



Client:
Yorkshire Housing

Carried out for:
Pearson Crescent, Barnsley

Flood Risk Assessment

Project No: 04.12001

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1.0 INTRODUCTION

1.1 Reason for the Report

Adept Consulting Engineers Ltd has been requested by Yorkshire housing to prepare a Flood Risk Assessment (FRA) for the proposed residential redevelopment at Pearson Crescent, Wombwell, Barnsley

The site is currently fields following demolition of properties that used to occupy the site.

1.2 Objectives

The aim of this report is to present the findings of the assessment of flood risk associated with the proposed redevelopment. The objectives of this report have been undertaken in accordance with the requirements of the Technical Guidance to the National Planning Policy Framework (NPPF) which superseded Planning Policy Statement 25 (PPS25) and are as follows:

- Undertake a site visit to establish a better understanding of the existing site
- Identify and quantify the possible sources of flood risk to the site and the impact of flood risk to the surrounding area.
- Review constraints to development due to flood risk issues and liaise with the Environment Agency (EA) in determining extents of 100 year (functional Floodplain) and 1 in 200 year tidal flood zone boundaries including allowances for Climate Change.
- Assess if the proposed development is likely to increase flood risk elsewhere due to increased runoff rates and volumes from the site and loss of floodplain
- Identify any further study that maybe required and to recommend options for proceeding with the development proposals to ensure the development is safe and flood risk is appropriately managed.

1.3 Flood Risk

Flood Risk includes the statistical probability of an event occurring and the scale of the potential consequences. The risk is estimated from historical data and expressed in terms of the expected frequency (or 'return period') of a flood of a given magnitude. The 10-year, 50-year and the 100-year floods have a 10%, 2% and 1% chance, respectively, of occurring in any given year (this is termed the Annual Exceedance Probability, AEP), however over a longer period the probability of flooding is considerably greater.

For example, for the 100-year return period flood:

- There is a 1% chance of the 100-year flood occurring or being exceeded in any year;
- a 26% chance of it occurring or being exceeded in a 30-year period; and
- a 51% chance of it occurring or being exceeded in a 70-year period.

1.4 NPPF

The Technical Guidance to the National Planning Policy Framework (NPPF) which superseded Planning Policy Statement 25 (PPS25) 'Development and Flood Risk' was introduced by the Government in March 2012. NPPF sets out the Government's policy with respect to these issues and has to be taken into account by all relevant statutory bodies from regional to local authority planning departments. The aim is to ensure that flood risk is assessed at all stages of the planning process in order to avoid inappropriate development in areas that are at risk of flooding.

NPPF promotes a sequential risk-based approach to determine the suitability of land for development in flood risk areas.



NPPF assigns the level of fluvial flood risk depending upon the annual probability of flooding occurring as follows:

- I. Zone 1: little or no risk (<0.1% AEP);
- II. Zone 2: low to medium risk (0.1 – 1.0% AEP); and
- III. Zone 3: high risk (>1.0% AEP).

1.5 CIRIA C624 – Development and Flood Risk

CIRIA C624 provides guidance on the implementation and good practice in assessing flood risk through the development process. The aim of this document is to promote developments that are sustainable with regard to flood risk. This report has been developed with this document and NPPF in mind to ensure that all aspects of flood risk have been covered.

1.6 EA Requirements

The Environment Agency (EA) Guidance Note 1 considers the requirements for undertaking a Flood Risk Assessment for a development in Flood Zones 1, greater than 1 Hectare. The assessment should be designed to:

The following list sets out information that should be submitted within the FRA for developments covered by this guidance note:

Plans

- A location plan that includes geographical features, street names and identifies the catchment, watercourses or other bodies of water in the vicinity.
- A plan of the site showing:
 - i. existing site;
 - ii. development proposals; and
 - iii. identification of any structures (e.g. embankments), which may influence local flood flow overland or in any watercourses (e.g. culverts) present on the site.

Surveys

- Site levels - both existing and proposed. Reference to Ordnance Datum, may be required where details of context of the site to its surroundings is needed.

