

Furners Lane, Henfield

Drainage Strategy Report

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1. Introduction

ABSTRACT Consulting have been appointed by Elivia Homes Eastern to prepare a surface and foul water drainage strategy to support a planning application for a new development of 29 dwellings.

1.1. Site Address / Location

Furners Lane, Henfield, West Sussex, BN5 9HS

Ordnance Survey Grid TQ 217 161



Figure 1 – Site Location Plan

1.2. Description of Site

1.2.1. Site

The site extends to 2.90ha and is located within the administrative boundary of Horsham District Council. The site comprises a greenfield with a track running through it which serves several dwellings on the eastern side of the site.

1.2.2. Surrounding Area

The site is immediately south of Furners Lane

To the west is the village of Henfield, whilst to the south is Henfield Bowling Club. There are further fields and small areas of woodland to the north and east.

1.2.3. Access

The site is accessed via an existing track, accessed off Furners Lane (public highway), beyond the existing track access Furners Lane changes to private. The existing access onto the development will be upgraded and formalised into a junction whilst the development is built out.

1.3. Description of Development

The development will comprise 29 dwellings along with associated access roads, parking areas, driveways, and landscaping. A proposed site layout can be found in Appendix A.

2. Existing Foul Water Drainage

Being a greenfield site there is no existing foul drainage on site. This is supported by the topographic survey found in Appendix B which shows no drainage onsite. There is a foul chamber within Furners Lane to the northwest of the site.

The Southern Water sewer records (found in Appendix C) shows that this is a public sewer.

3. Proposed Foul Drainage

A new private foul drainage system will be developed to discharge all foul water to the Southern Water public sewer manhole identified to the northwest of the site entrance.

All foul drainage is proposed to discharge under gravity via the new foul drainage system.

All new foul drainage will be designed and constructed in accordance with Approved Document Part H of the Building Regulations. A layout showing the drainage strategy can be found in Appendix D.

Southern Water have been consulted and have confirmed that they have adequate capacity for the foul flows at the proposed connection point. A letter confirming this can be found in Appendix G.

4. Existing Surface Water Drainage

Being a greenfield site there is no existing surface water drainage on site, however there will be greenfield runoff due to the impermeable nature of the soils beneath the site.

5. SUDS Assessment

Sustainable Urban Drainage Systems (SUDS) is the philosophy of trying to replicate, as closely as possible, the natural drainage from a site before development.

There are a number of SUDS features that should be considered for any development and these are set out in a hierarchy. These are summarised along with their suitability for the site in Table 2 below.

The British Geological Survey mapping for the area shows that the site is underlain by the Lower Greensand Group – Sandstone, silty. This, combined with the on site evidence of poor drainage through the upper layers of the soils shows that infiltration features would not be suitable for this site.

Further to this, infiltration testing was undertaken on site which recorded no infiltration potential. The results of this can be found in Appendix F.

SUDS Feature	Site Specific Notes	Proposed Use
1) Store Rainwater for Later Use		
Rainwater Harvesting	The site has a requirement to consider water neutrality. Rainwater harvesting will assist with this.	Proposed for use.
2) Use Infiltration Techniques		
Green Roofs	Sloped roofs generally offer poor results with green roofs.	Not proposed for use.
Soakaways	Site underlain by unsuitable soils.	Not proposed for use.
Permeable Paving	Site underlain by unsuitable soils. However, a tanked (lined) permeable paving system, discharging to the main drainage system would be possible and provides water quality improvement.	Proposed for use as a tanked system discharging to the sewer for water quality benefits.
3) Attenuate Rainwater in Ponds / Open Features for Gradual Release		
Swales / Detention Basins / Ponds	There are large open areas suitable for the use of these features.	Swales and a pond are proposed for use on site.
4) Attenuate Rainwater in Tanks for Gradual Release		
Reduced Discharge and Storage	Infiltration is expected to be very poor, offering no practical infiltration solution. Therefore, surface water will be discharged to a local sewer. A combination of below ground attenuation tanks, tanked (lined) permeable paving, and a pond will be used to temporarily store the surface water prior to discharge.	Proposed for use.

Table 2 – SUDS Features Summary

6. Proposed Surface Water Drainage

Pre development, the site is classified as a greenfield site and therefore West Sussex's requirements for surface water drainage is to manage and control discharge rates to QBar, Greenfield runoff rates for the developed area.

Surface water runoff will be collected via a mix of tanked (lined) permeable paving, road gullies, swales, and gutters and rainwater downpipes. Surface water from the roofs will be collected and stored for reuse via rainwater harvesting units.

The remaining surface water will be conveyed via a new gravity surface water drainage network to a combined pond and below ground tank storage system located to the northeastern corner of the site.

Due to the topography of the site the surface water held in the pond / below ground attenuation tank will need to be pumped to a surface water sewer located further along Furners Lane to the west of the new site entrance.

The final, offsite flow rate will be restricted through the use of a surface water pump. Vortex flow controls will be utilised within the development in key areas (parking courts) to help control and manage the surface water runoff / discharge into the wider site drainage network.

A layout showing the drainage strategy can be found in Appendix D.

The above changes are summarised in table 3 below, and calculations supporting this summary can be found in Appendix E.

Return Period	Developed Area Greenfield Runoff Rate (l/s ⁻¹)	Post Development Runoff Rate (l/s ⁻¹)
1:2 year	1.7	2.0
QBar	1.9	2.0
1:30 year	3.7	2.0
1:100 year	4.7	2.0

Table 3 – Pre / Post Development Offsite Flow Rate Comparison

Temporary storage will be provided within a combination of a below ground attenuation tank and a pond to balance the volumes prior to discharge to the offsite sewer network up to and including the 1:100 year event with a 45% allowance for climate change which is in accordance with the Environment Agencies recent changes (May 2022), to how Climate Change Allowance is assessed and incorporated within developments.

The tank will be sufficient to store all storms up to and including the 1:30 year event, with the pond providing additional storage for the 1:100 year event.

Using the Environment Agencies Climate Change Allowances web page the 1% annual exceedance rainfall event for the 2070's Epoch * (upper end allowance) is 45%.

* Environment Agency guidelines state:-

Use '2050s' for development with a lifetime up 2060 and use the 2070s epoch for development with a lifetime between 2061 and 2125. Design life of building is 100 years, therefore the 2070s number has been used.

Causeway Flow Calculations supporting the above strategy can be found in Appendix E.

In the event of surface water drainage system exceedance / failure, surface water will discharge over ground towards the north and west, as per the existing condition.

Southern Water have been consulted and have confirmed that they have adequate capacity for up to 3l/s of surface flows at the proposed connection point, therefore they have capacity for the 2l/s required. A letter confirming this can be found in Appendix G.

It is therefore shown that post development offsite surface water flows will be suitably managed and controlled in accordance with West Sussex Councils requirements.

7. Water Quality, Ecology, and Amenity

As demonstrated in Figure 2 below the site is not within any Source Protection Zones.

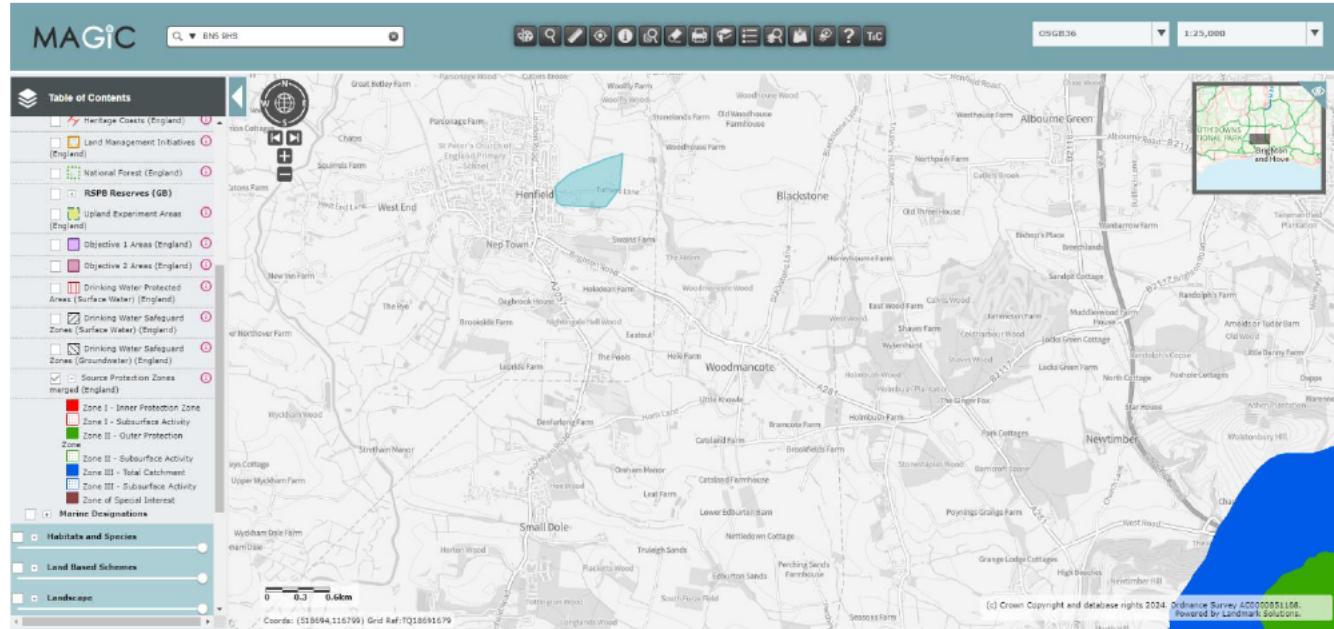


Figure 2 – Magic Map Showing Source Protection Zone

Surface water should be treated prior to discharge to the public sewer. Table 4.3 from CIRIA C753 (The SuDS Manual, 2015) sets out water quality management requirements for discharging surface water.

For Residential Roofs, removal of gross solids only is considered appropriate.

For Residential Parking, and Streets, a Simple Index Approach is considered appropriate. Therefore the site can be assessed using the simple index approach.

Table 26.2 of CIRIA C753 sets out the Hazard Indices for the areas of the site as identified in the previous paragraph. These need to be equalled or better by the Mitigation Indices of the SuDS components proposed to satisfy the requirements of the Simple Index Approach.

