



LAND SOUTH OF SCHOOL ROAD, LUDHAM

FOUL AND SURFACE WATER DRAINAGE STATEMENT

JULY 2009

DOC REF: 9887/02/NH/07-09/2795 RevA

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FOUL AND SURFACE WATER DRAINAGE STATEMENT

JULY 2009

REPORT REFERENCE: 9887/02/NH/07-09/2795 Revision A

CLIENT: Alan Irvine

ENGINEER: Millard Consulting
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REGISTRATION OF AMENDMENTS

Revision and Date	Amendment Details	Revision Prepared By	Revision Approved By
A 31.07.09	Amendment to Client's comments	JPM	NH

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1.0 INTRODUCTION

- 1.1 Millard Consulting have been instructed by Alan Irvine to investigate claims made by Willow Way Residents' Association regarding the impact of the proposed development on land south of School Road will have on the existing drainage.
- a. The problem of foul sewage backing up in properties on Willow Way will be made worse by the development.
 - b. Existing problems of ground water flooding will also be made worse by the proposed development.
- 1.2 The site is situated on land south of School Road, Ludham, immediately to the west of Willow Way, as shown on drawing 9887/00/01.
- 1.3 Millard Consulting disclaim any responsibility to the client and others in respect of any matters outside the scope of this report. This report is intended solely for the purpose of submission to the Planning Authority and may not be used for any other purpose.
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2.0 FOUL SEWAGE INVESTIGATION

- 2.1 An Anglian Water pre-development enquiry was carried out in September 2008. Anglian Water confirmed that the existing foul sewer running along the southern boundary of the site has capacity to facilitate the development. This sewer leaves the site to the south into Norwich Road before turning south. A copy of the Anglian Water sewer plan has been provided in Appendix B.
- 2.2 It has been suggested that the properties on Willow Way currently experience problems with the disposal of foul sewage. The Willow Way Residents' Association claim that ingress of ground water into the wet well of the pumping station off School Road to which the Willow Way system drains is the cause of this problem.
- 2.3 The suggestion is that the ingress of groundwater prevents the foul sewage from being transported away from the dwellings and, in some cases, forces sewage back up the system into people's homes. The residents claim that this problem would be made worse by development of land south of School Road.
- 2.4 Attempts to contact the Willow Way Residents' Association for details of the foul sewage problems they experienced have been unsuccessful.
- 2.5 Anglian Water have also provided a letter confirming that the Willow Way system is separate to the system to which the site will connect. Anglian Water recognise the issues experienced by Willow Way residents and confirm that these issues will not be affected by the development. A copy of the letter can be found in Appendix A.

3.0 SURFACE WATER INVESTIGATION

- 3.1 The current proposal is to drain the site to soakaways in accordance with current PPS25, Environment Agency and CIRIA guidance. It is alleged that some properties on Willow Way experience natural springs in their gardens and that the development of land south of School Road would increase the flow from these springs, causing increased detriment to the house owners.
- 3.2 Willow Way is built on a watercourse which has been culverted through the development. This has prevented the ingress of ground water into the watercourse and this is likely to have caused the springs to rise in the area surrounding the line of the watercourse. It has been suggested that the migration of ground water is aided by the presence of a clay seam which extends under Willow Way to under the land south of School Road.

Clay Seam

- 3.3 Some evidence of the clay seam was found when carrying out soakage tests but only in three of the four locations. The depth and thickness of the seam varied considerably across the site. The seam appears to fall to the north east but further investigation will be required to properly assess the seam.
- 3.4 At the southern end of the site, the seam is only 750mm thick and terminates at 1.5m below ground level. Any soakage features in this are therefore likely to be founded on the permeable strata below the clay seam.

Contributing Area

- 3.5 Although the extent of the clay seam cannot be identified, the catchment to the culverted watercourse covers an area of approximately 124 ha of mostly agricultural land. The area proposed for conversion to impermeable surfaces is approximately 0.65 ha. This is 0.5% of the potential total catchment for the springs arising in Willow Way.
- 3.6 Information published in the Flood Estimation Handbook (FEH) as part of their computer modelling software (Appendix C) shows that approximately 16% of surface water is likely to run off the development site, with 84% adding to ground water levels. The construction of the dwellings will mean 100% of the water landing in the area of the building footprint will be collected and taken to a soakaway, ensuring 100% infiltration over this area rather than the current 84%. The development would therefore increase the contribution for the 0.65 ha covered by the dwellings to 100%, increasing ground water recharge for the site by 1.7% and for the catchment only by 0.08%.