Assessments

The Applicant should submit:

- Proposals for surface water management that aims to not increase, and where practicable reduce the rate of runoff from the site as a result of the development (in accordance with sustainable drainage principles, the Local Planning Authority's published SFRA and any guidance provided by the Lead Local Flood Authority in unitary or county councils).
- Information about the surface water disposal measures already in place and their state of maintenance.
- An assessment of the volume of surface water run-off likely to be generated from the proposed development.



- Allowance in design for how the increased frequency and intensity of rainfall that is predicted as a result of climate change will affect the proposal (see NPPF technical guidance).
- Information about other potential sources of flooding, if any, that may affect the site e.g. streams, surface water run-off, sewers, groundwater, reservoirs, canals and other artificial sources or any combination of these; including details on how these sources of flooding will be managed safely within the development proposal.
- Confirmation as to whether Environment Agency consent is needed for any aspect of the work, and whether this has been applied for or not.

1.7 Planning Context

A FRA should consider all types of flooding to satisfy the following three key objectives:

- to assess flood risk to the proposed development and to demonstrate that any residual risks to the development and its users would be acceptable;
- to assess the potential impact of the proposed development on flood risk elsewhere and to demonstrate that the development would not increase flood risk elsewhere; and
- to satisfy the requirements of national planning.

Flood risk should be considered alongside other spatial planning issues such as transport, housing, economic growth, natural resources, regeneration, biodiversity, the historic environment and the management of other hazards. Policies should recognise the positive contribution that avoidance and management of flood risk can make to the development of sustainable communities, including improved local amenities and better overall quality of life.

A flood risk assessment should be carried out to an appropriate degree at all levels of the planning process. It should assess the risks of all forms of flooding to and from development, taking into account climate change, and should inform the application of the sequential approach if appropriate.

1.8 Sources of Information

The following sources of information have been consulted for the review;

- Environment Agency floodmaps available online
- Yorkshire water correspondence dated 23rd February 2012.
- Solmek Report on Soakaways dated 20th March 2012

1.9 Limitations

The opinions expressed in this report and the recommendations given, are based on the information obtained from the desktop assessment.

The information, views and conclusions drawn concerning the site are based, in part, on information supplied to Adept Consulting Engineers Ltd by other parties. Adept Consulting Engineers Ltd accepts no liability for any inaccurate conclusions, assumptions or actions taken resulting from any inaccurate information supplied to Adept Consulting Engineers Ltd from others.

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2.0 SITE SETTING

2.1 Site Location

The site is located in Wombwell to the south east of Barnsley within an existing residential development. The site is bordered on all boundaries by existing residential properties.

The approximate centre of the site is given by National Grid Reference: 438615,403951.

2.2 Site Walkover Visit and Description

A site walkover survey was conducted on 19th March 2012. The walkover was conducted in general accordance with CLR 2, ref. 9.1.

The site generally falls from 64m AOD in the south on Wortley Avenue to 52.5m AOD in the north on the junction of Pearson Crescent and Wortley Avenue. A topographical survey of the site has been carried out by CT Surveys. The site has no significant structures/embankments what would influence local flood flows.

2.3 Existing Drainage

The site is currently undeveloped following demolition of the existing properties between 2006-2011. A survey of the existing drainage system has been carried out by GP Drains that has located locations of a number of drains across the site that would have served the existing properties

2.4 Hydrological Setting

The nearest surface water feature, The River Dove, is shown to be 144m north west of the site.

3.0 PROPOSED DEVELOPMENT

3.1 Proposed Development

As discussed above it is proposed to redevelop the existing site with construction of 56 new dwellings with new access roads and infrastructure to serve the properties. A Site Layout plan is attached to the back of this report.

4.0 DEFINITION OF THE FLOOD HAZARD AND PROBABILITY

4.1 Extent of Known Flood Information

Consultation with the EA has established that the site is located in Floodzone 1, this zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).

The River Dove close to the site lies at around 37m AOD with site levels varying from 52.5-64m AOD.

4.2 Existing Flood Defences and Management Structures

No flood defences are noted in the vicinity of the site but this is considered not to be of consequence to this development considering the location of the site.



