



john newton & partners
jnp group
Consulting Engineers

www.jnpgroup.co.uk

Report

Flood Risk Assessment

Project: St Michaels Avenue
Barnsley,
S71 2SD

Client: NPS Group

Reference: S10774-JNP-XX-XX-RP-C-1002-S2-P01

Date: May 2019

Brighthouse

telephone
01484 400691

email
brighthouse@jnpgroup.co.uk

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Flood Risk Assessment



Prepared by.....
Sarah Longstaff BSc (Hons), MSc
Principal Hydrogeologist



Approved by.....
Kevin Green
HSQE Manager

FOR AND ON BEHALF OF JNP GROUP

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1 INTRODUCTION

1.1 Terms of Reference

1.1.1 **jnp group** was instructed by NPS Group to undertake a Flood Risk Assessment (FRA) of:

Land off St Michael's Avenue

Barnsley

South Yorkshire

S71 2SD

hereinafter referred to as 'the site' (Appendix A).

1.1.2 It is understood that the site is to be redeveloped with 37 residential properties with private gardens, with associated roads and areas of hardstanding for parking as well as a block of apartments. The proposed redevelopment layout is shown in Appendix B.

1.1.3 All comments given are based on the understanding that the proposed redevelopment will be as detailed above.

1.2 Objectives




1.2.1 The National Planning Policy Framework (NPPF) states that when determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where informed by a site-specific FRA. This assessment is required for:

1.2.2 "Proposals of 1 hectare (ha) or greater in Flood Zone 1, all new development (including minor development and change of use) in Flood Zones 2 and 3 and an area within Flood Zone 1, which has critical drainage problems as notified to the local planning authority by the Environment Agency (EA)."

1.2.3 This FRA has been produced in support of a full planning application for the site which is 1.2 ha in size.

1.3 Methodology

1.3.1 In accordance with the March 2014 Planning Practice Guidance (PPG), which supports the NPPF, the objectives of this FRA are to establish:

-  Whether a proposed development is likely to be affected by current or future flooding from any source;
-  Whether it will increase flood risk elsewhere;
-  Whether the measures proposed to deal with these effects and risks are appropriate.

1.3.2 The FRA should be read in conjunction with the Drainage Strategy, which has been prepared separately (**jnp group** report reference S10774-JNP-XX-XX-RP-C-1001-S2, May 2019). Reference should also be made to the Ground Investigation (GI) Report (Met Consultancy Group report reference P18-01603, February 2019).

2 SITE DESCRIPTION, GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

2.1 Site Description

- 2.1.1 The site is located off St Michael's Avenue in Barnsley, South Yorkshire, approximately 3.0km north east of Barnsley town centre. The centre of the site is located at National Grid Reference 436740 408717 and the site covers an area of 1.2 hectares (ha).
- 2.1.2 The site is currently in undeveloped land.
- 2.1.3 The surrounding land uses are summarised in Table 1 below.

Table 1 Surrounding Land Use

Direction	Land Use
North	Wooded area with employment uses beyond
East	Residential
South	Residential
West	Paddock with employment uses beyond

2.2 Topography

Topography of Wider Area

- 2.2.1 To appreciate the context of the site and understand how it sits in relation to the wider area, LiDAR data has been obtained (<https://www.lidarfinder.com/>), as shown in Figure 1.

Figure 1: LiDAR Map of Wider Area



Site Topography

- 2.2.2 An onsite topographic survey has been carried out by HH Surveys (December 2018) and shows that the site is set on a slope with levels falling from the south east to the north west, with levels ranging from c. 76.3m above Ordnance Datum (aOD) to c. 67.2m aOD along the north western boundary. There are two large mounded areas towards the east of the site adjacent to St Michael's Avenue which range from 1.2 to 2m high.

2.3 Hydrology

- 2.3.1 The nearest surface water feature is a small unnamed stream c. 250m north of the site. The stream runs through the Carlton Industrial estate.
- 2.3.2 The site is located between the valley of the Cudworth Dike (to the east) and the valley of the River Dearne (to the south west), within the catchment of the Cudworth Dyke from Source to the River Dearne.
- 2.3.3 The closet surface watercourse is a small stream c. 400m to the north west, which flows through Spring Wood. This appears to disappear and is probably culverted beneath industrial units to the north of the site.

