PORINGLAND INTEGRATED URBAN DRAINAGE STRATEGY

SUPPLEMENTARY GROUNDWATER DRAINAGE REPORT

REPORT REF: 8807/02/SH/05-08/2237

MAY 2008

SOUTH NORFOLK COUNCIL
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REPORT REFERENCE: 8807/02/SH/05-08/2237

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REGISTRATION OF AMENDMENTS

Revision and Date	Amendment Details	Revision Prepared By	Revision Approved By

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APPENDICES

PLANS

1.0 INTRODUCTION

1.1 Millard Consulting has been commissioned by South Norfolk Council to investigate surface water flooding problems at Poringland and Framingham Earl associated with the occurrence of natural springs, as part of the Poringland Integrated Urban Drainage (IUD) Study.

1.2 The Poringland IUD Study is one of 15 pilot projects funded by Defra as part of its 'Making Space for Water' initiative. This initiative has been designed to identify the causes of flooding in urban areas and to provide evidence for the development of new guidance, policy and regulation to achieve integrated urban drainage management.

1.3 This report follows on from our previous Report No. 8807/02/SH/01-08/2041, which identified the causes of flooding in Poringland and Framingham Earl, examined the geology and hydrogeology of the study area to identify potential natural spring lines and considered the impact of these on present and possible future development. This report focuses on the evaluation of additional ground investigation and historical records to supplement earlier information and to review sites identified in the existing Local Plan and the Local Development Framework (LDF). The review is for their development potential taking into consideration the degree of ground and surface water flood risk, the most appropriate type and amount of land required for Sustainable Drainage Systems (SuDs) and suggested densities of development, based on allowance for drainage systems.

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2.0 LOCATION AND DESCRIPTION OF SITE

2.1 The site lies approximately five miles to the south of Norwich on the B1132 between Norwich and the market town of Bungay.

2.2 The location of the site and the extent of the study area are shown on the plan number 8807/21/01A.

2.3 The Poringland Integrated Urban Drainage (IUD) study area comprises the villages of Poringland and Framingham Earl in South Norfolk. The urban areas of the two villages are conjoined and surrounding area is used as agricultural land. The extent of existing developed area and the sites approved for future development are shown on plan number 8807/21/02A.

2.4 The two villages occupy one of the highest points in South Norfolk. The highest elevation is approximately 75m above Ordnance Datum (AOD) and occurs in the vicinity of Fiveways junction. From this point, the land falls away gradually in all directions. The lowest part of the study area occurs on Rectory Lane at the southern edge of Poringland. The difference in level between the highest and lowest points in the villages is approximately 25m.

2.5 The villages are served by a positive foul drainage system which drains to a sewage treatment works located to the south of Poringland. Since the 1980's development has also included separate surface water drainage systems discharging direct to local watercourses. Earlier development was largely taken to soakaways serving individual properties.

2.6 Most of the development in the two villages has occurred within the last 50 years. Initially this consisted of linear development, following the network of existing roads and lanes bounded by Long Road, Upgate, Rectory Lane, The Street, Carr Lane and Shottesham Road. Since the 1970's considerable infilling development has occurred in Poringland, changing the character of the village from rural to essentially sub-urban. Recently, development of land to the west of The Street has commenced by Norfolk Homes. Development in Framingham Earl has been more limited and consequently this has retained a more rural feel, particularly along Long Road and Upgate.

3.0 REVIEW OF ADDITIONAL SOILS INFORMATION

3.1 An appraisal of the geological and subsoil conditions under Poringland and Framingham Earl is included in Report No. 8807/02/SH/01-08/2041. This showed that the two villages are situated on Glacial Till comprising Sands and Gravels on Chalky Boulder Clay. The sub soil is not uniform across the study area and in many places the Sands and Gravels are absent.

3.2 In general, the Glacial Sands and Gravels are acidic in nature whilst the underlying Chalky Boulder Clay is slightly alkaline. Soils derived from these different materials favour certain specific groups of plants. In particular, the acidic sandy soils favour plants associated with heathland such as heather, gorse and bracken and introduced species such as rhododendrons. As part of the initial study a brief survey of plant species was completed along Long Road to check the accuracy of the British Geological Survey (BGS) maps. The results of this survey indicated discrepancies between the published plans and on site observations.

3.3 It should however be borne in mind that the geological maps were originally produced from field notes collected in the nineteenth century prior to urban development. These notes were later transferred to imperial scale plans and more recently were converted to the current metric scale maps. At each stage of this process there is scope for error. The surface geology of the study area taken from maps produced by the BGS is shown on drawing number 8807/21/05A.

3.4 In addition to the published geological survey maps, a number of borehole logs were available from BGS which provide additional geological information. In all a total of 9 recorded borehole logs were obtained from BGS and examined. The borehole locations are shown on plan 8807/21/08 and the logs are included in Appendix A.

3.5 Only one of the available boreholes in the area extended through the Glacial Till to the Chalk. This suggests that the top of the chalk bedrock lies at approximately 12m AOD.

3.6 Where encountered, the boreholes showed that there was in general between 8 and 12 metres of sand and gravels overlying the boulder clay. However, in borehole number 4, which was drilled at Mill House near the Fiveways junction, the sand and gravels were found to be present to a depth of over 50 metres. This is not replicated in other boreholes. One possible explanation could be the presence of an in-filled post glacial solution pipe in the chalk bedrock which has caused the downward migration of the surface deposits at this location. This would require extensive soils investigation to confirm and is beyond the scope of this report.

3.7 In addition to the borehole information obtained from the BGS, an examination of selected Building Control Records has also been undertaken for any information relating to soil conditions in the Poringland and Framingham Earl area. Prior to 1974, Building Control in the study area was the responsibility of Forehoe and Henstead Rural District Council and no records appear to have survived. After 1974, responsibility for Building Control passed to South Norfolk Council but the due to the complexities of merging a large number of Rural Districts, effective records are only available after about 1980. Changes in Government legislation and the use of private Building Inspectors from the mid 1990's, means that from this time records are no longer held in a single location. Where possible, developers who used approved private Building Inspectors on their sites have also been contacted to find out whether they would be prepared to release soils information acquired as part of the Building Control process. A summary of soils information obtained from Planning, Building Control and Developer's records is included in Appendix B.

3.8 In general, the information shows that there is a gradual transition from Glacial Sands and Gravels to the Chalky Boulder Clay. The Glacial Sands and Gravels contain clay bands or lenses which seem to become thicker and more frequent with increasing depth. The Chalky Boulder Clay contains bands of sand which become less frequent with increasing depth. As a result, the transition from one soil type to the other is not always distinct and it is perhaps more realistic to describe different parts of the study area as being predominantly sands or predominantly clays. A suggested revision to Geological Plan of the study area based on the records examined is shown on Drawing No 8807/21/08.

4.0 REVIEW OF HISTORIC MAPS AND FIELD DRAINAGE

Surface Water

4.1 A number of streams rise in the area. The topography creates a watershed causing the streams to flow towards three different river systems.

4.2 Prior to development, it is probable that an agricultural field drainage system was in place over much of the developed area. In its simplest form this may have comprised a network of interconnected field boundary ditches. However it is possible that fields may also have had piped land drainage systems, particularly those fields which were naturally wet or boggy. An effect of development has been for many of these pre-existing drainage ditches to become infilled. There is no recorded evidence of consistent piping of such ditches to maintain their effectiveness. Where the ditches remain insitu, there is considerable evidence to suggest that they are not effectively maintained. It is also likely that any piped land drainage system would have been severely damaged by the building process. Damage to the pre-development land drainage system could be a factor in localised surface flooding following severe or prolonged rainfall.

4.3 Although the earliest maps of the area date from the mid 1800's, these were relatively small scale (1/63360 or 1 inch to 1 mile) and show insufficient detail to allow pre-development field patterns to be accurately established. The earliest larger scale maps of the study area (1/10560 or 6 inches to 1 mile) date from 1891. A selection of historic maps produced by the Ordnance Survey has been examined between 1891 and 1974. The most recent surveys and maps have been produced to a metric scale of one to ten thousand (1/10000) and all the historic maps have been rescaled electronically to allow comparison at this scale.

4.4 The maps show that there was little change to field boundaries between 1891 and 1946. However, between 1946 and 1974 there were significant changes, as field sizes were enlarged to allow for mechanisation of farming and as a consequence many original field boundaries were lost.

4.5 At the scale of maps examined, it is not possible to tell how field boundaries were originally formed. It is probable that most of the boundaries to the fields would originally have been marked by a hedge. However, in areas of poor drainage, it was also customary practice to excavate a ditch adjacent to the boundary hedge.

4.6 The removal of a hedge and its root system leaves a shallow infilled trench which can act as a conduit for groundwater. Similarly, the fill material within a backfilled ditch will not be as consolidated as the surrounding natural soil and so will continue to provide a path for groundwater. The reduction in capacity created by the fill considerably increases the risk of flooding.

4.7 The watercourses within the study area are shown on drawing 8807/21/09 together with the pre-development field boundaries. It is noted that the pre-development field boundaries follow lines approximately parallel and at right angles to the water courses which drain the villages suggesting that field drainage was formally managed.

4.8 To the south of Poringland in the vicinity of Church Close and Alder Close, previous maps have shown a drain (watercourse) running through the now developed area. It is not clear whether this watercourse was diverted or culverted when development took place.

Groundwater

4.9 Water falling on the Sands and Gravels within the two villages will rapidly percolate through to the underlying Chalky Boulder Clay. The relatively high level of surface water runoff at the interface with the Chalky Boulder Clay will tend to follow any natural variations in level between the two layers to emerge as springs near the edge of the Sand and Gravels. Over the years, these paths will tend to become defined, forming buried channels which follow any natural weaknesses and variations in the clay material.

4.10 The springs formed by this process over the limited area of Sands and Gravels within the two villages can vary from a steady continuous flow to transient minor seepage which would create no more than a damp slightly boggy area.

4.11 Further examination of the study area now suggests that the transient areas of seepage become very wet following prolonged rainfall and can give rise to localised flooding. This seems to be exacerbated in many cases by inadequate or poorly maintained soakage systems.

4.12 The additional soils information obtained suggests that the boundary between the Sands and Gravels and Chalky Boulder Clay is not distinct. The presence of clay layers within the sands and gravels creates zones of perched water whilst the presence of Sand and Gravel bands in the upper clay allows groundwater movement beyond the boundaries suggested by the BGS Maps. This is the most likely reason why springs occur at different levels above Ordnance Datum around the villages.

4.13 The location and effect of transient springs are also affected by vegetation and new development. Trees, and particularly deciduous trees, can alter the local water table on a seasonal basis affecting the appearance and migration of springs. The Jacobs Report commissioned by Defra entitled "Making Space for Water" and published in November 2006 has highlighted the effect of foundations, drainage and other sub structures on the flow of ground and surface water. As a result, new and recent development in the study area may have caused springs to migrate to new locations as a result of changes to the pre-existing ground and surface water flows.

5.0 REVIEW OF FLOODING INCIDENTS

5.1 A schedule of reported flooding incidents in Poringland and Framingham Earl has been provided which was compiled from a survey undertaken by South Norfolk Council in 2007. However, it is not expected that this schedule represents a complete list of all recorded flooding incidents in the study area and several previously unrecorded incidents were reported during the course of the additional investigations. The schedule in Appendix C has been revised to include these sites.

5.2 The schedule has been reviewed and those flooding incidents which seem to be due to ground or surface water have been shown on plan number 8807/21/05A. In addition to a small number of isolated or individual flooding problems, the plan clearly identifies six clusters of flooding problems across the study area, in Oaklands, Spruce Crescent, Springfield, Malten Close, Hadden Close, and Church Close.

5.3 The flooding incidents in the Oaklands area of Framingham Earl seem to straddle the interface between the edge of the Glacial Sands and Gravels and the underlying Chalky Boulder Clay. This suggests that the flooding problems in these areas may be groundwater related. A review of the historic maps indicates that the development was constructed across three former fields. Survey work undertaken by Anglia Survey and Design indicates that the previous field drainage ditches have been infilled contributing to the surface water flooding problems. Recent work undertaken by South Norfolk Council to identify and open up former ditches in this part of the study area may assist in lowering groundwater levels and reducing future flooding problems.

5.5 The reported flooding incidents in Spruce Crescent are located at the edge of the Glacial Sands and Gravels. However, it is likely that the Chalky Boulder Clay will lie fairly close to the surface under this site. The properties have been constructed with a positive surface water drainage system which drains to a watercourse to the west of the development. In view of this, the most likely cause of the flooding at this location is groundwater. Comparison with the historic maps of the area shows that the site of this development originally comprised several small fields. The reported flooding incidents all lie close to former field boundaries and therefore it is likely that the problems are caused by either infilled ditches or the removal of former hedges.

5.6 There is a broad scatter of flooding incidents along the likely interface between Glacial Sands and Gravels and the Chalky Boulder Clay in the area which includes Springfield, Malten Close and Hadden Close. The name Springfield possibly predates the development and is likely to be indicative of wet soil conditions. Malten Close and Hadden Close lie in the shallow valley of a watercourse and as a result could expect to have a high natural water table. Both of these locations would be vulnerable to flooding due to groundwater seepage. Recent flooding in Malten Close seems to have been aggravated by defective soakaways and the development of adjacent land which has raised soil levels to the rear of numbers 6 to 14

5.7 The historic maps show that the land occupied by Church Close is crossed by a field boundary and is bordered to the west and south by a drain (watercourse). This watercourse flows in a southerly direction along the western boundary of Church Close before turning east between Church Close and Alder Close. It is no longer clear on the ground where the watercourse runs after this point though it is likely to flow towards Shottesham Road to the west of the Churchyard. Over half of the reported flooding incidents in Church Close coincide with the route of the drain and the line of the former field boundary which crosses the site. The remaining flooding incidents in the northern part of Church Close are possibly due to defective soakaways within the clay subsoil.

5.8 There are a small number of flooding incidents in the area around Carr Lane and Saxonfields. It is possible that ground and surface water movement patterns may have been altered by the ongoing development by Norfolk Homes to the north of this area, although as stated previously, the name Carr Lane is indicative of a marshy area.

5.9 The isolated flooding incident reported on Rosebery Avenue to the east of the study area is unclear but most likely to be the result of an inadequate or poorly maintained soakaway.

5.10 There are several individual flooding incidents that are largely sited on the Glacial Sands and Gravels and flooding at these locations may be an indication of perched water due to the presence of clay lenses.

6.0 IMPLICATIONS FOR APPROVED AND PROPOSED DEVELOPMENT SITES

6.1 Sites for possible future development have been identified by South Norfolk District Council within the Local Plan. In addition, other sites have been put forward by land owners and developers for consideration for future development as part of the Local development Framework (LDF) process. These sites are shown on Plan No. 8807/21/10 and numbered in accordance with details provided by South Norfolk Council.

6.2 Each site has been considered for the following parameters:

- Potential for Groundwater Flooding
- Potential for Surface Water Flooding
- The Land Requirements for SuDs
- Appropriate Density of Development

6.3 No detailed ground investigation survey information was available for any of the sites under consideration. It is not possible therefore to provide in depth analysis of the parameters. The sites have been broadly assessed for each of the above parameters and Table 6.1 below categorises the risk in the form of traffic light guidance, where green represents low risk, orange medium risk and red, high risk.