4.3 The Potential Sources of Flooding

4.3.1 Fluvial Flooding

When the quantity of water in a river exceeds the flow capacity, a river will flood. The speed at which this happens generally depends on the intensity of the rain, the size of the watercourse and catchment area. Consultation with the EA has established that the proposed development area of is within the **Flood Zone 1**, land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%). A copy of the Environment Agency's floodplain map is appended to this report.

4.3.2 Coastal Flooding

High tides, storm surges, and wave attack can cause flooding in low-lying areas when defences may be breached or overtopped. No coastal flooding is expected on this site.

4.3.3 Flooding from the Ground

Groundwater flooding arises when the groundwater in the permeable strata (aquifer) rises or enters below ground structures. There are two hydrogeological processes that give rise to flooding events; "groundwater flooding" and "rising groundwater".

The first, "a groundwater flood", is an event where the flood volume is dominated by a groundwater component that unlike a fluvial source could take many weeks to subside. The second, "rising groundwater", is much less noticeable and occurs when a rising water table increases the levels of infiltration into sewers, soakaways and underground services to reduce their capacity to remove surface water runoff. This may pose an issue during construction in dealing with groundwater within the working area.

4.3.3.1 Groundwater Flooding

There are no known incidents of groundwater flooding. The site investigation report confirmed that no groundwater was evident within the test holes.

4.3.3.2 Rising Groundwater

Rising groundwater would be linked to the rising water levels in the river and would be no worse than the river levels. AS no groundwater had been recorded this is not considered to be an issue on this development.

4.3.4 Surface and Overland Flooding

Flooding can occur when intense rainfall exceeds the infiltration capacity of the ground, or when the rainwater flowing over the ground is not intercepted by natural or man-made drainage. Given that the topography of the site and surrounding area any overland flood flows would drain around the proposed dwellings to the south on Pearson Crescent and not cause problems with the site, hence not flooding proposed properties.

Proposes site levels will be close to existing so not significantly changing the natural overland flood paths. Floor levels should be set slightly above surrounding levels to allow any overland flood flows to drain around the properties and not through them.



4.3.5 Overloading of Local Sewers

Flooding from this source can occur when the sewer network can no longer handle the volume of surface or foul water. This can occur when the sewerage network has insufficient capacity, becomes blocked, or is faced with exceptionally intense rainfall. The site itself drains to public sewers which could surcharge in flood conditions. Measures should be incorporated to reduce the impact of this, in particular from any combined systems or flooded foul drains.

A CCTV survey of the existing system has been conducted with no significant defects to the existing system. Any overland flows from other overloaded sewers in the vicinity of the site would drain around the proposed dwellings to the south on Pearson Crescent and not cause problems with the site, hence not flooding proposed properties.

Yorkshire Water have agreed to a restricted discharge to the existing public sewers which will not overload the receiving sewers. This is currently set at 10 l/sec based on a pre-planning enquiry and is to be agreed with Yorkshire Water at detailed design.

4.3.6 Flooding from Reservoirs, Canals or other Artificial Sources

During flood conditions it is likely that other water bodies will experience the affects of increased rainfall. If these assets are not able to cope during these conditions and are forced to overtop or fail, this floodwater can inundate areas downstream of the asset.

There are no reservoirs, canals or artificial water sources near the site. Flooding from these sources is not considered to be a risk for the proposed development.

4.4 Climate Change

Given the potential sources of flooding already outlined, the principal aspect of climate change likely to impact the site would be variation in rainfall patterns. The recommended national precautionary sensitivity ranges compiled by Defra suggest that peak rainfall intensities should be expected to increase by 30% by 2085 with peak river flow expected to increase by 20% by 2085.

With increased peak rainfall intensity, the risk of flooding from surface water (overland flow) and overtopping of the River Derwent would increase. This will be taken into account during the development of proposed mitigation measures.

4.5 Summary of Flooding Mechanisms

Considering the current flooding regime, potential flood risks, and the effects of climate change there is considered no risk of flooding from the sources discussed above.

5.0 APPLICATION OF FLOOD RISK POLICY

5.1 Policy Context

The broad aim of the NPPF is to reduce the number of people and properties within the natural and built environment at risk of flooding. To achieve this aim, planning authorities are required to ensure that flood risk is properly assessed during the initial planning stages of any development.



