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**FLOOD RISK ASSESSMENT AND DRAINAGE PROPOSAL FOR THE
REDEVELOPMENT OF LAND ADJACENT TO BARNSELY ROAD, DARTON,
SOUTH YORKSHIRE**

ON BEHALF OF

**BRAITHWAITE EXCAVATIONS & DEMOLITION
CLAYCLIFFE ROAD
BARUGH GREEN
BARNSELY
SOUTH YORKSHIRE
S75 1HS**

FEBRUARY 2010

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FLOOD RISK ASSESSMENT FOR BARNSELEY ROAD, DARTON, SOUTH YORKSHIRE

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FLOOD RISK ASSESSMENT AND DRAINAGE PROPOSAL FOR THE REDEVELOPMENT OF LAND ADJACENT TO BARNSELEY ROAD, DARTON, BARNSELEY, SOUTH YORKSHIRE

1 INTRODUCTION

- 1.1 Fennell, Green and Bates have been instructed by Braithwaite Excavations & Demolition to assess and provide a flood risk and drainage assessment for the proposed development at land adjacent to Barnsley Road which is located within the residential district of Darton which is on the outskirts Barnsley Town Centre, South Yorkshire. The site is centred at National Grid Reference: 431717, 408948.
- 1.2 The site under investigation is currently a disused parcel of land overgrown with vegetation present and was formerly used by Barnsley Council as a tip for highway rubble and repair waste. The proposed development consists of screening the material on the site laying the screened material in and constructing a stable block, a bale storage shed with associated car parking facilities and an area of meadow for grazing purposes.
- 1.3 Following recent national flood events, guidelines have been developed to assist the planning authorities in situations where flooding is probable¹. The Environment Agency aims to ensure that all future developments are assessed with these guidelines in mind.
- 1.4 These planning guidelines emphasise the need to redevelop land in the flood plain rather than develop new areas. However, the restrictions on the suitability of using a particular site for any category of development in such areas are becoming more rigid. The latest edition of PPS 25 discusses the sequential and exception test for development in flood risk areas.
- 1.5 The Environment Agency were consulted with regards to the known flooding regime. The requirements of the guidelines have also been considered. The site is located inside a known flood risk zone.
- 1.6 The standing advice issued by the Environment Agency regards builds like this one (i.e. area smaller than 1 hectare and inside a flood risk zone) as needing a flood risk assessment, to focus on the management of surface water run-off and the affects this could have on the immediate surrounding area. A copy of the advice is attached in Appendix D of this report.

¹ Department of Transport, Local Government and the Regions
Planning Policy Statement Note 25: Development and Flood Risk 2006

2 CURRENT SITUATION

Existing Site

- 2.1 The site under investigation has an overall area of approximately 7,538m² (0.75 Ha). The subject site is currently a disused overgrown parcel of land. The proposed development is to construct a stable block and a bale storage block on site with associated car parking facilities. This is due to the field and local area used for horses.
- 2.2 The site adjacent to Barnsley Road and the proposed access road to the application site will be from this particular highway. Within the existing access to the site Barnsley Road is situated within the western vicinity of Darton which is a residential district 5km north west of Barnsley Town Centre.
- 2.3 The nearest surface water body to the site is the River Dearne. This particular watercourse flows from the north east of the subject site through agricultural land and bypasses the south of Darton, this watercourse then flows to south west of the nearby community known as Mapplewell.
- 2.4 The River Dearne is located approximately 150m to the east of the subject site and the field to the east of the subject site is part of the flood plain.
- 2.5 To the south east of Darton is the Barnsley Canal. This watercourse flows from the west to the south eastern of Mapplewell. The watercourse continues to flow south easterly through Barnsley town centre.
- 2.6 Also throughout the proximity of Darton, surface water features are evident such as reservoirs and sludge beds which are associated to local sewerage works.
- 2.7 In all directions of the site, residential dwellings and associated buildings are evident. Some of the houses throughout the vicinity of the site were constructed in the early 1900s with more development in the 1930s to the 1940s and more recent housing has been constructed in the past twenty years. Further east and north of the site is agricultural land that is relatively flat and used for cropping and pasture.
- 2.8 There is a drainage system on Barnsley Road to collect storm water. The majority of the surrounding area is drained due to evidence of manhole covers located within this particular area of Darton and all the surrounding areas. There is an existing combined sewer which is along the public highway.

3 INFORMATION FROM SITE VISIT

- 3.1 A site reconnaissance was undertaken by Fennell, Green and Bates on Thursday 21 January 2010 to assess the level of the flood risk on the site. The weather on this occasion was fine and dry, following a period of rain.
- 3.2 The site itself comprises a disused parcel of land which is overgrown with thick vegetation consisting various grasses and brambles. The proposed development consists of the construction of a stable block, a bale storage block and associated car parking facilities with grassed areas for grazing and aesthetical purposes.

- 3.3 The nearest surface water body to the site is the River Dearne which is 150m east of the subject site. The land to the east and south of the site is farmland and offers flood capacity in times of increased rain flow run off due to the land being on lower ground. The underlying strata is sandstone with mudstone evident.
- 3.4 Although the flood plain of the River Dearne is in close proximity, this particular area from our investigations for the development will not flood due to the land being 3 metres above the adjacent field and in addition to this the site and the immediate surrounding area at a level above the flood plain has never flooded in living memory.
- 3.5 The majority of Darton and the area immediately surrounding the site are not within a flood risk zone, although the subject site is with the River Dearne according to the Environment Agency flood risk map. This part of the community currently has a risk of 1.3% or one in 75 risk of being flooded from waters rising from the River Dearne. Please refer to plan BE/BR/FR 03.
- 3.6 The majority of Darton does not offer any mitigation to flooding in the area, i.e. it is not in a flood risk zone, although the site is within a flood zone and if there were an extreme event the lower lying land does not flood, as it is above level of the stream and the River Dearne.
- 3.7 The storm water is mitigated by percolation into the underlying sandstone and topsoil that will regulate flow to watercourses during heavy rain.
- 3.8 Flooding had not occurred in the recent heavy rainfall events on 15 June and 25 June 2007 or 21st January 2008 and this is due to the field at a lower level to the site providing flood mitigation. The underlying strata which consists of sandstone at depth and mudstone will be present as this is associated with the Carboniferous period and it has impermeable characteristics that will influence perched water tables and would restrict downward migration of water to strata.

