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empd²⁰⁰⁹
CONSULTANT OF THE YEAR 2009

Residential Development, Larch Place, Barnsley, South Yorkshire.

Flood Risk Assessment and Drainage Strategy For Keepmoat Homes Ltd.

11085: FRA/DS
Original: May 2011

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Breakwell Sumner Partnership Ltd. Registered Office: 12 Oxford Street, Nottingham NG1 5BG. Registered in England and Wales No. 3669014



Flood Risk Assessment and Drainage Strategy

Land at Larch Place, Barnsley.

Prepared By:

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Checked By:

Contents

Executive Summary

1.0 Introduction

2.0 Background Information

3.0 Flood Risk Assessment and Drainage Strategy

4.0 Recommendations

Appendix A Site Location Plan

Appendix B Topographical Survey

Appendix C Proposed Site Drainage Layout

Appendix D YW Developer Enquiry and Sewer Records

Appendix E Existing and Proposed Drainage Areas

Appendix F Percolation Test Results

Executive Summary

Introduction	BSP Consulting has been commissioned by Keepmoat Homes Ltd. to undertake a Flood Risk Assessment and Drainage Strategy for the proposed redevelopment of Land at Larch Place, Kendray, Barnsley. This Flood Risk Assessment has been prepared in accordance with the Department for Communities and Local Government (DCLG) publication 'Planning Policy Statement 25 (PPS25) Development and Flood Risk' and in line with current guidance and best practice.
Site Location Description and Details	The site is currently accessed off Swance Road to the north but following redevelopment it will be accessed off Cypress Road to the west and was previously occupied by houses and associated car parking and hard standing. The site has been demolished and cleared recently and only the previous site road remains. The site is steeply sloping and falls generally from the west to the north east. Levels vary from 128.5m at the western site entrance to 116.3m AOD at the existing site entrance to the north east.
Definition of the Flood Hazard and Probability	The site is noted to lie in the low risk flood zone 1 and therefore the risk of flooding from rivers is less than 1 in 1000 years. The River Dearne lies approximately 1km to the north east of the site at about 75m below the lowest site level. The River Dove lies approximately 1.2km to the south of the site at about 65m below the lowest site level. An un-named watercourse lies 500m to the west and north west of the site
Predevelopment Surface Water Runoff	0.251ha of the site is covered with impermeable surfaces of tarmac, concrete or roofing. All of this area is drained by the extensive drainage network.
Proposed Developed Site Surface Water Strategy	The impermeable area of the proposed layout is about 0.511ha. The proposed impermeable area is 210% of the current/post demolition impermeable area and will either be drained to the existing outfall sewers or to private soakaways. Yorkshire Water has confirmed that they will accept surface water into the adopted public sewer system at restricted rates of discharge to offer a 30% reduction over the previous site discharge rates if infiltration drainage is not viable for the site
Climate Change	It is proposed that the detailed design of the piped surface water drainage systems should be checked with a factor of 1.3 to assess exceedance flows.
Pre Development Foul Water Regime	Foul flows generated by the existing site discharge to the adopted sewer network.
Proposed Developed Site Foul Water Strategy	The foul water flows to be generated by the proposed development should be accommodated within the adopted sewer network. Yorkshire Water has confirmed that an unrestricted gravity domestic foul flow from the proposed 45 units can be accommodated within the adopted foul/combined sewers currently passing the site to the north and crossing the section of site off Masons Way.
Recommendations	The following recommendations are made to reduce flood risk and promote a sustainable and practicable drainage strategy at the proposed development: • The proposed houses and associated drives should be drained via soakaways within the private gardens of the proposed dwellings. • Options such as permeable paving should be considered as primary treatment and attenuation features for private areas, where viable, considering other site constraints. • Highway drainage generated by the development site should be discharged to the adopted surface water sewers crossing the site and attenuated to provide a 30% reduction over pre development surface water discharge rates for one year flows and attenuated on site. This reduced flow rate is calculated as 24.4l/s (see existing drained area plan in Appendix E for details). • The connectivity of the onsite sewers to the adopted sewer network should be proven by CCTV survey. • Permitted rates of surface water discharge will need to be confirmed with Yorkshire Water. • It is recommended that the final outfall for foul water from the site should be to the adopted foul/combined sewers crossing the site.

1.0 INTRODUCTION**1.1 Terms Of Reference**

- 1.1.1 BSP Consulting has been commissioned by Keepmoat Homes Ltd. to undertake a Flood Risk Assessment and Drainage Strategy for the proposed redevelopment of land at Larch Place, Kendray, Barnsley, South Yorkshire.
- 1.1.2 In the preparation of this report a Yorkshire Water Developer Enquiry has been undertaken and sewer records have been assessed to better understand the constraints affecting this site.
- 1.1.3 This Flood Risk Assessment and Drainage Strategy has been prepared in accordance with the Department for Communities and Local Government (DCLG) publication 'Planning Policy Statement 25 (PPS25) Development and Flood Risk' and in line with current guidance and best practice.
- 1.1.4 This report has been produced on behalf of the client, Keepmoat Homes 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 BSP Consulting. 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.

1.2 Planning Policy Statement 25 (PPS 25)

- 1.2.1 The final version of PPS 25 was released on the 7th December 2006 by DCLG and replaced the previous guidance on development and flood risk stated in PPG 25. PPG 25 has now been withdrawn.
- 1.2.2 PPS 25 can be downloaded free of charge from the internet at the following link:

<http://www.communities.gov.uk/publications/planningandbuilding/pps25floodrisk>

2.0 BACKGROUND INFORMATION

2.1 Site Location, Description and Details

- 2.1.1 Figure 2.1 below indicates the location of the site; a more detailed site location plan is located in Appendix A.