DEGREE OF RISK	GROUNDWATER FLOODING	SURFACE WATER FLOODING	LAND REQUIRED FOR SuDs	DENSITY OF DEVELOPMENT
LOW	Not expected to be a problem.	Not expected to be a problem.	SuDs solutions likely to be viable on whole site with normal land take.	Suitable for all densities of development.
MEDIUM	Geological potential for groundwater flooding problems.	The site is crossed by former field boundaries which may include infilled ditches.	SuDs solutions may be possible on part of the site but not achievable on the whole site, requiring additional land take.	Additional land required for SuDs may limit scale of development.
HIGH	Existing groundwater flooding problems.	Standing water has been observed on the site following prolonged or heavy rainfall.	High water table may make SuDs solutions difficult to achieve without considerable land take.	Density of development is likely to be severely restricted.

Table 6.1 Summary of Risk Assessment

6.4 An assessment of each site is given in Appendix D and a summary of the hazard assessment for each site identified in the Local Plan and LDF in the form of traffic light is given below in Table 6.2

SITE	GROUNDWATER FLOODING	SURFACE WATER FLOODING	LAND REQUIRED FOR SuDs	DENSITY OF DEVELOPMENT
LP14				
LP15				
LP16				
LP17				
LP18				
LP19				
UCS1				
UCS2				
UCS3				
LDF72				
LDF73				
LDF118				
LDF 119				
LDF239				
LDF286				
LDF345				
LDF402				
LDF450				
LDF477				
LDF501				
LDF606				

Table 6.2 Summary of Traffic Light Guidance for Surface Water Hazards for Poringland IUD Sites

6.5 Drawing 8807/21/11 shows the risk of ground or surface water flooding for the proposed Local Plan and LDF development sites.

7.0 CONCLUSIONS

7.1 The additional investigation work supports the earlier findings that groundwater flooding problems in Poringland and Framingham Earl are most likely to be the result of water percolation through the overlying Glacial Sands and Gravels followed by surface run-off across the interface with the underlying Chalky Boulder Clay.

7.2 In addition to groundwater springs which feed several watercourses in the study area, this run-off also produces damp or boggy conditions near the interface of the Glacial Sands and Gravels with they Chalky Boulder Clay which become very wet or flooded following prolonged or heavy rainfall. Road and field names such as Carr Lane, Springfield and Bog Plantation may be indicators of the longstanding occurrence of such problems.

7.3 The information obtained from site investigation and Building Control Records suggests that the Glacial Sand and Gravels merges into the underlying Chalky Boulder Clay over a depth of several metres and there is no definitive boundary between the two strata. This leads to perched water within the Sands and Gravels and the migration of water within the clays and is the most likely explanation of the different heights above Ordnance Datum at which groundwater appears at the surface.

7.3 Ground and surface water flooding in the study area has been exacerbated by the infilling and disruption of the predevelopment field drainage system.

7.4 The available soils information confirms that there discrepancies between the BGS survey plans and the actual conditions on the ground. The additional information made it possible to suggest revised boundaries between the Glacial Sands and Gravels and the Chalky Boulder Clay for the southern part of the study area. However there is insufficient soils information across the whole of the two villages to map precise boundaries. It will only be possible to provide complete guidance to assist Planners in the Planning Policy or Development Control Processes if a comprehensive soil investigation and/or ecological survey were undertaken in those areas where there is currently insufficient information.

7.5 Following the introduction of guidance for Sustainable Drainage Solutions (SuDs), developers are now required to consider the impact of their surface water proposals on adjacent sites and watercourses. To support their proposals, it is becoming more common to undertake soils investigation surveys for new development sites. It is suggested that soils investigation and drainage proposals should also consider the possible effects on ground or surface water drainage patterns due to construction of foundations, drainage and other sub-structures.

7.6 The use of SuDs techniques in new development in high permeability areas will affect groundwater flow and movement through the concentration and increased rate of discharge of water from roofs and hard landscaping through soakaways. Whilst the use of SuDS drainage solutions is generally beneficial from the perspective of ground water recharge, it is likely that, within the study area, it could create new or aggravate existing local groundwater flooding problems by increasing the rate at which rainwater enters the ground. In the case of the study area, this is most likely to result from a rigid adherence to the usual SuDS hierarchy. A combination of limited managed soakage together with partial positive drainage with controlled discharge to a watercourse is most likely to provide a solution which ensures recharge and limits the risk of groundwater flooding.

8.0 RECOMMENDATIONS

8.1 All new developments should be accompanied by a detailed site investigation and drainage assessment report which considers the effects of development on surface and groundwater flows.

8.2 The use of SuDS drainage on new development sites (even in areas of high permeability) should be considered very carefully on a site by site basis for possible effects on groundwater movement and potential to cause flooding. The optimum solution to avoid the risk of increased groundwater flooding may be a combination of managed soakage and managed positive drainage with controlled discharge to existing watercourses.

8.3 Wherever possible existing ditches should be maintained and incorporated within the drainage proposals for any new development. Culverting of ditches should be limited to road crossing points and should be of sufficient size to allow easy maintenance. Watercourses should be incorporated into areas of public open space.

8.4 If accurate surface geological plans are considered desirable to inform the planning process, then consideration should be given to undertaking additional soils testing and ecological studies in areas where no site investigation is currently available, to provide conclusive evidence of soil strata.

9.0 REFERENCES

i Millard Consulting; Report Ref. 8807/02/SH/01-08/2041

ii CNC Building Control; Site Inspection Records

iii Norfolk Homes Ltd and Norfolk County Laboratories; Site Investigation Records

iv British Geological Survey; Sheet 161 Solid and Drift and Borehole Records

v Communities and Local Government 2006; Planning Policy Statement 25: Development and Flood Risk. HMSO

vi Defra 2006; Making Space for Water: Groundwater Flooding Records, Collation, Monitoring and Risk Assessment (Reference HA5) – "The Jacob's Report". Environment Agency

vii National SuDS Working Group 2004; Interim Code of Practice for Sustainable Drainage Systems.

viii NERC 2006; Flood Estimation Handbook [CD-ROM]. Institute of Hydrology

ix Reed R,Faulkner D and Bayliss A 1999; Flood Estimation Handbook (FEH) 5 Volumes. Institute of Hydrology

x Woods-Ballard, et al 2007; The SuDS Manual Report C697. CIRIA

APPENDICES

APPENDIX A

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Central Enquiries Desk
British Geological Survey
Keyworth
Nottingham
NG12 5GG

Tel: +44 (0)115 936 3143 (24 hours)
Fax: +44 (0)115 936 3276 (24 hours)
Email: Enquiries@bgs.ac.uk (9am-4.30pm UK local time)

TG 20 SE/15

TG 20 SE 15 2758 0154 Wash Lane, East Poringland

Surface level (+ 38.7 m) + 127 ft Water struck at (+ 36.9 m) + 121 ft
Wirth B 1, 8-in diameter, July 1969

Overburden (0.6 m) 2 ft
Mineral (3.4 m) 11 ft
Waste (15.8 m +) 52 ft +

		Thickness (m)	ft	Depth (m)	ft
	Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	Sandy gravel. Gravel: fine to coarse with cobbles at the base, mainly subangular flint; with coarse to cobble subrounded flint and with fine subrounded quartz and chalk. Sand: medium with fine and coarse, subangular. Brown.	(3.4)	11	(4.0)	13
Boulder Clay	Grey chalky clay.	(10.6)	35	(14.6)	48
	Brown sandy clay with occasional flint pebbles.	(5.2+)	17+	(19.8)	65

		%
	+ 64 mm	: 0
Gravel 38%	– 64 + 16	: 19
	– 16 + 4	: 19
	– 4 + 1	: 8
Sand 60%	– 1 + ¼	: 34
	– 1 + 1	: 18
Fines 2%	– 1/16	: 2

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	3	77	20
5 - 8	4	64	32
8 - 12	1	54	45
12 - 13	0	15	85

TG 20 SE/14

TG 20 SE 14 2769 0294 Poringland Upgate

Surface level (+ 58.6 m) + 192 ft Water struck at (+ 57.3 m) + 188 ft
Wirth B 1, 8-in diameter, August 1969

Overburden (0.6 m) 2 ft
Mineral (8.5 m) 28 ft
Waste (9.2 m +) 30 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.6)	2	(0.6)	2
Glacial Sand and Gravel	Pebbly sand with clay seam from 11 to 12 ft. Clayey in parts. Gravel: fine and medium with coarse subangular flint, with fine subrounded quartz. Sand: fine and medium with coarse, subangular. Light brown. Clay: brown, slightly sandy.	(8.5)	28	(9.1)	30
Boulder Clay	Grey chalky clay.	(9.2+)	30+	(18.3)	60

		%
	+ 64 mm	: 0
Gravel 17%	− 64 + 16	: 4
	− 16 + 4	: 13
	− 4 + 1	: 7
Sand 74%	− 1 + ¼	: 38
	− ¼ + 1/16	: 29
Fines 9%	− 1/16	: 9

Depth below surface (ft)	Percentage Fines	Sand	Gravel
2 - 5	0	82	18
5 - 8	2	80	18
8 - 11	0	67	33
11 - 12		Clay	
12 - 15	1	69	30
15 - 18	33	44	23
18 - 21	7	91	2
21 - 24	6	84	10
24 - 27	1	90	9
27 - 30	29	65	6

TG 20 SE/2

TG 20 SE 2 2557 0956 Osier Carr, Caistor St Edmunds

Surface level (+ 51.3 m) + 168 ft Water struck at (+ 48.2 m) + 158 ft Waste (18.3 m +) 60 ft +
Wirth B 1, 8-in diameter, April 1969

		Thickness (m)	ft	Depth (m)	ft
Boulder Clay	Made ground on light brown to grey clay with traces of sand and occasional pebbles.	(4.6)	15	(4.6)	15
	Blue and greenish-grey clay, laminated in parts, with traces of sand and pebbles.	(3.9)	13	(8.5)	28
	Grey chalky clay with abundant cobbles at the top.	(9.8+)	32+	(18.3)	60

TG20/54

161/103 Forehoe and Henstead R.D.C., Mill House, Porlingland.

(Filled in) TG 2634 0266

Surface +233. Bore 9 in. Lining tubes: 132. R.W.L. +188. Hardness: total 180. Anal. Nov. 1937.

Sand and Gravel	...	...	100	100
Boulder Clay	...	...	6	106
Sand and Gravel	...	...	64	170

GEOLOGICAL CLASSIFICATION		NATURE OF STRATA	THICKNESS	DEPTH
GLACIAL DRIFT	GLACIAL GRAVEL + SAND	GRAVEL + FLINTS	40	40
		SAND	20	60
		GRAVEL + FLINTS	40	100
	CHALKY BOULDER CLAY	BLUE CLAY	6	106
	GLACIAL SAND + GRAVEL	GRAVEL	44	130
		SAND + GRAVEL	20	170

Classified by F. Cox 10.1.69.

RECORD OF WELL (SHAFT OR BORE)

TG20/54

161/03

103

At Forncett

Town or Village Poringland

County Six-inch quarter sheet 75 SE/E

For Mr. Forehoe & Henstead RDC.

Exact site of well See map. { Attach a tracing from a map, or a sketch-map, if possible.

Level of ground surface above sea-level (O.D.) ~~230~~ 233 feet.

Is well-top at ground level ? If not, state how far above / below ; feet.

Shaft ft., diameter ft. Details of headings

Bore 125 ft. ; diameter of bore : at top ins. ; at bottom ins.

Lengths, diameters, perforations, etc., of lining tubes

Water struck at depths, below well-top, of (feet)

TEST DETAILS
Month
Year

Rest-level of water 45 ft. ~~above~~ / below well-top. Suction at ft. Yield on hours' / days' pumping gallons per (max. capacity of pump g.p.h.), with depression of feet. Recovery to in mins. / hours.

WORKING CONDITIONS

Rest-level of water in (month), (year), ft. above / below well-top.

Highest " in (month), (year), ft. above / below "

Lowest " in (month), (year), ft. above / below "

Suction at ft. Rate of pumping galls. per for hours per day.

with average depression of ft. Recovery to in mins. / hours

Quality of water (*attach copy of analysis if available*)

Well made by Date of well 1937

Information from

ADDITIONAL NOTES.

Filled in. — out of perpendicular.
Approximately sited on Norfolk 75 SE/E
HB. 29/8/47
(Sited accurately by Consultant on attached record).

LOG OF STRATA OVERLEAF.

GEOLOGICAL SURVEY AND MUSEUM,
SOUTH KENSINGTON,
LONDON, S.W.7.

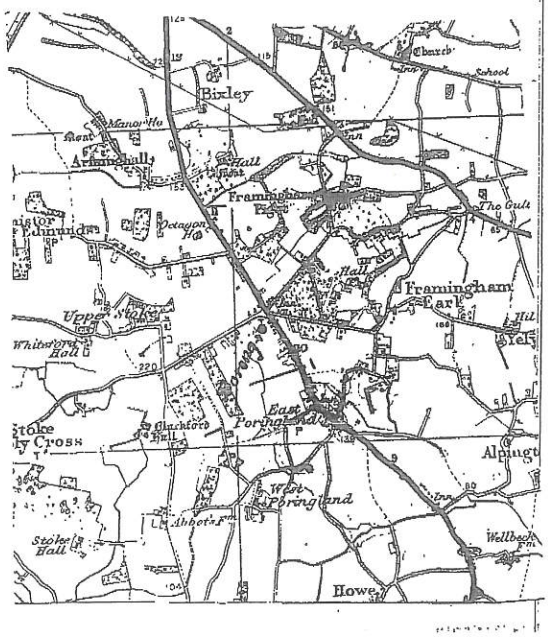
Date received.	G.S.M. Office File No.	1" N.S. Map No.	1" O.S. Map No.	Site marked (use symbol) on 1" Map.	on 6" Map.
		161		△	△

(17208) Wt.42901/0877 10,000 2/41 A.& E.W.Ltd. Gp.686

(For Survey use only) GEOLOGICAL CLASSIFICATION	NATURE OF STRATA If measurements start below ground surface, state how far... ...	THICKNESS Feet ...	 Inches ...	DEPTH Feet	 Inches
Glacial Gravel	Gravel sand & flints	40	0	40	0
	Running sand	20		60	0
	Gravel sand and flints	40		100	0
Drift Chalky Boulder clay	Blue clay with chalk indications	25		125.	—C+105

(Partial log)

Flooding
10.1.69



RECORD OF WELL (SHAFT OR BORE)

TG20/54

161

108

At new Mill House

Town or Village Forncland

County Norfolk Six-inch quarter sheet 75 SE/E

For Mr. Forehoe & Henstead R.D.C. – to supply the village.

Exact site of well (see Fring sheet) c 220 yds. S.W. of 5-roads meeting at 3/4 mile N.W. of parish church. { Attach a tracing from a map, or a sketch-map, if possible.

Level of ground surface above sea-level (O.D.) "233·00" feet.

Is well-top at ground level? ..... If not, state how far above ; below ; ..... feet.

Shaft ..... ft., diameter ..... ft. Details of headings .....

Bore ..... ft. ; diameter of bore : at top 9 ins. ; at bottom ..... ins.

Lengths, diameters, perforations, etc., of lining tubes 132 ft.

Water struck at depths, below well-top, of (feet) .....

TEST DETAILS
Month .....
Year .....

Rest-level of water ..... ft. above below well-top. Suction at ..... ft. Yield on ..... hours' days'
pumping ..... gallons per ..... (max. capacity of pump ..... g.p.h.),
with depression of ..... feet. Recovery to ..... in ..... mins. hours.

