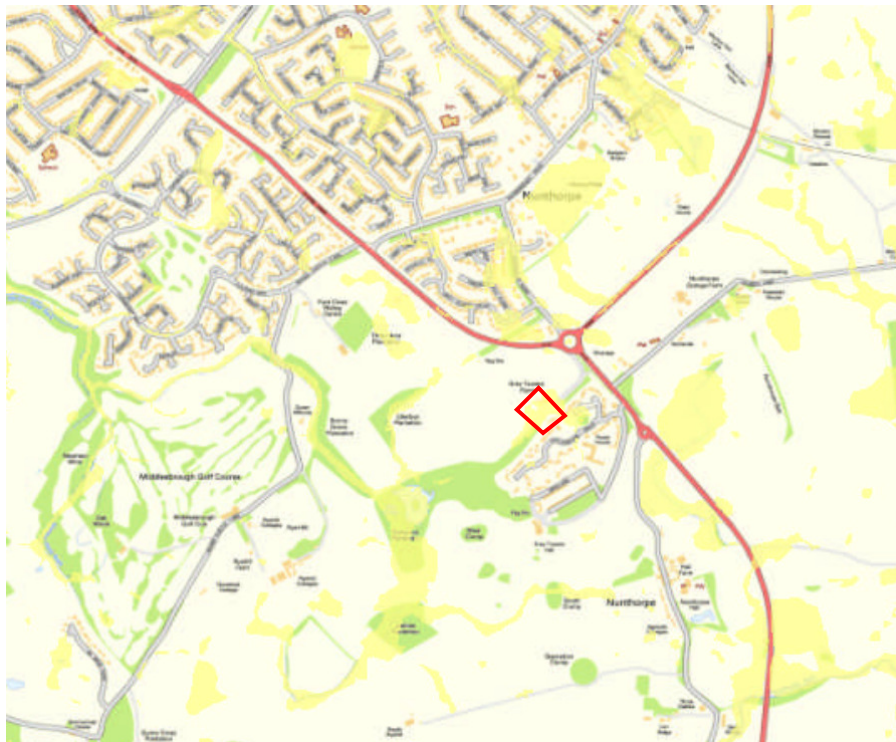


Figure 5 - Areas Susceptible to Surface Water

1.6 Consultations

1.6.1 Middlesbrough Council – Lead Local Flood Authority

Contact was made with Middlesbrough Council LLFA to outline the scope of the overall Grey Towers development and discuss storm water drainage strategies.

1.6.2 Environment Agency (EA)

The Environment Agency have not been directly consulted pre-application as there was no flood risk identified from relevant sources through their Flood Zone mapping, however, their flood maps have been used extensively throughout this report.

1.6.3 Northumbria Water Limited (NWL) – Sewerage Undertaker

A pre-development enquiry has been made to NWL regarding the disposal of foul and surface water. The S104 agreement for the previous phase has not yet been signed off and therefore the foul and surface water sewers in question are currently unadopted and NW are unable to give agreement to either connection at this point in time.

However, providing the S104 agreement is signed then the foul flows could discharge without restriction into the 225mm foul water sewer via manhole 5803.

The surface water flows have been designed into the adjacent phase and the ultimate discharge to the water course remain unchanged.

2.0

Flood Risk Identification & Analysis

2.0 Flood Risk Identification & Analysis

2.1 Tidal & Fluvial

The Environment Agency’s (EA) flood map for planning indicates that the site lies within Flood Zone 1. Land assessed as having less than a 1 in 1000 annual probability of river or sea flooding. An extract from the EA map is shown in **Figure 6**.

