MJA CONSULTING
CIVIL AND STRUCTURAL ENGINEERS

PROPOSED RESIDENTIAL DEVELOPMENT
AT

LAND OFF ROUNDSTONE LANE
ANGMERING
WEST SUSSEX

FLOOD RISK ASSESSMENT
&
DEVELOPMENT DRAINAGE STRATEGY

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A	Draft for comment	C.Pendle	A.McShane
B	Site layout updated, Foul and Surface drainage strategy amended to suit. References to PPS25 changed to NPPF.	C.Pendle	A.McShane

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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 have been commissioned by Barratt Homes (Southampton) to undertake a Flood Risk Assessment and Drainage Strategy to determine the potential flood risks associated with the proposed development at land situated off Roundstone Lane in Angmering, West Sussex.

1.1.2 Barratt Homes are proposing to develop approximately 6.8ha area of Greenfield land involving the construction of 150 residential dwellings, with associated access roads, 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 flooding on both the development site and off site parties and land.

1.2.2 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.

1.2.3 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.
- 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 at land off Roundstone Lane, in the village of Angmering, West Sussex.The approximate National Grid Reference of the site is TQ 07437 04072.

2.1.2 The site of approximately 68,330m² (6.8ha) comprises of undeveloped open fields.

Figure 1: Site Location



© 2011 Microsoft – Bing Maps

Figure 2: Development Site Boundary



© 2011 Google – Map Data

3 Topographical and Geological Information

3.1 Topography

3.1.1 In general the topography of the development falls north to south, from 16.25mAOD to 13.5mAOD over 300m.
Refer to Appendix B for the existing Topographical Survey.

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.

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. These are generally aquifers formerly classified as minor aquifers.

3.2.3 The underlying bedrock is classified by the Environment Agency as being a principle aquifer. These are layers of rock or drift deposits that have high inter-granular and/or fracture permeability, meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifers.

3.2.4 A preliminary ground investigation was carried out by Wilson Bailey Geotechnical & Environmental. This indicated that the generally geology of the site is underlain by Aeolian (Brickearth) clay overlaying locally gravelly Head Deposits and subsequently the Seaford Chalk member of the Upper Chalk.

3.2.5 Underlying the locally significant thickness of topsoil, which extends to depths of between 0.4 – 0.8m below ground level, superficial soils comprising a low to medium strength, pale brown and orange mottled silty clay were encountered to a depth of between 1.2 – 2.8m.
Whilst apparently highly variable across the site, below this depth the clay soils were noted as becoming increasingly granular and grading into clayey gravel below a depth of between 1.5 – 3.0m, with no overall pattern of variability discernible.

3.2.6 A number of the small diameter boreholes terminated within the gravel layer at depths of between 3.0 – 4.45m. A number of boreholes were extended through these gravels and encountered variably clayey gravel soils with pockets and layers of pale brown clayey silt and silty clay with fine chalk fragments to the maximum depth of investigation at 6.45m below ground level.

3.2.7 Groundwater was not encountered during the course of the ground investigations, however further monitoring of the groundwater levels will be required to determine seasonal fluctuations.

3.2.8 Further ground investigations and soakage testing should be carried out to ascertain soil infiltration rates for the potential use of soakaways.
Preliminary soil investigations indicate that a good rate of infiltration should be achievable within the gravel soils underlying the near surface clay and clayey gravel.

3.2.9 The results of soil contamination testing are currently awaited, although no visual or olfactory indications of soil contamination were noted.

3.3 Catchment Information

3.3.1 Watercourses

The nearest ordinary watercourses to the development are approximately 500m north of the site, a tributary of the Black Ditch stream and 500m south of the site, a tributary of the Ferring Rife stream.

3.3.2 Water bodies

There are no reservoirs or canals or other artificial sources of flooding within a 1km radius of the development area.

