



Langford, Horsemere Green Lane, Climping

Proposed development for 9 No Residential Dwellings

DRAINAGE STRATEGY

Foul Drainage

There is 100mm dia. public foul sewer north of the proposed development in Horsemere Green Lane.

The proposed development is for 9 No. residential dwellings, Calculated in accordance with the WRc document '*Sewers for Adoption*', the peak foul water flow into this sewer is 0.416 lits/sec.

It is proposed that there will be a gravity connection from the site into the public sewer system at a new manhole constructed on the sewer line. The final connection will be subject to a Section 106 application with Southern Water Services and payment of the current infrastructure charges.

Details of the existing sewer along with the proposed foul drainage connection can be seen on the Kazys Narbutas Consulting drawing KNC1933-602-01 included with this submission.

Surface Water Drainage

Southern Water sewer records show that there are no public surface water sewers in the vicinity of the development site.

In line with current SuDS (Sustainable Drainage Systems) practise it is proposed to utilise infiltration methods as the means of surface water disposal for the new development if tests prove satisfactory. In order to ascertain maximum depths of potential soakaways, winter groundwater measurements will be undertaken in line with Arun District Council drainage requirements. Having established the highest groundwater levels, tests in accordance with BRE365 will be undertaken at various locations across the site at these levels. The results will confirm if infiltration methods are suitable for the disposal of surface water at these locations and provide the infiltration rates at the proposed depths of the domestic soakaways and permeable paving sub-grade. The results will be utilised for the

*Kazys Narbutas Consulting KNC1933
November 2019*

detailed design of the infiltration measures, which in accordance with current Environment Agency recommendations will include an allowance of 40% for climate change. All detailed design will be in accordance with Arun District Council's Specifications and requirements.

Roof drainage areas will discharge to gravel filled trench soakaways through silt traps in order to minimise sediment deposit in the soakaways. The access road, domestic drives and parking areas will be constructed of permeable block paving.

In the event of infiltration methods not being appropriate across the site, or sections of it, the alternative strategy would be to discharge into the watercourse that runs along the northern boundary with Horsemere Green Lane. Surface water from the site would discharge into a proposed ditch running through the site adjacent to the access road, this new ditch would either be stone filled, if a suitable infiltration rate could be achieved, or contain an Aquacell cellular crate system should zero infiltration be recorded.

The ditch arrangement would discharge into a small pond before passing through a vortex flow control and into the receiving watercourse in Horsemere Green Lane. The discharge into the watercourse would be restricted to the agreed '*greenfield run off*' rate of 2.0lits/sec. Storage of surface water, to cater for the 100 year storm event with a 40% increase for climate change would be in the ditch and pond.

Details of this drainage strategy utilising a discharge into the watercourse can be seen on the Kazys Narbutas Consulting drawing KNC1933-602-01 which is included with this submission along with substantiating calculations for the proposals and the drawing KNC1933-500-01 which shows the impermeable areas that will discharge into the ditch.

Conclusions

The increase in foul water flow from the new site development is low enough not to have any impact on the sewer network and will be covered by Southern Water's infrastructure charges.

The proposal to utilise an infiltration system embraces the concept of the SuDS philosophy for the disposal of surface water drainage on new development sites. This will be investigated during the winter months to see if it is a feasible solution for this site, in part or whole. However should tests prove unsatisfactory then a system can be put in place to discharge into the adjacent watercourse at the '*greenfield run off*' rate and attenuate for the 100 year storm event with an allowance made for climate change, the criteria specified by the Environment Agency.



In accordance with standard procedures a '*Maintenance Manual*' for the ongoing servicing of the surface water drainage systems will be produced once a drainage design strategy has been finalised.