Responsibility for this assessment lies with developers and they must demonstrate the following:

- whether the proposed development is likely to be affected by flooding;
- whether the proposed development will increase flood risk to adjacent properties; and
- that the measures proposed to deal with any flood risk are sustainable.

The developer must demonstrate to the Local Planning Authority and the Environment Agency (a statutory consultee) that any existing flood risks or flood risk associated with the proposed development can be satisfactorily managed.

5.2 Vulnerability Classification

The vulnerability of the development or land use must be taken into account as the consequences of flooding may not be acceptable for particular types of development. NPPF Technical Guidance defines the Flood Risk Vulnerability classification (Table 2) for the proposed use of the development site. As the proposed development is intended for residential use, the site is classified as being "More Vulnerable" which is considered acceptable.

5.3 Sequential Test

NPPF requires a Sequential Test "to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development or land use proposed". This is intended to be applied by Local Planning Authorities (LPA's) when determining the suitability of land for development, for instance in the preparation of Local Development Documents or similar. An Exception Test also exists to permit development that provides wider sustainability benefits to the community which are considered to outweigh flood risk.

The aim of the sequential test is to steer new development to areas at the lowest probability and risk of flooding. As stated in Section 4, the proposed development is located within Flood Zone 1 (as defined in Table 1) and according to Table 2 of the type of development should be classed as 'less vulnerable' and appropriate for development/refurbishment and hence the sequential and exception test is not be required.

5.4 Exception Test

NPPF Table 1 defines the compatibility of each vulnerability class of development for land within each of the Flood Zone designations. As the exception test is not required for this project no further information is required.

6.0 CONTROL OF FLOOD RISK

6.1 On Site Mitigation Measures

6.1.1 Fluvial & Tidal Flood Risk

As discussed above the proposed site is not considered to be at risk from flooding and hence no mitigation measures are required.

6.1.2 Increased run-off from the development



Under NPPF it is required that the redevelopment of a site must put together proposals which manage the surface water with the aim of not increasing and if possible to reduce any risk of flooding to the site. It must also take account of climate change which is an increase of 30% for water run-off.

The existing dwellings on site were demolished at some point between 2006 and 2011 and hence could be considered “brownfield” and this classification needs to be agreed with the appropriate authorities. Sustainable drainage techniques should be considered as part of the detailed design process to attenuate any additional surface water run-off that is generated by the proposed development. Appropriate measures should be incorporated into the drainage design to ensure that the surface water run-off from the proposed development does not create flooding problems on downstream and adjacent properties. As discussed above this should be through a combination of SUDS systems and underground attenuation techniques.

As part of the Drainage Statement carried out by Adept Consulting Engineers infiltration tests were carried out on site and Yorkshire Water were consulted to assess the capacity of the existing sewerage system to accept flows from the proposed site. The infiltration tests proved that in some areas ground conditions were suitable but in some areas this was not the case and hence surface water flows should be restricted to that agreed with Yorkshire Water and sufficient surface water attenuation provided to satisfy the requirements of the Environment Agency, the local authority and Yorkshire Water.

6.1.3 Maintenance

Consideration should be given to the operational and maintenance requirements of the proposed drainage system as part of the design process to ensure that it is robust enough to prevent blockages allow ease of maintenance and reduce long term maintenance costs. Furthermore, the drainage scheme should be designed so that it could function with very minimal maintenance.

6.2 Cumulative Risks

During the design process for the proposed development’s drainage network, the existing drainage system should be taken into account in the overall drainage network. This would result in no cumulative risk to the proposed development.

6.3 Residual Risks

To account for the impact of climate change upon peak rainfall intensities and more extreme events than currently designed for, consideration of exceedance flow routes must be made.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The assessment of the flood risk associated with the proposed retail development has been produced in accordance with National Planning Policy Framework (NPPF) and the accompanying Practice Guide.

The Flood Risk Vulnerability Classification for the development as defined by NPPF Technical Guidance is “More Vulnerable” and taking into account the location of the site in Floodzone 1 does not require the sequential approach.



There are no risks of flooding to the proposed site from the sources discussed above.