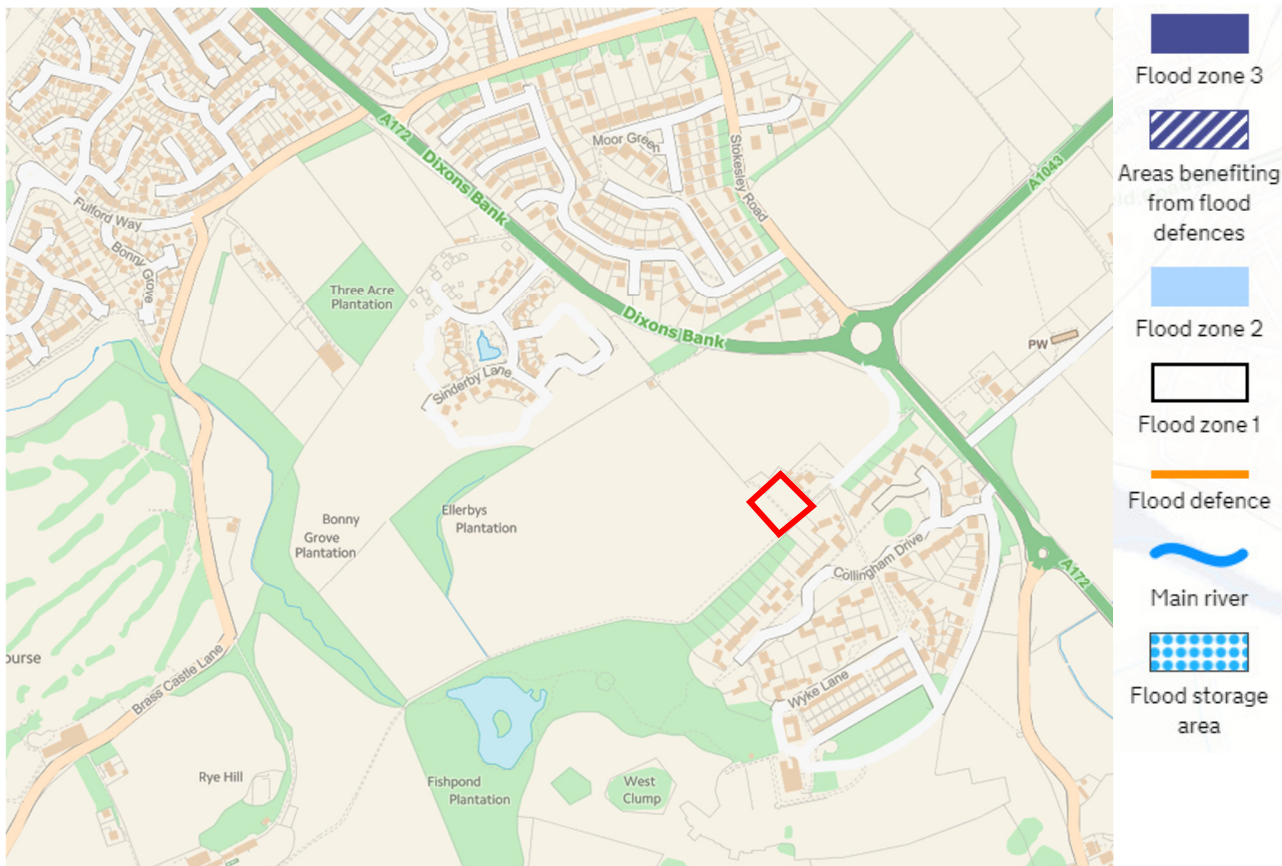


Figure 6 - EA - Flood Map for Planning

No historical flooding has been recorded within the proposed development.

As the site is located entirely within National Flood Zone 1 land, the risk of flooding from tidal or fluvial sources is low.

Assessment of Impact: LOW

Assessment of Probability: LOW

2.2 Artificial Drainage

2.2.1 Existing NWL Drainage

The existing drainage within the proposed development can be seen in Figure 7 and 8 below.

Figure 7 shows the line of an NWL sewer running South to North through the proposed development. This sewer shall remain in place with a 7m wide easement through the proposed development.

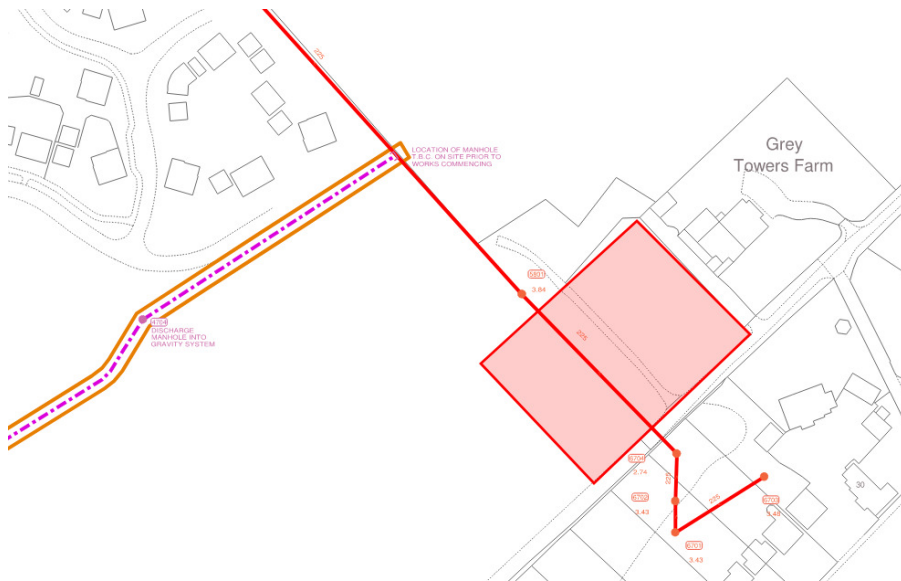


Figure 7 – Existing NWL Infrastructure

2.2.2 Existing Phase 4 Drainage

Figure 8 shows the existing Grey Towers Phase 4 development to the South-West of the proposed site. There is an existing pond located in the south-western corner of the site which collects the surface water runoff from the existing phase 4 with additional capacity for the current proposal and discharges to the watercourse that runs to the southwest boundary.

