Drainage Strategy

Springville

East Sleekburn

Revision Ø

2016064

September 2021

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1.00 Introduction

Portland have been commissioned by Amethyst Homes to undertake a drainage strategy to cover the proposed redevelopment of the existing sheltered housing accommodation at Springville, East Sleekburn.

The site is situated north west of the centre of East Sleekburn with an overall area of 1.40 hectares and an existing impermeable area of 0.670 hectares.

The site is bounded to the south by residential properties and by farmland and highways to the north, east and west.

2.00 Site Features and Topography

2.01 Watercourses.

The closest Watercourse is the Sleek Burn which is situated approximately 115m to the south of the proposed development.

2.02 Drainage.

The Northumbrian Water (NWL) sewer record plans indicate a 100mm dia surface water and 150mm dia foul water outside of the south eastern corner of the site boundary.

2.03 Site Levels.

A topographical survey was produced by Paul Evans Surveying for the site in October 2016.

The survey shows the site falls from north western boundary to south western boundary ranging between 13.64m and 13.24m.

(For survey refer to Appendix B)

2.04 Site Investigation.

A Phase 2 Intrusive Site Investigation Report was produced for the development site in July 2021 by Arc Environmental. As part of the investigation 5 boreholes and 16 trial pits were excavated to depths up to 5.0m. The boreholes show the site is predominantly underlain by clay.

3.00 Proposed Drainage Solution

3.01 Proposed Surface Water Solution

The proposed surface water will discharge at an unrestricted rate into the Sleek Burn which is a tidal estuary and tributary of the River Blyth. All proposed surface water including the outfall structure will be maintained by NWL.

3.02 Attenuation Options.

Given that the development has been granted unrestricted discharge, no attenuation will need to be provided on site.

3.03 Source Control SUDS.

Private parking areas are to be constructed as permeable paving with connection to the main surface water system. These measures will act as a slowing down mechanism of flows into the main system and also provide greater pollution protection. Water butts will also be provided for each dwelling.

Maintenance of the permeable paving will be the responsibility of the homeowner.

3.04 Climate Change.

In accordance with NPPF a percentage increase in rainfall has been included in the drainage design.

3.05 Urban Creep

The detailed design of the development should allow for an increase of the non-adopted (private) impermeable areas. The appropriate percentage increase applied to each cell should be in line with the recommendations within the 'LASOO - Non statutory Technical Standards Practice Guidance'.

The percentage increase is directly linked to the density of dwellings per hectare , see extract from the LASOO document below.

Residential development density Dwellings per hectar	Change allowance % of impermeable area
≤ 25	10
30	8
35	6
45	4
≥ 50	2
Flats & apartments	0

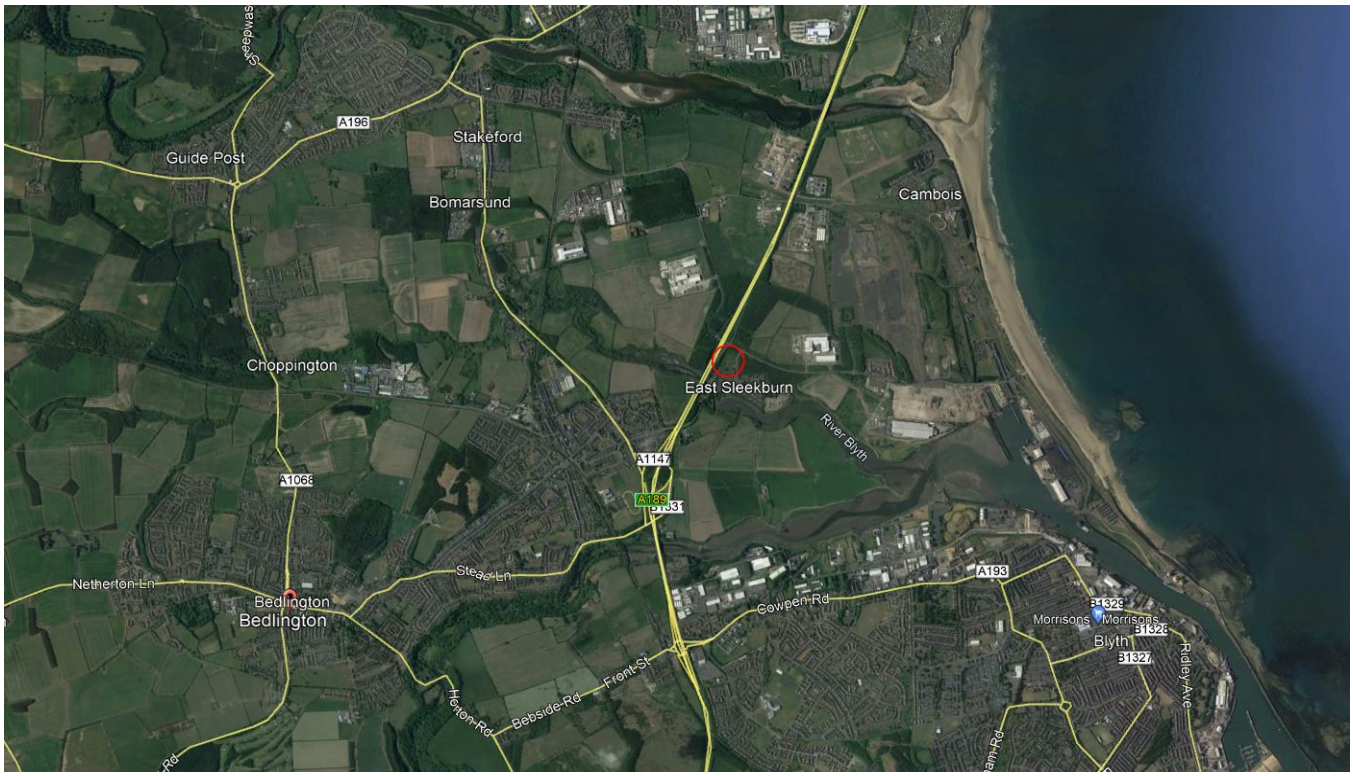
3.06 Foul Water Solution

The proposed foul drainage will discharge to MH 7502 at a rate of 2.2l/s. All proposed main foul drainage will be maintained by NWL.

3.07 Drainage Maintenance

All proposed main drainage to be adopted by NWL including the proposed outfall structure. All drainage is designed in accordance with 'Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England'

Appendix A Location Plan


A196
Guide Post
Stakeford
Bomarsund
Cambois
Choppington
East Sleekburn
River Blyth
A1147
A1068
A189
Netherton Ln
Bedlington
Bedlington
Steads Ln
Cowpen Rd
A193
Morrisons
Morrisons
Blyth
B1327
Ridley Ave
Horton Rd
Bebside Rd
Front St


Aggregate Industries
Aggregate Industries Commercial Landscaping
PJMX
A189
NSL Converter Station
Brock Ln
S Views
General Havelock
East Sleekburn
Barrington Park
River Blyth
Grange Park Ave
Parkside
Greenwood Ave
Burt Rd
Reawley Ave

Appendix B Topographical Survey

428650E
428700E
428750E
428800E
428850E
583650N
583600N
583550N

TREES
POST & RAIL FENCE
ROUGH GRASS
O/HEAD ELECTRIC
MANURE MOUND
POST & WIRE FENCE
ALLOTMENT GARDENS
GRASS
BROCK LANE
STONE
FARM
DISUSED ST.
BUS SHELTER
HOUSES
BRICK WALL WITH GATES
GARAGE

KEY

PM	PARKING METER
BD	BOLLARD
BS	BUS STOP
BT	BT COVER
BTP	BT POLE
CTV	CABLE TV COVER
EC	ELECTRIC COVER
EP	ELECTRIC POLE
ER	EARTHING ROD
FH	FIRE HYDRANT
G	GULLY
IC	INSPECTION COVER
JB	JUNCTION BOX
K	KERB OFFLET (GULLY)
LP	LAMP POST
MC	MANHOLE COVER
MK	MARKER POST
P	POST (SCALEABLE DIA)
RS	ROAD SIGN
SN	SIGN
SV	WATER STOP VALVE
TS	TRAFFIC SIGNAL
WM	WATER METER
+	SPOT LEVEL
EL=	EAVES LEVEL
RL=	RIDGE LEVEL
△3	SURVEY STATION
	FENCE
	INDIVIDUAL TREE (SCALEABLE SPREAD & TRUNK)
	INDIVIDUAL BUSH (SCALEABLE SPREAD)
	EDGE OF TREE SPREAD
	TOP OR BTM OF BANK
	OVER HEAD CABLES
	DRAINAGE

N

N.G. NORTH

REVISIONS

NOTES

STATION INFORMATION

STN	E	N	L	TYPE
1	428808.414	583573.583	13.504	NAIL
2	428801.245	583501.397	13.978	NAIL
3	428766.846	583474.581	13.536	NAIL
3A	428765.849	583409.773	12.508	PEG
4	429088.674	583409.523	9.750	NAIL
4A	429072.832	583381.232	10.718	PEG
4B	429080.271	583300.350	8.415	PEG
4C	429015.859	583319.144	10.539	PEG
5	429029.804	583417.173	11.458	NAIL