- 3.7 The figures of 1.7% and 0.08% above are for the potential increase in water added to ground water and do not necessarily equate to the increase in water that may arise at springs in Willow Way as there will be some losses to further infiltration. It is likely that the level of any additional flow, being potentially less than 0.08% than existing would be too small to be perceived and will not have a significant effect on the residents of Willow Way.

4.0 ALTERNATIVE SURFACE WATER STRATEGY

4.1 In the event that further Site Investigation (SI) confirms that there is a clay seam that would cause an unacceptable level of risks to properties on Willow Way, there are three alternative options:

Option A

4.2 Soakage could be limited to areas where no clay seam is found or the seam is above the lowest level of the infiltration feature. This would ensure water is discharged to the aquifer below the clay and it would not, therefore, contribute to the water arising in Willow Way. The south east corner of the site may be suitable for implementing infiltration features such as infiltration basins.

Option B

4.3 A proportion of the rain falling on the site equal to the proportion currently lost to surface water runoff, evaporation and transpiration (approximately 16%) could be discharged directly to the watercourse. This could be achieved by a positive system serving just the highways, discharging to the stream as it passes under Norwich Road as the highway area is likely to be at least 16% of the new impermeable area. A positive outfall (and area identified to provide attenuation infiltration which would serve such a system) is shown on drawing 9887/02/01.

Option C

4.4 If infiltration is not used for the disposal of surface water a positive system can be used. This would be a sustainable system designed to satisfy CIRIA C697 and Environment Agency criteria for long term storage. There is ample open space to locate the required attenuation. Micro Drainage software has been used to calculate the worst case volume of attenuation (Water to be stored and discharge at a reduced rate) of 1089m³. Calculations in Appendix D show the information used and the results produced by the Micro Drainage programme. All results are for a 1:100 year storm, including an allowance of 30% for climate change.

4.5 Drawing 9887/02/01 shows the potential routes for the outfall sewer.

Option 1

This uses land owned by the Church on the south of Norwich Road, assuring that the land will be made available. It is noted that Anglian Water can lay the sewer under a requisition.

Option 2

Should Church land not be available, an outfall route is available using highway land. Although this is the route that guarantees deliverability due to existing rights to lay adoptable sewers in highway land. The Church land route is desirable to minimise disruption to traffic on Norwich Road caused by excavating and laying pipework in the road.

- 4.6 In the event that it cannot be demonstrated through additional geotechnical information that the risk to Willow Way from soakaways is negligible, the above options show that a surface water scheme can be delivered to serve the proposed development.

5.0 CONCLUSIONS

Foul Water

- 5.1 It has been demonstrated that the foul sewer serving Willow Way is completely separate to the system that will serve the proposed development. There is, therefore, no possibility that the development will impact on any foul sewerage problems that may be experienced by the residents of Willow Way.

Surface Water

- 5.2 It is possible that there may be an impact on the level of water arising at Willow Way, however, initial assessment suggests that the impact is likely to be small. Further investigations may be required to confirm the level of impact, if any.
- 5.3 The primary cause of the ground water arising in Willow Way is likely to be the removal of the ditch which once passed through the centre of the area now comprising Willow Way. The removal of the natural drainage path for the ground water has most likely caused the water to become trapped under Willow Way where it surfaces as springs.
- 5.4 The relative impact on ground water levels of the development using infiltration is likely to be very small, however, if deemed unacceptable an alternative scheme utilising a positive outfall can be achieved. Such a scheme would not cause detriment to the residents of Willow Way but is contrary to current PPS25 Environment Agency and CIRIA guidance, which promotes the use of soakaways.

Where practical positive outfalls are permitted where increased ground water recharge carries an associated risk to third parties and CIRIA Guidance gives design requirements to ensure such positive systems are sustainable and do not increase flood risk. It is, therefore, likely that if the use of soakaways is not acceptable to the LPA due to consideration of the concerns of the residents of Willow Way, a viable alternative to infiltration is available.