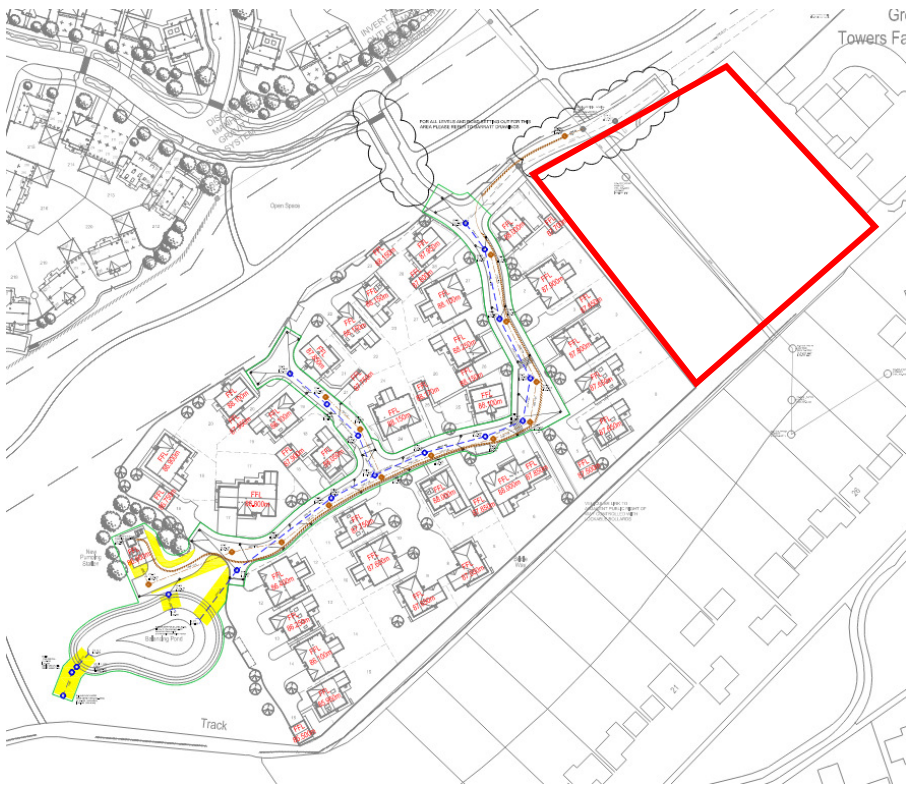


Figure 8– Existing Phase 4 Drainage

Assessment of Impact: LOW

Assessment of Probability: LOW

2.2.3 Proposed Drainage

The proposed drainage strategy drawing can be seen in **Appendix 5**.

Surface water: It is proposed that Phase 9 will discharge into the sewers running along the North boundary of the site and connect into the Phase 4 drainage network. This network connects to the existing pond located to the south-western corner which then discharges to the NWL sewer to the south.

The existing site drainage system was originally designed to allow the flows from the development so there is no change to the flood risk impact.

The development shall contain attenuation to be designed to store flows up to and including the 1 in 100 year critical storm with a 40% allowance for climate change and 10% allowance for urban creep.

Foul water: Phase 9 is proposed to discharge foul water flows to the existing NWL sewer that is located within the proposed development.

Refer to the drainage strategy report with reference GT9-CDL-XX-XX-RT-C-1002 DS for more information on the proposed drainage.

Assessment of Impact: LOW

Assessment of Probability: LOW

2.3 Overland/Surface Water

The EA’s long-term flood risk map in **Figure 9** shows that the site is in a zone identified as having a low to medium risk of flooding. This is due to the existing topography of the site and the medium flood risk should be mitigated to low flood risk across the site as the proposed levels shall raise the dwellings above the low spots on site by approximately 1m.