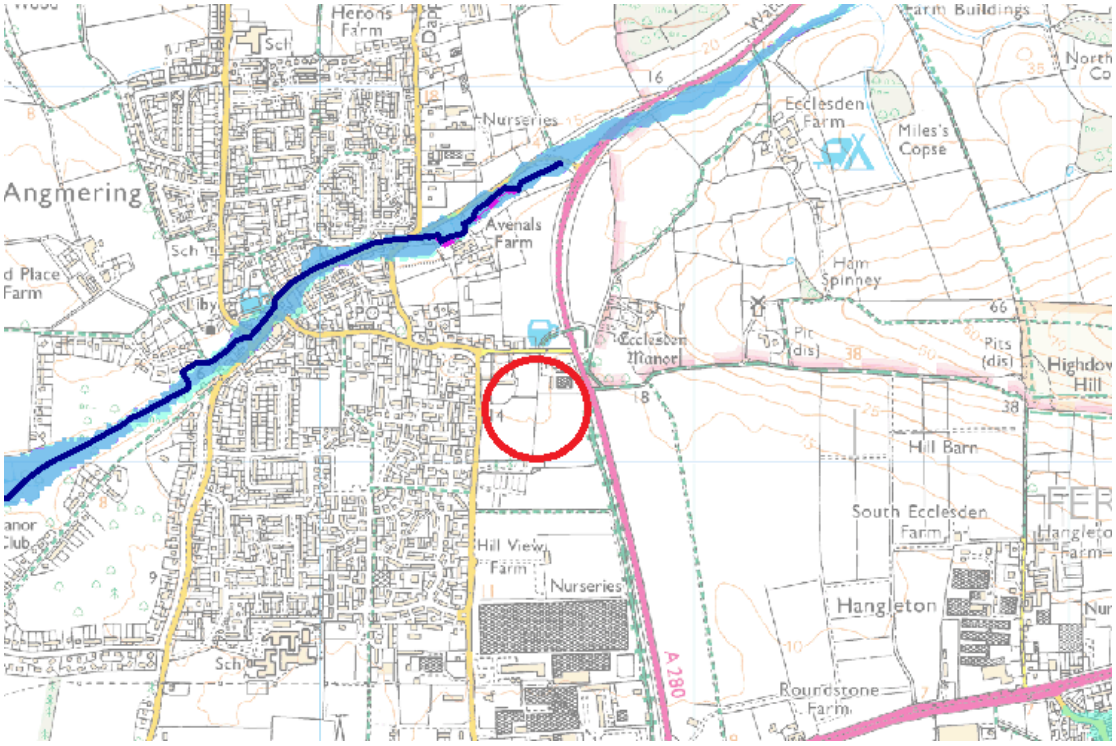
3.3.3 History of Flooding

The site has no reported history of flooding from all sources.

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 (Lowest Risk).
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 2 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 developed site. The potential sources of flooding that The National Planning Policy Framework identifies, which could affect the site include that from groundwater, rivers and watercourses (fluvial), overland runoff (pluvial), artificial sources (canals and reservoirs) and flooding from surcharging within existing and proposed sewer networks.

5.2 Existing Watercourses

The watercourses that are situated 500m north and south of the site boundaries do not present a flood risk and are assessed as having a less than 1 in 1000 (<0.1%) annual probability of flooding by the Environment Agency.

5.3 Waterbodies

The topographical survey indicates that the lowest ground elevation on the site is approximately 13.5mAOD, whilst the ground levels near the outfall into the English Channel over 2.5Km south of the development are 0 – 5.0mAOD.
The Environment Agency have assessed this site as having a less than 1 in 1000 (<0.1%) annual probability of flooding from the sea.

5.4 Within the overgrown rear section of the Manor Nursery within the northern part of the site a heavily vegetated surface depression was noted during the site investigations. This could possibly be surface water storage associated with the adjacent Angmering Bypass. Further investigations will be required.

5.5 Groundwater

No evidence or instances of groundwater flooding has been recorded.
Groundwater was not encountered during the course of the onsite ground investigations, however further monitoring of the groundwater levels will be required to determine seasonal fluctuations.
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. 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.

5.6 Existing Sewers

5.6.1 Surface

Southern Water records indicate the existing site is not served by or within close proximity to a surface water sewer system that could surcharge and pose a flood risk to the development.

5.6.2 Foul

Southern Water records indicate that no major foul sewers lie within the development boundary. The nearest foul sewers located in Roundstone Lane do not pose a flood risk to the development.

5.7 Proposed Site Drainage

5.7.1 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 water sewers.
- SUDS systems for the collection and discharge of surface water runoff within the site boundary.
- Foul water pumping station and associated rising main.

5.7.2 All piped sewers will be designed to the Sewers for Adoption (6th 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 has been consulted with to ensure that there is adequate capacity in the local foul network to receive the expected flows from the proposed development.

5.7.3 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.

5.7.4 The foul water pumping station and rising main will be designed and installed in accordance with Sewers for Adoption (6th edition) specifications.
As the entire site is located within Flood Zone 1 (lowest risk) the pumping station will not be located in an area susceptible to flooding.
For the rising the main a non-degradable marker tape should be laid 300 mm above the top of the pipe.
The pumping station should be fully automatic with provision for remote monitoring by telemetry.
To ensure that sewage flooding does not occur at, or upstream of, the pumping station during plant or power failure, additional storage will be provided.
This storage will be above the high level alarm and below the lowest connected lateral drain or private sewer invert.

