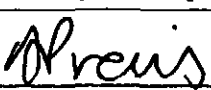
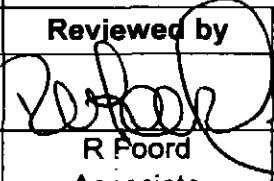




Gladedale (South Yorkshire) Ltd
Development at Land Off
Mapplewell Drive, Mapplewell, Barnsley
Flood Risk and Run-off Assessment

Report Ref: R001
Job Number: J-DK010
October 2008

Job Number: J-DK010			Document Ref: R001AJP - J-DK010 - Mapplewell FRA.doc		
Revision	Status	Prepared by	Reviewed by	Authorised by	Date
-	For Approval				Oct 2008
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Contents

1	Executive Summary.....	1
2	Introduction.....	2
3	Existing Site	4
3.1	Site Description	4
3.2	Existing Site Drainage	4
3.3	Adopted Drainage.....	5
3.4	Land Drainage	5
3.5	Redevelopment Proposals.....	5
4	Sources and Extent of Existing Flooding	6
4.1	River Dearne	6
4.2	Land Drainage	6
4.3	Adopted Drainage.....	6
4.4	Overland Flow.....	6
4.5	Site Redevelopment	6
5	Flood Risk Assessment.....	7
5.1	River Dearne	7
5.2	Land Drainage	7
5.3	Adopted Drainage.....	8
5.4	Site Redevelopment	8
6	Run-Off Assessment	9
6.1	Control of Surface Water	9
6.2	Infiltration Systems	9
6.3	Watercourse	9
6.4	Adopted Drainage.....	10
6.5	Mitigation Measures.....	10
6.6	Flood Routing	10
6.7	Peak Run-off	10
7	Ditch Rerouting.....	11
8	Conclusions	13
Appendix A - Site Location plan – OJP Drawing ref J-DK010-601		
Appendix B - Environment Agency Flood Zone Map OJP drawing ref J-DK010-602		
Appendix C - Site Topographical Information		
Appendix D - Barnsley MBC – Highways and Engineering Department Correspondence		
Appendix E - Yorkshire Water Pre-Planning Enquiry Response and Asset Records		
Appendix F - Existing Drainage Ditch System OJP Drawing J-DK010-604		
Appendix G - Proposed Drainage Ditch Rerouting OJP Drawing ref J-DK010-605		
Appendix H - Proposed Indicative Development Layout		

1 Executive Summary

Opus Joynes Pike (OJP) were commissioned to carry out a flood risk and run-off assessment for proposed residential development on land off Mapplewell Drive, Mapplewell, Barnsley.

The site has been assessed in accordance with the requirements of Planning Policy Statement 25 (PPS25) to identify the site specific flood risk for this area and determine the suitability of the proposed development for this site.

The site was identified from the Flood Zone information given on the Environment Agency website as within Flood Zone 1 (FZ1) an area of low fluvial flooding potential.

Furthermore, site drainage proposals will incorporate sustainable drainage techniques, wherever possible, and surface water attenuation will be used to control surface water run-off and limit flows from the proposed development.

This report has been produced on behalf of the client, Gladedale (South Yorkshire) Ltd, and no responsibility is accepted to any Third Party for all or any part. This report should not be relied upon or transferred to any other parties without the express written authorisation of Opus Joynes Pike. If any unauthorised Third Party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty of care or skill.

The findings and opinions conveyed within this report are based on information obtained from a variety of sources, as detailed, which Opus Joynes Pike believes are reliable. Nevertheless, Opus Joynes Pike cannot and does not guarantee the authenticity or reliability of the information it has relied upon from these sources.

2 Introduction

The Government has placed increasing priority on the need to take full account of the risks associated with flooding at all stages of the planning and development process, to reduce future damage to property and loss of life. PPS25 Development and Flood Risk identifies how the issue of flooding is dealt with in the drafting of planning policy and the consideration of planning applications.

The purpose of this report is to assist our client and the local Planning Authority to make an informed decision on the flood risks associated with the site redevelopment.

Local Planning Authorities have the powers to control development in accordance with the guidelines contained in PPS 25, and are expected to apply a risk-based approach to development with the sequential test in Annex D Table D.1. This sets out a sequential characterisation of flood risk in terms of annual probability of river, tidal and coastal flooding.

In accordance with the sequential test in PPS 25 sites are to be classed as follows:

Flood Zone	Appropriate Uses
Flood Zone 1 - Low Probability – This zone comprises land having less than 1 in 1000 annual probability of river or sea flooding (<0.1%)	All uses of land are appropriate in this zone
Flood Zone 2 - Medium Probability – This zone comprises land assessed as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between 1 in 200 and 1 in 10000 annual probability of sea flooding (0.5%-0.1%) in any year	The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure in Table D.2 are appropriate in this Zone Subject to the Sequential Test being applied, the highly vulnerable uses in Table D.2 are only appropriate in this zone if the Exception Test is passed
Flood Zone 3a - High Probability – 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	The water-compatible and less vulnerable uses of land in Table D.2 are appropriate in this zone. The highly vulnerable uses in Table D.2 should not be permitted in this zone. The more vulnerable and essential infrastructure uses in Table D.2 should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this should be designed and constructed to remain operational and safe for users in time of flood.

Flood Zone 3b - Functional**Floodplain**

– This zone comprises land where water has to flow or be stored in times of flood. SFRAs should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes)

Only the water-compatible uses and the essential infrastructure listed in Table D.2 that has to be there should be permitted in this zone. It should be designed and constructed to:

Remain operational and safe for users in times of flood;

Result in no net loss of floodplain storage;

Not impede water flows; and

Not increase flood risk elsewhere.

Essential infrastructure in this zone should pass the Exception Test.

3 Existing Site

3.1 Site Description

The site is located in the Barnsley suburb of Mapplewell, approximately 3.7km north west of Barnsley town centre.

The site is approximately 17.36ha in area and roughly rectangular in shape. It is centered on approximate National Grid Reference 433050, 409740.

A plan showing the location of the site is included in Appendix A.