Table 4 below sets out the hazard indices.

Land Use	Total Suspended Solids	Metals	Hydrocarbons
Individual Driveways and low traffic roads	0.3	0.2	0.05

Table 4 – Pollution Hazard Indices

Table 26.3 of CIRIA C753 sets out the Mitigation Indices for various common SUDS features.

The surface water from the site will pass through various SUDS features, all of which will provide sufficient cleansing to the surface water.

Table 5 below compares the mitigation indices in the various treatment types to the pollution hazard indices and demonstrates compliance.

Land Use	SUDS Component	Total Suspended Solids	Metals	Hydrocarbons
Individual Driveways and low traffic roads.		0.3	0.2	0.05
	Pond	0.7	0.7	0.5
	Permeable Pavement	0.7	0.6	0.7
	Swale	0.5	0.6	0.6

Table 5 – Pollution Hazard Indices and Mitigation Indices

It can therefore be seen that the Mitigation Indices equal or better the Hazard Indices as required by the Simple Index Approach.

As well as providing water quality benefits the Swales and pond will also provide Ecology and Amenity benefits and will help soften the boundary with the housing to the southeast.

8. Adoption

It is not proposed to offer the new below ground surface and foul water drainage systems for Adoption.

9. Drainage Maintenance

The surface water drainage system serving the development will be managed and maintained by the residents own appointed management and maintenance team once the development has been officially handed over.

The pipework within the site will be designed to be self-cleansing in accordance with Part H of the Building Regulations and as such should have no specific maintenance requirements other than general clearance of silts and debris as and when required.

The use of manholes and inspection chambers will allow future access to maintain the system.

Standard typical maintenance associated with any property will be required for the roof water, typically consisting of ensuring that the system is clear of any leaves or other debris. This should be carried out as required.

Table 6 sets out the various elements of the drainage system and suggested maintenance requirements.

Drainage Element	Inspection Requirements	Maintenance Requirements	Inspection Schedule
Gutters & Rainwater Downpipes	Visual inspection to check for blockages.	Clear and blockages / debris found.	Yearly
Pipework	Designed to be self-cleansing, only required if flooding issue occurs, then by specialist CCTV company.	As recommended by specialist CCTV survey company.	When required.
Catchpits / Hydrobrake Chambers	Visual inspection for silt / debris.	Clear silt / debris.	Initially after 3 months, then every 6 months.
Permeable Paving	Visual check for debris and weeds.	Remove debris and weeds with powered brush to sweep the surface.	Initially after 3 months, then every 6 months.
Attenuation Tanks	CCTV survey to check distributor pipe is clear of debris, visual inspection of surface to check for deformation indicating an issue with the tank below.	Clear silt / debris. Excavation and replacement if required.	Yearly
Swales and Pond	Check for litter, debris, and weeds. Check grass length. Check for areas of poor vegetation growth.	Clear litter, debris, and weeds. Mow grass. Reseed areas to assist with growth.	Initially after 3 months, then every 6 months. Monthly during growing season.
Pump	As required by the manufacturer	As required by the manufacturer	Yearly
Below ground drainage system <u>MUST</u> only be worked on / entered by suitably trained and qualified people using appropriate Health and Safety equipment			

Table 6 – SUDS Maintenance Summary

10. Construction Phase Drainage System

Once appointed, the main contractor as part of their overall responsibilities will prepare the necessary documentation and methodology regarding how they intend to manage the surface water run-off during the main construction works.

11. Conclusions

The site is currently a greenfield site. There is a public foul water sewer network to the northwest of the site entrance in Furners Lane. A public surface water sewer network is also located to the northwest of the site entrance in Furners Lane.

The new development will comprise 29 new dwellings, alongside associated access roads, parking area, and driveways.

The proposed development will discharge foul water to the Southern Water public foul sewer to the northwest of the site in Furners Lane, via a new connection.

Surface water will be discharged to a surface water sewer identified to the northwest of the site along Furners Lane. Surface water flow rates will be restricted to the Greenfield Runoff QBar rate in accordance with the requirements of West Sussex County Council's surface water drainage requirements. Surface water will be temporarily stored on site through the use of a combined below ground attenuation tank and pond prior to discharge. This will be sized for the 1:100 year event with a 45% allowance for climate change.

All surface water runoff shall also be treated prior to discharge to the sewer to help prevent contaminated surface water from leaving the site.

Appendix A – Proposed Site Layout

Designers Hazard Register

1. Conflict between construction work and Furners Lane highway.
2. Sloping site could cause subsidence when strip foundations are dug.
3. Construction works on an existing highway to create site access.
4. Close proximity to existing dwellings on Furners Mead and The Daisycroft.
5. Existing mature trees on site that are to be retained, full arboricultural recommended protection measures to be implemented.
6. Overhead cables to be buried as part of the works.



Accommodation Schedule

Affordable Rented Dwellings [16no. - 34.5%]

2no.	1-Bedroom M(3) Flats	AFF Type 1	Block	607sqft
2no.	2-Bedroom Flats	AFF Type 2	Block	716sqft
2no.	2-Bedroom Houses	AFF Type 3	Terraced	874sqft
4no.	3-Bedroom Houses	AFF Type 4	Terraced	1003sqft

Open Market Dwellings [19no. - 65.5%]

2no.	3-Bedroom Chalet Bungalows	New House Type A	Detached	1526sqft
2no.	3-Bedroom Chalet Bungalows	New House Type B	Detached	1261sqft
2no.	3-Bedroom Chalet Bungalows	New House Type C	Semi-D	1295sqft
3no.	3-Bedroom Chalet Bungalows	Birley	Detached	1238sqft
3no.	4-Bedroom Houses	Ashcombe II	Detached	1427sqft
5no.	4-Bedroom Houses	Barnham	Detached	1605sqft
2no.	4-Bedroom w/ Study Houses	Goring	Detached	1854sqft

Total: 29 Dwellings

Parking
Allocated Spaces: 54 spaces
Visitor Parking: 11 spaces
Private Garages: 18 (Garages to Plot 26 & 23 to be included in allocated spaces)

Total Parking Spaces: 65 spaces

N
SITE PLAN

P5 03/01/25 Issued to Planning LP TW
P4 23/12/24 Issued to Planning LP TW
P3 18/12/24 Amended to clients comments LP TW
P2 12/12/24 Amended to clients comments LP TW
P1 27.09.24 Planning Submission NK TW
Rev Date Revision Details Dr Ch



