Appendix 7

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DRAINAGE AND FLOODING APPRAISAL

Client: **Stainsby Grange Limited**

Project Address: **Proposed Residential Development**
Bleachcroft Way
Barnsley

Project Number: **08363**

Date: **January 2008**

Issue Status	**Draft**	Initial & date		Initial & date		Initial & date
Report Author:	P Keighley					
Checked:	P Haines					
Approved:	P Haines					

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DRAINAGE AND FLOODING APPRAISAL

Bleachcroft Way, Barnsley

1.0 Introduction

Appointment and Brief

1.1 Arcadis Terrence E Dudley & Associates have been appointed to carry out a Flood Risk Assessment for a site located off Bleachcroft Way, Barnsley.

1.2 This document reports on potential drainage issues associated with the development and has been prepared as supplementary documentation for use in support of a planning application to enable an informed decision to be made on drainage and flood risk in relation to the proposed development.

Objective of the Study

1.3 The objective of the study is to undertake a Flood Risk Assessment in accordance with Planning Policy Statement 25 (PPS25) – Development and Flood risk.

1.4 This report also provides an outline drainage strategy for the disposal of foul and surface water flows from the development based on currently available information.

1.5 Mitigation measures have been included to demonstrate that the development is not at risk of flooding and will not increase flood risk to properties elsewhere.

Study Methodology

1.6 The appraisal process comprises a desk study, data research and site visit to ascertain the extent of information available and identify any constraints with regard to drainage and flood risk that may affect the site.

1.7 The assessment is an holistic risk based assessment of potential flooding from various sources including fluvial flooding, groundwater and surface water run-off. The assessment also examines residual flood risk and proposes mitigation to offer protection against flooding for the lifetime of the development.

2.0 Existing Conditions

Topography and Setting

2.1 The site is approximately 9.3 Hectares and is located off Bleachcroft Way, Barnsley, 3.2 kilometres to the southeast of Barnsley Town Centre. (See Appendix A– site Location Plan)

2.2 The local topography falls relatively steeply to the northeast with an overall gradient across the site of 1 in 15 (See Appendix B – Topographical Survey)

2.3 The disused Barnsley canal is located along the eastern boundary in raised banks with a Tesco superstore located beyond. The ground continues to fall towards the east where the A633 is located close to the valley bottom with a longitudinal fall to the southeast.

2.4 The area to the North of the site is commercial/retail development with a DIY Store, Cash & Carry and several small offices.

2.5 The site is bounded to the west by the Barnsley to Sheffield railway line which is in cutting along the site frontage.

2.6 The southern boundary is formed by a watercourse which flows from southwest to northeast along a local valley in the topography. Land on the opposite bank rises for a short distance to a high point in the topography.

2.7 The watercourse is named as Dob Syke on Ordnance Survey mapping and is an 'ordinary watercourse' as defined under Section 72 of the Land Drainage Act 1991 and is therefore in the riparian ownership of landowners through which it passes.

2.8 Barnsley MBC Highways and Engineering Section have stated that they will recommend a planning condition requiring that no structures are to be erected within 6m of the top of bank to allow access for future maintenance.

2.9 The watercourse passes under the disused canal near the southeastern corner of the site in a 600diameter pipe and flows away from the site to the southeast where it ultimately discharges to the River Dove.

2.10 There is an area of standing water in the old canal bed close to the culvert inlet. A defined stream channel along the original line of the canal flows to the southeast. In the event of surcharge flow from Dob Syke this channel would convey water away from the site.

2.11 The nearest main rivers are the Rivers Dove and Dearne approximately 1.25 km to the southeast and north of the site respectively. The rivers both flow generally in an easterly direction.

Surface Water Drainage (See Appendix C – YW Sewer Records)

2.12 The site is currently undeveloped and is mainly rough grassland with bushes and trees.

2.13 Two access roads with associated gulleys and below ground drainage have been installed to serve future development of the site. The access roads drain away from the site to the north and discharge to the public surface water sewer in Bleachcroft Way.

2.14 A 225 diameter SW sewer in Bleachcroft way flows north for 175m where the sewer changes direction to the east passing below an existing retail unit in 525 diameter pipe. The sewer then flows south in 600 diameter pipes towards the north east corner of the site where it passes under the disused canal and flow south east through the Tesco development in 675 diameter pipe.

2.15 It is understood that the surface water sewer ultimately discharges into Dob Syke

2.16 The offices and B & Q development are drained by a private system along the northern boundary. A 700 diameter pipe discharges to the public surface water sewer via a control chamber adjacent to the northeast corner of the site. A vortex flow control device restricts the rate of discharge to the sewer to 252 l/s. Surplus flows back up via a link pipe into an open storage basin (dry pond) located within the development site boundary.

Existing Foul Drainage (See Appendix C – YW Sewer Records)

2.17 A 225 diameter foul public sewer is located in the footway/verge of Bleachcroft Way to the north of the site. The sewer flows north towards Hunningley Lane/Wombwell Lane (See Appendix D – Yorkshire Water Records)

Geology and Hydrogeology

2.18 Information received from the Environment Agency indicates that the site is underlain by a sandstone unit of the coal measures.

2.19 The Environment Agency's Policy and Practice for the Protection of Groundwater classifies the solid geology below the site as a Minor-Aquifer. Locally the sandstone units are important aquifers.

Historical Flooding

2.20 Consultations have been carried out with the Environment Agency, Barnsley Metropolitan Borough Council and Yorkshire Water.