5.8 Overland Flow

5.8.1 Overland flow results from rainfall that is unable to infiltrate into the ground due to saturation, runs off hard impermeable surfaces or water 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.
The finished floor slab levels of the buildings shall also be set a minimum of 150mm above finished ground level.

6 Existing and Proposed Site Runoff

This section aims to calculate the estimated peak runoff rate of surface water leaving the site, for the pre and post development conditions.
These discharge rates can then be used for the preliminary design of the surface water drainage strategy for the proposed development.

6.1 Catchment Areas

6.1.1 The existing and proposed permeable and impermeable areas are listed in the table below. This assumes the development will increase impermeable areas by 50%.

	Permeable	Impermeable	Total
Existing Site Area	68,330 m²	0 m²	68,330 m²
Proposed Site Area	34,165 m²	34,165 m²	68,330 m²

6.1.2 This represents an overall increase of 34,165m² (3.4ha) in impermeable area post development.

6.2 Existing Greenfield Runoff

6.2.1 Greenfield runoff rates are calculated to determine the level of acceptable rate of discharge from the site to a receiving watercourse and are likely to be used by the environmental regulator to set site-specific drainage constraints. The calculation of peak rates of runoff from Greenfield areas is related to catchment size.

6.2.2 An assessment of the estimated Greenfield runoff has been carried out using the *Institute of Hydrology Report 124* methodology.
Refer to Appendix D for a summary of results.

6.2.3 IH124 mean annual flood flow rate equation:
$QBAR_{Rural} = 0.00108 \times AREA^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}$

Where:
$QBAR_{rural}$ = Catchment mean annual peak flow (l/s)
AREA = Catchment area (km2)
SAAR = Standard average annual rainfall (mm)
SOIL = Soil index (from Flood Studies or Wallingford Procedure WRAP maps).

Catchment: 6.83 ha

1 in 1 year	21.8 l/sec
1 in 30 year	58.1 l/sec
1 in 100 year	81.8 l/sec
QBar	25.6 l/sec

6.3 Proposed Development Runoff

6.3.1 The proposed peak runoff rate from the site is based on 100% runoff from impermeable areas and 0% runoff from permeable areas, in accordance with CIRIA C697 'The SUDS Manual' & 'Preliminary rainfall runoff management for developments' (EA/DEFRA W5-074/A).

6.3.2 Modified rational method:
Q = 2.78 x C x I x A

Where:
Q = flow (l/s)
I = average rainfall intensity (equal to time of concentration of 30mins)
A = Impermeable area (3.4ha)
C = runoff coefficient (assumed to be 1.0)

1 in 1 year	187 l/sec
1 in 30 year	459 l/sec
1 in 100 year	601 l/sec
1 in 100 year + 30% Climate Change	781 l/sec

7 Surface Water Drainage Strategy

7.1 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 and sewers.

7.2 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

7.3 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.

7.4 Following a review of the preliminary site investigation the soil conditions should have a suitable permeability to enable infiltration. Subject to further testing the entire surface water runoff from the development for all storm events up to and including the 1:100year +30% climate change will be discharged via infiltration to the ground.

7.5 Infiltration is a SuDS technique that enables storm water to be dealt with at source rather than discharging into a sewer network or watercourse.
This method of disposal improves the quality of the storm water runoff, whilst maintaining the existing natural drainage regime, maintaining the Greenfield rate of runoff rate and volume.
Infiltration is also an important process of maintaining groundwater recharge.

7.6 Roofs, Driveways and Parking courts
All surface water runoff from houses, driveways, parking courts will be conveyed to underground infiltration devices of cellular crates, perforated concrete rings, or deep trench type soakways.

7.7 Access Roads

Runoff from the access roads will infiltrate to the ground through permeable block paving surfacing and into a permeable sub-base structure.
This runoff will be temporary stored within the sub-base and infiltrate to the surrounding soils.

7.8 Pollution Mitigation

The permeable block paving system will provide a level of treatment through filtration of hydrocarbons and others pollutants through the pavers , filter membrane and media sub-base.

7.9 All SUDS features will be designed to cater for the 1 in 100 year + 30% climate change events in accordance with Environment Agency requirements.
The piped system will be designed in accordance with the requirements of Sewers for Adoption 6th Edition.

7.10 Climate Change

7.10.1 The Flood Risk technical guidance for 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 and SUDS features, an increase in 30% is considered as a likely increase in rainfall intensity due to long term climate change, up to 2115.

