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FLOOD RISK ASSESSMENT
Land North of Station Road, Hook Norton

Prepared for: Nursery Ground Ltd
Issue 1: 30 September 2014
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Document History

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Appendix B: Environment Agency Groundwater Source Protection Zone Map

Appendix C: Envirocheck Geological Plans

Appendix D: British Geological Survey Borehole Data

Appendix E: Thames Water Asset Records (Sewer Location)

1.0 Introduction

- 1.1 This Flood Risk Assessment (FRA) has been prepared by Glanville Consultants Ltd on behalf of Nursery Ground Ltd. The site is located on the eastern edge of the village of Hook Norton and is part of Crushill Farm. The site is currently greenfield land and the proposed development of the site will see the erection of 48 homes. An internal road system will also be built to connect the dwellings with the existing Station Road to the south.
- 1.2 This FRA has been produced in accordance with the *National Planning Policy Guidebook* (NPPF) and Planning Practice Guidance (PPG) in order to establish the suitability of the proposed development when considering the overall hydrological and hydrogeological risks associated with the site. Consideration has also been given to Oxfordshire's Strategic Flood Risk Assessment. The FRA policy aims to reduce the overall level of flood risk in the area and beyond, through the layout and form of the redevelopment and the appropriate application of suitable drainage techniques compatible with the specific site.
- 1.3 Data collected for this report is as follows:
- Topographical survey of the site and Station Road
 - Environment Agency Groundwater Source Protection Zone map
 - Envirocheck Flood and Geological maps
 - British Geological Survey borehole data
 - Thames Water sewer and manhole locations

Site Location

- 1.4 The development site, currently part of Crushill Farm, is located to the east of the village of Hook Norton, the nearest post code being OX15 5LQ. The site location is shown in Figure 1. The site extends to an area of approximately 2.38 hectares and is bordered by:
- Station Road to the south
 - A public footway to the west
 - The rest of Crushill Farm to the north and east

2.0 Existing Conditions, Flood Zone and Sources of Flooding

Introduction

- 2.1 This section describes the existing features of the site and its surroundings together with potential sources of flooding. Section 3 describes the proposed development and Section 4 describes how the flood risks which are identified in this section will be managed within the proposed redevelopment.
- 2.2 The plot is currently a small section of Crushill Farm. Dense vegetation currently occupies the site's northern and western borders and much of the southern border.
- 2.3 Station Road borders the south of the site. The access road to the site comes off Station Road just inside the western edge.
- 2.4 A disused tramway tunnel runs under the western border of the site and has been blocked off at both ends.
- 2.5 The existing site layout and topographical survey are shown in Figures 2 and 3.

Geology

- 2.6 Geological maps indicate that the site geology consists of worked ground at surface level, overlying Alluvium over Marlstone Rock Formation (Secondary Aquifers). These are illustrated in Appendix C.
- 2.7 Nearby boreholes (Appendix D) encountered silts and sands to a depth of 24.4m, underlain by clay to a depth of up to 159.1m. The clay contains bands of limestone between 29.9 and 146.0m. It should be noted that no local borehole data contained groundwater level data.
- 2.8 A site investigation has not yet been undertaken. Intrusive testing would need to be carried out in order to determine initial groundwater levels, infiltration rates and to confirm the site is free of contamination.

Topography

- 2.9 The development site is relatively flat, with levels across the site ranging between 150 and 157m AOD, with a gradual downwards slope in the eastern direction. The plot covers an area of approximately 2.38 hectares and is currently farmland.
- 2.10 The site sits at the edge of a plateau overlooking the valley of the River Swere to its south and the valley of a tributary to its north and east. The site is elevated between 3-13m above these valleys. A bank runs within the northern, western and part of the southern edges of the site. The levels at the base of the bank range from 152.3m to 154.3m AOD and 153.3m to 157.0m at the top.
- 2.11 A public footpath to the west of the site, currently 1.2m wide, connects with further footpaths across the fields to the north and with Station Road to the south.

- 2.12 The northern branch of the River Swere to the south of the site travels west to east. The river's partially-culverted tributary curves around the site to its north and east, coming to within 150m of it, before joining the Swere 400m southeast of the site. Both waterways originate from local sources within 3km of the site and no flood defence barriers exist along either of them.
- 2.13 Figures 2 and 3 show the topographical survey with levels in metres above Ordnance Datum.

Flood Zone

- 2.14 The indicative Environment Agency flood mapping data provided by Envirocheck indicates that the site area falls within Flood Zone 1. This is shown in Appendix A. Flood Zone 1 comprises land assessed as having a less than 1 in 1,000 annual probability of river flooding (<0.1%). The PPG classifies the proposed housing development as being "More Vulnerable". The PPG determines this type of development acceptable for construction in Zone 1 as illustrated in Table 3: Flood risk vulnerability and flood zone 'compatibility' within the PPG document.

Sources of Fluvial Flooding

- 2.15 The northern branch of the River Swere is located 230m south of the site boundary, while its tributary comes within 150m of the site's northeast corner. These are the nearest sources of potential fluvial flooding.
- 2.16 No flood defence exists along either watercourse.

Sources of Groundwater Flooding

- 2.17 An intrusive site investigation has yet to be carried out to determine ground water levels under the site. However, the soil condition and elevation of the site suggest that groundwater flooding is unlikely. Furthermore, the site has been classified by 'Envirocheck' as having "limited potential for ground water flooding to occur", which is their lowest classification, see Appendix A.

Sources of Pluvial Flooding

- 2.18 Pluvial flooding can be defined as '*flooding that results from rainfall-generated overland flow, before the runoff enters any watercourse or sewer*'. It is usually associated with high intensity 'extreme' rainfall events (typically >30mm/h) resulting in overland flow and ponding in depressions in the topography. The residential area to the west of the site is elevated above the site. However its positive drainage system will capture and manage pluvial flow, limiting any run-off onto the development site. This and the permeable silt and sand layer under the site suggests that pluvial flooding is unlikely.

Sources of Surface Water Sewer Flooding

- 2.19 Local private and Thames Water surface water sewers are present (Appendix E). However, Thames Water have confirmed that they have no records of sewer flooding close to the site.

Sources of Foul Sewer Flooding

- 2.20 Local private and Thames Water foul water sewers are present (Appendix E). However, Thames Water have confirmed that they have no record of sewer flooding close to the site.

Sources of Reservoir Flooding

- 2.21 No source Identified

Sources of Tidal Flooding

- 2.22 No source Identified.

Sources of Canal Flooding

- 2.23 No source Identified.

3.0 Proposed Development and Drainage Strategy

Proposed Development

- 3.1 The proposed development of the site will consist of constructing a residential development of 48 houses, including new road access to the site from Station Road.
- 3.2 The proposed site outline is shown in Figure 1.

Proposed Finished Floor Level (FFL)

- 3.3 The proposed finished floor level of the buildings will be set higher than adjacent land, particularly where land slopes towards the property, to reduce the risk of pluvial flooding. Where possible, gradients around buildings will be designed to fall away from the buildings.

Pedestrian Escape Route

- 3.4 The site and Station Road both lie in flood risk Zone 1 with dry escape routes in all directions.

Surface Water Drainage Discharge

- 3.5 In accordance with the Building Regulations Part H, the proposed site drainage will be via one of three methods: soakaways, direct discharge into nearby watercourses, or via sewers into the available existing surface water sewer network.
- 3.6 Soakaways for the site would be sufficient in draining the site providing the geology has a high enough infiltration rate. This rate is currently unknown, though the soil composition of permeable silts and sands are likely to allow some infiltration. The infiltration rate will be determined through an intrusive site investigation if planning consent is granted. If the infiltration testing proves that the infiltration rate is insufficient for this drainage to be effective, then another form of discharge will be required to supplement the infiltration drainage. Direct discharge to the River Swere and/or its tributary would have to be ruled out as they cannot be reached directly from the site. Discharge into the existing sewer system at the southern end of the site could be considered. The site drainage could be connected to the existing 375mm diameter pipeline to the south of the site, north of Station Road. The discharge rate would be restricted to the local greenfield run-off rate using flow controls and attenuation. The existing local sewers and manholes are shown in Appendix E.

Sustainable Drainage Systems (SUDS)

3.7 The selection of SUDS techniques for this site will follow the SUDS management train concept explained in the SUDS Manual 'CIRIA C697'. The concept is to use drainage techniques in series to incrementally reduce pollution, flow rates and volumes. The hierarchy of techniques to be used are as follows:

- Prevention – prevent runoff and pollution e.g. by rainwater re-cycling and road sweeping.
- Source Control – control runoff at or near its source e.g. local infiltration methods.
- Site Control – routing water to site controls e.g. pipes to a large detention basin.
- Regional Control – routing water from several sites to regional controls e.g. pipes to a balancing pond or wetland.

3.8 While the sections below set out the general principles, the drainage proposals cannot be detailed until the reserved matters stage when a detailed site layout will be produced. Final approval will be subject to adoption procedures.

Re-cycling

3.9 Water butts will be provided for houses to encourage rainwater re-cycling for irrigation of private gardens. Water butts will operate as in-line storage devices, with in-built overflows. Located beneath rainwater pipes, they will store all rainfall until they reach a set level, near full, when the in-built overflow will re-direct further rainwater from rainwater pipes through the drainage pipework into the swale/infiltration trench drainage as described below.

Infiltration

3.10 Infiltration is likely to be possible due to the expected infiltration rates of the sand and silt under the site. Infiltration drainage will be utilised in the form of private soakaways for gardens, permeable paving for paved areas and permeable swales where convenient and maintainable.

Attenuation at Source

3.11 Open space for provision of open attenuation features such as swales will be provided. The extent and volume of swales would be dependent upon the infiltration rate. A good infiltration rate may not require any swales, however they may still be provided for their ecological value where appropriate. A poor infiltration rate will require a greater extent and volume of swales to attenuate the discharge of surface water.

3.12 Crate storage systems may be utilised where site constraints require additional storage volume that cannot be effectively accommodated in open storage features.

3.14 Permeable paving may provide at source attenuation for adjacent properties and where necessary this will be supplemented with below ground cellular storage.

3.15 Bio retention strips could be provided in some areas to supplement infiltration discharge.

Conveyance

- 3.16 Swales will be used where open spaces permit as described above and linked to pipe drainage infiltration devices. Thames Water will not permit land drainage to discharge to adopted sewers and therefore any open drainage features such as soakaways and swales will need to be kept separate from any positive drainage system which discharges to the adopted sewers.
- 3.17 Rills could be used for collection and conveyance of run-off in some paved areas.
- 3.18 In areas where swales and rills are less practical, conventional pipework will form the main form of conveyance.