2.4 Geology

- 2.4.1 The geology of the site has been determined by reference to the 1:50,000 scale British Geological Survey (BGS) online Geoindex Tool (<http://mapapps2.bgs.ac.uk/geoindex/home.html>); as well as to the BGS 1:50,000 Series published geological map, Sheet 281 Frome (Solid and Drift, scale 1:50 000, dated 2000), accessed via the website (<http://www.bgs.ac.uk/data/maps/home.html>); these were both accessed on 04/04/2019.
- 2.4.2 No artificial ground or mass movement deposits are indicated to be present underlying the site. Superficial deposits are also absent from beneath the site.
- 2.4.3 The underlying geology is indicated to be the Pennine Middle Coal Measures Formation, which is described by the BGS as "*Interbedded grey mudstone, siltstone, pale grey sandstone and commonly coal seams, with a bed of mudstone containing marine fossils at the base, and several such marine fossil-bearing mudstones in the upper half of the unit.*" A named sandstone unit in the Coal measures is located across the southern part of the site (Oak Rock). A marine band is also shown at outcrop running from north east to south west across the site. Coal seam outcrops and faults are absent from within 250m of the site.
- 2.4.4 The 1:50,000 map does not show the dip of the strata close to the site. Generally, in this area, strata dip gently towards the east or north east.

2.5 Ground Investigation

- 2.5.1 A ground investigation was undertaken by Met Consultancy Group in January 2019 and comprised five windowless sampling boreholes, and seven mechanically excavated trial pits located evenly across the site.
- 2.5.2 The ground conditions encountered during the intrusive investigation were generally consistent with the published geological map and the borehole records for the land immediately east of the site. Made Ground, up to 0.8m thick, was encountered in three locations across the site. In all but one location, stiff silty gravelly clay was identified beneath the whole site from between 0.15m and 0.75m bgl. Weathered mudstone was then present beneath the whole site from between 0.6m and 1.8m bgl.
- 2.5.3 Thus, with the exception of sporadic Made Ground, the site was underlain by gravelly clay overlying weathered mudstone.
- 2.5.4 Groundwater strikes were noted in four investigation points at depth between 1.8m to 2.0m bgl.

2.6 Hydrogeology

- 2.6.1 The Aquifer Maps accessed via the MAGiC website (<https://magic.defra.gov.uk/MagicMap.aspx>) indicates that the site is underlain by a Secondary A-Aquifer (Coal Measures).

2.6.2 The Environment Agency define a Secondary-A Aquifer as:

“Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.”

2.6.3 The site's proximity to groundwater Source Protection Zones (SPZs) was determined by reference to the MAGiC website. These zones show the risk of contamination of major licensed groundwater abstractions from any activities that might cause pollution in the area, with the closer the activity, the greater the associated risk. The site is not located close to a SPZ.

3 FLOOD RISK ASSESSMENT

3.1 Flood Risk Guidance

3.1.1 The following resources have been reviewed to assist with the preparation of the FRA:




Strategic Flood Risk Assessment (SFRA), Level 1: An SFRA was prepared for Barnsley Metropolitan Borough in 2010. This document provides useful information regarding the specific flood risks associated with the local area.

Barnsley Interactive Map – these provide the locations of flooding and drainage issues (<https://www.barnsley.gov.uk/barnsley-maps/flooding-and-drainage-issues/>, accessed 17/4/2019).

3.1.2 The documents above were prepared several years ago and updated information has been used in some cases.

3.2 National Planning Policy

3.2.1 The PPG, which supports NPPF, defines three Flood Zones in relation to river flooding. These are defined as:

-  Flood Zone 1 (Low Probability): This zone comprises land assessed as having less than a 1 in 1000 annual probability of river flooding;
-  Flood Zone 2 (Medium Probability): This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding; and
-  Flood Zone 3 (High Probability): This zone comprises land assessed as having greater than a 1 in 100 annual probability of river flooding.

3.2.2 The EA's Flood Map for Planning shows that the site is located in Flood Zone 1.

3.3 Climate Change

3.3.1 In line with PPG, a site-specific FRA must consider the following question:

“How is flood risk at the site likely to be affected by climate change?”