The proposed development and the increase in impermeable area would lead to an increase in surface water runoff from the site and increase the risk of flooding to downstream and adjacent properties. The proposed drainage system for the site should take this into consideration to ensure the risk to these properties is reduced. Yorkshire Water have confirmed that the receiving sewers have capacity for the scheme and the discharge rate agreed with them should not be exceeded to ensure the flood impact of the proposed development is adequately controlled.

The FRA has demonstrated that subject to the implementation of the recommended mitigation measures, the proposed construction of the development should not increase the risk of flooding elsewhere and will limit the effects of any flooding event.

No consent is expected to be required for any of the proposed works. Details of the final drainage scheme should be forwarded to the planning department to ensure that appropriate flood impact measures have been introduced to ensure adjacent and downstream properties are not affected.

7.2 Recommendations

The completion of this flood risk assessment recommends that following should be carried out:

An appropriate drainage scheme should be implemented to ensure the proposed development does not increase the flood impact of the existing properties adjacent to, and downstream of the site.



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CONSULTING ENGINEERS

APPENDIX 1

SITE LOCATION PLAN

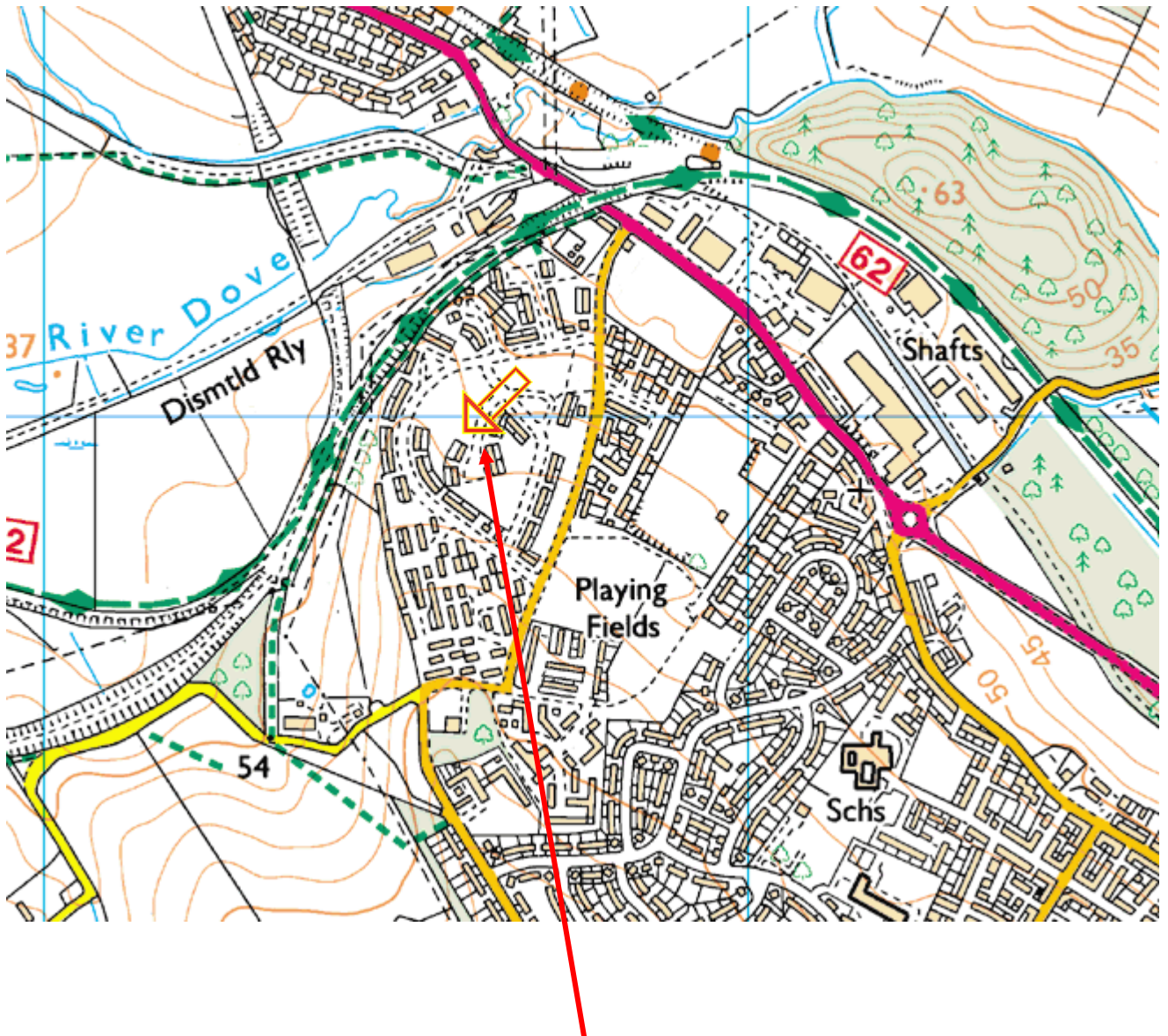


Fig A1.1 Site Location Plans

APPENDIX 2

SITE PHOTOGRAPHS

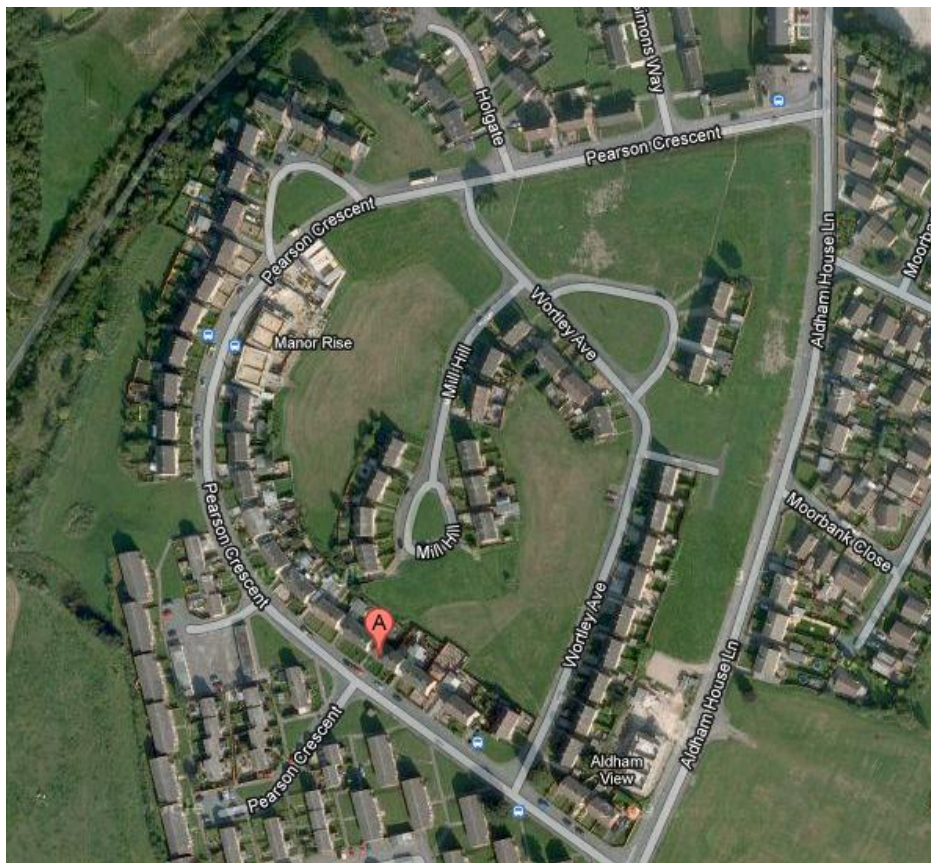


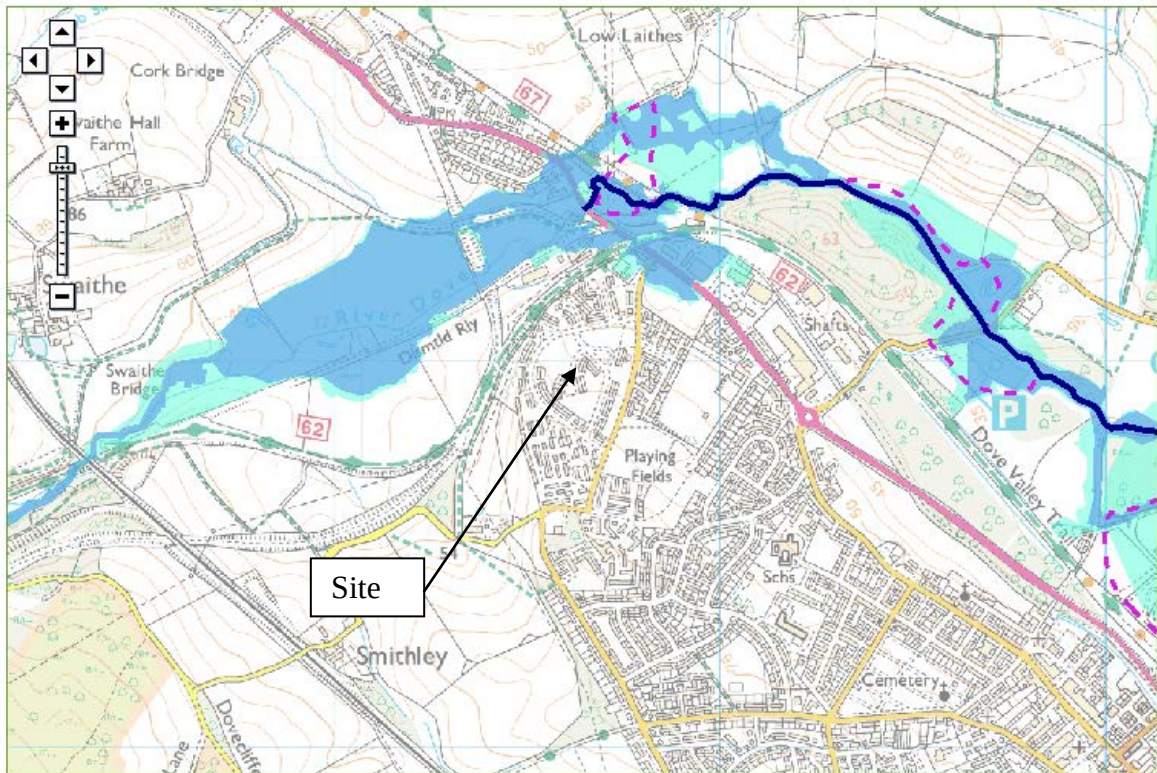
Fig A2.2 Aerial Photography

APPENDIX 3

ENVIRONMENT AGENCY FLOODMAP

X: 438,648;Y: 403,921 at scale 1:15,000

Data search  Text only version 



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Fig A3-1 Extract from Environment Agencies Floodmap