Client's Name
Elvia Homes

Job Title
Land West of Backsettow,
Furners Lane, Henfield

Drawing Title
Proposed Site Plan:
Presentation

Scale
1:500 @ A1 / 1:1000 @ A3

metres 10 20 30 40 50

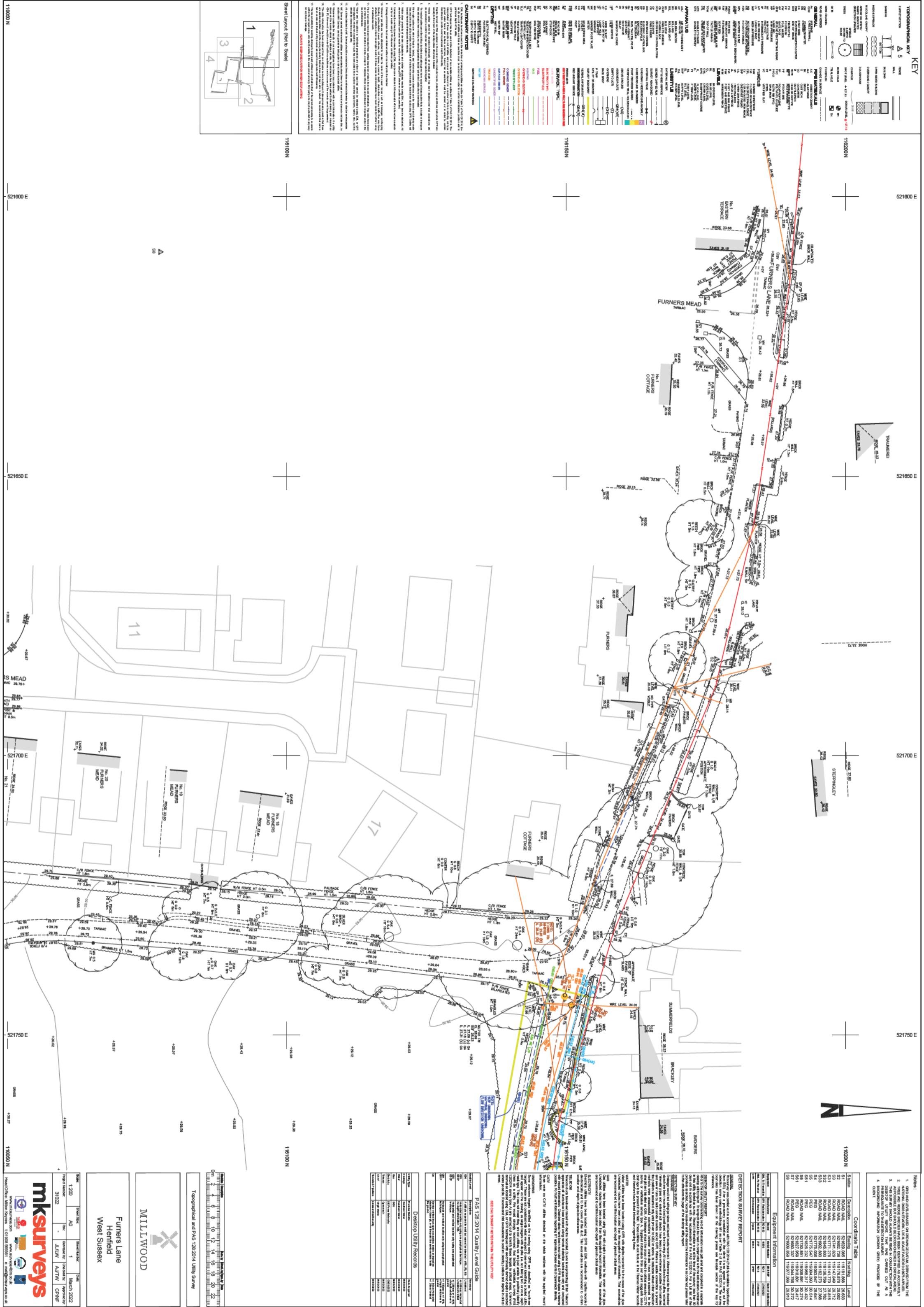
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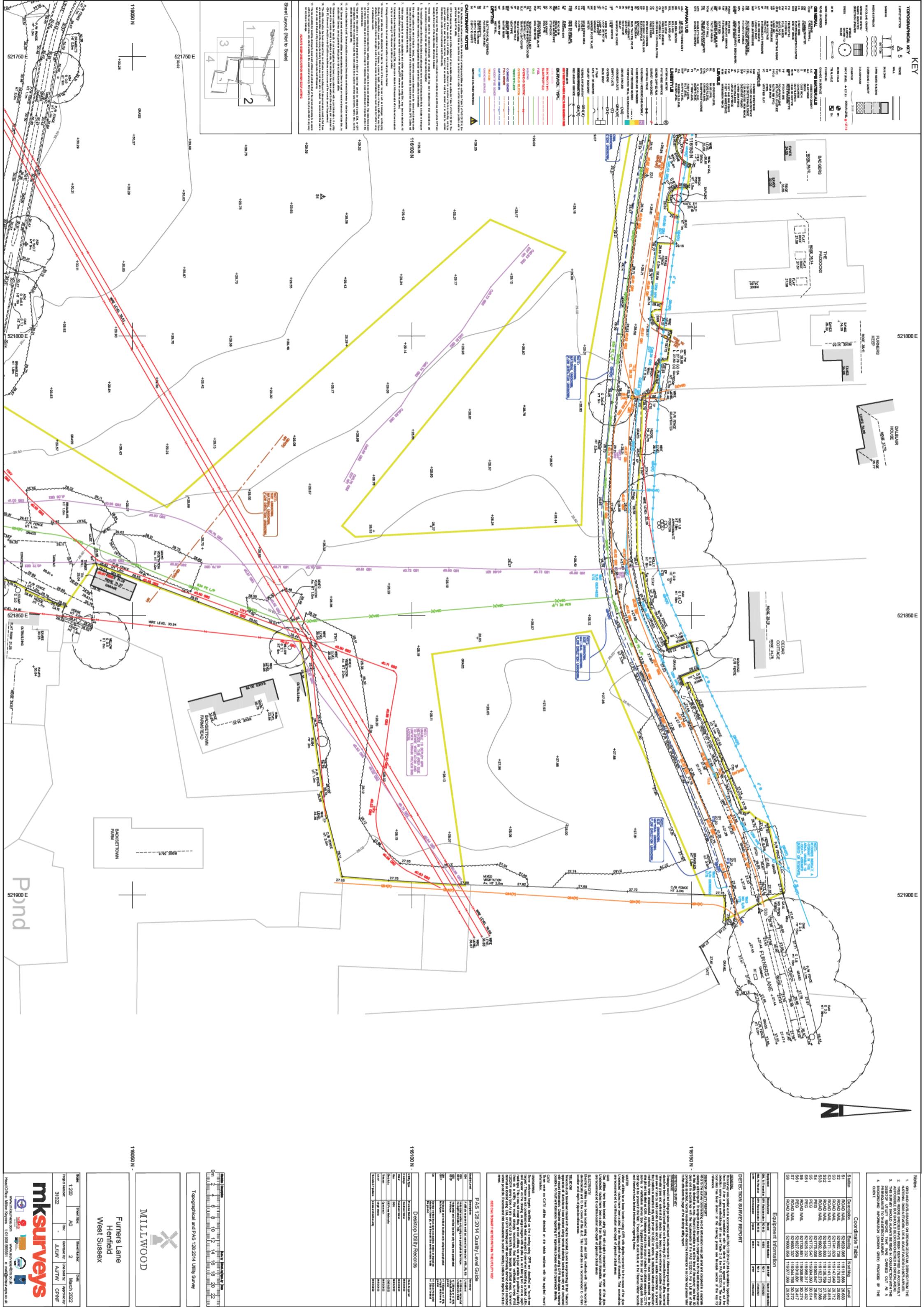
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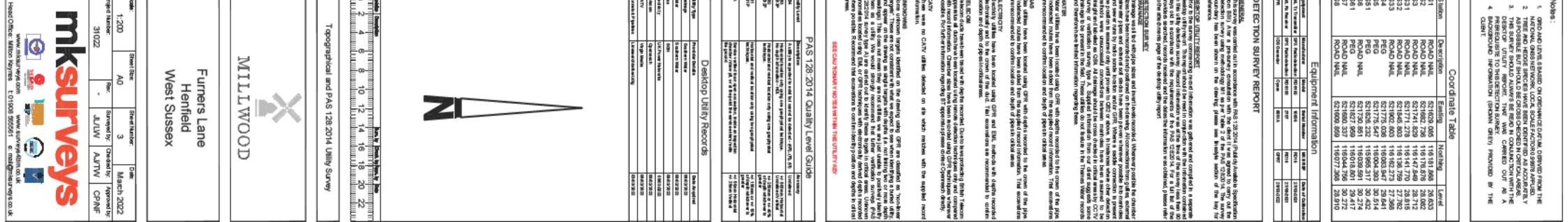
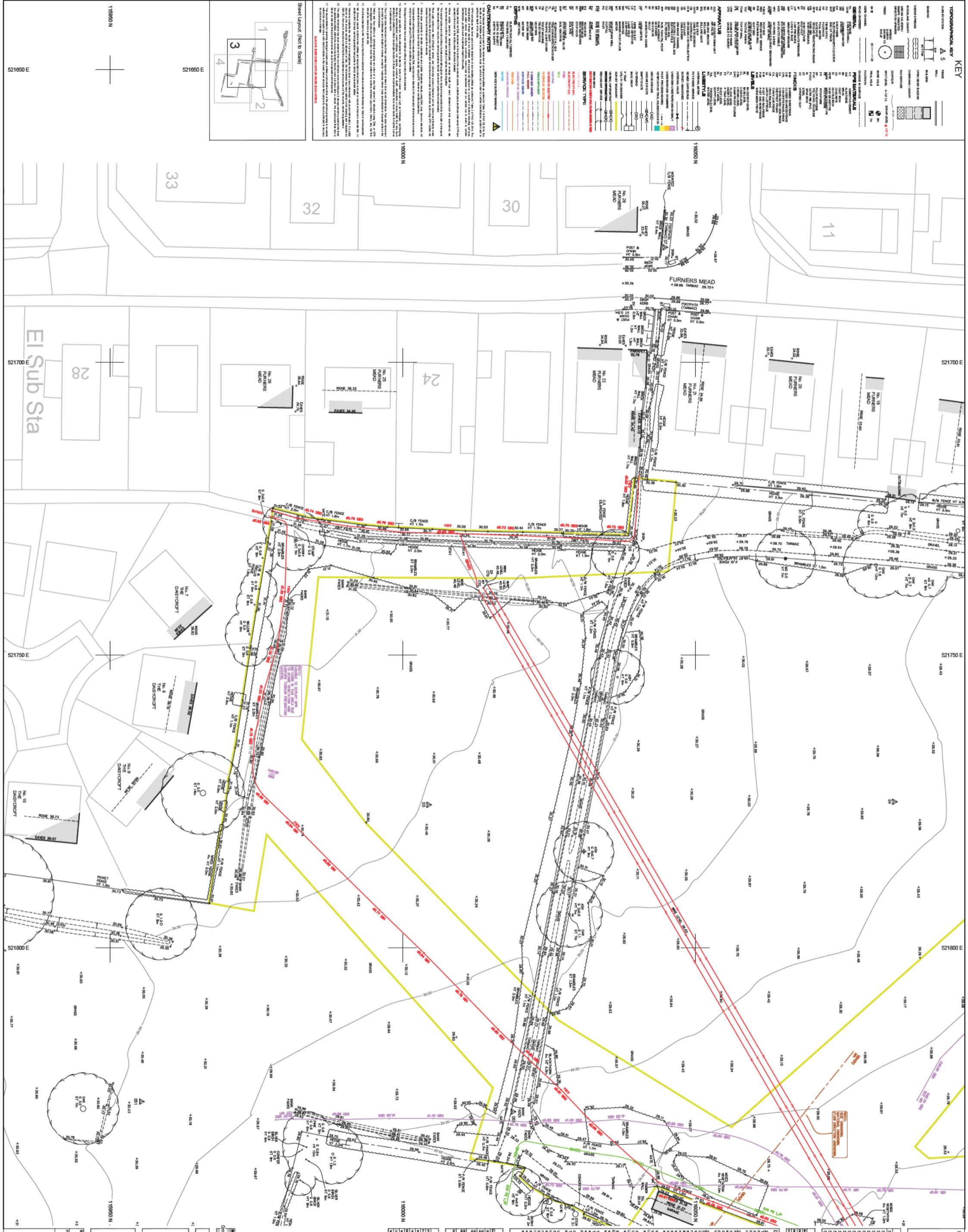
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Appendix B – Topographic and Utility Survey