2.21 We are not aware of any fluvial flooding incidents that have affected the site.

2.22 Barnsley MBC state that localised flooding incidents have occurred at the rear of the Tesco superstore, from Dob Syke, during prolonged or excessive rainfall. They are aware of two incidents in the past five years.

3.0 <u>Proposed Development</u> (See Appendix D – Proposed Site Layout)

3.1 The proposed development will consist of approximately 280 new residential properties with ancillary parking, roads, landscaping and public open spaces.

3.2 The site is currently undeveloped with no hard standing areas that are

positively drained to sewer or watercourse and therefore must be considered as greenfield development.

3.3 The proposed development will result in a significant increase in impermeable area.

4.0 Planning context

PPS25 – Development and Flood Risk

4.1 The site is located within Flood zone 1 (low risk) as defined on the Environment Agency Flood Zone Maps. This is land designated as having an annual probability of fluvial flooding from rivers of less than 0.1% (less than a 1 in 1000 annual probability of flooding) in any given year (See Appendix E).

4.2 In Flood Zone 1, developers and regulatory authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through layout and form while applying sustainable drainage techniques where appropriate and practical.

4.3 The sequential test within PPS25 aims to steer all new development to areas at the lowest risk of flooding. The site is located in FZ1 and therefore meets the requirements defined in Table 2 of PPS25 and the type of proposed development is appropriate for this location.

Environment Agency Standing Advice

4.4 For a site of greater than 1 hectare located in Flood Zone 1 the Environment Agency standing advice is that they should be consulted as part of the planning process. A flood risk assessment, focussing mainly on the management of surface water run-off to demonstrate that the development will not increase flood risk to itself or elsewhere within the catchment, should be provided in support of a planning application.

5.0 Sources of Flooding

Fluvial Flood Risk

5.1 The site is shown located in flood zone 1 on the Environment Agency mapping and is at low risk of fluvial flooding.

5.2 Dob Syke which passes through the site is located in a natural valley and any out of bank flow would follow the natural contours to the east. If the culvert under the canal became blocked then water could potentially back up but there is an overland flow route away from the site across/along the line of the disused canal to the southeast.

5.3 The risk of fluvial flooding to the site is therefore considered negligible.

Overland Flow

5.4 Flooding from overland flow is considered unlikely. The general topography falls from southwest to and northeast. The railway cutting adjacent to the western boundary would intercept any run-off from higher ground. Dob Syke would intercept runoff from a small area of land to the south of the watercourse.

Groundwater Flooding

5.5 No information is available on the depth of groundwater, however it is not considered to be a potential source of flooding to properties due to the relatively steep slope of the overall topography falling east towards the disused canal and the Tesco Development beyond.

5.6 The site will be contoured to ensure that no dwellings are located in low spots where a rising groundwater level could potentially enter the building.

Surcharged Sewer Flooding

5.7 Yorkshire Water record plans show public sewers adjacent to the site along the northern boundary.

5.8 In the event of surcharge flow due to lack of hydraulic capacity during extreme rainfall events any overland flows would be relatively shallow in depth and would flow away from the site to the northeast following the local topography.

6.0 Development and Flood Risk Management

Mitigation of flood risk on-site

6.1 Surface water drainage systems have the potential to flood under extreme conditions. Current drainage design standards generally require no surface flooding from the piped system for a 1 in 30 year storm.

6.2 In addition the on-site drainage should be designed to accommodate a 1 in 100 year plus climate change event. It is acceptable to store the surplus from such an occurrence in hollows on the surface, however it must be demonstrated at detailed design stage that this water will be retained on site and not flow overland off-site.

6.3 Development of the site will not affect existing overland flow routes.

6.4 Floor and external levels should be designed to ensure that buildings are not located in localised low spots where surface ponding could build up and enter through openings in the structure. It is recommended that FFLs of dwellings adjacent to Dob Syke are set at least 1m above top of bank level.

Mitigation of Flood Risk Off-site

6.5 Requirement H3 of the Building Regulations 2000 states that the preferred hierarchy for disposal of surface water is infiltration then watercourse then sewer.

6.6 No intrusive ground investigations have been carried out to date, however the Environment Agency's groundwater team has indicated that the site is located on a sandstone unit of the coal measures. The coal measures are designated as a minor-aquifer which is considered to be an important local aquifer.

6.7 Subject to confirmation by permeability testing it may be possible to use infiltration devices as a means of disposal for some surface water run-off from the development.

6.8 The Environment Agency has indicated that there is likely to be an hydraulic connectivity between local groundwater and Dob Syke which suggests that any water discharged into the ground would ultimately find it's way into the watercourse.

6.9 Taking into account the likely hydraulic connectivity of groundwater with Dob Syke, the relatively steeply sloping local topography and the low lying nature of the Tesco development beyond the canal it is considered that the use of infiltration techniques as a means of disposal for large volumes of water is undesirable on this site. There is a strong possibility of water entering the watercourse or emerging from the ground below the site in an uncontrolled manner.

6.10 For discharge of surface water to river/watercourse, Barnsley MBC and the Environment Agency both require that any discharge to should be restricted to a Greenfield run-off rate of 5 l/s/ha. Any discharge direct to Dob Syke must be calculated using the current area that naturally drains to the watercourse.

6.11 A total area of approximately 3.05 Hectares currently drains naturally to Dob Syke which gives a Greenfield run-off of 15.25 litres/sec.

6.12 Yorkshire Water have indicated that the 600 diameter surface water sewer adjacent to the northeastern corner of the site has sufficient capacity to take a maximum discharge of 35 l/s from the development.