3.3.2 In February 2016, the EA provided guidance on the predicted impacts of climate change on peak river flow and rainfall intensity over the next 100 years. The site is located in the Humber River Basin District, where peak river flow is predicted to increase by 10-50% by 2115. Peak rainfall intensity is predicted to increase by up to 40% by 2115.

3.3.3 Residential development has an expected minimum lifetime of 100 years, so to ensure that the development is safe from the effects of flood risk through this lifetime, climate change (flood levels and rainfall intensity) must be considered. This assessment takes account of the forecasted effects of climate change although as the site is located in Flood Zone 1, the impact on fluvial flood levels need not be considered.

3.4 Sequential Test and Exception Test

3.4.1 In accordance with the NPPF:

“The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding.”

3.4.2 Where areas of lower risk are not available, the Exception Test, as set out in paragraph 102 of the NPPF can be applied, to ensure flood risk management for people and property meets the required level of standard.

3.4.3 The site is within Flood Zone 1 so passes the Sequential Test. An Exception Test is not required.

3.5 Flood Risk from Rivers (Fluvial)

3.5.1 The site is located in Flood Zone 1 so has a less than 1 in 1000 year risk of fluvial flooding. The nearest area at greater risk of flooding is located c. 1.5km to the east therefore the site is at low risk from fluvial flooding.

3.6 Coastal and Tidal Flood Risk

3.6.1 The site is located inland and is not near any tidally influenced watercourses; therefore, there is no risk of flooding from this source.

3.7 Groundwater Flood Risk

3.7.1 Groundwater flooding occurs when the water table rises to the surface and is most likely to occur in low-lying areas underlain by permeable rocks. The underlying deposits are classed as Secondary A Aquifer by the EA and a ground investigation has found that the underlying strata are clays which generally have low permeability.

3.7.2 During the ground investigation at the site, groundwater was only encountered in some investigation holes, at a level in excess of 1.8m bgl; the GI was undertaken in January 2019 when groundwater levels are approaching the seasonal maxima.

3.7.3 The SFRA indicates that some areas of Barnsley may be at risk of groundwater flooding, but the site is not located within, or close to, these areas.

3.7.4 The SFRA also indicated sites that may be at risk of groundwater flooding due to mine water rebound. The site is allocated within the local plan (Ref HS22) and this is not one of the site indicated by the Coal Authority to be at risk.

3.7.5 It is therefore concluded that there is a low risk of groundwater flooding at the site.

3.8 Surface Water Flood Risk (Overland Flows)

3.8.1 Surface water flooding (pluvial flooding) is defined as flooding resulting from rainfall-generated overland flow before it enters a watercourse or sewer. It is usually associated with high intensity rainfall events but can also occur with low intensity rainfall where ground is frozen, saturated or has a low permeability. Large catchments are particularly prone to surface water flooding.

3.8.2 The EA produced a Risk of Flooding from Surface Water Map in December 2013. The maps were produced using 'direct rainfall' modelling. Although they take into account local drainage capacity, non-surface water influences such as rivers, seas or groundwater are not considered. The map is based on LiDAR topographic data which is not suitable for site specific assessment and therefore, where available, topographic survey data should be used to provide a more accurate understanding of potential flow paths.

3.8.3 The map shows the entire country within four different risk categories, defined below in Table 2.

Table 2: EA Surface Water Flood Risk Categories

Risk Category	Definition
High	Each year, there is a chance of flooding of greater than 1 in 30 (3.3%)
Medium	Each year, there is a chance of flooding of between 1 in 30 (3.3%) and 1 in 100 (1%)
Low	Each year, there is a chance of flooding of between 1 in 100 (1%) and 1 in 1000 (0.1%)
Very Low	Each year, there is a chance of flooding of less than 1 in 1000 (0.1%)

- 3.8.4 An extract of the map provided below in Figure 2, suggests that the site is at very low risk from surface water flooding.
- 3.8.5 On the basis of the EA's mapping and local topography, there is considered to be a very low risk of surface water flooding to the site.