Pollution Control

- 3.19 The measures described above include varying levels of improvement to water quality. For example, finer stone in permeable paving helps to filter and break down hydrocarbons which may leak from vehicles. Soakaways will also have some filtering properties, but the larger stone and void size will reduce the potential for pollutant removal. Grass and topsoil within swales and bio-retention strips also remove pollutants from run-off.
- 3.20 Pipes and open channels (rills) have little pollution control, so in coordination with these measures, road sweeping, trapped gulleys and sand filters will also be employed as appropriate to catch potential pollutants close to source. Gulleys and sand filters will be designed for easy maintenance access.
- 3.21 Interceptor manholes can help to remove sediment and baffle plates can assist with removal of floating pollutants. These manholes can be located to assist maintenance.
- 3.22 Community bin stores will be drained to the foul system.

Foul Water Drainage

- 3.23 The site's proposed foul drainage would be connected to the foul sewer that runs under the site's southern edge, see Appendix E. The peak foul flow rate would be 2.2L/s, and a section 106 application will be made to Thames Water during the detailed design process.

4.0 Proposed Development Flood Risk Management

Flood Risk to the Development and Mitigation Measures

Fluvial Flooding

- 4.1 The risk of fluvial flooding is very unlikely for the proposed development use, due to its position in Flood Zone 1. Its residual risk is therefore negligible.

Groundwater Flooding

- 4.2 The existing risk is believed to be low and the development will include drainage features further reducing the risks.

Pluvial Flooding

- 4.3 The site's profile ensures runoff across the site in an easterly direction. Flooding will be mitigated through careful design of the development floor levels, external levels and drainage, ensuring the residual risk of pluvial flooding is negligible.

Surface Water Sewer Flooding

- 4.4 There have been no recorded instances of sewer flooding near this site. The proposed site levels will be set higher than surrounding surface water sewers, thus making the residual risk for surface water sewer flooding negligible. On-site drainage and levels will be designed to contain the 1:100 year plus climate change rainfall event. If a positive discharge is required, this will be reduced to a greenfield run-off rate using attenuation storage and a flow control. The risk of flooding to the site will be reduced through the use of sustainable drainage techniques and the design of a resilient system, reducing the risk of on-site blockages.

Foul Sewer Flooding

- 4.5 The proposed site levels will be set higher than surrounding foul water sewers, thus making the residual risk for foul sewer flooding negligible. On-site drainage will be designed to accommodate the predicted peak flow of 2.2L/s.

Reservoir Flooding

- 4.6 The Environment Agency reservoir flood map locates the site in an area with negligible residual risk. No mitigating measures are considered.

Impact of the Development on Flood Risk to Others and Mitigation Measures

Fluvial Flooding

- 4.7 The development drainage proposals will not increase either the volume or rate at which run-off from the site enters nearby watercourses, nor will it change the floodplain. Therefore there will be no impact from the development on fluvial flood risk to others.

Groundwater Flooding

- 4.8 The development drainage will be similar to existing drainage conditions due to the proposed infiltration and greenfield run-off rates. It is very unlikely that the development will increase groundwater flood risks to others.

Pluvial Flooding

- 4.9 There will be no change in risk of pluvial flooding to adjacent properties to the west as they lie uphill of the site. On-site drainage will reduce the risk for the downhill Crushill Farm.

Surface Water Sewer Flooding

- 4.10 If the ground infiltration rate is so low that soakaways alone would not be sufficient in draining the site, discharge to the surface water sewer network would be applied. The discharge rate from the site would not exceed the greenfield run-off rate, so it is unlikely that the network would be unable to cope. No mitigating measures are proposed.

Foul Sewer Flooding

- 4.11 The development will result in an increase in flow to the foul water sewer of 2.2L/s. It is currently unknown whether the existing local system will be able to contain this increase. However further enquiries will be made with Thames Water as part of the detailed design.

On-site Drainage

- 4.12 On-site drainage will be designed to remove the risk of flooding to properties around the site through the use of sustainable drainage techniques.

Residual Risk & Maintenance

- 4.13 The foul and surface water system will be part of an inspection maintenance regime, which will include gutter clearing, gulley emptying and inspection of manholes.

5.0 Conclusion

- 5.1 The proposed development will consist of the erection of a new housing development with 48 detached and semi-detached homes, along with an internal road system.
- 5.2 The proposed development should be acceptable on hydrological and hydrogeological grounds given that:
- The site is within zone 1 in respect of fluvial flooding which represents 'low risk' and is suitable for residential development.
 - The building finished floor levels, external ground levels and drainage systems will be designed to accommodate a 1:100 year plus climate change rainfall event without flooding on or off-site property.
 - The on-site surface water system will be formed from either soakaways and/or a direct connection to the local surface water sewer system, depending on the soil infiltration rates. SUDS will be employed to attenuate run-off, create pollution controls and to increase the ecological of open spaces.
 - The site is to be provided with a positive foul water connection.

Figures

NOTES:

1. This drawing must not be scaled. work to figured dimensions only.
2. This drawing is to be read in conjunction with all relevant drawings, documents and specifications.
3. All site works shall be in accordance with the Health & Safety Act at Work and associated regulations issued by the Health & Safety Executive and the Construction regulations.

| Rev | Description | Date |
|-----|-------------|-------------|
| - | FINAL ISSUE | 30/09/14 SY |



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| Client: | NURSERY GROUND LTD |
| Project: | LAND NORTH OF STATION ROAD HOOK NORTON |
| Title: | LOCATION PLAN |
| Project Engineer: | SY |
| Project Director: | RG |
| Status: | PRELIMINARY |
| Scale: | 1:10000 @ A4 |
| Date: | SEP 2014 |
| Drawing No. | 414077-1002 |
| Rev | |

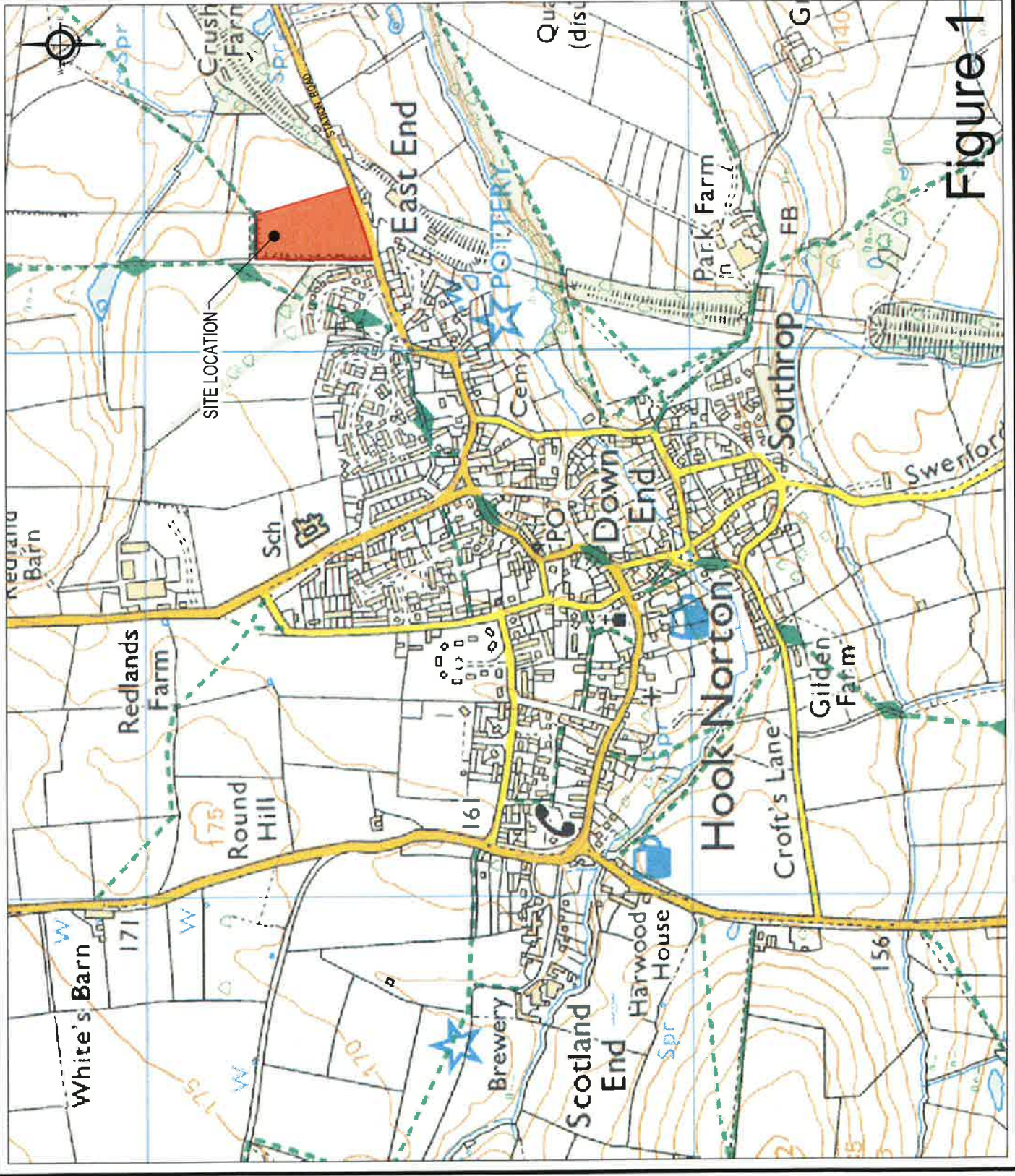
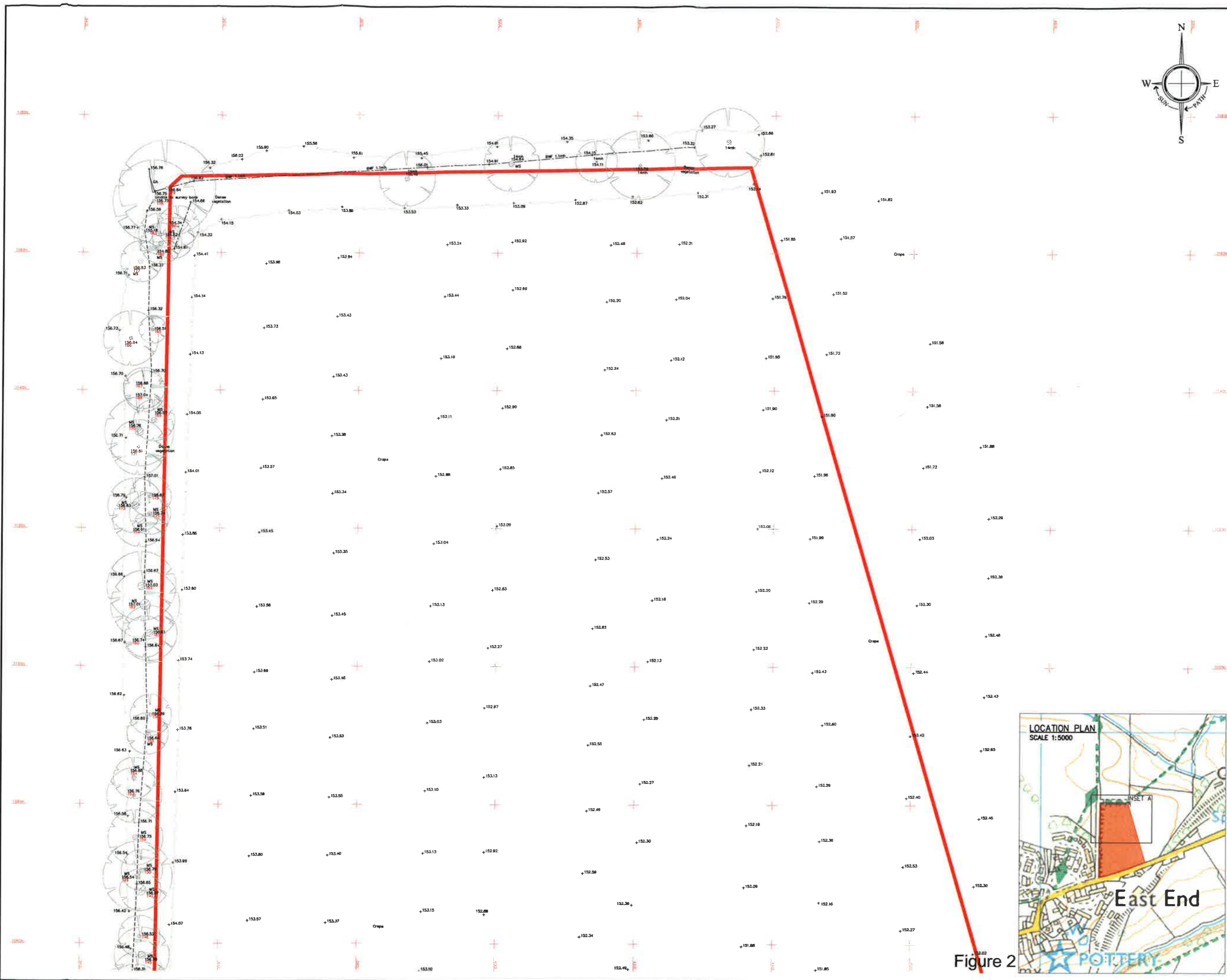