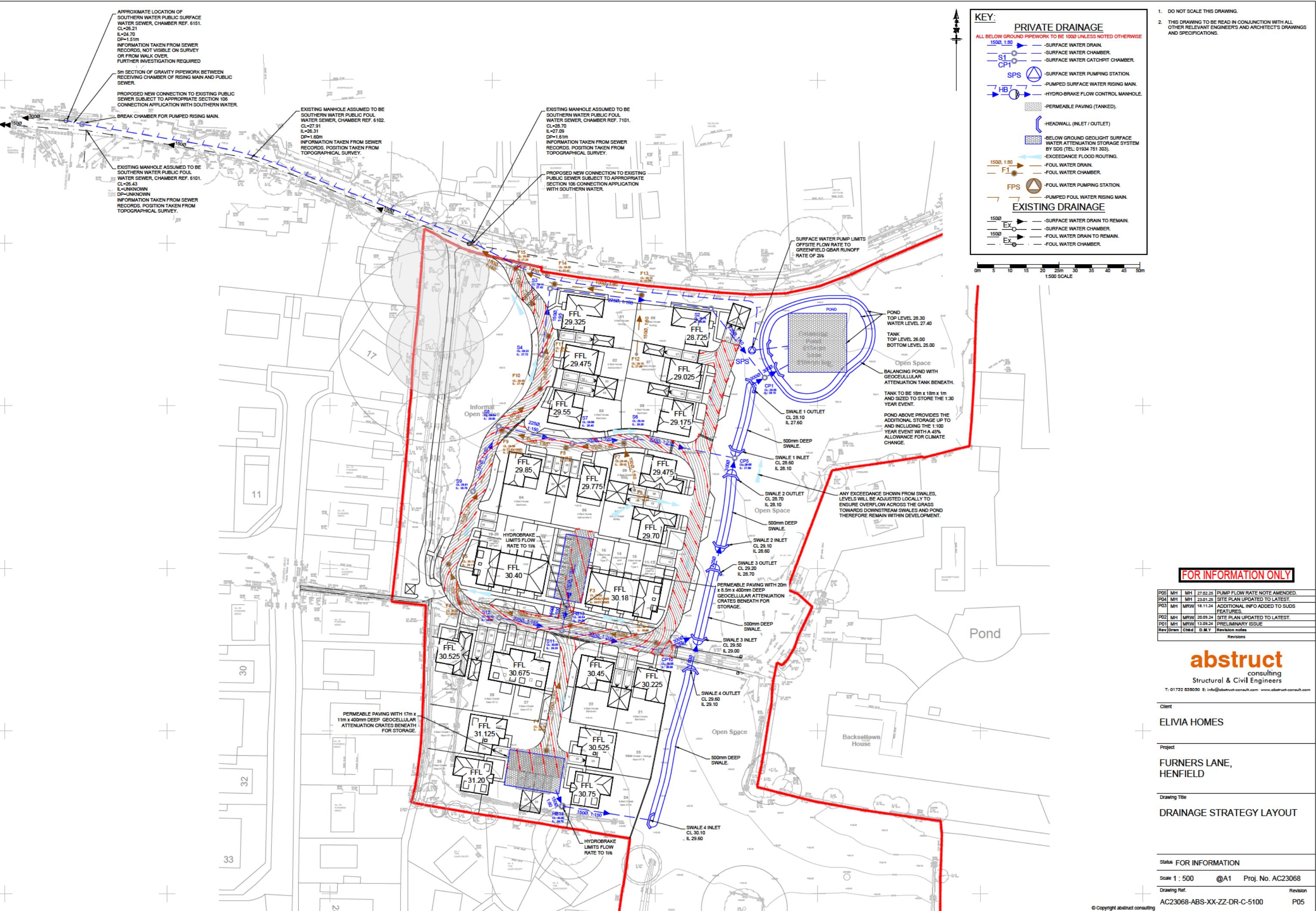




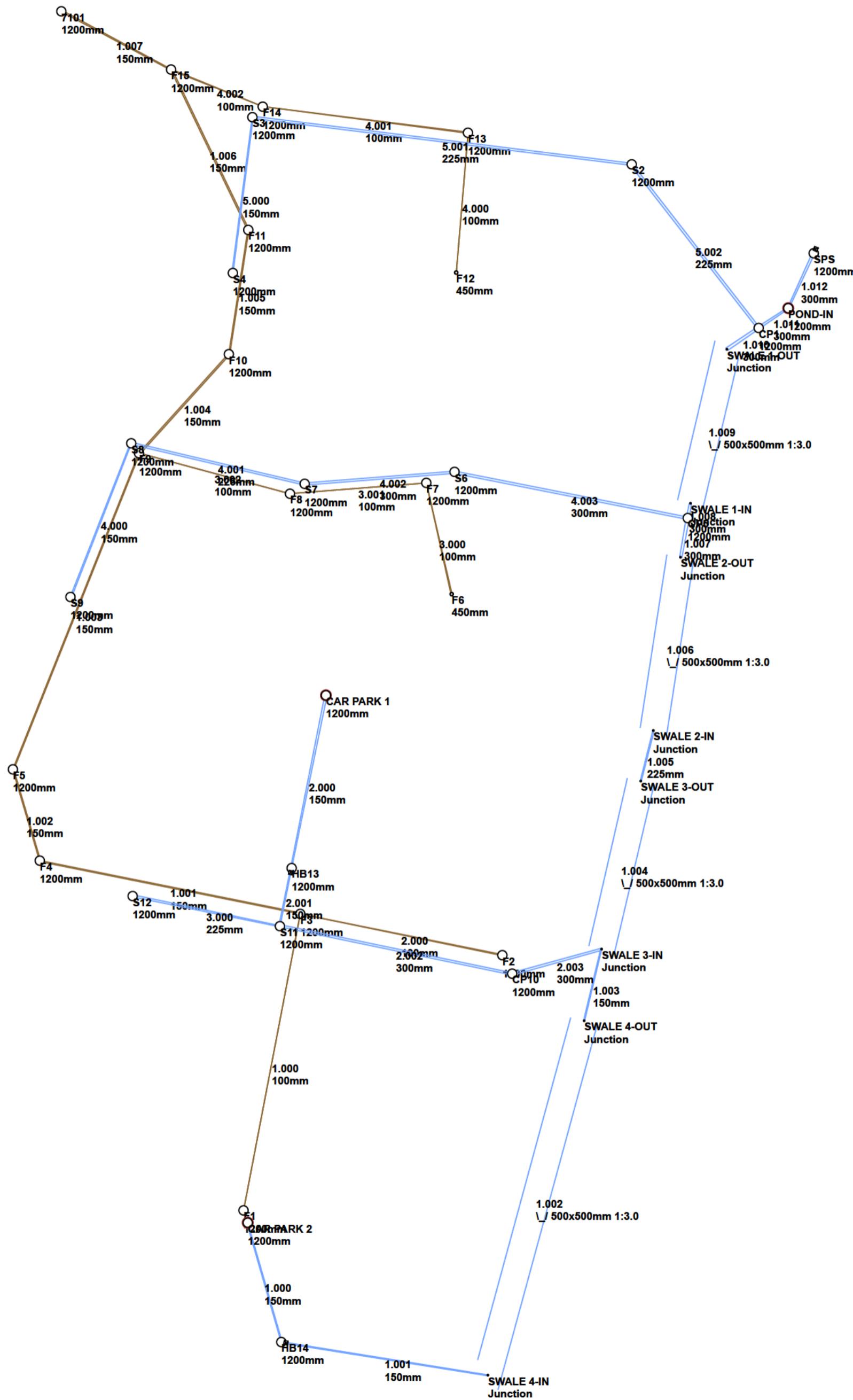
Appendix C – Southern Water Sewer Records



Appendix D – Drainage Strategy Drawing



Appendix E – Surface Water Drainage Calculations



Design Settings

Rainfall Methodology	FEH-22	Time of Entry (mins)	5.00	Connection Type	Level Soffits	Enforce best practice design rules	<input checked="" type="checkbox"/>
Return Period (years)	2	Maximum Time of Concentration (mins)	30.00	Minimum Backdrop Height (m)	0.200		
Additional Flow (%)	0	Maximum Rainfall (mm/hr)	50.0	Preferred Cover Depth (m)	1.200		
CV	1.000	Minimum Velocity (m/s)	1.00	Include Intermediate Ground	✓		

Nodes

	Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
CAR PARK 2		0.072	5.00	30.700	1200	521767.150	115992.379	0.800
HB14				30.800	1200	521771.524	115976.874	1.020
SWALE 4-IN				30.100		521798.450	115972.578	0.500
SWALE 4-OUT				29.600		521810.994	116018.628	0.500
CAR PARK 1		0.072	5.00	30.200	1200	521777.341	116060.905	0.600
HB13				30.540	1200	521772.872	116038.455	1.110
S12		0.039	5.00	30.430	1200	521752.149	116034.821	1.030
S11		0.060	5.00	30.500	1200	521771.339	116030.910	1.300
CP10		0.029	5.00	30.050	1200	521801.619	116024.738	1.000
SWALE 3-IN				29.500		521813.275	116027.931	0.500
SWALE 3-OUT				29.200		521818.374	116049.764	0.500
SWALE 2-IN				29.100		521820.015	116056.335	0.500
SWALE 2-OUT				28.700		521823.552	116078.845	0.500
S9		0.020	5.00	29.810	1200	521744.044	116073.681	0.960
S8		0.027	5.00	29.540	1200	521751.963	116093.650	0.910
S7		0.039	5.00	29.680	1200	521774.568	116088.386	1.280
S6				29.440	1200	521794.103	116089.937	1.140
CP5		0.018	5.00	28.650	1200	521824.503	116083.936	0.500
SWALE 1-IN				28.600		521824.863	116085.860	0.500
SWALE 1-OUT				28.100		521829.602	116105.867	0.500
S4		0.041	5.00	29.220	1200	521765.209	116115.773	1.500
S3		0.036	5.00	29.140	1200	521767.756	116136.025	1.710
S2		0.033	5.00	28.750	1200	521817.196	116129.896	1.850
CP1				28.050	1200	521833.746	116108.634	1.950
POND-IN				28.300	1200	521837.596	116111.205	3.300
SPS				28.300	1200	521840.918	116118.346	3.333

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)	Design Flow (l/s)
1.000	CAR PARK 2	HB14	16.110	0.600	29.900	29.780	0.120	134.3	150	5.31	50.0	
1.001	HB14	SWALE 4-IN	27.267	0.600	29.780	29.600	0.180	151.5	150	5.87	50.0	1.0
1.002	SWALE 4-IN	SWALE 4-OUT	47.728	0.240	29.600	29.100	0.500	95.5	500	10.30	39.2	
1.003	SWALE 4-OUT	SWALE 3-IN	9.579	0.600	29.100	29.000	0.100	95.8	150	10.46	38.9	

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.865	15.3	13.0	0.650	0.870	0.072	0.0	106	0.969
1.001	0.814	14.4	1.0	0.870	0.350	0.072	0.0	27	0.465
1.002	0.179	179.5	10.2	0.000	0.000	0.072	0.0	133	0.085
1.003	1.027	18.1	10.1	0.350	0.350	0.072	0.0	80	1.054