6.13 With a total site area of 9.35 hectares and a Greenfield run-off rate of 5 l/s/ha the maximum allowable discharge from the site is 46.75 l/s. Surplus flows will be attenuated on-site for up to a 1 in 100 year event including an allowance for climate change.

6.14 Preliminary calculations of surface water run-off and indicative storage volumes have been completed based on the following parameters;

Total Site Area (ha)	9.35
Existing impermeable area (ha)	ZERO
Estimated proposed impermeable area (ha) based on 55%	5.15
Estimated total attenuation storage volumes based on 55% impermeable area (5.15 hectares) at the restricted discharge rate of 46.75 l/s	
1 in 30 year storm event	1720 m^3
1 in 100 year plus 20% climate change	3125 m^3

6.15 The existing drainage and storage basin serving the B&Q and office development currently discharges to the Public Sewer at a restricted rate of 252 l/s. The storage basin may need to be relocated to accommodate the proposed development. This could provide an opportunity to reconfigure the outflow and storage to improve flood protection both on and off site.

6.16 The channel of the disused canal is clearly visible, however it currently does not contain any water other than ponding in localised low spots. There is potential to use the available volume within the canal banks for storage of surplus flows. Introduction of surface water through flow to the canal would improve water quality with potential to increase biodiversity, prior to a controlled discharge to sewer/watercourse.

6.17 The plan area of the canal channel is approximately 3000m2 which is sufficient to provide storage volume for the whole site with a maximum water depth in the region of 1m. This is subject to detailed design including an assessment of canal bed levels and invert levels of incoming pipes required to achieve a gravity solution.

6.18 Other possibilities for storage provision within the development include oversized pipes, swales and filtration systems. These would form an integral part of the on-site drainage system, however future maintenance responsibilities would be a material consideration in the final choice.

Foul Drainage

6.19 There is currently no foul flow generated by the site and the proposed development will result in an increase in discharge to the public foul sewer.

6.20 The nearest foul sewer is located in Bleachcroft Way approximately 30m North of Stairfoot Way. Yorkshire Water has indicated that the proposed development can discharge unrestricted to this sewer.

6.21 An alternative foul sewer outfall is located on the opposite side of the disused canal close to the southeast corner of the site.

6.22 As part of the previous retail and office development, foul drainage to serve future development was installed in the two stub roads. The exact status of these drains in unknown, however they are not shown on the sewer records. It may be necessary to seek adoption of the private foul drains under Section 102 of the Water Industry Act.

7.0 Recommendations for Further Work

7.1 Soakaway tests on the underlying soils to confirm rates of infiltration. This will be necessary to demonstrate that infiltration techniques have been considered as a means of disposal for surface water run-off from the development.

Conclusions

8.1 The site is shown as lying within Flood Zone 1 (low risk) on the Environment Agency mapping.

8.2 The nearest watercourse is Dob Syke which passes along the southern boundary. The site is significantly higher than the watercourse which is located in a valley in the topography. Any out of bank flow would follow the line of the watercourse away from the site to the east therefore the risk of Fluvial Flooding is considered negligible.

8.3 It is recommended that finished floor levels of dwelling adjacent to the watercourse are set at least 1m higher than top of bank level to provide nominal protection against flooding from out of bank flow.

8.4 Overall site levels should be designed to ensure that buildings are not located in localised low spots to provide protection against water entering habitable areas due to drainage infrastructure failure, overland flows or groundwater.

8.5 Drainage of Surface Water run-off will be at a restricted discharge rate to the public sewer and Dob Syke. Based on Greenfield run-off rate of 5 l/s/hectare the combined total discharge from the site of 46.75 l/s will be split between the allowable discharges to sewer (35 l/s) and watercourse (15 l/s). Surplus flows will be attenuated on site to ensure no increase in flood risk downstream.

8.6 The exact method for provision of attenuation storage will be determined at detailed design stage when the most environmentally acceptable, sustainable and cost effective solution can be determined.

8.7 This flood risk assessment and outline drainage strategy is based on a review of currently available information and is considered to be appropriate to the scale and nature of the development.

Report prepared by:

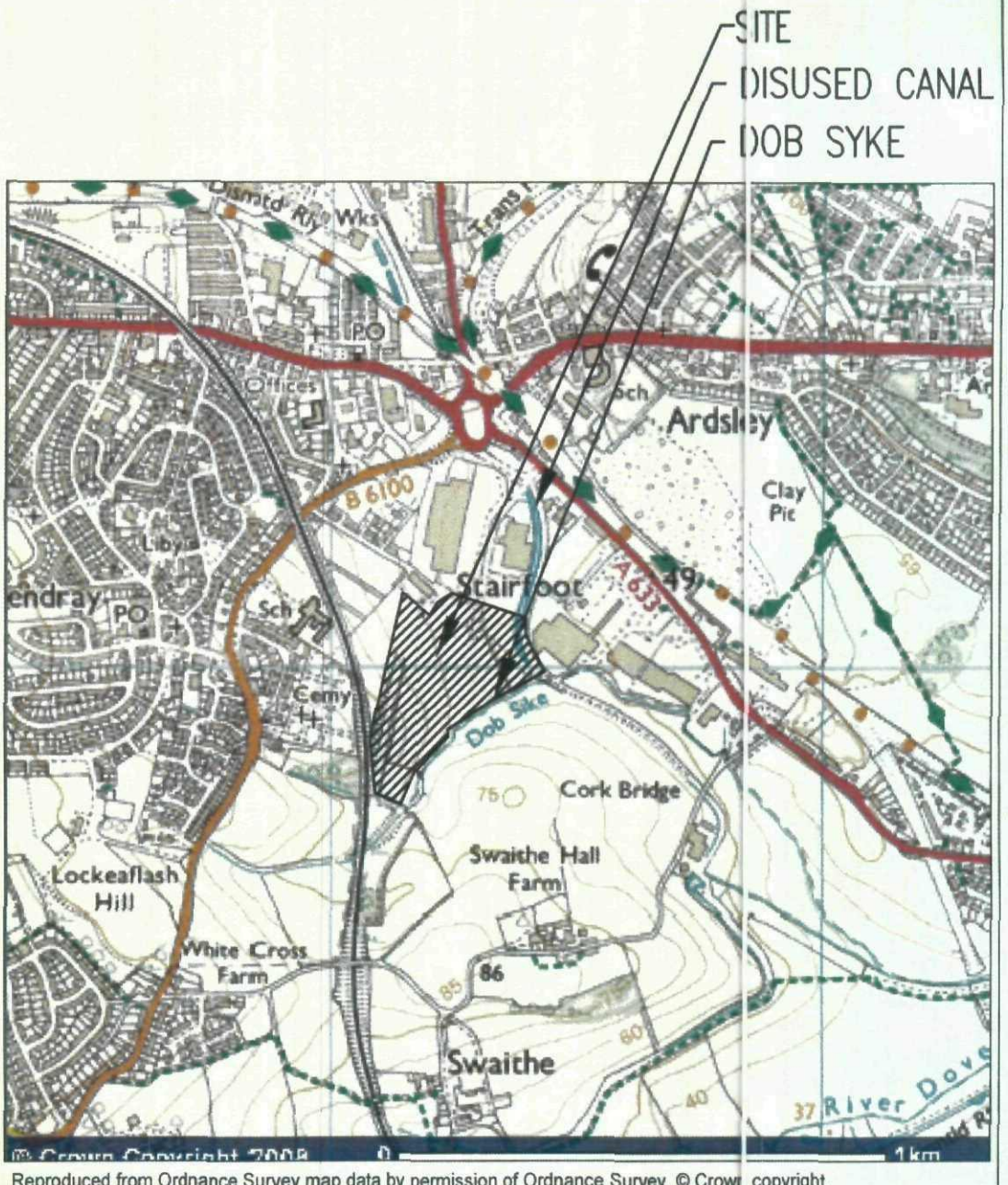
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Paul Keighley

Appendix A

Site Location Plan

Do Not Scale



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Job Title
PROPOSED DEVELOPMENT
BLEACHCROFT WAY, BARNSLEY