Figure 1



This drawing should not be used for construction purposes unless the original drawing is used.

Original Sheet Size A1

- NOTES**
1. Survey is based on an arbitrary grid.
 2. All levels relate to Ordnance Survey Datum from GPS observations to the National GPS Network transformed using OSGM02.
 3. All levels on kerb lines are channel levels unless noted otherwise.

ABBREVIATIONS

| | | | |
|------|----------------------------|--------|-----------------------------------|
| ACU | Air Conditioning Unit | IRS | Illuminated Road Sign |
| AL | Access Ladder | KO | Kerb Outlet |
| AR | Assumed Route | LB | Litter Bin |
| AV | Air Valve | LP | Lamp Post |
| BB | Beisha Beacon | MH | Manhole |
| BH | Borehole | MP | Marker Post |
| BL | Basement Light | MS | Multi-Stemmed Tree (No. of Stems) |
| BD | Ballard | NB | Notice Board |
| BP | Block Paving | NP | Street Name Plate |
| BRW | Brick Retaining Wall | ORW | Overhead Wire |
| BS | Bus Stop | OSM | OS Bench Mark |
| BSH | Bus Shelter | P | Pillar |
| BT | British Telecom IC | PB | Post Box |
| BW | Brick Wall | PC | Pedestrian Crossing |
| BWF | Barbed Wire Fence | PCF | Post & Chain Fence |
| CB | Control Box | PF | Palisade Fence |
| CBF | Close Board Fence | PK | Portakabin |
| CCTV | Closed Circuit Television | PL | Planter |
| CF | Corrugated Iron Fence | PL | Pinth |
| CL | Cover Level | PM | Parading Meter |
| CLF | Chain Link Fence | PO | Post |
| CLSF | Chain Link Security Fence | PPF | Post & Rail Fence |
| Conc | Concrete | PSF | Palisade Security Fence |
| Ca | Column | PWF | Post & Wire Fence |
| CPS | Concrete Paving Slabs | RE | Rodding Eye |
| CPF | Chestnut Paling Fence | RH | Road Hump |
| CP | Concrete Pinth | RL | Ridge Level |
| CR | Cycle Rack | RS | Road Sign |
| CRW | Concrete Retaining Wall | RW | Retaining Wall |
| CS | Cobblestones | SEF | Service Entry Point |
| CT | Cable TV IC | SL | Softil Level |
| CW | Concrete Wall | SM | Sump Level |
| DC | Duct Covers | SP | Stand Pipe |
| DCh | Drainage Channel | SRW | Slope Retaining Wall |
| DK | Drop Kerb | SW | Stone Wall |
| DP | Down Pipe | SMW | Surface Water Manhole |
| DPC | Damp-Proof Course Level | SY | Sloy Wire |
| EIC | Electricity IC | TCS | Telephone Cab Box |
| EL | Eaves Level (at Drip Edge) | TDR | Traffic Direction Restrictor |
| EP | Electricity Pans | THL | Threshold Level |
| ER | Earthing Rod | TK | Top of Kerb level |
| FB | Flower Bed | TL | Traffic Light |
| FFL | Finished Floor Level | TM | Ticket Machine |
| FH | Fire Hydrant | TP | Telegraph Pole |
| FL | Flood Light | TPS | Tactile Paving Slabs |
| FP | Fuel Pump | TW | Top of Wall |
| FWMH | Foul Water Manhole | UTL | Unobscure To Lift |
| GA | Gate | UTL(1) | Covered |
| GB | Grid Box | UTL(2) | Unobscure |
| GC | Grasscrete | UTL(3) | Damaged |
| GP | Gate Post | UTL(4) | Water Down |
| GR | Guard Rail | UTL(5) | Traffic Management |
| GJ | Gully | VP | Vent Pipe |
| GV | Gas Valve | WB | Wheel Barrier |
| HW | Heard Wall | WL | Water Level |
| IB | Illuminated Ballard | WM | Water Meter |
| IC | Inspection Cover | WO | Washout |
| IL | Invert Level | WV | Water Valve |
| IRF | Iron Rolling Fence | VDL | Vehicle Detector Loop |

CONTROL STATION INFORMATION

| STATION | EASTING | NORTHING | LEVEL | TYPE |
|---------|---------|----------|---------|------|
| ST01 | 500.000 | 1000.000 | 152.003 | Peg |
| ST02 | 459.775 | 1086.057 | 152.642 | Peg |
| ST03 | 449.289 | 971.201 | 154.268 | Peg |
| ST04 | 398.305 | 852.374 | 155.085 | Nail |
| ST05 | 340.558 | 843.172 | 155.741 | Nail |
| ST06 | 345.705 | 972.226 | 156.089 | Nail |
| ST07 | 345.703 | 1023.593 | 156.281 | Nail |
| ST08 | 346.511 | 1071.295 | 156.486 | Nail |
| ST09 | 345.633 | 1120.621 | 156.650 | Nail |
| ST10 | 345.253 | 1154.311 | 156.694 | Nail |
| ST11 | 349.640 | 1169.365 | 156.743 | Nail |
| ST12 | 389.071 | 1164.066 | 154.053 | Peg |

KEY

— SITE OUTLINE

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Rev | **Description** | **Date** | **Chkd**

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Client: **NURSERY GROUND LTD**

Project: **LAND NORTH OF STATION ROAD
HOOK NORTON**

Title: **TOPOGRAPHIC SURVEY
(INSET A)**

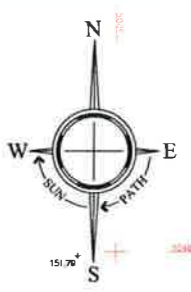
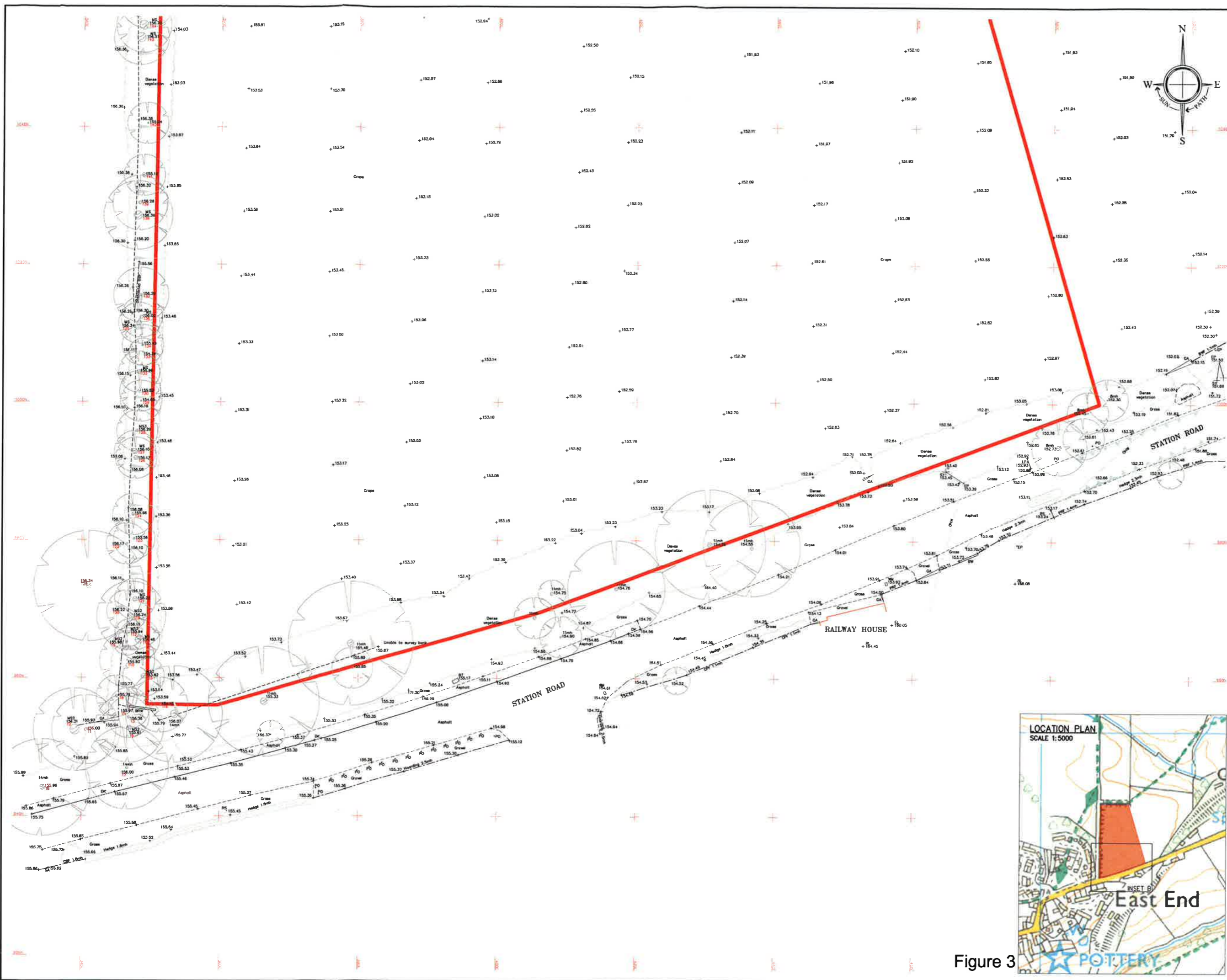
Project Engineer: JJ Scale: 1:500 @ A3
 Project Director: NP Date: SEP 2014

Status: **PRELIMINARY**

Drawing No. 4140177-1007



Figure 2



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Client: NURSERY GROUND LTD
 Project: LAND NORTH OF STATION ROAD, HOOK NORTON
 Title: TOPOGRAPHIC SURVEY (INSET B)
 Project Engineer: JJ
 Project Director: NP
 Status: PRELIMINARY
 Drawing No. 4140177-1008

- NOTES**
- Survey is based on an arbitrary grid.
 - All levels relate to Ordnance Survey Datum from GPS observations to the National GPS Network transformed using OSGM02.
 - All levels on kerb lines are channel levels unless noted otherwise.