The site lies some 0.6km to the north of the River Dearne.

Previously the site was part of Mapplewell Colliery. It is bounded by existing residential development along Spark Lane to the west, recent industrial development to the north along Mapplewell Drive, Carr Green Lane to the East and open grass land to the south.

The site has been subject to significant remediation works and various phases of landscaping over the years.

Topographical information for the existing site is included in Appendix C. This indicates that the site generally falls from north west to south east with various interceding banks and plateaus between.

The levels along the northern boundary vary from just over 96.0mAOD in the west to 89.0mAOD in the east. The southern boundary falls from 75.0mAOD in the west to 68.0mAOD in the east.

There are no developed areas within the boundaries of the site. It is therefore assumed that the existing site can be classified as 100% permeable.

3.2 Existing Site Drainage

There are two drainage ditches recorded within the boundary of the site. The largest ditch is approximately 500m long and flows west to east around 75m north of the southern boundary.

The second, significantly smaller ditch, is approximately 250m long and follows part of the eastern boundary.

A plan showing the routes of the existing ditches is included in Appendix F.

Both ditches have suffered marked deterioration over time. The larger ditch is also culverted for parts of its run. This ditch is fed by a 750mm diameter surface water pipe discharging adjacent to the football pitch in the north west of the site.

The smaller ditch appears to pick up only surface run-off from the existing site. It flows southwards and connects to the larger ditch towards the south east corner of the site.

3.3 Adopted Drainage

Correspondence received from Yorkshire Water is included in Appendix E. This confirms the surface water outfall to the north east of the site. It also indicates that a 450/525mm diameter combined sewer follows the western boundary crossing the site along the southern boundary.

Yorkshire Water have not indicated that there are flooding problems with their adopted assets in this area.

3.4 Land Drainage

It is also noted that the other ditches / land drains are located on the opposite side of the southern boundary.

These appear to connect to the same ditch system to which the site in question discharges.

This main system flows southwards from the area of the site and connects to the River Dearne, across open land to the south.

3.5 Redevelopment Proposals

An indicative development plan is included as Appendix H of this report.

The site is to be developed in two areas constituting the north portion and southern portion of the overall site. The areas are split by the designated area of public open space.

The northern area is approximately 9.77ha in area and the southern area 7.59ha.

As it is to be developed as residential it will be classified as 'More Vulnerable' in accordance with PPS25 Annex D table D.2.

The development of northern part will generate approximately a development density of approximately 50% giving a design impermeable area of around 4.9ha. Similarly, the southern part is likely to be developed to the same density yielding an impermeable area of around 3.8ha.

To facilitate suitable development it will be necessary to reroute the existing ditches within the boundary of the site. It is proposed that these will be directed to follow the western and southern boundaries and discharge at the existing point in the south eastern corner.

4 Sources and Extent of Existing Flooding

4.1 River Dearne

With reference to the Environment Agency's indicative flood plain information published on the internet (see Appendix B) the site can be classified as being in flood zone 1, an area of low fluvial flood risk.

4.2 Land Drainage

Correspondence received from Barnsley MBC indicates that the assets located to the west of the site have previously flooded, a copy of this response is included in Appendix D.

It is thought that the main cause of this flooding is the discharge from the public sewer, noted previously, and the lack of maintenance of the existing ditch across the site.

These factors have combined to cause flooding onto the public highway in Spark Lane. The extent and depth of this flood is not recorded.

4.3 Adopted Drainage

There are no specific issues related to the adopted drainage in this area although the combination of the surface water outfall and the poor condition of the existing drainage ditch does appear to be the cause of the flooding in Spark Lane.

4.4 Overland Flow

Due to the presence of the existing carriageways to the west, north and east the potential routes of overland flow will be intercepted by these roads and directed away from the development site.

4.5 Site Redevelopment

Potentially the redevelopment of the site could impact upon the flood profile in this area. The introduction of new impermeable areas and more effective drainage could increase the peak run-off from the site and the response of the system as a whole.

This may impact on the downstream infrastructure and will require mitigation.

5 Flood Risk Assessment

5.1 River Dearne

Given the distance of the site from the watercourse and the intervening topography the River Dearne is discounted as a flood risk for this site.

5.2 Land Drainage

The flood risk associated with the existing drainage ditches is principally the result of lack of maintenance and the subsequent deterioration of the system within the site.

The partial culverting of the ditch across the site also increases the flood risk locally.

The existing ditch sections, where they are still intact, have a base channel width of around 1.5m, a maximum depth of 1.6m with sides at around 1v in 1.5h. This gives a cross sectional area of approximately 5.5m².

It is thought that these ditch dimensions are more a result of the ad-hoc ground works on the site rather than describing the 'natural' profile. It is therefore necessary to make an assessment of the required capacity based on the anticipated inputs to the system.

The required capacity of the ditch will be a function of the potential flow from the surface water outfall and the estimated run-off from the existing greenfield site.

The 750mm diameter surface water outfall at the head of the ditch on site does not currently have any recorded level or gradient information. However, the two upstream manhole cover levels are recorded. Assuming that the invert fall matches the cover level fall, the pipe has an indicative gradient of 1v in 70h.

This assumption should be verified by further on-site investigation. At the minimum, and in lieu of any specific flow information from Yorkshire Water, the maximum gradient of the last three runs of the outfall should be measured and used to determine anticipated surface water input to the ditch.

Based on the above assumptions the anticipated flow from the 750mm diameter outfall will be approximately 1.5m³s⁻¹ ($K_s=0.6\text{mm}$).

The second element in determining the flow is the likely run-off from the existing site. The simplified method for assessing the anticipated run-off is to assume the standard 5l/s/ha as noted by BMBC (see correspondence in Appendix D) and factor this for the 1 in 100 year event.

The growth factor for Hydrological Region 4 for the 1 in 100 year event is 2.6, taken from Institute of Hydrology 124 Method. This gives a Q_{BAR} figure of $(5 \times 17.36\text{ha}) = 86.8\text{l/s}$ and $Q_{100} = 225.7\text{l/s}$.