Escher Silverman		Page 1
Lone Barn Studios Stanbridge Lane Romsey SO51 0HE	Langford Horsemere Green Lane	
Date September 2019 File	Designed By KN Checked By	
Micro Drainage	Source Control W.11.2	

IH 124 Mean Annual Flood

Input

Return Period (years)	100	SAAR (mm)	758.000	Urban	0.000
Area (Ha)	50.000	Soil	0.400	Region Number	7

Results l/s

QBAR Rural	186.7
QBAR Urban	186.7

Q 100 years	595.6
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Q 1 year	158.7
Q 2 years	164.5
Q 5 years	239.0
Q 10 years	302.5
Q 20 years	374.0
Q 25 years	401.1
Q 30 years	423.2
Q 50 years	489.2
Q 100 years	595.6
Q 200 years	700.2
Q 250 years	733.8
Q 1000 years	963.5

Section: Civils		 KAZYS NARBUTAS CONSULTING <i>Civil Engineering Consultant</i> Roughton, A2 Omega Park, Electron Way, Chandlers Ford. SO53 4SE Telephone: 023 8027 8643 Email: kazys.n@knc.email			
Project: Langford, Horsemere Green Lane, Climping					
Client : MJH Executive Homes					
Date: November 2019	Job No. KNC1933	Page No. 1	Chk:	By: KHN	Rev: A
Reference	Calculation Existing Site Discharge & Attenuation				Result

Existing Green Field Run off from IH124

Existing site area 0.42Ha

Q_{bar} discharge from 50Ha site = 186.7lits/sec (see MicroDrainage IH124 results)
Applying ratio of existing site to this discharge:

$$0.420/50 \times 186.7 = 1.6 \text{ lit/sec; assume practical discharge } 2.0\text{lit/sec}$$

Take 2.0 lits/sec limiting discharge through new surface water drainage network.
Proposed impermeable area draining through attenuated discharge = 0.19Ha

MicroDrainage Calculations:

Volume of storage required in ditch with Aquacell, without infiltration for
1 in 100yr storm event + 40% addition for climate change = 110.0 cu.m.
Ditch 90.5 x 1.5 x 1.3m deep.

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Lone Barn Studios	Langford	
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Romsey SO51 0HE	Aquacell Filled Ditch	
Date November 2019	Designed By KN	
File Trench Attenuation 100ys+40%.SRC	Checked By	
Micro Drainage	Source Control W.11.2	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 541 minutes

Storm Duration (mins)	Maximum Control (l/s)	Maximum Filtration (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m ³)	Status
15 Summer	1.3	0.0	1.3	5.3527	0.5027	43.2	0 K
30 Summer	1.5	0.0	1.5	5.5173	0.6673	57.4	0 K
60 Summer	1.6	0.0	1.6	5.6863	0.8363	71.9	0 K
120 Summer	1.8	0.0	1.8	5.8418	0.9918	85.2	0 K
180 Summer	1.8	0.0	1.8	5.9113	1.0613	91.2	0 K
240 Summer	1.9	0.0	1.9	5.9428	1.0928	93.9	0 K
360 Summer	1.9	0.0	1.9	5.9593	1.1093	95.4	0 K
480 Summer	1.9	0.0	1.9	5.9558	1.1058	95.0	0 K
600 Summer	1.9	0.0	1.9	5.9468	1.0968	94.3	0 K
720 Summer	1.9	0.0	1.9	5.9343	1.0843	93.2	0 K
960 Summer	1.8	0.0	1.8	5.9048	1.0548	90.7	0 K
1440 Summer	1.8	0.0	1.8	5.8403	0.9903	85.2	0 K
15 Winter	1.4	0.0	1.4	5.4142	0.5642	48.5	0 K
30 Winter	1.6	0.0	1.6	5.6003	0.7503	64.5	0 K
60 Winter	1.7	0.0	1.7	5.7923	0.9423	81.0	0 K
120 Winter	1.9	0.0	1.9	5.9723	1.1223	96.5	0 K
180 Winter	2.0	0.0	2.0	6.0563	1.2063	103.7	0 K
240 Winter	2.0	0.0	2.0	6.0978	1.2478	107.3	0 K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	124.63	23
30 Summer	83.79	37
60 Summer	53.78	68
120 Summer	33.34	126
180 Summer	24.83	186
240 Summer	20.01	246
360 Summer	14.71	362
480 Summer	11.82	414
600 Summer	9.97	478
720 Summer	8.67	540
960 Summer	6.94	678
1440 Summer	5.07	956
15 Winter	124.63	23
30 Winter	83.79	37
60 Winter	53.78	66
120 Winter	33.34	124
180 Winter	24.83	182
240 Winter	20.01	240