NPPF Table 5: Recommended national precautionary sensitivity ranges for peak rainfall intensities:

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak rainfall intensity	*+5%*	*+10%*	*+20%*	*+30%*
Peak river flow	*+10%*	*+20%*		
Offshore wind speed	*+5%*		*+10%*	
Extreme wave height	*+5%*		*+10%*	

8 Foul water drainage strategy

8.1 All foul drainage associated with the development is to drain to the existing public foul network and offered for adoption to Southern Water.
Southern Water has confirmed that a public foul sewer is available for connection within a manhole located 300m off-site within High Street.
Southern Water has confirmed this network has sufficient capacity to accommodate the foul flows from the proposed development of 150 dwellings.

8.2 The foul water discharge from each property will drain via gravity through the private house drainage before out falling to a sewer system within the development road network.
This sewer will drain via gravity to a pumping station located at the southern boundary of the development site.
A rising main will pump flows back up through the site, running offsite north along Roundstone Lane ultimately discharging in to the existing Southern water foul sewer within High Street.

8.3 The predicted peak foul discharge rate based on the Sewers for Adoption 6th figure (4000 l/dwelling/day) for 150 units will be 6.9 l/s.

9 Summary & Conclusion

9.1 The Environment Agency's indicative Flood Map shows the proposed development site to be located within Flood Zone 1 (Lowest Risk).
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.

9.2 No other sources of flooding were identified on or within the vicinity of the site.

9.3 The proposed development represents an overall increase of 34,165m² (3.4ha) in impermeable areas.

9.4 Preliminary site investigations would indicate that the design philosophy for the management of the increase in surface water runoff from the site can be to utilise infiltration techniques throughout the development. These will include deep trench, cellular crate or concrete ring soakaways.
Further soil infiltration rate testing is required to confirm feasibility.

9.5 The philosophy of infiltration as a SuDS technique is to replicate as closely as possible the natural drainage regime for a site before development, reducing impact on existing sewers and receiving watercourses, whilst offering a valuable method of ground water recharge.

9.6 The surface water runoff from the development for all storm events up to and including the 100-year +30% climate change storms will be attenuated and disposed to the ground via infiltration.

9.8 All SUDS features will be designed for the 1 in 100 year + 30% climate change events 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

9.9 The foul water discharge from each property will drain via gravity through the private house drainage before out falling to a sewer system within the development road network.
This sewer will drain via gravity to a pumping station located at the southern boundary of the development site.
A rising main will pump flows back up through the site, running offsite north along Roundstone Lane ultimately discharging in to the existing Southern water foul sewer within High Street.

9.10 The predicted peak foul discharge rate based on the Sewers for Adoption 6th figure (4000 l/dwelling/day) for 150 units will be 6.9 l/s.

9.11 All foul and surface piped systems will be designed in accordance with the requirements of Southern Water and Sewers for Adoption 6th Edition.

APPENDIX A

SITE LAYOUT

KEY:

- Site Boundary
- SW — 1.8m Brick Screen Wall
- CB — 1.8m Close Board Fence
- PF — 1.8m Panel Fence
- 900mm Flint/Brick Dwarf Wall
- 1.5m Rolled Top Railings
- 1.2m 3 Bar Timber Post & Rail Fence
- 900mm Rolled Top Railings
- Denotes Trees Within Adoptable Highway
- Denotes Affordable Units (Tenure Split To Be Confirmed)
- Denotes Block Paving
- Denotes Resin Bonded Gravel

Affordable House Type Schedule:

House Type	Description	No.
P230	2 Bed Affordable Coach House Type.	4No
SH27	2 Bed Affordable Terrace Type.	11No
SH39	3 Bed Affordable Terrace Type.	30No
Total:		45No

House Type Schedule:

House Type	Description	No.
P237	1 Bed Semi Detached Type.	1No
P230/231	2 Bed Coach House Type.	2No
P206	2 Bed Semi Detached House Type.	6No
P331	3 Bed Semi / Detached House Type.	8No
P341	3 Bed Semi / Detached House Type.	19No
P382	3 Bed Semi Detached House Type.	10No
P441	4 Bed Semi / Detached House Type.	3No
H404	4 Bed Detached House Type.	3No
H421	4 Bed Detached House Type.	4No
H433	4 Bed Detached House Type.	4No
H436	4 Bed Detached House Type.	14No
H438	4 Bed Detached House Type.	3No
H451	4 Bed Detached House Type.	11No
H469	4 Bed Detached House Type.	7No
H500	5 Bed Detached House Type.	6No
H536	5 Bed Detached House Type.	4No
Total:		105No
Grand Total:		150No