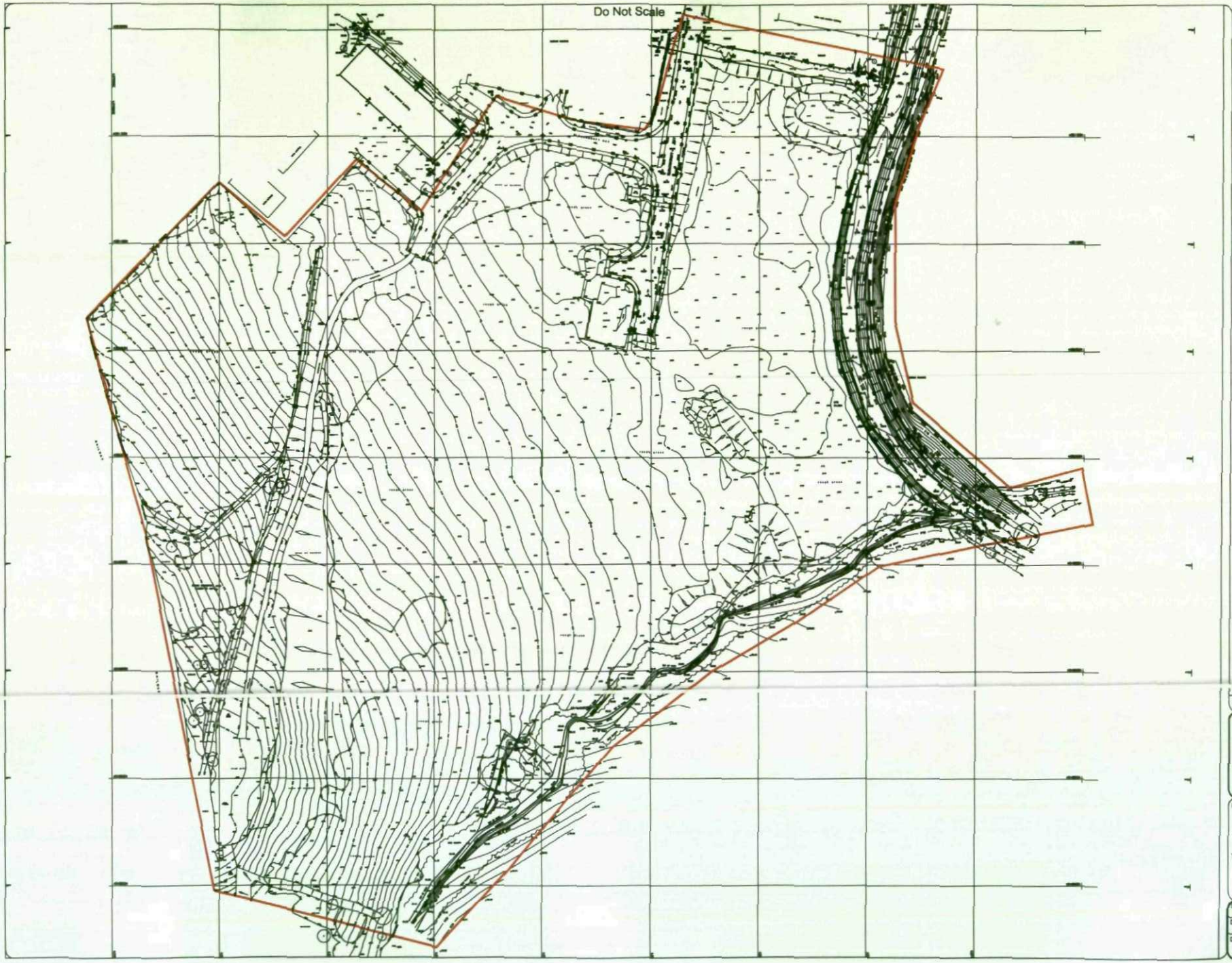
Drawing Title
SITE LOCATION PLAN

Date	Revision	By	Chk	Ref

Scale NTS		Job No. 09363	
Drn PRK	Date DEC 08	Drg No. SK1	
Chkd.	Date 12.08	v.2.1	Rev. P1

Appendix B

Topographical Survey



Notes

In Progress

Date	Revision	By	Chkd/Ref

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ARCADIS TERENCE E. DUDLEY & ASSOCIATES STRUCTURAL & CIVIL CONSULTING ENGINEERS

Project
BLEACHCROFT WAY,
BARNSLEY

Title
TOPOGRAPHIC SURVEY

Scale	Drawn	Checked
Date	Status	
Drg. No. 08363/APPENDIX B		Rev.

Appendix C

Yorkshire Water Sewer Records

YorkshireWater

08363
PK

Yorkshire Water
New Development Team Sewerage
Western House
Halifax Road
PO Box 500
Bradford
BD6 2LZ

Tel: (0845)1242424
Fax: (01274) 372 834

Email:
Planning.Sewerage@yorkshirewater.co.uk

Terence E Dudley & Associates
Springwood House
Low Lane
Horsforth
LEEDS LS18 5NU

For the attention of Paul Keighley

Your Ref: 08363
Our Ref: J010073 /ndt-sew/peh

For telephone enquiries ring:

Philip Hoffmann on (0845)1242424

8th December 2008

Dear Sir,

Land at Bleachcroft Way, Stairfoot, Barnsley - Pre-Planning Sewerage Enquiry - Residential Development

Thank you for your enquiry of 28th November 2008. Our charge of £80.00 (plus VAT) will be added to your account with us, reference TED 079. 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 225mm and 600mm diameter public surface water sewers recorded crossing the site. No buildings are to be erected within 3 (three) 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 24.

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 225mm diameter public foul sewer recorded in Bleachcroft Way, at a point approximately 12 metres from the site. From the information supplied, it is not possible to determine if the whole site will drain by gravity to the public sewer network. If the site, or part of it, will not drain by gravity, then it is likely that a sewage pumping station will be required to facilitate connection to the public sewer network. If sewage pumping is required foul water discharge must not exceed 6 (six) litres per second. An alternative is to the 225mm diameter public foul sewer in land to the east of the disused canal, at a point approximately 40 metres from the site.

The local public sewer network does not have capacity to accept an unrestricted 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 a watercourse, Dob Sike, is located through land to the south of the site. This appears to be the obvious place for surface water disposal.

Failing the above, surface water should discharge to the 225mm and 600mm diameter public surface water sewers recorded within and adjacent to the site. However, the existing public sewers to which

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CHARTER MARK

surface water from the site may discharge will have a problem accommodating the anticipated run-off. To prevent overloading of the existing public sewers, a storage tank - or some other means of flow attenuation - will be required to control the rate of discharge of surface water. The total surface water discharge from the site to be restricted to not greater than 35 (thirty-five) litres/second.

Please note further restrictions on surface water disposal from the site may be imposed by other parties. You are strongly advised to seek advice/comments form the local Planning Authority/Environment Agency/Land Drainage Authority, with regard to surface water disposal from the site.

Surface water run-off from communal parking (greater than 800 sq metres or more than 50 car parking spaces) and hardstanding must pass through an oil, petrol and grit interceptor/separator of adequate design before any discharge to the public sewer network. Roof water should not pass through the traditional 'stage' or full retention type of interceptor/separator. It is good drainage practice for any interceptor/separator to be located upstream of any on-site balancing, storage or other means of flow attenuation that may be required.

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 24 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 24.

Prospectively adoptable sewers must be designed and constructed in accordance with the WRc publication "Sewers for Adoption - a design and construction guide for developers" 5th 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 24) for further information.

Pumping stations may be adopted, subject to a minimum of 8 (eight) properties being served. Yorkshire Water has a Design Guide and Specification for Electrical & Mechanical Equipment for Use in Small Submersible Sewage Pumping Stations, which is to be used for pumping stations included in Section 104 agreements. Copies - which have already been sent out to most Developers - may be obtained by telephoning 0845 124 24 24.

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 24.

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,

pp

New Development Team

YorkshireWater

Supplementary Information: Adoption of Lateral Drains

With the implementation of the Water Act 2003 the Government's strategy on the ownership of new sewers is moving forward.

The intention is that all new sewers are to be built to adoptable standards. Furthermore, drains from the curtilage to the point of connection to the public sewer (to be known as Lateral Drains) can also be in public ownership.

Yorkshire Water's policy on these issues is in line with the Governments thinking and to facilitate this, the following protocol is required to be implemented.

All drains and sewers to be adopted are to be laid at the front of the curtilage, the termination of the lateral drain to be defined by a demarcation access point and to be constructed in accordance with documentation to be introduced in the autumn of 2004. As an interim solution demarcation chambers are to be constructed as per Yorkshire Water's guidelines for demarcation chambers.