Links

	Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)	Design Flow (l/s)
2.000	CAR PARK 1	HB13		22.890	0.600	29.600	29.430	0.170	134.6	150	5.44	50.0	
2.001	HB13	S11		7.699	0.600	29.430	29.350	0.080	96.2	150	5.57	50.0	1.0
3.000	S12	S11		19.584	0.600	29.400	29.275	0.125	156.7	225	5.31	50.0	
2.002	S11	CP10		30.903	0.600	29.200	29.050	0.150	206.0	300	6.04	50.0	
2.003	CP10	SWALE 3-IN		12.085	0.600	29.050	29.000	0.050	241.7	300	6.24	50.0	
1.004	SWALE 3-IN	SWALE 3-OUT		22.421	0.240	29.000	28.700	0.300	74.7	500	12.30	35.6	
1.005	SWALE 3-OUT	SWALE 2-IN		6.773	0.600	28.700	28.600	0.100	67.7	225	12.37	35.4	
1.006	SWALE 2-IN	SWALE 2-OUT		22.786	0.240	28.600	28.200	0.400	57.0	500	14.00	33.0	
1.007	SWALE 2-OUT	CP5		5.179	0.600	28.200	28.150	0.050	103.6	300	14.06	33.0	
4.000	S9	S8		21.482	0.600	28.850	28.705	0.145	148.2	150	5.43	50.0	
4.001	S8	S7		23.210	0.600	28.630	28.475	0.155	149.7	225	5.80	50.0	
4.002	S7	S6		19.596	0.600	28.400	28.300	0.100	196.0	300	6.09	50.0	
4.003	S6	CP5		30.987	0.600	28.300	28.150	0.150	206.6	300	6.56	49.2	
1.008	CP5	SWALE 1-IN		1.957	0.600	28.150	28.100	0.050	39.1	300	14.07	32.9	
1.009	SWALE 1-IN	SWALE 1-OUT		20.561	0.240	28.100	27.600	0.500	41.1	500	15.33	31.4	
1.010	SWALE 1-OUT	CP1		4.983	0.600	27.600	26.100	1.500	3.3	300	15.33	31.4	
5.000	S4	S3		20.412	0.600	27.720	27.430	0.290	70.4	225	5.22	50.0	
5.001	S3	S2		49.818	0.600	27.430	26.900	0.530	94.0	225	5.83	50.0	
5.002	S2	CP1		26.944	0.600	26.900	26.175	0.725	37.2	225	6.04	50.0	
1.011	CP1	POND-IN		4.630	0.600	26.100	26.000	0.100	46.3	300	15.37	31.3	
1.012	POND-IN	SPS		7.876	0.600	25.000	24.967	0.033	238.7	300	15.50	31.2	

	Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
2.000	0.864	15.3	13.0	0.450	0.960	0.072	0.0	106	0.968	
2.001	1.024	18.1	1.0	0.960	1.000	0.072	0.0	24	0.546	
3.000	1.042	41.4	7.0	0.805	1.000	0.039	0.0	63	0.782	
2.002	1.091	77.1	30.9	1.000	0.700	0.171	0.0	132	1.033	
2.003	1.007	71.2	36.1	0.700	0.200	0.200	0.0	151	1.011	
1.004	0.203	202.9	39.2	0.000	0.000	0.305	0.0	241	0.133	
1.005	1.591	63.3	39.1	0.275	0.275	0.305	0.0	128	1.671	
1.006	0.232	232.4	41.2	0.000	0.000	0.345	0.0	231	0.149	
1.007	1.544	109.2	41.1	0.200	0.200	0.345	0.0	127	1.439	
4.000	0.823	14.5	3.6	0.810	0.685	0.020	0.0	51	0.682	
4.001	1.066	42.4	8.5	0.685	0.980	0.047	0.0	68	0.837	
4.002	1.119	79.1	15.5	0.980	0.840	0.086	0.0	90	0.876	
4.003	1.090	77.0	15.3	0.840	0.200	0.086	0.0	90	0.853	
1.008	2.520	178.1	53.5	0.200	0.200	0.449	0.0	112	2.211	
1.009	0.273	273.5	54.8	0.000	0.000	0.483	0.0	245	0.181	
1.010	8.683	613.8	54.8	0.200	1.650	0.483	0.0	60	5.444	
5.000	1.561	62.0	7.4	1.275	1.485	0.041	0.0	52	1.058	
5.001	1.349	53.6	13.9	1.485	1.625	0.077	0.0	78	1.135	
5.002	2.152	85.6	19.9	1.625	1.650	0.110	0.0	73	1.760	
1.011	2.316	163.7	67.2	1.650	2.000	0.593	0.0	134	2.207	
1.012	1.013	71.6	66.8	3.000	3.033	0.593	0.0	231	1.145	

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	1.000	Drain Down Time (mins)	7200	Check Discharge Rate(s)	✓	100 year (l/s)	4.7
Rainfall Events	Singular	Analysis Speed	Detailed	Additional Storage (m ³ /ha)	0.0	2 year (l/s)	1.7	Check Discharge Volume	✓
Summer CV	1.000	Skip Steady State	x	Starting Level (m)		30 year (l/s)	3.7	100 year 360 minute (m ³)	218

Storm Durations
 15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440 | 2160 | 2880 | 4320

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	10	0	30	40	10	0	100	45	10	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Host	1	Growth Factor 2 year	0.90	QMed	1.7	Q 100 year (l/s)	4.7
Greenfield Method	FEH	BFIHost	0.610	Growth Factor 30 year	1.95	QBar	1.9		
Positively Drained Area (ha)	0.593	Region	1	Growth Factor 100 year	2.48	Q 2 year (l/s)	1.7		
SAAR (mm)	808	QBar/QMed conversion factor	1.111	Betterment (%)	0	Q 30 year (l/s)	3.7		

Pre-development Discharge Volume

Site Makeup	Greenfield	Positively Drained Area (ha)	0.593	SPR	0.47	Return Period (years)	100	Storm Duration (mins)	360	PR	0.511
Greenfield Method	FSR/FEH	Soil Index	4	CWI	121.185	Climate Change (%)	0	Betterment (%)	0	Runoff Volume (m³)	218

Node HB14 Online Hydro-Brake® Control

Flap Valve	x	Design Depth (m)	0.520	Sump Available	✓	Min Node Diameter (mm)	1200
Replaces Downstream Link	✓	Design Flow (l/s)	1.0	Product Number	CTL-SHE-0053-1000-0520-1000		
Invert Level (m)	29.780	Objective	(HE) Minimise upstream storage	Min Outlet Diameter (m)	0.075		

Node HB13 Online Hydro-Brake® Control

Flap Valve	x	Design Depth (m)	0.590	Sump Available	✓	Min Node Diameter (mm)	1200
Replaces Downstream Link	✓	Design Flow (l/s)	1.0	Product Number	CTL-SHE-0052-1000-0590-1000		
Invert Level (m)	29.430	Objective	(HE) Minimise upstream storage	Min Outlet Diameter (m)	0.075		

Node SPS Online Pump Control

Flap Valve	x	Replaces Downstream Link	✓	Invert Level (m)	24.967	Switch on depth (m)	0.001	Switch off depth (m)	0.000
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 Depth Flow
 (m) (l/s)
 0.001 2.000

Node CAR PARK 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Side Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Porosity	0.95	Invert Level (m)	29.600	Time to half empty (mins)	744
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Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	170.0	0.0	0.400	170.0	0.0	0.401	0.0	0.0

Node CAR PARK 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Side Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Porosity	0.95	Invert Level (m)	29.900	Time to half empty (mins)	552
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Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	187.0	0.0	0.400	187.0	0.0	0.401	0.0	0.0

Node POND-IN Depth/Area Storage Structure

Base Inf Coefficient (m/hr) 0.00000 | Side Inf Coefficient (m/hr) 0.00000 | Safety Factor 2.0 | Porosity 1.00 | Invert Level (m) 27.400 | Time to half empty (mins) 1860

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	609.0	0.0	0.600	782.0	0.0	0.900	875.0	97.9

Node POND-IN Depth/Area Storage Structure

Base Inf Coefficient (m/hr) 0.00000 | Side Inf Coefficient (m/hr) 0.00000 | Safety Factor 2.0 | Porosity 0.95 | Invert Level (m) 25.000 | Time to half empty (mins) 1320

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	324.0	0.0	1.000	324.0	0.0	1.001	0.0	0.0