The combined capacity of the drainage ditch would then be in the region of $1.7\text{m}^3\text{s}^{-1}$. This should be modified to account for potential climate change to give a design capacity of $2.07\text{m}^3\text{s}^{-1}$.

5.3 Adopted Drainage

Flood issues associated with the adopted drainage system in this area have been discussed as part of Section 5.2.

5.4 Site Redevelopment

The introduction of additional impermeable areas on any site will potentially increase the run-off response and flood risk of any downstream areas.

It is necessary to balance the run-off generated by the development to the capacity of the existing drainage systems such that there is no overall increase in flood risk and where possible to incorporate a reduction in flood risk locally.

The site currently drains by natural systems, with run-off into the ditches generated as overland flow.

It has been recommended by BMBC that a figure of 5l/s/ha is assumed for the allowable discharge rate for the development. Based on the overall areas identified in 3.5 this gives the following allowable discharge rates;

Northern Area	9.77×5	$= 49\text{l/s}$
Southern Area	7.59×5	$= 38\text{l/s}$

6 Run-Off Assessment

To mitigate any potential flood risk caused by the development and attributable to a possible increase in impermeable area, it is necessary to demonstrate that the site can be suitably drained and have no impact on the existing flood scenario.

The surface water drainage system should also seek to reduce flood risk, wherever possible, in addition to including mitigation measures against potential future climate change.

In this case the development of the site will increase the impermeable area footprint of the site and commensurately the potential run-off.

It is therefore proposed that the site will attenuate flows from the new developed areas prior to discharging to the existing adopted system crossing the site.

6.1 Control of Surface Water

Part H of the Building Regulations 2002 recommends that surface water run-off shall discharge to one of the following, listed in order of priority:

- (a) an adequate soakaway or some other adequate infiltration system, or where that is not reasonably practicable,
- (b) a watercourse, or, where that is not reasonably practicable,
- (c) a sewer.

6.2 Infiltration Systems

With reference to Scott Doherty Associates Ltd – Ground Investigation Department dated March 2008, it is evident that the site is underlain by over 4m of made ground generally consisting of clay rich colliery spoil and waste material.

The borehole logs indicate that under this deposited material, the site lies on a band of weathered mudstone.

Given the identified ground conditions, the use of infiltration based systems would not be viable for this site.

6.3 Watercourse

The drainage ditches crossing the site are well suited for the discharge of surface water from the development.

They already receive run-off from the existing site and connect to an extensive network of other ditches flowing towards the River Dearne to the south.

6.4 Adopted Drainage

There are no adopted systems in the area suitable to connect surface water to.

6.5 Mitigation Measures

As the adjacent drainage ditch is the only viable outfall location for the surface water system it will be necessary to attenuate run-off generated by the development to 1 in 100 years with an allowance for the impact of climate change, in accordance with PPS25.

For this preliminary design the outfall rate will be reduced by 20% in line with the requirements of PPS25 to give a design discharge rate of 39.2l/s for the northern and 30.4l/s for the southern parts of the development..

Considering development of northern part only, using the allowable discharge defined above, the estimated proposed impermeable area given in 3.5 (4.9ha) and FSR site characteristics of $M5-60min = 19.0$ and Ratio $r = 0.38$, the estimated volume of attenuation required for the development will be between $1734m^3$ and $2433m^3$.

For the southern portion, the same FSR characteristics will be used but for an allowable discharge of 30.4l/s and a developed impermeable area of 3.8ha. This gives an estimated volume of attenuation of be between $1347m^3$ and $1891m^3$.

The range of figures represents the myriad combinations of flow control device and storage structure available.

6.6 Flood Routing

The performance of the system during extreme events (>1 in 100 years) should also be considered at this stage.

The routing of potential surface water run-off, should the capacity of the proposed system be exceeded, needs to be built into the layout of the site such that the residual risk of flooding from this element can be easily mitigated.

By identifying the most vulnerable manholes in the system, flooding routes on to public open space, landscaped areas or gardens may be incorporated relatively easily and economically at the planning stage. If there is insufficient volume available in surface storage systems then additional attenuation will be required on site.

6.7 Peak Run-off

The use of non-traditional and SuDS based collection systems such as swales and porous surfaces should be considered at this stage as an additional method of improving the run-off profile of the development. These collection systems can extend the time of concentration thereby reducing the peak run-off from the site and easing flooding pressures downstream. This would benefit not only the site and the downstream areas but also assist in improving the quality of water discharged from the site.

7 Ditch Rerouting

In order to provide suitable development for this site it is proposed that the existing ditches are rerouted along the western and southern boundaries.

The proposed route is shown on OJP drawing J-DK010-605 included in Appendix G.

The ditch should be profiled to provide sufficient replacement conveyance capacity as determined in 5.2, $2.07\text{m}^3\text{s}^{-1}$.

The capacity of the channel is determined using the Chézy Equation for steady flow. This is a function of the slope and channel resistance to flow thus;

$$Q = \frac{Am^{3/2} i^{1/2}}{n}$$

Where

n	=	Mannings Roughness
i	=	Bed slope (m/m)
A	=	Area (m^2)
m	=	Hydraulic Radius (m)

Based on the preliminary regrade levels of the site the minimum landform gradient along the route of the rerouted ditch is approximately 1v in 400h.

The Manning's roughness co-efficient is taken to be 0.035, this is representative of a ditch in poor condition. This has been selected to represent a 'natural' channel rather than a purposely maintained grass lined swale.

It will therefore be necessary to design the new channel with the required capacity at this gradient and roughness. Reaches of the ditch at higher gradient will potentially pass forward more flow, the effects of this should be determined when the detailed design of this channel is implemented.

The flow profile anticipated within the channel is also important in determining the suitable morphology. The nominal channel should be capable of conveying the 'normal' flow at controlled velocities i.e. fast enough to not cause significant backwater effects and slow enough to promote sedimentation and tertiary treatment.

The Q_{BAR} rate represents the approximate peak 1 in 2 year flow rate, the majority of 'normal' flows will be significantly less than this. Taking the normal flow as 50% of Q_{BAR} the nominal channel should be designed for approximately 35l/s.