WORKING CONDITIONS

Rest-level of water in ..... (month), ... (year), ... ft. above below well-top.
Highest " in ..... (month), ... (year), ... ft. above below "
Lowest " in ..... (month), ... (year), ... ft. above below "
Suction at ..... ft. Rate of pumping ..... galls. per ..... for ..... hours per day.
with average depression of ..... ft. Recovery to ..... in ..... mins. hours

Quality of water (*attach copy of analysis if available*) Hard

Well made by ? Date of well 1937

Information from Messrs Elliott & Brown, C.E., Stanley House, Pelham Road, Nottingham

ADDITIONAL NOTES.

Abortive, & never used (see overleaf).

LOG OF STRATA OVERLEAF.

GEOLOGICAL SURVEY AND MUSEUM,
SOUTH KENSINGTON,
LONDON, S.W.7.

Date received.	G.S.M. Office File No.	1" N.S. Map No.	1" O.S. Map No.	Site marked (use symbol) on 1" Map.	on 6" Map.
16-X-44	W.	161 (SE)	66 SE	⊙	⊙

(17208) Wt.42901/0877 10,000 2/41 A.& E.W.Ltd. Gp.686

(For Survey use only) GEOLOGICAL CLASSIFICATION	NATURE OF STRATA If measurements start below ground surface, state how far... ...	THICKNESS Feet ...	THICKNESS Inches ...	DEPTH Feet	DEPTH Inches
U					
Glacial	Gravel & flints	40	—	40	—
Glacial sand + gravel	Sand	20	—	60	—
Drift	Gravel & flints	40	—	100	—
chalky Boulder clay	Blue clay	6	—	106	—
glacial sand + gravel	Gravel	44	—	150	—
	Sand & gravel	20	—	170	—

Bore stopped, because "Contractor had broken very much out of the vertical, so far that an ordinary borehole pump could not be installed" ... Chalk was expected at 190 ft, "there was no water in the bore at this depth" [clearly meaning 170'] The water for the village was ultimately obtained from Norwich Corp^{n} Waterworks.

Proposed depth for bore had been 250'.

"Some water was met when boring, [from analysis attached, possibly met at 120 ft ?] so it was analysed"

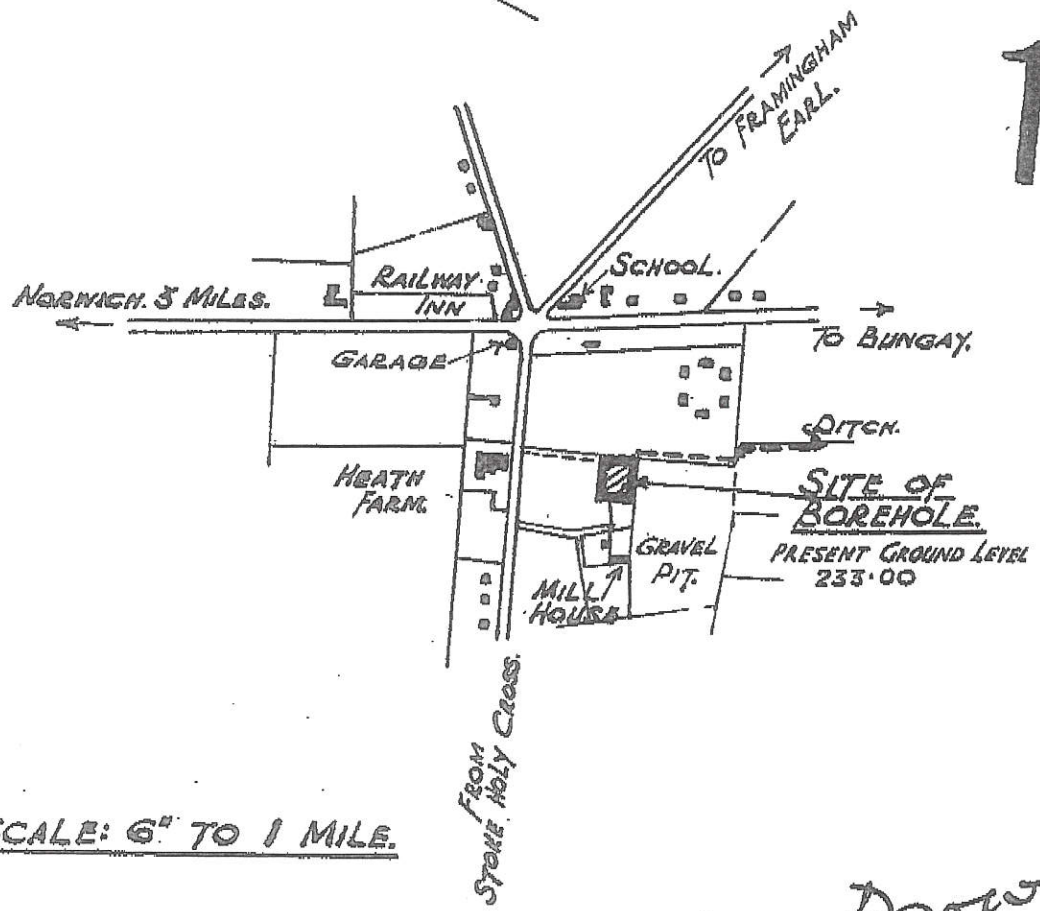
F.B.Lady
18.2.69

5

SKETCH PLAN OF SITE.

TG20/54 161

103



SCALE: 6" TO 1 MILE.

Elliott Brown
Framingham
16.X.44

[TG20SE BJ 29 .]

TG20/54 161

103

Copy of the

ANALYSIS OF WATER, by W.L.Sutton.

19th., November, 19[illegible]

No.85353 Book CC

Sample received from Forehoe & Henstead R.D.C. per Mr D.Matthews, Clerk of Works to Messrs Elliott & Brown, Nottingham.

Mark or Seal: Poringland Water Borehole, 120 feet.

Physical Characteristics: Turbid with brown tint. Sediment of rusty vegetable debris and silt. Colour good after filtration.

RESULT OF ANALYSIS:- Grains per Gallon

Free and Saline Ammonia	0.014
Albuminoid Ammonia	0.011
Combined Chlorine	1.60
Nitrogen as Nitrates	nil
Nitrites	nil
Total Solids in Solution	
Oxygen absorbed in [illegible]	[illegible]
Iron in Solution	Faint Trace.
Hardness before Boiling (total)	12.6
" after Boiling (permanent)	

OPINION:- This Water is free from any pollution of a dangerous character. It is of rather poor organic quality. The hardness is very moderate for a Norfolk water. The appearance of the sample was affected by rusty silt, but I do not think that the water is itself ferruginous.

Sgd.

W. Lincolne Sutton.

Rec'd from Messrs Elliott & Brown

DATA Bank

TG20SE/29
2634.0266

161/103 Forehoe and Henstead R.D.C., Mill House, Porlingland.

71.02 (Filled in)

Surface +233. Bore 9 in. Lining tubes: 132. R.W.L. +188. Hardness: total 180. Anal. Nov. 1937.

Sand and Gravel	100	100
Boulder Clay	6	106
Sand and Gravel	64	170

GEOLOGICAL CLASSIFICATION		NATURE OF STRATA	THICKNESS	DEPTH
GLACIAL DRIFT	GLACIAL GRAVEL + SAND	GRAVEL + FLINTS	40	40
		SAND	20	60
		GRAVEL + FLINTS	40	100
	CHALKY BOULDER CLAY	BLUE CLAY	6	106
	GLACIAL SAND + GRAVEL	GRAVEL	44	130
		SAND + GRAVEL	20	170

Classified by F. Cox 10.1.69.

51.82

TG 20 SE 3

TG 20 SE 3 2574 0260 Trolla Row, Framingham Earl

Surface level (+ 65.1 m) + 213 ft Water struck at (+ 61.9 m) + 203 ft
Wirth B 1, 8-in diameter, April 1969

Overburden (1.2 m) 4 ft
Mineral (6.4 m) 21 ft
Waste (10.7 m +) 35 ft +

		Thickness (m)	ft	Depth (m)	ft
	Soil.	(1.2)	4	(1.2)	4
Glacial Sand and Gravel	Sand. Clayey between 10 and 13 ft. Gravel: fine, subangular mainly flint. Sand: fine and medium with traces of coarse, subangular. Brown.	(6.4)	21	(7.6)	25
Boulder Clay	Brown silty clay with traces of gravel.	(6.1)	20	(13.7)	45
Glacial Sand and Gravel	Gravel. Gravel: coarse to cobble subrounded and subangular flint. Sand: subangular. Brown.	(0.6)	2	(14.3)	47
Boulder Clay	Grey chalky clay with occasional flint pebbles.	(4.0+)	13+	(18.3)	60

		%
	+ 64 mm	: 0
Gravel 3%	- 64 + 16	: 0
	- 16 + 4	: 3
	- 4 + 1	: 5
Sand 91%	- 1 + ¼	: 45
	- ¼ + 1/16	: 41
Fines 6%	- 1/16	: 6

Depth below surface (ft)	Percentage Fines	Sand	Gravel
4 - 7	5	95	0
7 - 10	5	82	13
10 - 13	15	81	4
13 - 16	4	91	5
16 - 19	4	96	0
19 - 21	8	88	4
21 - 25	0	99	1

TG 20 SE/9

TG 20 SE 9 2681 0219 Parish Hall, Poringland

Surface level (+ 55.1 m) + 181 ft Water struck between (+ 54.6 m) + 179 ft and (+ 50.0 m) + 164 ft, and below (+ 49.1 m) + 161 ft
Wirth B 1, 8-in diameter, June 1969

Overburden (0.5 m) 1.5 ft
Mineral (2.9 m) 9.5 ft
Waste (21.0 m +) 69 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.5)	1.5	(0.5)	1.5
Glacial Sand and Gravel	Pebbly sand. Traces of clay. Gravel: medium with fine and coarse subangular flint with occasional subrounded quartz. Sand: medium with fine and a little coarse, subangular to subrounded; occasional ironstaining. Brown.	(2.9)	9.5	(3.4)	11
Boulder Clay	Grey chalky clay, chalk content increasing with depth.	(21.0+)	69+	(24.4)	80

		%
	+ 64 mm	: 0
Gravel 20%	– 64 + 16	: 9
	– 16 + 4	: 11
	– 4 + 1	: 14
Sand 76%	– 1 + ¼	: 40
	– ¼ + 1/16	: 22
Fines 4%	– 1/16	: 4

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1.5 - 5	3	79	18
5 - 8	5	71	24
8 - 11	5	77	18

161/399 Dormer House, Poringland. (Disused)

TG20SE/33
2635.0167

Surface 51.82 +170. Lining tubes: 109 x 4 in; 60 x 3 in. Ck +40. R.W.L. +60. P.W.L. +59. Yield 200 g.p.h. (8 h. test). Buckingham, Feb. 1950.

I/c engine. Before 1960.

Boulder Clay	70	70
Sand and Gravel	60	130
~~Crag~~ UCk	50	180

Chalky Boulder Clay 70'
Glacial Sand + Gravel + ~~Crag~~ 60'
Upper Chalk 50'

Top soil	1	1
Clay	69	70
Hard Pan	60	130
Chalk	50	180

54.88

pp. F. Cox
9.1.69.

Suggested revision

	T	D
CHALKY BOULDER CLAY	70'	70
SAND & GRAVEL	60'	130'
UPPER CHALK	50'	180'

ERST 8/75

6" quarter sheet
75 SE E

TG 20 SE/10

TG 20 SE 10 2664 0129 Carr Lane, Poringland

Surface level (+ 46.6 m) + 153 ft Water struck at (+ 40.5 m) + 133 ft
Wirth B 1, 8 in diameter, June 1969

Overburden (0.3 m) 1 ft
Mineral 12.7 m) 42 ft
Waste (11.4 m +) 37 ft +

		Thickness (m)	Thickness ft	Depth (m)	Depth ft
	Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	Sandy gravel, with clay seam from 35 to 37 ft. Gravel absent between 28 and 36 ft. Clayey between 31 and 34 ft. Gravel: medium with fine and coarse subangular flint with subrounded quartz, with traces of subrounded flint cobbles and coarse subrounded quartzite. Sand: fine and medium with coarse, subangular. Brown.	(12.7)	41.5	(13.0)	42.5
Boulder Clay	Brown chalky clay with sandy bands in parts, becoming grey at depth.	(11.4+)	37.5+	(24.4)	80

		%
Gravel 35%	+ 64 mm	1
	− 64 + 16	18
	− 16 + 4	16
Sand 61%	− 4 + 1	13
	− 1 + ¼	23
	− ¼ + 1/16	25
Fines 4%	− 1/16	4

Depth below surface (ft)	Percentage Fines	Sand	Gravel
1 - 4	7	77	16
4 - 7	2	62	36
7 - 10	0	64	36
10 - 13	0	44	56
13 - 16	3	42	55
16 - 19	5	62	33
19 - 22	4	52	44
22 - 25	0	57	43
25 - 28	3	72	25
28 - 31	2	98	0
31 - 34	30	70	0
34 - 36	4	96	0
36 - 37		Clay	
37 - 40	1	13	86
40 - 42.5	2	33	65

TG 20 SE/8

TG 20 SE 8 2682 0281 Forty Acre Plantation, Framingham E.ast

Surface level (+ 67.7 m) + 222 ft Water struck at (+ 69.1 m) + 207 ft
Wirth B 1, 8-in diameter, August 1969

Overburden (1.5 m) 5 ft
Mineral (6.7 m +) 22 ft +

		Thickness (m)	ft	Depth (m)	ft
	Soil on brown stony clay.	(1.5)	5	(1.5)	5
Glacial Sand and Gravel	Gravel. Gravel: medium with fine and coarse subangular flint, with fine and medium subrounded quartz. Sand: medium with fine and coarse subangular. Light brown.	(6.7+)	22+	(8.2)	27

		%
	+ 64 mm	: 0
Gravel 53%	– 64 + 16	: 30
	– 16 + 4	: 23
	– 4 + 1	: 8
Sand 46%	– 1 +, ¼	: 28
	– ¼+ 1/16	: 10
Fines 1%	– 1/16	: 1