Results for 1 year +10% A Critical Storm Duration. Lowest mass balance: 99.16%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	CAR PARK 2	232	29.948	0.047	3.2	8.4919	0.0000	OK
360 minute summer	HB14	232	29.947	0.167	1.2	0.1890	0.0000	SURCHARGED
120 minute winter	SWALE 4-IN	104	29.651	0.051	1.0	0.0000	0.0000	OK
15 minute summer	SWALE 4-OUT	14	29.137	0.037	2.8	0.0000	0.0000	OK
240 minute summer	CAR PARK 1	160	29.650	0.050	3.9	8.1833	0.0000	OK
240 minute summer	HB13	160	29.650	0.220	1.7	0.2484	0.0000	SURCHARGED
15 minute summer	S12	10	29.455	0.055	5.2	0.0617	0.0000	OK
15 minute summer	S11	10	29.282	0.082	13.1	0.0930	0.0000	OK
15 minute summer	CP10	11	29.158	0.108	16.8	0.1221	0.0000	OK
15 minute summer	SWALE 3-IN	12	29.142	0.142	16.6	0.0000	0.0000	OK
15 minute summer	1.004:50%	13	29.038	0.188	17.2	0.0000	0.0000	OK
15 minute summer	SWALE 3-OUT	13	28.777	0.077	15.0	0.0000	0.0000	OK
15 minute summer	SWALE 2-IN	14	28.740	0.140	15.2	0.0000	0.0000	OK
30 minute summer	1.006:50%	22	28.578	0.178	16.4	0.0000	0.0000	OK
30 minute summer	SWALE 2-OUT	23	28.288	0.088	15.7	0.0000	0.0000	OK
15 minute summer	S9	11	28.894	0.044	2.7	0.0497	0.0000	OK
15 minute summer	S8	11	28.689	0.059	6.2	0.0669	0.0000	OK
15 minute summer	S7	11	28.479	0.079	11.2	0.0889	0.0000	OK
15 minute summer	S6	11	28.378	0.078	11.2	0.0883	0.0000	OK
30 minute summer	CP5	21	28.260	0.110	22.8	0.1239	0.0000	OK
30 minute summer	SWALE 1-IN	22	28.260	0.160	22.7	0.0000	0.0000	OK
30 minute summer	1.009:50%	23	28.093	0.243	24.4	0.0000	0.0000	OK
30 minute summer	SWALE 1-OUT	23	27.640	0.039	23.4	0.0000	0.0000	OK
15 minute summer	S4	10	27.765	0.045	5.5	0.0507	0.0000	OK
15 minute summer	S3	10	27.497	0.067	10.2	0.0758	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute summer	CAR PARK 2	1.000	HB14	1.2	0.213	0.079	0.1803	
360 minute summer	HB14	Hydro-Brake®	SWALE 4-IN	1.0				
120 minute winter	SWALE 4-IN	1.002	SWALE 4-OUT	1.0	0.043	0.006	1.1265	
15 minute summer	SWALE 4-OUT	1.003	SWALE 3-IN	-2.8	-0.294	-0.156	0.0972	
240 minute summer	CAR PARK 1	2.000	HB13	1.7	0.220	0.113	0.2608	
240 minute summer	HB13	Hydro-Brake®	S11	1.0				
15 minute summer	S12	3.000	S11	5.1	0.704	0.123	0.1420	
15 minute summer	S11	2.002	CP10	12.9	0.691	0.168	0.5940	
15 minute summer	CP10	2.003	SWALE 3-IN	16.6	0.619	0.233	0.3348	
15 minute summer	SWALE 3-IN	1.004	1.004:50%	13.2	0.089	0.065	1.8362	
15 minute summer	SWALE 3-IN	1.004	SWALE 3-OUT	15.0	0.126	0.074	1.4356	
15 minute summer	SWALE 3-OUT	1.005	SWALE 2-IN	15.2	0.975	0.240	0.1256	
15 minute summer	SWALE 2-IN	1.006	1.006:50%	14.6	0.097	0.063	1.7387	
15 minute summer	SWALE 2-IN	1.006	SWALE 2-OUT	15.1	0.131	0.065	1.3885	
30 minute summer	SWALE 2-OUT	1.007	CP5	15.7	0.841	0.144	0.1036	
15 minute summer	S9	4.000	S8	2.6	0.623	0.181	0.0910	
15 minute summer	S8	4.001	S7	6.2	0.757	0.146	0.1894	
15 minute summer	S7	4.002	S6	11.2	0.769	0.142	0.2863	
15 minute summer	S6	4.003	CP5	11.3	0.726	0.147	0.5158	
30 minute summer	CP5	1.008	SWALE 1-IN	22.7	0.749	0.128	0.0601	
30 minute summer	SWALE 1-IN	1.009	1.009:50%	22.6	0.103	0.083	2.3365	
30 minute summer	SWALE 1-IN	1.009	SWALE 1-OUT	23.4	0.179	0.086	1.6641	
30 minute summer	SWALE 1-OUT	1.010	CP1	23.4	1.935	0.038	0.0674	
15 minute summer	S4	5.000	S3	5.4	0.708	0.088	0.1582	
15 minute summer	S3	5.001	S2	10.1	1.056	0.188	0.4758	

Results for 1 year +10% A Critical Storm Duration. Lowest mass balance: 99.16%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S2	11	26.964	0.064	14.4	0.0721	0.0000	OK
30 minute summer	CP1	21	26.205	0.105	31.2	0.1183	0.0000	OK
960 minute summer	POND-IN	765	25.382	0.382	11.5	118.0245	0.0000	SURCHARGED
960 minute summer	SPS	765	25.382	0.415	4.4	0.4694	0.0000	OK
Link Event (Upstream Depth)	US Node	Link Node	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S2	5.002	CP1	14.3	1.584	0.168	0.2440	
30 minute summer	CP1	1.011	POND-IN	31.2	1.600	0.191	0.0904	
960 minute summer	POND-IN	1.012	SPS	4.4	0.727	0.061	0.5546	
960 minute summer	SPS	Pump		2.0				196.5

Results for 30 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.16%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	CAR PARK 2	352	30.164	0.264	7.5	47.1965	0.0000	SURCHARGED
360 minute winter	HB14	352	30.164	0.384	1.3	0.4337	0.0000	SURCHARGED
2880 minute winter	SWALE 4-IN	1380	29.651	0.051	1.0	0.0000	0.0000	OK
30 minute summer	SWALE 4-OUT	21	29.309	0.209	12.9	0.0000	0.0000	FLOOD RISK
360 minute winter	CAR PARK 1	352	29.887	0.287	7.5	46.7429	0.0000	SURCHARGED
360 minute winter	HB13	352	29.887	0.457	1.4	0.5166	0.0000	SURCHARGED
15 minute summer	S12	11	29.640	0.240	28.2	0.2712	0.0000	SURCHARGED
15 minute summer	S11	11	29.574	0.374	69.4	0.4224	0.0000	SURCHARGED
15 minute summer	CP10	11	29.423	0.373	89.5	0.4213	0.0000	SURCHARGED
15 minute summer	SWALE 3-IN	11	29.321	0.321	89.4	0.0000	0.0000	OK
15 minute summer	1.004:50%	11	29.209	0.359	95.3	0.0000	0.0000	OK
15 minute summer	SWALE 3-OUT	13	29.106	0.406	94.0	0.0000	0.0000	FLOOD RISK
15 minute summer	SWALE 2-IN	13	28.920	0.320	84.3	0.0000	0.0000	OK
30 minute summer	1.006:50%	21	28.745	0.345	100.0	0.0000	0.0000	OK
30 minute summer	SWALE 2-OUT	21	28.635	0.435	97.3	0.0000	0.0000	FLOOD RISK
15 minute summer	S9	11	28.977	0.127	14.5	0.1437	0.0000	OK
15 minute summer	S8	10	28.788	0.158	33.5	0.1790	0.0000	OK
15 minute summer	S7	12	28.686	0.286	61.0	0.3237	0.0000	OK
15 minute summer	S6	12	28.638	0.338	60.1	0.3820	0.0000	SURCHARGED
30 minute summer	CP5	20	28.569	0.419	145.4	0.4737	0.0000	FLOOD RISK
30 minute summer	SWALE 1-IN	21	28.481	0.381	145.2	0.0000	0.0000	OK
30 minute summer	1.009:50%	23	28.360	0.510	159.8	4.9086	0.0000	PONDING
2160 minute winter	SWALE 1-OUT	2100	27.719	0.119	16.5	0.0000	0.0000	OK
15 minute summer	S4	10	27.829	0.109	29.7	0.1227	0.0000	OK
2160 minute winter	S3	2160	27.712	0.282	1.9	0.3193	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	CAR PARK 2	1.000	HB14	1.3	0.210	0.083	0.2836	
360 minute winter	HB14	Hydro-Brake®	SWALE 4-IN	1.0				
2880 minute winter	SWALE 4-IN	1.002	SWALE 4-OUT	1.0	0.043	0.006	1.1261	
30 minute summer	SWALE 4-OUT	1.003	SWALE 3-IN	-12.7	-0.721	-0.699	0.1686	
360 minute winter	CAR PARK 1	2.000	HB13	1.4	0.212	0.090	0.4030	
360 minute winter	HB13	Hydro-Brake®	S11	1.0				
15 minute summer	S12	3.000	S11	27.1	0.966	0.653	0.7789	
15 minute summer	S11	2.002	CP10	69.5	0.987	0.901	2.1762	
15 minute summer	CP10	2.003	SWALE 3-IN	89.4	1.269	1.256	0.8510	
15 minute summer	SWALE 3-IN	1.004	1.004:50%	72.5	0.140	0.358	5.8006	
15 minute summer	SWALE 3-IN	1.004	SWALE 3-OUT	94.0	0.198	0.464	6.9399	
15 minute summer	SWALE 3-OUT	1.005	SWALE 2-IN	84.3	2.121	1.333	0.2694	
15 minute summer	SWALE 2-IN	1.006	1.006:50%	83.6	0.169	0.360	5.6489	
15 minute summer	SWALE 2-IN	1.006	SWALE 2-OUT	96.9	0.169	0.417	7.3784	
30 minute summer	SWALE 2-OUT	1.007	CP5	100.8	1.432	0.923	0.3647	
15 minute summer	S9	4.000	S8	14.1	0.943	0.969	0.3198	
15 minute summer	S8	4.001	S7	32.8	1.145	0.775	0.7484	
15 minute summer	S7	4.002	S6	60.1	1.117	0.760	1.3688	
15 minute summer	S6	4.003	CP5	54.3	0.926	0.705	2.1821	
30 minute summer	CP5	1.008	SWALE 1-IN	145.2	2.063	0.815	0.1378	
30 minute summer	SWALE 1-IN	1.009	1.009:50%	143.9	0.179	0.526	8.3628	
30 minute summer	SWALE 1-IN	1.009	SWALE 1-OUT	133.7	0.324	0.489	5.5150	
2160 minute winter	SWALE 1-OUT	1.010	CP1	23.7	1.552	0.039	0.2402	
15 minute summer	S4	5.000	S3	29.5	1.045	0.476	0.5720	
2160 minute winter	S3	5.001	S2	2.0	0.655	0.038	1.9813	

Results for 30 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.16%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute winter	S2	2100	27.716	0.816	2.7	0.9226	0.0000	SURCHARGED
2160 minute winter	CP1	2100	27.716	1.616	23.7	1.8280	0.0000	SURCHARGED
2160 minute winter	POND-IN	2100	27.713	2.713	30.4	516.3690	0.0000	SURCHARGED
2160 minute winter	SPS	2100	27.713	2.746	2.1	3.1061	0.0000	OK
Link Event (Upstream Depth)	US Node	Link Node	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2160 minute winter	S2	5.002	CP1	2.7	0.978	0.032	1.0716	
2160 minute winter	CP1	1.011	POND-IN	30.4	1.293	0.186	0.3260	
2160 minute winter	POND-IN	1.012	SPS	2.1	0.649	0.030	0.5546	
2160 minute winter	SPS	Pump		2.0				753.7

Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 99.16%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	CAR PARK 2	464	30.260	0.360	7.7	64.2881	0.0000	SURCHARGED
480 minute winter	HB14	464	30.259	0.479	1.1	0.5418	0.0000	SURCHARGED
4320 minute winter	SWALE 4-IN	2040	29.651	0.051	1.0	0.0000	0.0000	OK
30 minute summer	SWALE 4-OUT	21	29.346	0.246	14.4	0.0000	0.0000	FLOOD RISK
480 minute winter	CAR PARK 1	464	29.992	0.392	7.7	63.7450	0.0000	FLOOD RISK
480 minute winter	HB13	464	29.991	0.561	1.2	0.6346	0.0000	SURCHARGED
15 minute summer	S12	11	29.904	0.504	36.8	0.5695	0.0000	SURCHARGED
15 minute summer	S11	11	29.787	0.587	91.6	0.6634	0.0000	SURCHARGED
15 minute summer	CP10	11	29.539	0.489	116.9	0.5532	0.0000	SURCHARGED
15 minute summer	SWALE 3-IN	11	29.369	0.369	116.0	0.0000	0.0000	OK
15 minute summer	1.004:50%	12	29.269	0.419	128.2	0.0000	0.0000	OK
15 minute summer	SWALE 3-OUT	12	29.200	0.500	117.8	0.0000	1.1188	FLOOD
30 minute summer	SWALE 2-IN	21	28.944	0.344	98.8	0.0000	0.0000	OK
30 minute summer	1.006:50%	20	28.793	0.393	124.7	0.0000	0.0000	OK
30 minute summer	SWALE 2-OUT	19	28.700	0.500	122.4	0.0000	3.6579	FLOOD
15 minute summer	S9	11	29.269	0.419	18.9	0.4738	0.0000	SURCHARGED
15 minute summer	S8	11	29.054	0.424	40.4	0.4794	0.0000	SURCHARGED
15 minute summer	S7	11	28.890	0.490	74.2	0.5545	0.0000	SURCHARGED
30 minute summer	S6	19	28.784	0.484	68.9	0.5479	0.0000	SURCHARGED
15 minute summer	CP5	12	28.641	0.491	174.2	0.5549	0.0000	FLOOD RISK
15 minute summer	SWALE 1-IN	12	28.513	0.413	174.3	0.0000	0.0000	OK
30 minute summer	1.009:50%	25	28.369	0.519	198.6	18.7851	0.0000	PONDING
2880 minute winter	SWALE 1-OUT	2820	27.988	0.388	11.1	0.0000	0.0000	FLOOD RISK
15 minute summer	S4	12	28.568	0.848	38.7	0.9591	0.0000	SURCHARGED
15 minute summer	S3	12	28.466	1.036	67.7	1.1717	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	CAR PARK 2	1.000	HB14	1.1	0.213	0.074	0.2836	
480 minute winter	HB14	Hydro-Brake®	SWALE 4-IN	1.0				
4320 minute winter	SWALE 4-IN	1.002	SWALE 4-OUT	1.0	0.043	0.006	1.1261	
30 minute summer	SWALE 4-OUT	1.003	SWALE 3-IN	-14.1	-0.804	-0.780	0.1686	
480 minute winter	CAR PARK 1	2.000	HB13	1.2	0.219	0.079	0.4030	
480 minute winter	HB13	Hydro-Brake®	S11	1.0				
15 minute summer	S12	3.000	S11	35.8	0.954	0.864	0.7789	
15 minute summer	S11	2.002	CP10	89.6	1.272	1.161	2.1762	
15 minute summer	CP10	2.003	SWALE 3-IN	116.0	1.648	1.631	0.8510	
15 minute summer	SWALE 3-IN	1.004	1.004:50%	98.5	0.153	0.485	7.3910	
15 minute summer	SWALE 3-IN	1.004	SWALE 3-OUT	117.8	0.203	0.581	9.7361	
15 minute summer	SWALE 3-OUT	1.005	SWALE 2-IN	99.3	2.497	1.570	0.2694	
30 minute summer	SWALE 2-IN	1.006	1.006:50%	98.7	0.168	0.425	6.7578	
30 minute summer	SWALE 2-IN	1.006	SWALE 2-OUT	122.4	0.173	0.527	9.4569	
30 minute summer	SWALE 2-OUT	1.007	CP5	117.8	1.672	1.079	0.3647	
15 minute summer	S9	4.000	S8	16.7	0.949	1.149	0.3782	
15 minute summer	S8	4.001	S7	39.1	1.136	0.923	0.9231	
15 minute summer	S7	4.002	S6	73.2	1.140	0.925	1.3799	
30 minute summer	S6	4.003	CP5	67.9	0.965	0.882	2.1821	
15 minute summer	CP5	1.008	SWALE 1-IN	174.3	2.475	0.978	0.1378	
15 minute summer	SWALE 1-IN	1.009	1.009:50%	173.2	0.203	0.633	8.8275	
15 minute summer	SWALE 1-IN	1.009	SWALE 1-OUT	134.5	0.326	0.492	5.5167	
2880 minute winter	SWALE 1-OUT	1.010	CP1	16.2	1.549	0.026	0.3509	
15 minute summer	S4	5.000	S3	35.3	1.070	0.569	0.8118	
15 minute summer	S3	5.001	S2	61.8	1.555	1.153	1.9813	

Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 99.16%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute winter	S2	2820	27.987	1.087	3.4	1.2300	0.0000	SURCHARGED
2880 minute winter	CP1	2820	27.987	1.887	19.1	2.1347	0.0000	FLOOD RISK
2880 minute winter	POND-IN	2820	27.987	2.987	13.2	719.1191	0.0000	SURCHARGED
2880 minute winter	SPS	2820	27.987	3.020	2.3	3.4160	0.0000	OK

Link Event (Upstream Depth)	US Node	Link Node	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2880 minute winter	S2	5.002	CP1	3.0	0.978	0.035	1.0716	
2880 minute winter	CP1	1.011	POND-IN	13.2	1.291	0.081	0.3260	
2880 minute winter	POND-IN	1.012	SPS	2.3	0.658	0.032	0.5546	
2880 minute winter	SPS	Pump			2.0	1046.8		

Water Quality

Area (ha)	Intended Land Use	Entering via Node or Link	Name	SuDS Component	Pollution hazard indices			Pollution mitigation indices			Cumulative pollution hazard indices		
					TSS	Metals	Hydrocarbons	TSS	Metals	Hydrocarbons	TSS	Metals	Hydrocarbons
		Link	1.002	Swale				0.5	0.6	0.6			
		Link	1.004	Swale				0.25	0.3	0.3			
		Link	1.006	Swale				0.25	0.3	0.3			
		Link	1.009	Swale				0.25	0.3	0.3			
		Node	SPS									Sufficient	Sufficient
													Sufficient

Appendix F – Infiltration Testing Results

31th May 2022

Our ref: GE20688/JG01/220531



Sue Fulton
Millwood Designer Homes Limited
6 Alexander Grove,
Kings Hill,
West Malling,
Kent,
ME19 4XR

By email only

Dear Sue

RE: Furners Lane, Henfield – Preliminary Information

Further to our recent field works and subject to the results of the ongoing laboratory testing, we write to confirm our preliminary assessments with respect to the ground conditions and the proposed redevelopment:

Scope of works

The investigation was undertaken on 12th May 2022 and comprised:

- 2No. machine excavated trial pits to depths of up to 2.60m bgl (TP01 to TP02).

Figure 1 presents the exploratory hole locations.

The exploratory hole locations were positioned across the paddocks and were situated in areas that had been cleared of vegetation by the ecologists.

Site Description

The site was composed of two paddocks located to the south for Furners Lane, the paddocks are accessed along a track running along the west of the northern field. The fields were currently in pasture.

Ground Conditions

According to the British Geological Survey the ground conditions are likely to comprise the Folkestone Formation. During the investigation a thin mantle of Topsoil was encountered, overlying the Folkestone Formation. A summary of the ground conditions is provided below:

Top (m bgl)	Base (m bgl)	Geology	Positions
0	0.40-0.70	TOPSOIL: Light brown silty SAND with matted rootlets.	All
0.40-0.70	>2.60	FOLKESTONE FORMATION: Light grey with orangish brown mottling sandy CLAY becoming clayey SAND. Sand was fine.	All

The draft exploratory hole logs are appended.

Geo-Environmental Services Ltd
Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL
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Environmental Consultants | Geotechnical Engineers | Site Investigations

Geo-Environmental Services Ltd incorporated in England number 3214980 VAT number 679544479



No significant organoleptic evidence of contamination was noted during the intrusive investigation. However, samples have been recovered from the exploratory holes and submitted for laboratory analysis for a suite of commonly occurring contaminants including pesticides. The test results and assessment thereof will be presented within the final report.

Groundwater

Perched groundwater was encountered at 2.5m bgl in TP01.

It should be noted that changes in groundwater and perched water levels do occur for a number of reasons including seasonal effects and variations in drainage. Such fluctuations may only be recorded by the measurement of the groundwater level within a series of standpipes or piezometers installed within appropriate response zones.

Soakage Testing

Two full scale BRE Digest 365 tests were carried out, preliminary results are recorded below,

Location	Depth of Pit (m bgl)	Fall in head (m)	Total time (mins)	Calculated infiltration rate (m/s)	Remarks
TP01	2.60	0.20	180	-	Insufficient fall over time to calculate rate.
TP02	2.50	0.26	250	-	Insufficient fall over time to calculate rate.

It was inappropriate to extrapolate the test data, given the limited fall in head. Based on the results it is considered unlikely that conventional shallow soakaways will work effectively on the site.

Excavations

Both shallow and deeper dry excavations within the cohesive soils are likely to remain stable in the short to medium term. However, any excavation that intersects perched water bodies may become unstable in the short term and may require pumping from sumps and shoring to maintain stability.

Appropriate Health and Safety precautions should be adopted where man entry into excavations is required. However, groundworks should be designed in such a manner to avoid man entry into excavations.

Foundations

Based on the ground and groundwater conditions encountered during the intrusive works, it is considered that conventional foundations may be appropriate for a low-rise development. The clay horizons of the Folkestone Formation are likely to be classified as ranging between medium and high volume change potential as defined by NHBC Standards, Chapter 4.2. The more granular horizons of the Folkestone Formation are likely to range between low and medium volume change potential. However, these assessments will be confirmed by the ongoing geotechnical classification tests. Minimum foundation depths of at 1.50m bgl are likely to be applicable within the more granular horizons, outside of the zone of influence of any current, recently removed or proposed trees. Foundations within shrinkable soils within the zone of moisture demand of existing, proposed or recently removed trees will require deepening and potentially heave protection measures included.