CO-ORDINATES AND LEVELS TO OS GPS NETWORK

CLIENT

DYSART GROUP

TITLE

LAND AT BROCK LANE
EAST SLEEKBURN, NORTHUMBERLAND
TOPOGRAPHICAL SURVEY

PAUL EVANS SURVEYING Ltd

3, Gladstone Terrace, Gateshead, NE8 4DY
Tel: 0191 4770200, Fax: 0191 4776669, Mobile 07803 199360
E-Mail, paul-evans-surveying@btconnect.com

Date	Scale	Plan No.
3.4.13	1: 250	ESB1

Appendix C Proposed Site Plan

A1

PROPOSED HOUSING MIX

Type A - Semi	2B4P	2 storey/Parking space	755sqft	7no
Type B - Semi/Tce	3B5P	2 storey/Parking space	850sqft	18no
Type C - Semi	3B6P	2.5 storey/Det S.Garage	1125sqft	3no
Type D - Detached	3B6P	2 storey/Int Garage	1225sqft	5no
Type E - Detached	4B8P	2 storey/Int Garage	1470sqft	8no
Type G - Detached	4B8P	2 storey/Det S.Garage	1332sqft	6no
Type N - Detached	3B6P	2 storey/Det S.Garage(dual fronted)	936sqft	1no
		TOTAL	50,773sqft (4,717sqm)	48no

Approx Gross Site Area = 1.41Ha (3.49 acres)
Approx POS Area = .07Ha (0.175 acres)
Approx Nett Site Area = 1.34Ha (3.31 acres)

Density Gross = 34 units/Ha (13.75 units/Acre)
Density Nett = 35.5 units/Ha (14.37 units/Acre)

Parking Provision.

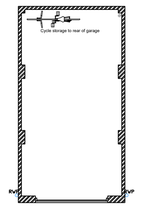
Please note the following-

- Provision has been based on the current requirements of the Highways Authority, using Type A in-curtilage and communal parking standards.These figures are a 'maximum' provision.
- Plots 9-15 have assessed as being 'communal' parking. These are provided with 14no spaces for 7no houses, (the actual requirement is 13.5 spaces).
- Detached Garages are a minimum 6x3m internally and have been counted as in-curtilage spaces.
- House types D and E have integral garages where the garage doors are set back from the front of the house by 0.5m and 1.2m respectively. The minimum drive length of 5.5m has been taken from the recessed garage door.
- Visitor bays within verges are shown as 2.4m wide with an additional hardstanding strip of 0.5m.

Parking spaces - 96no
Garage spaces - 23no
On-street (in-line)Visitor spaces - 11no
Total spaces provided - 130no @ average 2.7 spaces per unit.

NOTE- This drawing is to be read in conjunction with the Landscaping proposals provided by Auton Design Studio Ltd.

Typical Cycle storage
Integral garage house type.



Typical Cycle storage position
Detached garage house type.

REV	DATE	DESCRIPTION	BY	CHK
J	21.07.21	Plot 1 position adjusted. Client name changed.	TSP	
H	20.07.21	Alterations to layout following latest Highways comments- Plot 6 revised to a Type N dual fronted house, and plots 1-6 adjusted to detach garages. Parking and plot footpaths to plots 7-9 adjusted. 90 degree VP parking adjacent plot 19 changed to a single 'in-line' VP bay. VP bays adjacent plot 27 adjusted to avoid clash with plot 26 drive. Grass verge omitted from plot 28-32 and footpath added. Plot 36 changed to integral type D house and VP bay. 1m frontage removed. Turning head extended and plot 37 moved forwards 1m. VP to frontage of plot 40 omitted. Parking to plot 45 gable widened to 3m and shortheaed to 2 spaces, to provide better turning facility for plots 44 and 45. VP bays between plots 42 and 48 adjusted to avoid clash with plot 46 parking. Clarification of garage cycle storage added. Bin collection refuge points clarified. Cycle storage sheds indicated.	TSP	
G	04.02.21	Plots 23&24 changed from Type C to Type B with gable driveways, and detached garage to plot 25 moved [all to accommodate as-built position of overhead cable drops]. Additional spaces removed from plots 7 and 28. Plot 36 adjusted to provide an additional parking space. Plots 43-&44 provided with rear access footpaths. Notes revised accordingly.	TSP	
F	18.09.18	Bin Refuge storage areas shown to private drives/courtyards at plots 7-15 inc, 16/17, 20/21, 25-27, and 44/45.	TSP	
E	02.02.18	Bin Storage positions added	TSP	
D	09.02.16	House type footprints amended to comply with current versions - indicating service points etc.	TSP	
C	10.12.14	Layout revised - Visitor parking bays to frontage of plots 32-34 removed and adopted footpath extended across frontage. All as requested by Planning and Highways Officers.Schedule adjusted accordingly.	TSP	
B	19.11.14	• Layout revised. • 1m strip added to rear of visitor parking spaces within verges. • Plot 25 - 2 further parking spaces added. • Plot 26 - handed. • Plot 27 - moved forward 1m. • Plot 28 - gable parking added. • Plot 36 - 1 visitor parking space added. • All detached Type D and E houses shown with double width driveways. Note - garage door set back from front of house to allow for minimum 5.5m driveway lengths. • Plots 1/2 and 4/5 - garages set back to provide double length drives.	TSP	
A	11.12.13	Layout revised and housing mix adjusted.	TSP	

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Project Managers

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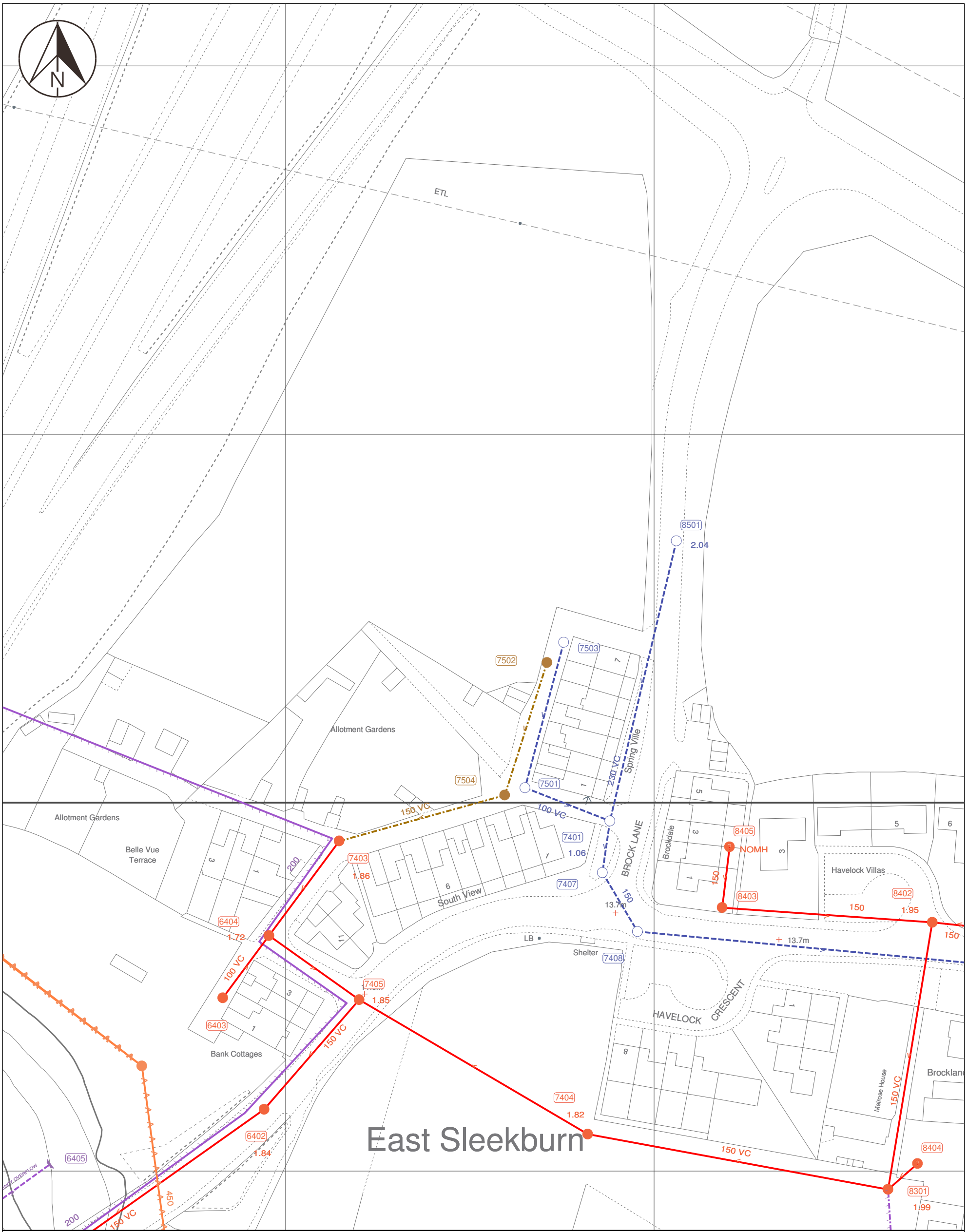
Client
AMETHYST HOMES