14.6m
Littleworth
15.7m
Post
GP
Pound House
Tall Trees
MANOR NURSERY
The Retreat
Dane Villa
Poundville
Belmont
5
The Chantrelles
1
Flint Cottage
Silver Birch
Junction to be determined
Dane Acre
ROUNDSTONE LANE
ESS
14
16
Brambley Cottages
2
1
POUND PLACE
3.1m
Y ROAD
N
POS
PLAY AREA
COMMUNITY GARDEN
PUMPING STATION
A280 ANGMERING BYPASS
Drain
RUGBY CLUB

Rev	Description	Date
A	Amendments to plot numbers: 12 - 13, 37, 45 - 47, 74 - 75, 85 - 86, 91, 114 - 120, 131, 135 - 136	16/07/2012

Urban Design

Urban Design Department
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Interlink Business Park
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Leicestershire
LE67 1LE

telephone 01530 513900
fax 01530 814328

Angmering

Land of Roundstone Lane
Angmering

Drawing Title

CAD Planning Layout

Scale
1:500 @ A0

Date
27.06.20112

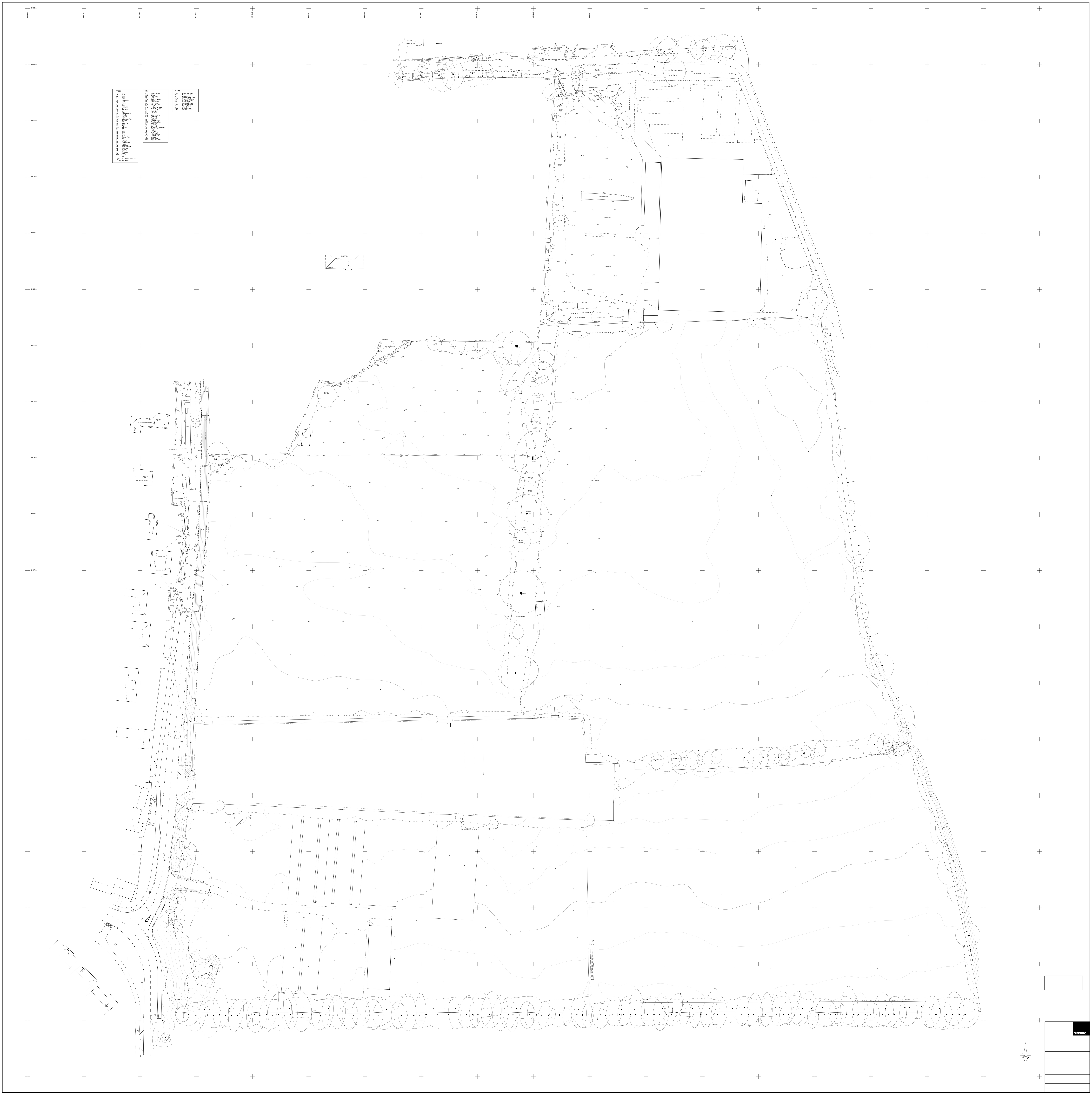
Drawn By
SW

Drawing Ref
ST-02-12A

DAVID WILSON HOMES
BARRATT HOMES

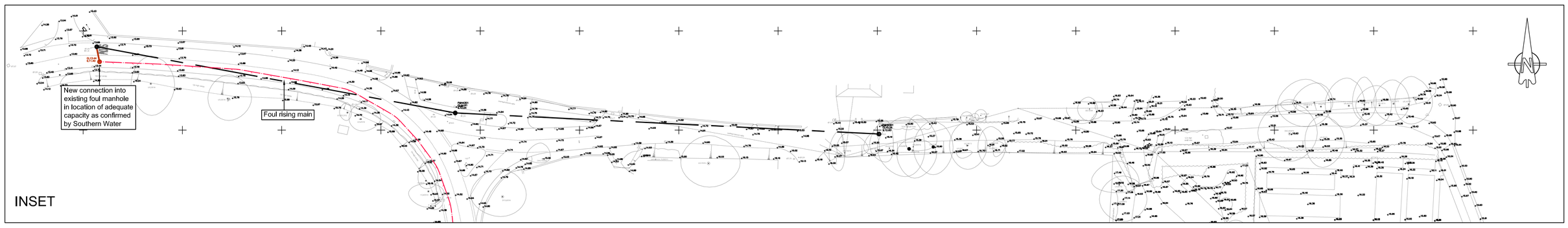
APPENDIX B

TOPOGRAPHICAL SURVEY

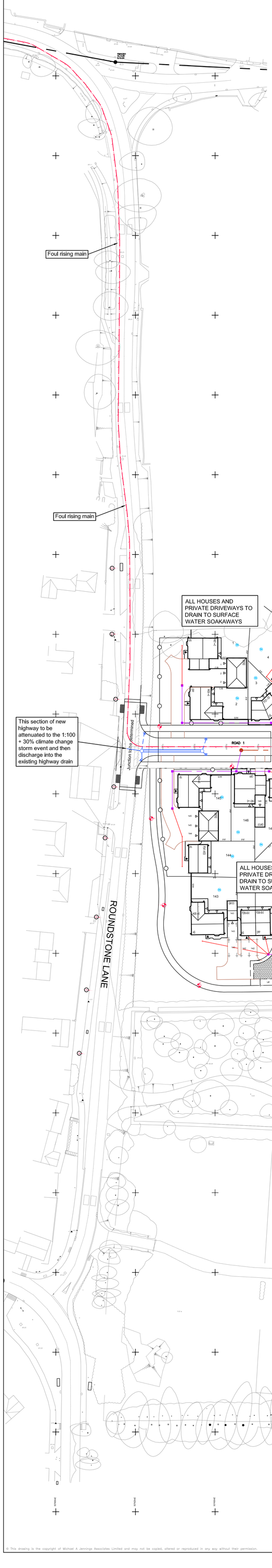

TREES
A Ash
AL Alder
AP Apple
B Beech
C Cedar
CB Copper Beech
CH Cherry
CY Cypress
E Elm
EL Elder
EU Eucalyptus
F Fir
FM Field Maple
FR Fruit
HZ Hazel
HC Horse Chestnut
HO Holm Oak
HW Hawthorn
HY Holly
IBT Indian Bean Tree