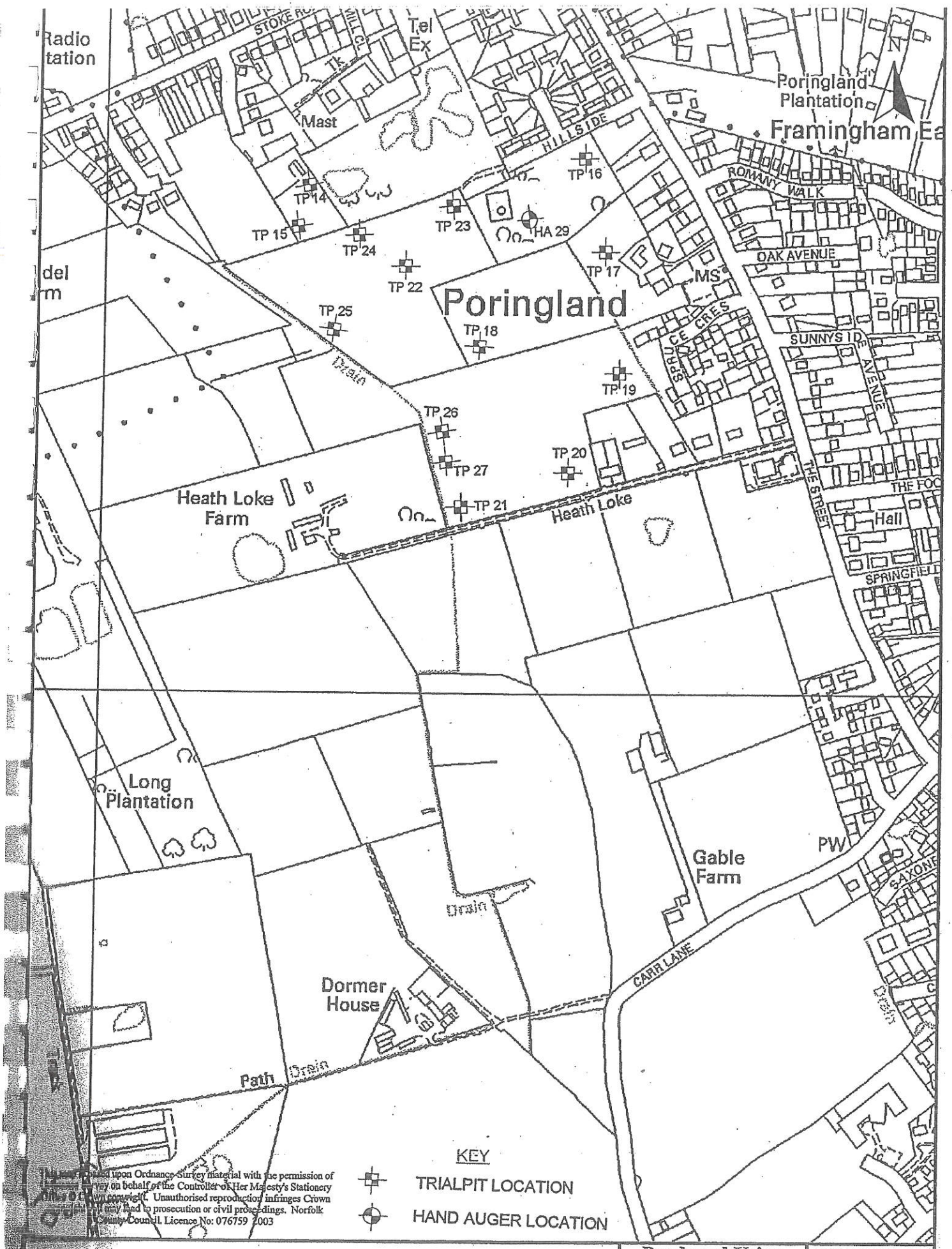
Depth below surface (ft)	Percentage Fines	Sand	Gravel
5 - 8	2	45	53
8 - 11	1	34	65
11 - 14	2	42	56
14 - 17	0	32	68
17 - 20	1	47	52
20 - 23	2	61	37
23 - 26	0	64	36
26 - 27	3	37	60

Borehole abandoned because of 'rising sand'.

APPENDIX B

PLANNING APPLICATION/BUILDING CONTROL SOILS RECORDS

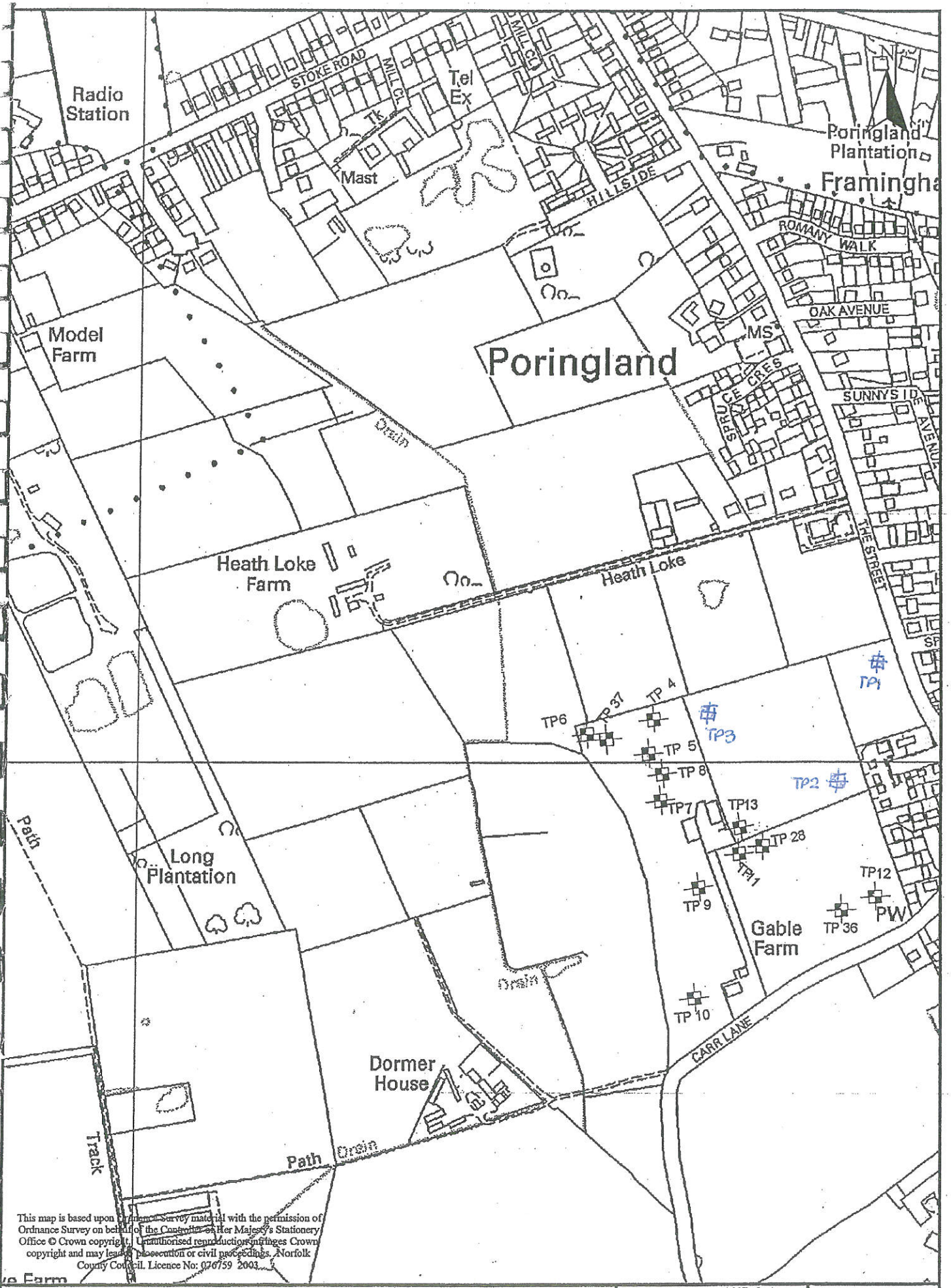
LOCATION	DEPTH OF EXCAVATION	SOIL DESCRIPTION
5 Upgate	1.0m	Sandy gravel
13a Upgate	0.9m	Sandy clayey gravel
8 Fallowfield	1.5m	Sandy gravel
9 Fallowfield	1.3m	Sandy clay
19a The Street	1.0 – 1.4m	Sand with clay pockets
19b The Street	0.9m	Sandy gravel with some clay
33 The Street	3.0m	Clay, sand below 1.0m deep
1 Tulip Tree Drive	0.9m	Sandy clay with flints
3 Tulip Tree Drive	0.9m	Clayey sandy gravel
5 Tulip Tree Drive	1.0m	Sandy clay
7 Tulip Tree Drive	1.2m	Sandy gravel with clay
9 Tulip Tree drive	1.0m	Clay with sand pockets
11 Tulip Tree Drive	1.0m	Clay
13 Tulip Tree Drive	1.0m	Clay
15 Tulip Tree Drive	1.8m	Sand with clay pockets
17 Tulip Tree Drive	0.7m	Sand
4 Tulip Tree Drive	2.0m	Sandy clay
6 Tulip Tree Drive	2.0m	Sandy clay
8 Tulip Tree Drive	0.9m	Sandy gravel
10 Tulip Tree Drive	0.9m	Sandy gravel
1 Cranwell Gardens	1.0m	Sand with some clay
3 Cranwell Gardend	2.0m	Sand
8 Burgate Lane	1.2m	Sand
10 Burgate Lane	1.1m	Sand
8 Brooks Meadow	0.9m	Sand
7 Brooks Meadow	0.9m	Silty sand
13 Rectory Lane	1.2m	Sandy clayey gravel
13a Rectory Lane	1.4m	Sandy clayey gravel
15a Rectory Lane	0.7m	Sandy gravel
73 Rectory Lane	?	Sand
Porchways, Bungay Road	1.0m	Sandy gravel
5 Page Close	1.0m	Sandy gravel
3 Oak Avenue	0.9m	Sandy gravel
34 Stoke Road	1.4m	Sandy clay
1 The Ridings	1.2m	Sand
7 The Ridings	2.0m	Sandy gravel
Gable Farm, Carr Lane	0.9 -1.3m	Silty sand
Alston's Meadow, Long Road		Clay, Sand on Clay in SE corner of site



Land to the West of the Street, Poringland. Area A
302/03:194 Approx. trialpit and handauger location plan

Produced Using HMMS
Scale 1: 5000
Map centered on 626421 302076

NORFOLK COUNTY COUNCIL
Planning & Transportation



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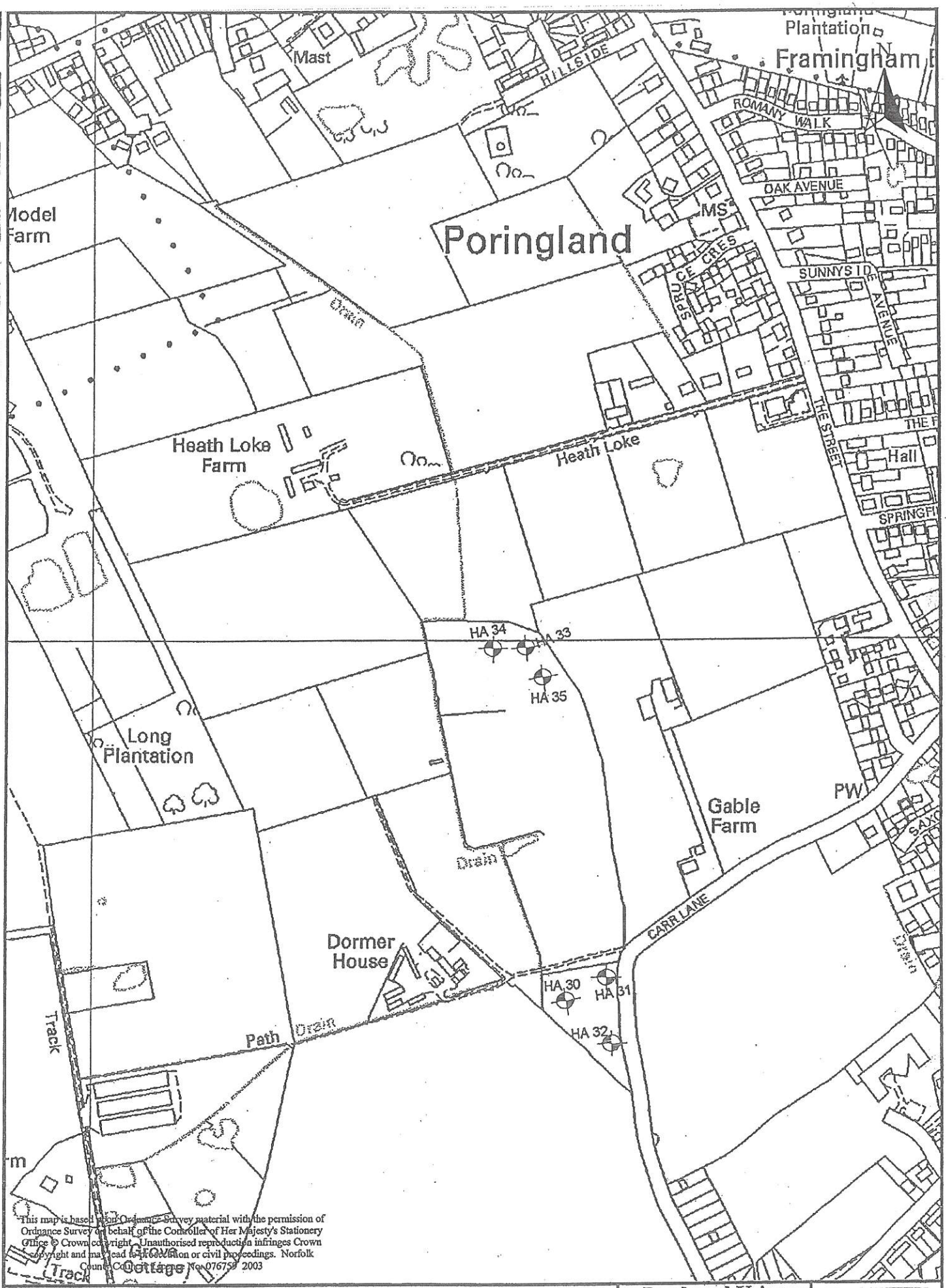
Land to the West of the Street, Poringland Area C
S02/03:194 Approx. trialpit location plan

Produced Using HMMS

Scale 1: 5000

Map centered on 626354 302119

NORFOLK COUNTY COUNCIL Planning & Transportation



Land to the West of the Street, Poringland Lagoons
S02/03:194 Approx. handauger location plan

Produced Using HMMS

Scale 1: 5000

Map centered on 626402 301991

NORFOLK COUNTY COUNCIL
Planning & Transportation

NORFOLK HOMES RECORDS

LOCATION	DEPTH OF EXCAVATION	SOIL DESCRIPTION
TP1	3.1m	Sand, clay below 2.2m
TP2	4.1m	Sand, clay below 1.7m
TP3	3.5m	Sand, clay below 1.4m
TP4	2.5m	Sandy gravel
TP5	1.0m	Sandy gravel
TP6	1.0m	Sandy gravel
TP7	3.5m	Sand, clay below 1.0m
TP8	1.3m	Sand, clay below 1.0m
TP9	3.5m	Sand, clay below 2.0m
TP10	3.7m	Sand, clay below 0.9m
TP11	3.0m	Sand, clay below 0.6m
TP12	4.3m	Clay
TP13	1.2m	Clay
TP14	4.0m	Sandy gravel
TP15	4.4m	Clay
TP16	3.8m	Clay, sand between 1.3m and 2.4m
TP17	2.8m	Sandy gravel
TP18	4.0m	Sand, clay below 1.2m
TP19	3.8m	Sand, clay below 2.1m
TP20	3.5m	Sand, clay between 0.8m and 2.8m
TP21	3.5m	Sand, clay below 1.0m
TP22	4.0m	Clay, sand below 3.8m
TP23	3.4m	Sand, clay between 0.9m and 2.4m
TP24	2.5m	Sand, clay below 1.0m
TP25	3.0m	Clay
TP26	4.7m	Clay, sand between 2.4m and 3.0m
TP27	3.9m	Clay
TP28	3.6m	Clay
TP29	2.5m	Clay, sand below 1.5m
HA30	3.0m	Clay
HA31	3.2m	Clay
HA32	3.2m	Clay,
HA33	3.4m	Clay
HA34	3.1m	Clay
HA35	3.4m	Clay
TP36	0.3m	Topsoil
TP37	0.2m	Topsoil