4 WATERCOURSE

- 4.1 The nearest surface water body to the site a small stream on the eastern boundary and the River Dearne which flows from the north east to the south east and is 150m to the east of the subject site. Any drains or issues that are evident can adjoin the watercourse and are able to flow reasonably continually due to the relatively flat topography.
- 4.2 The site stands at 62m Above Ordnance Datum (AOD) and descends with a gentle gradient towards the south of Darton to 54m AOD. The majority of the area is residential and agricultural land which is evident to the east and south of the town and from this, there will be absorption of rainwater in the summer months, with up to 35% of the water being evaporated and 20% being absorbed into the soil.
- 4.3 In the winter months, the evapo-transpiration will be less creating a slightly higher risk of ponding water and run off. There will be some percolation into the underlying sandstone and mudstone which will allow water to percolate at the base feeding the watercourses.

- 4.4 Most of the storm water in the drained and sealed areas will currently drain to gullies and flow through the sewer system or storm water pipes to the river.
- 4.5 The stream and the River Dearne are receptive to heavy rainfall upstream from the Eastern Pennines and flooding has occurred on the flat land between the two watercourses.

5 REGIME

- 5.1 The Environment Agency shows the nearby stream and river as being within the area which may be affected by a flood event, i.e. the flood with a level that is statistically expected less than once every 75 years, or with a 1.3% (1 in 75) probability of occurring in any one year.
- 5.2 The indicative flood plain maps show that should a flood occur, and also regarding the presence of any flood defences, the land surrounding the site would not flood. The River Dearne does not pose a flood risk to the subject site, as the land is above the flood level in the area. Please refer to plan number BE/BR/FR 03, which can be found within Appendix A of this report.
- 5.3 Although the site is within a flood zone, the land that is proposed for the development has not been flooded in living memory, and does not appear to have flooded ever. The flood plain is modelled using Ordnance Survey (O.S) contour data and to accurately predict the flood zone, the site has been surveyed.
- 5.4 The 100-year flood has been modelled by the Environment Agency based on the levels taken on watercourses, canal and the river system, the contours of the land and benchmarks. The modelling does not take into consideration site-specific levels and the flood plain can be modified by a site survey.
- 5.5 Levels from various floods over recent years were obtained from the Environment Agency. Of these, the December 2002 and the June 2007 events appear to be the most recent recorded flood to affect the area as a whole in this location, indeed in the Country.
- 5.6 On observation of the Environment Agency's Flood Map for the site and surrounding area, it can be noted that an area which is shaded blue, is one which is of significant risk of flooding. The subject site is shaded blue and therefore this shows that the Environment Agency have modelled the site within a known flood zone with a moderate flood risk.
- 5.7 It should be noted that if climate change occurs, river characteristics alter or the statistical return periods are reassessed and currently the Agency use a multiplier of 2.2 x the 10 year return period for a 30 minute storm in a 30 year return period for river flow.
- 5.8 From the obtained flood risk plan, the site is inside the known flood risk zone as shown on the Environment Agency plan within Appendix A and as mentioned, this is based on GIS digital terrain models without the benefit of a local topographical survey. The subject site has been surveyed, Drawing No: BE/BR/GL 09 and the proposed level of the site is at the same level as the access road into the public highway.

The proposed development is a sufficient distance from the nearest watercourses and therefore is considered as moderate low risk.

6 DISCUSSION

Planning Policy

- 6.1 It is likely that the Environment Agency and the Local Authority's Flood Risk Officer would be concerned about any new development in this area until they were furnished with details of the local topographical survey. The area is protected against flooding to at least the 100-year flood defence standard in the flood zone in Darton and the River Dearne and the surrounding areas, the water flow regime is uninterrupted and the development will not have an adverse affect on the drainage by additional flow from the hard standing and buildings. They are unlikely to have any concerns about this site.
- 6.2 The existing land form will be recreated to provide a platform for stables and a ménage and there will be no sealed area to increase run-off.
- 6.3 Considering the planning guidelines (PPS25), the available estimate of the 100-year flood and the fact that some is open land and the majority of the surrounding areas of the site are in the Moderate Risk Functional Flood Plain. Please refer to plan BE/BR/FR 03. In addition, a topographical survey was undertaken. Please refer to plan BE/BR/GL 09.
- 6.4 The probability of the nearby land flooding is 1.3% (1 in 75). The location of the subject site falls outside the moderate risk barrier of flooding due to the distance and height above the nearest watercourse, which is the River Dearne and the nearby field.
- 6.5 There are flood risk issues within the area, and the areas that are affected by flooding around the vicinity of the site are the areas shaded in blue on the flood risk plan which is plan number: BE/BR/FR 03. These areas are 3 metres below the level of the land within the application area.
- 6.6 The site, to the west of Barnsley Road is within flood risk Zone 2 but should not at risk from flooding (unless it is an extreme event) due to the distance of the watercourses and the site is on land which is at a higher elevation than the watercourses and is fairly flat.
- 6.7 The site, to the west of Barnsley Road, is within a known flood zone but it should not flood due to the distance of the watercourses and the site is on land which is at a higher elevation than the watercourses and is fairly flat.
- 6.8 Although the majority of the lower lying land is within a known flood zone, the western side of the stream is not, according to the site survey. The proposed development is to be situated adjacent to the western boundary, the access road onto the public road is not at risk from flooding, therefore the public, and vehicles are not subjected to flood risk. The access road is to the south west of the site.

- 6.9 The site area is suitable for most types of development, subject to planning approval, including the residential and commercial proposals. In recent years, development in various directions has taken place, especially in the past forty years with new housing and industrial developments taking place within the district throughout Darton and the Barnsley area.
- 6.10 Development of the site could reduce the area of permeable surface through the creation of hard standings and roofs. Due to the previous use of the land, the proposed redevelopment will not increase the total and peak run-off rates to the receiving watercourses. The site will be covered with topsoil and hardcore for the parking and will drain the same as the current site. The roof of the stables will have a gutter and fall pipe and water will be collected in a series of water butts for use in the stables.
- 6.11 Water that could cause increased flows downstream and thus increasing the risk of flooding to the surrounding region. The areas of hardstanding and roofs can be calculated to assess the surface water run-off from the proposed buildings.
- 6.12 PPS25 guidance advocates the use of Sustainable Drainage Solutions (SDS). Mitigation measures such as allowing for permeable hard and soft surfaces should be allowed for in a good design practice. The restriction and reduction of surface water run-off from new developments can be encouraged by the provision of surface water storage areas, flow-limiting devices in conjunction with surface or sub-surface storage or, where ground conditions permit, the use of infiltration areas or soakaways.
- 6.13 The Environment Agency and Yorkshire Water could request that there be no increase in surface water run-off, and so some form of control may require further consideration.
- 6.14 As well as reducing total and peak flows of run-off, sustainable drainage systems can contribute substantially to good design in improving the amenity and wildlife interest of developments.
- 6.15 The application site provides an approximate area of 7,538 square metres, which is the application area for the proposed construction of a stable block and a bale storage block with associated soft landscaped areas.
- 6.16 The proposal states that there will be approximately 390 square metres of roof area which spans over the stable block and the bale storage block. The roof water is proposed to flow naturally into the underlying sandstone. The areas outwith of this application site are sealed and drained to sewer so the recharge of the sub strata will have been reduced as the region of Darton has been built on. There is also 5,468 square metres of soft landscaping on site for the proposed development and this consists of a grazing area to the north of the site and grassed areas used for aesthetical purposes.
- 6.17 The proposal states that the hardstanding on site will be the main access road, and vehicle parking areas, which will lead to the proposed stables and bale storage shed. The hardstanding is to comprise of clean, crushed and compacted hardcore. Therefore, the proposed hardstanding is 1,680 square metres.

