MJA CONSULTING
CIVIL AND STRUCTURAL ENGINEERS

PROPOSED RESIDENTIAL DEVELOPMENT
AT

MANOR FARM
DENVILLES
HAVANT
HAMPSHIRE

FLOOD RISK ASSESSMENT

MJA Consulting
58-62 Ock Street
Abingdon
Oxon
OX14 5BZ

Tel: 01235 555173
Fax: 01235 523226
www.mjaconsulting.co.uk

Client:
Barratts (Southampton)

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CONTENTS

		Page
1	Introduction.....	1
2	Existing Site.....	2
3	Topographical and Geological Information.....	4
4	Flood Risk Assessment.....	5
5	Impact of Development on Flood Risk.....	7
6	Surface Water Drainage Strategy.....	9
7	Foul Water Drainage Strategy.....	10
8	Summary & Conclusions.....	11

APPENDICES:

Appendix A - Development Foul & Surface water strategy

Appendix B - Topographical Survey

FIGURES:

Figure 1 - Site Location

Figure 2a & b - Development Site Boundary

Figure 3 - Extract from Environment Agency Flood Zone Map

REFERENCES:

Technical Guidance to the National Planning Policy Framework (2012)
Department for Communities and Local Government ISBN: 978-1-4098-3410-6

Environment Agency Information © and database right *www.environment-agency.gov.uk*

Flood risk assessment guidance for new development -Technical Summary: FD2320
www.defra.gov.uk

CIRIA Report 624: Development and Flood Risk - Guidance for the Construction Industry (2004)

CIRIA Report 697: The SUDS Manual *www.ciria.org*

1 Introduction

1.1 Scope

1.1.1 MJA Consulting was commissioned by Barrett Homes (Southampton) & Generator Group to undertake a Flood Risk Assessment to determine the potential flood risks associated with the proposed development at land situated at Manor Farm, Denvilles, Havant.

1.1.2 Barratt Homes are proposing to develop approximately 7.85ha of land involving the construction of 191No. residential dwellings, with associated access road, hardstanding parking and soft landscaping.
Refer to Appendix A for site layout.

1.2 Report Structure

1.2.1 The National Planning Policy Framework - *Department for Communities and Local Government (2012)* is the current guidance on development and flood risk in England and Wales.
This guidance replaces but retains key elements of Planning Policy Statement 25: Development and Flood Risk.
The Flood Risk technical guidance for the National Planning Policy Framework requires a Flood Risk Assessment to be carried out to consider all potential forms of flooding including that from river, sea, estuarial, land drainage, groundwater, overland flow, surface water run-off, sewer systems, and artificial water bodies (lakes, reservoirs, canals etc).
A Flood Risk Assessment is required to consider the impact of all these potential forms of flooding on both the development site and off site parties and land.

1.1.2 This report will take the structure of a 'Flood Risk Assessment' in accordance with the Environment Agency's Flood Risk Assessment Guidance, the National Planning Policy Framework and CIRIA Report 624 'Development and Flood Risk – Guidance for the Construction Industry.

1.1.3 The purposes of this report are:

- To confirm that the proposed development will not be subject to flood risk.
- To confirm that a satisfactory strategy for the disposal of surface and foul water from the proposed development is achievable.
- To confirm that this development will not increase the risk of flooding to any offsite parties and land.

2 Existing Site

2.1 Site Location and Description

2.1.1 The site is located to the east of Havant in Hampshire.
The approximate National Grid Reference of the site is SU 73022 06767.
The overall site of approximately 7.85ha forms part of the current Copseys Plant Nursery (4.48ha) and land associated with Manor Farm (3.37ha).

2.1.2 The northern area of the site (Copseys Plant Nursery) predominately comprises of greenhouses with an area of hardstanding and one property within grass covered grounds.
The southern section of the site (Manor Farm) predominately comprises of open arable farm land with storage barns, associate farm structures, and No.17 & 19 Hallett Road.