Figure 2: Environment Agency Flood Risk from Surface Water Map



3.9 Sewer/Drainage Flood Risk

- 3.9.1 Sewer flooding is often caused by excess surface water entering the drainage system and when there is insufficient sewer capacity to cope with this excess water, but also due to 'one off' events such as blockages.
- 3.9.2 The Barnsley Council SFRA has indicated Yorkshire Water has provided data on flooding from their databases which has identified there is not a widespread or frequent sewer flooding issue.
- 3.9.3 There are a number of public sewers within the adjacent roads. A 225 mm diameter surface water sewer and 225 mm diameter foul water sewer run north east along St Michael's Avenue. There are no known sewers crossing the site.
- 3.9.4 The Barnsley Interactive Map provides the location of sewer and drainage issues. None are shown on or close to the site.
- 3.9.5 The risk of sewer flooding impacting the site is considered to be low.

3.10 Reservoir Flood Risk

- 3.10.1 The EA has produced a Reservoir Flood Map that shows that the site is at no risk from reservoir flooding.

4 FLOOD RISK MITIGATION

4.1 Introduction

- 4.1.1 The FRA demonstrates that the risk from all sources (fluvial, tidal, surface water, groundwater, sewer and reservoir) is low. Development of the site will increase the impermeable area, increasing surface water run-off. However this will be mitigated by attenuating the surface water run-off both below ground and on the surface for a 100 year return period with an allowance for climate change. The attenuated water will then discharge to the public sewer at a controlled rate.
- 4.1.2 Further information on the drainage strategy can be found in the accompanying report (reference S10774-JNP-XX-XX-RP-C-1001-S2).