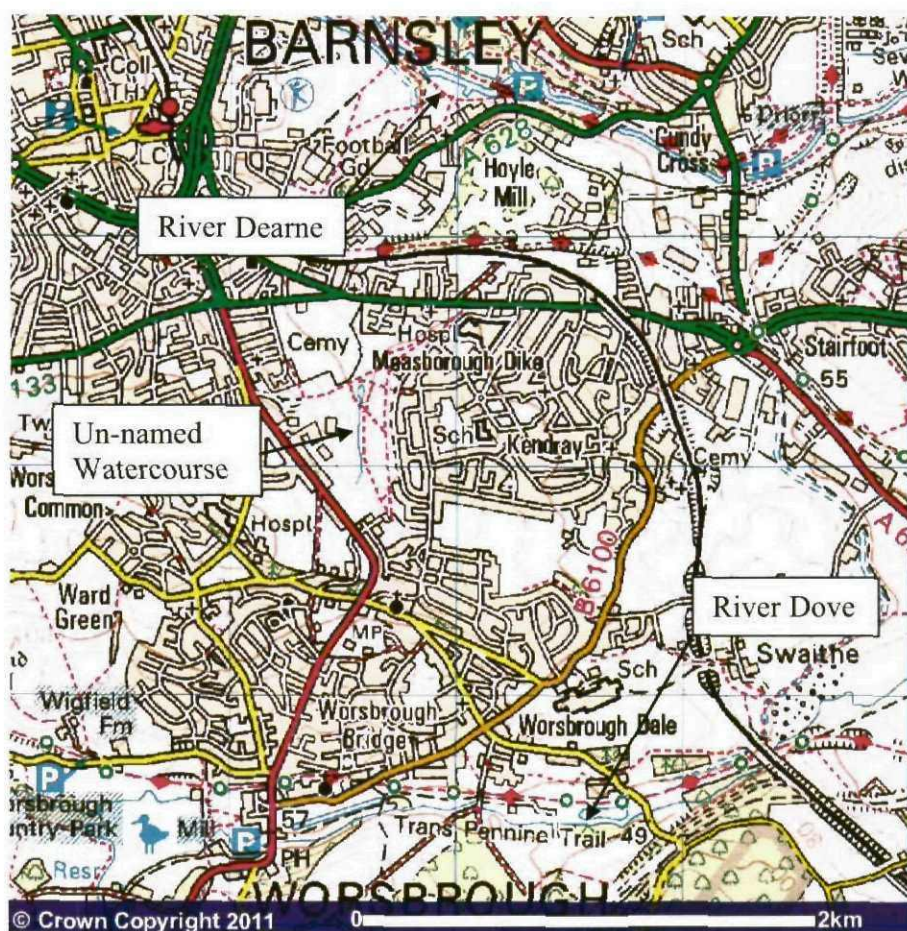


Fig 2.1 Land at New Lodge, Barnsley – Site Location Plan

- 2.1.2 The proposed development site has an area of approximately 1.07 hectares and is located to the south east of the centre of Barnsley in the Kendray area of Barnsley, South Yorkshire at grid reference SE 360 049.
- 2.1.3 The site is accessed off Swanee Road to the north currently but development proposals are for the access to be altered to be off Cypress Road to the west. The site was previously occupied by various residential dwellings and associated drives and hardstanding. The site is bounded by existing residential development on all sides.
- 2.1.4 No watercourses are noted on Ordnance Survey mapping to lie within 250m of the site. The River Dearne lies approximately 1km north east of the site, the River Dove 1.2km to the south of the site and an unnamed watercourse designated as main river lies 500m to the west of the site.

2.1.5 A topographical survey of the site area has been carried out and a copy of this is included within Appendix B. Levels on site vary from 128.5m to 116.3m AOD.

2.1.6 The site slopes steeply from the west to the north east.

2.2 Main Drainage Catchment Context and Local Watercourse Classifications

Main Rivers

The River Dearne is a non tidal Main River that lies 1km to the north east of the site.

The River Dove is a non tidal Main River that lies 1.2km to the south of the site.

There is an unnamed watercourse identified as a main river at its downstream end 500m to the west and north west of the site. There is high ground between the site and this watercourse precluding the possibility of discharging site generated surface water to it. This watercourse is a tributary of the River Dearne.

Watercourses

No ordinary watercourses are located within 250m of the development site.

Adopted Main Sewers

Surface Water:

Yorkshire Water's sewer records indicate surface water sewers crossing and within close proximity of the site. These sewers are identified on the site drainage plan in Appendix C. The pre development site discharged to these sewers at an unrestricted rate.

Foul Water:

Yorkshire Water's sewer records indicate foul/combined sewers crossing and within close proximity of the site. These sewers are identified on the site drainage plan in Appendix C. The pre development site discharged to these sewers at an unrestricted rate.

The location of the River Dearne and the River Dove are indicated on Figure 2.1 above. The locations of the main sewers are indicated on the Yorkshire Water sewer records included in Appendix D.

2.3 Approach To The Assessment

2.3.1 This assessment seeks to consider the risks of flooding both to the site and to the wider area as a consequence of the development proposal. This also requires assessment of the development constraints of the site and the opportunities offered by the existing infrastructure and natural environment in order to propose a strategy by which the site can be developed both economically and sustainably. This assessment draws upon our investigations and experience within the local area.

3.0 FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

3.1 Definition of the Flood Hazard and Probability

3.1.1 Fluvial Flood Risk

- 3.1.2 The site is noted to lie in the low risk Flood Zone 1 and therefore the risk of flooding from rivers is less than 1 in 1000 years. The River Dearne lies 1km to the north east of the site at about 75m below the lowest site level. The River Dove lies 1.2km to the south of the site at about 65m below the lowest site level. Figure 3.1 below indicates the extent of the natural flood plain. An un-named watercourse lies 500m to the west and north west of the site which is designated main river at its downstream end prior to discharging to the River Dearne. There is an area of high ground to the west of the site between the watercourse and the development site. These Main Rivers are therefore not considered to present a flood risk to the proposed development. There are no other significant watercourses within influence distance of the site.



Fig 3.1 Land at Larch Place, Barnsley – Indicative Flood Map

3.1.3 Tidal Flood Risk

- 3.1.4 The site is at a lowest level of 116.3m above mean sea level. The site is therefore not at risk of flooding from tidal sources.