2.1.3 The site is bound to the north, South & West by residential properties and to the East by open arable farm land.

Figure 1: Site Location

© 2011 Microsoft – Bing Map

Figure 2a: Development Site Boundary

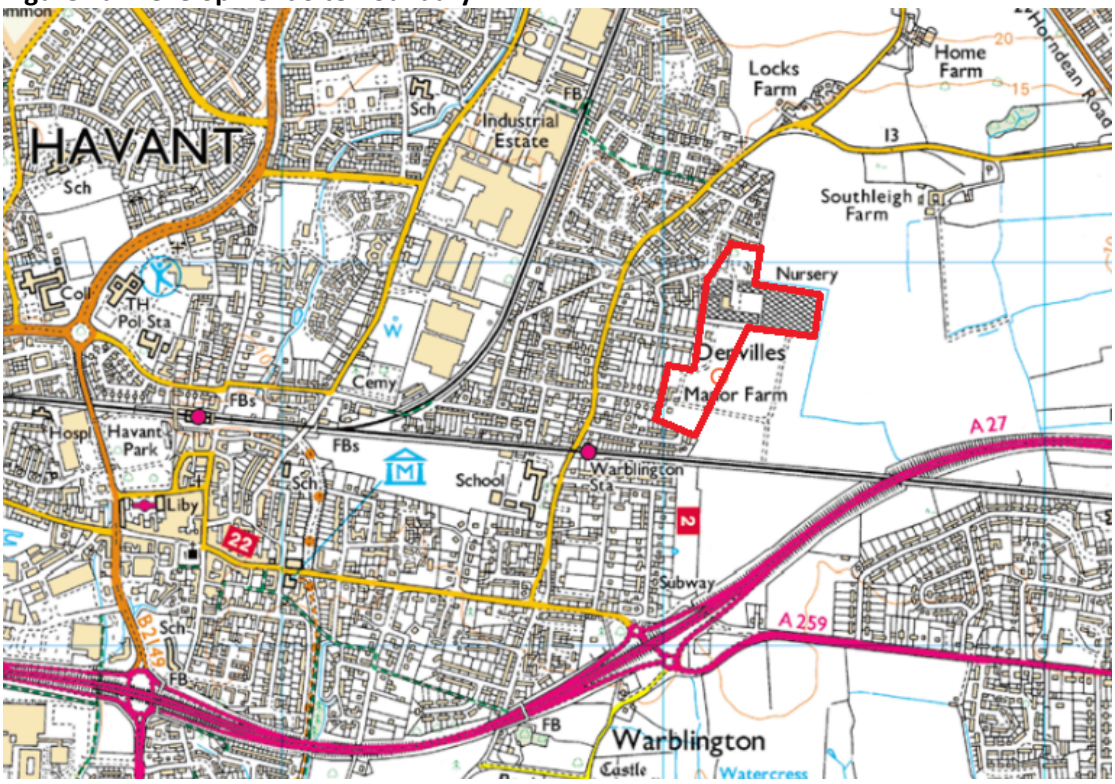


Figure 2b: Development Site Boundary

© 2011 Google – Map Data

3 Topographical and Geological Information

3.1 Topography

3.1.1 The topography of the existing Manor Farm site is generally flat, falling from 14.50mAOD to 13.000mAOD north to south.
Refer to Appendix B for the existing Topographical Survey.
No detailed topographical data exists for Copseys Plant Nursery, however the site is generally flat at approximately 15.00mAOD.

3.2 Geology

3.2.1 The Environment Agency's mapping website (www.maps.environmentagency.gov.uk) has classified the site as not located within a groundwater source protection zone for groundwater abstractions.
Groundwater vulnerability for this area is classed as a minor aquifer intermediate to high.

3.2.2 The underlying superficial soils are classified by the Environment Agency as being 'Secondary A' Aquifer. These are defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

3.2.3 The underlying bedrock is classified by the Environment Agency as being 'Unproductive Strata', these are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

3.2.4 The initial ground investigations have shown that the ground water table is highly seasonable with rapid fluctuations, found generally between 0.75m and 1.38m bgl. There are certain areas, notably within the fill area located in the N.W. of the site, where the ground water is high possibly due to a perched water table caused by the fill material.

3.2.5 The soils were found to be gravels over loose clays.
Soakage tests indicate that the soakage rate is in the region of 1 x 10-5m/s.

3.3 Catchment Information

3.3.1 Watercourses

The nearest ordinary watercourse to the development borders the eastern boundary of Copseys nursery. This runs south past Manor farm and under the A27 where it joins the main tributary discharging to Chichester Harbour 1.5km south of the site.

3.3.2 Water bodies

Chichester harbour is located 1.5km south of the development.