NORFOLK COUNTY COUNCIL RECORDS

LOCATION	DEPTH OF EXCAVATION	SOIL DESCRIPTION
Fiveways Junction	1.5m	Sandy gravel
Framingham Earl High School	7.5m	Clay

APPENDIX C

No	Location	Description	Report by	Authority	Action	Frequency
1	Car Park off Howe Lane	Car Park floods for days following heavy rain - AW have been involved	No 6 Howe Ln	SNC / AW	Passed to saffron Housing	everytime it rains - Jan07
2	No 33 Howe Lane	Driveway floods - becoming more frequent	No 33			
3	No 10 Shotesham Road	Garden floods from Alder Close - ditch piped - possible blockage becoming more frequent	No 10		Ditch maintenance chased at Nos 17 & 19 Church Cls	sustained rainfall - Jan07
4	Shotesham Road	Highway floods following heavy rain	No 11 21 & 24	NCC	west of play barn	heavy rain - Jan 07
5	Car Park off Howe Lane	Car Park floods and across access to Glenn Road	No 21 & 39 Sh	SNC / Aw	Passed to Saffron Housing	
6	Car Park off Howe Lane	Car Park floods, 2 soakaways fillup when emptied, may run from Shot Rd bungalows		SNC / AW		
7	No 45 Shotesham Road	Garden floods from water off road	No 45	NCC		heavy or sustained rainfall-Jan07
8	No 9 Church Close	Rear Garden floods - becoming more frequent - used to be very dry	No 9		Flare 206854	
9	No 27 Church Close	Driveway floods - becoming more frequent	No 27		Flare 207694	everytime it rains-Jan07
10	No 14 Saxonfields	Pond outfall prone to blockages	No 16		Flare 173538, 198770 - new owners - maintenance addressed	
11	Carr Lane	System prone to blockages	No 16	NCC	Flare 198770 - Improvements by Norfk Hms & NCC	
12	Saxonfields	Standing water in field at end of development	No 22	Nor Homes		
13	No 1 & 3 Carr Lane	Garden flooded at No 3 and driveway at No 1	No 1		Suggests worse since development in Carr Lane-NCC	Last two years - evrytime it rains
14	No 124 The Street	Water rising up through floor - history of flooding	No 124		SNC advised - dehumidifier on 24hr day	All the time - sitting room flooded 06
15	No 128 The Street	Flooding at rear of house - alleviated by owner	No 128			
16	No 128b The Street	Flooding on driveway	No 128b		problem made worse by building of Budgens?	heavy rain - Jan 07
17	No 23 Meadow Way	Rear garden floods following heavy rain	No 23		only referred to Carr Lane	less frequent
18	No 1 Page Close	Garden floods - neighbouring land slopes towards property	No 1			Last problem 10 years ago
19	No 12 Malten Close	Garden floods, poor drainage, bunalow damp, ditch filled in floods from Phillip Drive	No 12			every time it rains - Jan07
20	No 11 Rectory Lane	Ditch system needs attention along its length	No 11	Riparian	concern regarding maintenance	
21	No 13 Rectory Lane	Rear Garden Flood following heavy rain	No 13			
22	No 11 Malten Close	High water table	No 11			
23	No 4 & 6 Hadden Close	Flooded on 3 occasions due to obstructions in watercourse	No 4	Riparian	maybe spring in front garden-ditch to rear piped	always wet
24	No 6 Hadden Close	Possible springs - alleviated by owner	No 10			
25	No 10 Hadden Close	running water under house - discharging throught brickwork	No 10	No 10	Flare 150489	water pours down path eitherside of property evrytime it rains
26	No 18 Hadden Close	Flooding of driveway, garage and garden - draining from higher ground	SNC		Flare SNC advised of remedial work	
27	No 3 Springfields	Flooding in gardens, high ground water - foul system surcharging	No 3	AW -foul	Flare SNC advised, AW to fit NRV-completed 11/07	no action by AW - problem ongoing
28	No 2 Springfields	Flooded garden, high ground water	No 2	No 2	Flare SNC advised of remedial work	problem the same
29	Recreation Ground	Ditch needs attention - maitenance and improvements	26 Springfields	PC?	IUD Imp Scheme - will address maintenance also	
30	No 40 Rectory Lane	Road and garden floods quite severely - problem for 30 years - some work done	No 40	NCC, AW		wet garden for 6 months of the year
31	No 46 Rectory Lane	Watercourse needs attention - bank erosion	No 46	AW	AW carried out work in the past	
32	No 52 Rectory Lane	History of flooding, storm & foul drains overwhelmed - some improvement work	No 52	AW, NCC	no longer sewer problem - AW works	Heavy summer storms 06-regular maintenance of storm drains would help
33	No 53 Rectory Lane	Blocked ditch causes flooding	No 55	Riparian	SDS to investigate	sustained rainfall - culvert under road needs unblocking
34	No 65 & 63 Rectory Lane	Garden floods from higher ground to east, some remedial work done SNC advised	No 65	No 65	Flare NCC & SNC involved	heavy rain - does not appear that remedial work was carried out as advised to previous owner
35	Rectory Lane/Upgate Junct	Road floods when drains are not maintained	No 75 & 13	NCC		no problem at No 75
36	No 3 Upgate	Driveway floods with water off highway	No 3	NCC		
37	No 5 Upgate	Flooding on road due to highway repairs that have created low in centre of road	No 5	NCC		
38	No 5 Hall Road	Flooding front of property (150-225mm) running off highway	No 5	NCC		
39	No 26 Hall Road	Flooding in garden believed to run from Bligh Close	No 39			
40	No 1 Bligh Close	SW penetrating pitch fibre foul drains causing some concern	No 1	SNC		
41	No 15 Bligh Close	Flooding on drive and in garage, subsidence in garage	No 15	private	Flare SNC advised	
42	No 14 Bligh Close	Flooding in front garden, subsidence in garage - springs	No 14	private	Dug 10' soakaway - has helped	Maybe resolved by works
43	Rectory Lane	Blocked drain near post box	No 2 Roseb	NCC		drian blocked for a number of years
44	No 20,22,24,26,28 Roseber	Flooding in front gardens	No 22		Some remedial work by residents SWD surveyed 4/07	Resolved
45	NCC Primary School	Ditch needs attention - maitenance and improvements	No 14 Springf	NCC	See record No 92 - being addressed by SNC & NPS	Ditch no mentioned in reply
46	No 75 The Street	Ditch filled in/piped - prone to problems - cause of some flooding	No 23 Springf	Riparian	May have been resolved	See record No 93
47	No 4, 6 & 8 Spruce Crescent	Standing water in rear gardens - suggested runoff from field - piped ditch, loss of infiltration	No 4 & 6	Persimmon	Loss of open ditch - runoff from higher ground- being ad	every winter for 9 years
48	Nos 2-18 Spruce Cresscent	Water logging and standing water	No 10	Persimmon	Being addressed by Dev - SNC involvement	
49	No 16 Spruce Crescent	Boggy rear garden - problems with driveway	No 16	Persimmon	Being addressed by Dev - SNC involvement	every winter especially Dec - Mar
50	Nos 24,26,29,31 Spruce Cre	Flooding - gardens garages and roads	No 24	Dev AW SNC	Flare 157251 Improvement scheme being considered -	being addressed by Dev - SNC involvement
51	No 25 & 27 Spreuce Crescent	Flooding - gardens garages and roads	No 25 7 27	Dev SNC	Inadequate drainage - being addressed by Dev	heavy or prolonged rainfall- Jan 07
52	No 52a The Street	Floods into front of house during heavy rain - house lower than drive	No 52a	Private	AW have been involved - subsidance of driveway	continually
53	No 44 Royal Oak	Car park floods - soakaway ineffective - following raising of pavement	No 44	NCC	Being addressed as part of Spruce Crescent Imp wks	
54	Birches Sunnyside	Water laying on unmade road	Birches	Private		Problem resolved
55	41 & 43a The Street	Standing water in rear gardens	No 43		SNC advised resident - possibly soakaways need replacing	
56	43a The Street	Standing water in rear garden	No 43			No 43a reports never having a problem
57	18 Romany Walk	Flooding Nos 18 & 20 - Highway drains unable to cope - water not able to enter system	No 18	NCC	Flare 212337 SNC NCC Riparian - Imp option being cor	when culverts block - SDS survey Feb07
58	20 Romany Walk	Flooding - turning head & Nos 18 & 20 - water unable to get away - pond not efficient	No 20 & 23	NCC	Flare 212337 SNC NCC Riparian - Imp option being considered by NCC & IUD	
59	Tulip Tree Drive entrance	Flooding on junction - hazzard for motorists & pedestrians	No 3 & 4	NCC	Drains in The Street inadequate - Jetting to remove blockages - NCC & IUD	
60	No 7 Tulip Tree Drive	Runoff washes through property and down drive like a river	No 7		New Owners - no problems experience so far	
61	No 15 Tulip Tree drive	Water logged garden - soakaway no effective - some remedial work - problem unresolved	No 15	Private	SNC visited	
62	No 22 Hillside	SW runs into front garden & pools to side and rear - low point	No 22	NCC		everytime it rains-Jan07
63	No 8 Long Road	Flooding from road during heavy rain - floods near house - paddle to get to house	No 8	NCC		heavy rain - Jan 07
64	No 78 long Road	Flooding on road and into front garden	No 78	NCC	drians in Long Road ineffective	steady rain - Feb 07
65	No 5 Alder Close	Water logged rear garden - Ditch needds attention	No 5	Riparian	No 17 & 19 Church Close - Maintenance requirement	
66	No 9 Alder Close	Flooded rear garden - ditch nedds attention	No 9	Riparian	No 17 & 19 Church Close - Maintenance requirement	
67	No 11 Alder close	Flooded rear garden - Ditch filled in?	No 11	Riparian	No 17 & 19 Church Close - Maintenance requirement	every time it rains - at least every month
68	Church close - north side	Flooded or waterlogged gardens north side of Church Close	No 14		May be Spring related	heavy rain 3/4 times a year-Jan07
69	No 6 Church Close	Flooded or waterlogged front garden - drain surcharges in footpath	No 6	NCC	May be Spring related	
70	Church close near No 8	Foul drain surcharges and floods pathway	No 17	Private PFP	Pitch Fibre Pipe Protocol proceeding	
71	No 19 Church Close	Ditch backs up and floods neighbouring garden to south	No 19		May be Spring related	
72	Church Close storm drains	Drains surcharge flooding road and gardens No 20, 25 & 27	No 20,21,25	NCC	SW seeps into Pitch Fibre foul system - Fould System b	sustained wet weather-Dec/Jan07
73	No 22 Church Close	Flooded rear garden	No 22		SNC advised	sustained wet weather-Dec/Jan07

74	No 19 & 25 The Rambles	Flooded rear gardens - no 25 can be under 2" water	No 25		Visit by SNC-told by residents no flooding issues only c	winter months
75	No 5 Highgrove Court	Flooded rear garden - ditch needs attention	No 5	Riparian	Flare 161658 SNC Riparian maintenance	heavy rain - less since ditch cleaned -Jan07
76	Highgrove Court junction	Possible damaged pipe	SNC		CCTV survey - jetted - some restrictions cleared	
77	Clearview Drive	Highway floods - drains surchage in heavy rain	No 23 & 29	NCC	Alleged soakaways inefficient-PFP Potocol progress	no often
78	Nos 32 - 40 Clearview Drive	Drainage problems - allegedly caused by Stoke Road development filling in ditch	No 38		Further info see Questionairre	
79	Oakcroft Drive	Flooded road outside No 3 - from Norwich Road & southern end of Oakcroft drive	No 4	NCC	Alleged worse since roundabout constructed-highway d	heavy rain - Dec/Jan 07
80	No 14 & 15 Oakcroft Drive	Flooded front gardens and drives - runoff from south	No 14		Alleged worse since roundabout constructed-may be sp	whenever it rains- new soakaways have not been effective
81	No 36 Oaklands	Alleged ditch filled in blocking NCC drain	No 3 oakcroft	NCC	Reported to NCC	
82	No 3 Oaklands	Flooded rear garden from No 2	No 3		May be Spring related - uncovered blocked piped syste	heavy rain - okay at present
83	No 8 & 9 Oaklands	Flooded rear gardens	No 9		May be Spring related - uncovered blocked piped system downstream - under investigation	
84	Oaklands	All properties in Oaklands suffer from drainage problems - ditches filled by Dev	No 16 & 38		May be spring related or blocked drains	heavy rain Jan 07
85	No 19 Oaklands	Flooding in rear garden - soakaways unable to cope- Highway drains unable to cope	No 19	NCC	NCC drains cleared- IUD investigating - may be spring r	Flare 196703
86	No 20 Oaklands	Flooded front garden - road drains surcharge - maintenance issue	No 20	NCC	New residents - two wells in garden-garden very wet - may be spring related	
87	No 23 Oaklands	Flooded rear garden & flooding from road - improved with remedial work	No 23	NCC	NCC drain ineffective - also runoff from No 22 - Passed	heavy rain
88	No 28 Oaklands	Flooded rear garden & garage	No 28		Blocked culvert?? - may be spring related	every month sewers get blocked
89	No 32 Oaklands	Road floods - drains unable to cope - ditch to rear needs attention - rear garden floods	No 32	NCC	NCC gully too high - passed to NCC - ditch to rear need	everytime it rains hard Jan07
90	No 33 Oaklands	Flooded rear garden and garage	No 33		Flare 196703 SNC-may be spring related	constantly a problem with high ground water
91	No 7 Highgrove Court	Flooding from field-rear garden and laying beside house-large soakaway in front drive	No 7	Riparian	Flare 221322 - field runoff & blocked drains - neighbour	heavy rain - Jan/Feb 07
92	No 14 Springfields	Flooding on drive and sometimes into garage runs onto property from road	No 14	NCC	Some improvement to drainage on main road	2/3 times a year
93	No 23 Springfields	Flooding on road into Springfields	No 23	NCC		heavy rain - 6 times a year Jan 07
94	No 26 Springfields	Standing water in agrden, on drive and in road	No 28		AW aware of past sewage problem - still to be resolved	heavy rain Jan/Feb 07
95	No 29, 27 Norwich Road	Dyke at rear of properties full of rubbish, cant cope with surface water from field	No 29	Riparian	Will address as part of Imp Scheme	
96	1 Hall Lane	Surface water being thrown into drive by cars- Drive & Garage flooding	No 1		SNC advised	
97	Carr Lane	Road flooded - ditch adjacent to field full of brown water for months	Parish Council	Norfk Homes	EA approved scheme - new highway drainage - ditched piped and pond storage provided by Dev	
98	No 26 Springfields	Standing water on rear garden	No 26		SW problem only since Jan 07- exceptional weather	
99	No 12 Oaklands	FWD in rear garden surcharges during heavy rain	No 12		AW & SNC aware but no action taken-being addressed	frequently
100	Oaklands - turning head	Floods like a lake whenever there is heavy rain	No 12	NCC	NCC aware - Drains jetted 11/07 and ds ditch cleared	frequently
101	No 7 Oaklands	Flooded rear garden	No 7		Blocked drains or Spring related	heavy rain
102	No 14 Church Close	Rear garden very wet - originally old ditch system ran to rear and between No 16 & 18	No 14		Loss of ditch - may be spring related	
103	No 11a Norwich road	Rear garden very wet - alleged piped system to rear but no access points	No 11a		SNC aware-new temp ditch being dug - culvert approx 150mm dia - possibly blocked downstream - needsd further investigation	
104	No 24 Spruce Crescent	No Problems at present - last problem 3 years ago. Frequncy Sporadic	No.24	Persimmon	Being addressed by Dev - SNC involvement	
105	No 10 Spruce Crescent	Bad Drainage - due to ditches being filled in with clay	No. 10	Persimmon	Being addressed by Dev - SNC involvement	
106	No 7 & 9 Calstor Lane	Runoff from field at rear through air bricks of property - ditch to front not flowing	No 7 & 9	Riparian	Imp Scheme to address field runoff (IUD)-jetting & surveying of system to front - some Imp but further jetting programmed	
107	No 3 St Edmunds Close	Runoff from field to south through No 4, 4a 5 & 6	No 3	Riparian	Downstream maintenance to be addressed by Landowr	Flare 230327
108	No 11a Hadden Close	Saturated rear garden running ground waters-neighbouring properties have similar problems	No 11a		possibly spring related	Flare 230327
109	Nos 1, 3 & 5 Boundary Way	Saturated rear garden - lack of ditch maintenance at No 49 Stoke Road	No 3, 1 & 5	Riparian	Legal Case-Dev stopped outfall from ditch - IUD looking	at possible solution
110	No 2 Oaklands	Flooded rear garden	No 2		IUD investigating - possible blocked SWD drain	Flare 196703
111	No 14 Oaklands	Flooded rear garden	No 14		IUD investigating - possible blocked SWD drain	Flare 196703
112	No 15 Oaklands	Flooded rear garden	No 15		IUD investigating - possible blocked SWD drain	Flare 196703
113	No 16 Oaklands	Flooded rear garden	No 16		IUD investigating - possible blocked SWD drain	Flare 196703
114	No 22 Oaklands	Standing water in garden	No 22		IUD investigating - possible blocked SWD drain	Flare 196703
115	No 25 Oaklands	Front drive & garden floods	No 25		IUD investigating - possibly spring related	Flare 196703
116	No 29 Oaklands	rear garden floods from runoff to south	No 29		IUD investigating - possibly spring related	Flare 196703
117	No 40 Oaklands	Surface water problems after heavy or prolonged rainfall	No 40		IUD investigating - possibly spring related	Flare 196703
118	12 Malten Close	Surface water problems after heavy or prolonged rainfall		SNC	IUD investigating	
119	44 Long Road	Surface water problems after heavy or prolonged rainfall		SNC	IUD investigating	
120	26 Fitzgerald Road	Surface water problems after heavy or prolonged rainfall		SNC	IUD investigating	
121	15 -19 Pigot Lane	Surface water problems after heavy or prolonged rainfall		SNC	IUD investigating	