LB Laburnum
LM Lime
LO Locust Tree
LR Laurel
M Maple
MG Magnolia
OK Oak
P Pine
PA Palm
PL Plane
PM Plum
PO Poplar
PP Prissardi Plum
PR Pear
R Redwood
RD Red Oak
RH Rhododendron
RO Rowan
SB Silver Birch
SC Sweet Chestnut
SP Scots Pine
SU Spruce
SY Sycamore
U Unidentified
W Willow
WN Walnut
Y Yew
Species / Dia / Spread (max) / Ht
e.g. OK / 0.6 / 8 / 15
KEY
BT British Telecom
BOL Bollard
CB Control Box
CL Cover Level
CTV Cable Television
EL Electric
EP Electricity Pole
FH Fire Hydrant
GSV Gas Stop Valve
HT Height
HVC High Voltage Cable
IC Inspection Cover
IL Invert Level
LP Lamp Post
MH Man Hole
MKR Marker
MW Monitoring Well
O/H Overhead
G Road Gully
PB Post Box
RNP Road Name Plate
RS Road Sign
S/A Soakaway
ST Stay / Strut
SV Stop Valve (Unidentified)
TB Telephone Box
TC Telecom
TH Trial Hole
TL Traffic Light
TP Telegraph Pole
UTL Unable to Lift
VP Vent pipe
WM Water Meter
WSV Water Stop Valve
FENCES
BWF Barbed Wire Fence
CBF Closed Board Fence
CP Concrete Post
CPF Chestnut Paling Fence
CWF Chicken Wire Fence
IRF Iron Railing Fence
PKF Picket Fence
PRF Post & Rail Fence
PWF Post & Wire Fence
SCF Security Fence
SP Steel Post
WMF Wire Mesh Fence
WPF Wood Panel Fence
THE SPOTTED COW
TALL TREES
THE WILLOWS
TURNERS COTTAGE
DANE ACRE
ROUNDSTONE LANE
siteline