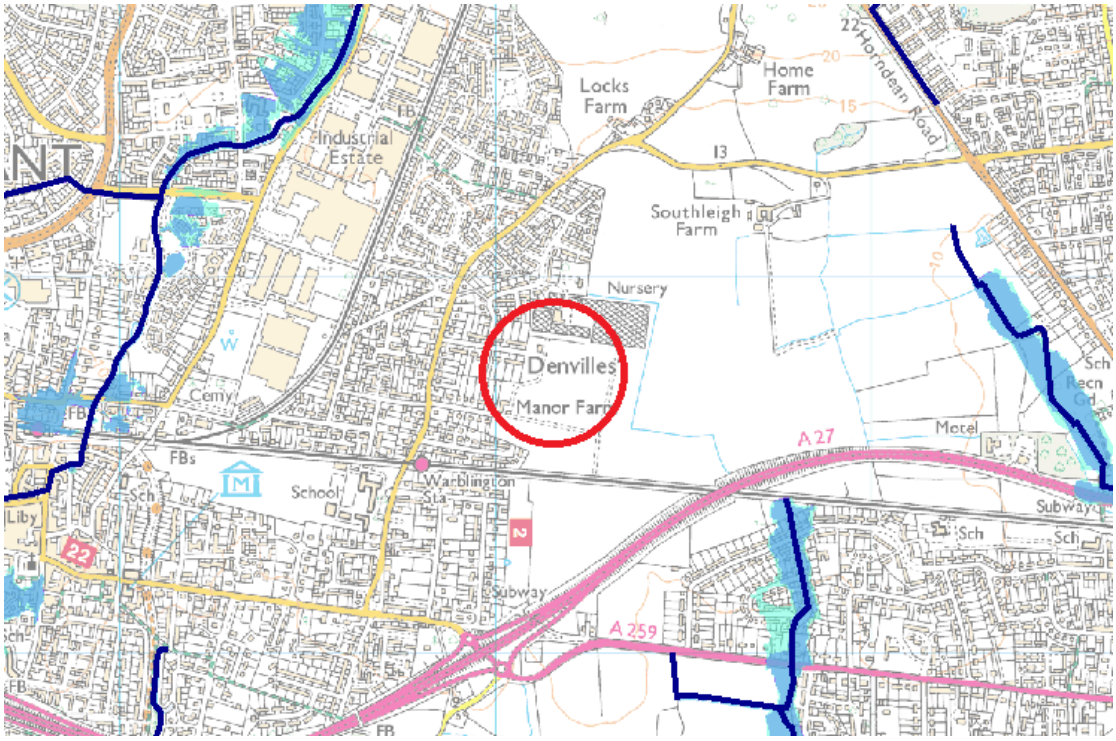
3.3.3 History of Flooding

The site has no recorded history of flooding from all sources.
Anecdotal evidence from local residents has indicated an historic flood event caused by the rapid melting of snow from the site onto Hallett Road.

4 Flood Risk Assessment

4.1 Flood Zone Map

Figure 3: Extract from Environment Agency Flood Zone Map



© Environment Agency 2011

Main Rivers

Dark blue shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded:

- From the sea by a flood that has a 0.5 per cent (1 in 200) or greater chance of happening each year.
- From a river by a flood that has a 1 per cent (1 in 100) or greater chance of happening each year.

Light blue shows the additional extent of an extreme flood from rivers or the sea. These outlying areas are likely to be affected by a major flood, with up to a 0.1 per cent (1 in 1000) chance of occurring each year.

4.2 The Environment Agency's indicative Flood Map shows the site to be located within Flood Zone 1.
This is land assessed as having a less than 1 in 1000 (<0.1%) annual probability of flooding from a river or stream in any year by the Environment Agency and is not within an area subject to either flooding or extreme flooding events.

4.3 The flood risk technical Guidance to the National Planning Policy Framework Table 2: Flood Risk Vulnerability classification, classifies residential developments as 'More Vulnerable'.

NPPF Table 2 of technical Guidance: Flood Risk Vulnerability classification

More vulnerable

- Hospitals.
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non–residential uses for health services, nurseries and educational establishments.
- Landfill and sites used for waste management facilities for hazardous waste[6].
- Sites used for holiday or short-let caravans and camping, *subject to a specific warning and evacuation plan.*[7]

4.4 Table 2 & 3 would indicate that 'more vulnerable' developments located within Flood Zone 1 are considered appropriate under the National Planning Policy Framework.

NPPF Table 3: Flood Risk Vulnerability and Flood Zone 'compatibility'

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

4.5 Sequential Test

4.5.1 The National Planning Policy Framework Guidance states that Planning Authorities should complete a risk based 'Sequential Test' at all stages of the planning process, to steer new development to areas with the lowest probability of flooding.

4.5.2 Under the requirements of the 'sequential test' and as the proposed development is already located within flood zone 1 (lowest risk), there are no more suitable, developable and deliverable alternative sites, better located from a flood risk perspective, which would accommodate the proposed development.