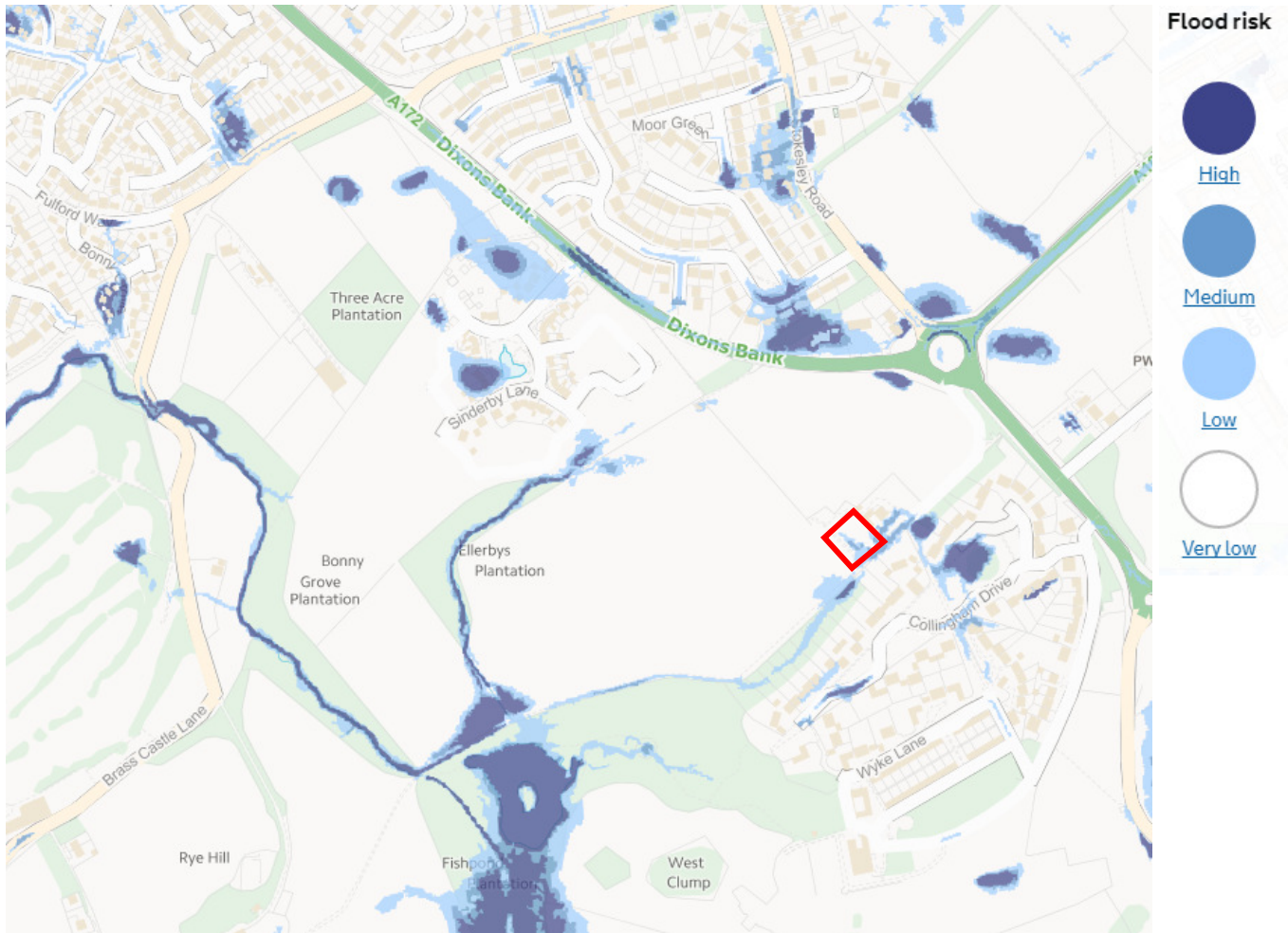


Figure 9 - EA - Flood Risk from Surface Water (Extend of Flooding)

The areas of flooding shown within Phase 9 are standing water areas. The areas of flooding located to the south west at the ends of the culvert, are mainly caused due to the site’s topography and the culvert restriction. The topographical survey can be seen in **Appendix 3**. Overland flows will be alleviated with the inclusion of the new drainage system.

The development proposals will not increase flood risk elsewhere or offsite as all development flows will be collected, conveyed and stored on site.

As the new drainage system will improve the site’s current drainage system and intercept any overland flows, the risk of flooding from surface water is considered low.

Assessment of Impact: LOW

Assessment of Probability: LOW

2.4 Infrastructure Failure

The development is not noted to be downstream from any large infrastructure assets and is not in an area noted to be risk of flooding from reservoir failure. See **Figure 10**.