APPENDIX C

FOUL & SURFACE DRAINAGE STRATEGY



SEE INSET ABOVE



CONSTRUCTION NOTES:

1. Do not scale from this drawing.
2. All dimensions in metres.
3. All levels relate to ordnance datum.
4. This drawing is based on the latest Architectural planning layout and shall be read in conjunction with all other relevant longitudinal sections and construction drawings.
5. Any discrepancies with any of the drawings shall be reported to MJA Consulting Engineer.
6. The level and location of all existing services shall be verified on site by the Contractor before commencing any construction work.
7. Contractor must comply with all current legislation relating to CDM, Health and Safety and COSHH.
8. All material in excess of 20kg (i.e. kerbs, manhole units cover etc.) shall be mechanically lifted and laid where possible at all times.
9. Manholes, sewers, headwalls and other structures intended to convey surface water or sewerage are to be constructed in accordance with the Water Authorities Association specification "Sewers for Adoption" 6th edition and to Southern Water specification and addendum.
10. Gullies, gully connections, drains, manholes, catchpits, soakaways, headwalls and other drainage structures intended to convey highway water are to be constructed in accordance with the specification issued by West Sussex County Council.
11. All foul and storm water drains which are not to be adopted as public sewers under a section 104 agreement shall be constructed using uPVC pipes or similar approved, bedded and backfilled in accordance with the manufacturers instructions and to the Building Regulations Part H, BS EN 752 & B.R.E. SD1.
12. All building drainage to be 100mm dia. laid at a minimum gradient of 1 in 40 where serving less than 1 WC, 1 in 80 otherwise (FW) and 1 in 80 (SW) unless otherwise shown.
13. Sewers and drains of different diameters should be laid soffit to soffit
14. Inspection chambers on private drains shall be non–access preformed polypropylene.

Depth to invert	Minimum size
< 0.6m	DN300
> 0.6m	DN475

In accordance with the Building Regulations Part H & BS EN 752.

15. Position of soil pipes, stubstacks, WC outlets rainwater downpipes etc positions shall be checked against architects house type drawings to ensure compatibility.
16. Where back inlet gullies are used they should be roddable.
17. All stub stacks to be fitted with air admittance valve where branch drain exceeds 12m except at head of run.
18. Rainwater downpipes to be connected directly to drains via removable adapter to permit access for rodding.
19. Positions of yard and house gullies are nominal and may be adjusted on site, aco drains to be installed at the end of all drives falling towards the public highway. All gully gratings in drives and parking areas should be of sufficient strength to withstand vehicular loading.
20. Lintels or sleeves are to be provided for drains passing through foundation brickwork.
21. All gully connections to be 150 dia. uPVC ultrarib or similar.
22. All gully connections other than at manholes to be "Y" junctions
23. All drain runs are to be flushed through and building materials removed where necessary at the time of final test by Building Inspector and prior to occupation.
24. All soakaways to be positioned a minimum of 5.0m from buildings (where utilised)
25. All finished floor levels are shown on the drawing for guidance only and may need to be adjusted on site. However there is to be no deviation without prior approval
26. All drives are to have a crossfall or gradient of 1:40 minimum. Maximum drive gradient on down slope to be 1 in 10 and 1 in 8 on up slopes.
27. Continuous edging to be laid at rear of service margin.