5 Impact of Development on Flood Risk

5.1 This section identifies sources of potential flood risk to the site.
The sources of flooding that could potentially affect the site include flooding from groundwater, rivers (fluvial), overland runoff (pluvial), artificial sources and flooding from overloaded existing and proposed sewer networks.

5.2 Existing Watercourses
The watercourse that bound the eastern part of the site does not present a flood risk and is assessed as having a less than 1 in 1000 (<0.1%) annual probability of flooding by the Environment Agency.

5.3 Fluvial
The topographical survey indicates that the lowest ground elevation on the site is approximately 13.00mAOD, while ground elevation at head of the tributary is 10.00m and the Chichester harbour at approximately < 5.00mAOD. It is therefore highly unlikely that the tributary or Chichester harbour will have an influence on fluvial flooding at the site.

5.4 Pluvial
Overland flow results from rainfall that is unable to infiltrate into the ground due to soil saturation and/or a high water table, runs off hard impermeable surfaces or surcharging from manholes during intense storm events above the sewer design capacity.
The design levels of landscaping and hard standing areas as part of the proposed design of the development will aim to keep overland flows across the site to a minimum.

5.5 Local residents have indicated a previous flood event near Hallett Road was caused by the rapid melting of snow from the development site.
The provision of a new land drainage system at the boundary of the proposed site will intercept and safely dispose of any overland flows.
This will ensure that offsite parties will not experience an increase in pluvial flood risk, and that the development drainage proposals will in fact provide a betterment over the exiting site conditions.

5.6 Provided design & landscaping consider overland flow routes and the proposed road drainage is adequately designed and constructed, the risk of flooding of buildings on site from overland flows will not increase beyond the current level of risk.
This will ensure that this development does not impact on or pose any increased flood risk to the site or offsite parties and land.

5.7 Groundwater
No evidence or instances of groundwater flooding have been recorded.
The proposed plans for the site do not include basements and the height of proposed finished floor levels will preclude groundwater flooding from being an issue. During intense rainfall it is likely that ponding may occur on the permeable surface at various locations throughout the site during heavy rain events, this will however be minimal and will drain slowly through the sub strata.

5.8 Existing Sewers

5.8.1 Surface

The existing surface water sewers that serve the various roofed and paved areas within this site will be abandoned and removed, therefore posing no risk of flooding to the proposed development.

5.8.2 Foul

The existing foul water system that serves the development will be abandoned and removed, therefore posing no risk of flooding to the proposed development.

5.9 Proposed Site Drainage

A Flood Risk Assessment requires that an evaluation of all proposed artificial drainage systems and infrastructure within, or in close proximity to the site is carried out.

In the context of this development, the following systems are to be installed which need to be assessed in terms of potential flooding through the capacity of the systems being exceeded or the structural, hydraulic, mechanical or operational failure of the system occurring:

- Piped gravity foul and surface water drains.
- SUDS systems for the collection and conveyance of surface water runoff within the site boundary.

5.9.1 All piped sewers will be designed to the Sewers for Adoption (7th edition) requirement of 'no surcharge of pipes up to the 1 in 1 year storm' and 'no flooding up to the 1 in 30 year storm event'.

Southern Water will be consulted with to ensure that there is adequate capacity in the local foul network to receive the foul flows from the proposed development.

5.9.2 The surface water runoff generated on the site as a result of the development will be managed using appropriate SUDS techniques up to the 1 in 100 +30% storm event. This will ensure that the peak rate of surface water leaving the developed site is no greater than the existing Greenfield runoff rate, including the temporary condition during the construction of new buildings.

5.10 Structures Affecting Local Hydraulics

There is no evidence of structures affecting the hydraulics of watercourses in the vicinity of the site that would impact on flood risk at the site.

5.11 Other Water Bodies

There are no reservoirs or canals or other artificial sources of flooding within the area.

6 Surface water drainage strategy

6.1 The National Planning Policy Framework requires that new developments do not exacerbate flood risks elsewhere, which means there is a need to control drainage and runoff to ensure there are no increases in overland flow as a result of the development.
Sustainable Drainage Systems (SuDS) will be incorporated into the surface water drainage strategy to mitigate the additional runoff and reduce flood risk to downstream areas.
The philosophy of the SuDS will be to replicate as closely as possible the natural drainage regime from a site before development, reducing the impact on receiving watercourses.