ABBREVIATIONS

| | | | |
|------|---------------------------|-------|-----------------------------------|
| ACU | Air Conditioning Unit | IRS | Illuminated Road Sign |
| AL | Access Ladder | KO | Kerb Outlet |
| AR | Assumed Route | LB | Litter Bin |
| AV | Air Valve | LP | Lamp Post |
| BB | Belted Beacon | MH | Manhole |
| BH | Borehole | MP | Manor Post |
| BL | Basement Light | MS | Multi-Stemmed Tree (No. of Stems) |
| BO | Boiler | NB | Notice Board |
| BP | Black Paving | NP | Street Name Plate |
| BRW | Brick Retaining Wall | OHW | Overhead Wire |
| BS | Bus Stop | OSM | OS Bench Mark |
| BSH | Bus Shelter | P | Pole |
| BT | British Telecom IC | PB | Post Box |
| BW | Brick Wall | PC | Post & Chain Fence |
| BWF | Barbed Wire Fence | PCF | Post & Chain Fence |
| CB | Control Box | PF | Palisade Fence |
| CBF | Close Board Fence | PK | Portakabin |
| CCTV | Closed Circuit Television | PI | Pipe |
| CF | Corrugated Iron Fence | PL | Plinth |
| CL | Cover Level | PM | Parking Meter |
| CLF | Chain Link Fence | PO | Post |
| CLSF | Chain Link Security Fence | PRF | Post & Rail Fence |
| Conc | Concrete | PSF | Post & Wire Fence |
| Co | Column | RE | Rodding Eye |
| CPS | Concrete Paving Slabs | RH | Road Hump |
| CPF | Chestnut Paving Fence | RL | Ridge Level |
| CP | Concrete Plinth | RS | Road Sign |
| CR | Cycle Road | RW | Retaining Wall |
| CRW | Concrete Retaining Wall | SEP | Service Entry Point |
| CS | Cobbles/stones | SL | Soffit Level |
| CT | Cable TV IC | SM | Sump Level |
| CW | Concrete Wall | SP | Stand Pipe |
| DC | Duct Covers | SRW | Stone Retaining Wall |
| DCH | Drainage Channel | SW | Stone Wall |
| DK | Drop Kerb | SWM | Surface Water Manhole |
| DP | Down Pipe | SY | Strip Wire |
| DPC | Damp-Proof Course Level | TCB | Telephone Call Box |
| DPE | Electricity IC | TDR | Traffic Direction Restrictor |
| EL | Level (at Drip Edge) | TL | Threshold Level |
| EP | Electricity Pole | TM | Towel Machine |
| ER | Earthing Rod | TP | Telegraph Pole |
| FB | Flower Bed | TPS | Tactile Paving Slabs |
| FFL | Finished Floor Level | TV | TV |
| FD | Flood Light | UL | Unable to Lift |
| FL | Flood Light | UL(1) | Covered |
| FP | Fuel Pump | UL(2) | Grasscrete |
| FWMH | Four Water Manhole | UL(3) | Damage |
| GA | Gate | UL(4) | Botled Down |
| GB | Grid Box | UL(5) | Traffic Management |
| GC | Grasscrete | VP | Vent Pipe |
| GP | Gate Post | WB | Wheel Barrier |
| GR | Guard Rail | WC | Water Level |
| GJ | Gully | WM | Water Meter |
| GV | Gas Valve | WO | Washout |
| HW | Head Wall | WV | Water Valve |
| IB | Illuminated Bollard | VDL | Vehicle Detector Loop |
| IC | Inspection Cover | | |
| IL | Invert Level | | |
| IRF | Iron Rolling Fence | | |

CONTROL STATION INFORMATION




| STATION | EASTING | NORTHING | LEVEL | TYPE |
|---------|---------|----------|---------|------|
| ST01 | 500.000 | 1090.000 | 152.033 | Peg |
| ST02 | 499.775 | 1086.057 | 152.642 | Peg |
| ST03 | 449.289 | 971.201 | 154.268 | Peg |
| ST04 | 398.305 | 832.374 | 155.085 | Iron |
| ST05 | 340.558 | 943.172 | 155.741 | Nail |
| ST06 | 345.705 | 872.226 | 156.099 | Nail |
| ST07 | 345.703 | 1020.893 | 156.261 | Nail |
| ST08 | 346.511 | 1071.295 | 156.488 | Nail |
| ST09 | 345.633 | 1120.621 | 156.650 | Nail |
| ST10 | 345.263 | 1134.311 | 156.634 | Nail |
| ST11 | 349.640 | 1169.385 | 156.743 | Nail |
| ST12 | 389.071 | 1184.066 | 154.053 | Peg |

KEY
 — SITE OUTLINE








Figure 3

General

-  Specified Site
-  Specified Buffer(s)
-  Bearing Reference Point

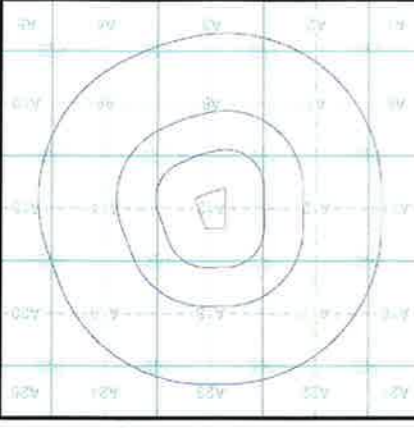
Flood Data

-  Extreme Flooding from Rivers or Sea without Defences (Zone 2)
-  Flooding from Rivers or Sea without Defences (Zone 3)
-  Area Benefiting from Flood Defence
-  Flood Water Storage Areas
-  Flood Defence

Contours (height in meters)

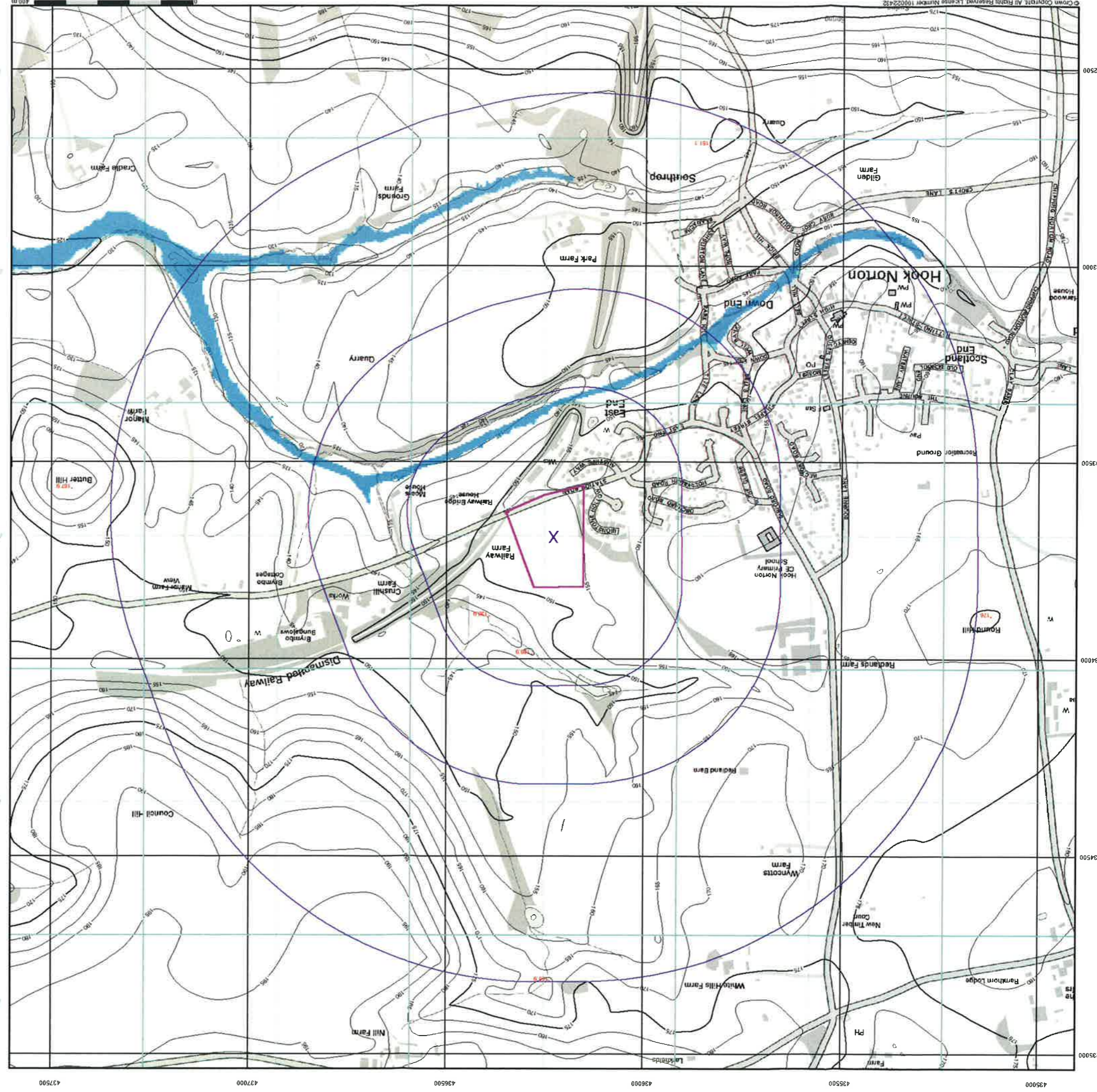
-  Mean Low Water (MLW)
-  Mean High Water (MHW)
-  Standard Contour
-  Master Contour
-  Spot Height

EANRW Flood Data Map - Slice A



Order Details
 Order Number: 60356604_1_1
 Customer Ref: 4140177
 National Grid Reference: 436230, 233690
 Slice: A
 Site Area (Ha): 3.81
 Search Buffer (m): 1000