Project
LAND AT SPRING VILLE / BROCK LANE EAST SLEEKBURN

Description
PROPOSED PLANNING LAYOUT

Project Ref:	13014	Dwg No.	P05
Scale:	1:500@A1	Rev.	J
Date:	11.10.13		
Drawn by:	TSP		
Checked by:		Date:	

Appendix D NWL Sewer Records



NORTHUMBRIAN WATER living water

User : TELFG

Title :

Centre Point : 428754,583550

Date : 06/07/2016 15:47:46

Map Sheet : NZ2883NE

Paper / Scale : A3@1:1000

10 m

Appendix E Surface Water Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for STORM.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	16.000	Add Flow / Climate Change (%)	0
Ratio R	0.327	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Surcharged Outfall Details for STORM.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.013	50	2.800	2.500	0.000	0	0

Datum (m) 0.000 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.300	24	0.300	47	0.300	70	0.300	93	0.300	116	0.300
2	0.300	25	0.300	48	0.300	71	0.300	94	0.300	117	0.300
3	0.300	26	0.300	49	0.300	72	0.300	95	0.300	118	0.300
4	0.300	27	0.300	50	0.300	73	0.300	96	0.300	119	0.300
5	0.300	28	0.300	51	0.300	74	0.300	97	0.300	120	0.300
6	0.300	29	0.300	52	0.300	75	0.300	98	0.300	121	0.300
7	0.300	30	0.300	53	0.300	76	0.300	99	0.300	122	0.300
8	0.300	31	0.300	54	0.300	77	0.300	100	0.300	123	0.300
9	0.300	32	0.300	55	0.300	78	0.300	101	0.300	124	0.300
10	0.300	33	0.300	56	0.300	79	0.300	102	0.300	125	0.300
11	0.300	34	0.300	57	0.300	80	0.300	103	0.300	126	0.300
12	0.300	35	0.300	58	0.300	81	0.300	104	0.300	127	0.300
13	0.300	36	0.300	59	0.300	82	0.300	105	0.300	128	0.300
14	0.300	37	0.300	60	0.300	83	0.300	106	0.300	129	0.300
15	0.300	38	0.300	61	0.300	84	0.300	107	0.300	130	0.300
16	0.300	39	0.300	62	0.300	85	0.300	108	0.300	131	0.300
17	0.300	40	0.300	63	0.300	86	0.300	109	0.300	132	0.300
18	0.300	41	0.300	64	0.300	87	0.300	110	0.300	133	0.300
19	0.300	42	0.300	65	0.300	88	0.300	111	0.300	134	0.300
20	0.300	43	0.300	66	0.300	89	0.300	112	0.300	135	0.300
21	0.300	44	0.300	67	0.300	90	0.300	113	0.300	136	0.300
22	0.300	45	0.300	68	0.300	91	0.300	114	0.300	137	0.300
23	0.300	46	0.300	69	0.300	92	0.300	115	0.300	138	0.300

Surcharged Outfall Details for STORM.SWS

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
139	0.300	189	0.300	239	0.300	289	0.300	339	0.300	389	0.300
140	0.300	190	0.300	240	0.300	290	0.300	340	0.300	390	0.300
141	0.300	191	0.300	241	0.300	291	0.300	341	0.300	391	0.300
142	0.300	192	0.300	242	0.300	292	0.300	342	0.300	392	0.300
143	0.300	193	0.300	243	0.300	293	0.300	343	0.300	393	0.300
144	0.300	194	0.300	244	0.300	294	0.300	344	0.300	394	0.300
145	0.300	195	0.300	245	0.300	295	0.300	345	0.300	395	0.300
146	0.300	196	0.300	246	0.300	296	0.300	346	0.300	396	0.300
147	0.300	197	0.300	247	0.300	297	0.300	347	0.300	397	0.300
148	0.300	198	0.300	248	0.300	298	0.300	348	0.300	398	0.300
149	0.300	199	0.300	249	0.300	299	0.300	349	0.300	399	0.300
150	0.300	200	0.300	250	0.300	300	0.300	350	0.300	400	0.300
151	0.300	201	0.300	251	0.300	301	0.300	351	0.300	401	0.300
152	0.300	202	0.300	252	0.300	302	0.300	352	0.300	402	0.300
153	0.300	203	0.300	253	0.300	303	0.300	353	0.300	403	0.300
154	0.300	204	0.300	254	0.300	304	0.300	354	0.300	404	0.300
155	0.300	205	0.300	255	0.300	305	0.300	355	0.300	405	0.300
156	0.300	206	0.300	256	0.300	306	0.300	356	0.300	406	0.300
157	0.300	207	0.300	257	0.300	307	0.300	357	0.300	407	0.300
158	0.300	208	0.300	258	0.300	308	0.300	358	0.300	408	0.300
159	0.300	209	0.300	259	0.300	309	0.300	359	0.300	409	0.300
160	0.300	210	0.300	260	0.300	310	0.300	360	0.300	410	0.300
161	0.300	211	0.300	261	0.300	311	0.300	361	0.300	411	0.300
162	0.300	212	0.300	262	0.300	312	0.300	362	0.300	412	0.300
163	0.300	213	0.300	263	0.300	313	0.300	363	0.300	413	0.300
164	0.300	214	0.300	264	0.300	314	0.300	364	0.300	414	0.300
165	0.300	215	0.300	265	0.300	315	0.300	365	0.300	415	0.300
166	0.300	216	0.300	266	0.300	316	0.300	366	0.300	416	0.300
167	0.300	217	0.300	267	0.300	317	0.300	367	0.300	417	0.300
168	0.300	218	0.300	268	0.300	318	0.300	368	0.300	418	0.300
169	0.300	219	0.300	269	0.300	319	0.300	369	0.300	419	0.300
170	0.300	220	0.300	270	0.300	320	0.300	370	0.300	420	0.300
171	0.300	221	0.300	271	0.300	321	0.300	371	0.300	421	0.300
172	0.300	222	0.300	272	0.300	322	0.300	372	0.300	422	0.300
173	0.300	223	0.300	273	0.300	323	0.300	373	0.300	423	0.300
174	0.300	224	0.300	274	0.300	324	0.300	374	0.300	424	0.300
175	0.300	225	0.300	275	0.300	325	0.300	375	0.300	425	0.300
176	0.300	226	0.300	276	0.300	326	0.300	376	0.300	426	0.300
177	0.300	227	0.300	277	0.300	327	0.300	377	0.300	427	0.300
178	0.300	228	0.300	278	0.300	328	0.300	378	0.300	428	0.300
179	0.300	229	0.300	279	0.300	329	0.300	379	0.300	429	0.300
180	0.300	230	0.300	280	0.300	330	0.300	380	0.300	430	0.300
181	0.300	231	0.300	281	0.300	331	0.300	381	0.300	431	0.300
182	0.300	232	0.300	282	0.300	332	0.300	382	0.300	432	0.300
183	0.300	233	0.300	283	0.300	333	0.300	383	0.300	433	0.300
184	0.300	234	0.300	284	0.300	334	0.300	384	0.300	434	0.300
185	0.300	235	0.300	285	0.300	335	0.300	385	0.300	435	0.300
186	0.300	236	0.300	286	0.300	336	0.300	386	0.300	436	0.300
187	0.300	237	0.300	287	0.300	337	0.300	387	0.300	437	0.300
188	0.300	238	0.300	288	0.300	338	0.300	388	0.300	438	0.300