6.2 The Building Regulations Document H (2002) details a hierarchy of potential methods of disposing of surface water from a site:

- An adequate soakaway or some other adequate infiltration system, or where that is not practicable,
- A watercourse, or where that is not practicable,
- A sewer

6.3 Surface water runoff will be managed in accordance with current requirements to incorporate Sustainable Urban Drainage into development. The suitability of various techniques has been assessed using the SUDS management train as stated in the CIRIA Manual C697. The various techniques will be reviewed as to their suitability in consideration of the characteristics of the development to manage runoff at source. The use of SUDS systems will provide an improvement to the biodiversity and water quality and a reduction in runoff peak runoff flows.

6.4 As the soil conditions on the site are suitable for infiltration, SuDS features such as permeable paving, cellular crate soakaways and swales will be utilised.
These techniques also improve the quality of the storm water runoff.
Each house will also have a 200L rainwater butt connected to a down pipe with a draw off tap.

6.5 All SUDS features will be designed to cater for the 1 in 100 year + 30% climate change events in accordance with Environment Agency requirements.

6.6 The piped system will be designed in accordance with the requirements of Sewers for Adoption 7th Edition and offered to for adoption to Southern Water.

6.7 It is recommended the site is raised by 300-400mm to increase the dissolution layer (the distance between the underside of any permeable structure and the water table).

6.8 Surface water drainage for the site will follow the principals as outlined below:

6.8.1 Residential Access Road:

The adoptable roads will drain via a permeable surface of either permeable block paving or permeable macadam. The sub base for both will be designed to attenuate the 1:100 year + 30% climate change event.
Overflows from the permeable road system will be collected by sub based drains and discharged to shallow infiltration swales that will run along the eastern boundary.

6.8.2 Residential Areas:

Roof drainage will drain via traditional rainwater down pipes discharging to shallow cellular crate soakaways or sub base drainage systems.

6.8.3 Driveways and Parking Courts

Parking courts will be constructed using a mixture of permeable block paving in the parking bays and tarmac surfacing on the running areas. Runoff from both areas will drain through the block paving to the permeable sub base below.
As runoff percolates through the structure, pollutants and contaminates are filtered out by the bedding layer providing an improvement in water quality.

6.9 The provision of a new land drainage system at the boundary of the proposed site will intercept and safely dispose of any overland flows.
This will ensure that offsite parties will not experience an increase in pluvial flood risk, and that the development drainage proposals will in fact provide betterment over the exiting site conditions.

6.10 Climate Change

6.10.1 The National Planning Policy Framework requires that consideration is given to the effect of climate change on the flows generated by any new development. For piped surface water drainage, an increase in 30% is considered as a likely increase in rainfall intensity due to long term climate change, up to 2115.

7 Foul water drainage strategy

7.1 The foul water discharge from each property will drain via gravity through the development to a new pumping station located at the south of the site.
This flow will then be pumped via a rising main, discharging to the existing foul water sewer located in Hallett Road.

8 Summary & Conclusion

8.1 The Environment Agency's indicative Flood Map shows the proposed development site to be located within Flood Zone 1.
This is land assessed as having a less than 1 in 1000 (<0.1%) annual probability of flooding from a river or stream in any year by the Environment Agency and is not within an area subject to either flooding or extreme flooding events.

8.2 No other sources of flooding were identified on the site or within the vicinity of the site including that from groundwater, rivers (fluvial), overland runoff (pluvial), artificial sources and flooding from overloaded existing and proposed sewer networks.

8.3 Anecdotal evidence from local residents has indicated a previous flood event near Hallett Road was caused by the rapid melting of snow from the development site. The provision of a new land drainage system at the boundary of the proposed site will intercept and safely dispose of any overland flows.
This will ensure that offsite parties will not experience an increase in pluvial flood risk, and that the development drainage proposals will in fact provide betterment over the exiting site conditions.

8.4 The design philosophy for management of surface water runoff from this site is to utilise infiltration via SUDS features throughout the development. These will include permeable block paving, swales and cellular crate soakaways to provide a sustainable drainage system.

8.5 The philosophy of SuDS is to replicate as closely as possible the natural drainage from a site before development, reducing the impact on receiving watercourses.