APPENDIX D

ASSESSMENT OF LOCAL PLAN AND LOCAL DEVELOPMENT FRAMEWORK SITES

SITE	POTENTIAL FOR GROUND WATER FLOODING	POTENTIAL FOR SURFACE WATER FLOODING	LAND REQUIRED FOR SUSTAINABLE DRAINAGE SYSTEMS	SUGGESTED DENSITY OF DEVELOPMENT
LP14	The site lies to the north of an area of former historic sand and gravel pits located in Poringland Wood. A large spring rises immediately south of the site and flows northwards along its western boundary. The presence of wetland species of grasses across the site (photo included in earlier report) is indicative of a very high water table and poor drainage.	The site is more or less level with a very gentle slope to the north. Although there is no evidence of previous sub-division of the site, the high water table and almost flat gradient increases the possibility of surface water flooding.	The high water table will not be suitable for soakage solutions and will significantly increase the area required for attenuation.	This site is only likely to be suitable for small scale development of very low density.
LP15	The BGS plans indicate Sand and Gravel subsoils. Subject to confirmation by on site soils investigation, groundwater flooding is unlikely to be a problem.	The site slopes gently to the north west. There is no evidence of surface water flooding problems associated with this site which lies totally within historic field boundaries.	Subject to soils investigation the site is likely to be suitable for soakage solutions or attenuation prior to discharge to a watercourse.	This site is likely to be suitable for high density development.
LP16	The BGS plans indicate that the site lies at the interface between the Glacial Sands and Graves and Boulder Clay with an attendant risk of ground water flooding.	The site is more or less level, with a very gentle slope to the south. There is no evidence of surface water flooding problems associated with this site. The site is crossed by an historic field boundary which may have a buried ditch associated with it.	Subject to soils investigation the site will probably require attenuation prior to discharge to a watercourse.	Subject to soils investigation, density of development is likely to be medium.

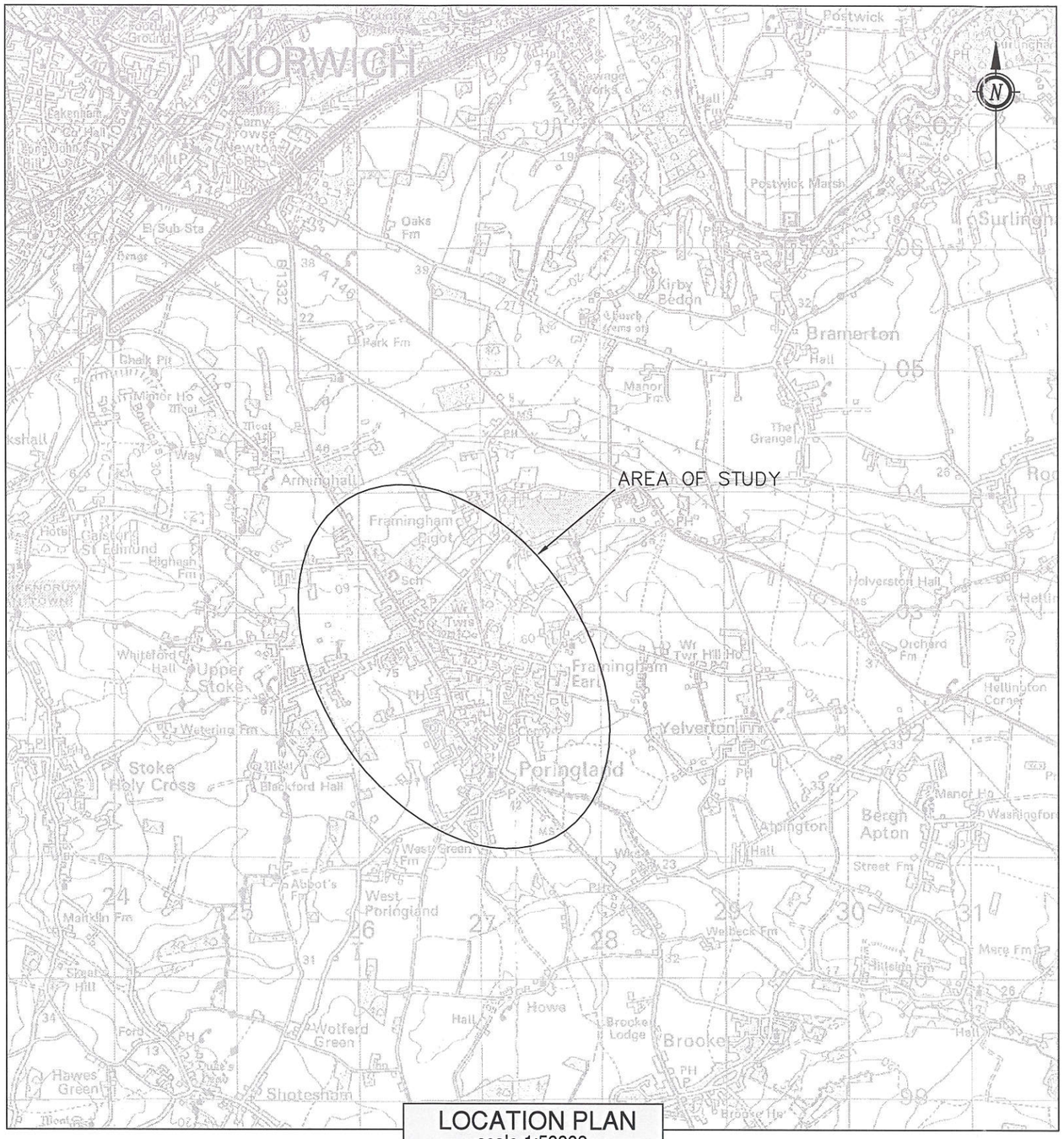
SITE	POTENTIAL FOR GROUND WATER FLOODING	POTENTIAL FOR SURFACE WATER FLOODING	LAND REQUIRED FOR SUSTAINABLE DRAINAGE SYSTEMS	SUGGESTED DENSITY OF DEVELOPMENT
LP17	There are no known groundwater flooding issues associated with this site.	The site slopes gently to the south. There are no known surface water flooding issues associated with this site. There is one historic filed boundary crossing the site which may be associated with an infilled drainage ditch.	Subject to soils investigation the site is likely to be suitable for soakage solutions or attenuation prior to discharge to a watercourse.	This site is likely to be suitable for high density development.
LP18	There are no known groundwater flooding issues associated with this site.	The site slopes gently to the south east. There are two water courses running from north to south through the site and a number of historic field boundaries crossing the site which may be associated with infilled drainage ditches.	Subject to soils investigation the site is likely to be suitable for soakage solutions or attenuation prior to discharge to a watercourse.	This site is likely to be suitable for high density development.
LP19	There are no known groundwater flooding issues associated with this site.	The site slopes gently towards the line of two watercourses which runs from north to south through the site. There are no known surface water flooding issues associated with this site.	Subject to soils investigation the site is likely to be suitable for soakage solutions or attenuation prior to discharge to a watercourse.	This site is likely to be suitable for high density development.
UCS1	There are no known groundwater flooding issues associated with this site.	The site is level. There are no known surface water flooding issues associated with this site.	Subject to soils investigation the site is likely to be suitable for soakage solutions or attenuation prior to discharge to a watercourse.	This site is likely to be suitable for high density development.
UCS2	There are no known groundwater flooding issues associated with this site.	The site is level. There are no known surface water flooding issues associated with this site.	Subject to soils investigation the site is likely to be suitable for soakage solutions or attenuation prior to discharge to a watercourse.	This site is likely to be suitable for high density development.

SITE	POTENTIAL FOR GROUND WATER FLOODING	POTENTIAL FOR SURFACE WATER FLOODING	LAND REQUIRED FOR SUSTAINABLE DRAINAGE SYSTEMS	SUGGESTED DENSITY OF DEVELOPMENT
UCS3 It is noted that the current application for this site includes the adjacent house and garden.	The site has a high water table. Several springs rise on Long Road opposite this site.	The site is more or less level. The site has ditches along all boundaries. The high water table and flat gradient increase the risk of surface water flooding.	The high water table will not be suitable for soakage solutions and will significantly increase the area required for attenuation.	This site is only likely to be suitable for low density development.
LDF72	There are no known groundwater flooding issues associated with this site.	The site is more or less level. There are no known surface water flooding issues associated with this site.	Subject to soils investigation the site is likely to be suitable for soakage solutions or attenuation prior to discharge to a watercourse.	This site is likely to be suitable for high density development.
LDF73	The site has a very high water table and is crossed by two shallow watercourses. There are known groundwater flooding issues with the adjacent site.	The site slopes very gently to the north east. Some of the historic field boundaries crossing this site are no longer visible and may include infilled ditches. Following rainfall, water has been noted to stand on this site due to the high water table.	The high water table will not be suitable for soakage solutions and will significantly increase the area required for attenuation.	This site is only likely to be suitable for small scale development of very low density.
LDF118	There are no known groundwater flooding issues associated with this site.	The site is more or less level. There are no known surface water flooding issues associated with this site.	Subject to soils investigation the site is likely to be suitable for soakage solutions or attenuation prior to discharge to a watercourse.	This site is likely to be suitable for high density development.
LDF119	There are no known groundwater flooding issues associated with this site.	The site is more or less level. There are no known surface water flooding issues associated with this site.	Subject to soils investigation the site is likely to be suitable for soakage solutions or attenuation prior to discharge to a watercourse.	This site is likely to be suitable for high density development.

SITE	POTENTIAL FOR GROUND WATER FLOODING	POTENTIAL FOR SURFACE WATER FLOODING	LAND REQUIRED FOR SUSTAINABLE DRAINAGE SYSTEMS	SUGGESTED DENSITY OF DEVELOPMENT
LDF239	There are no known groundwater flooding issues associated with this site.	The site slopes gently towards the line of a watercourse which runs from north west to south east across the site. There are no known surface water flooding issues associated with this site.	Subject to soils investigation the site is likely to be suitable for soakage solutions or attenuation prior to discharge to a watercourse.	This site is likely to be suitable for high density development.
LDF286	There are no known groundwater flooding issues associated with this site.	The site is more or less level. There are no known surface water flooding issues associated with this site.	Subject to soils investigation the site is likely to be suitable for soakage solutions or attenuation prior to discharge to a watercourse.	This site is likely to be suitable for high density development.
LDF345	The BGS plans indicate that the site lies at the interface between the Glacial Sands and Graves and Boulder Clay with an attendant risk of ground water flooding.	The site slopes gently towards the north. There are no known surface water flooding issues associated with this site. However, the site is crossed by a number of historic field boundaries which may include infilled ditches.	Subject to soils investigation the site is likely to be suitable for soakage solutions or attenuation prior to discharge to a watercourse.	The site is likely to be suitable for medium density development.
LDF402	The BGS plans indicate that the site lies at the interface between the Glacial Sands and Gravels in the west and Boulder Clay in the north and east with an attendant risk of ground water flooding. The presence of wetland species of grasses in the eastern side of the site is indicative of a very high water table on part of the site. Several springs are noted to rise on the site.	The site slopes gently towards the north. The south- eastern parts of the site have been observed to have standing water possibly associated with groundwater springs. The site is crossed by a number of historic field boundaries which may include infilled ditches.	Subject to soils investigation, the western part of the site between the existing development on Long Road and Pine Cottages on Pigot Lane may be suitable for soakage solutions. In the eastern and northern parts of the site, the high water table will not be suitable for soakage solutions and will significantly increase the area required for attenuation.	The western part of the site between the existing development on Long Road and Pine Cottages is likely to be suitable for medium development. Elsewhere, this site is only likely to be suitable for small scale development of very low density

SITE	POTENTIAL FOR GROUND WATER FLOODING	POTENTIAL FOR SURFACE WATER FLOODING	LAND REQUIRED FOR SUSTAINABLE DRAINAGE SYSTEMS	SUGGESTED DENSITY OF DEVELOPMENT
LDF450	There are no known groundwater flooding issues associated with this site.	The site is more or less level. There are no known surface water flooding issues associated with this site.	Subject to soils investigation the site is likely to be suitable for soakage solutions or attenuation prior to discharge to a watercourse.	This site is likely to be suitable for high density development.
LDF477	There are no known groundwater flooding issues associated with this site.	The site slopes to the south east and is crossed by several historic field boundaries which may be associated with infilled ditches.	The expected soil conditions are likely to prevent soakage solutions on but subject to soils investigation the site is likely to be suitable attenuation prior to discharge to a watercourse.	The site is likely to be suitable for medium density development.
LDF501	There are no known groundwater flooding issues associated with this site.	The site slopes to the south east and is crossed by several historic field boundaries which may be associated with infilled ditches.	The expected soil conditions are likely to prevent soakage solutions on but subject to soils investigation the site is likely to be suitable attenuation prior to discharge to a watercourse.	The site is likely to be suitable for medium density development.
LDF606	The BGS plans indicate that the site lies at the interface between the Glacial Sands and Graves and Boulder Clay with an attendant risk of ground water flooding.	The site slopes down towards the line of a watercourse which runs in a south easterly direction. In addition the site is crossed by historic field boundaries which may be associated with infilled ditches. It is likely that the watercourse may have been in part diverted at some time in the past and one of the historic field boundaries seems to indicate a former channel.	Subject to soils investigation, the south western part of the site adjacent to Bungay Road may be suitable for soakage solutions. In the north eastern part of the site, the Clay Soils will not be suitable for soakage solutions and surface water drainage will require attenuation.	The south western part of the site near Bungay Road is likely to be suitable for medium density development. Elsewhere, this site is only likely to be suitable for small scale low density development.