Site Details
 Site at, Hook Norton, Oxfordshire



437500 437000 436500 436000 435500 435000

232500 233000 233500 234000 234500 235000

Appendices

Appendix A
Envirocheck Flood Maps

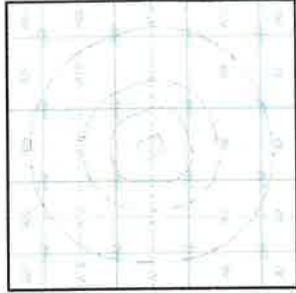
BGS Flood Data (1:50,000)

- General**
- Specified Site
 - Specified Buffer(s)
 - Bearing Reference Point
 - Site
 - Map ID

BGS Groundwater Flooding Susceptibility

- Potential for Groundwater Flooding to Occur at Surface
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Limited Potential for Groundwater Flooding to Occur

BGS Flood Data Map - Slice A



Order Details

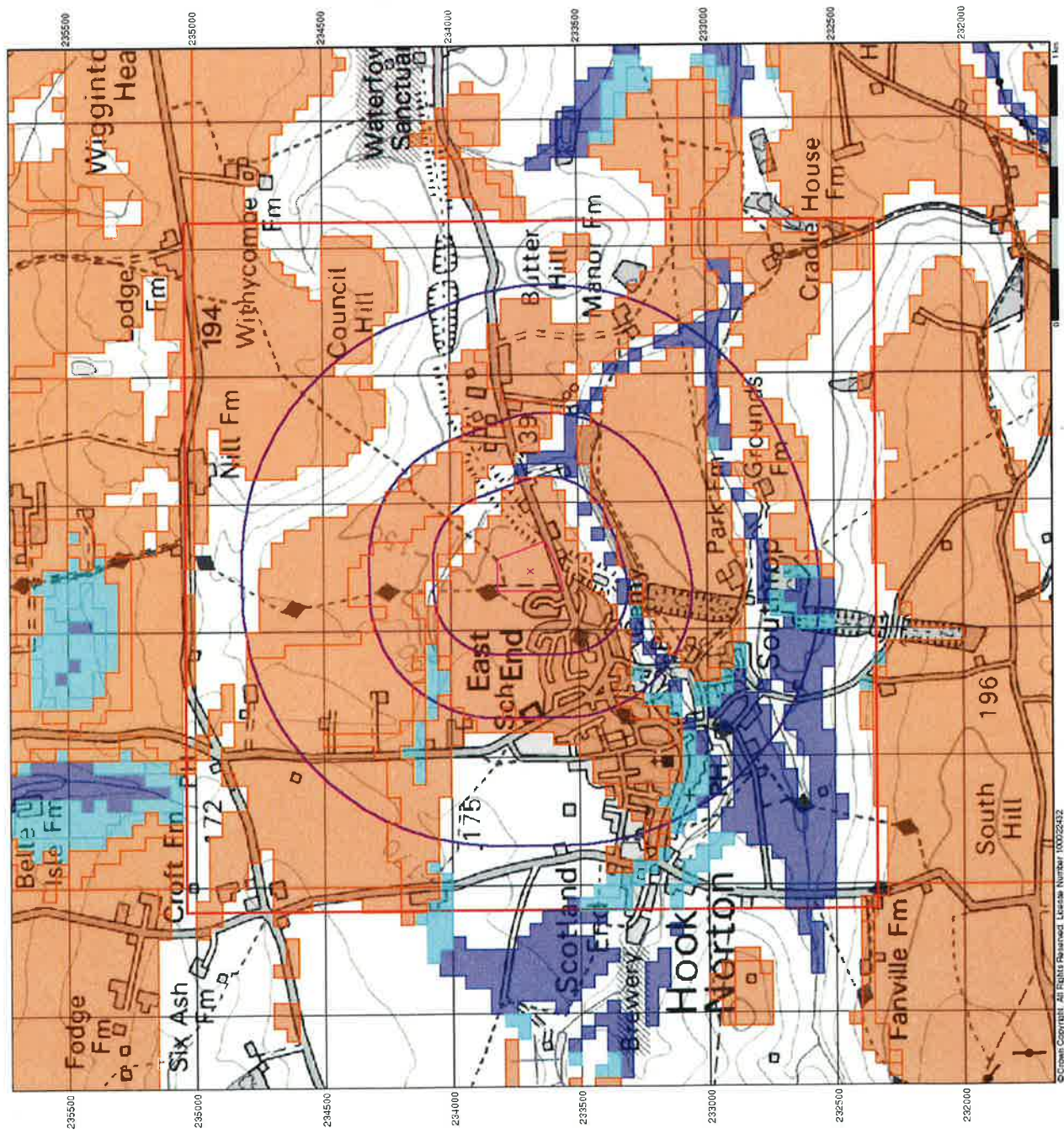
Order Number: 60356604_1_1
 Customer Ref: 4140177
 National Grid Reference: 436230, 233690
 Site: A
 Site Area (Ha): 3.81
 Search Buffer (m): 1000

Site Details

Site at, Hook Norton, Oxfordshire



Tel: 0844 844 5867
 Fax: 0514 844 5867
 Web: www.landmark.co.uk



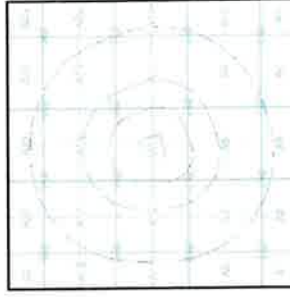
EANRW NaFRA Data (1:50,000)

- General**
- Specified Site
 - Specified Buffer(s)
 - Bearing Reference Point
 - Slice
 - Map ID

National Flood Risk Assessment (NaFRA)

- High Risk
- Medium Risk
- Low Risk
- Very Low Risk

EANRW NaFRA Data Map - Slice A

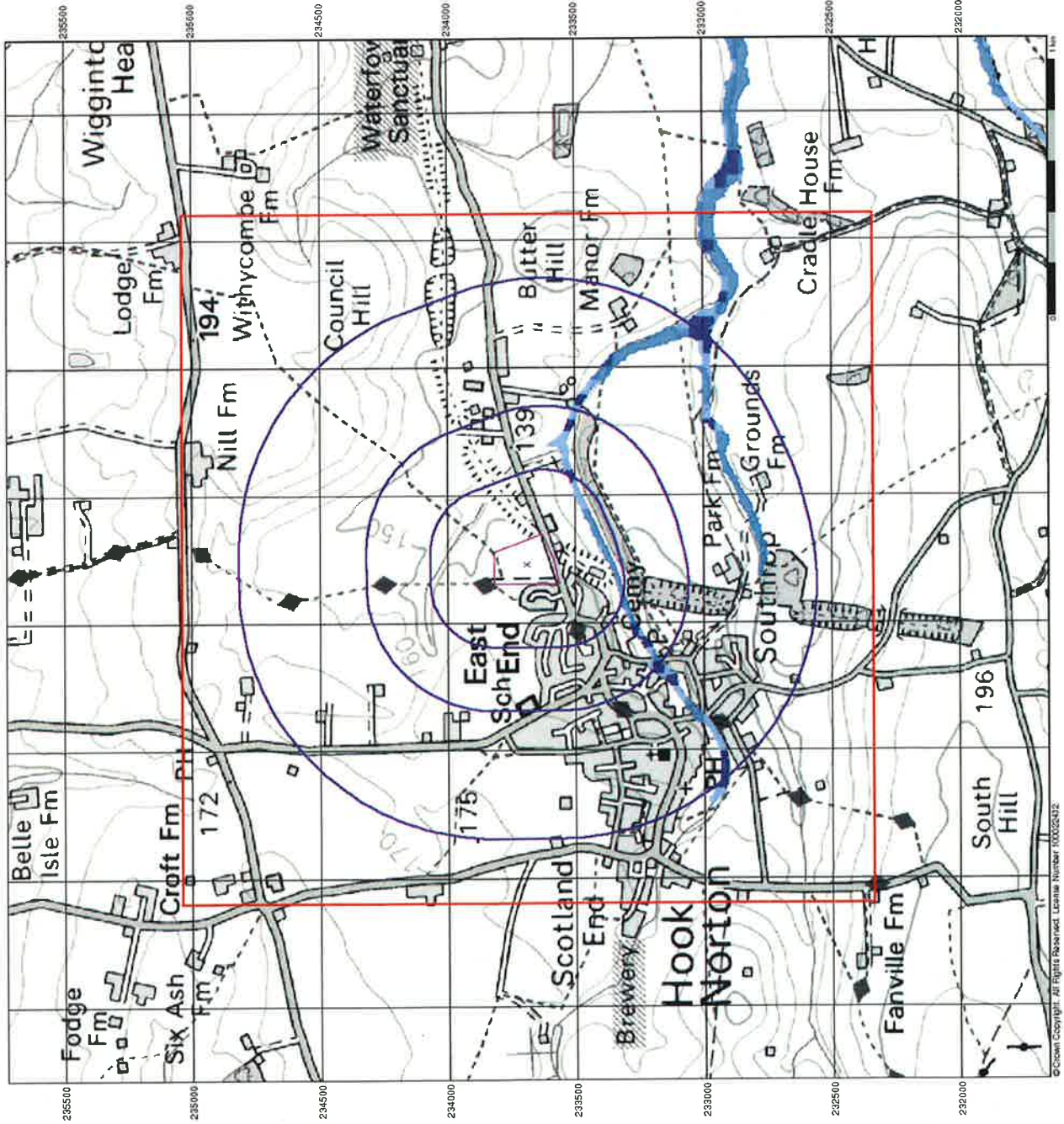


Order Details

Order Number: 60356604_1_1
 Customer Ref: 4140177
 National Grid Reference: 436230, 233690
 Slices: A
 Site Area (Ha): 3.81
 Search Buffer (m): 1000