APPENDICES

APPENDIX A

Mr Jamie Metcalf
Millard Consulting
The Atrium
St George's Street
Norwich
NR3 1AB

Millard Consulting - Norwich Office
Received: 30/07/09
Project No: 9887
Circulate To: JM
Copied To:
Action:

Tel 01733 414690
Fax 01223 201001

Our ref 1004/SP36(002)

24 July 2009

Dear Mr Metcalf

RE: LAND AT LUDHAM

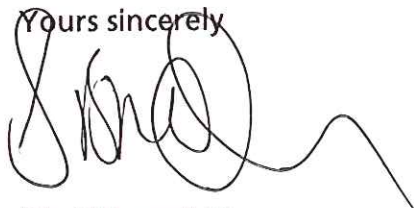
Thank you for your correspondence dated 21 July 2009 seeking our comments on the above.

The foul water sewer at Willow Way discharges north to the Terminal Pumping Station off School Lane as highlighted on your sketch. This then pumps direct to the Sewage Treatment Works situated to the north of the catchment.

Anglian Water are aware of issues within Willow Way however the site will not affect these problems as the proposed point of connection for the site, i.e. manhole 6310, runs south and then east on a different part of the catchment and ends up at Womack Staithe Terminal Pumping Station off Horsefen Road.

I hope this answers your questions however if any further information or assistance is required concerning this matter please contact me on 01733 414200.

Yours sincerely



**Ms S Brereton
Planning Advisor
Planning & Equivalence Team**

APPENDIX B



Origin			Downstream Sewer			
Manhole Number	Cover Level (m AOD)	Depth to Invert (m)	Upstream Invert Level (m AOD)	Length (m)	Downstream Invert Level (m AOD)	Downstream Manhole Number
4202	-99	-99	-99.00	75.00	-99.00	4201
4301	-99	-99	-99.00	59.91	-99.00	5301
5301	-99	-99	-99.00	80.19	-99.00	5310
5202	-99	-99	-99.00	16.63	-99.00	5201
6301	-99	-99	-99.00	30.99	-99.00	6202
6302	-99	-99	-99.00	49.66	-99.00	6203
6303	-99	-99	-99.00	5.98	-99.00	6302
6304	-99	-99	-99.00	6.78	-99.00	6303
6305	-99	-99	-99.00	10.29	-99.00	6304
6306	-99	-99	-99.00	19.73	-99.00	6305
6307	-99	-99	-99.00	31.18	-99.00	6306
6308	-99	-99	-99.00	13.02	-99.00	6307
6309	-99	-99	-99.00	71.17	-99.00	6303
6310	-99	-99	-99.00	48.45	-99.00	6309
6401	-99	-99	-99.00	27.57	-99.00	6308
6402	-99	-99	-99.00	14.02	-99.00	6401
6501	-99	-99	-99.00	47.26	-99.00	7401
6502	-99	-99	-99.00	24.78	-99.00	6501
6503	-99	-99	-99.00	61.62	-99.00	6501
6601	-99	-99	-99.00	67.04	-99.00	7502
6602	10	1.56	-99.00	38.85	-99.00	6601
6603	10.3	1.513	8.78	4.66	8.70	6604
6604	10.2	1.497	8.70	11.84	8.44	6602
7301	-99	-99	-99.00	20.54	-99.00	6301
7302	-99	-99	-99.00	32.37	-99.00	7301
7303	-99	-99	-99.00	10.77	-99.00	7302
7304	-99	-99	-99.00	16.12	-99.00	7303
7401	-99	-99	-99.00	46.81	-99.00	
7402	-99	-99	-99.00	82.25	-99.00	7401
7403	-99	-99	-99.00	8.24	-99.00	7402
7501	-99	-99	-99.00	46.96	-99.00	
7502	-99	-99	-99.00	40.01	-99.00	
7503	-99	-99	-99.00	57.76	-99.00	8502
7504	-99	-99	-99.00	16.68	-99.00	7503
7601	-99	-99	-99.00	33.48	-99.00	7504
8204	-99	-99	-99.00	9.99	-99.00	8203
8301	-99	-99	-99.00	40.06	-99.00	8203
8302	-99	-99	-99.00	58.48	-99.00	7304
8303	-99	-99	-99.00	49.09	-99.00	8302
8501	-99	-99	-99.00	39.68	-99.00	9404
8502	-99	-99	-99.00	77.17	-99.00	8501