3.1.5 Surface Water Flood Risk

3.1.6 The site has a steep fall towards the north east as noted in section 2.1 above. In an extreme rainfall event any overland flows around the site would be intercepted by the road network and discharge to the public sewers adjacent to and crossing the site. The site is therefore not at risk of flooding from sheet run-off from adjacent land.

3.1.7 The site is greater than 1 hectare in size and therefore there is an inherent risk of flooding to areas off site as a result of the development sewerage although in this instance the redevelopment will result in a reduction in the discharge rates from the site by 30% following the development. With regard to the issue of onsite flooding from site runoff, flood flow routes will be assessed as part of the detailed design.

3.1.8 The proposals for the management of surface water in section 3.4 of this report address this issue in more detail.

3.1.9 Flood Risk from Ground Water

3.1.10 The site occupies an elevated position above the surrounding areas with only the land immediately to the west rising higher. Inspection of the Site Investigation report confirms that the site is underlain by permeable rock at shallow but variable depth. No groundwater was encountered in the trial holes during the intrusive investigation. It can therefore be confirmed that the site is not at risk of flooding from ground water.

3.1.11 Flood Risk from Infrastructure

3.1.12 The site is not within close proximity of any reservoirs, canals or wet process industrial works. This site is not at risk of flooding from sewers or water mains based on the comments raised in paragraph 3.1.6.

3.2 Development Description and Planning Context

3.2.1 The current development proposals are for the demolition of the existing buildings and hardstandings and for the erection of a new residential development as outlined on the Proposed Site Layout included in Appendix C.

3.2.2 In accordance with PPS 25, the proposed residential end use falls under the **More Vulnerable** category in terms of flood risk. All forms of development are appropriate in flood zone 1.

3.3 Pre Development Surface Water Runoff

3.3.1 Inspection of the topographical survey indicates that 0.210 hectares of the site is covered with impermeable surfaces of tarmac, concrete or roofing. All of this area is drained by the existing drainage network.

3.3.2 Given that the site slopes with falls to gullies and that the drainage system is present across the entire site it can be seen that the entire area is positively drained. The flows appear to discharge to the existing public sewerage network crossing the site. In an extreme rainfall event accelerated runoff from the hardstandings and roof areas would tend to pond on site or discharge onto the existing road network. The arrangement of the site areas are shown graphically on the Existing Impermeable Areas drawing included in Appendix E.

3.3.3 No evidence has been found to suggest that soakaways have been successfully used to drain surface water from any of the original buildings or hardstandings.

3.4 Proposed Developed Site Surface Water Strategy

3.4.1 The current development proposals are for the demolition of the existing buildings and hardstandings and for the erection of a new development of residential dwellings. The impermeable areas of the buildings and car parking are to be drained to private soakaways. The impermeable areas of the adoptable road network are to be positively drained. The existing road network on the site is to be altered and extended, but largely retained.

3.4.2 The impermeable area of the proposed layout is about 0.511 hectares. This area is noted on the Proposed Impermeable Areas plan included in Appendix E. The proposed impermeable area is 210% of the original impermeable area.

3.4.3 A developer enquiry has been instructed with Yorkshire Water and they have confirmed that surface water may discharge to the adopted sewers at a rate not exceeding the current rate with a reduction of 30% if the use of infiltration drainage is not feasible. It will be necessary to prove by CCTV survey the connectivity of the onsite sewers to the adopted sewer network. A drainage survey of the existing pipe runs has been carried out confirming discharge of the previous site to the public sewerage network. Copies of the Yorkshire Water response and sewer records are included in Appendix D.

3.4.4 A proposed drainage layout is included in Appendix C. Surface water generated by the proposed dwellings and associated private drives is to be drained to soakaways. Surface water generated by the adoptable road network is to be attenuated to 30% less than the existing one year flow rates and then discharged locally to the existing public sewer network. This flow rate is calculated as 24.4l/s.

3.4.5 A Phase 1 and Phase 2 Site Investigation has been carried out on this site. With regard to the feasibility of using infiltration drainage, to reduce the pass forward volume of surface water from the developed site, the Site Investigation reports that there exists a band of sandstone beneath the development site which offers the potential for infiltration drainage. Four trial pits were excavated and percolation testing carried out. The results are included in Appendix F. Percolation rates of between 1.66×10^{-3} m/s and 1.91×10^{-4} m/s were obtained. The permeable sandstone layer was found at shallow depths across the site and therefore soakaways are considered appropriate for draining surface water from the private impermeable areas on the site, Barnsley Metropolitan Borough

Council will not permit the use of soakaways for highway drainage so it is proposed to discharge highway drainage to the existing public sewerage network at a rate not exceeding the previous site surface water discharge rate reduced by 30%. The area of highway drainage to discharge to the public sewers will be 0.220 hectares.

3.4.6 Options such as permeable paving should be considered as primary treatment features for private areas, where viable, considering other site constraints, notably the steeply sloping nature of the site which may preclude their use in many parts of the site.

3.4.7 On the basis that there is a reduction of 30% in site discharge rates as a result of the development proposal it can be confirmed that the proposed development will be safe from flooding without increasing the risk of flooding to others. This proposal is therefore compliant with PPS 25 - Development and Flood Risk.

3.4.8 The final design proposals will need to be verified by building control, Yorkshire Water and the Environment Agency as necessary.

3.5 Design Considerations for Exceedance

3.5.1 The proposed surface water drainage system should be designed to accommodate the 1 in 30 year rainfall event without any surface water flooding and should be capable of retaining the 1 in 100 year-plus 30% climate change storm event on site without flooding any buildings.

3.6 Climate Change

3.6.1 Climate change is recognised as a factor for consideration in terms of its effect on surface water runoff. This issue affects the likely future runoff from developed areas to the extent whereby it is proposed that the detailed surface water design calculations should be checked with a factor of 1.3 to assess exceedance flows.

3.7 Pre Development Foul Water Regime

3.7.1 Foul flows generated by the existing site discharge to the adopted sewer network.

3.8 Proposed Developed Site Foul Water Strategy

3.8.1 The foul water flows to be generated by the proposed development should be accommodated within the adopted sewer network.