- 6.18 In the design work for the proposed development, we need to consider the rainfall for a 30-minute event for a 30-year return and add for climate change. The multiplying factor for river flow used by the Environment Agency is 2.2 and therefore for 30 year event the water would be 44 mm, if we add 20% for climate change then the rainfall in a 30 minute event for a 30 year return period with climate change is 52mm:

$$\text{Roof Water} = 390\text{m}^2 \times 0.052 = 20.28\text{m}^3 \times 1000 = 20,280 + 1800 = 11.26 \text{ l/s.}$$

$$\text{Hardstanding Water (Not sealed)} = 1,680\text{m}^2 \times 0.052 = 87.36\text{m}^3 \times 1000 = 87,360 \div 1800 = 48.53 \text{ l/s.}$$

$$\text{Soft Landscaping} = 5,568 \times 0.052 = 284.33\text{m}^3 \times 1000 = 284,330 \div 1800 = 157.96 \text{ l/s.}$$

- 6.19 In a ten-minute storm for a ten-year return period, the rainfall on the proposed development on the proposed roof area would be 20 mm.

$$\text{Roof Water} = 390\text{m}^2 \times 0.02 = 7.80\text{m}^3 \times 1000 = 7,800 + 600 = 13.0 \text{ l/s.}$$

$$\text{Hardstanding Water (Not sealed)} = 1,680\text{m}^2 \times 0.02 = 33.60\text{m}^3 \times 1000 = 33,600 + 600 = 56.0 \text{ l/s.}$$

$$\text{Soft Landscaping} = 5,468\text{m}^2 \times 0.02 = 109.36\text{m}^3 \times 1000 = 109,360 + 600 = 182.26 \text{ l/s.}$$

- 6.20 As the current water run off can be calculated and if we consider 100% of the plot to have been soft landscaping for the existing use this will be $7,538 \times 0.020$ for a ten minute storm = 150.76 cubic metres, the water would have been disposed of naturally to the nearby stream.

- 6.21 The subject site is underlain by the Middle Coal Measures Formation which is of the Westphalian age. The Westphalian age is a stratigraphic stage name for European strata of the Upper Carboniferous period. The strata underlying the site is sandstone. Minor mudstone will be present as this is associated with the Carboniferous period and it has impermeable characteristics.

- 6.22 As is typical with the Carboniferous Period, the area has been subjected to much faulting, all apparently from one period of tectonic activity. Within 1000m of the sites proximity, there are a number of faults evident. Although the nearest fault lies to the east of the site, this strikes in a north west to a south eastern direction at approximately a 30° angle. Although there are many faults close to the site, there is no evidence of the faults running through the site.

- 6.23 Further work would be required on the site to ascertain the geology but initial findings from geological plans have concluded that there is sandstone at shallow depth.

- 6.24 However the site is likely to be underlain by a stiff clay due to the weathering of the sandstone and our investigations on the neighbouring houses that suffered mining subsidence in the mid 1980's.

7 SUMMARY

- 7.1 The nearest watercourse which is the River Dearne, does pose a flood risk to the site, according to the published flood risk map. The Environment Agency shows the land as being outside the indicative area which may be affected by a 100 year event, i.e. the flood with a level that is statistically expected once every 75 years, or with a 1.3% probability of occurring in any one year.
- 7.2 The site has a moderate probability of flooding, but it is unlikely as the flood plain is the field to the east. The development does not alter the flood plain at all.
- 7.3 As the area is defended by being at a level of 62.0m AOD and the River Dearne is a sufficient distance from the subject site, the proposed development should not affect the flood risk or the capacity of the watercourses. The water drained off the roof is proposed to flow into a water butt with an overflow through the hardcore road surfacing and into the nearby watercourse.
- 7.4 The nearest watercourse is a stream at the boundary of the site and the River Dearne do not pose a flood risk to the site. Surface water run off will be produced on the development but the flow can be mitigated by capture.

Foul Water –

- 7.5 For the proposed development there will be foul water runs evident due to the characteristics of the development. There are no foul drains evident on site and this will remain the same. Toilet facilities will be to a small septic tank. Washing will be to the grey water storage for reuse in washing down the proposed stables.
- 7.6 The proposed development will not increase discharge to the underlying strata in large amounts and this would be the preferred method. Please see the tables below which show the existing storm water run-off at the subject site and then the proposed amount of storm water run-off.

Existing Use – Agricultural Land

	Roof Water	Hardstanding Water	Soft landscaping Water
30 minute storm	Nil	Nil	217.76 l/s
10 minute storm	Nil	Nil	251.26 l/s

Proposed Use – Stables with associated Car Parking Facilities

	Roof Water	Hardstanding Water (Not Sealed)	Soft landscaping Water
30 minute storm	11.26 l/s	48.53 l/s	157.96
10 minute storm	13 l/s	56 l/s	182.26 l/s

- 7.7 The water make that requires draining will be from the roof of the buildings which is 13 litres per second. This water will be utilised for the site through a collection system of butts.

- 7.8 The remainder of the site will drain to the stream and if we take this area as $7,538\text{m}^2$, then using the Greenfield run-off rate at 5 litres per second per hectare, then the run-off should be 3.8 litres per second.
- 7.9 Clearly in a ten minute rainfall event taken from BRE 365, the rainfall is 20mm that would be 150.76 cubic metres which is 257 litres per second run-off on the existing site at one point.

8 LIMITS AND LIABILITIES

Fennell, Green and Bates have produced this report for the site referred to as land off Barnsley Road, Darton, solely for the use of the client and his professional advisors, on matters appertaining to the application for Building Regulation approval for the redevelopment of the aforementioned site.

Both the findings and opinions expressed within the report are relevant to the period of the site visit and data supplied; they therefore should not be relied on at a later date. No part of the report may be reproduced or relied upon by any third party who may subsequently advise of client or undertake his own investigation without the prior written consent of Fennell, Green and Bates.