Map Centre 638625, 318496 Scale: 1250 Date: 31/07/2008 12:19

This plan is provided by Anglian Water pursuant to its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but the position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or drain or disposal main or any item of apparatus. This information is valid for the date printed. The plan is produced by Anglian Water Services Limited, trading as Geodesys from Ordnance Survey © Crown Copyright, WU 100018507. This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other use of the map data or further copies are not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

GEODESYS
LINE & PROPERTY SURVEYORS
Asset Information Team
Geodesys
PO Box 486
Huntingdon
PE29 6YN

Sewerage Asset Legend

- Surface Water Sewer
- S104/Private Sewer
- Foul Sewer
- Combined Sewer
- - - Decommissioned Sewer
- - - Rising Main
- Vacuum Sewer
- Gravity Sewer
- Vent Column
- Manhole (Non Surface Water)
- Manhole (Surface Water)

Data updated: May 2006

Property Address: SITE AT, SOUTH OF SCHOOL ROAD, LUDHAM NORFOLK

Customer: Millard Consulting
Title: A754091(1) (Joshua Mayes)

APPENDIX C

FEH INFORMATION

FIGURES TO DESCRIBE THE PHYSICAL CHARACTERISTICS OF THE DEVELOPMENT AREA

VERSION	FEH CD- ROM	Version	2	exported at	15:13:47	GMT	Thu	30-Jul- 09
CATCHMENT	GB	638550	318400	TG	38550	18400		
CENTROID	GB	638257	318872	TG	38257	18872		
AREA	1.21							
ALTBAR	6							
ASPBAR	179							
ASPVAR	0.12							
BFIHOST	0.843							
DPLBAR	1.41							
DPSBAR	12.2							
FARL	1							
LDP	3.13							
PROPWET	0.27							
RMED-1H	11.3							
RMED-1D	29.3							
RMED-2D	38.2							
SAAR	608							
SAAR4170	643							
SPRHOST	15.99							
URBCONC1990	0.723							
URBEXT1990	0.0476							
URBLOC1990	0.344							
URBCONC2000	0.882							
URBEXT2000	0.0424							
URBLOC2000	0.371							
C	-0.0241							
D1	0.30879							
D2	0.38145							
D3	0.22395							
E	0.30964							
F	2.49282							
C(1 km)	-0.024							
D1(1 km)	0.315							
D2(1 km)	0.385							
D3(1 km)	0.223							
E(1 km)	0.308							
F(1 km)	2.498							

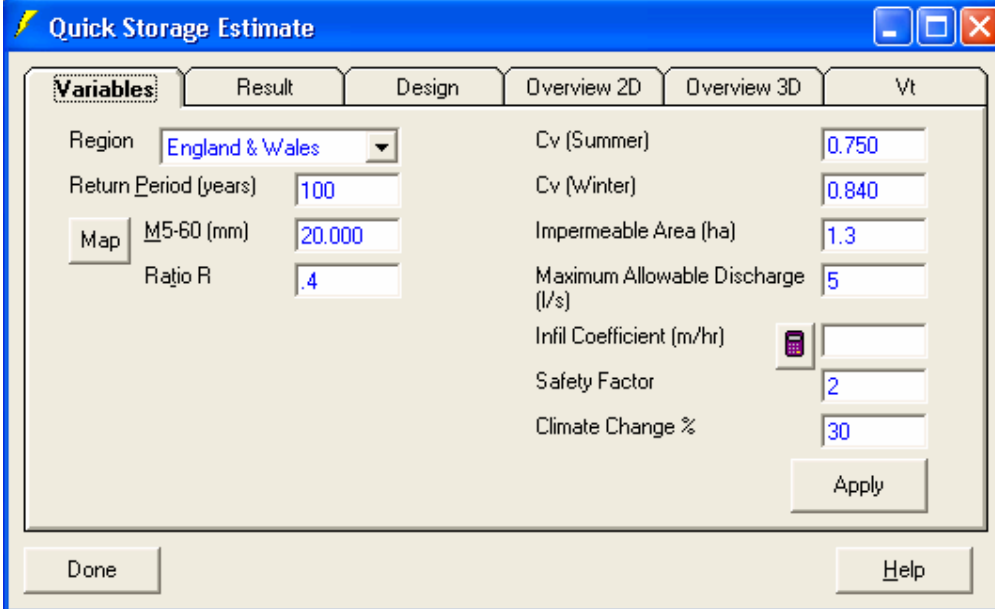
SPRHOST – Percentage of Rainfall Runoff for the development area. (Will not infiltrate)