3.8.2 Yorkshire Water has confirmed that an unrestricted gravity domestic foul flow from the proposed 45 units can be accommodated within the adopted foul/combined sewers crossing the site.

3.8.3 The final design proposals will need to be verified by building control and Yorkshire Water as necessary.

4.0 RECOMMENDATIONS

4.1 The following recommendations are made to reduce flood risk and promote a sustainable and practicable drainage strategy at the proposed development:

- The proposed houses and associated drives should be drained via soakaways within the private gardens of the proposed dwellings.
- Options such as permeable paving should be considered as primary treatment and attenuation features for private areas, where viable, considering other site constraints.
- Highway drainage generated by the development site should be discharged to the adopted surface water sewers crossing the site, and attenuated to provide a 30% reduction over pre-development surface water discharge rates for one year flows and attenuated on site. This reduced flow rate is calculated as 24.4l/s (see existing drained area plan in Appendix E for details).
- Permitted rates of surface water discharge will need to be confirmed with Yorkshire Water.
- It is recommended that the final outfall for foul water from the site should be to the adopted foul/combined sewers crossing the site.

Disclaimer

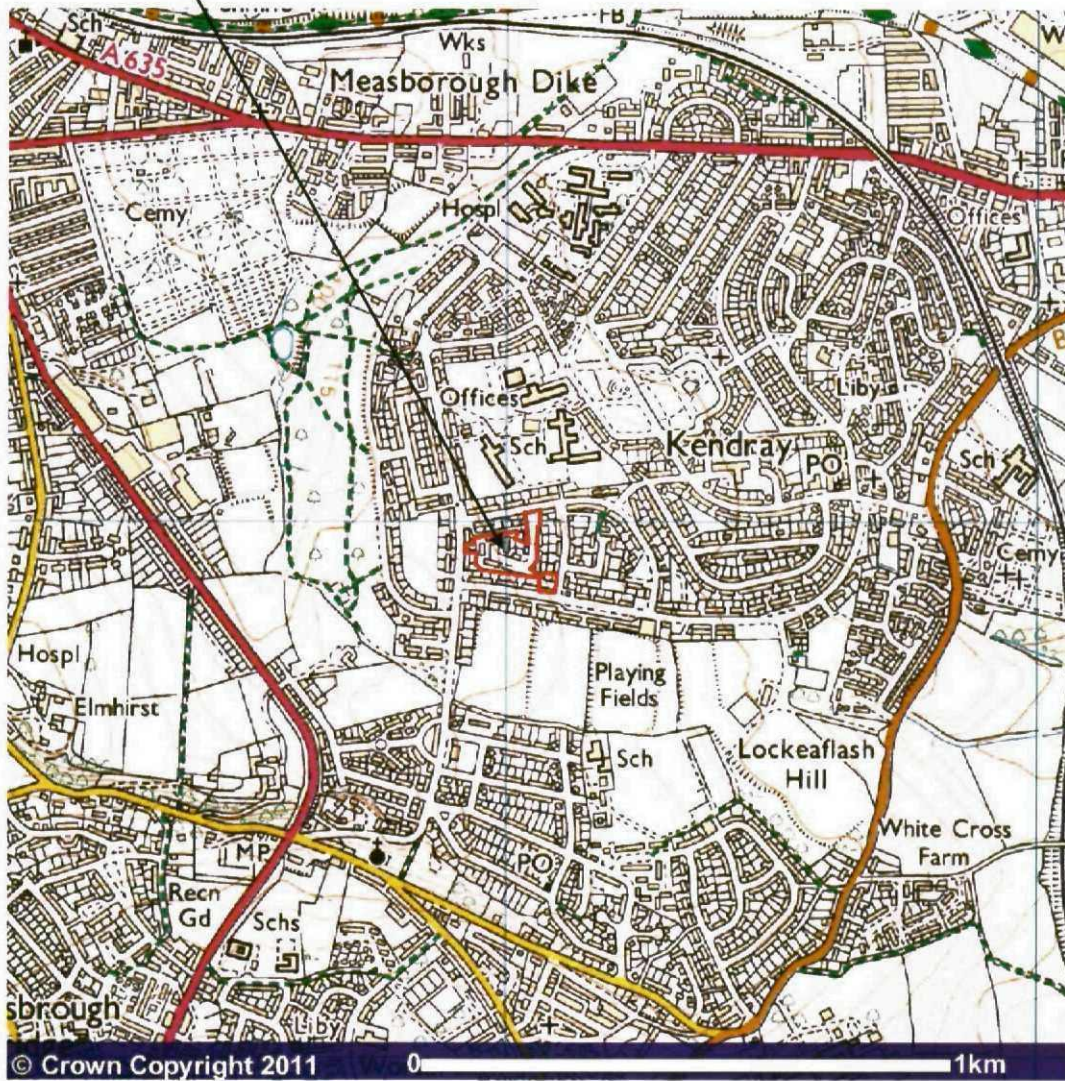
We would note that all comments made in this report are based on the sources stated in Section 1.1. This report and its recommendations are intended for the use of Keepmoat Homes Ltd. for the above site only.

Appendix A
Site Location Plan

SITE LOCATION PLAN

Site grid ref. E: 436000, N:404930

Larch Place
Barnsley
South Yorkshire



Appendix B
Topographical Survey

HAYDOCK & TODD
 1000 W. 10th St., Suite 100
 Anchorage, Alaska 99501
 Phone: (907) 562-1111
 Fax: (907) 562-1112
 E-mail: haydock@haddock.com

SITE SURVEY
LARCH PLACE
REDEVELOPMENT

Project No.	57280
Client	City of Anchorage
Location	1000 W. 10th St., Suite 100
Scale	1" = 100'
Date	10/1/01
Drawn by	J. Haydock
Checked by	J. Haydock
Approved by	J. Haydock

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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Appendix C
Proposed Site Drainage Layout