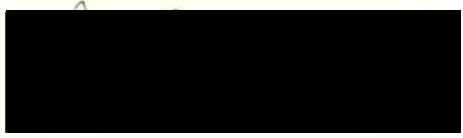
It is recommended that any other potential developer consult with the writer of this report prior to undertaking any site investigation work as the contents of this report cannot be relied upon for the design of a site investigation.

Main Author:



A L Hanson
Environmental Engineer

Checked & Approved By:

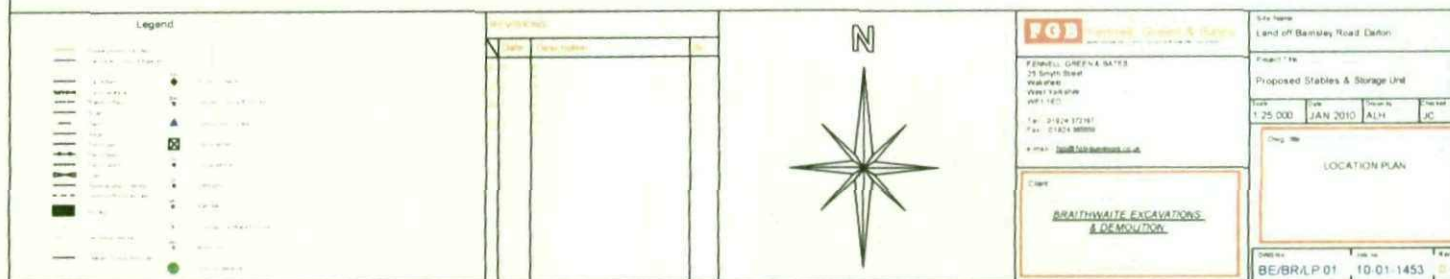
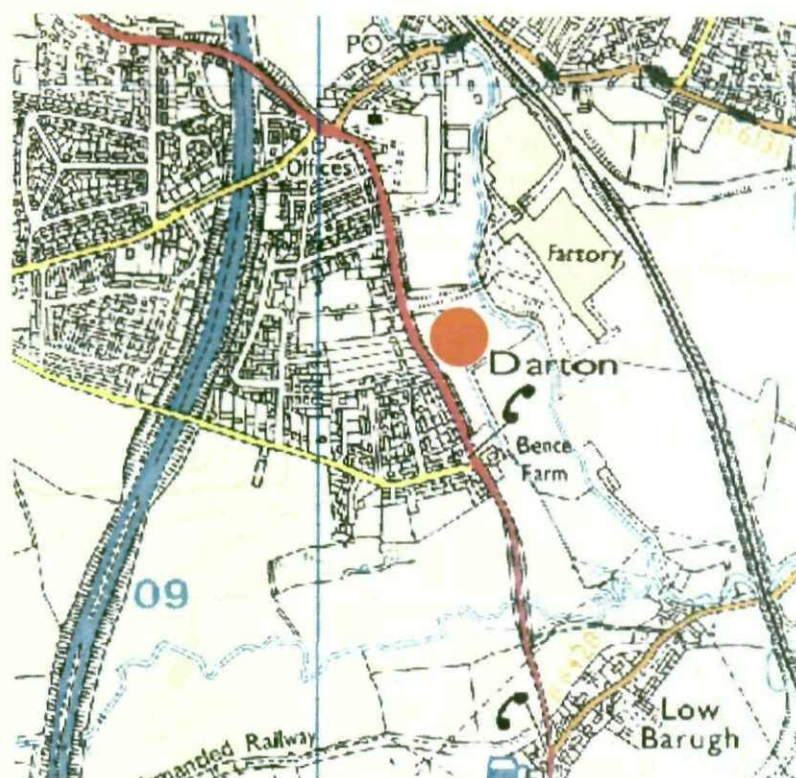


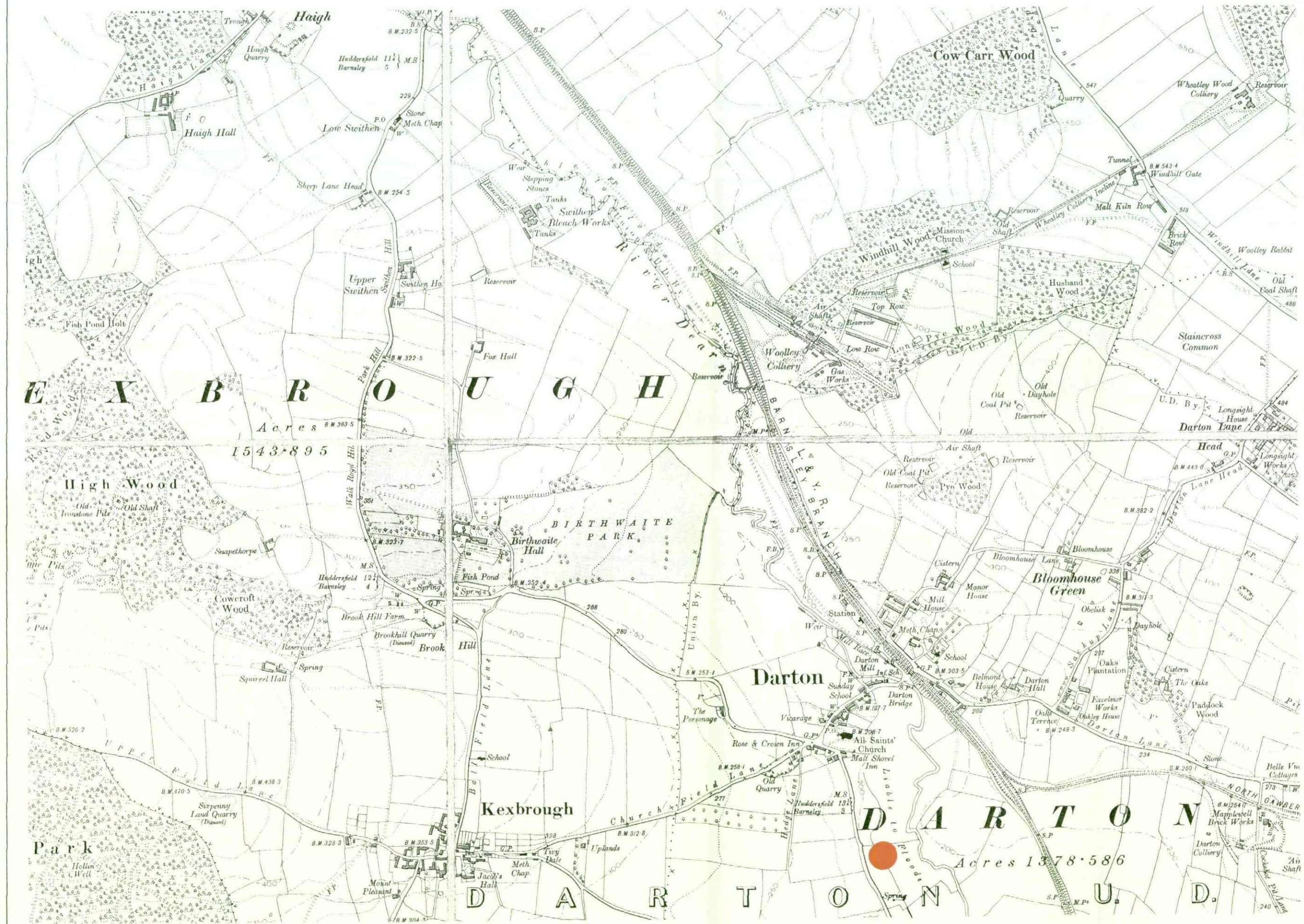
Eur Ing J Carlon (Hons) C.Eng, CEnv, MIMM MRICS MIQ MCIWM
Principal Consulting Engineer