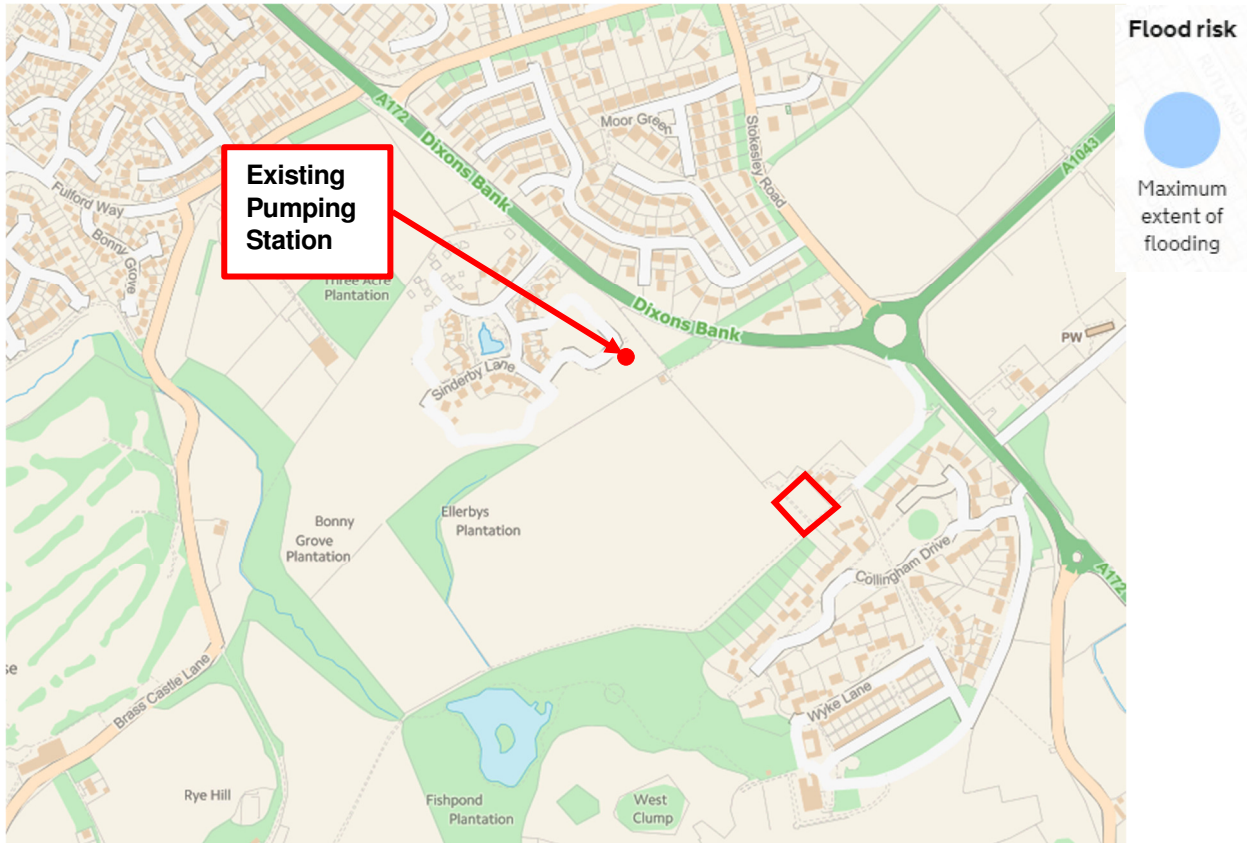


Figure 10 - EA - Flood Risk from Reservoirs

No records of pumping failure leading to flooding of the Grey Towers site has been found. It is expected that the foul flows will be conveyed by the existing pumping station that has already been designed to accept additional flows from the wider Grey Towers development. NWL has been informed with regards to any potential capacity issues, and it is proposed that the detailed design of the drainage network will consider NWL’s requirements.

Assessment of Impact: LOW

Assessment of Probability: LOW

2.5 Groundwater

Flooding from groundwater is considered as low according to the EA's groundwater map. See **Figure 11**.