The central channel will be approximately rectangular in cross section. To provide the 35l/s capacity required at 1v in 400h the nominal channel will need to measure 1.3m wide by 250mm deep.

The main channel will provide flow capacity of $2.07\text{m}^3\text{s}^{-1}$ and measure 6.7m wide with side slopes 1v in 3h with a central 1.3m wide base.

This typical cross section is shown on OJP drawing J-DK010-605 included in Appendix G.

The landscaping and planting of the channel gives the opportunity to increase biodiversity in an ecology corridor including and bounding the route. It will also assist in the tertiary treatment of the flow resulting in improvements in water quality at the outfall from the system.

Localised modifications to the bed level and channel slopes can be made to create wet areas, 'shelves' and gullies which will serve to provide a variety of different habitats.

8 Conclusions

Following this assessment it is considered that the development site can be classified as within Flood Zone 1, an area at low risk of fluvial flooding (>1 in 1000 years).

It is determined that the site can be suitably developed for residential use in line with the requirements of PPS25.

The existing ditches that cross the site are to be rerouted as indicated on OJP drawing J-DK010-605. This new ditch system will enable development of the site but also positively impact upon the reported flooding issues associated with the existing system.

The rerouting exercise will also enable the opportunity to create a significant local amenity in the form of a wildlife corridor along the route of the amended ditch system.

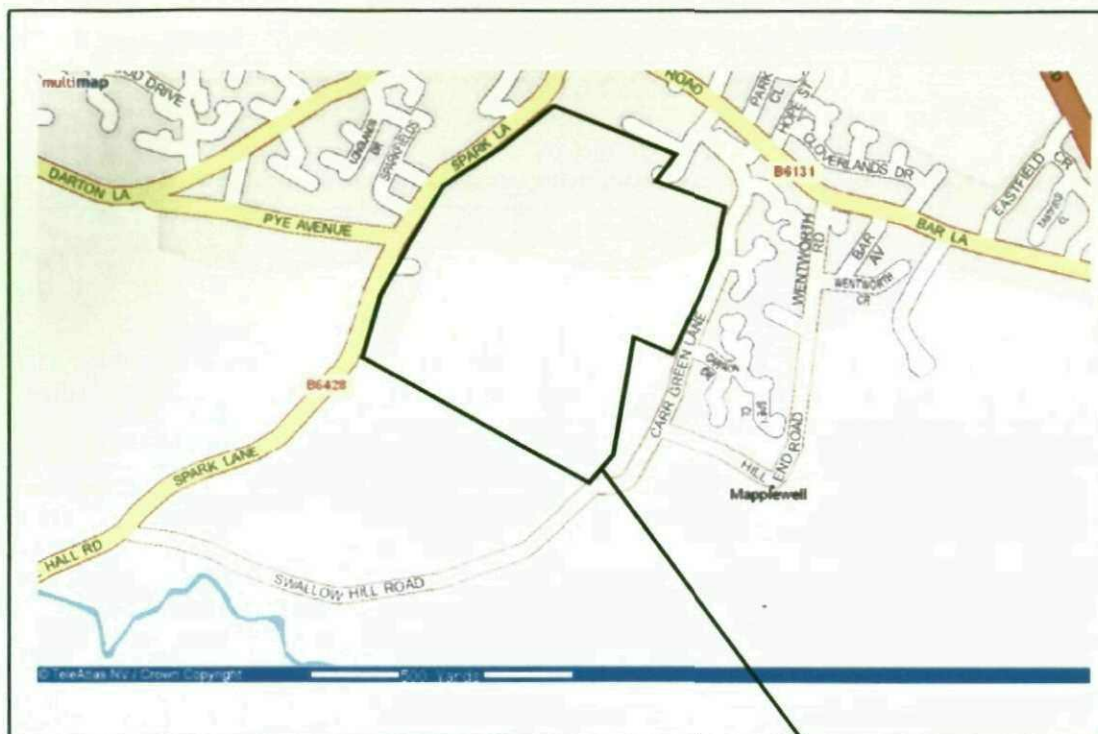
It is also demonstrated that the site drainage can be detailed such that additional run-off is suitably controlled and attenuated onsite to have a positive impact on the local flood regime.

Approximately 1734m³ and 2433m³ of onsite attenuation will be required for the northern part of the development and between 1347m³ and 1891m³ for the southern portion for events up to the 1 in 100 year +20% scenario.

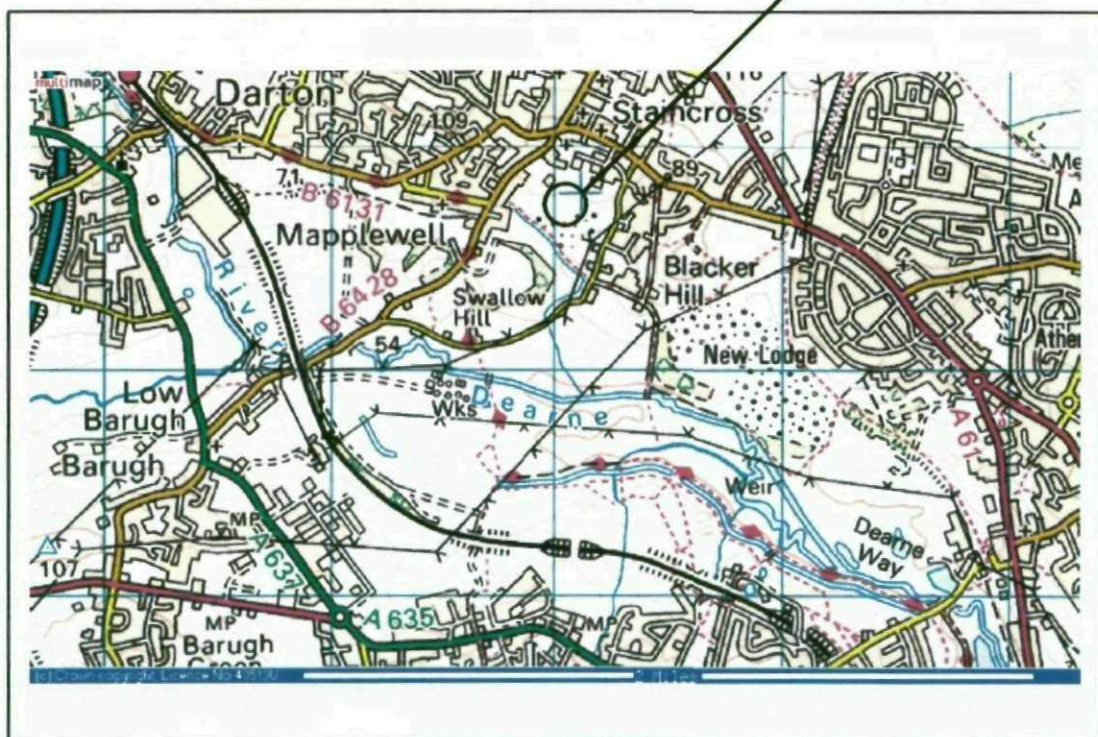
It should be noted that infiltration based schemes have not been considered further due to the anticipated impermeability in the observed underlying ground conditions in this area.