- Key:
- Existing Public Foul Sewer
 - Existing Public Surface Water Sewer
 - Proposed Sewer Easement
 - Proposed sewerline
 - Proposed Surface Water Sewer
 - Proposed Foul Sewer
 - Potential roadway location
 - Proposed FFLs
 - Approximate location and height of existing wall
 - 675mm Polypropylene Inspection Chamber
 - 1200mm Concrete Manhole

- General Notes
1. SCALE WITH CAUTION FROM PRINTED DRAWINGS
 2. This drawing is to be read in conjunction with all other relevant drawings and details.
 3. Should there be any conflict between the details indicated on this drawing and those indicated on other drawings the Engineer shall be informed PRCR in consultation with the relevant Authority.
 4. All technical approval has been obtained from the relevant Authority. It should be understood that all drawings issued are preliminary and NOT for construction. Should the contractor commence work prior to such approval being given, it is solely at his own risk.
 5. All dimensions are in millimetres unless otherwise stated.
 6. The BSP (Survey) Information and Flow Assessment information for this project must be reviewed and understood by the contractor PRCR to the commencement of any works on site.
 7. This drawing is to be read in conjunction with MFLS, Design 11008-001 and Drainage Design Ltd. Design 00418-23-01.
 8. All proposed levels and heights are indicative only and are not to be taken as finalised. Levels are subject to change following updates to the relevant highway authority approved and detailed design. Sewer dimensions and proposed manhole elevations to be confirmed following confirmation of existing sewer levels.
 9. Existing utility infrastructure locations shown are based on plans provided in green leaf by BHSU. Statutory Undertakers in good faith have guaranteed as to the accuracy in completeness of the information shown as given. Neither BSP Consulting nor Keepmoat Homes accept any responsibility for damage to such apparatus. However, caused. Road works locations are to be confirmed by on-site investigations in accordance with the relevant Statutory Undertakers' guidelines.
 10. Preliminary roadway designs are based on the basis of information provided by LHA, and shown exclusively in green leaf. For copying purposes other roadway types can be used.
 11. Roadways are designed for a 30 year AADT with a factor of safety of 2 in accordance with CWS document 0907 The Safe Motorist.

Confirmation of the discharge point of the existing adopted highway drainage is required in order to confirm to Yorkshire Water that we are matching the existing system.
Existing highway impermeable area = 1975m²
Proposed highway impermeable area = 2201m²

1	Design generic contract	100	June 2015	CE
2	PR, submitted for external system works	100	June 2015	CE
3	Scale Assessment	100	June 2015	CE
4	Design assessment: Design levels, existing and proposed levels to design	100	June 2015	CE
5	PR, submitted for external system works	100	June 2015	CE
6	Design assessment: Design levels, existing and proposed levels to design	100	June 2015	CE
7	PR, submitted for external system works	100	June 2015	CE
8	Design assessment: Design levels, existing and proposed levels to design	100	June 2015	CE
9	PR, submitted for external system works	100	June 2015	CE
10	Design assessment: Design levels, existing and proposed levels to design	100	June 2015	CE
11	PR, submitted for external system works	100	June 2015	CE
12	Design assessment: Design levels, existing and proposed levels to design	100	June 2015	CE
13	PR, submitted for external system works	100	June 2015	CE
14	Design assessment: Design levels, existing and proposed levels to design	100	June 2015	CE
15	PR, submitted for external system works	100	June 2015	CE
16	Design assessment: Design levels, existing and proposed levels to design	100	June 2015	CE
17	PR, submitted for external system works	100	June 2015	CE
18	Design assessment: Design levels, existing and proposed levels to design	100	June 2015	CE
19	PR, submitted for external system works	100	June 2015	CE
20	Design assessment: Design levels, existing and proposed levels to design	100	June 2015	CE

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Email: info@bspconsulting.co.uk
Bespoke solutions for the construction industry

PRELIMINARY

Keepmoat Homes

Larch Place
Barnsley
South Yorkshire

Engineering Appraisal
Drainage Strategy

Drawn By: CMC
Checked By: CMC
Scale: 1:250
Date: 11/02/15

11085/100 E

Appendix D
YW Developer Enquiry and Sewer Records



YorkshireWater

BSP Consulting
5 Pride Point Drive
Pride Park
Derby
DE24 8BX

FAO Mr Chris Dodd

Your Ref:
Our Ref: M001025



Yorkshire Water Services
Developer Services
Sewerage Technical Team
PO BOX 52
Bradford
BD3 7AY

Tel: 0845 120 8482
Fax: (01274) 372 834

Email:
Planning.Sewerage@yorkshirewater.co.uk

For telephone enquiries ring:

Kashif Khan on (0845)120 8482

4th March 2011

Dear Sir,

Larch Place, Kendray - Pre-Planning Sewerage Enquiry - Residential - J239960

Thank you for your letter received 15th February 2011 and remittance. Our official VAT receipt has been sent to you under separate cover. 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 150/225 mm diameter public foul sewers and a 225 mm diameter public surface water sewer 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 120 84 82.