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Lone Barn Studios	Langford	
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Romsey SO51 0HE	Aquacell Filled Ditch	
Date November 2019	Designed By KN	
File Trench Attenuation 100ys+40%.SRC	Checked By	
Micro Drainage	Source Control W.11.2	

Summary of Results for 100 year Return Period (+40%)

Storm Duration (mins)	Maximum Control (l/s)	Maximum Filtration (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m³)	Status
360 Winter	2.0	0.0	2.0	6.1297	1.2798	110.0	O K
480 Winter	2.0	0.0	2.0	6.1298	1.2798	110.0	O K
600 Winter	2.0	0.0	2.0	6.1148	1.2648	108.8	O K
720 Winter	2.0	0.0	2.0	6.1023	1.2523	107.6	O K
960 Winter	2.0	0.0	2.0	6.0648	1.2148	104.4	O K
1440 Winter	1.9	0.0	1.9	5.9733	1.1233	96.6	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
360 Winter	14.71	350
480 Winter	11.82	456
600 Winter	9.97	498
720 Winter	8.67	568
960 Winter	6.94	724
1440 Winter	5.07	1028

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Rainfall Details

Region	ENG+WAL	Cv (Summer)	0.750	Summer Storms	Yes
Return Period (years)	100	Cv (Winter)	0.840	Winter Storms	Yes
M5-60 (mm)	19.000	Shortest Storm (mins)	15	Climate Change %	+40
Ratio-R	0.350	Longest Storm (mins)	1440		

Time / Area Diagram

Total Area (ha) = 0.190

Time from:	(mins) to:	Area (ha)	Time from:	(mins) to:	Area (ha)
0	4	0.000	4	8	0.190

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Lone Barn Studios Stanbridge Lane Romsey SO51 0HE	Langford Horsemere Green Lane Aquacell Filled Ditch	
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Micro Drainage	Source Control W.11.2	