Surcharged Outfall Details for STORM.SWS

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
439	0.300	489	0.300	539	0.300	589	0.300	639	0.300	689	0.300
440	0.300	490	0.300	540	0.300	590	0.300	640	0.300	690	0.300
441	0.300	491	0.300	541	0.300	591	0.300	641	0.300	691	0.300
442	0.300	492	0.300	542	0.300	592	0.300	642	0.300	692	0.300
443	0.300	493	0.300	543	0.300	593	0.300	643	0.300	693	0.300
444	0.300	494	0.300	544	0.300	594	0.300	644	0.300	694	0.300
445	0.300	495	0.300	545	0.300	595	0.300	645	0.300	695	0.300
446	0.300	496	0.300	546	0.300	596	0.300	646	0.300	696	0.300
447	0.300	497	0.300	547	0.300	597	0.300	647	0.300	697	0.300
448	0.300	498	0.300	548	0.300	598	0.300	648	0.300	698	0.300
449	0.300	499	0.300	549	0.300	599	0.300	649	0.300	699	0.300
450	0.300	500	0.300	550	0.300	600	0.300	650	0.300	700	0.300
451	0.300	501	0.300	551	0.300	601	0.300	651	0.300	701	0.300
452	0.300	502	0.300	552	0.300	602	0.300	652	0.300	702	0.300
453	0.300	503	0.300	553	0.300	603	0.300	653	0.300	703	0.300
454	0.300	504	0.300	554	0.300	604	0.300	654	0.300	704	0.300
455	0.300	505	0.300	555	0.300	605	0.300	655	0.300	705	0.300
456	0.300	506	0.300	556	0.300	606	0.300	656	0.300	706	0.300
457	0.300	507	0.300	557	0.300	607	0.300	657	0.300	707	0.300
458	0.300	508	0.300	558	0.300	608	0.300	658	0.300	708	0.300
459	0.300	509	0.300	559	0.300	609	0.300	659	0.300	709	0.300
460	0.300	510	0.300	560	0.300	610	0.300	660	0.300	710	0.300
461	0.300	511	0.300	561	0.300	611	0.300	661	0.300	711	0.300
462	0.300	512	0.300	562	0.300	612	0.300	662	0.300	712	0.300
463	0.300	513	0.300	563	0.300	613	0.300	663	0.300	713	0.300
464	0.300	514	0.300	564	0.300	614	0.300	664	0.300	714	0.300
465	0.300	515	0.300	565	0.300	615	0.300	665	0.300	715	0.300
466	0.300	516	0.300	566	0.300	616	0.300	666	0.300	716	0.300
467	0.300	517	0.300	567	0.300	617	0.300	667	0.300	717	0.300
468	0.300	518	0.300	568	0.300	618	0.300	668	0.300	718	0.300
469	0.300	519	0.300	569	0.300	619	0.300	669	0.300	719	0.300
470	0.300	520	0.300	570	0.300	620	0.300	670	0.300	720	0.300
471	0.300	521	0.300	571	0.300	621	0.300	671	0.300	721	0.300
472	0.300	522	0.300	572	0.300	622	0.300	672	0.300	722	0.300
473	0.300	523	0.300	573	0.300	623	0.300	673	0.300	723	0.300
474	0.300	524	0.300	574	0.300	624	0.300	674	0.300	724	0.300
475	0.300	525	0.300	575	0.300	625	0.300	675	0.300	725	0.300
476	0.300	526	0.300	576	0.300	626	0.300	676	0.300	726	0.300
477	0.300	527	0.300	577	0.300	627	0.300	677	0.300	727	0.300
478	0.300	528	0.300	578	0.300	628	0.300	678	0.300	728	0.300
479	0.300	529	0.300	579	0.300	629	0.300	679	0.300	729	0.300
480	0.300	530	0.300	580	0.300	630	0.300	680	0.300	730	0.300
481	0.300	531	0.300	581	0.300	631	0.300	681	0.300	731	0.300
482	0.300	532	0.300	582	0.300	632	0.300	682	0.300	732	0.300
483	0.300	533	0.300	583	0.300	633	0.300	683	0.300	733	0.300
484	0.300	534	0.300	584	0.300	634	0.300	684	0.300	734	0.300
485	0.300	535	0.300	585	0.300	635	0.300	685	0.300	735	0.300
486	0.300	536	0.300	586	0.300	636	0.300	686	0.300	736	0.300
487	0.300	537	0.300	587	0.300	637	0.300	687	0.300	737	0.300
488	0.300	538	0.300	588	0.300	638	0.300	688	0.300	738	0.300

Surcharged Outfall Details for STORM.SWS

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
739	0.300	789	0.300	839	0.300	889	0.300	939	0.300	989	0.300
740	0.300	790	0.300	840	0.300	890	0.300	940	0.300	990	0.300
741	0.300	791	0.300	841	0.300	891	0.300	941	0.300	991	0.300
742	0.300	792	0.300	842	0.300	892	0.300	942	0.300	992	0.300
743	0.300	793	0.300	843	0.300	893	0.300	943	0.300	993	0.300
744	0.300	794	0.300	844	0.300	894	0.300	944	0.300	994	0.300
745	0.300	795	0.300	845	0.300	895	0.300	945	0.300	995	0.300
746	0.300	796	0.300	846	0.300	896	0.300	946	0.300	996	0.300
747	0.300	797	0.300	847	0.300	897	0.300	947	0.300	997	0.300
748	0.300	798	0.300	848	0.300	898	0.300	948	0.300	998	0.300
749	0.300	799	0.300	849	0.300	899	0.300	949	0.300	999	0.300
750	0.300	800	0.300	850	0.300	900	0.300	950	0.300	1000	0.300
751	0.300	801	0.300	851	0.300	901	0.300	951	0.300	1001	0.300
752	0.300	802	0.300	852	0.300	902	0.300	952	0.300	1002	0.300
753	0.300	803	0.300	853	0.300	903	0.300	953	0.300	1003	0.300
754	0.300	804	0.300	854	0.300	904	0.300	954	0.300	1004	0.300
755	0.300	805	0.300	855	0.300	905	0.300	955	0.300	1005	0.300
756	0.300	806	0.300	856	0.300	906	0.300	956	0.300	1006	0.300
757	0.300	807	0.300	857	0.300	907	0.300	957	0.300	1007	0.300
758	0.300	808	0.300	858	0.300	908	0.300	958	0.300	1008	0.300
759	0.300	809	0.300	859	0.300	909	0.300	959	0.300	1009	0.300
760	0.300	810	0.300	860	0.300	910	0.300	960	0.300	1010	0.300
761	0.300	811	0.300	861	0.300	911	0.300	961	0.300	1011	0.300
762	0.300	812	0.300	862	0.300	912	0.300	962	0.300	1012	0.300
763	0.300	813	0.300	863	0.300	913	0.300	963	0.300	1013	0.300
764	0.300	814	0.300	864	0.300	914	0.300	964	0.300	1014	0.300
765	0.300	815	0.300	865	0.300	915	0.300	965	0.300	1015	0.300
766	0.300	816	0.300	866	0.300	916	0.300	966	0.300	1016	0.300
767	0.300	817	0.300	867	0.300	917	0.300	967	0.300	1017	0.300
768	0.300	818	0.300	868	0.300	918	0.300	968	0.300	1018	0.300
769	0.300	819	0.300	869	0.300	919	0.300	969	0.300	1019	0.300
770	0.300	820	0.300	870	0.300	920	0.300	970	0.300	1020	0.300
771	0.300	821	0.300	871	0.300	921	0.300	971	0.300	1021	0.300
772	0.300	822	0.300	872	0.300	922	0.300	972	0.300	1022	0.300
773	0.300	823	0.300	873	0.300	923	0.300	973	0.300	1023	0.300
774	0.300	824	0.300	874	0.300	924	0.300	974	0.300	1024	0.300
775	0.300	825	0.300	875	0.300	925	0.300	975	0.300	1025	0.300
776	0.300	826	0.300	876	0.300	926	0.300	976	0.300	1026	0.300
777	0.300	827	0.300	877	0.300	927	0.300	977	0.300	1027	0.300
778	0.300	828	0.300	878	0.300	928	0.300	978	0.300	1028	0.300
779	0.300	829	0.300	879	0.300	929	0.300	979	0.300	1029	0.300
780	0.300	830	0.300	880	0.300	930	0.300	980	0.300	1030	0.300
781	0.300	831	0.300	881	0.300	931	0.300	981	0.300	1031	0.300
782	0.300	832	0.300	882	0.300	932	0.300	982	0.300	1032	0.300
783	0.300	833	0.300	883	0.300	933	0.300	983	0.300	1033	0.300
784	0.300	834	0.300	884	0.300	934	0.300	984	0.300	1034	0.300
785	0.300	835	0.300	885	0.300	935	0.300	985	0.300	1035	0.300
786	0.300	836	0.300	886	0.300	936	0.300	986	0.300	1036	0.300
787	0.300	837	0.300	887	0.300	937	0.300	987	0.300	1037	0.300
788	0.300	838	0.300	888	0.300	938	0.300	988	0.300	1038	0.300