Flood routing and non-traditional collection systems, such as pervious paving, should also be considered as part of the detailed design of the surface water system to further improve the run-off profile of the proposed development.

Appendix A - Site Location plan – OJP Drawing ref J-DK010-601



SITE LOCATION
Grid Ref SE 330 097
Post Code S75 6FW



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TITLE DEVELOPMENT AT MAPPLEWELL
BARNSELY

SITE LOCATION PLAN

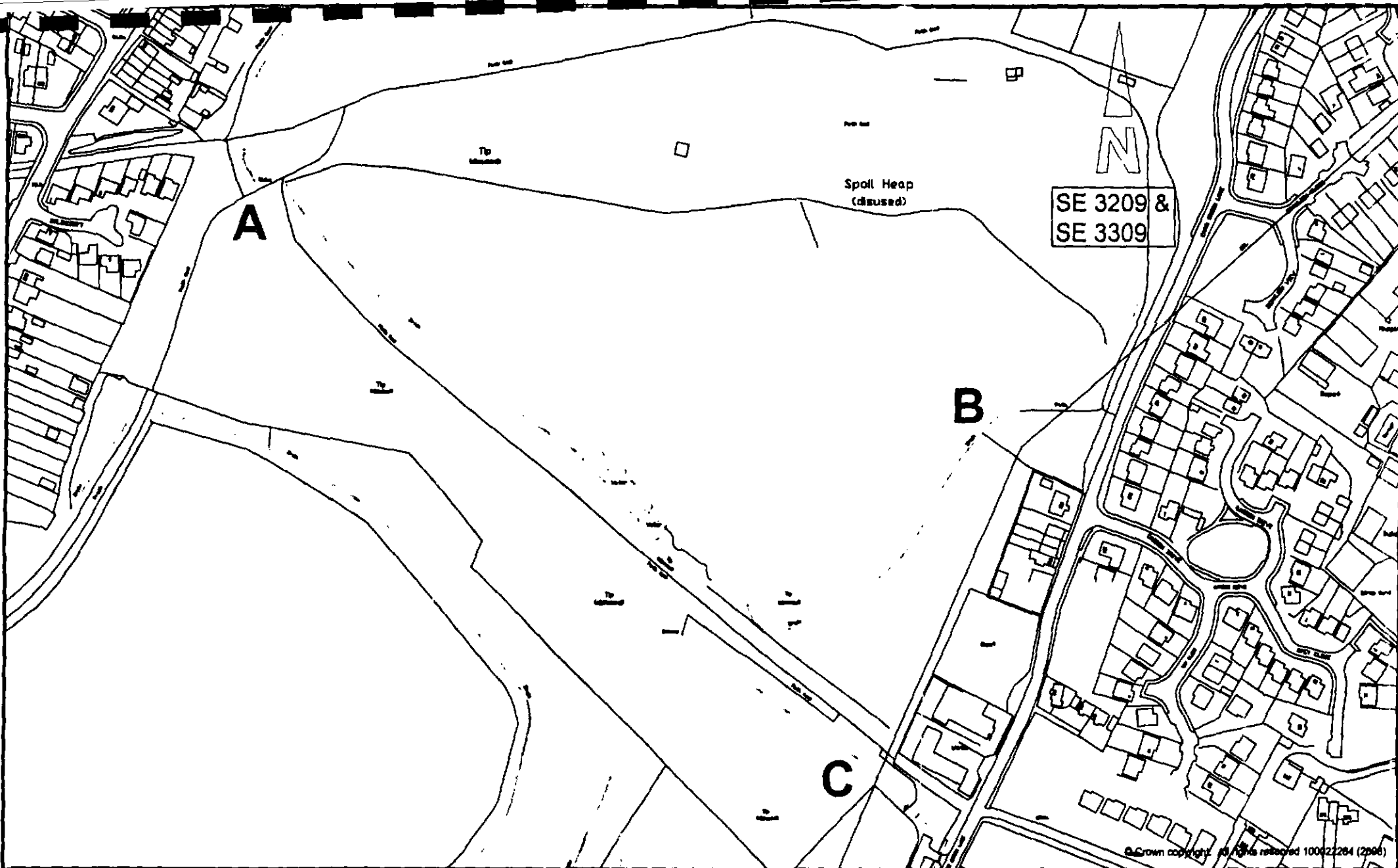
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		J-DK010 - 601
		REVISION
		-

APPENDIX A: SITE PLAN 1:10000

**Appendix B - Environment Agency Flood Zone Map OJP
drawing ref J-DK010-602**

Appendix C - Site Topographical Information

**Appendix D - Barnsley MBC – Highways and Engineering
Department Correspondence**



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BARNSLEY
Metropolitan Borough Council
Highways & Engineering

LAND OFF MAPPLEWELL DRIVE, MAPPLEWELL WATERCOURSE CLEANING

Scale
1/2500

Drawn WA	Date JAN 08
Checked	File

A J. Camall BSc., M.Eng., M.I.C.E., M.I.H.T.,
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Drawing No.
DRAWING No. 1

Your Ref:

Our Ref: L001AJP-12080010

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JOYNES PIKE
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CONSULTING ENGINEERS

9 January 2008

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For the Attention of Mr S Kilner

Dear Steve,

Re: Proposed Residential Development at Land off Mapplewell Drive, Mapplewell, Barnsley

Joynes Pike and Associates have been retained to advise on the feasibility of drainage options for a proposed development at the above referenced site.