Cellular Storage Details

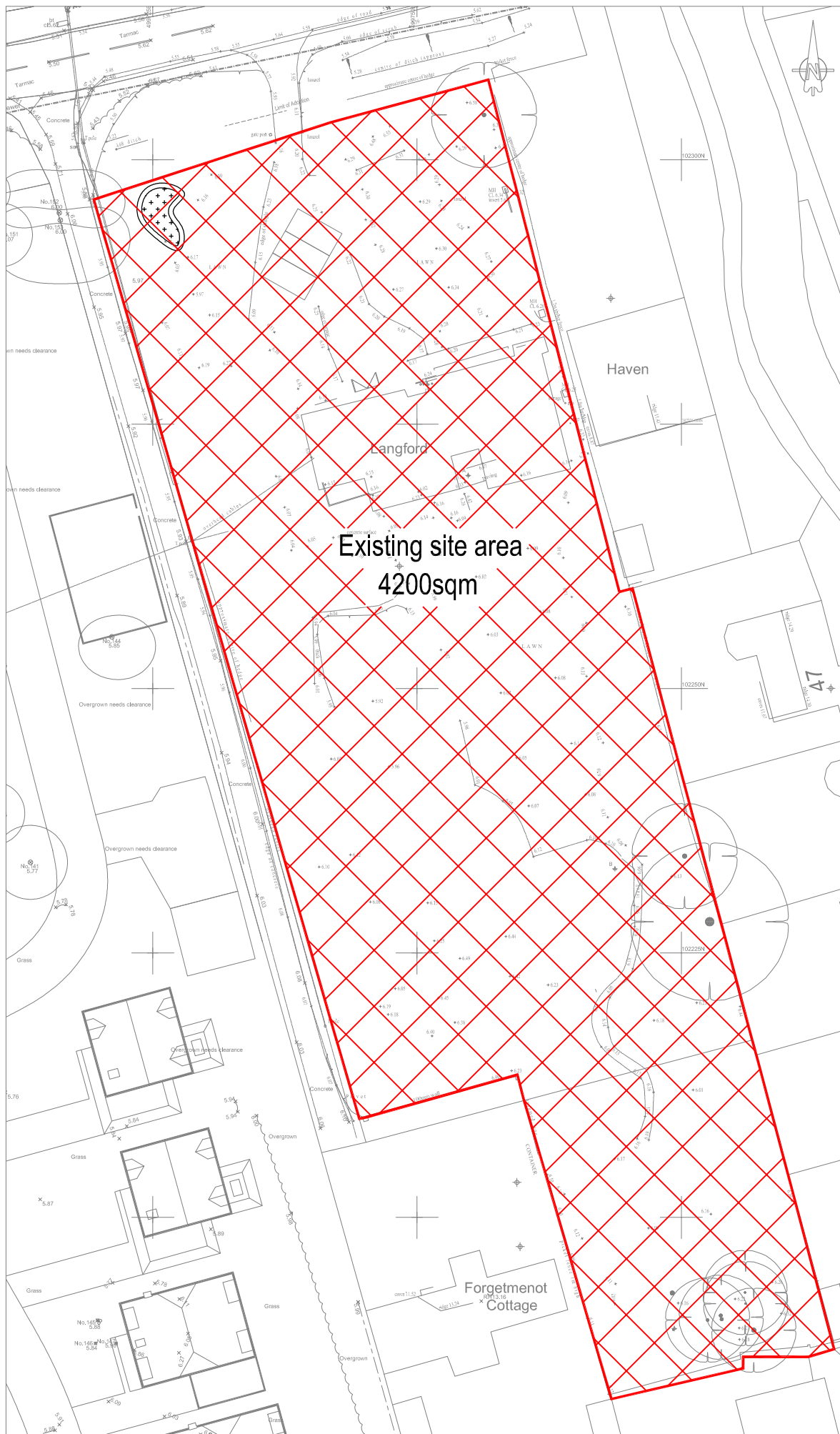
Infil Coef - Base (m/hr) 0.000100 Porosity 0.95
 Infil Coef - Sides (m/hr) 0.000100 Invert Level (m) 4.850
 Safety Factor 10.0 Ground Level (m) 6.200

Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)
0.00	90.5	90.5	1.40	90.5	143.8	2.80	90.5	197.0	4.20	90.5	250.3
0.20	90.5	98.1	1.60	90.5	151.4	3.00	90.5	204.7	4.40	90.5	257.9
0.40	90.5	105.7	1.80	90.5	159.0	3.20	90.5	212.3	4.60	90.5	265.5
0.60	90.5	113.3	2.00	90.5	166.6	3.40	90.5	219.9	4.80	90.5	273.2
0.80	90.5	120.9	2.20	90.5	174.2	3.60	90.5	227.5	5.00	90.5	280.8
1.00	90.5	128.6	2.40	90.5	181.8	3.80	90.5	235.1			
1.20	90.5	136.2	2.60	90.5	189.4	4.00	90.5	242.7			