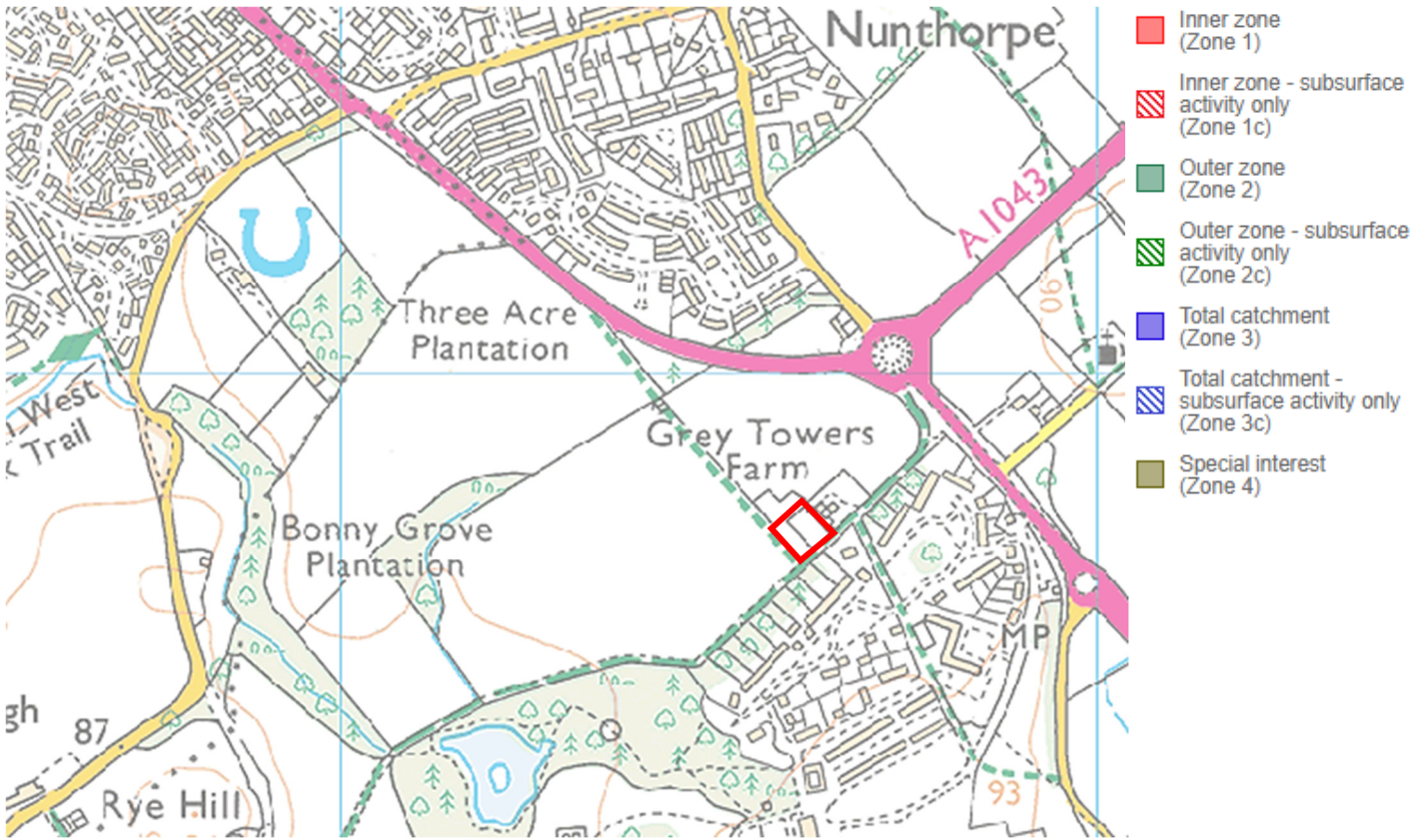


Figure 11 – Groundwater

Desktop studies have shown that the Grey Towers site is largely underlain by boulder clay and the groundwater levels are not critical.

Assessment of Impact: LOW



Assessment of Probability: LOW

3.0

Flood Risk Mitigation

3.0 Flood Risk Mitigation

A summary of the flood risks identified in **Section 2** are shown in the table below.

RISK ASSESSMENT MATRIX				
				
	Impact			
Probability of Event		Low	Medium	High
	Low	A, B, C, D, E		
	Medium			
	High			

Key:

- A:** Tidal & Fluvial – (Section 2.1)
- B:** Artificial Drainage – (Section 2.2)
- C:** Overland/Surface Water – (Section 2.3)
- D:** Infrastructure Failure – (Section 2.4)
- E:** Groundwater – (Section 2.5)

All forms of flood risk posed to the site and the potential impact of the development on flood risk elsewhere has been assessed as low.

4.0 Conclusions

This document shows that the proposed Grey Towers Phase 9 development is acceptable from a flood risk perspective. The vulnerability classification is considered compatible with the flood zone in accordance with NPPF criteria and given the low flood risk from all sources.

All forms of flood risk to and from the proposed development have been considered. These include tidal, fluvial, artificial drainage, overland, infrastructure failure and groundwater.