APPENDIX 4

DRAWINGS

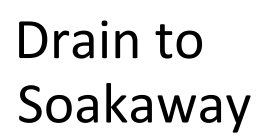
Do Not Scale

PEARSON CRESCENT

MILL HILL

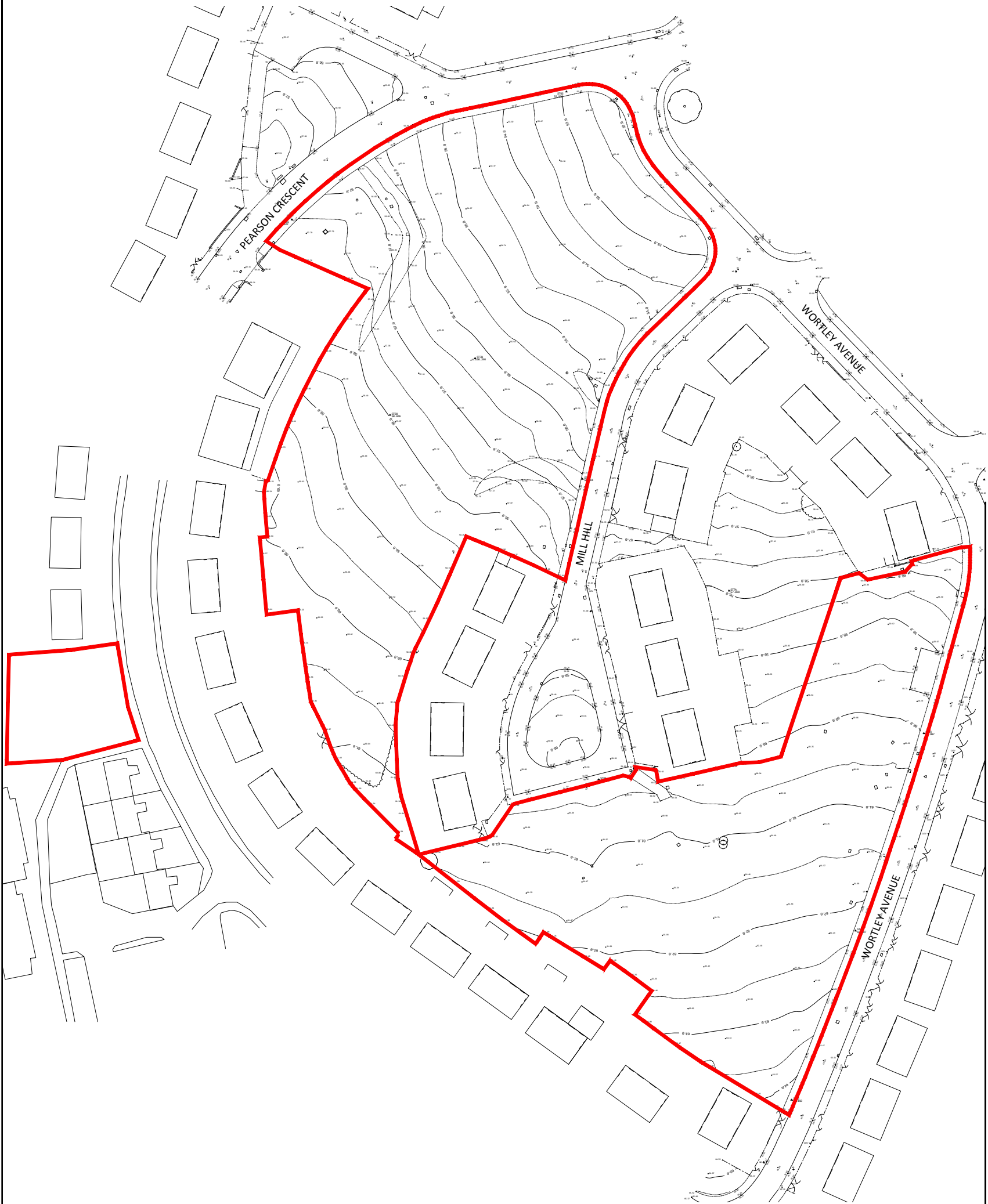
WORTLEY AVENUE

Plot 1 through Plot 56 are labeled on the plan. Plots 1 through 8 are colored red, and plots 9 through 56 are colored green. The plan shows the layout of the plots, including building footprints, parking areas, and landscaping. A north arrow is located in the top right corner of the plan.



09.08.12	Initial Issue	CB	RP	/
Date	Revision	By	Chkd	Rev
Engineering Better Solutions Together Tel: 0115 239 4518 Web: www.adeptscse.com Park Square House Park Square Pudsey Leeds LS28 7RG		    		
Project		A1-V3.2		
Pearson Crescent, Barnsley				
Title Development Proposals and Proposed Discharge Method				
Client Yorkshire Housing				
Scale	1:500 @ A1	Drawn	CB	Checked RP
Date	Aug 12	Status	PRELIMINARY	
Drg. No.			04.12001/SK101	Rev. /

Do Not Scale



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09.08.12	Initial Issue	CB	RP	/
Date	Revision	By	Chkd	Rev
Engineering Better Solutions Together Tel 0113 239 4518 www.adeptcse.com Park Square House Park Square Pudsey Leeds LS28 7RG		ADEPT Civil and Structural Consulting Engineers 		
Project		A1-v3.2		
Pearson Crescent, Barnsley				
Title				
Existing Site				
Client				
Yorkshire Housing				
Scale	1:500 @ A1	Drawn	CB	Checked RP
Date	Aug 12	Status	PRELIMINARY	
Drg. No.	04.12001/SK102			Rev. /