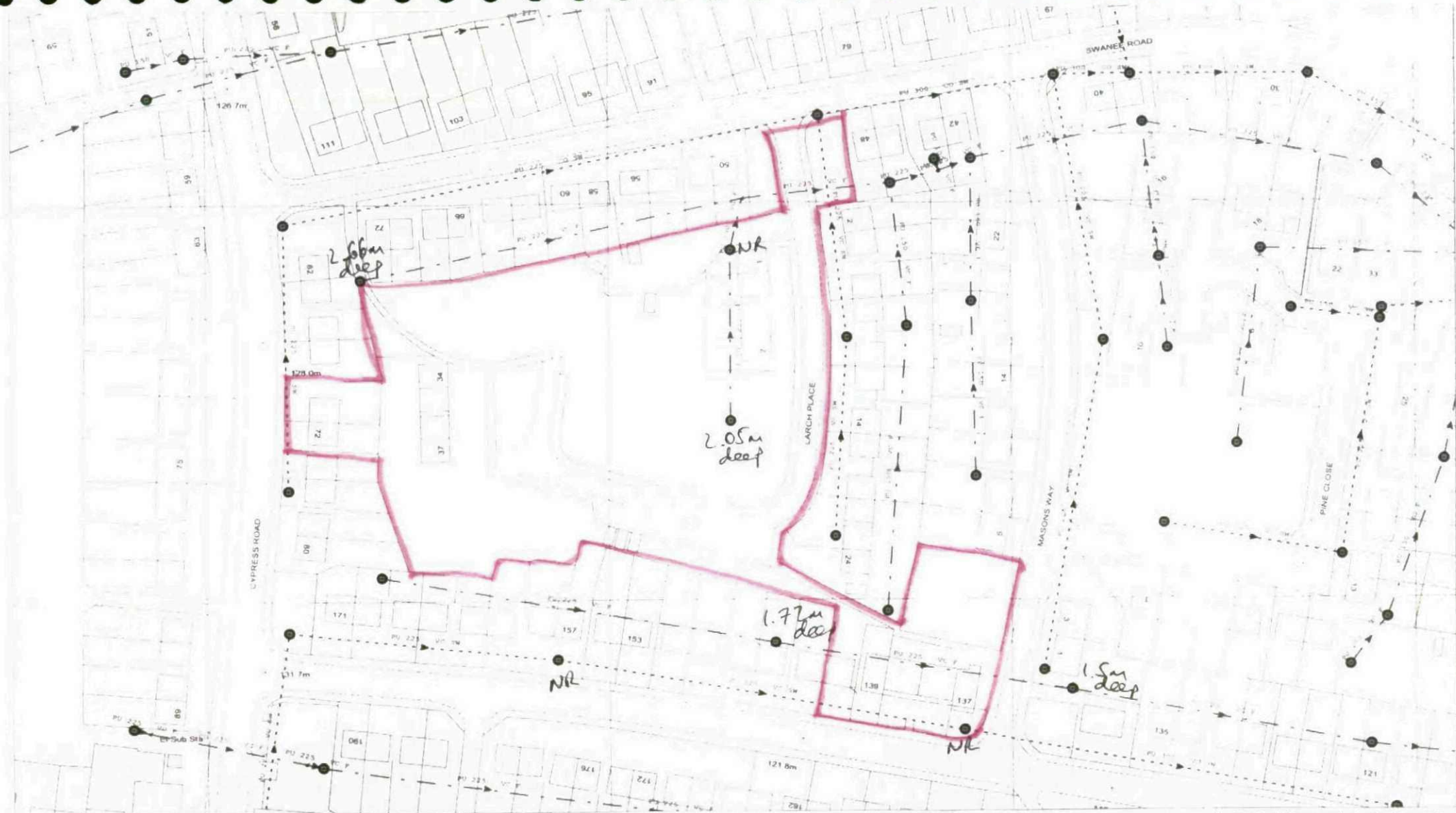
Development of the site should take place with separate systems for foul and surface water drainage. The separate system should extend to the public sewer.

Foul water domestic waste should discharge to the public foul sewers recorded within and adjacent to the site.

The developer's attention is drawn to Requirement H3 of the Building Regulations 2000. This establishes a preferred hierarchy for surface water disposal. Consideration should firstly be given to discharge to soakaway, infiltration system and watercourse in that priority order.

Sustainable Drainage Systems (SUDS), for example the use of soakaways and/or permeable hardstanding etc., may be a suitable solution for surface water disposal appropriate in this situation. You are advised to seek comments on the suitability of SUDS in this instance from the appropriate authorities.

Where appropriate, soakaways, swales and infiltration trenches (SUDS) may be adopted as part of the public sewer network. For general conditions for the adoption of SUDS please see the attached sheet. Further information may be seen in the DEFRA publication 'Interim Code of Practice for Sustainable Drainage Systems' (ISBN 0-86017-904-4). If the developer is considering adoption of SUDS they should contact our Developer Services Team on 0845 120 84 82.



435856 404848

Map Name SE3504NE

Title

Partial Key

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 connection



YorkshireWater

Yorkshire Water,
PO Box 500,
Halifax Road,
Bradford BD6 2LZ
Contact Name
K KHAN
Contact Tel

Notes

(Only) COPYRIGHT STATEMENTS: Reproduced by permission of Ordnance Survey on behalf of HMSO © Crown copyright and database 2004. All rights reserved Ordnance Survey Licence number 100019559

Foul Sewer = F
Combined Sewer = C
Surface Water Sewer = SW
Trade Sewer = TD
Partially Separate = PS