All sewers to be adopted (and Yorkshire Water would look to have all sewers adopted) should be designed to either the WRc publication "Sewers for Adoption - a design and construction guide for developers" 6th Edition or if serving less than 9 properties on foul only systems to the protocol on design, construction and adoption of sewers in England and Wales produced by DEFRA. Please contact our Development Team - Technical (telephone 0114 251 8321, Fax 0114 251 8384) for further information.



YorkshireWater

General Conditions in relation to the adoption of Sustainable Drainage Systems (SUDS)

1. There should be no potential to cause pollution and a discharge consent from the EA should not be required – see Sections 4.1.2 and 4.1.3 of the SUDS Interim Code of Practice for further detail. (Yorkshire Water cannot readily control what is discharged into sewers and the risk of pollution to watercourses and groundwater must be avoided.)
2. Health and safety file must be provided to quantify and mitigate any associated risks
3. Yorkshire Water will not adopt SUDS features that are situated in private land. They should be sited in public open space; common shared areas held for general communal purposes or public highway and have unrestricted access. Access to these features is required on a 24 hour basis to ensure entry for routine maintenance and in the event of emergencies.
4. Drainage must be from roofs & yards with a proper outfall and should not have land drainage or groundwater inflow. This will enable adoption as part of the public sewerage system.
5. Any discharges into watercourses or other SUDS features must have the benefit of a right to discharge in perpetuity as Yorkshire Water have no statutory powers in respect of such discharges.
6. Ground conditions must be suitable to allow free drainage from the particular SUDS feature all year round (by having regard to groundwater levels).
7. Required technical considerations:

   (i) Clearly defined channel, conduit or structure for flows
   (ii) Extent of controlled storage of the particular SUDS feature to be defined
   (iii) Must meet relevant design guidance found in current versions of 'Sewers for Adoption or CIRIA documentation
   (iv) Sphere of influence not within 5m of the building
   (v) No tree planting within 5m of feature as this would prevent access for maintenance (approved shallow rooted shrubs may be permitted).
   (vi) Designed flood route as per 'Sewers for Adoption'
   (vii) No outlet to combined sewers or foul sewers
   (viii) Design for 1:30 year flooding if Yorkshire Water is to adopts
   (ix) The SUDS feature must incorporate an adoptable bypass pipe that can be used in the event that the SUDS feature fails and is designed to comply with the requirements of items (vi) and (viii) above.

Experience with 'Sewers for Adoption' has shown that compliance with the criteria detailed above provides a robust and cost effective solution to draining new developments whilst offering a high level of protection to occupiers of premises that are served by these SUDS features.

In addition to the above general conditions the following specific conditions apply in relation to SUDS features that may be adopted/operated by Yorkshire Water

Swales

- If a swale meets the general requirements detailed above then it could enable adoption by Yorkshire Water. However, swales would normally be expected to be owned and operated by either:

    - Local authority for public open space
    - Highway authority for public highway and verges
    - Private landowners and/or management companies (through maintenance agreements with owners) in respect of private land

Soakaways

- Must be constructed at least 5m from the curtilage of private land to ensure free drainage and no building over
- Properly engineered structure constructed to an agreed design having -
    - A defined chamber or structure
    - Outlet to underground strata
    - Drainage from more than one property
    - An outfall to S.W. sewer/highway drain/watercourse

Infiltration Trenches

- If a infiltration trenches meet the general requirements detailed above then it could enable adoption by Yorkshire Water. However, infiltration trenches would normally be expected to be owned and operated by either:

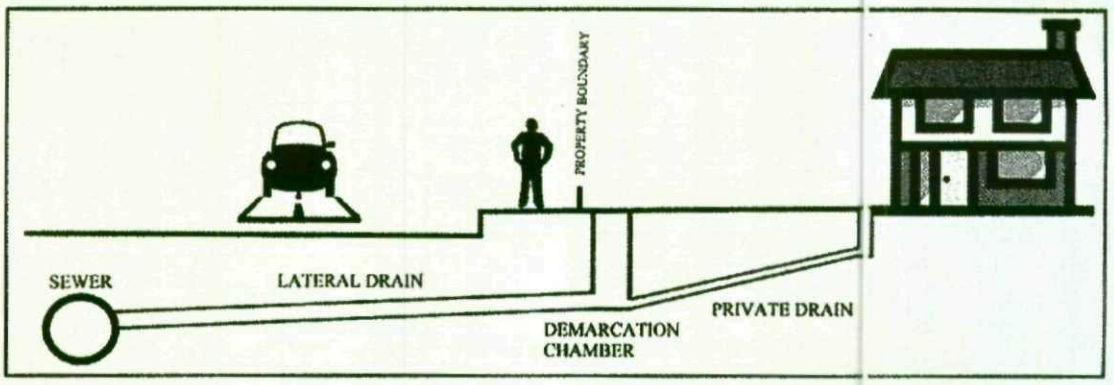
    - Local authority for public open space
    - Highway authority for public highway and verges
    - Private landowners and/or management companies (through maintenance agreements with owners) in respect of private land

Filter drains

- As infiltration trenches

Pipes - Covered in 'Sewers for Adoption'

Criteria for laying adoptable lateral drains/sewers in highway



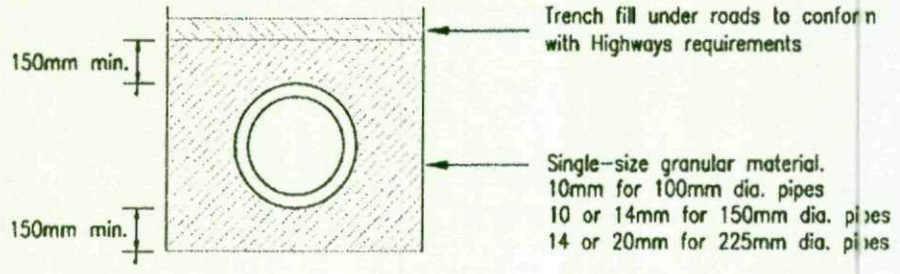
Pipes

The pipes detailed in the table below can be used when laying a lateral drain/sewer under public highway subject to acceptable minimum gradients, also detailed below.