Surcharged Outfall Details for STORM.SWS

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1039	0.300	1089	0.300	1139	0.300	1189	0.300	1239	0.300	1289	0.300
1040	0.300	1090	0.300	1140	0.300	1190	0.300	1240	0.300	1290	0.300
1041	0.300	1091	0.300	1141	0.300	1191	0.300	1241	0.300	1291	0.300
1042	0.300	1092	0.300	1142	0.300	1192	0.300	1242	0.300	1292	0.300
1043	0.300	1093	0.300	1143	0.300	1193	0.300	1243	0.300	1293	0.300
1044	0.300	1094	0.300	1144	0.300	1194	0.300	1244	0.300	1294	0.300
1045	0.300	1095	0.300	1145	0.300	1195	0.300	1245	0.300	1295	0.300
1046	0.300	1096	0.300	1146	0.300	1196	0.300	1246	0.300	1296	0.300
1047	0.300	1097	0.300	1147	0.300	1197	0.300	1247	0.300	1297	0.300
1048	0.300	1098	0.300	1148	0.300	1198	0.300	1248	0.300	1298	0.300
1049	0.300	1099	0.300	1149	0.300	1199	0.300	1249	0.300	1299	0.300
1050	0.300	1100	0.300	1150	0.300	1200	0.300	1250	0.300	1300	0.300
1051	0.300	1101	0.300	1151	0.300	1201	0.300	1251	0.300	1301	0.300
1052	0.300	1102	0.300	1152	0.300	1202	0.300	1252	0.300	1302	0.300
1053	0.300	1103	0.300	1153	0.300	1203	0.300	1253	0.300	1303	0.300
1054	0.300	1104	0.300	1154	0.300	1204	0.300	1254	0.300	1304	0.300
1055	0.300	1105	0.300	1155	0.300	1205	0.300	1255	0.300	1305	0.300
1056	0.300	1106	0.300	1156	0.300	1206	0.300	1256	0.300	1306	0.300
1057	0.300	1107	0.300	1157	0.300	1207	0.300	1257	0.300	1307	0.300
1058	0.300	1108	0.300	1158	0.300	1208	0.300	1258	0.300	1308	0.300
1059	0.300	1109	0.300	1159	0.300	1209	0.300	1259	0.300	1309	0.300
1060	0.300	1110	0.300	1160	0.300	1210	0.300	1260	0.300	1310	0.300
1061	0.300	1111	0.300	1161	0.300	1211	0.300	1261	0.300	1311	0.300
1062	0.300	1112	0.300	1162	0.300	1212	0.300	1262	0.300	1312	0.300
1063	0.300	1113	0.300	1163	0.300	1213	0.300	1263	0.300	1313	0.300
1064	0.300	1114	0.300	1164	0.300	1214	0.300	1264	0.300	1314	0.300
1065	0.300	1115	0.300	1165	0.300	1215	0.300	1265	0.300	1315	0.300
1066	0.300	1116	0.300	1166	0.300	1216	0.300	1266	0.300	1316	0.300
1067	0.300	1117	0.300	1167	0.300	1217	0.300	1267	0.300	1317	0.300
1068	0.300	1118	0.300	1168	0.300	1218	0.300	1268	0.300	1318	0.300
1069	0.300	1119	0.300	1169	0.300	1219	0.300	1269	0.300	1319	0.300
1070	0.300	1120	0.300	1170	0.300	1220	0.300	1270	0.300	1320	0.300
1071	0.300	1121	0.300	1171	0.300	1221	0.300	1271	0.300	1321	0.300
1072	0.300	1122	0.300	1172	0.300	1222	0.300	1272	0.300	1322	0.300
1073	0.300	1123	0.300	1173	0.300	1223	0.300	1273	0.300	1323	0.300
1074	0.300	1124	0.300	1174	0.300	1224	0.300	1274	0.300	1324	0.300
1075	0.300	1125	0.300	1175	0.300	1225	0.300	1275	0.300	1325	0.300
1076	0.300	1126	0.300	1176	0.300	1226	0.300	1276	0.300	1326	0.300
1077	0.300	1127	0.300	1177	0.300	1227	0.300	1277	0.300	1327	0.300
1078	0.300	1128	0.300	1178	0.300	1228	0.300	1278	0.300	1328	0.300
1079	0.300	1129	0.300	1179	0.300	1229	0.300	1279	0.300	1329	0.300
1080	0.300	1130	0.300	1180	0.300	1230	0.300	1280	0.300	1330	0.300
1081	0.300	1131	0.300	1181	0.300	1231	0.300	1281	0.300	1331	0.300
1082	0.300	1132	0.300	1182	0.300	1232	0.300	1282	0.300	1332	0.300
1083	0.300	1133	0.300	1183	0.300	1233	0.300	1283	0.300	1333	0.300
1084	0.300	1134	0.300	1184	0.300	1234	0.300	1284	0.300	1334	0.300
1085	0.300	1135	0.300	1185	0.300	1235	0.300	1285	0.300	1335	0.300
1086	0.300	1136	0.300	1186	0.300	1236	0.300	1286	0.300	1336	0.300
1087	0.300	1137	0.300	1187	0.300	1237	0.300	1287	0.300	1337	0.300
1088	0.300	1138	0.300	1188	0.300	1238	0.300	1288	0.300	1338	0.300

Surcharged Outfall Details for STORM.SWS

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1339	0.300	1356	0.300	1373	0.300	1390	0.300	1407	0.300	1424	0.300
1340	0.300	1357	0.300	1374	0.300	1391	0.300	1408	0.300	1425	0.300
1341	0.300	1358	0.300	1375	0.300	1392	0.300	1409	0.300	1426	0.300
1342	0.300	1359	0.300	1376	0.300	1393	0.300	1410	0.300	1427	0.300
1343	0.300	1360	0.300	1377	0.300	1394	0.300	1411	0.300	1428	0.300
1344	0.300	1361	0.300	1378	0.300	1395	0.300	1412	0.300	1429	0.300
1345	0.300	1362	0.300	1379	0.300	1396	0.300	1413	0.300	1430	0.300
1346	0.300	1363	0.300	1380	0.300	1397	0.300	1414	0.300	1431	0.300
1347	0.300	1364	0.300	1381	0.300	1398	0.300	1415	0.300	1432	0.300
1348	0.300	1365	0.300	1382	0.300	1399	0.300	1416	0.300	1433	0.300
1349	0.300	1366	0.300	1383	0.300	1400	0.300	1417	0.300	1434	0.300
1350	0.300	1367	0.300	1384	0.300	1401	0.300	1418	0.300	1435	0.300
1351	0.300	1368	0.300	1385	0.300	1402	0.300	1419	0.300	1436	0.300
1352	0.300	1369	0.300	1386	0.300	1403	0.300	1420	0.300	1437	0.300
1353	0.300	1370	0.300	1387	0.300	1404	0.300	1421	0.300	1438	0.300
1354	0.300	1371	0.300	1388	0.300	1405	0.300	1422	0.300	1439	0.300
1355	0.300	1372	0.300	1389	0.300	1406	0.300	1423	0.300	1440	0.300

Simulation Criteria for STORM.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	16.000	Storm Duration (mins)	30
Ratio R	0.327		

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.328
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	16.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	2	+0%	30/15 Summer	100/15 Summer		
1.001	2	15 Winter	2	+0%	30/15 Summer			
1.002	3	15 Winter	2	+0%	30/15 Summer			
1.003	4	15 Winter	2	+0%	30/15 Summer			
1.004	5	15 Winter	2	+0%	100/15 Summer			
2.000	15	15 Winter	2	+0%	30/15 Summer			
2.001	16	15 Winter	2	+0%	30/15 Summer			
2.002	17	15 Winter	2	+0%	30/15 Summer			
1.005	6	15 Winter	2	+0%	30/15 Summer			
1.006	7	15 Winter	2	+0%	30/15 Summer			
1.007	8	15 Winter	2	+0%	30/15 Summer			
1.008	9	15 Winter	2	+0%	30/15 Summer			
1.009	10	15 Winter	2	+0%	30/15 Summer			
1.010	11	15 Winter	2	+0%				
1.011	12	15 Winter	2	+0%				
1.012	13	15 Winter	2	+0%				
1.013	14	15 Winter	2	+0%	30/15 Summer			

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM.SWS

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	13.223	-0.043	0.000	0.83			12.5	OK	4
1.001	2	12.938	-0.119	0.000	0.45			22.7	OK	
1.002	3	12.762	-0.116	0.000	0.47			22.8	OK	
1.003	4	12.692	-0.065	0.000	0.85			30.3	OK	
1.004	5	12.509	-0.143	0.000	0.28			33.7	OK	
2.000	15	11.880	-0.180	0.000	0.33			20.2	OK	
2.001	16	11.808	-0.174	0.000	0.36			23.5	OK	
2.002	17	11.740	-0.113	0.000	0.41			25.2	OK	
1.005	6	11.715	-0.061	0.000	0.98			64.2	OK	
1.006	7	11.584	-0.055	0.000	0.96			66.6	OK	
1.007	8	11.515	-0.047	0.000	1.00			77.6	OK	
1.008	9	11.391	-0.075	0.000	0.92			77.6	OK	
1.009	10	11.222	-0.081	0.000	0.88			77.3	OK	
1.010	11	10.899	-0.166	0.000	0.41			77.5	OK	
1.011	12	8.006	-0.194	0.000	0.27			77.5	OK	
1.012	13	5.206	-0.194	0.000	0.27			77.5	OK	
1.013	14	2.910	-0.110	0.000	0.73			77.4	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.328
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	16.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
1.001	2	15 Winter	30	+0%	30/15 Summer			
1.002	3	15 Winter	30	+0%	30/15 Summer			
1.003	4	15 Winter	30	+0%	30/15 Summer			
1.004	5	15 Winter	30	+0%	100/15 Summer			
2.000	15	15 Winter	30	+0%	30/15 Summer			
2.001	16	15 Winter	30	+0%	30/15 Summer			
2.002	17	15 Winter	30	+0%	30/15 Summer			
1.005	6	15 Winter	30	+0%	30/15 Summer			
1.006	7	15 Winter	30	+0%	30/15 Summer			
1.007	8	15 Winter	30	+0%	30/15 Summer			
1.008	9	15 Winter	30	+0%	30/15 Summer			
1.009	10	15 Winter	30	+0%	30/15 Summer			
1.010	11	15 Winter	30	+0%				
1.011	12	15 Winter	30	+0%				
1.012	13	15 Winter	30	+0%				
1.013	14	15 Winter	30	+0%	30/15 Summer			