Site Details

Site at: Hook Norton, Oxfordshire



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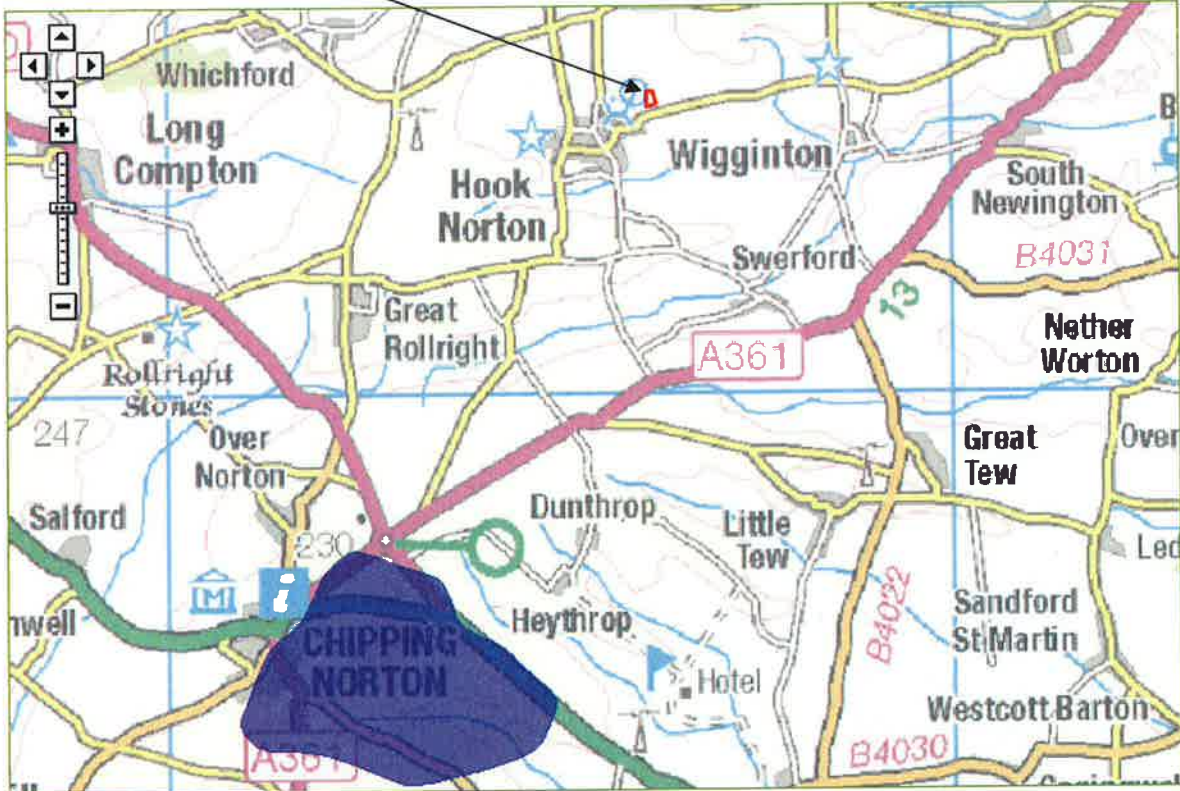
Appendix B

Environment Agency Groundwater Source Protection Zone Map

Site Location

OX15 5LQ at scale 1:75,000

Other maps Data search Text only version



Customers in Wales - From 1 April 2013 Natural Resources Wales (NRW) has taken over the responsibilities of the Environment Agency in Wales.
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Contains Royal Mail data © Royal Mail copyright and database right 2014.
This service is designed to inform members of the public, in line with our terms and conditions. For business or commercial use, please contact us.

Appendix C
Envirocheck Geological Plans

Geology 1:50,000 Maps Legends

Artificial Ground and Landslip

| Map Colour | Lex Code | Rock Name | Rock Type | Min and Max Age |
|------------|----------|---------------------------|-----------|---------------------|
| | WGR | Worked Ground (Undivided) | Void | Holocene - Holocene |
| | | | | |

Superficial Geology

| Map Colour | Lex Code | Rock Name | Rock Type | Min and Max Age |
|------------|----------|-----------|-----------------------------|-------------------------|
| | ALV | Alluvium | Clay, Silt, Sand and Gravel | Flandrian - Flandrian |
| | HEAD | Head | Clay, Silt, Sand and Gravel | Quaternary - Quaternary |

Bedrock and Faults

| Map Colour | Lex Code | Rock Name | Rock Type | Min and Max Age |
|------------|----------|-------------------------------------|---|-------------------------------|
| | CNL | Chipping Norton Limestone Formation | Ooidal Limestone | Bathonian - Bathonian |
| | SHHB | Sharp's Hill Formation | Argillaceous Rocks with Subordinate Sandstone and Limestone | Bathonian - Bathonian |
| | GOG | Great Oolite Group | Interbedded Limestone and [Subequal/Subordinate] Argillaceous Rocks | Bathonian - Bathonian |
| | FMB | Forest Marble Formation | INTERBEDDED LIMESTONE AND MUDSTONE | Bathonian - Bathonian |
| | CB | Combrash Formation | Limestone | Callovian - Bathonian |
| | HYSA | Horsehay Sand Formation | Sandstone | Bathonian - Bajocian |
| | CG | Clypeus Grit Member | Ooidal Limestone | Bathonian - Bajocian |
| | NS | Northampton Sand Formation | Sandstone, Limestone and Ironstone | Aalenian - Aalenian |
| | WHM | Whitby Mudstone Formation | Mudstone | Toarcian - Toarcian |
| | DYS | Dyrham Formation | Siltstone and Mudstone, Interbedded | Pliensbachian - Pliensbachian |
| | MRB | Marlstone Rock Formation | Feruginous Limestone and Ironstone | Toarcian - Pliensbachian |

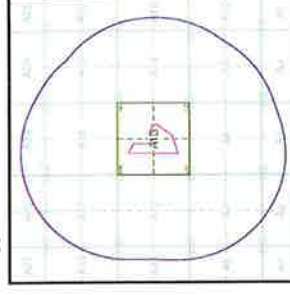
Geology 1:50,000 Maps

This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published paper maps. The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final Combined Surface Geology map. All map legends feature on this page. Not all layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:50,000 Maps Coverage

| | |
|----------------------|---------------|
| Map ID: | 1 |
| Map Sheet No: | Z16 |
| Map Area: | 216 |
| Map Date: | 1985 |
| Bedrock Geology: | Available |
| Superficial Geology: | Available |
| Artificial Geology: | Available |
| Faults: | Available |
| Landslip: | Available |
| Rock Segments: | Not Available |

Geology 1:50,000 Maps - Slice A



Order Details:

Order Number: 53472482_1.1
 Customer Reference: Hook Norton
 National Grid Reference: 436260, 233810
 Slice: A
 Site Area (Ha): 6.82
 Search Buffer (m): 1000

Site Details:

Railway Farm, Station Road, Hook Norton, Banbury, OX15 5LT

Artificial Ground and Landslip

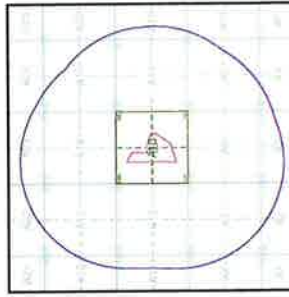
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions and unstable ground.

Artificial ground includes:

- Made ground - man-made deposits such as embankments and spoil heaps on the natural ground surface.
- Worked ground - areas where the ground has been cut away such as quarries and road cuttings.
- In-filled ground - areas where the ground has been cut away then wholly or partially backfilled.
- Landscaped ground - areas where the surface has been reshaped.
- Disturbed ground - areas of ill-defined shallow or near surface mineral workings where it is impracticable to map made and worked ground separately.

Mass movement (landslip) deposits on BGS geological maps are primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground. The dataset also includes 'rounded strata', where the ground has collapsed due to subsidence.

Artificial Ground and Landslip Map - Slice A

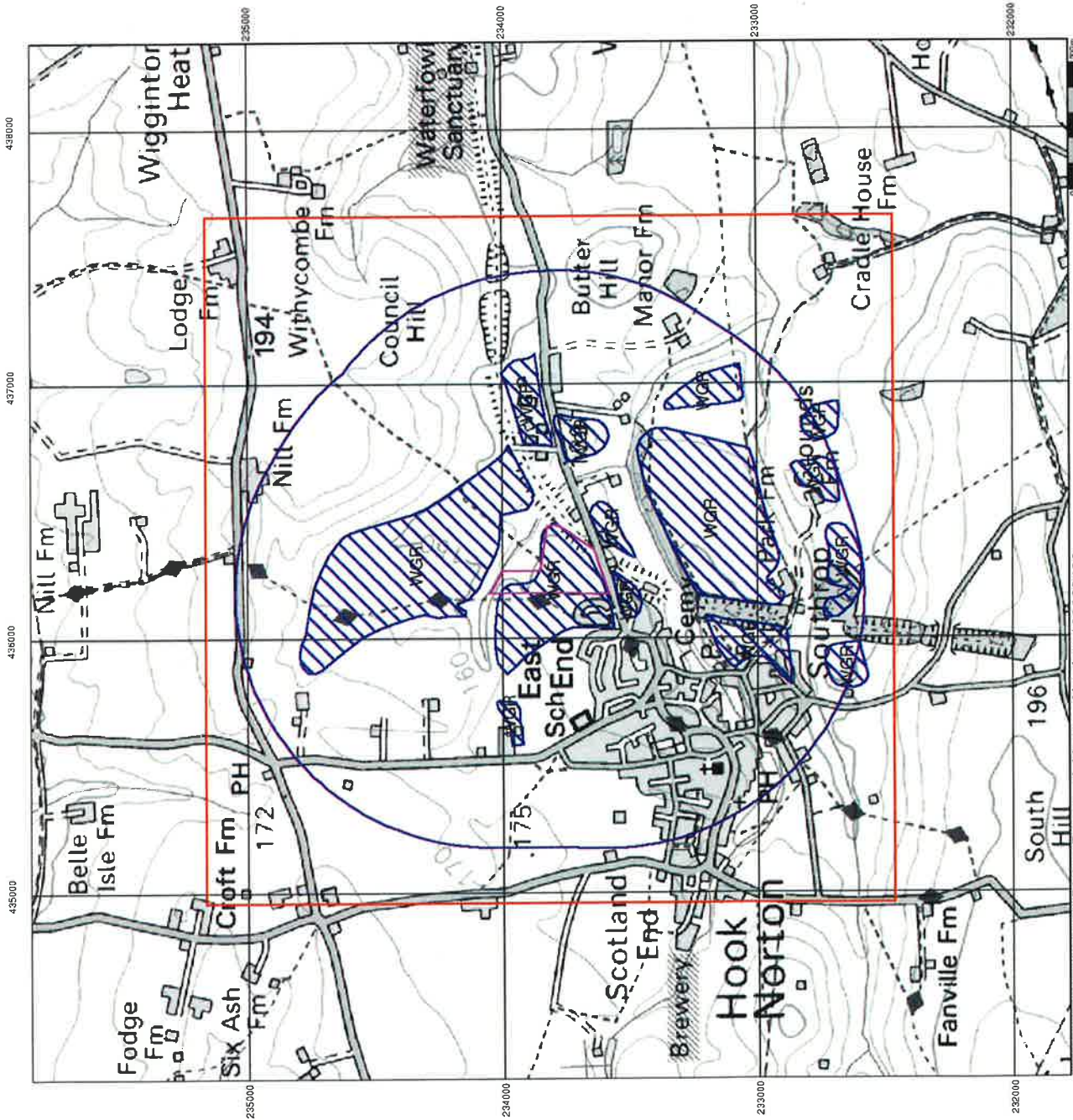


Order Details:

Order Number: 53472482_1.1
 Customer Reference: Hook Norton
 National Grid Reference: 436260, 233810
 Slices: A
 Site Area (Ha): 6.82
 Search Buffer (m): 1000

Site Details:

Railway Farm, Station Road, Hook Norton, Banbury, OX15 5LT



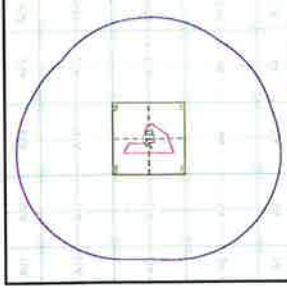
Superficial Geology

Superficial Deposits are the youngest geological deposits formed during the most recent period of geological time, the Quaternary, which extends back about 1.8 million years from the present.