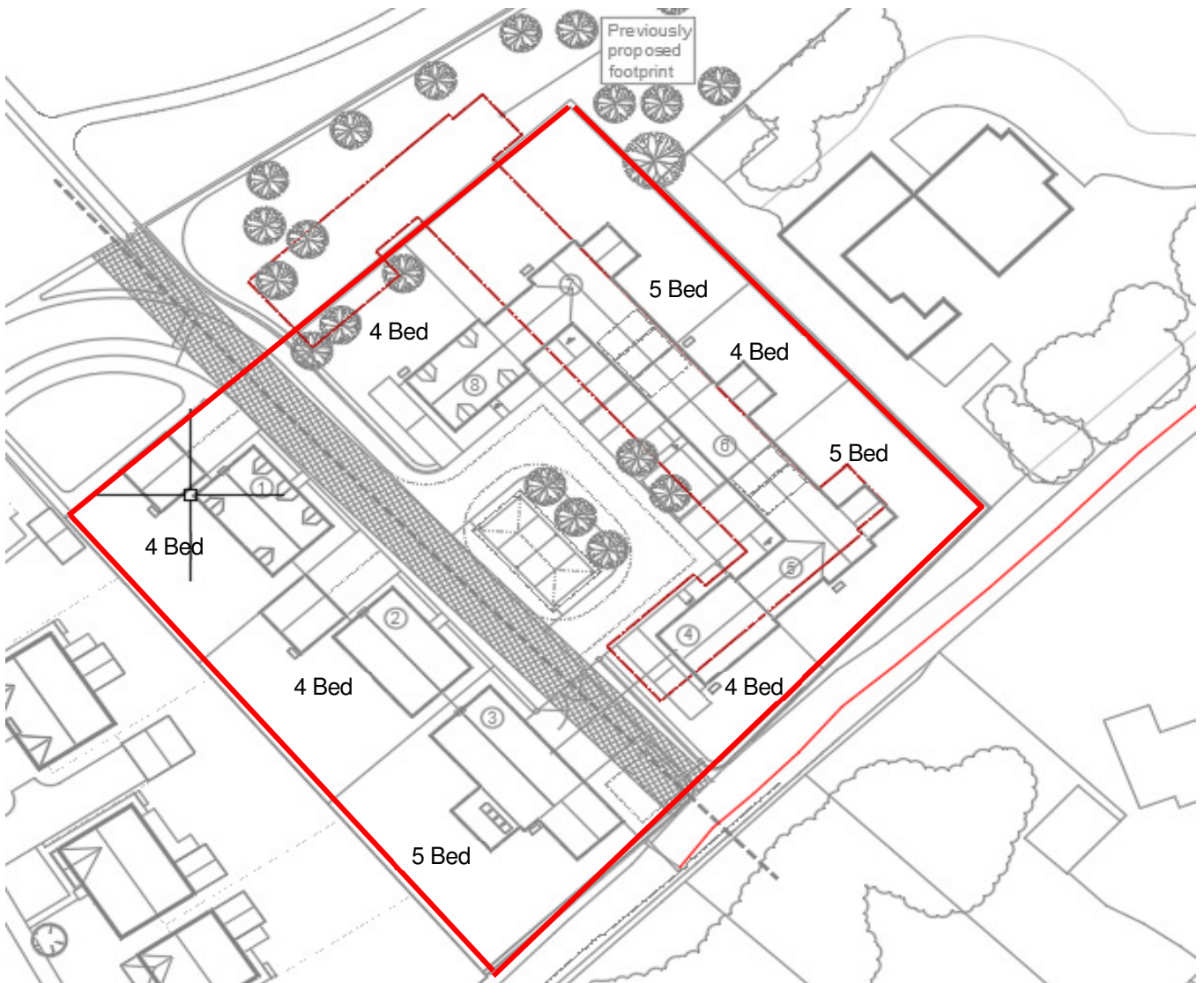
The detailed design of topography and layout arrangements will mitigate the risk of standing water present on site.

5.0 References

- Department for Communities and Local Government, 2019: National Planning Policy Framework
- Department for Communities and Local Government, 2019: Technical Guidance to the National Planning Policy Framework
- JBA Consulting, 2010: Middlesbrough Council Strategic Surface Water Flooding Study, Final Report
- Middlesbrough Council, 2007: Preliminary Flood Risk Assessment
- Arup, 2013: Middlesbrough Council, Strategic Flood Risk Assessment – Update to 2007 SFRA
- JBA Consulting, 2018: Middlesbrough Council, Strategic Flood Risk Assessment – Update to 2013 SFRA

6.0 Appendices

6.1 Appendix 1 – Proposed Site Plan



6.2 Appendix 2 – NPPF Technical Guidance Tables 2 & 3

Table 2: Flood risk vulnerability classification

<p>Essential infrastructure</p> <ul style="list-style-type: none"> • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
<p>Highly vulnerable</p> <ul style="list-style-type: none"> • Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use³. • Installations requiring hazardous substances consent⁴. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as “essential infrastructure”⁵).
<p>More vulnerable</p> <ul style="list-style-type: none"> • Hospitals. • Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non-residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste⁶. • Sites used for holiday or short-let caravans and camping, <i>subject to a specific warning and evacuation plan</i>.⁷
<p>Less vulnerable</p> <ul style="list-style-type: none"> • Police, ambulance and fire stations which are <i>not</i> required to be operational during flooding. • Buildings used for shops, financial, professional and other services,

³ For any proposal involving a change of use of land to a caravan, camping or chalet site, or to a mobile home site or park home site, the Sequential and Exception Tests should be applied.
⁴ See Circular 04/00: *Planning controls for hazardous substances* (paragraph 18) at: www.communities.gov.uk/publications/planningandbuilding/circularplanningcontrols
⁵ In considering any development proposal for such an installation, local planning authorities should have regard to planning policy on pollution in the National Planning Policy Framework.
⁶ For definition, see *Planning for Sustainable Waste Management: Companion Guide to Planning Policy Statement 10* at www.communities.gov.uk/publications/planningandbuilding/planningsustainable
⁷ See footnote 3.

<p>restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in “more vulnerable”, and assembly and leisure.</p> <ul style="list-style-type: none"> • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do <i>not</i> need to remain operational during times of flood. • Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).
<p>Water-compatible development</p> <ul style="list-style-type: none"> • Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of Defence defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, <i>subject to a specific warning and evacuation plan.</i>

Notes to table 2:

- a. This classification is based partly on Department for Environment, Food and Rural Affairs and Environment Agency research on *Flood Risks to People (FD2321/TR2)*⁸ and also on the need of some uses to keep functioning during flooding.
- b. Buildings that combine a mixture of uses should be placed into the higher of the relevant classes of flood risk sensitivity. Developments that allow uses to be distributed over the site may fall within several classes of flood risk sensitivity.
- c. The impact of a flood on the particular uses identified within this flood risk vulnerability classification will vary within each vulnerability class. Therefore, the flood risk management infrastructure and other risk mitigation measures needed to ensure the development is safe may differ between uses within a particular vulnerability classification.