Date Req 04/03/2011, 13:50:04

Date Gen 04/03/2011, 13:50:12

Source Sewer Network Enquiry

Appendix E
Existing and Proposed Drainage Areas

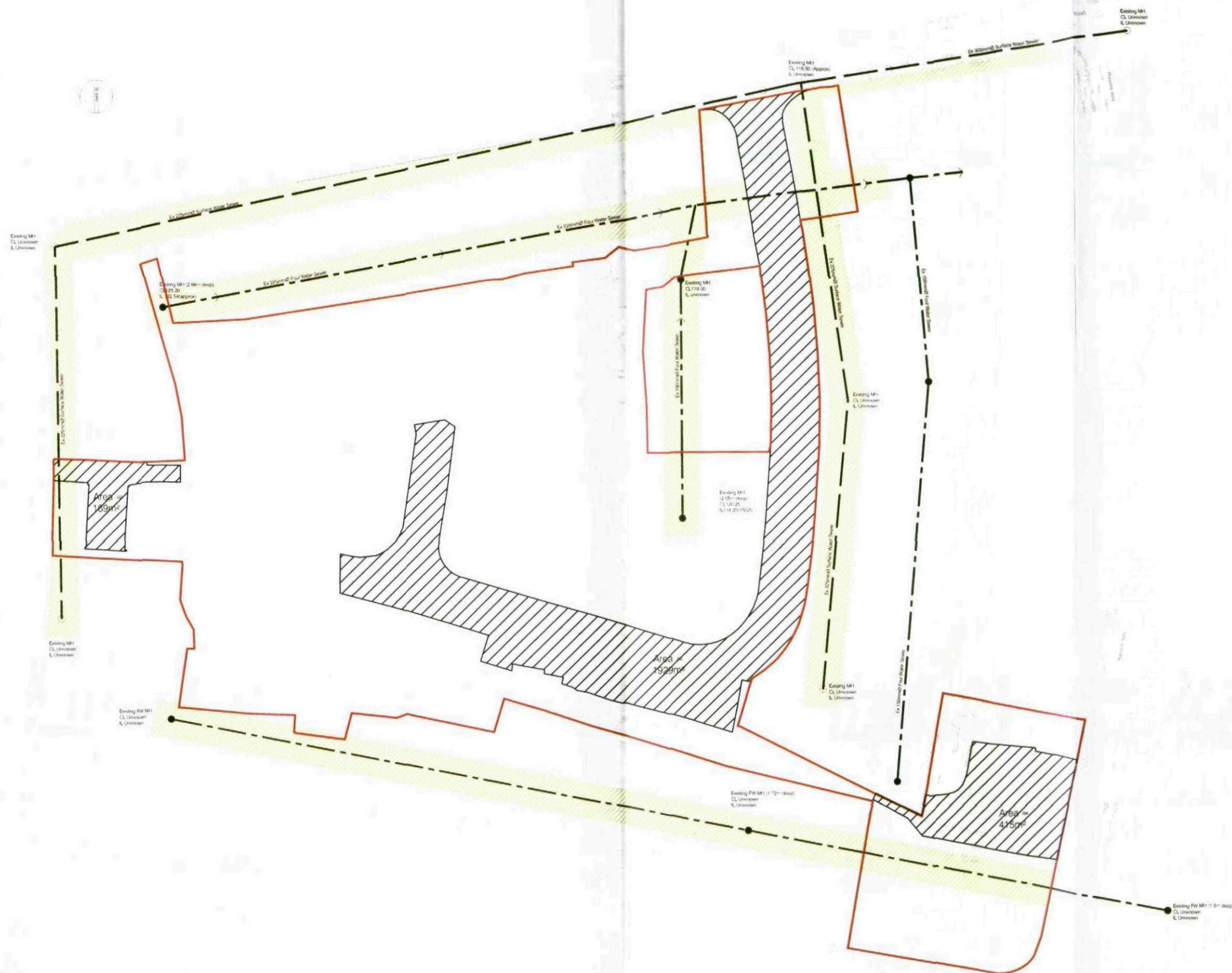
General Notes

1. SCALE WITH CAUTION FROM PRINTED DRAWINGS. Confirm all critical dimensions with Engineer. If in doubt, see relevant drawings and details.
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4. Unless technical approval has been obtained from the relevant Authority, it should be understood that all drawings issued are Preliminary and NOT for construction. Should the contractor commence site work prior to such approval being given, it is entirely at his peril.
5. All dimensions are in metres, unless otherwise stated.
6. The BSP Hazard Identification and Risk Assessment information for this project must be reviewed and understood by the contractor PRIOR to the commencement of any work on site.
7. Finished floor levels are subject to change by $\pm 100\text{mm}$ during the detailed design process.

Total Existing Impervious Area including the housing units already demolished on the site: 2513m^2
 This equates to a peak flow rate of: $14.6\text{m}^3/\text{s}$
 Peak (2) = Area (2) $\times$ rainfall intensity $\times 2.78$
 $= 6.2513 \times 50 \times 2.78$
 $= 86.31\text{m}^3/\text{s}$
 30% reduction for future climate change
 $= 24.4\text{m}^3/\text{s}$ permeable discharge rate



Working Title	PRELIMINARY				
Client	Keepmoat Homes				
Project Title	Larch Place Barnsley South Yorkshire				
Project Description	Engineering Appraisal Existing Drained Area Plan				
Drawn By	SMPS	Checked By	SMPS	Scale	1:250 (A0)
Issue No	01	Issue Date	23/05/11	Revision	
Drawing Number	11085/102	Sheet	A		



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755 License no. 100041272

A0

0 10 20 30 40 50
Metres
At Original Drawing Size

General Notes

1. SCALE WITH CAUTION FROM PRINTED DRAWINGS
Confirm all critical dimensions with Engineer. If in doubt ask.

2. This drawing is to be read in conjunction with all other relevant drawings and details.

3. Should there be any conflict between the details indicated on this drawing and those indicated on other drawings the Engineer shall be informed PRIOR to construction on site.

4. Until technical approval has been obtained from the relevant Authority, it should be understood that all drawings issued are preliminary and NOT to be used as a basis for construction. Should the contractor commence site work prior to such approval being given, it is entirely at his own risk.

5. All dimensions are in millimetres, unless otherwise stated.

6. The BSP Hazard Identification and Risk Assessment information for this project must be reviewed and understood by the contractor PRIOR to the commencement of any work on site.

7. Finished floor levels are stated to change by $\pm 300\text{mm}$ during the detailed design process.

Total Proposed Impervious Area = 5107m²
Provisionally, transient roads discharging to the public sewerage system = 2201m²
Impervious areas discharging to private sewerage = 2906m²

hsp

CONSULTING

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Project Status

PRELIMINARY

Client

Keepmoat Homes

Project Title

Larch Place
Barnsley
South Yorkshire

Drawing Title

Engineering Appraisal
Proposed Drained Area Plan

Drawn By: SMRS / J. Jackson

Scale: 1:250 A0

Project: SMRS

Author: J. Jackson

Date: 29.05.11

Drawing Number: 11085/103

Sheet: A

Appendix F
Percolation Test Results

The local public sewer network does not have capacity to accept any additional 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 (if any nearby) for discharge.

In the first instance, please provide evidence to show soakaways are not a viable option (eg, a ground investigation report) and that there are no watercourses in the vicinity of the site.

As a last resort and the evidence submitted being satisfactory, curtilage surface water discharges to the public sewer will be restricted to the level of run-off - i.e. same rate of discharge - to that from the existing use of the site. Discharges to the public sewer must also take into account a 30% reduction in existing discharge and climate change. To maintain the "status quo" in the public sewer network, any discharge of surface water from the site should take place with similar rates of flow and/or measured areas discharging to similar points of connection to that of the existing use of the site. You will need to demonstrate positive drainage, based on a 1 in 1 year storm, to the public sewer to Yorkshire Water by means of investigation and calculation carried out at your expense.