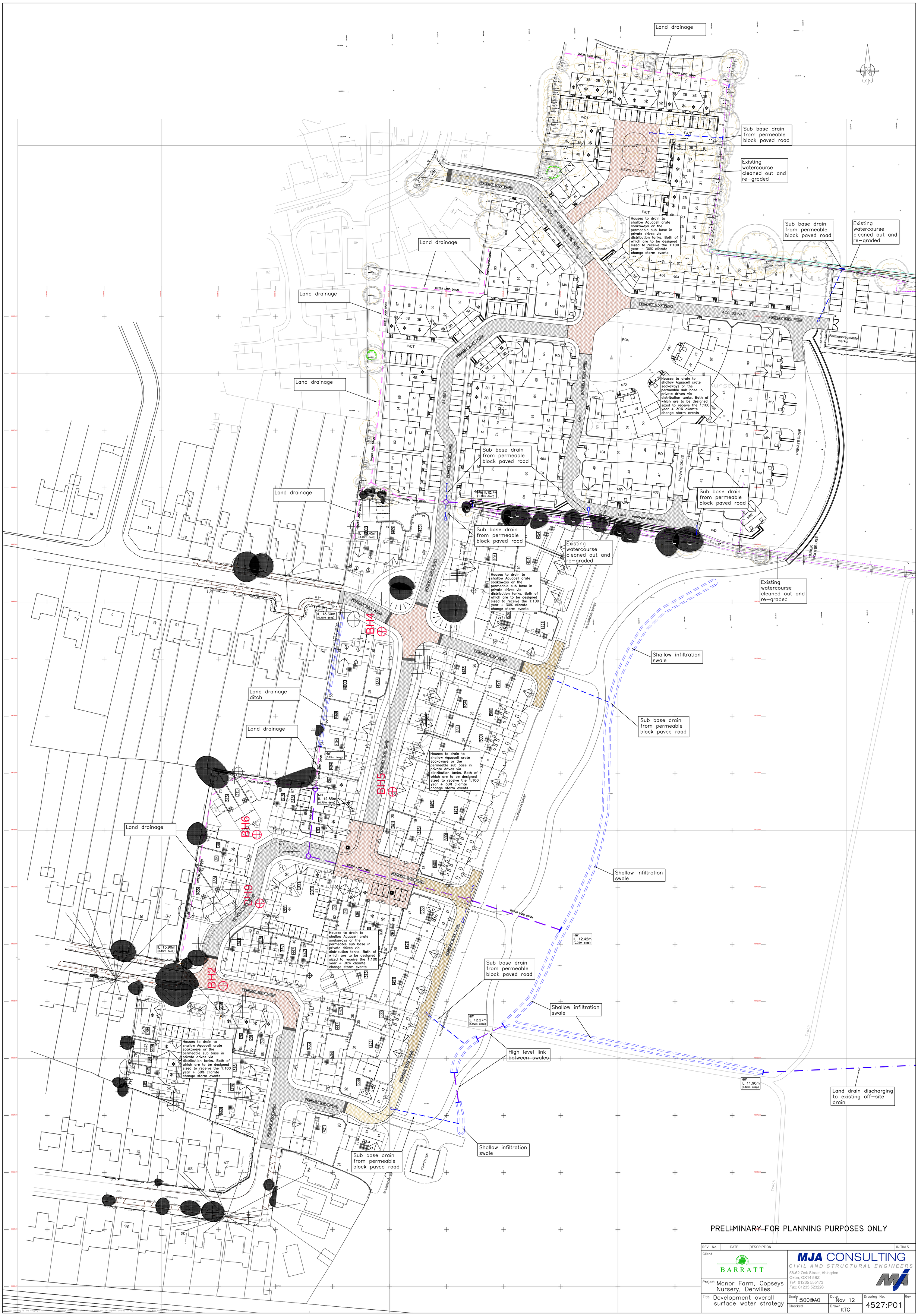
8.6 In accordance with Environment Agency requirements and consideration will be given to increasing the size, beyond that required to provide additional surface water storage and further reduce flood risk.

8.7 The foul and surface water piped drainage system will be designed in accordance with the requirements of Sewers for Adoption 7th Edition and offered to for adoption to Southern Water.

8.8 It is recommended the site is raised by 300-400mm to increase the dissolution layer (the distance between the underside of any permeable structure and the water table level).

APPENDIX A

DEVELOPMENT FOUL & SURFACE WATER STRATEGY


Land drainage
Sub base drain from permeable block paved road
Existing watercourse cleaned out and re-graded
Houses to drain to shallow Aquacell crate soakaways or the permeable sub base in private drives via distribution tanks. Both of which are to be designed sized to receive the 1:100 year + 30% cliamte change storm events
Farmers/vegetable market
Shallow infiltration swale
High level link between swales
Land drain discharging to existing off-site drain
Land drainage ditch
BH2
BH4
BH5
BH6
BH9
MEWS COURT
ACCESS ROAD
ACCESS WAY
STREET
LANE
PRIVATE DRIVE
PERMEABLE BLOCK PAVING
DN225 LAND DRAIN
DN300 LAND DRAIN
BLENHEIM GARDENS
FIFTH AVENUE
PUMP STATION
TIMBER FOOTBRIDGE
PRELIMINARY FOR PLANNING PURPOSES ONLY
BARRATT
MJA CONSULTING
CIVIL AND STRUCTURAL ENGINEERS
58-62 Ock Street, Abingdon
Oxon, OX14 5BZ
Tel: 01235 555173
Fax: 01235 523226
Client
Project Manor Farm, Copseys Nursery, Denvilles
Title Development overall surface water strategy
Scale 1:500@A0
Date Nov 12
Drawing No. 4527:P01
Rev
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Drawn KTG
REV. No.
DATE
DESCRIPTION
INITIALS