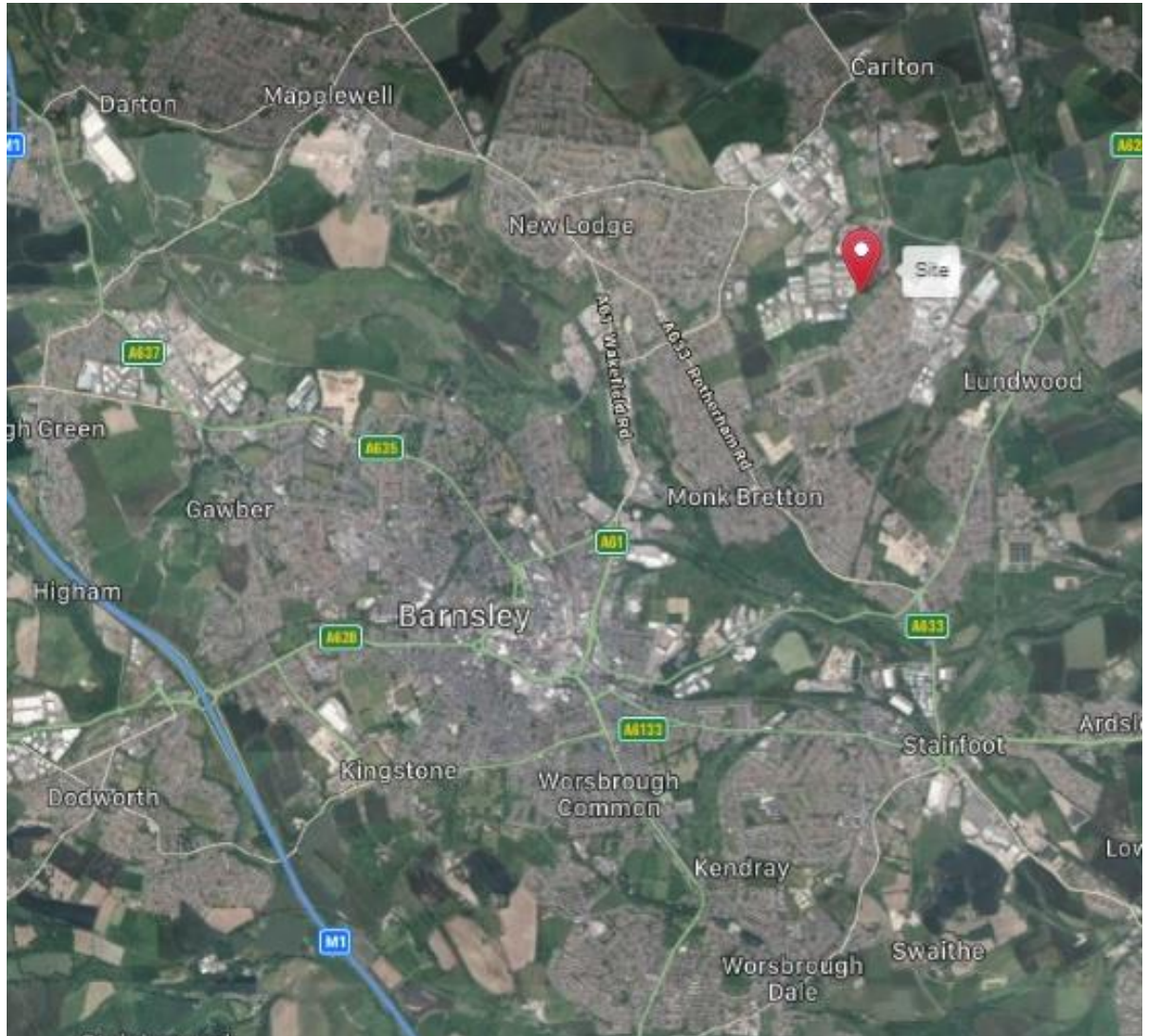
5 CONCLUSIONS AND RECOMMENDATIONS

- 5.1.1 This FRA has been prepared in accordance with the NPPF and the associated PPG, which reviews all aspects of flood risk to the site and should be read in conjunction with the associated Drainage Strategy (jnp group report reference S10774-JNP-XX-XX-RP-C-1001-S2-P01) which proposes a strategy for the discharge of surface water runoff in a manner that will not increase the risk of flooding from this source either on or off site.
- 5.1.2 According to the EA's Flood Map for Planning the development area of the site is entirely located in Flood Zone 1. Given the local topography and lack of historical flooding at the site itself, it has been concluded that the site has a very low risk of flooding from a fluvial source.
- 5.1.3 The risk of other forms of flooding (groundwater, surface water, tidal, reservoir and sewer) is considered low.
- 5.1.4 Development of the site will increase the impermeable area, increasing surface water run-off. However this will be mitigated by controlling the surface water run-off from the site in a surface water drainage system, which will discharge the run-off to the Yorkshire Water sewer. The risk of surface water flooding is therefore similar or less than the existing situation.
- 5.1.5 In conclusion the proposed development has an acceptable flood risk within the terms and requirements of the NPPF.
- 5.1.6 The comments stated above are based on information received from other consultees. The flood risk classification of this site has been based on the above observations and the recommendations stated. This report is intended for the use of the developer of the site in support of their planning application for this site only.