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM.SWS

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	13.533	0.267	0.000	1.42			21.4	SURCHARGED
1.001	2	13.108	0.051	0.000	0.80			40.7	SURCHARGED
1.002	3	12.990	0.112	0.000	0.86			41.6	SURCHARGED
1.003	4	12.903	0.146	0.000	1.56			55.8	SURCHARGED
1.004	5	12.652	-0.001	0.000	0.51			61.2	OK
2.000	15	12.560	0.500	0.000	0.50			30.8	SURCHARGED
2.001	16	12.533	0.551	0.000	0.48			31.4	SURCHARGED
2.002	17	12.497	0.644	0.000	0.70			43.4	SURCHARGED
1.005	6	12.464	0.688	0.000	1.47			96.4	SURCHARGED
1.006	7	12.176	0.537	0.000	1.45			100.9	SURCHARGED
1.007	8	12.019	0.457	0.000	1.52			118.1	SURCHARGED
1.008	9	11.793	0.327	0.000	1.38			117.1	SURCHARGED
1.009	10	11.476	0.173	0.000	1.33			117.0	SURCHARGED
1.010	11	10.937	-0.128	0.000	0.62			116.7	OK
1.011	12	8.034	-0.166	0.000	0.41			116.9	OK
1.012	13	5.234	-0.166	0.000	0.41			117.0	OK
1.013	14	3.051	0.031	0.000	1.10			117.1	SURCHARGED

PN	US/MH Name	Level Exceeded
1.000	1	4
1.001	2	
1.002	3	
1.003	4	
1.004	5	
2.000	15	
2.001	16	
2.002	17	
1.005	6	
1.006	7	
1.007	8	
1.008	9	
1.009	10	
1.010	11	
1.011	12	
1.012	13	
1.013	14	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.328
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	16.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
1.001	2	15 Winter	100	+40%	30/15 Summer			
1.002	3	15 Winter	100	+40%	30/15 Summer			
1.003	4	15 Winter	100	+40%	30/15 Summer			
1.004	5	15 Winter	100	+40%	100/15 Summer			
2.000	15	15 Winter	100	+40%	30/15 Summer			
2.001	16	15 Winter	100	+40%	30/15 Summer			
2.002	17	15 Winter	100	+40%	30/15 Summer			
1.005	6	15 Winter	100	+40%	30/15 Summer			
1.006	7	15 Winter	100	+40%	30/15 Summer			
1.007	8	15 Winter	100	+40%	30/15 Summer			
1.008	9	15 Winter	100	+40%	30/15 Summer			
1.009	10	15 Winter	100	+40%	30/15 Summer			
1.010	11	15 Winter	100	+40%				
1.011	12	15 Winter	100	+40%				
1.012	13	15 Winter	100	+40%				
1.013	14	15 Winter	100	+40%	30/15 Summer			

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM.SWS

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	14.768	1.502	2.256	1.85			28.0	FLOOD
1.001	2	14.547	1.490	0.000	1.00			50.6	FLOOD RISK
1.002	3	14.437	1.559	0.000	0.93			44.7	FLOOD RISK
1.003	4	14.360	1.603	0.000	1.77			63.5	FLOOD RISK
1.004	5	14.094	1.441	0.000	0.54			64.0	FLOOD RISK
2.000	15	14.023	1.963	0.000	0.74			45.8	FLOOD RISK
2.001	16	13.975	1.993	0.000	0.77			50.1	SURCHARGED
2.002	17	13.900	2.047	0.000	0.91			56.5	SURCHARGED
1.005	6	13.845	2.069	0.000	2.01			131.7	SURCHARGED
1.006	7	13.303	1.664	0.000	2.01			139.5	SURCHARGED
1.007	8	13.005	1.443	0.000	2.16			167.5	SURCHARGED
1.008	9	12.542	1.076	0.000	1.97			166.7	SURCHARGED
1.009	10	11.903	0.600	0.000	1.89			166.2	SURCHARGED
1.010	11	10.985	-0.080	0.000	0.89			166.4	OK
1.011	12	8.065	-0.135	0.000	0.58			166.4	OK
1.012	13	5.265	-0.135	0.000	0.58			166.4	OK
1.013	14	3.320	0.300	0.000	1.56			166.2	SURCHARGED

PN	US/MH Name	Level Exceeded
1.000	1	4
1.001	2	
1.002	3	
1.003	4	
1.004	5	
2.000	15	
2.001	16	
2.002	17	
1.005	6	
1.006	7	
1.007	8	
1.008	9	
1.009	10	
1.010	11	
1.011	12	
1.012	13	
1.013	14	

Appendix F Drainage Strategy Drawing

ENGINEERING LEGEND:

Adoptable Drainage and highways

Existing adopted Combined

Existing adopted Storm

Existing adopted Storm to be abandoned

Proposed adoptable Storm S1

Proposed adoptable Foul F1

Highway Gully RG

Private Drainage

Rodding eye Re

3000 private inspection chamber. To be used where depth to invert is 0.6m or less.

4500 private inspection chamber. To be used where depth to invert is 1.2m or less. Reduced access fitting required at depths greater than 1.2m

Drainage channel ACO

Yard gully G

Permeable Paving

External Works

Existing levels

Retaining wall or flag on edge FOE 0.3m
Max indicated (exposed only)

Additional Exposed brickwork (below nominal 150mm) Add 0.1mBrk 0.150m

NOTES:

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ALL PRIVATE DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH BUILDING REGULATIONS 2002 EDITION.
2. POSITION SIZE AND DEPTH OF ALL EXISTING SEWERS AND SERVICES SHALL BE ESTABLISHED BY MAIN CONTRACTOR PRIOR TO COMMENCEMENT ON SITE.
3. THE CONTRACTOR SHALL ALLOW FOR THE PROTECTION, TEMPORARY AND PERMANENT SUPPORT, AND TEMPORARY AND PERMANENT DIVERSION WORKS, AS NECESSARY TO ALL EXISTING SERVICES.
4. THE CONTRACTOR SHALL ALLOW FOR ALL TRAFFIC MANAGEMENT IN CONNECTION WITH ROAD AND SEWER WORKS.
5. THE CONTRACTOR SHALL ALLOW FOR KEEPING SEWER TRENCHES AND EXCAVATIONS AS DRY AS PRACTICABLE BY PUMPING FROM TEMPORARY SUMPS AND DEWATERING AS APPROPRIATE. THE POINT AND METHOD OF DISCHARGE TO BE AGREED WITH THE DRAINAGE AUTHORITY.
6. PIPES UP TO AND INCLUDING 225mmØ TO BE EXTRA STRENGTH V CLAY OR UNPLASTICISED PVC. VITRIFIED CLAY PIPES AND FITTINGS SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN295 AND BS 65 RESPECTIVELY. PIPES 300mmØ AND GREATER TO BE CONCRETE CLASS H.
7. VITRIFIED CLAY PIPES AND FITTINGS SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN295 AND BS 65 RESPECTIVELY AND BE KITEMARKED. ALL PIPES SHALL BE EXTRA STRENGTH TO BS 65 OR EQUIVALENT BS EN295 PIPE CRUSHING STRENGTH.
8. ALL PIPEWORK TO BE 100mm DIAMETER UNLESS NOTED OTHERWISE.
9. INSITU AND PRECAST CONCRETE UNITS SHALL HAVE SULPHATE RESISTING PORTLAND CEMENT TO BS 4027, UNLESS AGREED OTHERWISE WITH THE ADOPTING AUTHORITY.
10. PRECAST CONCRETE PRODUCTS SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS 5911 AND BE KITEMARKED.
CONCRETE PIPES TO BE CLASS H UNLESS NOTED OTHERWISE.
11. MANHOLE COVERS AND FRAMES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN124. HAVE MINIMUM 675 x 675 CLEAR OPENINGS WITH 150 DEEP FRAMES UNLESS OTHERWISE SPECIFIED. MANHOLE COVERS AND FRAMES TO BE OF A NON-ROCKING DESIGN WITHOUT CUSHION INSERTS AND BE KITEMARKED. LOAD CLASS D400 IN VEHICULAR TRAFFICKED AREAS AND LOAD CLASS B125 IN FOOTWAYS AND PEDESTRIAN AREAS.
12. GULLY GRATES AND FRAMES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN124 AND BE OF A NON-ROCKING DESIGN WITH CAPTIVE HINGE ACCESS AND BE KITEMARKED. LOAD CLASS D400 FOR ROADS REGULARLY CARRYING FAST MOVING HEAVY VEHICLES. CLASS C250 TO BE USED IN LESSER TRAFFICKED AREAS eg. ESTATE ROADS, CUL-DE-SACS, RESIDENTIAL CAR PARKING AREAS ETC.
13. CLASS X BEDDING DETAIL SHALL BE PROVIDED WHERE COVER TO THE PIPE BARREL IS LESS THAN 1.2M IN VEHICULAR TRAFFICKED AREAS AND 0.9M ELSEWHERE, TO ALL ROAD GULLY CONNECTIONS AND WITHIN AREAS OF DEEP ROOTING VEGETATION.
14. WHERE CLASS X TRENCH BEDDING DETAIL IS USED, THE CONCRETE BED AND SURROUND SHALL BE DISCONTINUED AT EACH PIPE JOINT OVER THE FULL CROSS SECTION BY MEANS OF A SHAPED COMPRESSIBLE FILLER.
15. SELECTED BACKFILL MATERIAL SHALL CONSIST OF UNIFORM MATERIAL FREE FROM STONES LARGER THAN 40mm, CLAY LUMPS LARGER THAN 75mm, TREE ROOTS, ORGANIC MATTER AND FROZEN SOIL. SELECTED BACKFILL MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING 225mm, EACH LAYER COMPACTED TO FORM A STABLE TRENCH BACKFILL.
16. GENERAL BACKFILL MATERIAL TO BE FREE FROM STONES LARGER THAN 40mm. GENERAL BACKFILL MATERIAL IS TO BE PLACED IN LAYERS NOT EXCEEDING 150mm THICKNESS AND EACH LAYER COMPACTED BY HAND. NO MECHANICAL COMPACTION OF FILL MATERIAL SHALL BE PERMITTED WITHIN 300mm ABOVE THE CROWN/BARREL OF THE PIPE.
17. BACKFILLING AND REINSTATEMENT TO TRENCHES IN PUBLIC HIGHWAYS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS AND SPECIFICATIONS OF THE ADOPTING AUTHORITY, OR, IN THE ABSENCE OF SUCH, IN ACCORDANCE WITH THE REQUIREMENTS OF "THE STREET WORKS REGULATIONS 1992" AND RELEVANT PROVISIONS OF H.A.U.C. "SPECIFICATION FOR THE REINSTATEMENT OF OPENINGS IN HIGHWAYS" JUNE 1992. BOTH UNDER SECTION 71 OF THE NEW ROADS AND STREET WORKS ACT 1991.
18. BACKFILL TO DRAINAGE TRENCHES IN HARD PAVED AREAS SHALL BE GS.B. TYPE 1.
19. ALL RW DOWNCOMERS TO DISCHARGE TO TRAPPED GULLIES
20. ALL ROAD GULLIES ARE TO BE TRAPPED GULLIES.
21. ALL GULLY LEADS TO BE 150mm DIAMETER.
22. ALL REDUNDANT EXISTING DRAINAGE TO BE GRUBBED UP OR GROUTED, ANY EXISTING LIVE DRAINAGE SHOULD BE REPORTED TO THE ENGINEER AND RECONNECTED.
23. ALL ROAD GULLIES & LEADS TO BE CLEARED OF DEBRIS UPON COMPLETION OF WORKS.
24. ANY EXISTING DRAINAGE WHICH BECOMES UNDER TRAFFICKED AREAS IN THE NEW SCHEME SHOULD BE SUBJECT TO THE FOLLOWING REMEDIALS/REVISIONS. WHERE DEPTH OF COVER IS LESS THAN 1200MM. THE EXISTING PIPEWORK SHALL BE EXPOSED & SURROUNDED WITH 150MM CONCRETE AS CLASS "X" BEDDING. WHERE THE EXISTING MANHOLE COVER & FRAME IS NOT AS MANHOLE DETAIL A OR B, OR TO BS497 GRADE A, OR EN124 CLASS D, THEN IT SHOULD BE CHANGED FOR SUCH.
25. THE CONTRACTOR MUST ENSURE THAT ANY OF THE EXISTING DRAINAGE WHICH IS LIVE IS KEPT CLEAR OF DEBRIS AND SHOULD ALLOW FOR JETTING THROUGH THE NEW & EXISTING DRAINAGE UPON COMPLETION.
26. CONTRACTOR TO TAKE MEASURES TO PROTECT HIS OPERATIVES WITH RESPECT TO THE PRESENCE OF GAS IN SEWER TRENCHES AND MANHOLES THROUGH THE USE OF GAS MONITORING EQUIPMENT AND BREATHING APPARATUS AS REQUIRED.
27. CONTRACTOR TO APPLY FOR SEWER PERMITS AND ROAD OPENING PERMITS AS NECESSARY FROM THE APPROPRIATE AUTHORITIES, PRIOR TO COMMENCING WORKS.