Date: February 2010

Job No: 10-01-1453

APPENDIX A
Plans of the Site





DO NOT SCALE FROM DRAWING FOR CONSTRUCTION PURPOSES

Legend

Planning Permissions and Light Under Control of Applicant	Top of Bank	Top of Quarry	Bottom of Bank	Road	Track	Fence Type 1	Fence Type 2	Fence Type 3	Gate	Road Street/Drainage	Overhead Electricity Cable	Building	Tree Central Island	Obstacle Survey Boundary	Boundary/Field No.	Ordnance Survey	Survey Control Mark	Electricity Pylon	Telegraph Pole	Unploughed	Man Hole	Stop Top (G.A.M.)	Water Level	Tree (Unploughed)
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Client:

**BRAITHWAITE EXCAVATION
DEMOLITION**

Site Name:

Land off Bamsley Road, Darton

Project Title:

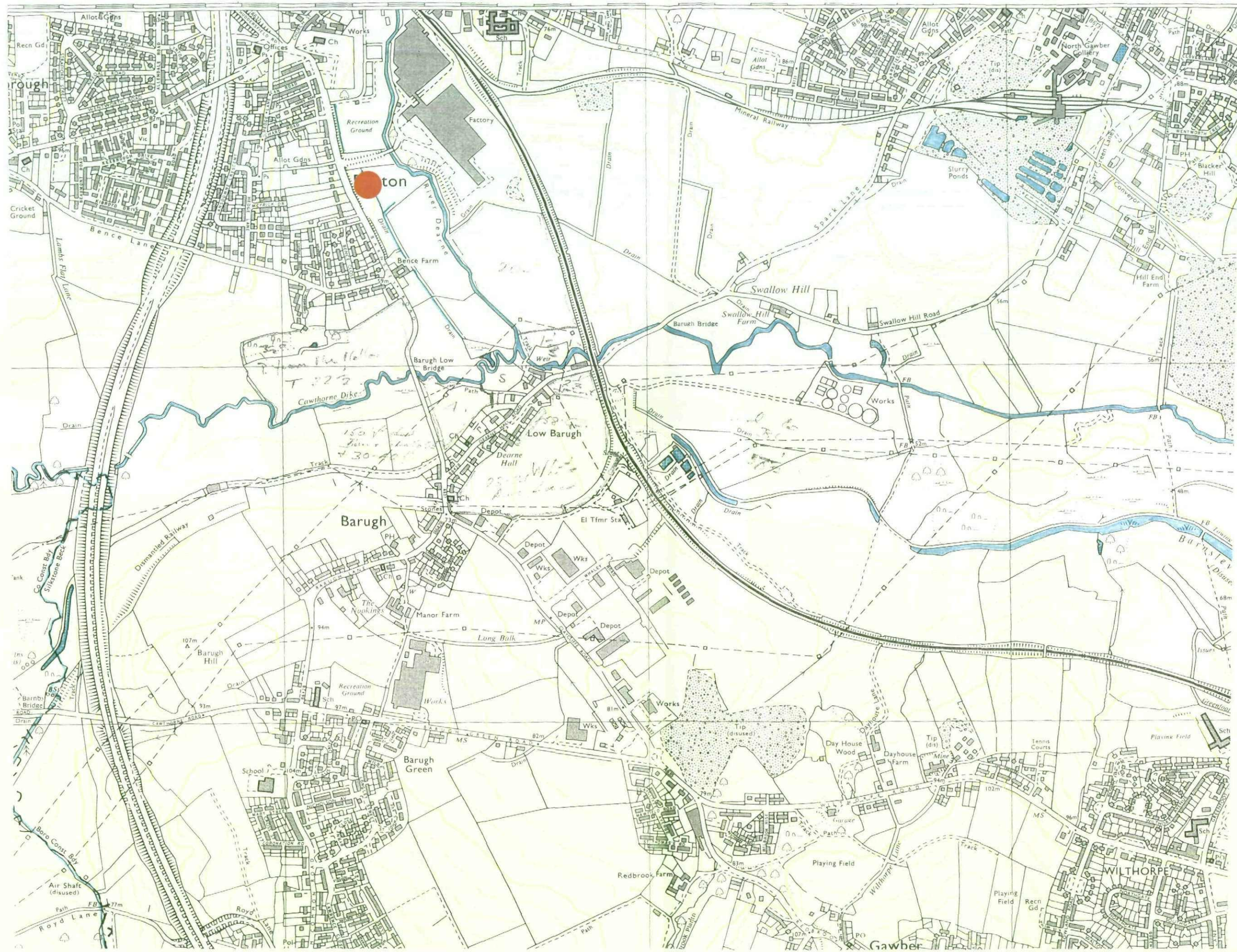
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Dwg title:

1907 HISTORICAL PLA
COUNTY SHEET 262

DWG No: BE/BR/HP 05 Job No: 10-01-145



REVISIONS

Date	Description
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DO NOT SCALE FROM DRAWING
FOR CONSTRUCTION
PURPOSES

Legend

Proposed Planning Area	Boundary of 1st 1st
Land Under Control of Applicant	Boundary of 2nd 1st
Top of Bank	Boundary of 3rd 1st
Top of Quarry Face	Boundary of 4th 1st
Bottom of Bank	Boundary of 5th 1st
Drain	Boundary of 6th 1st
Track	Boundary of 7th 1st
Path	Boundary of 8th 1st
Field Type 1	Boundary of 9th 1st
Field Type 2	Boundary of 10th 1st
Field Type 3	Boundary of 11th 1st
Field Type 4	Boundary of 12th 1st
Field Type 5	Boundary of 13th 1st
Field Type 6	Boundary of 14th 1st
Field Type 7	Boundary of 15th 1st
Field Type 8	Boundary of 16th 1st
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Field Type 87	Boundary of 95th 1st
Field Type 88	Boundary of 96th 1st
Field Type 89	Boundary of 97th 1st
Field Type 90	Boundary of 98th 1st
Field Type 91	Boundary of 99th 1st
Field Type 92	Boundary of 100th 1st