Appendix A

Location Map

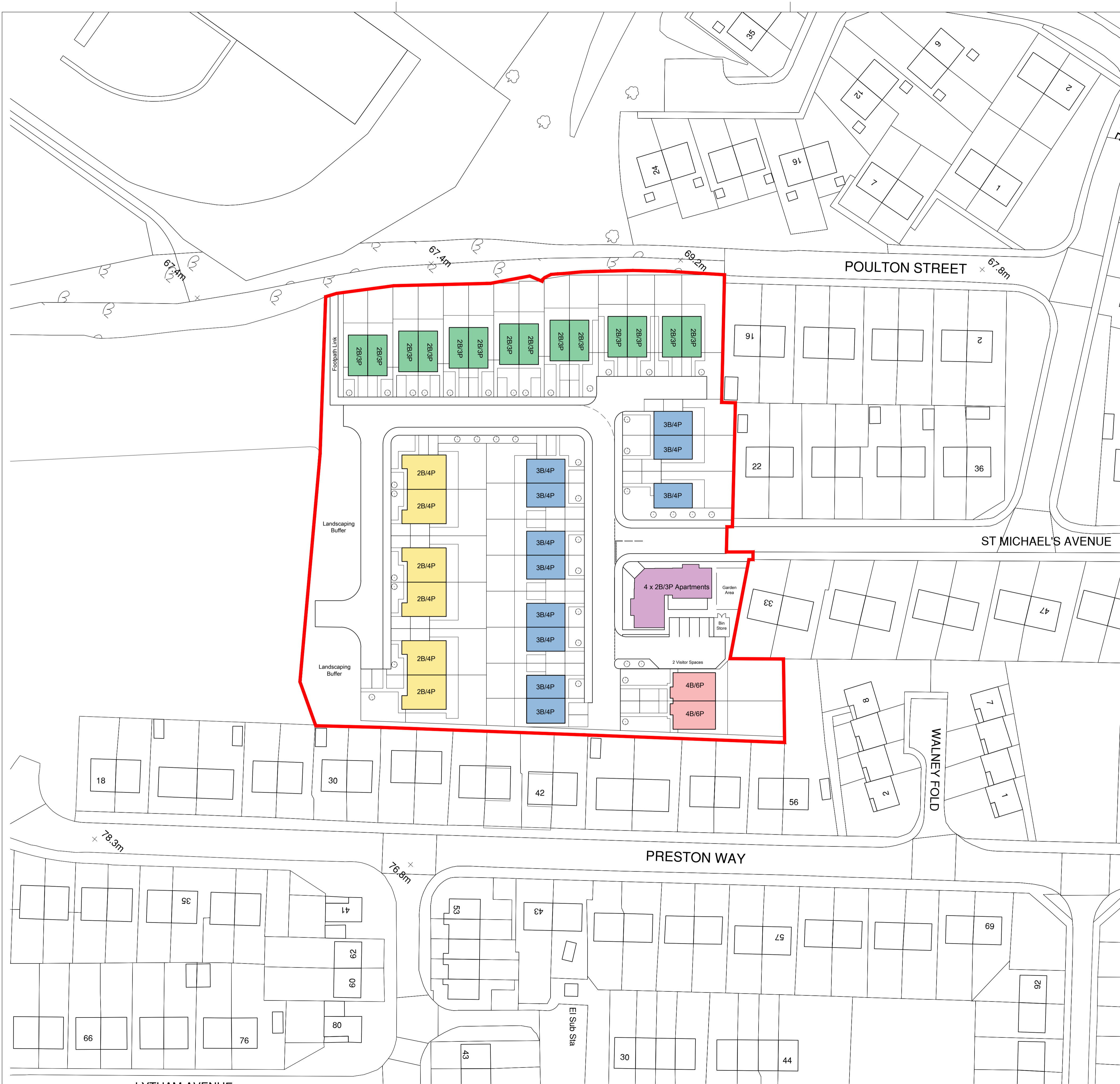




Appendix B

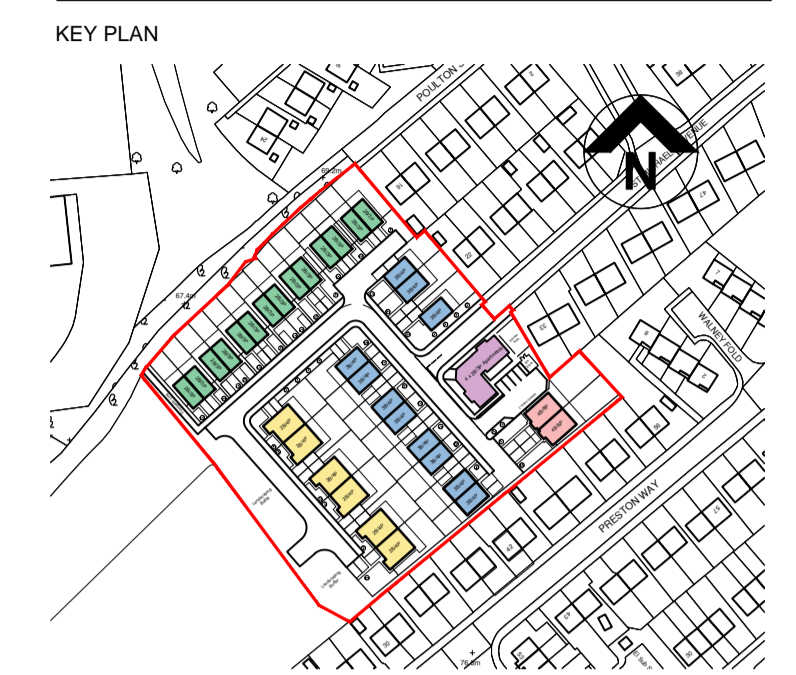
Proposed Development





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0m 5 10 15 30m ORIGINAL SHEET SIZE **A1**
 1:500