Furthermore, foundations which span the clay and sand horizons of the Folkestone Formation should be nominally reinforced to account for differential settlement.

Where the depth of foundations require deepening beyond 2.50m bgl on account of trees, the use of a piled foundation solution on site may be more appropriate.

A preliminary net allowable bearing pressure of 125kPa is considered suitable for traditional trench foundations up to 1.50m in width taken down through any disturbed, desiccated or loose materials to bear upon the granular deposits of the Folkestone Formation.

Given the presence of shrinkable soils on site, floor slabs should be fully suspended.

Closure

We trust we have interpreted your request correctly and provide sufficient information for your current requirements.

It should be noted that the comments provided herein are for preliminary purposes only and could change following receipt and review of geotechnical laboratory testing. As such, detailed design should not be undertaken based on the preliminary findings.

If you have any questions or queries in relation to the preliminary information provided at this stage, please do not hesitate to contact the undersigned.

Yours sincerely
For and on Behalf of Geo-Environmental

GS, AMIEEnvSc

Senior Consulting Engineer

Enc. Figure 1 - Exploratory hole plan
Preliminary exploratory hole logs



 Microsoft product screenshot should be credited with permission from Microsoft Corporation

Project:	Furners Lane, Henfield			Title	Exploratory Hole Plan			
Client:	Millwood Designer Homes Ltd			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net				
Ref No:	GE20688	Revision:	0					
Drawn:	JG	Date:						
Figure:	1	Scale:	NTS					



Geo-Environmental



Unit 7, Danworth Farm
Hurstpierpoint
BN6 9GL

Geo-Environmental www.gesl.net

Trial Pit Log

TrialPit No

TP01

Sheet 1 of 1

Project Name: Furners Green			Project No. GE20688		Co-ords: 521791.19 - 116077.21			Date 12/05/2022
Location: Henfield					Dimensions (m):		2.45	Scale 1:25
Client: MDH					Depth 2.60	0.58		Logged JG
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.40	1.50		Light brown silty SAND. Matted rootlets to 0.5m bgl. TOPSOIL	
	0.50	D					Firm light grey mottled orange brown sandy CLAY. Sand is fine. FOLKESTONE FORMATION	
	0.60	ES						
	1.00	D						
	1.50	D					Light grey mottled orange brown clayey SAND with pockets of clay. FOLKESTONE FORMATION	
	2.00	D						
	2.50	D					Grey with occasional orange brown mottling very clayey SAND. Sand is fine. FOLKESTONE FORMATION <small>Perched groundwater was encountered at 2.5m bgl.</small>	
							End of Pit at 2.60m	
Water Strike - Details		Remarks						
Depth Water	Depth Water Value							
		Stability	Sides Stable					



Unit 7, Danworth Farm
Hurstpierpoint
BN6 9GL

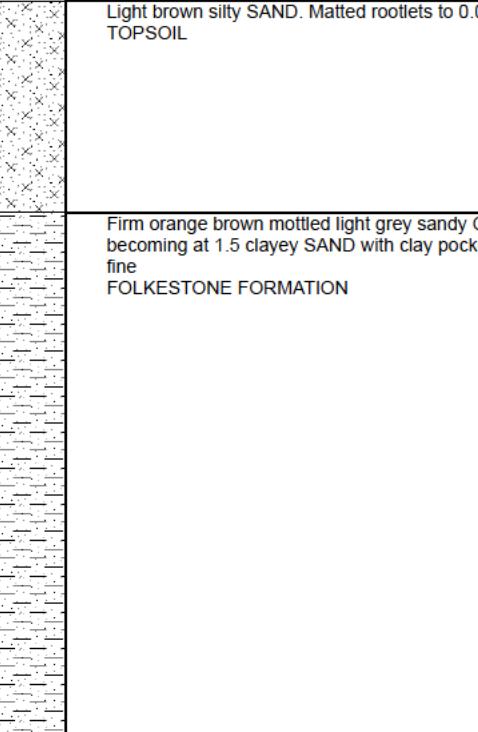
Geo-Environmental www.gesl.net

Trial Pit Log

TrialPit No

TP02

Sheet 1 of 1

Project Name: Furners Green			Project No. GE20688		Co-ords: 521779.60 - 115997.76		Date 12/05/2022		
Location: Henfield			Dimensions (m):		2.73	Scale 1:25			
Client: MDH			Depth 2.50	0.63		Logged JG			
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.10	ES		0.70	0.70		Light brown silty SAND. Matted rootlets to 0.05m bgl. TOPSOIL		
	0.20	ES							
	0.50	D					Firm orange brown mottled light grey sandy CLAY becoming at 1.5 clayey SAND with clay pockets. Sand is fine FOLKESTONE FORMATION		
	1.00	D							
	1.50	D							
	2.00	D							
	2.50	D					End of Pit at 2.50m		
Water Strike - Details	Depth Water	Depth Water Value	Remarks						
			Stability	Sides Stable					

Appendix G – Southern Water Sewer Capacity Check Response



from
Southern Water The logo for Southern Water features the company name in a bold, blue, sans-serif font. To the right of the text is a stylized graphic of three blue wavy lines of varying lengths, representing water.

Matthew Woods
The Dovecote
Salters Heath Business Centre
Cold Arbor Road
Sevenoaks
Kent
TN13 2BL

Your ref
18253

Our ref
DSA000039341

Date
26 February 2025

Contact
Tel 0330 303 0119

Dear Mr Woods,

Level 1 Capacity Check Enquiry: Furner's Lane, Henfield, West Sussex, BN5 9HX.

We have completed the capacity check for the above development site and the results are as follows:

Foul Water

The enquiry has been reassessed to determine the capacity available for 0.26 l/s at manhole reference TQ21167101.

There is currently adequate capacity in the local sewerage network to accommodate a foul flow of 0.26 l/s for the above development at manhole reference TQ21167101. Please note that no surface water flows (existing or proposed) can be accommodated within the existing foul sewerage system unless agreed by the Lead Local Flood Authority in consultation with Southern Water, after the hierarchy Part H3 of Building Regulations has been complied with.

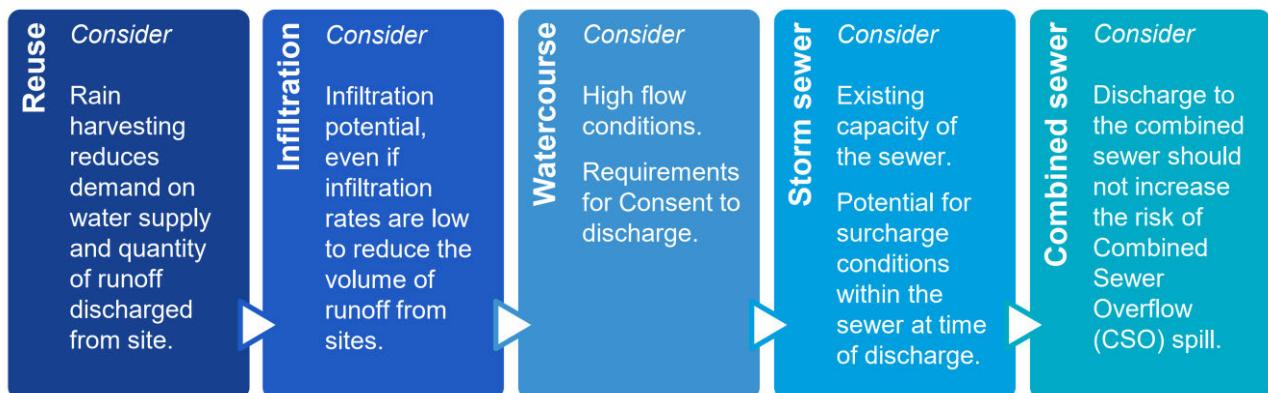
Surface Water

The enquiry has been reassessed to determine the capacity available for 3.2 l/s (pumped) at manhole reference TQ21166151.

There is currently adequate capacity in the local surface water/foul sewerage network to accommodate a surface water flow of 3.0 l/s for the above development at manhole reference TQ21166151.

This assessment has been undertaken using a theoretical check that shows capacity from all upstream properties for 46.0l/s.

Although capacity in the surface water network has been identified, in all situations where surface water is being considered for discharge to our network, we require the below hierarchy for surface water to be followed which is reflected in part H3 of the Building Regulations. Whilst reuse does not strictly form part of this hierarchy, Southern Water would encourage the consideration of reuse for new developments.



Guidance on Building Regulations is here: [gov.uk/government/publications/drainage-and-waste-disposal-approved-document-h](https://www.gov.uk/government/publications/drainage-and-waste-disposal-approved-document-h)

We would welcome the opportunity to engage with you on the design for disposal of surface water, with a particular focus on the potential for incorporating Sustainable Drainage Systems (SuDS), for this development at the earliest opportunity and we recommend that civil engineers and landscape architects work together and with Southern Water.

Where a surface water connection to the foul or combined sewer is being considered, this should be agreed by the Lead Local Flood Authority, in consultation with Southern Water.

It should be noted that although the above assessment indicates that there is capacity available for your proposed surface water flows the LLFA (Local Lead Flood Authority) may impose/request that a lower flow is discharged to the public surface water sewer.

If the excess surface water flows are to be attenuated on site, it could have a significant effect on any proposed Sewer Adoption (S104) Agreements. Any attenuation proposals should be agreed before any works are implemented on site. Where capacity is limited/restricted, agreement should be sought if you are to include any highway drainage within your proposals as Southern Water is not obligated to accept highway flows.

Connecting to our network

It should be noted that this information is only a hydraulic assessment of the existing sewerage network and does not grant approval for a connection to the public sewerage system. A formal Sewer Connection (S106) application is required to be completed and approved by Southern Water Services. To make an application visit: developerservices.southernwater.co.uk

The results quoted above are only valid for 12 months from the date of issue of this letter.

Please get in touch via the Get Connected customer dashboard if you have any queries.

Yours sincerely,

Future Growth Planning Team
Developer Services

southernwater.co.uk/developing-building/planning-your-development