Client

**BRAITHWAITE EXCAVATION
DEMOLITION**

Site Name

Land off Barnsley Road, Darton

Project Title

Proposed Stables & Storage Unit

Scale

1:10,000

Date

JAN 2010

Drawn by

ALH

Check by

ALH

1983 SURFACE WATER PL
COUNTY SHEET 262 S.

Drawn by

BE/BR/SW/08

Check by

10-01-1453

APPENDIX B

Topographical Survey & Proposed Site Layout Plan



Fennell, Green & Bates

MINING ENGINEERS, SURVEYORS & ENVIRONMENTAL CONSULTANTS

APPENDIX C

Site Photographs

**PROPOSED DEVELOPMENT AT LAND ADJACENT TO BARNSELEY ROAD, DARTON,
BARNSELEY, SOUTH YORKSHIRE –**

SITE PHOTOGRAPHS THURSDAY 21 JANUARY 2010



Photograph 1 – Showing the application site and the flood plain with Shaw Carpets in the background.



Photograph 2 – Showing the boundary fence and trees with the tipped land in the foreground.



Photograph 3 – Showing the tip and access road into Shaw Carpets in the background.



Photograph 4 – Showing the tipped area and field beyond the site which is the flood plain.



Photograph 5 – Showing the tip and housing over Barnsley Road.



Photograph 6 – Slope at the side of the tip leading to an unnamed stream.



Photograph 7 – Trackway to tip from the access road.



Photograph 8 – Looking over the tip with the stream at the toe and the Shaw Carpets access in the background.



Photograph 9 – Showing the adjacent field which acts as *flood attenuation*.



Photograph 10 – Showing the tipped material and boundary hedge against Barnsley Road.



Photograph 11 – Showing vegetation on the tip and bank for the Shaw Carpets access.



Photograph 12 – Showing base of the tip looking towards Barnsley Road.



Photograph 13 – Showing the unnamed stream at the base of the tip which will be cleared out.



Photograph 14 – Showing the boundary line hedge on the west side near the access from Barnsley Road.



Photograph 15 – Showing neighbouring small holdings.



Photograph 16 – Showing boundary hedge, trees and fence with field that provides flood attenuation in the background.



Photograph 17 – Showing old manhole.



Photograph 18 – Showing old manhole.



Photograph 19 – Showing the stream at the toe of the tip and field behind.



Photograph 20 – Showing neighbouring small holding.



Photograph 21 – Showing concrete kerbs and highway rubble with vegetation evident.



Photograph 22 – Showing stream and field with flooding plain in the field – some ponding shown from the last heavy rain.

APPENDIX D

Environment Agency Standing Advice



FRA Guidance Note 1: Development Greater Than 1 Hectare in Flood Zone 1

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FRA Guidance Note 1: Development Greater Than 1 Hectare in Flood Zone 1

Environment Agency guidance on requirements for undertaking a Flood Risk Assessment (FRA) for planning applications. This guidance note principally relates to the commissioning and undertaking of flood risk assessment studies for development greater than 1.0 ha in **Flood Zone 1**¹. It is designed:

- to consider the principles of the sustainable drainage of surface water,
- for use where works may affect watercourses or flood defences, or
- for use where a known drainage problem exists on which the LPA would like assurance from the developer that flood risk has been addressed.

For sites less than 1 hectare in Flood Zone 1, a formal FRA will not usually be required (see Table D1 of Planning Policy Statement 25). In these cases, applicants are advised to refer to the standard comments on managing surface water drainage as set out in our Standing Advice on Development and Flood Risk. However, where (b) and/or (c) above apply, a FRA may still be required for development of less than 1 hectare and this guidance note can be used to inform the FRA.

Why is a FRA required?

In Flood Zone 1, where the risk of flooding from rivers or the sea is classified as low, a Flood Risk Assessment is still required but it should be focused on the management of surface water run-off. Development that increases the amount of impermeable surfaces can result in an increase in surface water run-off, which in turn can result in increased flood risk both on site and elsewhere within the catchment. This is particularly important for larger scale sites, which have the potential to generate large volumes of surface water run-off. The site may also still be at risk from other sources of flooding (e.g. groundwater and overland runoff), which are not considered in the mapping of Flood Zones. Further information is provided in Annex C of PPS25.

What should be in the FRA?

The detail and technical complexity of a flood risk assessment will reflect the scale, nature and location of the development. The following list sets out the kind of information that should be submitted as a FRA for developments of greater than 1ha in Flood Zone 1:

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:
 - existing site
 - development proposals and
 - identification of any structures, which may influence local flood flow overland or in any watercourses present on the site.

Surveys

- Site levels related to Ordnance Datum, both existing and proposed.

Assessments

The Applicant should submit:

- 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.
- Proposals for surface water management according to sustainable drainage principles, with the aim of not increasing, and where practicable reducing, the rate of runoff from the site as a result of the development.

- Allowance in design for how climate change will affect the probability and intensity of events in the future.
- Information about any other potential sources of flooding that may affect the site – streams, surface water run-off, sewers, groundwater, reservoirs, canals and other artificial sources or any combination of these.
- Information on how these sources of flooding will be managed safely within the development proposal.
- Consideration of the proposal relative to any existing Strategic Flood Risk Assessment carried out by the local authority.
- Confirmation as to whether Environment Agency consent is needed for any aspect of the work, and whether this has been applied for or not.

'Dry islands':

An additional issue that may need to be considered for development in Flood Zone 1 is that of 'dry islands'. These are areas within Flood Zone 1 that are completely surrounded by areas at a higher risk of flooding i.e. areas falling within Flood Zones 3 and 2. In certain cases development within 'dry islands' can present particular hazards to public safety and risks such as those risks associated with maintaining a means of safe access and exit for occupants during flood events. The distribution of dry islands and risks posed by them in terms of access/exit vary considerably across the country. If you are in any doubt about how flood risks associated with 'dry islands' may affect an area, please contact the Development Control team in the area where the development is planned.

What is the Environment Agency's Role?

We will usually provide comments at the planning application stage on Flood Risk Assessments covered by this guidance note. We have three main interests:

- Ensuring that the calculation and design of the site drainage system meets the aims of sustainable drainage management, and does not increase, and where practicable reduces, the current runoff from the site.
- If the proposal is within the Byelaw Distance ² of a Main River ³ or flood defence structure, or includes the diversion or culverting of an Ordinary Watercourse ⁴ then formal consent for the proposal may also be required from us.
- Prior to carrying out a FRA, developers should contact the Environment Agency and other operating authorities (including the engineering department of the local authority or Internal Drainage Board as appropriate) to establish whether any information is available relating to flood risk at the site they propose to develop. It should be noted that we only record known problems of this kind and the absence of information does not mean that a site will not flood. Developers should also take full account of the local knowledge of flooding in the community and account for this within the FRA.