HEALTH & SAFETY
1. CONTRACTOR SHOULD BE AWARE OF GENERAL CONSTRUCTION RISKS TO PREVENT SLIPS, TRIPS AND FALLS AND TAKE NECESSARY PRECAUTIONS WITHOUT SPECIAL INSTRUCTION.
ROADS & DRAINAGE
2. CONTRACTOR TO PROVIDE TRENCH SUPPORTS AS APPROPRIATE AND ENSURE THAT PLANT REMAINS A SAFE DISTANCE FROM TRENCHES PRIOR TO INSTALLING DRAINAGE
3. THE TIME THAT EXCAVATIONS ARE OPEN ON SITE SHOULD BE KEPT TO A MINIMUM AND ALL TRENCHES SHOULD BE SURROUNDED BY A BARRIER.
4. CONTRACTOR TO MAKE OPERATIVES AWARE OF ASSOCIATED DANGERS TO HEALTH SUCH AS LEPTOSPIROSIS (WEILS DISEASE) AND RECOMMENDED PRECAUTIONS. ADEQUATE WELFARE FACILITIES AND PROTECTIVE CLOTHING TO BE PROVIDED AS REQUIRED.
5. UNFINISHED MANHOLES MUST BE COVERED WITH LOAD BEARING MATERIALS AND SURROUNDED WITH BARRIER.
PIPES & CABLES
6. SERVICE RECORDS TO BE REFERRED TO PRIOR TO WORK COMMENCING. CONTRACTOR TO PROCEED WITH CAUTION AND SERVICES TO BE LOCATED BY HAND DIG AND PROTECTED ACCORDINGLY.
EXCAVATION/FILL
7. CONTRACTOR TO ENSURE RELEVANT MEASURES ARE TAKEN TO KEEP PLANT AND PEOPLE A SAFE DISTANCE FROM STEEP SLOPES DURING THE WORKS.
8. CONTRACTOR TO ENSURE THAT PROCEDURES ARE IN PLACE TO KEEP PEOPLE A SAFE DISTANCE FROM WORKING PLANT WHERE NECESSARY.
9. CONTRACTOR TO REFER TO GROUND INVESTIGATION REPORT FOR CONTAMINATION TESTS AND TO PROVIDE ADEQUATE WELFARE FACILITIES AND PROTECTIVE CLOTHING AS REQUIRED.

Rev.	Description	By	Chk	App	Date
F	Revised to suit the latest layout	KC	SH	LRB	02/09/21
E	Revised to suit the latest layout	KC	SH	LRB	16/07/21
D	Manhole S14 moved	SH	LRB	LRB	17/09/18
C	Drawings revised as per Northumberland Council's request	KC	SH	LRB	24/04/17
B	Drawings revised as per Northumberland Council's request	KC	SH	LRB	07/03/17
A	Manhole F13 moved	SH	LRB	LRB	05/12/16
Ø	Initial Issue	SH	LRB	LRB	14/10/16