They rest on older deposits or rocks referred to as Bedrock. This dataset contains Superficial deposits that are of natural origin and 'in place'. Other superficial strata may be held in the Mass Movement dataset where they have been moved, or in the Artificial Ground dataset where they are of man-made origin.

Most of these Superficial deposits are unconsolidated sediments such as gravel, sand, silt and clay, and onshore they form relatively thin, often discontinuous patches or larger spreads.

Superficial Geology Map - Slice A

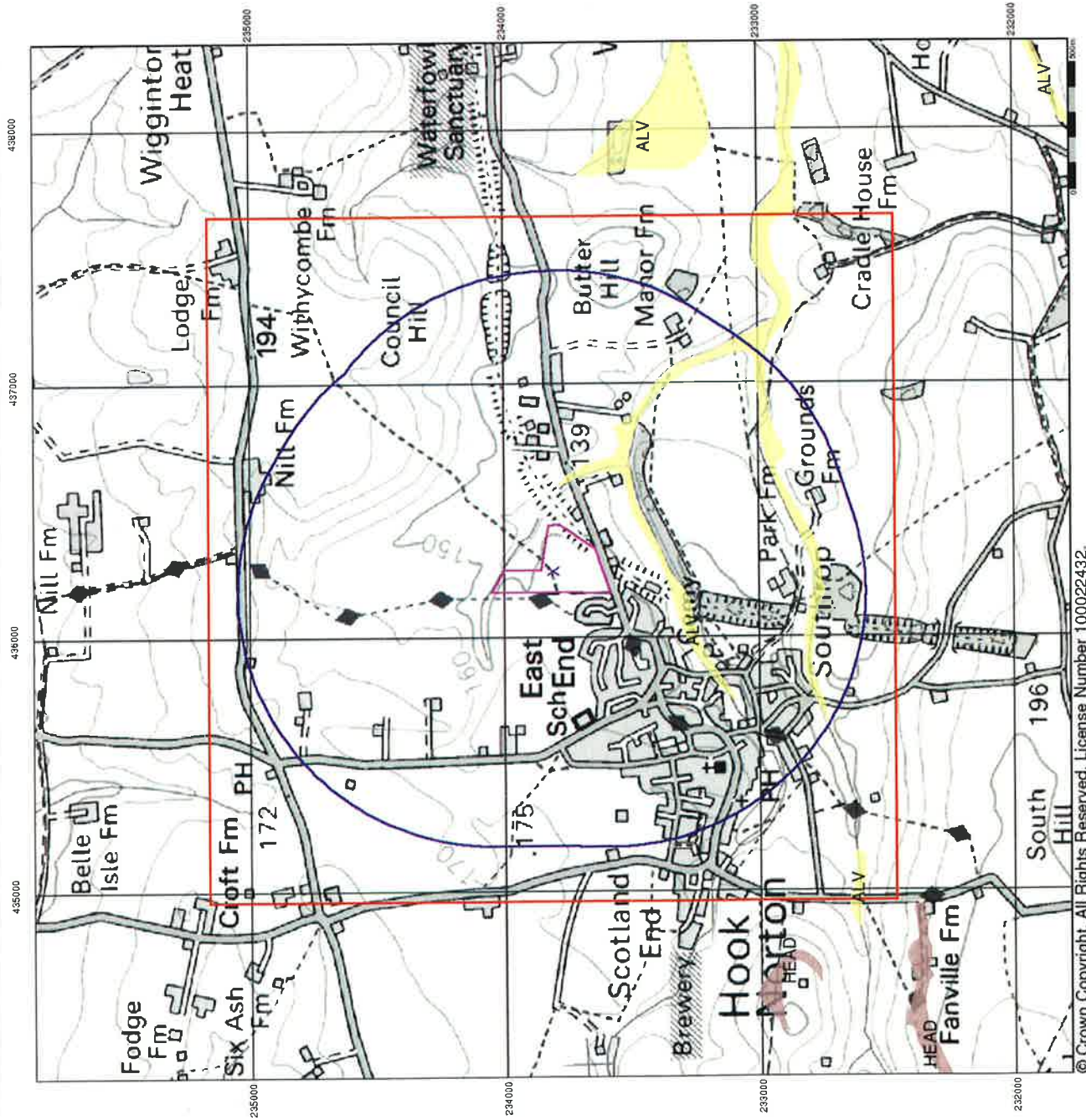


Order Details:

Order Number: 53472482_1_1
 Customer: Hook Norton
 National Grid Reference: 436260, 233810
 Slice: A
 Site Area (Ha): 6.82
 Search Buffer (m): 1000

Site Details:

Railway Farm, Station Road, Hook Norton, Banbury, OX15 5LT



Bedrock and Faults

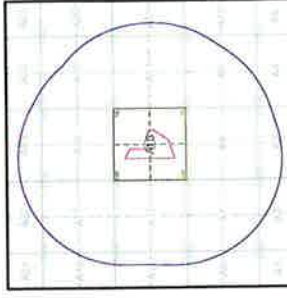
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

The bedrock has formed over vast lengths of geological time ranging from ancient and highly altered rocks of the Proterozoic, some 2500 million years ago, or older, up to the relatively young Pliocene, 1.8 million years ago.

The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

The BGS Faults and Rock Segments dataset includes geological faults (e.g. normal, thrust), and thin beds mapped as lines (e.g. coal seams, gypsum bed). Some of these are linked to other particular 1:50,000 Geology datasets, for example, coal seams are part of the bedrock sequence, most faults and mineral veins primarily affect the bedrock but cut across the strata and post date its deposition.

Bedrock and Faults Map - Slice A



Order Details:

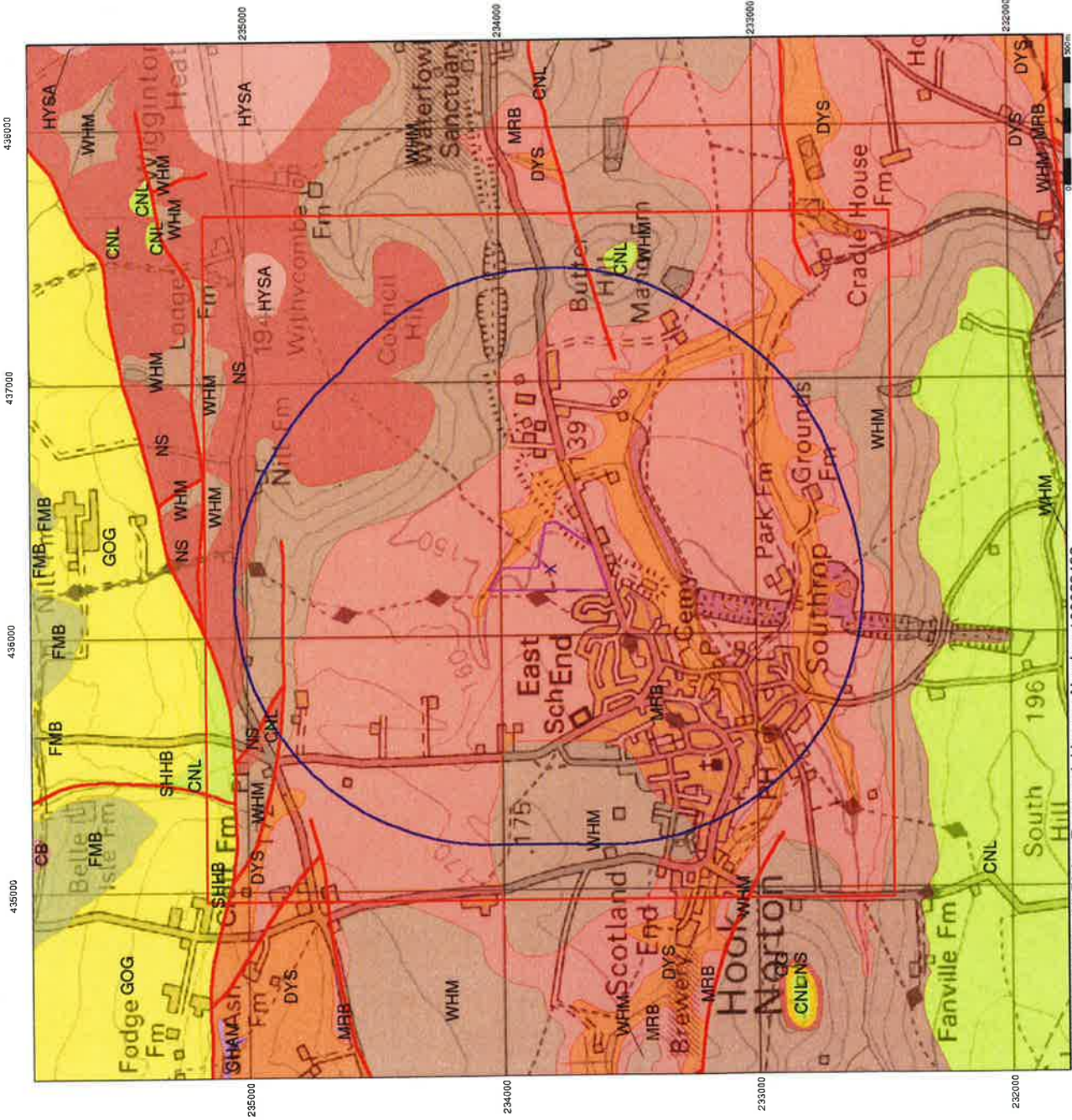
Order Number: 53472482_1_1
 Hook Norton
 Customer Reference: 436280, 233810
 National Grid Reference: A
 Site Area (Ha): 6.82
 Search Buffer (m): 1000

Site Details:

Railway Farm, Station Road, Hook Norton, Banbury, OX15 5LT



Tel: 0844 844 9652
 Fax: 0844 844 8661
 Web: www.envirocheck.co.uk



Combined Surface Geology

The Combined Surface Geology map combines all the previous maps into one combined geological overview of your site.

Please consult the legends to the previous maps to interpret the Combined "Surface Geology" map.

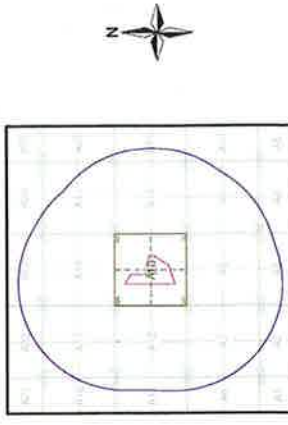
Additional Information

More information on 1:50,000 Geological mapping and explanations of rock classifications can be found on the BGS website. Using the LEX Codes in this report, further descriptions of rock types can be obtained by interrogating the 'BGS Lexicon of Named Rock Units'. This database can be accessed by following the 'Information and Data' link on the BGS website.