To do this, Yorkshire Water requires to see existing and proposed drainage layouts with pipe sizes, gradients and connection points, measured impermeable areas of the present and proposed use of the site, along with the calculations that show the existing and proposed discharge rate from the site to the public sewer.

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 from the Environment Agency/Land Drainage Authority, with regard to surface water disposal from the site.

Prospectively adoptable sewers and pumping stations 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 Developer Services Team (telephone 0845 120 84 82) for further information.

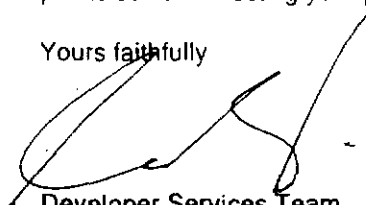
The public sewer network is for domestic sewage purposes. This generally means foul water for domestic purposes and, where a suitable surface water or combined sewer is available, surface water from the roofs of buildings together with surface water from paved areas of land appurtenant to those buildings. Land and highway drainage have no right of connection to the public sewer network. 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.

No land drainage to be connected/discharged to public sewer.

Any new connection to an existing public sewer will require the approval of Yorkshire Water. You may obtain an application form from our website (www.yorkshirewater.com) or by telephoning 0845 120 84 82.

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



Developer Services Team

1175/014/RJH/rjh

13th March 2011

Mr P Rice
Keepmoat Homes Yorkshire
Balby Court
Carr Hill
Doncaster
DN4 8DE



Please reply to

45 High Street
South Milford
North Yorkshire
LS25 5AF

T 0845 680 9781

E info@lithosconsulting.co.uk

Dear Peter

Larch Place, Kendray (Soakaways)

Introduction

Lithos Consulting were commissioned by Keepmoat Homes to carry out soakaway testing at Larch Place, Kendray.

It is understood that consideration is being given to redevelopment of the site with two storey domestic dwellings, associated gardens and adoptable roads and sewers.

A site investigation has been previously undertaken by Lithos Consulting Limited, Report No. 1175/1, August dated.

Fieldwork and Ground Conditions

Fieldwork was supervised by Lithos on 9th March 2011 and comprised the excavation of four supplementary trial pits (SA1 to SA4) across the site followed by soakaway testing in each of the pits. Trial pit locations are shown on Drawing 1175/5A, which is appended to this letter report.

Ground conditions are generally consistent with those found in the Lithos investigation with either granular or cohesive made ground overlying weathered sandstone with sandstone at depth.

Trial pits remained stable and no groundwater seepages were noted.

Trial pit logs are appended to this letter report.

Soakaway Testing

Soakaway tests were carried out in general accordance with BRE Digest 365 "Soakaway Design". Ideally tests in each trial pit should be undertaken three times; this was not possible in trial pits SA2 and SA3 where two tests were undertaken due to limited water availability.

Infiltration rates for each soakaway test have been calculated in accordance with BRE Digest 365. This design takes into account the time of emptying the soakaway pit between 25% and 75% of its effective depth. The effective depth is calculated from the starting water level to the soakaway pit base. Where the water level did not fall to 25% effective depth, the data was interpolated in order to obtain a representative infiltration rate; this was the case for SW6.

The calculated infiltration rates for each test are summarised in the Table below, and copies of these calculations are appended to this letter report.

Summary of Soakaway Infiltration Rates

Exp Hole	Stratum	Infiltration Rate (m/s)			
		Test 1	Test 2	Test 3	Average
SA1	Orange-brown medium to coarse grained SANDSTONE. Recovered as slightly sandy gravelly tabular cobbles.	1.66 ⁻³	1.64 ⁻³	5.49 ⁻⁴	1.28 ⁻³
SA2	?Medium dense orange-brown sandy gravelly angular COBBLES of sandstone. Gravel is angular to subangular fine to coarse of sandstone.	7.11 ⁻⁴	3.47 ⁻⁴	-	0.53 ⁻⁴
SA3	Orange-brown medium to coarse grained SANDSTONE. Recovered as sandy gravelly tabular cobbles.	4.37 ⁻⁴	4.46 ⁻⁴	-	4.44 ⁻⁴
SA4	Orange-brown medium to coarse grained SANDSTONE. Recovered as slightly sandy gravelly angular tabular cobbles.	1.91 ⁻⁴	2.07 ⁻⁴	4.78 ⁻⁴	2.92 ⁻⁴

Drainage Engineers could use the infiltration rates reported above in soakaway design. However, preliminary estimates (assuming an impermeable surface area of 100m²) suggest 600mm wide soakaway trenches would need to be 2.5m in length, and chamber-type soakaways would require a square pit with side length of at least 1m; both types taken to a minimum depth of 2.0m.

It is generally assumed that soakaways become impracticable on residential developments when:-

- the trench type design requires a length greater than about 10m, or an effective depth greater than 1.5m.
- the chamber type design requires a square pit with side length in excess of 1.8m, or an effective depth greater than 1.5m.

Conclusions

This investigation has confirmed that soakaways should provide a suitable solution for disposal of surface water.

It is hoped the above is sufficient for your present needs. However, should you require any further information, please contact the undersigned.

Yours sincerely



Richard Hey
Director
for and on behalf of
LITHOS CONSULTING LIMITED

enc



NOTES

Trial Pit Location (2010)

Soakaway Pit Location (2011)

Approximate Site Boundary

REV.	DESCRIPTION	DATE

LITHOS CONSULTING

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CLIENT

KEEPMOAT HOMES

JOB TITLE

LARCH PLACE, KENDRAY

DRAWING TITLE

EXPLORATORY HOLE LOCATION PLAN

DRAWN	DATE	STATUS
MJT	10/03/2011	FOR COMMENT ☐
CHECKED	DATE	FOR APPROVAL ☐
RJH	11/03/2011	DRAFT ☐
		FINAL ☒

SCALE	SHEET	DRAWING NO.	REVISION
1:1000	A3	1175/5A	A