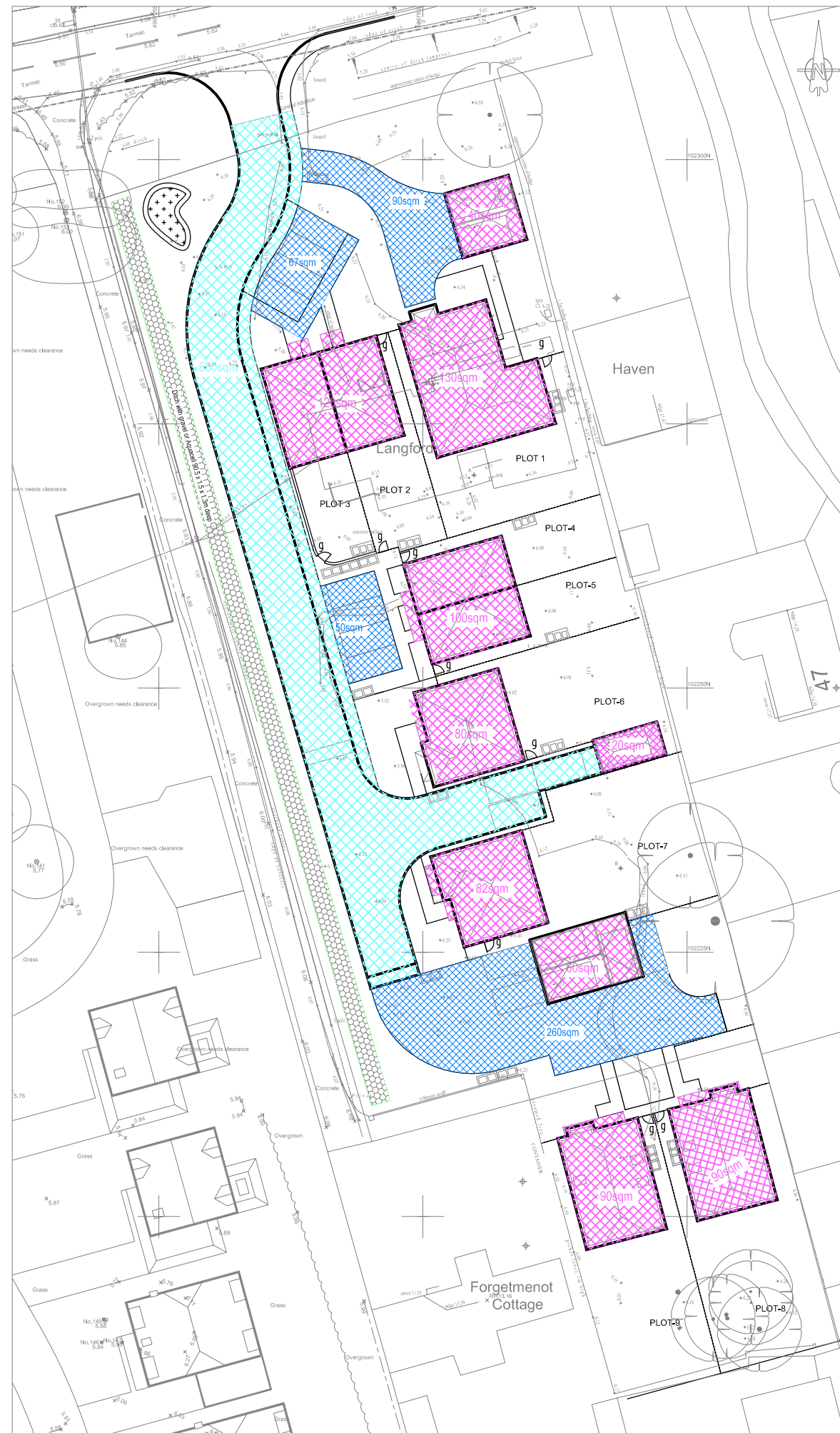
Hydro-Brake Outflow Control

Design Head (m) 1.350 Hydro-Brake Type MD6 Invert Level (m) 4.800
 Design Flow (l/s) 2.0 Diameter (mm) 55

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.10	1.1	0.60	1.4	1.60	2.2	2.60	2.8	5.00	3.9	7.50	4.8
0.20	1.0	0.80	1.6	1.80	2.4	3.00	3.0	5.50	4.1	8.00	5.0
0.30	1.0	1.00	1.8	2.00	2.5	3.50	3.3	6.00	4.3	8.50	5.1
0.40	1.1	1.20	1.9	2.20	2.6	4.00	3.5	6.50	4.5	9.00	5.3
0.50	1.2	1.40	2.1	2.40	2.7	4.50	3.7	7.00	4.6	9.50	5.4