Contact

British Geological Survey
 Kingsley Dunham Centre
 Keyworth
 Nottingham
 NG12 5GG
 Telephone: 0115 936 3143
 Fax: 0115 936 3276
 email: enquires@bgs.ac.uk
 website: www.bgs.ac.uk

Combined Geology Map - Slice A

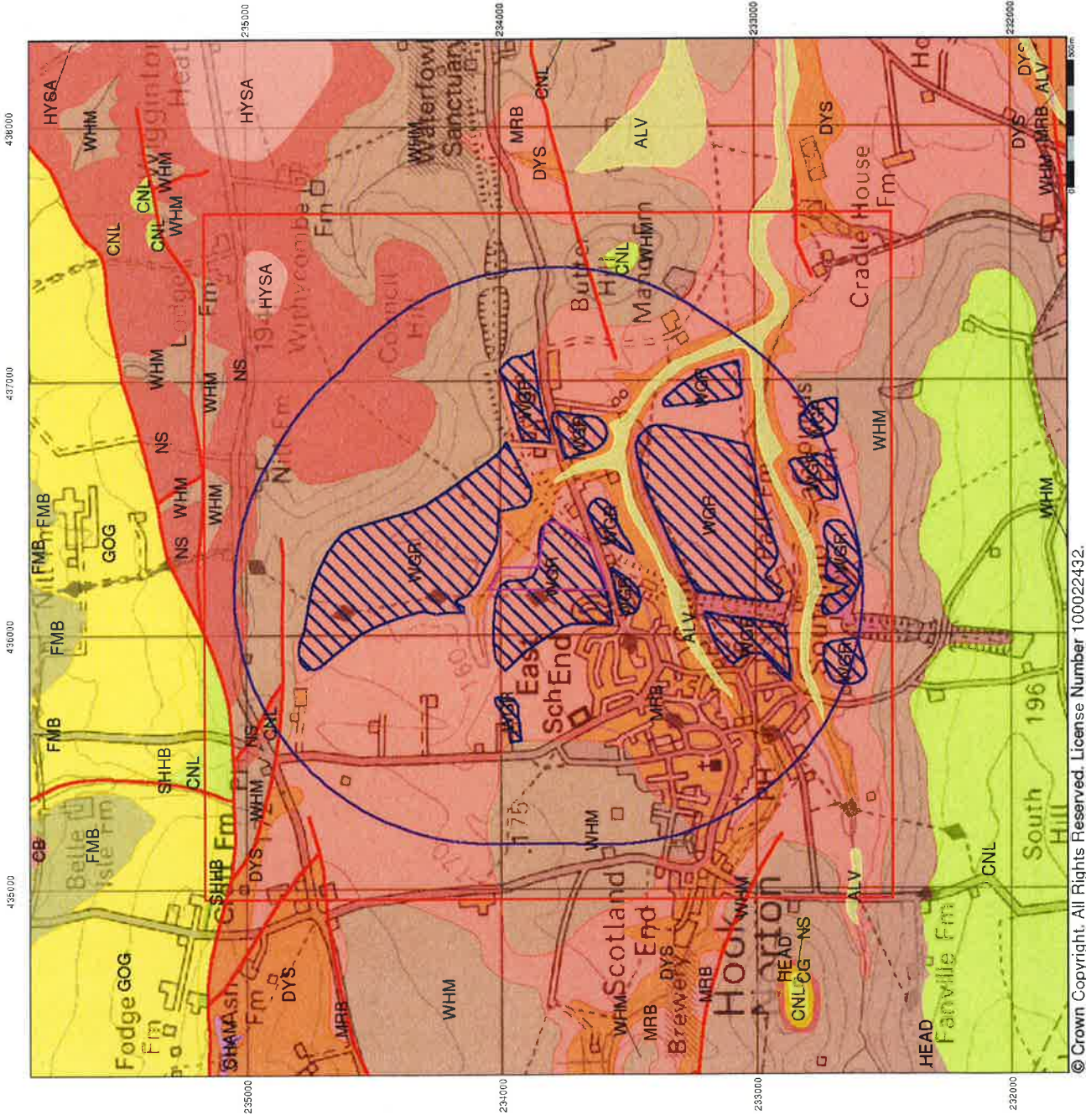


Order Details:

Order Number: 53472482_1.1
 Customer Reference: Hook Norton
 National Grid Reference: 436260, 233810
 Slice: A
 Site Area (Ha): 6.82
 Search Buffer (m): 1000

Site Details:

Railway Farm, Station Road, Hook Norton, Banbury, OX15 5LT



Appendix D
British Geological Survey Borehole Data

GEOLOGICAL SURVEY OF GREAT BRITAIN

RECORD OF SHAFT OR BORE FOR MINERALS

(For Survey use only)

6-inch Map Registered No.

SP 33 SE/14

Name of Shaft or Bore given by Geological Survey:

GCN-205

Name and Number given by owner:

GCN-205

For whom made: Gas Council

Town or Village: Hook Norton. County: Oxon.

Exact site:

Attach a tracing from a map, or a sketch-map, if possible.

Nat. Grid Reference

E4 36320 : N2 33640

1" N.S. Map No.

1" O.S. Map No.

Confidential

218

No

Purpose for which made: Proving underground structure.

Ground Level at bore relative to O.D. +501 ft. (152.71m)

Made by: British Petroleum Co. mobile rig.

Date of sinking: 12-20/11/63

Information from: Schlumberger Gamma Ray log.

Examined by: E. G. Poole, Geological Survey.

SPECIMEN NUMBERS AND ADDITIONAL NOTES

Worked out Marlstone according to map.

| GEOLOGICAL CLASSIFICATION | DESCRIPTION OF STRATA | THICKNESS | | DEPTH | |
|-------------------------------------|---|-----------|-----|-------|-----|
| | | FT | IN. | FT | IN. |
| | <u>Schlumberger log interpretation:-</u> | | | | |
| (24-38m) | Middle Lias, silts and sands. | 80 | 0 | 80 | 0 |
| | Lower Lias, mainly clay with limestone bands at 98 to 100 ft, 152 to 154 ft, 216 to 217 ft, 232 to 236 ft, 333 to 339 ft, 344 to 348 ft, 382 to 385 ft and 477 to 479 ft. Becoming common below 522 ft and abundant below 571 ft. | 561 | 0 | 641 | 0 |
| (145-38m) (197-81m) (207-26m) | White Lias, limestone. | 8+ | 0 | 649 | 0 |
| | Drilled to | | | 680 | 0 |
| | <u>No samples taken.</u> | | | | |

71/10/11 2005 4m 14/11/11

Appendix E
Thames Water Asset Records (Sewer Location)

Asset Location Search



Glanville Consultants
Grovelands Business Centre

HEMEL HEMPSTEAD
HP2 7TE

Search address supplied 13
Austins Way
Hook Norton
Banbury
OX15 5LQ

Your reference 4140177 - HOOK NORTON

Our reference ALS/ALS Standard/2014_2863135

Search date 12 September 2014

You are now able to order your Asset Location Search requests online by visiting
www.thameswater-propertysearches.co.uk



Asset Location Search



Search address supplied: 13, Austins Way, Hook Norton, Banbury, OX15 5LQ

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0845 070 9148, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk

Web: www.thameswater-propertysearches.co.uk

Asset Location Search



Waste Water Services

Please provide a copy extract from the public sewer map.

The following quartiles have been printed as they fall within Thames' sewerage area:

SP3633SW
SP3633NW
SP3633NE

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

The following quartiles have been printed as they fall within Thames' water area:

SP3633SW

Asset Location Search



SP3633NW
SP3633NE

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Asset Location Search



Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0845 850 2777
Email: developer.services@thameswater.co.uk

Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0845 850 2777
Email: developer.services@thameswater.co.uk



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 436250,233750
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|-------------------|---------------------|----------------------|
| 4651 | n/a | n/a |
| 4602 | n/a | n/a |
| 1605 | 154.73 | 152.63 |
| 1601 | 154.76 | 152.88 |
| 1608 | 154.99 | 153.44 |
| 1607 | 154.54 | 152.81 |
| 1603 | 154.97 | 153.68 |
| 1602 | 154.54 | 153.14 |
| 1555 | 154.77 | 152.26 |
| 1552 | 154.77 | 152.58 |
| 1553 | 154.77 | 152.47 |
| 1606 | 154.75 | 152.18 |
| 1501 | 154.98 | 151.98 |
| 1550 | 154.98 | 152.24 |
| 2601 | n/a | n/a |
| 2651 | n/a | n/a |
| 3651 | n/a | n/a |
| 3601 | n/a | n/a |
| 3652 | n/a | n/a |
| 3602 | n/a | n/a |
| 3653 | n/a | n/a |
| 3603 | n/a | n/a |
| 4650 | n/a | n/a |
| 4601 | n/a | n/a |
| 9604 | 158.92 | 157.56 |
| 9591 | n/a | n/a |
| 0501 | 157.95 | 155.68 |
| 0551 | 157.37 | 156.27 |
| 0601 | 155.78 | 154.5 |
| 0603 | 155.73 | 154.21 |
| 0602 | 156.02 | 154.74 |
| 0604 | 155.99 | 154.44 |
| 1609 | 155.41 | 153.87 |
| 1554 | 155.27 | 153.14 |
| 1604 | 155.41 | 154.19 |
| 1551 | 155.26 | 153.56 |

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.



ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

| | |
|--|---|
| | Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works. |
| | Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses. |
| | Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works. |
| | Trunk Surface Water |
| | Trunk Foul |
| | Storm Relief |
| | Trunk Combined |
| | Bio-solids (Sludge) |
| | Vent Pipe |
| | Proposed Thames Surface Water Sewer |
| | Proposed Thames Foul Sewer |
| | Gallery |
| | Surface Water Rising Main |
| | Sludge Rising Main |
| | Vacuum |
| | Foul Rising Main |
| | Combined Rising Main |
| | Proposed Thames Water Rising Main |

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plans are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
- 5) 'na' or '0' on a manhole level indicates that data is unavailable.

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

| | |
|--|-------------|
| | Air Valve |
| | Dam Chase |
| | Fitting |
| | Meter |
| | Vent Column |

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

| | |
|--|---------------|
| | Control Valve |
| | Drop Pipe |
| | Ancillary |
| | Weir |

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

| | |
|--|---------------|
| | Outfall |
| | Undefined End |
| | Inlet |

Other Symbols

Symbols used on maps which do not fall under other general categories

| | |
|--------------|---|
| | Public/Private Pumping Station |
| | Change of characteristic indicator (C.O.C.I.) |
| | Invert Level |
| | Summit |
| Areas | Lines denoting areas of underground surveys, etc. |
| | Agreement |
| | Operational Site |
| | Chamber |
| | Tunnel |
| | Conduit Bridge |

Other Sewer Types (Not Operated or Maintained by Thames Water)

| | | | |
|--|-----------------------|--|---------------------|
| | Foul Sewer | | Surface Water Sewer |
| | Combined Sewer | | Gulley |
| | Culverted Watercourse | | Proposed |
| | | | Abandoned Sewer |



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