PLANS



LOCATION PLAN
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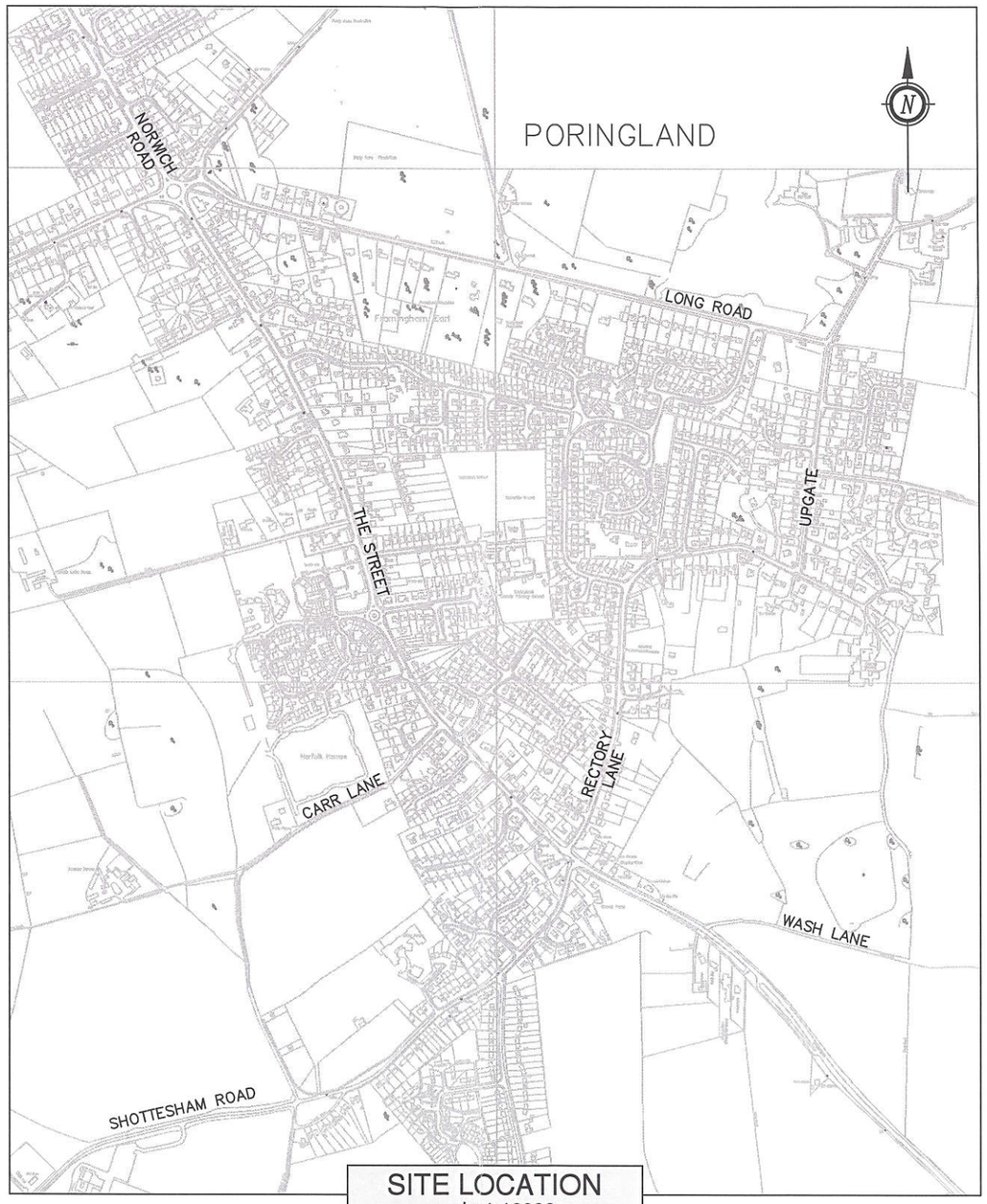

SITE LOCATION
scale 1:10000

REV	AMENDMENT DETAILS	DRAWN	APPROVED	DATE
A	CLIENT NAME AMENDED	SAC	SH	19.05.08

PROJECT: PORINGLAND INTEGRATED URBAN DRAINAGE STUDY	DESIGNED AND DRAWN BY: DJP	APPROVED BY:	CHECKED BY: SH	SCALE: AS SHOWN
DRAWING TITLE: SITE LOCATION PLAN	DRAWING STATUS:		DATE: 08.01.08	
	CAD REFERENCE FILE NUMBER: 8807_21_001A			
CLIENT: SOUTH NORFOLK COUNCIL	DRAWING NUMBER: 8807/21/01		REVISION: A	

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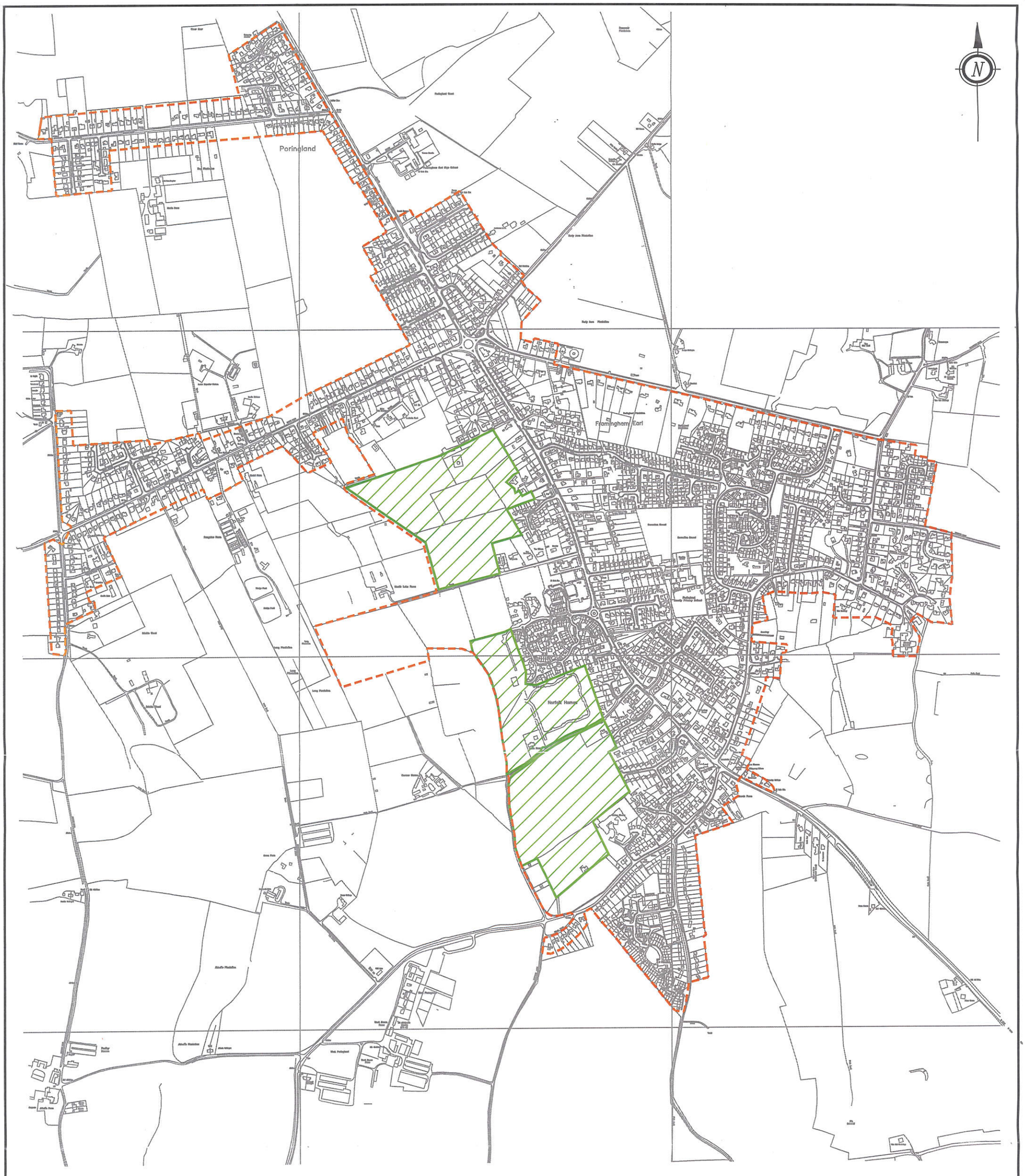

KEY

SNC LOCAL PLAN DEVELOPMENT BOUNDARY

APPROVED DEVELOPMENT SITES

NOTES

1 DO NOT SCALE FROM THIS DRAWING.

2 THE DETAILS CONTAINED ON THIS DRAWING HAVE BEEN SUPLIED TO MILLARD CONSULTING BY SOUTH NORFOLK COUNCIL.

REV	AMENDMENT DETAILS	DRAWN	APPROVED	DATE
A	SOUTH NORFOLK COUNCIL LOCAL PLAN DEVELOPMENT BOUNDARY AMENDED	SAC	SH	19.05.08

PROJECT: PORINGLAND INTEGRATED URBAN DRAINAGE STUDY	DESIGNED AND DRAWN BY: DJP	APPROVED BY:	CHECKED BY: SH
	SCALE: 1:10000		
DRAWING TITLE: EXISTING DEVELOPED AREAS AND SITES APPROVED FOR FUTURE DEVELOPMENT	DRAWING STATUS:		DATE: 08.01.08
	CAD REFERENCE FILE NUMBER: 8807_21_02A		
CLIENT: SOUTH NORFOLK COUNCIL	DRAWING NUMBER: 8807/21/02		REVISION: A

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KEY

- CONFIRMED FLOODING INCIDENT
- GLACIAL SAND AND GRAVEL
- BOULDER CLAY
- ALLUVIUM
- 60 CONTOUR
- AREAS SERVED BY POSITIVE SURFACE WATER DRAINAGE SYSTEMS

NOTES

1. GEOLOGICAL BOUNDARIES OBTAINED FROM BRITISH GEOLOGICAL SOCIETY DATA
2. DO NOT SCALE FROM THIS DRAWING

REV	AMENDMENT DETAILS	DRAWN	APPROVED	DATE
A	WATER COURSES REMOVED AND CONFIRMED FLOODING INCIDENTS ADDED	SAC	SH	19.05.08

PROJECT: PORINGLAND INTEGRATED URBAN DRAINAGE STUDY	DESIGNED AND DRAWN BY: DJP; APPROVED BY / CHECKED BY: SH	SCALE: 1:5000
DRAWING TITLE: FLOODING INCIDENTS, CONTOURS AND BGS GEOLOGICAL FEATURES	DRAWING STATUS	DATE: 08.01.08
	CAD REFERENCE FILE NUMBER: 8807_21_05A	
CLIENT: SOUTH NORFOLK COUNCIL	DRAWING NUMBER: 8807/21/05	REVISION: A

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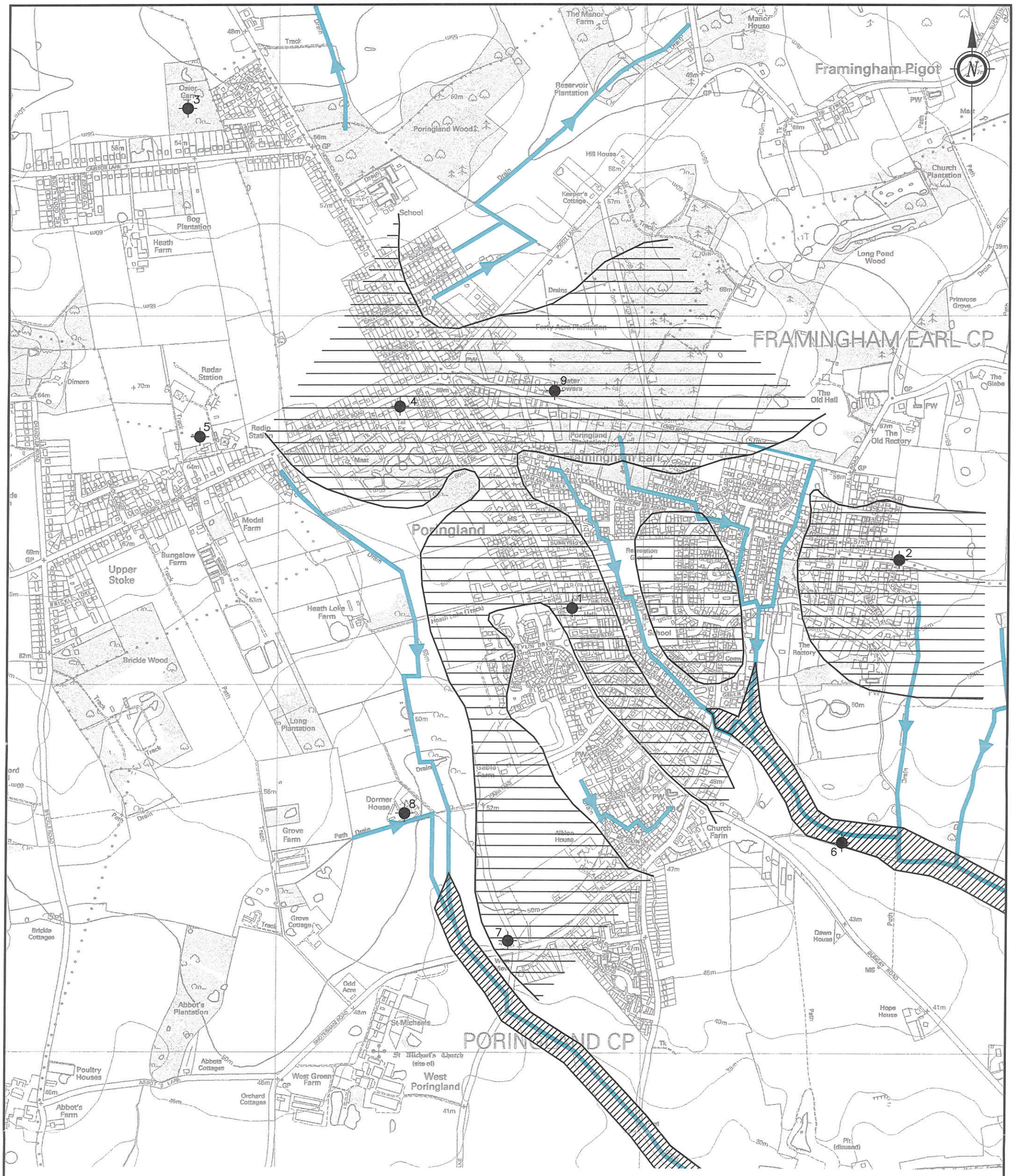