APPENDIX D

MIRCODRAINAGE CALCULATIONS

DEVELOPMENT SURFACE WATER STORAGE ESTIMATE

DEVELOPMENT INPUT:

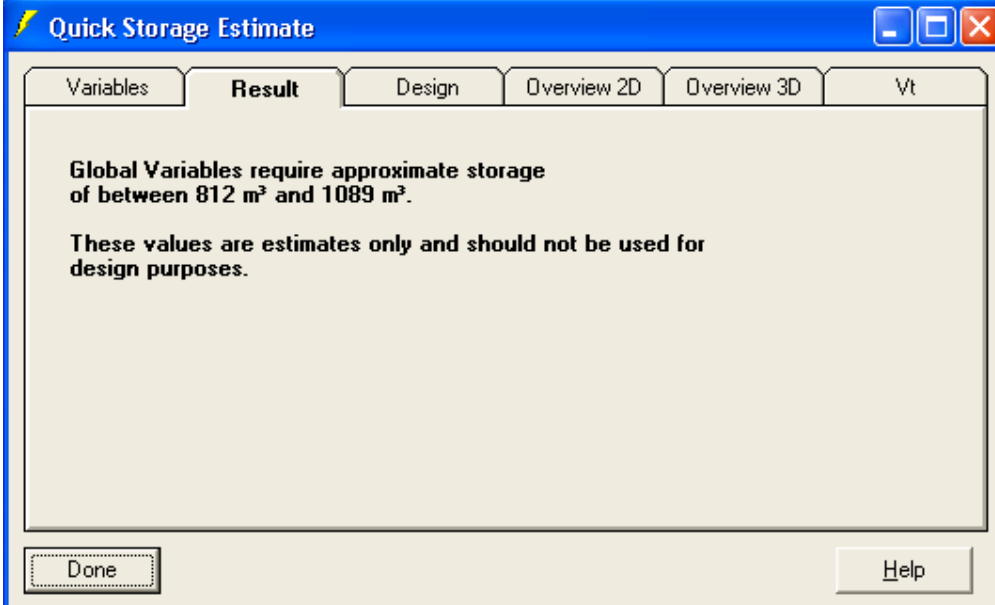


The screenshot shows the 'Quick Storage Estimate' software window with the 'Variables' tab selected. The window title is 'Quick Storage Estimate'. The 'Variables' tab is active, and the 'Result' tab is also visible. The input fields are as follows:

Variable	Value
Region	England & Wales
Return Period (years)	100
Map	M5-60 (mm)
Ratio R	.4
Cv (Summer)	0.750
Cv (Winter)	0.840
Impermeable Area (ha)	1.3
Maximum Allowable Discharge (l/s)	5
Infil Coefficient (m/hr)	
Safety Factor	2
Climate Change %	30

Buttons: Done, Help, Apply

DEVELOPMENT STORAGE RESULTS:



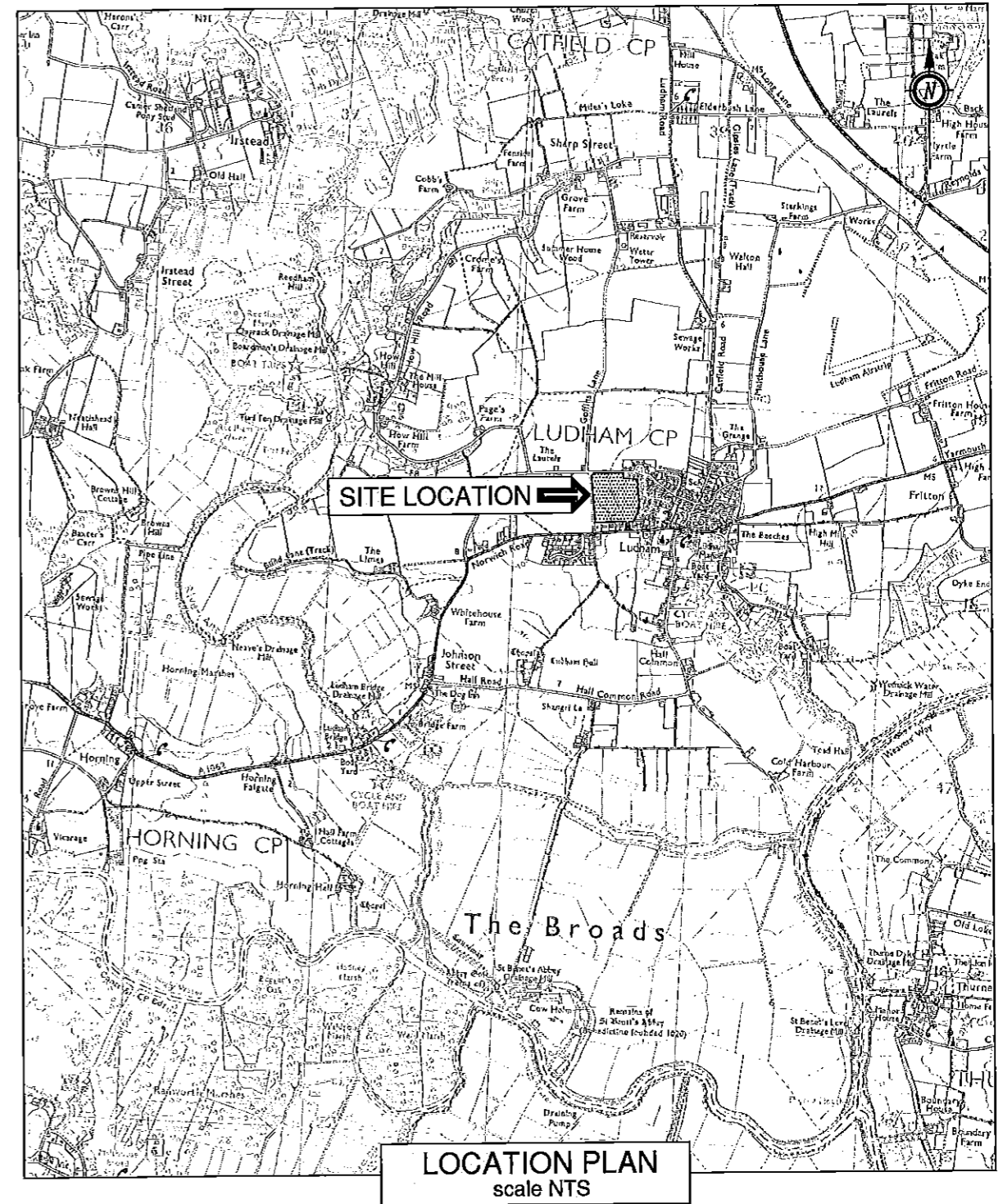
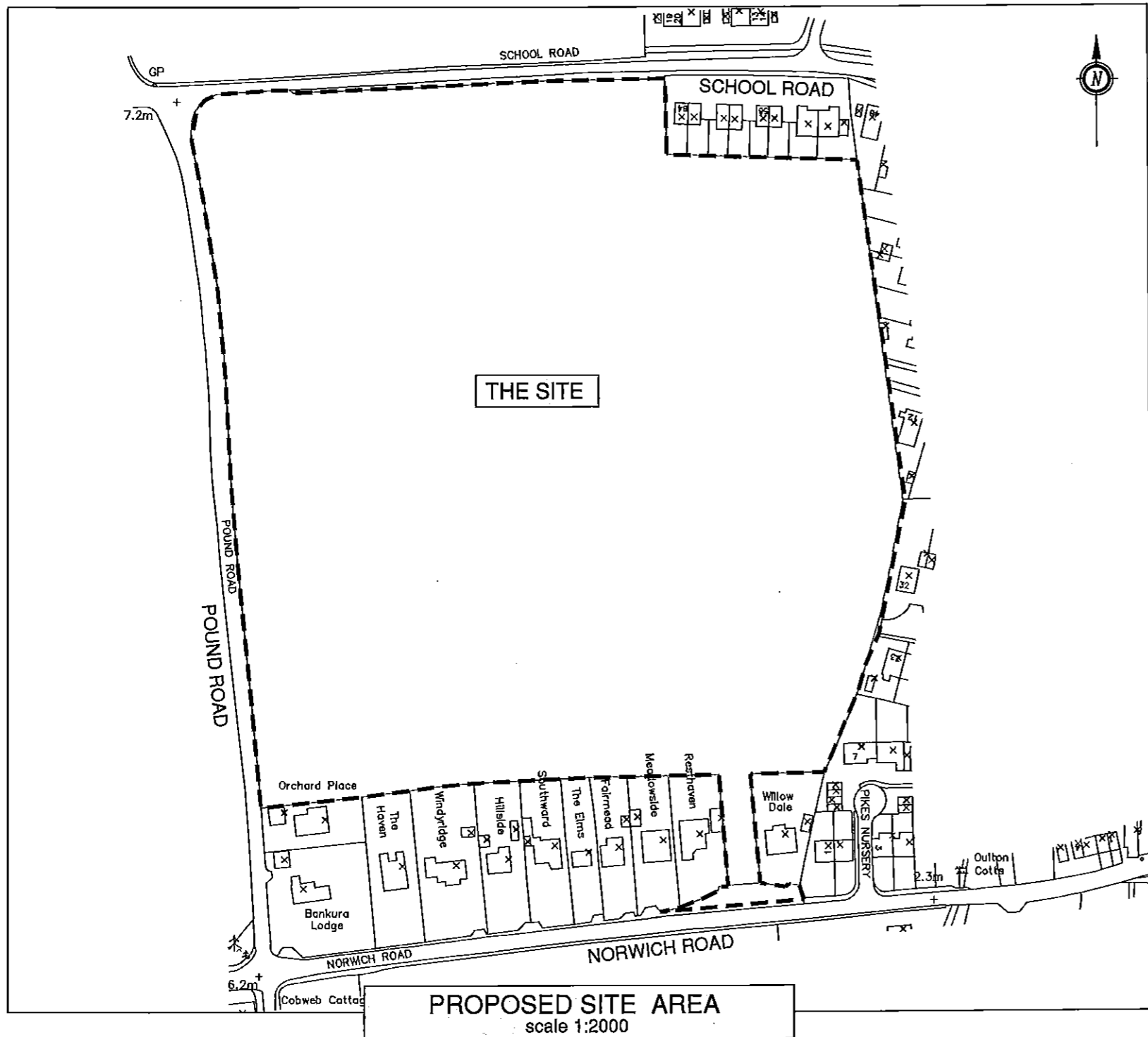
The screenshot shows the 'Quick Storage Estimate' software window with the 'Result' tab selected. The window title is 'Quick Storage Estimate'. The 'Result' tab is active, and the 'Variables' tab is also visible. The results are as follows:

Global Variables require approximate storage of between 812 m³ and 1089 m³.


These values are estimates only and should not be used for design purposes.

Buttons: Done, Help

PLANS

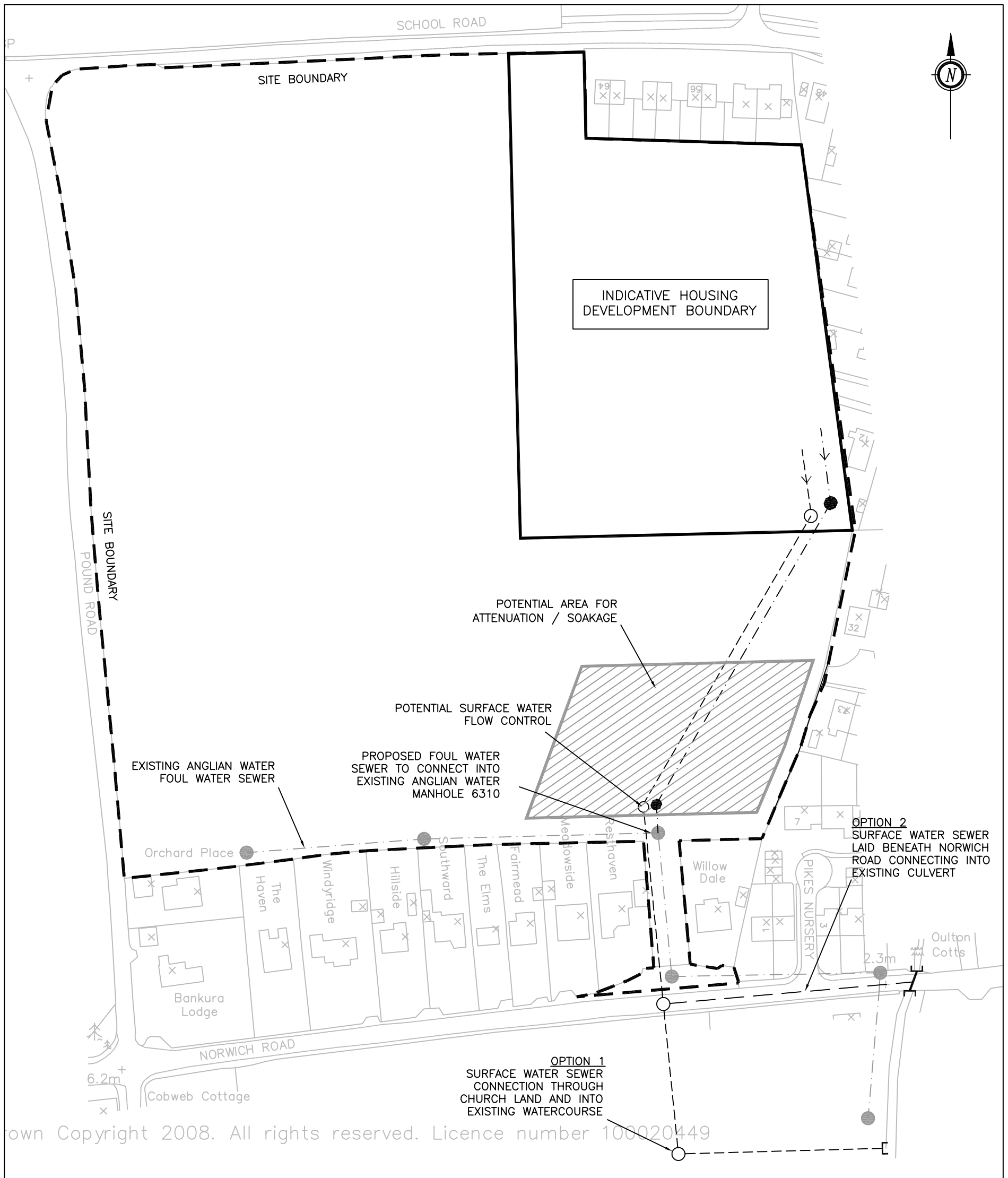


REV	AMENDMENT DETAILS	DRAWN	APPROVED	DATE

PROJECT LAND SOUTH OF SCHOOL ROAD, LUDHAM	DESIGNED AND DRAWN BY JPM	SCALE AS SHOWN	 Millard Consulting Engineers
DRAWING TITLE SITE LOCATION PLAN	APPROVED BY NDH	DATE 30.07.09	
CLIENT ALAN IRVINE	DRAWING NUMBER 9887/00/01	REVISION -	
CAD REFERENCE FILE NUMBER 9887_00_001_			

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 Parth, Ipswich, Sevenoaks
 and Nunston



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KEY

- INDICATIVE SURFACE WATER SEWER AND MANHOLE (OPTION 1)
- INDICATIVE SURFACE WATER SEWER AND MANHOLE (OPTION 2)
- INDICATIVE FOUL WATER SEWER AND MANHOLE
- EXISTING ANGLIAN WATER FOUL WATER SEWER AND MANHOLE

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. THIS DRAWING IS INDICATIVE ONLY AND IS SUBJECT TO DETAILED DESIGN.

REV	AMENDMENT DETAILS	DRAWN	APPROVED	DATE

PROJECT LAND SOUTH OF SCHOOL ROAD, LUDHAM	DESIGNED AND DRAWN BY JPM	SCALE 1:1000 @ A2	
	APPROVED BY	CHECKED BY NDH	
DRAWING TITLE SURFACE WATER DRAINAGE STRATEGY	DRAWING STATUS	DATE 30.07.09	Millard Consulting Engineers
	CAD REFERENCE FILE NUMBER 9887_02_001_		
CLIENT ALAN IRVINE	DRAWING NUMBER 9887/02/01	REVISION -	offices at Perth, Ipswich, Sevenoaks and Nuneaton

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