Table 3: Flood risk vulnerability and flood zone ‘compatibility’

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

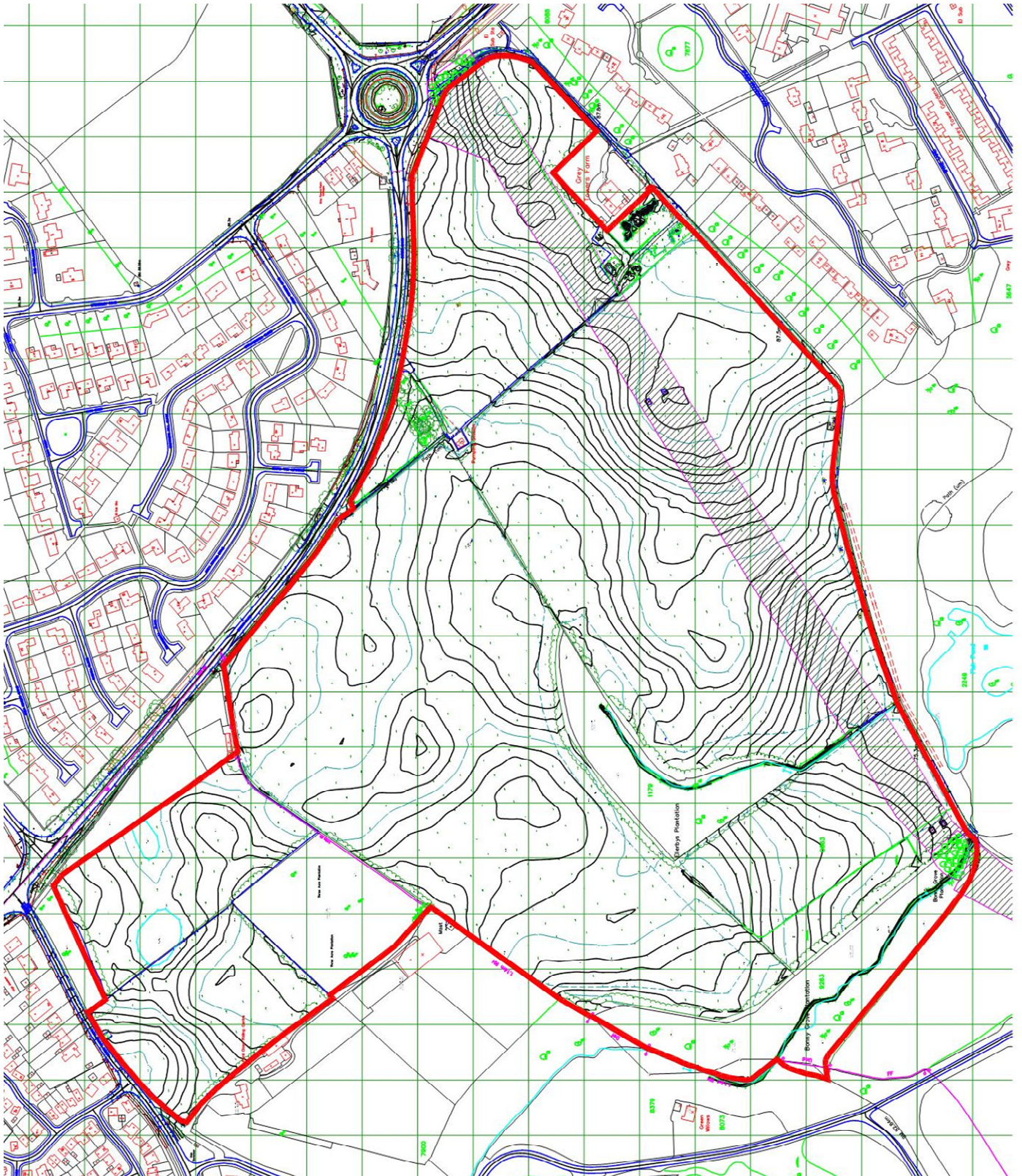
Key: ✓ Development is appropriate.
 × Development should not be permitted.

Notes to table 3:

This table does not show:

- a. the application of the Sequential Test which guides development to Flood Zone 1 first, then Zone 2, and then Zone 3;
- b. flood risk assessment requirements; or
- c. the policy aims for each flood zone.

6.3 Appendix 3 – Topographical Survey (by Findlay Surveys)



6.4 Appendix 4 – NWL Sewer Plans