The site is approximately 12.16ha in total and the final development would constitute 500 new properties. A location plan attached indicates the extent of the site in question.

There are several bodies of water and drains/watercourse crossing the site. It is understood that these are under riparian ownership. The ultimate outfall, to the south of the site, is the River Dearne, an Environment Agency controlled watercourse. However as the local drainage authority you would have a vested interest in the development of the design of the drainage in this area. It is for this reason that we would like to garner your comments regarding our initial drainage strategy for this site.

There are no detailed development plans for the proposed site, however it is assumed that standard housing densities of between 45 and 65% are to be anticipated.

The preferred outfall for the surface water drainage system would be to the existing watercourses flowing across the site. It may be the case that some of the channels may need to be redirected in order facilitate the development and it is not clear if the existing ponds on site. However, it is anticipated that the design criteria would be for a 1 in 100 year +20% rainfall event attenuated to a 1 in 1 year Greenfield run-off allowable discharge rate. This approach would present a robust system, offering significant benefits to the run-off profile in this area for larger storms (>10 year RP).

We would welcome your comments regarding our initial drainage strategy for this site and any comments you may have regarding the existing drainage systems in this area.

We trust that the enclosed information is adequate for you to be able to assess our request, however if you require any clarification or further information please do not hesitate to contact the undersigned.



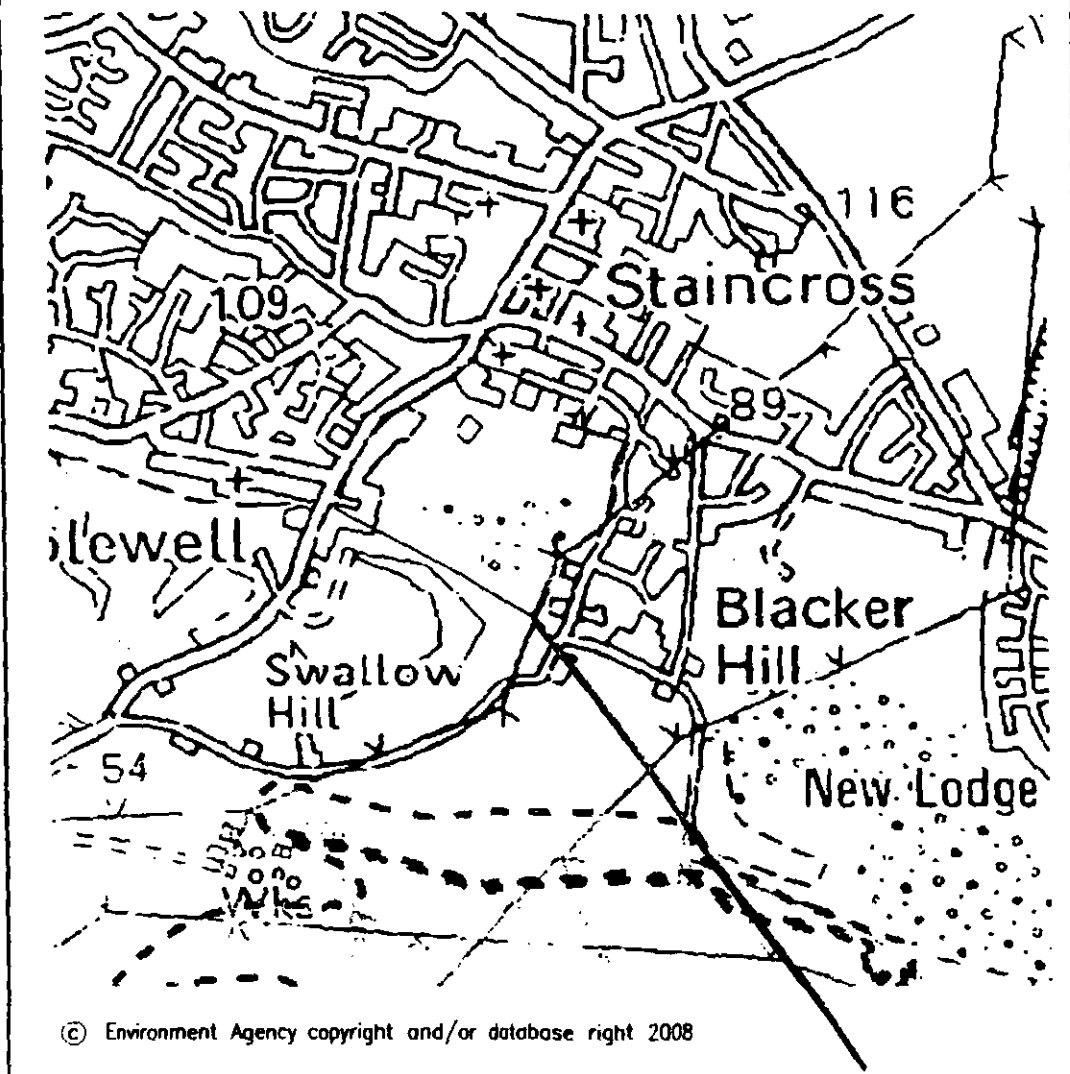
Yours sincerely

For and on behalf of Joynes Pike & Associates Limited



Andrew Precious MEng
Principal Civil Engineer
aprecious@joynespikes.co.uk

Encs – JPA Drawing ref 12080010 – 601 and 602



SITE LOCATION

KEY

FLOOD ZONE 2

FLOOD ZONE 3



FLOOD DEFENCES



AREAS BENEFITTING FROM FLOOD DEFENCES

DRAWING STATUS

PRELIMINARY

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 & ASSOCIATES LTD
 (INCORPORATED IN ENGLAND)