Existing Site Area
Scale 1:250



Proposed Impermeable Areas
Scale 1:250

Existing site area = 4200sqm

Proposed Area Draining to Discharge Proposals

Access Road.....600sqm

Drives.....467sqm

Houses.....312sqm

Total.....1379sqm

Ditch Storage volume for 1 in 100Year storm + 40%

Discharging at 2.0 lts/sec with no infiltration = 110 cu.m

B	04.12.19	Area adjustments based on revised layout	KN
A	12.11.19	First Issue	KN
Rev.	Date	Details	Initials

Drawing Status
FOR INFORMATION

Project
**LANGFORD
HORSEMER GREEN LANE, CLIMPING**

Client
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MICHAEL HARTNETT
EXECUTIVE HOMES**

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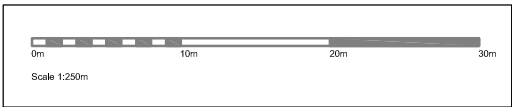
Drawing Title Engineering Details Impermeable Areas			
Drawn KN	Checked	Scales 1:250	Paper Size A1
Job No. ES1933	Drawing No. 500-01	Date 11.19	Revision B



Legend:

- Existing foul water sewer
- Domestic surface water drain
- Domestic foul water drainage
- Type 3 manhole
- Silt trap inspection chamber
- Undersloped highway gully
- Headwall discharge to pond
- Discharge headwall structure with Hydro Brake limiting discharge to 2.2Ml/sec (subject to agreement with ADC)
- Proposed levels
- Proposed Finished Floor Level
- Cartageway crossfall
- Ditch: Filled with stone (porosity >0.4) or Aquacell cellular crates. Final design dependant on infiltration test results measured in accordance with BRE365.
- Block paved parking/drive. Permeable if infiltration tests in accordance with BRE365 prove satisfactory
- Site boundary

- Surface Water Drainage Strategy:**
- The proposed development will embrace the SuDS philosophy of sustainable drainage. The initial proposal and investigation would be to utilise infiltration methods as the means of surface water disposal. Tests will be undertaken across the site in accordance with BRE365 and winter ground water monitoring will be undertaken to ascertain the highest ground level and prove feasibility. Surface water run off from roofs will discharge to domestic trench soakaways. No soakaways to be sited within 5.0 metres of buildings or within root protection zones. All surface water drainage will pass through a silt trap before discharging into soakaways. Drives and parking areas would be constructed in permeable paving and designed in accordance with shallow infiltration test results undertaken in accordance with BRE365.
 - All infiltration measures would be designed in accordance with Environmental Agency guidelines with an allowance for climate change.
 - In the event of infiltration methods not being partially or totally feasible for the disposal of surface water drainage from the site it is proposed to utilise a trench system filled with gravel or aquacell crates that will transport flow from the development to the ditch running along the northern boundary of the site. Discharge from the site will be limited to the calculated greenfield run-off rate and the ditch will be configured to retain the volume of water produced by the 100year storm event with a 40% allowance for climate change as advised by the Environment Agency.
 - The trench proposal should infiltration methods be totally unfeasible, is shown in detail on this drawing. It would be necessary to re-assess trench proposals should some areas of the site be receptive to infiltration methods.
- Foul Water Drainage Strategy:**
- North of the site, in Horsemere green Lane, is a public foul sewer. Under current legislation Southern Water would have no objections to the foul drainage discharge from the site connecting into this sewer. A new manhole would be constructed on the sewer which would be subject to a Section 106 agreement with Southern Water.



C	03.12.19	Adjustments in line with revised layout	RN
B	08.11.19	Ditch proposal and notes added	RM
A	20.08.19	Final issue	RN
Rev	Date	Details	Initials

Drawing Status				
INFORMATION FOR PLANNING				
Project				
LANGFORD HORSEMER GREEN LANE, CLIMPING				
Client				
				
Consultant				
				
Drawing Title				
Engineering Details Drainage Strategy				
Drawn	Checked	Scale	Paper Size	Date
KN		1:250	A1	09.19
Job No.	Drawing No.	Revision		
KNC1933	602-01	C		

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