Product Name	Diameter (mm)	Manufacturer	Material
SuperSleve	100 & 150 (I.D.)	Hepworth	Vitrified Clay
SuperSeal	150 & 225 (I.D.)	Hepworth	Vitrified Clay
Densleeve	100, 150 & 225 (I.D.)	Naylor	Vitrified Clay
Denseal	100, 150 & 225 (I.D.)	Naylor	Vitrified Clay
Ultra-Drain	110 & 160 (O.D.)	Uponor	uPVC (solid wall)
Plastidrain	110 & 160 (O.D.)	Hepworth	uPVC (solid wall)

Diameter (mm)	Gradient	
	Foul	S.W
100	1:40	1:100
150	1:80	1:150
225	1:125	1:225

Bedding (typical section)



Class S Bedding
To be used when pipe is more than 1200mm from highway surface
Concrete bed and surround required when less than 1200mm from highway surface

NOT TO SCALE

Demarcation Chamber

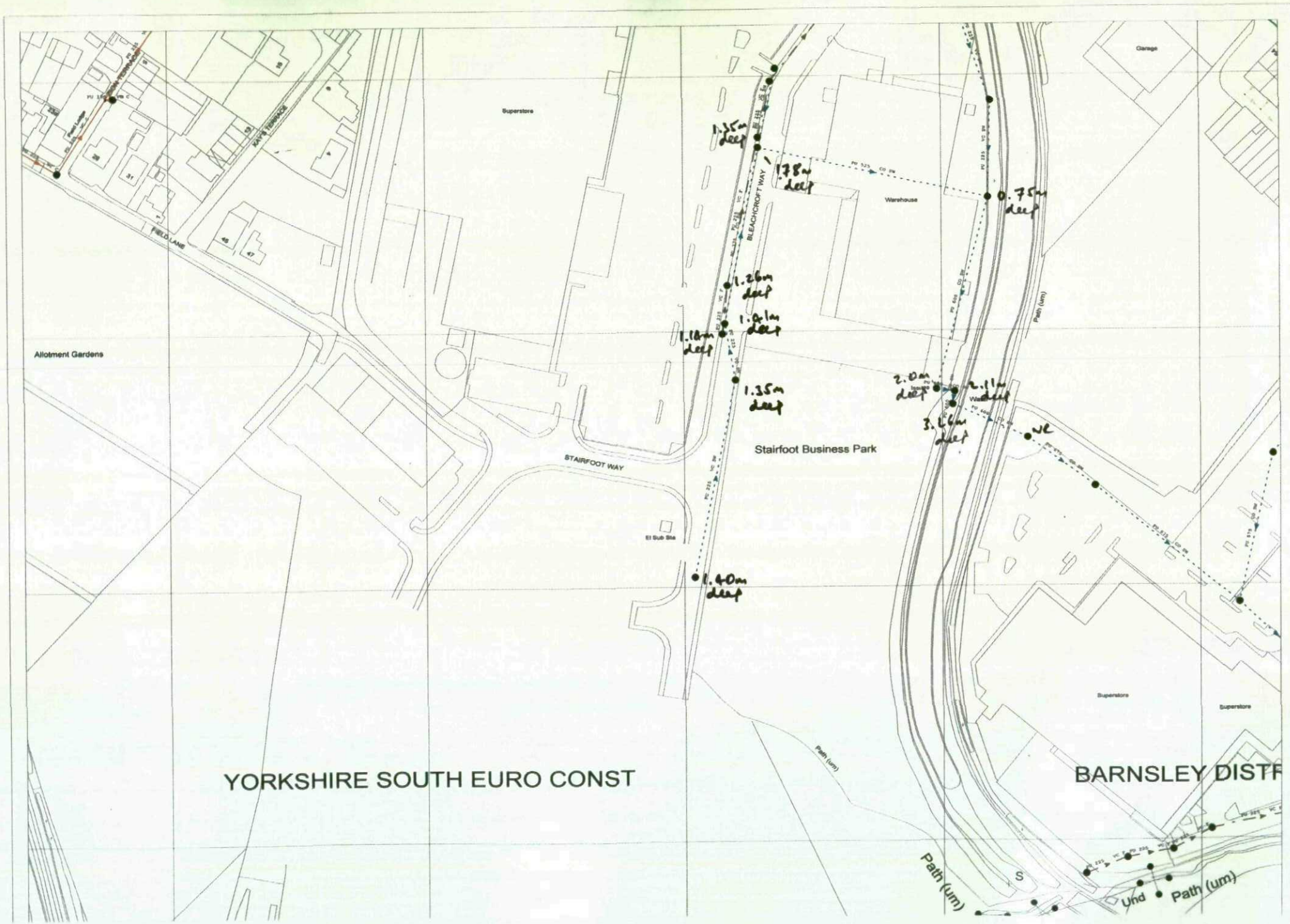
A chamber must be located just within the property boundary at the end of the public section of the lateral drain/sewer. The table below lists some acceptable chamber types.