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REV. No.	DATE	DESCRIPTION	INITIALS

Client: BARRATT

Project: Manor Farm, Copseys Nursery, Denvilles

Title: Development overall Foul drainage strategy

MJA CONSULTING
CIVIL AND STRUCTURAL ENGINEERS
58-62 Ock Street, Abingdon
Oxon, OX14 5BZ
Tel: 01235 555173
Fax: 01235 523226

Scale	Date	Drawing No.	Rev
1:500@A0	Nov 12	4527:P02	
Checked	Drawn KTG		

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APPENDIX B

TOPOGRAPHICAL SURVEY

TREES

A Ash
AB Alder
AP Apple
B Beech
C Cedar
CB Copper Beech
CH Cherry
CP Cypress
E Elm
EL Elder
EU Eucalyptus
F Fir
FM Field Maple
H Holly
HZ Hazel
HC Horse Chestnut
HH Hawthorn
HW Hawthorn
HY Holly
LB Indian Bean Tree
LB Laburnum
LM Lime
LP Larch Tree
LR Laurel
M Maple
MG Magnolia
OK Oak
P Pine
PA Poplar
PL Plane
PM Plum
PR Pear
PP Pissardi Plum
PR Pear
R Rowan
RO Red Oak
RD Rhododendron
S Sycamore
SB Silver Birch
SC Sweet Chestnut
SH Scots Pine
SJ Spruce
SY Sycamore
W Willow
WL Willow
WN Walnut
Y Yew