Sources of information:

Information on SUDS can be found in the PPS25 Draft Practice Guide and Appendix F of the PPS. In addition, the CIRIA C522 document Sustainable Urban Drainage Systems-design manual for England and Wales and the Interim Code of Practice for Sustainable Drainage Systems ⁵ give technical guidance on SUDS systems. This Interim Code of Practice provides advice on design, adoption and maintenance issues and a good overview of other technical guidance on SUDS. The Interim Code of Practice is available electronically on both the Environment Agency's web site at: www.environment-agency.gov.uk and CIRIA's web site at: www.ciria.org.uk Note that whilst the focus within the FRA must be on flood risk management, any SUDS should also seek to maximise opportunities for water quality and amenity benefits.

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%).

² Byelaw distance varies across the country. To find out what distance applies in your area call 08708 506 506 and ask to speak to a member of your local Development Control team in the area where the development is planned.

³ Main Rivers are watercourses designated as such on Main River maps and are generally the larger arterial watercourses. Main Rivers are indicated with a red line as part of the Flood Zones on maps held by the Local Planning Authority and on maps held by the Environment Agency.

⁴ An Ordinary Watercourse is any watercourse that doesn't form part of a Main River

⁵ Interim Code of Practice for Sustainable Drainage Systems Published by the National SUDS Working Group - July 2004 ISBN 0-86017-904-4



FRA Guidance Note 2: Minor Extensions
For the use where cumulative impact of development needs to be addressed

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FRA Guidance Note 2: Minor Extensions - For the use where cumulative impact of development needs to be addressed

Environment Agency guidance on the requirements for undertaking a Flood Risk Assessment (FRA) for planning applications. This guidance note relates specifically to the commissioning and undertaking of Flood Risk Assessment studies for householder extensions and for minor non-domestic extensions (of less than 250m²) in Flood Zones 2¹ or 3². This guidance note is applicable where local knowledge (Strategic Flood Risk Assessment, parish council etc.) has indicated that the cumulative impact of minor extensions may have a significant effect on flood risk as highlighted in Planning Policy Statement 25 (PPS) paragraph D16

Where cumulative impact from this type of development in these locations is not a recognised problem, a simpler format of FRA should suffice as detailed in our Flood Risk Standing Advice standard comments on 'Householder and other minor extensions'

Why is a FRA required?

For minor extensions within Flood Zone 3 and 2 areas the proposed development itself could be at risk of flooding from either rivers or the sea. Where this is the case, a FRA will need to focus on mitigation measures such as setting suitable floor levels and incorporating flood proofing into the design of the extension in addition to including an assessment of residual risks on and off site. Developments immediately alongside watercourses classified as a Main River or in close proximity to flood defence structures may also affect the operation or maintenance of these, and we will expect to comment individually on these proposals³. The FRA in these cases will need to consider these impacts and whether they might be acceptable or not.

What should be in the FRA?

The detail and technical complexity of a Flood Risk Assessment will reflect the scale and potential flood risk to and from the development. Flood Risk Assessments for this scale of development will be of a relatively minor nature and may even just take the form of a short written statement. In the cases covered here, the Strategic Flood Risk Assessment (if available) should highlight which elements of the section below will require particular attention.

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
 - existing site;
 - development proposals;
 - proposed flood protection measures incorporated into the development to reduce flood risk to the development itself and to others.

Surveys

- Site levels related to Ordnance Datum, both existing and proposed
- A cross-section of the site showing finished floor levels or road levels, or other relevant levels relative to the potential source of flooding.

Assessments

The Applicant should submit:

- Information about any other potential sources of flooding that may affect the site – streams, surface water run-off, sewers, groundwater, reservoirs, canals and other artificial sources or any combination of these
- Existing information on extent and depth of past flood events
- Details of flood mitigation measures proposed to reduce the impact of flooding
- Assessment of the residual risks after any necessary flood proofing measures or defences have been installed.

- The estimated standard of flood protection provided to the development when completed.
- Assessment of the off site impacts due to the effect on local flood storage and flood flow capacity.

What is the Environment Agency's Role?

With the exception of developments immediately alongside Main Rivers and in close proximity to flood defences, we will not provide comments in terms of flood risk on these minor developments at the planning application stage due to their low-risk nature. We have two main interests:

- If the proposal is within the Byelaw Distance⁴ of a Main River⁵ or flood defence structure, or includes the diversion or culverting of an Ordinary Watercourse⁶ then formal consent for the proposal may also be required from us.
- Prior to carrying out a FRA, developers should contact the Environment Agency and other operating authorities (including the engineering department of the local authority or Internal Drainage Board as appropriate) to establish whether any information is available relating to flood risk at the site they propose to develop. Our records of flooding are not exhaustive and the absence of information does not mean that a site will not flood. They should also take full account of the local knowledge of flooding in the community and account for this within the FRA.

Unless consent is required, our comments will be limited to the provision of flood level information where this is available.

Sources of information:

For information on flood resilience and resistance see

1. Draft Practice Guide to PPS25 Development and Flood Risk
2. Preparing for floods: interim guidance for improving the flood resistance of domestic and small business properties ODPM 2003.

¹ Flood Zone 2: This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.

² Flood Zone 3: This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

³ The Town And Country Planning (General Development Procedure) (Amendment) (No. 2) (England) Order 2006, came into force 1st October 2006 and requires consultation be made with the Environment Agency for development involving —

- i. the carrying out of works or operations in the bed of, or within 20 metres of the top of a bank of, a Main River which has been notified to the local planning authority by the Environment Agency as a main river for the purposes of this provision; or
- ii. the culverting or control of flow of any river or stream

⁴ Byelaw distance varies across the country. To find out what distance applies in your area call 08708 506 506 and ask to speak to a member of the Development Control team in the area where the development is proposed.

⁵ Main Rivers are watercourses designated as such on Main River maps and are generally the larger arterial watercourses. Main Rivers are indicated with a red line as part of the Flood Zones that have been provided to the Local Planning Authority and on maps held by the Environment Agency.