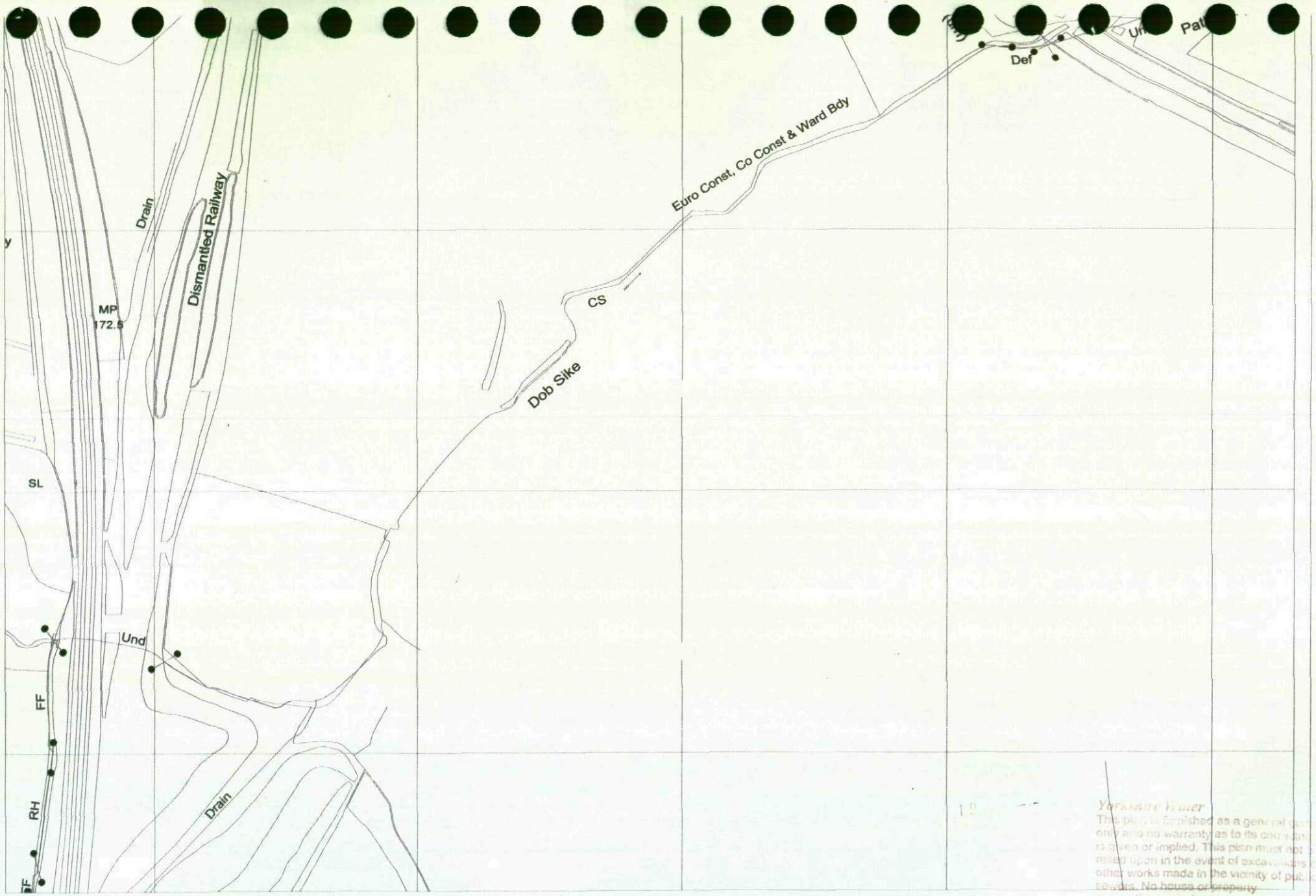
Manufacturer	Product Name / Ref	Material	Maximum Depth	Cover Type
Naylor	Plastic Inspection Chamber	Polypropylene	Up to 1200mm	Class B125
Hepworth	PPIC	Polypropylene	Up to 1200mm	Class B125
Uponor	Inspection chamber (450mm Ø)	Polypropylene	Up to 1200mm	Class B125
Marshalls	Inspection chamber	Precast concrete	Up to 1000mm	To BS5911 pt2

Yours faithfully,

pp

New Development Team


Superstore
1.35m deep
1.78m deep
Warehouse
0.75m deep
BLEACHCROFT WAY
Path (um)
1.26m deep
1.01m deep
1.18m deep
Allotment Gardens
1.35m deep
2.0m deep
2.11m deep
3.66m deep
Stairfoot Business Park
STAIRFOOT WAY
El Sub Sta
1.40m deep
Garage
Superstore
Superstore
Path (um)
YORKSHIRE SOUTH EURO CONST
BARNSLEY DISTR
Path (um)
Path (um)
Und



Date Requested : 16/01/2009, 14:22:49

Date Generated : 16/01/2009, 14:23:11

Scale : 1:1250

The position and depth of any YW apparatus shown on this map are approximate only.

UPN: Undefined

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Originator: K KHAN, New Development - Waste Water,

NR : No recorded depth.

Yorkshire Water

This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connections are shown.

Extract from Statutory Sewer Map

Location: STAINFOOT

Scale: ~~1/500~~ ~~1/1000~~ (1/1250) ~~1/2500~~

YWS Ref: 1010071 /

Sheet: 1 of 1

Appendix D

Proposed Site Layout