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Client
Amethyst Homes

Project
Springville
East Sleekburn

Drawing Title
Proposed Drainage Layout
Sheet 1 of 2

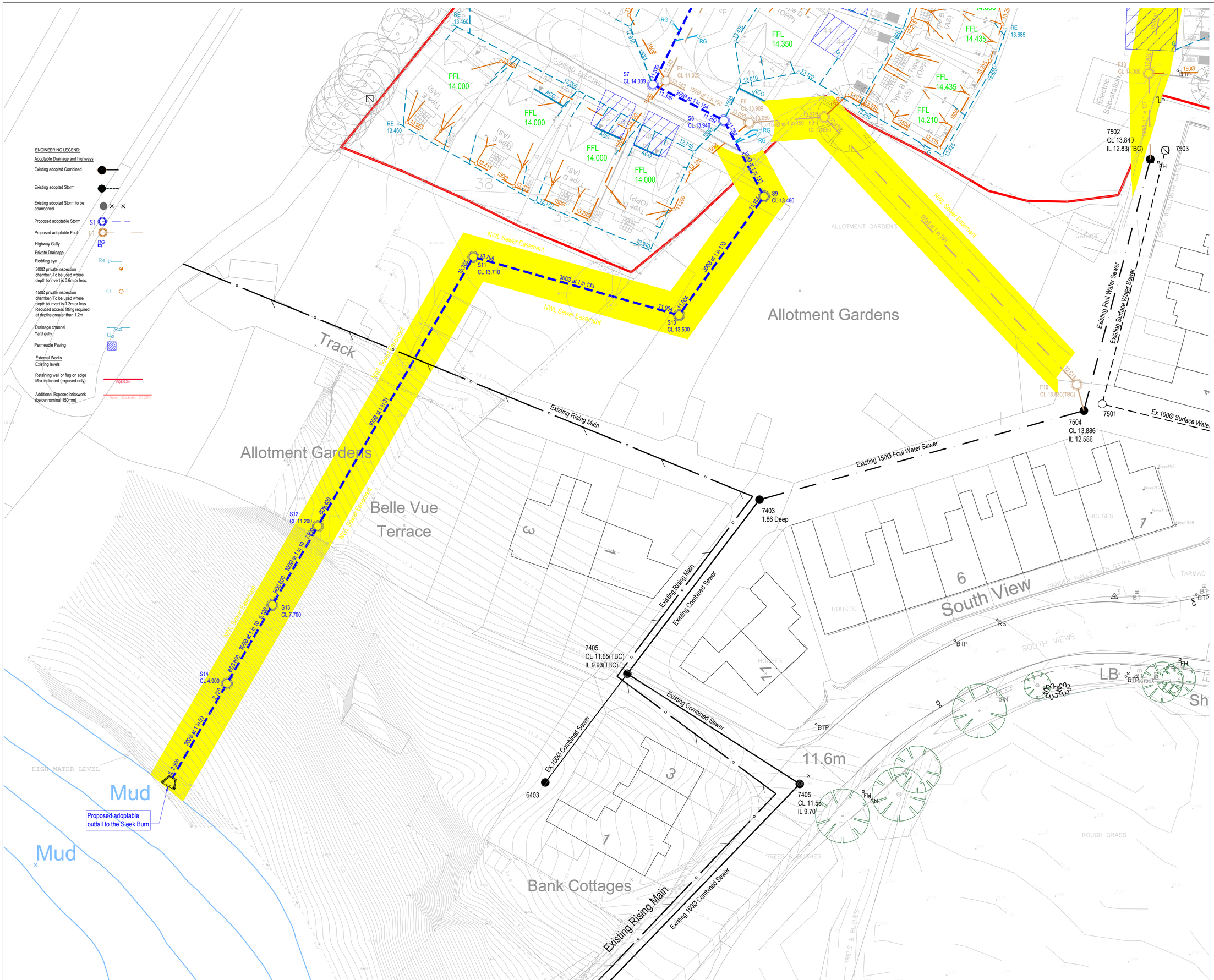
Scale	Sheet Size
1:250	A1

Drawn By	Checked By	Approved By	Date
SH	LRB	LRB	11/10/2016

Drawing Status
Preliminary

Project No.	Drawing No.	Revision
2016064	010	F

ISO 9001 REGISTERED FIRM



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16. GENERAL BACKFILL MATERIAL TO BE FREE FROM STONES LARGER THAN 40mm. GENERAL BACKFILL MATERIAL IS TO BE PLACED IN LAYERS NOT EXCEEDING 150mm THICKNESS AND EACH LAYER COMPACTED BY HAND. NO MECHANICAL COMPACTION OF FILL MATERIAL SHALL BE PERMITTED WITHIN 300mm ABOVE THE CROWN/BARREL OF THE PIPE.
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20. ALL ROAD GULLIES ARE TO BE TRAPPED GULLIES.
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HEALTH & SAFETY
1. CONTRACTOR SHOULD BE AWARE OF GENERAL CONSTRUCTION RISKS TO PREVENT SLIPS, TRIPS AND FALLS AND TAKE NECESSARY PRECAUTIONS WITHOUT SPECIAL INSTRUCTION.
ROADS & DRAINAGE
2. CONTRACTOR TO PROVIDE TRENCH SUPPORTS AS APPROPRIATE AND ENSURE THAT PLANT REMAINS A SAFE DISTANCE FROM TRENCHES PRIOR TO INSTALLING DRAINAGE.
3. THE TIME THAT EXCAVATIONS ARE OPEN ON SITE SHOULD BE KEPT TO A MINIMUM AND ALL TRENCHES SHOULD BE SURROUNDED BY A BARRIER.
4. CONTRACTOR TO MAKE OPERATIVES AWARE OF ASSOCIATED DANGERS TO HEALTH SUCH AS LEPTOSPIROSIS (WELS DISEASE) AND RECOMMENDED PRECAUTIONS. ADEQUATE WELFARE FACILITIES AND PROTECTIVE CLOTHING TO BE PROVIDED AS REQUIRED.
5. UNFINISHED MANHOLES MUST BE COVERED WITH LOAD BEARING MATERIALS AND SURROUNDED WITH BARRIER.
PIPES & CABLES
6. SERVICE RECORDS TO BE REFERRED TO PRIOR TO WORK COMMENCING. CONTRACTOR TO PROCEED WITH CAUTION AND SERVICES TO BE LOCATED BY HAND DIG AND PROTECTED ACCORDINGLY.
EXCAVATION/FILL
7. CONTRACTOR TO ENSURE RELEVANT MEASURES ARE TAKEN TO KEEP PLANT AND PEOPLE A SAFE DISTANCE FROM STEEP SLOPES DURING THE WORKS.
8. CONTRACTOR TO ENSURE THAT PROCEDURES ARE IN PLACE TO KEEP PEOPLE A SAFE DISTANCE FROM WORKING PLANT WHERE NECESSARY.
9. CONTRACTOR TO REFER TO GROUND INVESTIGATION REPORT FOR CONTAMINATION TESTS AND TO PROVIDE ADEQUATE WELFARE FACILITIES AND PROTECTIVE CLOTHING AS REQUIRED.

Rev.	Description	By	Chk	App	Date
B	Revised to suit the latest architect's layout	KC	SH	LRB	02/09/21
A	Revised to suit the latest architect's layout	KC	SH	LRB	16/07/21
Ø	Initial Issue	SH	LRB	LRB	14/10/16

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Client
Amethyst Homes

Project
Springville
East Sleekburn

Drawing Title
Proposed Drainage Layout
Sheet 2 of 2

Scale	Sheet Size		
1:250	A1		
Drawn By	Checked By	Approved By	Date
SH	LRB	LRB	06/10/16

Drawing Status
Preliminary

Project No.	Drawing No.	Revision
2016064	011	B

Appendix G Maintenance Schedule

Section1
General Maintenance & Inspection Requirements
For Below Ground Gravity Drainage. (Including Drainage Channels)

1. No work shall be carried out on the drainage system without permission from a nominated person, who has access to information/a working knowledge of the system.

2. Maintenance/inspection work shall be carried out in a safe/planned manner.

3. All work is to be carried out by competent persons suitably trained and equipped in accordance with current statutory safe working policies.

4. Entry into confined spaces shall be kept to a minimum and be restricted to suitably qualified/equipped persons working in accordance with current statutory safe working policies.

5. High levels of hygiene shall be maintained at all times, with adequate welfare facilities being provided for the personnel.

6. Drainage systems shall be inspected on a regular basis or should any problems be suspected. Any debris/ defects discovered shall be recorded and a programme of cleaning/ repair initiated. Urgent repairs/ cleaning shall be actioned as soon as practicable.

7. The following operations should be carried out annually.
    a) Covers of inspection chambers and manholes shall be removed and the sides, benchings and channels cleared.
    b) Accumulated deposits of silt in soakaways, catchpit manholes, drainage channels, gullies etc. shall be removed. Any traps shall then be plunged and thoroughly flushed out with clean water.
    c) Main and branch drains shall be cleared as required and afterwards be flushed with clean water. Any obstructions found shall be removed and not flushed down the system.
    d) Covers of inspection chambers, manholes, gullies etc. shall be replaced, bedded in suitable grease or other sealing material as required and bolted/locked down as appropriate. Missing bolts and broken items shall be replaced in accordance with the manufacturer's details.

8. Trapped gullies shall be checked and replenished as necessary in order to maintain the seal preventing the escape of odours.

9. Clearing of the drainage system can be achieved by a number of methods depending on the nature of the work
    a) Rodding – Manual/Mechanical with flexible rods.
    b) Jetting – High pressure water jetting.
    c) Plunging.

<u>All adopted drainage to be maintained by Northumbrian Water Limited</u>

<u>All non-adopted drainage to be maintained by the owner/occupier of each individual property</u>

Drainage installation to be carried out by a suitably qualified Contractor appointed by and under the supervision of Amethyst Homes.

Section2
Specific Items

Regular Maintenance		
Element	**Maintenance/Action required**	**Frequency**
Permeable Paving	Regular cleaning will be required, brushing should suffice to remove surface dirt and silt build up between blocks. Following the routine maintenance it may be necessary to redress the surface with 2-4mm gritstone as per manufacturer's recommendations	Bi-Annual – In the spring Autumn after leaf fall
Aco Channels	Covers should be lifted and debris cleared out	Annually - Autumn after leaf fall
Regular Monitoring		
Element	**Maintenance/Action required**	**Frequency**
Permeable Paving	Regular cleaning will be required, brushing should suffice to remove surface dirt and silt build up between blocks. Following the routine maintenance it may be necessary to redress the surface with 2-4mm gritstone as per manufacturer's recommendations	Bi-Annual – In the spring Autumn after leaf fall
Regular Monitoring		
Permeable Paving: Initial Inspections	1- Inspect for poor operation 2- Inspect for evidence of poor operation and or weed growth. Take remedial action if required.	1- Monthly for 3 months after installation 2- Every 3 months, 48hours after large storms
Permeable Paving	Check surface is draining adequately during storms.	Annually – during storm conditions
Remedial Actions		
Rutting of paving /broken blocks	Repair areas as necessary	As required
Surface and upper substructure if poor operation is encountered and cannot be rectified by cleaning of surface etc	Rehabilitation/Replacement of these layers	As required
Adjacent landscaping	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required

Appendix H Flood Exceedance Plan

2.256m³ FLOODED VOLUME FROM S1 FOR 1 IN 100 YEAR RETURN PERIOD

ALLOWANCE TO BE MADE FOR NEW D400 COVER & FRAME SUBJECT TO NWL APPROVAL

Ø	Initial Issue	KC	SH	LRB 23/09/21
Rev.	Description	By	Chk	App Date

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Drawing Title

Flood Exceedance Plan

Scale	Sheet Size		
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Drawing Status

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Appendix I Impermeable Areas Drawing

Rev.	Description	By	Chk	App	Date
Ø	Initial Issue	KC	SH	LRB	23/09/21

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Drawing Title

Impermeable Areas

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KC	SH	LRB	23/09/21

Drawing Status

Preliminary

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