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CLIENT

 GLADEDALE
 SOUTH YORKS LTD

DESCRIPTION

PROJECT TITLE

 DEVELOPMENT AT MAPPELWELL
 BARNSELY

DRAWING DETAIL

 ENVIRONMENT AGENCY
 FLOOD ZONE MAP

 DRAWN AP
 PROJECT ENGINEER AP
 CHECKED

APPROVED

 DRAWING NUMBER
 12080010/602

REV DATE CHKD APPR

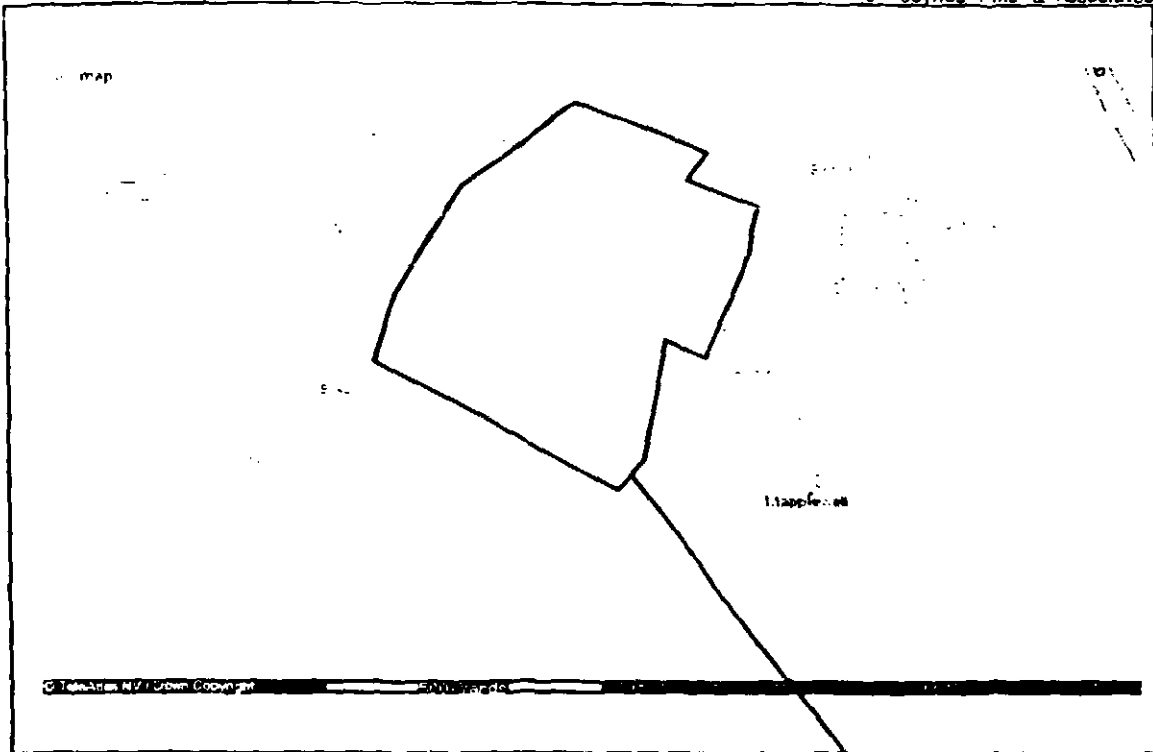
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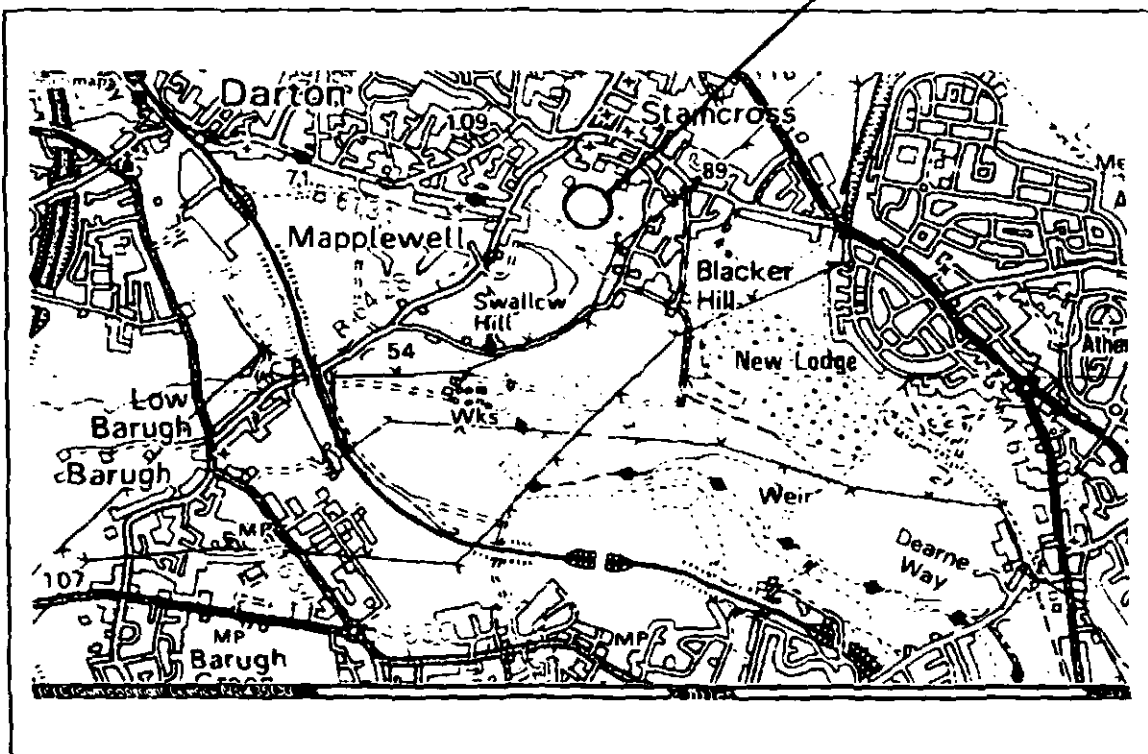
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REVISION