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- KEY TO HOUSETYPES**
- 4 Bedroom_6 Person Semi Detached
 - 2 Bedroom_4 Person Semi Detached Bungalow
 - 3 Bedroom_4 Person Semi Detached
 - 2 Bedroom_3 Person Semi Detached
 - 4 x 2 Bedroom_3 Person Apartments

Notes:

1.19 Hectare Site

Housing Provision

Total 37 Units

2 x 4B/6P Semi-Detached House
 11 x 3B/4P Semi-Detached Houses (5no. allocated for sale)
 14 x 2B/3P Semi-Detached Houses
 6 x 2B/4P Bungalows(All allocated for sale)
 4 x 2B/3P Apartments

Parking

2 Bed properties = 1no. Space
 2 Bed bungalows = 2no. space
 3 & 4 Bed properties = 2no. Spaces
 2 Bed Apartments = 1no. Space per unit + 2 visitor spaces

Drawing to be read in conjunction with drawing 014 Site Plan Landscaping

REV	DATE	BY	DESCRIPTION
P8	04.04.19	BST	ROAD WIDTHS UPDATED, TURNING HEAD ALTERED, PROPERTY DRIVEWAYS AND SET OUT RECONFIGURED TO SUIT ROADS, FENCE LINES AMENDED BETWEEN PROPERTIES.
P7	04.03.19	BST	SITE LAYOUT REVISED TO MOVE ROAD ONTO SOUTHWEST BOUNDARY, 2 BED AND 3 BED PROPERTIES GROUPED, 1NO. ADDITIONAL 3 BED DETACHED PROPERTY ADDED, GREEN SPACE REMOVED DUE TO OFFSITE FUNDED PROVISION.
P6	04.02.19	BST	SITE LAYOUT AMENDED TO ALLOW FOR ADDITIONAL ROOM TO REAR GARDENS, COLOUR KEY ADDED INDICATING HOUSETYPES.
P5	02.11.18	LG	ROADS UPDATED TO ROADS AND SECTIONS OF PRIVATE ROAD HIGHLIGHTED IN LINE WITH INITIAL HIGHWAYS COMMENTS, LANDSCAPING BUFFER NOTES ADDED AND NOTES ADDED REGARDING REAR BOUNDARY TREATMENTS TO CENTRAL PLOTS IN LINE WITH PRE-APP PLANNING COMMENTS.
P4	05.10.18	BST	COMMENT

REV	DRAWN	DATE	CHECKED	DATE	APPROVED	DATE

nps group

NPS Barnsley Ltd
 Gateway Plaza, Sackville St, Barnsley, South Yorkshire, S70 2RD,
 Tel: 01228 774605; Email: barnsley@nps.co.uk; www.nps.co.uk

CLIENT
BMBC Housing Growth

PROJECT
**New Housing Development
 St Michael's Avenue, Monk Bretton**

TITLE
Proposed Site Plan

SCALES 1:500	DISCIPLINE ARCHITECT	PROJECT NUMBER 18-1-1301
DRAWING NUMBER NPS-DR-A-(00)-012	REV CODE P8	
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john newton & partners

jnp group

Consulting Engineers

www.jnpgroup.co.uk

Brighouse

Woodvale House
Woodvale Road
Brighouse
West Yorkshire
HD6 4AB

telephone

01484 400691

email

brighouse@jnpgroup.co.uk

Chesham (HQ)

Link House
St Mary's Way
Chesham
Buckinghamshire
HP5 1HR

telephone

01494 771221

email

chesham@jnpgroup.co.uk

Hartlepool

The Innovation Centre
Venture Court
Queens Meadow Business Park
Hartlepool
TS25 5TG

telephone

01429 239539

email

hartlepool@jnpgroup.co.uk

Leamington Spa

Marlborough House
48 Holly Walk
Leamington Spa
Warwickshire
CV32 4XP

telephone

01926 889955

email

leamingtonspa@jnpgroup.co.uk

Sheffield

No.1 Meadowhall Riverside
Meadowhall Road
Sheffield
South Yorkshire
S9 1BW

telephone

0114 244 3500

email

sheffield@jnpgroup.co.uk