KEY

- WATER COURSES
- 1 BOREHOLE LOCATION
- ALLUVIUM
- SUGGESTED EXTENT OF SANDS AND GRAVELS FROM SITE INVESTIGATION RECORDS

REV	AMENDMENT DETAILS	DRAWN	APPROVED	DATE

NOTES

1 DO NOT SCALE FROM THIS DRAWING.

2 DRAWING BASED ON 2005 OS DATA.

PROJECT: PORINGLAND INTEGRATED URBAN DRAINAGE STUDY	DESIGNED AND DRAWN BY: SAC; APPROVED BY / CHECKED BY: SH	SCALE: 1:10,000
DRAWING TITLE: SUGGESTED SURFACE GEOLOGY AND BOREHOLES	DRAWING STATUS	DATE: 19.05.08
	CAD REFERENCE FILE NUMBER: 8807_21_008_	
CLIENT: SOUTH NORFOLK COUNCIL	DRAWING NUMBER: 8807/21/08	REVISION: _

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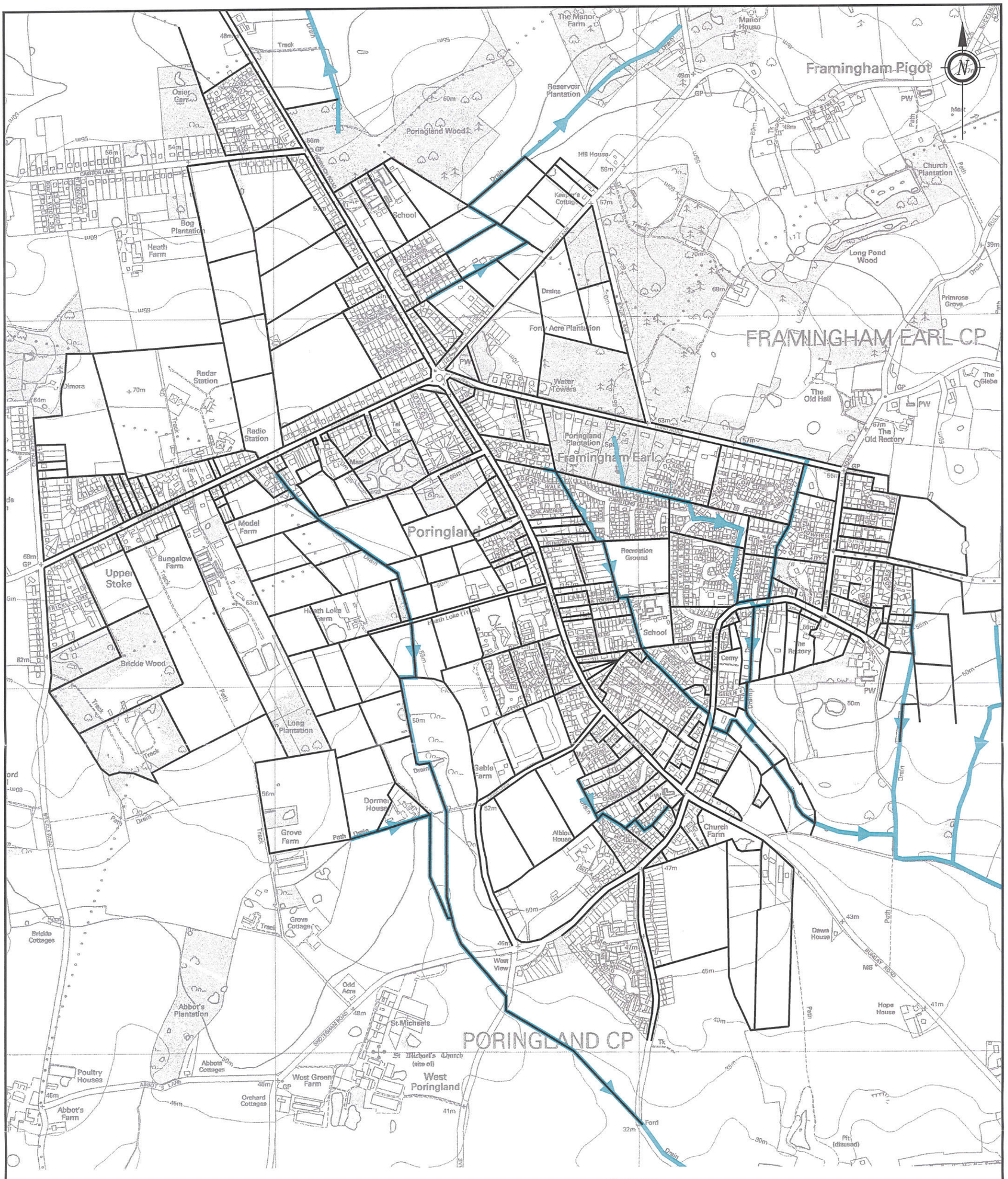

KEY

HISTORIC FIELD BOUNDARIES

WATER COURSES

NOTES

1 DO NOT SCALE FROM THIS DRAWING.

2 DRAWING BASED ON 2005 OS DATA.

REV	AMENDMENT DETAILS	DRAWN	APPROVED	DATE

PROJECT: PORINGLAND INTEGRATED URBAN DRAINAGE STUDY	DESIGNED AND DRAWN BY: SAC; APPROVED BY / CHECKED BY: SH	SCALE: 1:10,000
DRAWING TITLE: HISTORIC FIELD BOUNDARIES AND WATER COURSES	DRAWING STATUS	DATE: 19.05.08
	CAD REFERENCE FILE NUMBER: 8807_21_009_	
CLIENT: SOUTH NORFOLK COUNCIL	DRAWING NUMBER: 8807/21/09	REVISION: _

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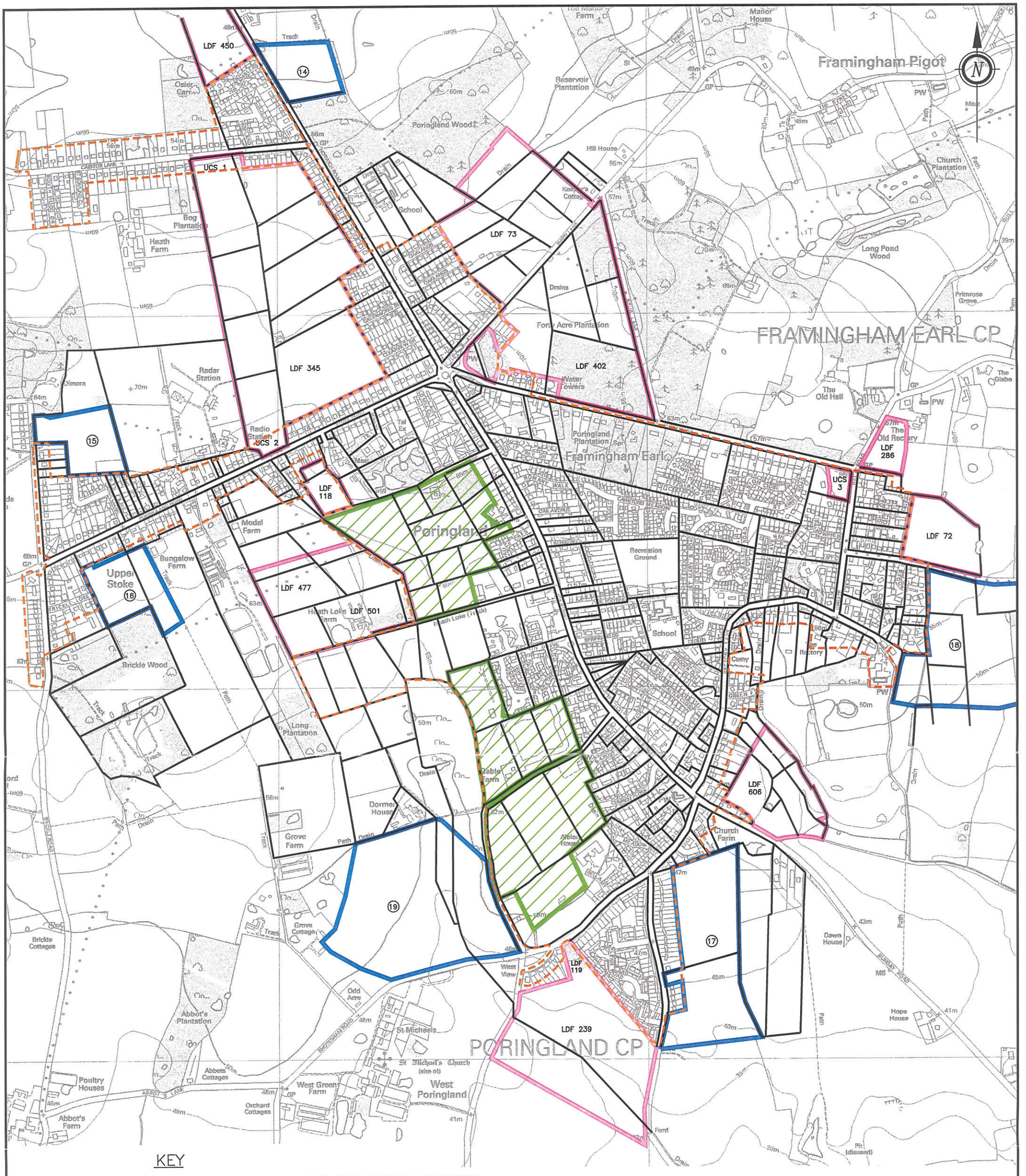

KEY

- SNC LOCAL PLAN DEVELOPMENT BOUNDARY
- APPROVED DEVELOPMENT SITES
- LOCAL AUTHORITY PROPOSED DEVELOPMENT SITES
- LANDOWNER PROPOSED DEVELOPMENT SITES
- HISTORIC FIELD BOUNDARIES
- ⑮ LOCAL PLAN INDENTIFIED AREA
- LDF 345 PROPOSED SITE

NOTES

1 DO NOT SCALE FROM THIS DRAWING.

2 DRAWING BASED ON 2005 OS DATA.

3 THE DETAILS CONTAINED ON THIS DRAWING HAVE BEEN SUPPLIED TO MILLARD CONSULTING BY SOUTH NORFOLK COUNCIL.

REV	AMENDMENT DETAILS	DRAWN	APPROVED	DATE

PROJECT: PORINGLAND INTEGRATED URBAN DRAINAGE STUDY	DESIGNED AND DRAWN BY: SAC	SCALE: 1:10,000
	APPROVED BY:	CHECKED BY: SH
DRAWING TITLE: DEVELOPMENT LAND	DRAWING STATUS:	DATE: 19.05.08
	CAD REFERENCE FILE NUMBER: 8807_21_010_	
CLIENT: SOUTH NORFOLK COUNCIL	DRAWING NUMBER: 8807/21/10	REVISION: _

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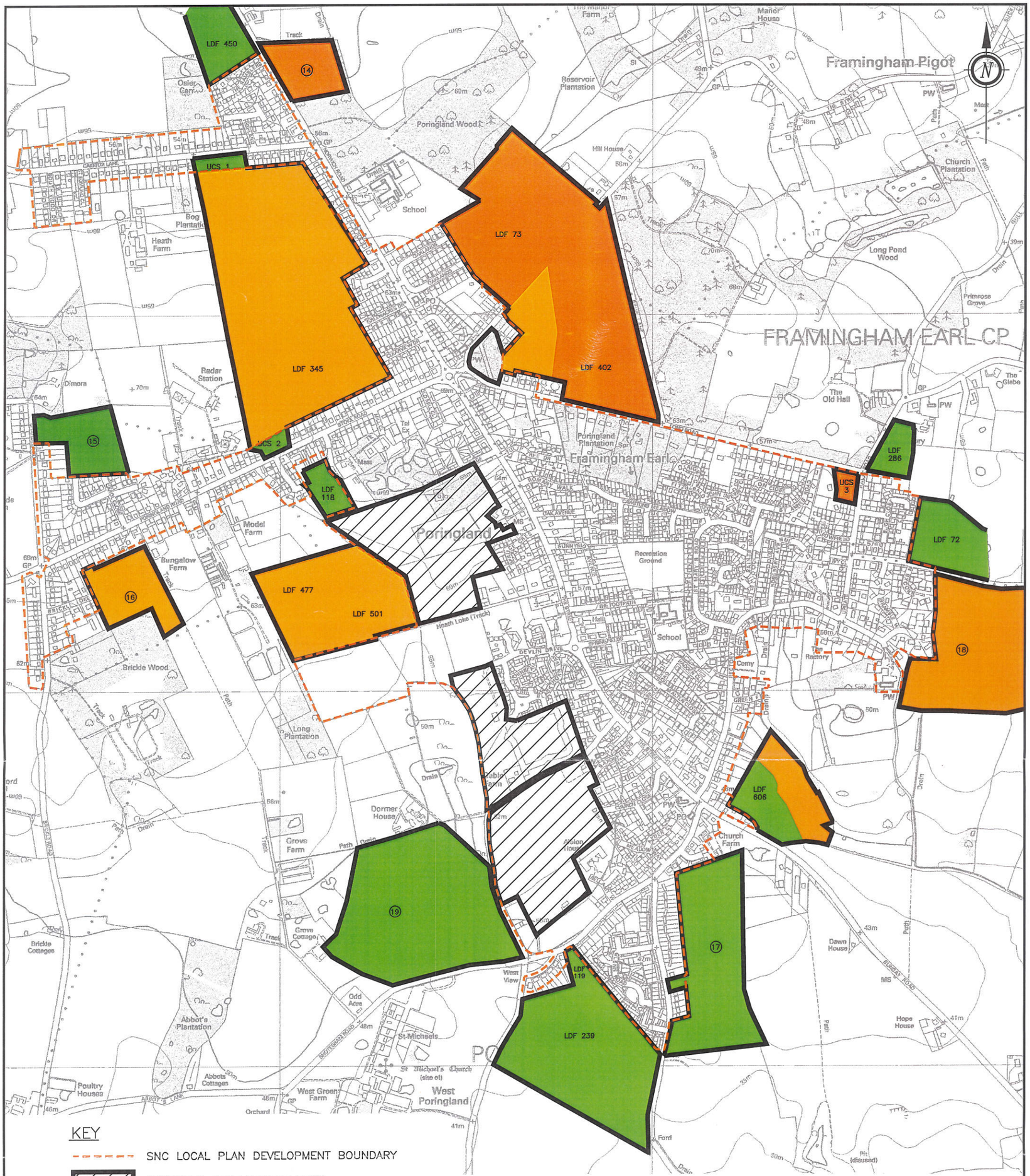

KEY

- SNC LOCAL PLAN DEVELOPMENT BOUNDARY
- APPROVED DEVELOPMENT SITES
- PROPOSED DEVELOPMENT SITES
- (15) LOCAL PLAN INDENTIFIED AREA
- LDF 345 PROPOSED SITE
- HIGH RISK
- MEDIUM RISK
- LOW RISK

NOTES

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REV	AMENDMENT DETAILS	DRAWN	APPROVED	DATE

PROJECT: PORINGLAND INTEGRATED URBAN DRAINAGE STUDY	DESIGNED AND DRAWN BY: SAC	SCALE: 1:10,000
	APPROVED BY: CHECKED BY: SH	
DRAWING TITLE: DEVELOPMENT LAND GROUND AND SURFACE WATER FLODDING RISK	DRAWING STATUS:	DATE: 19.05.08
	CAD REFERENCE FILE NUMBER: 8807_21_011_	
CLIENT: SOUTH NORFOLK COUNCIL	DRAWING NUMBER: 8807/21/11	REVISION: —

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