KEY:

Existing public sewers:

Foul sewer

Storm sewer

Proposed Adoptable Sewers:

Foul sewer

Adopted Foul lateral

Storm sewer

Highway Gully

Proposed Private Drainage:

Foul drain

Storm drain

Rodding eye

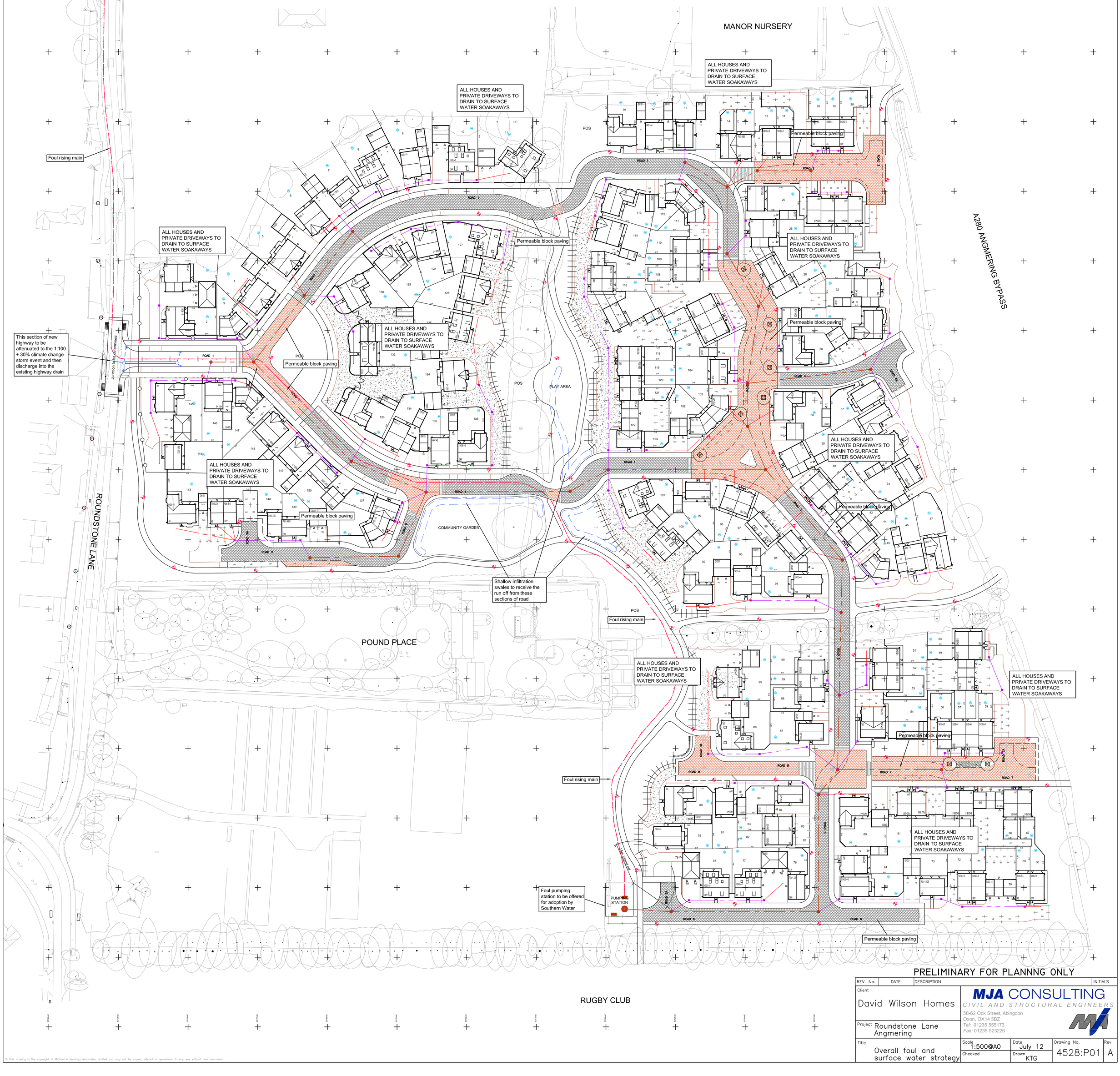
Yard gully

Aco drain

All private inspection chambers shall be polypropylene non–access chambers in accordance with The Building Regulations, Part H.

Chamber sizes:
Depth to invert <1.2m DN450
Depth to invert >1.2m DN600

Invert levels shown thus:	F10.00 S10.00
Primary mobility access	M
Stepped Cavity Tray	SCT
External Brickwork	EXT
Tanking	TNK
Slab on Edge	SOB



PRELIMINARY FOR PLANNNG ONLY

REV. No.	DATE	DESCRIPTION	INITIALS

Client: David Wilson Homes

Project: Roundstone Lane Angmering

Title: Overall foul and surface water strategy

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Scale	Date	Drawing No.	Rev
1:500@A0	July 12	4528:P01	A
Checked	Drawn		
	KTG		

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