⁶ An Ordinary Watercourse is any watercourse that doesn't form part of a Main River



FRA Guidance Note 3: Development in Flood Zones 3 and 2 (Excluding Minor Extensions)

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FRA Guidance Note 3: Development in Flood Zones 3 and 2 (Excluding Minor Extensions)

Environment Agency guidance on the requirements for undertaking a Flood Risk Assessment (FRA) for planning applications. This guidance note relates specifically to the commissioning and undertaking of flood risk assessment studies for development in Flood Zones 2 and 3 other than 'minor' extensions i.e. excluding householder extensions and non-domestic extensions with a footprint of less than 250m², which are covered separately in FRA guidance note 2.

Prior to investing resources in completing a FRA, applicants are advised to contact the Local Planning Authority (LPA) and discuss how the flood risk Sequential Test as set out in Planning Policy Statement 25 (PPS25) will affect the proposed development. It is possible that the development will be inappropriate and be refused planning permission irrespective of any FRA. Advice on the evidence required to show that the Sequential and Exception Test has been properly applied is set out in the Sequential Test table within the Environment Agency's Standing Advice on development and flood risk and in the draft Practice Guide to PPS25. The Environment Agency may require evidence that the Sequential Test has been properly applied before commenting in detail on FRAs for development in this category.

Why is a FRA required?

In Flood Zone 3, the flood risk from rivers and the sea is classified as 'high', while in Flood Zone 2 it is said to be 'low to medium'. This classification is simply based on the probability of flood events occurring and does not address the possible consequences including the effects of any flood defences in the area. A FRA is required to ensure that all aspects of flood risk are considered both to the proposed development itself and also the potential impact on people and property elsewhere within the catchment. The scale, nature and location of the proposed development will inform the scope of the FRA required.

What should be in the FRA?

The detail and technical complexity of a FRA will reflect the scale and potential significance of the development. FRAs can be of a relatively minor nature, evaluating a small development on a site at the margins of the flood plain, or conversely can comprise major basin-wide studies for significant infrastructure developments. On occasions, preliminary or scoping studies may be undertaken prior to a fuller assessment. The following list sets out the kind of information that should be submitted as a FRA for development in Flood Zones 2 and 3:

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
 - existing site;
 - development proposals;
 - identification of any structures, which may influence local hydraulics. This will include bridges, pipes/ducts crossing the watercourse, culverts, screens, embankments, walls, outfalls and condition of channel.

Surveys

- Site levels related to Ordnance Datum, both existing and proposed
- Appropriate cross-section(s) of the site showing finished floor levels or road levels, or other relevant levels relative to the source of flooding, and anticipated water levels and associated probabilities.

Assessments

- Consideration of whether the site falls within the functional flood plain as defined by the draft Practice Guide to Planning Policy Statement 25 (PPS25), and if so, demonstration that development meets the vulnerability criteria set out in table D1 PPS25.
- Flood alleviation measures already in place, their state of maintenance and their performance.
- Information about all potential sources of flooding that may affect the site – from rivers and the sea, streams, surface water

run-off, sewers, groundwater, reservoirs, canals and other artificial sources or any combination of these.

- The impact of flooding on a site including:
 - i. the likely rate or speed of surface water run-off with which flooding might occur;
 - ii. the order in which various parts of the location or site might flood;
 - iii. the likely duration of flood events
 - iv. the economic, social and environmental consequences of flooding on occupancy of the site
 - v. information on extent and depth of previous flood events or on flood predictions.
- An assessment of how safe access and exit can be provided for routine and emergency access under both frequent and extreme flood conditions.
- An assessment of how the layout and form of development can be used to reduce or minimise flood risk.
- An assessment of the capacity of any drains or sewers, existing or proposed, on the site during various flood events.
- An assessment of the volume of surface water run-off likely to be generated from the proposed development.
- Proposals for surface water management according to sustainable drainage principles, with the aim of not increasing, and where practicable, reducing the rate of runoff from the site as a result of the development
- The likely impact of any displaced water on third parties caused by alterations to ground levels or raising flood embankments.
- The potential impact on fluvial or coastal morphology and the likely longer-term stability and sustainability of existing defences.
- Estimates should be made of how climate change could affect the probability and intensity of flood events. The assessment should ensure that the development meets an acceptable standard of flood protection for the design life of the development. The hydrological analysis of flood flows and definition of defence standards needs to include the allowances for increased flows and sea level rise contained in DEFRA's project appraisal guidance for flood defence and in accordance with Appendix B of PPS 25 or the latest information from UKCIP.
- The residual risks to the site after the construction of any necessary defences and the means of managing those.
- *Consideration of the proposal relative to any existing Strategic Flood Risk Assessment carried out by the local authority.*

Exception Test requirements

In addition to the requirements listed above, when completing a FRA as part of meeting the requirements of the Exception Test, an assessment will be required of on and off site opportunities for reducing flood risk overall. This will include an appraisal of the strategic flood risk management measures to which the development can contribute.

For further information on the Exception Test contact the Local Planning Authority.

What is the Environment Agency's Role?

We will usually provide comments at the planning application stage on Flood Risk Assessments covered by this guidance note. (unless indicated otherwise by Environment Agency Planning Liaison team in the area where the development is proposed). We have three main interests:

- Ensuring that the calculation and design of the site drainage and flood risk management measures meet Environment Agency policies and plans where present, resulting in a contribution to sustainable development.
- If the proposal is within the Byelaw Distance² of a Main River³ or flood defence structure, or includes the diversion or culverting of an Ordinary Watercourse⁴ then formal consent for the proposal may also be required from us.
- Prior to carrying out a FRA, developers should contact the Environment Agency and other operating authorities (including the engineering department of the local authority or Internal Drainage Board as appropriate) to establish whether any information is available relating to flood risk at the site they propose to develop. It should be noted that, whilst we can provide information on flooding from rivers and the sea, we only record known problems relating to other sources. The absence of information in this respect does not mean that a site will not flood. Developers should also take full account of the local knowledge of flooding in the community and account for this within the FRA.

Sources of information:

1. www.environment-agency.gov.uk For information on SUDS best practice, flood proofing and flood resilient construction methods, flood warning, Flood Map and contact details for local Environment Agency offices.
2. www.ciria.org.uk Check 'publications' for details of relevant information
3. www.ciwem.com/directory/ For information on consulting engineers who may be able to carry out FRAs. This is by no means a definitive list.

4. www.hrwallingford.co.uk For information on an R&D project on flood risk assessment guidance for new development.

¹ Flood Zone 2: This Zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.

Flood Zone 3: This Zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

² Byelaw distance varies across the country. To find out what distance applies in your area call 08708 506 506 and ask to speak to a member of the Development Control team in the area where the development is proposed.

³ Main Rivers are watercourses designated as such on Main River maps and are generally the larger arterial watercourses. Main Rivers are indicated with a red line as part of the Flood Zones held by the Local Planning Authority and on maps held by the Environment Agency.

⁴ An Ordinary Watercourse is any watercourse that doesn't form part of a Main River

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