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SITE LOCATION
Grid Ref SE 330 097
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DRAWING STATUS

PRELIMINARY

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DESCRIPTION

PROJECT TITLE

DEVELOPMENT AT MAPPLEWELL
BARNSELY

DRAWING DETAIL

SITE LOCATION PLAN

REV DATE CHKD APPR

DATE
JAN 2008

DRAWN AP
PROJECT ENGINEER AP

CHECKED

APPROVED

SCALE
NTS

DRAWING NUMBER
12080010-601

REVISION

-

CLIENT

GLADEDALE HOMES
SOUTH YORKS LTD

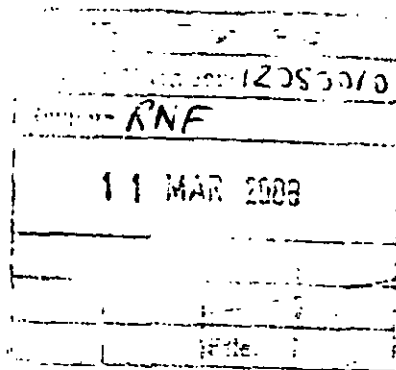
Appendix E - Yorkshire Water Pre-Planning Enquiry Response and Asset Records

YorkshireWater

Ben Bailey Homes Ltd
Elizabeth House
Cliff Street
MEXBOROUGH
S64 9HQ

For the attention of Laura Gommersall

Your Ref:
Our Ref: H003105 /sew/ndt/peh



Yorkshire Water
Waste Water - Sewerage
New Development Team
Knostrop WWTW
Knowsthorpe Lane
LEEDS
LS9 0PJ

Tel: (0113) 235 4148
Fax: (01274) 372 834

Email:
Planning.Sewerage@yorkshirewater.co.uk

For telephone enquiries ring:

Philip Hoffmann on (0113) 235 4148

3rd April 2007

Dear Madam,

Land at Spark Lane, Mapplewell, Barnsley - Pre-Planning Sewerage Enquiry - Residential Development

Thank you for your enquiry of 20th March 2007. Our charge of £80.00 (plus VAT) will be added to your account with us, reference BBH 0127. You will receive an invoice for your account in due course.

Please find enclosed a complimentary extract from the Statutory Sewer Map. This indicates the recorded position of the public sewers. The following comments reflect our view, with regard to the public sewer network only, based on a 'desk top' study of the site:

There are 450mm and 525mm diameter public combined sewer recorded crossing/close to the site. No buildings are to be erected within 6 (six) metres, nor trees planted within 5 (five) metres of these public sewer. It may not be acceptable to raise or lower ground levels over the sewers, nor to restrict access to the manholes on the sewers. If you wish to have these sewers diverted under Section 185 of the Water Industry Act 1991 an application should be made in writing. To discuss this matter, please telephone 0845 124 24 29.

Development of the site should take place with separate systems for foul and surface water drainage. The separate system should extend to the public sewer.

Foul water should discharge to the 525mm diameter public combined sewer recorded to the south of the site.

The local public sewer network does not have capacity to accept any discharge of surface water from the proposal site. The developer is advised to contact the Environment Agency/local Land Drainage Authority with a view to establishing a suitable watercourse for discharge. It is noted that watercourses are located through and to the south of the site. These appear to be the obvious place for surface water disposal.

Off-site foul and surface water sewers may be required which may be provided by the developer and considered for adoption under Section 104 of the Water Industry Act 1991. Please telephone 0845 124 24 29 for advice on sewer adoptions. Alternatively, the developer may in certain circumstances be able to requisition off-site sewers under Section 98 of the Water

Industry Act 1991 for which an application must be made in writing. For further information, please telephone 0845 124 24 29.

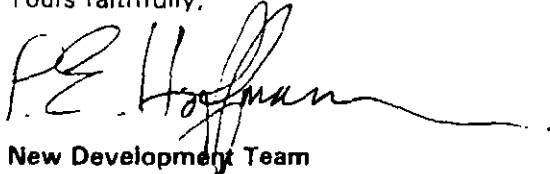
Prospectively adoptable sewers must be designed and constructed in accordance with the WRc publication "Sewers for Adoption - a design and construction guide for developers" 6th Edition as supplemented by Yorkshire Water's requirements, pursuant to an agreement under Section 104 of the Water Industry Act 1991. An application to enter into a Section 104 agreement must be made in writing prior to any works commencing on site. Please contact our New Development Team at Sheffield (telephone 0845 124 24 29) for further information.

The public sewer network is for domestic sewage purposes. This generally means foul water for domestic purposes and, where a suitable surface water or combined sewer is available, surface water from the roofs of buildings together with surface water from paved areas of land appurtenant to those buildings. Land and highway drainage have no right of connection to the public sewer network. Land drainage will not be allowed into a public sewer. Highway drainage, however, may be accepted under certain circumstances; for instance, if SUDS are not a viable option and there is no highway drain available and if capacity is available within the public sewer network. In this event, the developer will be required to enter into a formal agreement with Yorkshire Water Services under Section 115 Water Industry Act 1991 to discharge non-domestic flows into the public sewer network.

Any new connection to an existing public sewer will require the approval of Yorkshire Water. You may obtain an application form by telephoning 0845 124 24 29.

All the above comments are based upon the information and records available at the present time. The information contained in this letter together with that shown on any extract from the Statutory Sewer Map that may be enclosed is believed to be correct and is supplied in good faith. Please note that capacity in the public sewer network is not reserved for specific future development. It is used up on a 'first come, first served' basis. You should visit the site and establish the line and level of any public sewers affecting your proposals before the commencement of any design work.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'P. E. Hoffman', with a long horizontal flourish extending to the right.

New Development Team

Appendix F - Existing Drainage Ditch System OJP Drawing J-DK010-604

Appendix G - Proposed Drainage Ditch Rerouting OJP
Drawing ref J-DK010-605

Appendix H - Proposed Indicative Development Layout