Species / Dia / Spread (max) / Ht
e.g. OK / 0.6 / 8 / 15

KEY

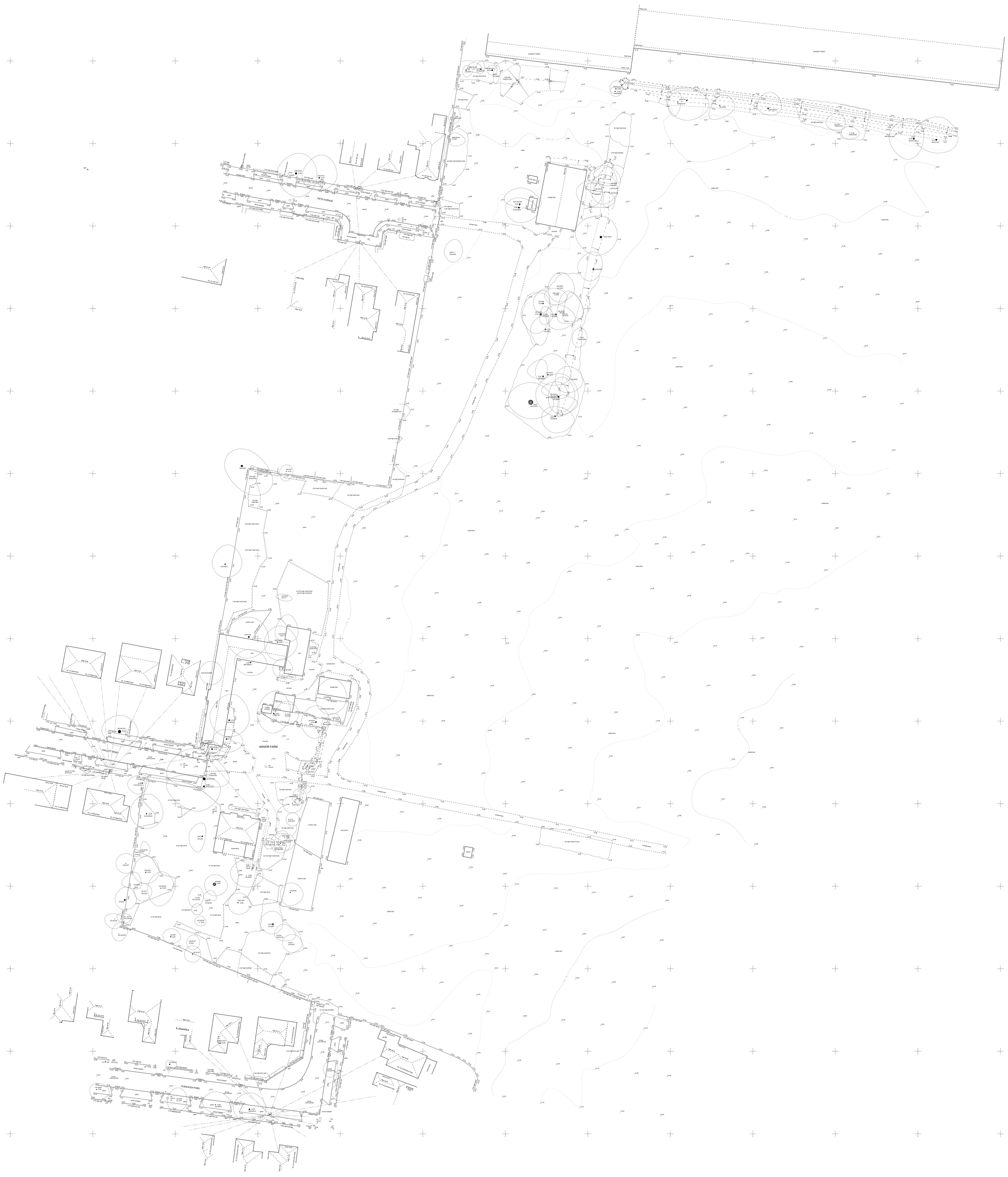
BT British Telecom
CB Control Box
CP Control Box
CL Cover Level
DV Drain Off Division
EL Electric
EP Electricity Pole
FH Fire Hydrant
GSV Gas Stop Valve
HT Height
IC Inspection Cover
IL Invert Level
LP Lamp Post
MH Manhole
MKR Marker
OHW Overhanging Wall
OH Overhead
G Road Gully
PC Protector
PC Pram Crossing
RNP Road Name Plate
S Soakaway
S/A Soakaway
ST Stay / Strut
TBM Temporary Bench (Undentified)
TB Telephone Box
TC Telecom
TL Traffic Light
TP Telegraph Pole
UP Utility Pole Lift
VP Vent pipe
WM Water Meter
WSV Water Stop Valve

FENCES

BWF Barbed Wire Fence
CBF Concrete Block Fence
CF Concrete Post
CPF Chestnut Paling Fence
ESF Estate Railing Fence
IRF Iron Railing Fence
PKF Picket Fence
PMF Post & Mesh Fence
PWF Post & Wire Fence
SCF Security Fence
WF Fence
WMF Wire Mesh Fence
WPF Wood Panel Fence

SURVEY STATION INFORMATION

STATION	EASTING	NORTHING	LEVEL	TYPE
H1	470930.390	106630.164	13.45	NAIL
H2	470878.300	106646.402	14.00	NAIL
H6	470879.240	106638.399	14.00	NAIL
H7	470937.680	106643.583	13.82	NAIL
H12	470904.610	106652.538	14.00	NAIL
H13	470904.610	106652.538	14.00	NAIL
H24	470906.770	106638.236	14.00	NAIL
H26	470925.575	106660.271	13.99	NAIL


FIFTH AVENUE
HALLETT ROAD
GLENLEIGH PARK
MANOR FARM
NURSERY FRESH
arable land
storage barn
chicken coop
poly tunnel
conservatory
concrete
green
orchard
orchard track
hedge
tarmac
tarmac footpath
tarmac over concrete
gate
fence
wire fence
post and wire fence
wire mesh fence
chestnut paling fence
iron railing fence
picket fence
concrete block wall
brick wall
2.5m high hedge
2.5m high conifer hedge
2.5m high privet hedge
2.5m high rose hedge
2.5m high bushes
2.5m high shrub
2.5m high mixed shrub
2.5m high mixed shrub and 5m high small trees
2.5m high small trees
2.5m high small hawthorn trees
2.5m high brambles
5m high small trees
5m high small hawthorn trees
5m high shrub
5m high mixed shrub
5m high mixed shrub and 5m high small trees
5m high small trees
5m high hawthorn trees
5m high brambles
5m high eucalyptus tree
5m high conifer tree
5m high conifer hedge
5m high rose hedge
5m high rose bushes
5m high rose bushes and 5m high small trees
5m high shrub
5m high mixed shrub
5m high mixed shrub and 5m high small trees
5m high small trees
5m high hawthorn trees
5m high brambles