

Ageas Bowl, Hampshire

Flood and Drainage Addendum

A Flood Risk Assessment (FRA) for the proposed development of the site at the Ageas Bowl (planning reference number F/22/93194) was provided by Andy Clay Consulting (ACC) in August 2022.

An updated FRA was provided in July 2023. The LPA are Eastleigh Borough Council (EBC) and the LLFA are Hampshire County Council (HCC). LPA and LLFA comments on the July 2023 FRA were received in November 2023.

For clarity and information, ACC is now operating as Sustain Environmental Ltd (SE). There is therefore consistency, as the previous works have informed the approach and information that has been provided in this Flood and Drainage Addendum.

The FRA included drainage design input from Tumu Consulting Ltd and also flood modelling input by Thomas Mackay Ltd. In response to the comments from the LPA and LLFA, this Flood and Drainage Addendum includes a slight update to the drainage design and landscape plans, as summarised below:

- **Appendix A1 to A4** – Drainage Network Calculations
- **Appendix B1 to B10** – Proposed Drainage Strategy
- **Appendix C1 to C4** – Drainage Catchment Areas
- **Appendix D1** – Surface Water Modelling Classification
- **Appendix E1 to E2** – Two-Stage Channel Layout and Sections
- **Appendix F1 to F8** – Pre- and Post-Development Exceedance Flows
- **Appendix G1** – Proposed Landscape Detail for Existing Lakes

This Flood and Drainage Addendum makes reference to the previous LLFA comments that were received on the August 2022 FRA and follow on FRA Addendum, included here as **Appendix H1**, and the more recent LLFA and LPA comments that were received on the July 2023 FRA, included here as **Appendix I1**.

The response has collated these comments under a number of headings and then provided a response, with the aim to reach a position of agreement.

Comment 1:

Flood and drainage input was provided from an early stage, with the aim to provide an integrated sustainable drainage solution that included landscaped SuDS features and that worked with the various site constraints; the existing hydrological features; and the aspirations of the proposed development.

An existing watercourse (Telegraph Brook) passes through the upper part of the site in a deep culverted section and which appears to be partially blocked at the culvert inlet (outside of the site boundary).

After the outlet from the culverted section, Telegraph Brook passes along the northern site boundary within a semi-natural channel; then into another culverted section; along a shallow graded and relatively featureless sleeper lined channel; and then into lakes in the lower part of the site.

The aim was to incorporate a surface water drainage strategy into the proposed development and improve the existing watercourse where possible. The drainage strategy has included a number of landscaped SuDS solutions together also with areas of permeable paving, a recognised sustainable drainage solution for providing source control.

In summary – we do not concur with the statement from the LLFA, as included in **Appendix I**, that: *“the layout was planned prior to a SuDS being designed (rather than the layout being led by conceptual SuDS planning) and therefore there are now limited opportunities to integrate SuDS throughout the development.”*

Comment 2:

As demonstrated in **Appendix I**, the LLFA have confirmed that the proposed development has met the water quality requirements of the SuDS Manual. However, the LLFA have advised that there are some parts of the proposed development where clarification is needed on the three natural forms of treatment to satisfy EBC’s Policy DM7.

The July 2023 FRA (Para 2.17) advised that the LLFA had agreed that the existing lakes could count as a naturalised form of treatment, although the FRA had noted that there are actually two separate lakes and a third lake that Telegraph Brook passes through prior to being discharged from the overall site.

After review of the previously submitted material, the July 2023 FRA (Para 2.28) advised that the LLFA had accepted the approach to enhance the existing watercourse and lakes.

The LLFA had previously suggested the following condition, as included in **Appendix H**, that:

“No development shall begin until a detailed surface water drainage scheme for the site, based on the principles within the Flood Risk Assessment and Addendums, has been submitted and approved in writing by the Local Planning Authority. The submitted details should include:

- a) A technical summary highlighting any changes to the design from that within the approved Flood Risk Assessment.*
- b) Confirmation that sufficient water quality measures have been included to satisfy the methodology in the CIRIA SuDS Manual C753.*
- c) Details of the Biodiverse Channel and Lakes identifying works proposed to enhance from the current situation and provide sufficient water quality benefits.”*

The July 2023 FRA (Para 6.30) advised that the existing lakes would be re-profiled slightly to accommodate the proposed development. In addition, the lakes would be enhanced by including areas around the edge with stepped banks with appropriate bankside planting to improve biodiversity.

The November 2023 LLFA comments advised that these modifications must form part of the drainage proposals and must be shown to be capable of acting as effective filtration components. However, the earlier response from the LLFA had suggested a condition for providing the details of these works to enhance the lakes, and which we consider to be appropriate.

We have however provided some additional landscape details in response to the request from the LLFA, included as **Appendix G**.

This shows how the northern bank of the existing lake could be re-profiled with a stepped bank and with areas for marginal planting. We would also consider the use of a floating island solution to provide additional biodiversity benefit, such as the FloraFloat plastic free floating islands available from Salix.

In terms of the drainage design detail associated with these works, we feel that this could be addressed as part of an appropriately worded condition, similar to what the LLFA had previously suggested.

Comment 3:

For the residential home, the LLFA advised that the green roof will provide good interception. The majority of the run-off from the roof and the surrounding area will then enter a permeable pavement prior to discharge into an existing surface water drain which continues in a north-east direction. The LLFA advised that this only provides one form of filtration, and does not satisfy EBC's Policy DM7.

To clarify, the drainage from the residential home discharges to a 600mm diameter pipe and then drains north-east towards the lakes, as described above. The lakes would therefore provide additional biodiversity benefit and natural filtration. We would also suggest that rain gardens could be incorporated into the building design, at detailed design stage, to provide additional biodiversity benefit and natural filtration.

In terms of the drainage design detail associated with these works, we feel that this could be addressed as part of an appropriately worded condition, similar to what the LLFA had previously suggested.

Comment 4:

There are three sections of pipe within the surface water drainage strategy that the LLFA have identified and asked if they could instead be open drainage channels, as shown in **Figure 1**.

We have taken a look at the viability of completing this, and unfortunately the depth to the invert levels of the pipes is the main constraint to providing open drainage channels.

Given the requirement to provide 1:3 bank side slopes and with the depth of these pipes, this would require a wide grading to be included either side of any potential open flow channel. This would result in the loss of an area of accessible public open space where benches are currently proposed.

We do not therefore feel that this is viable and the best overall solution for the proposed development.

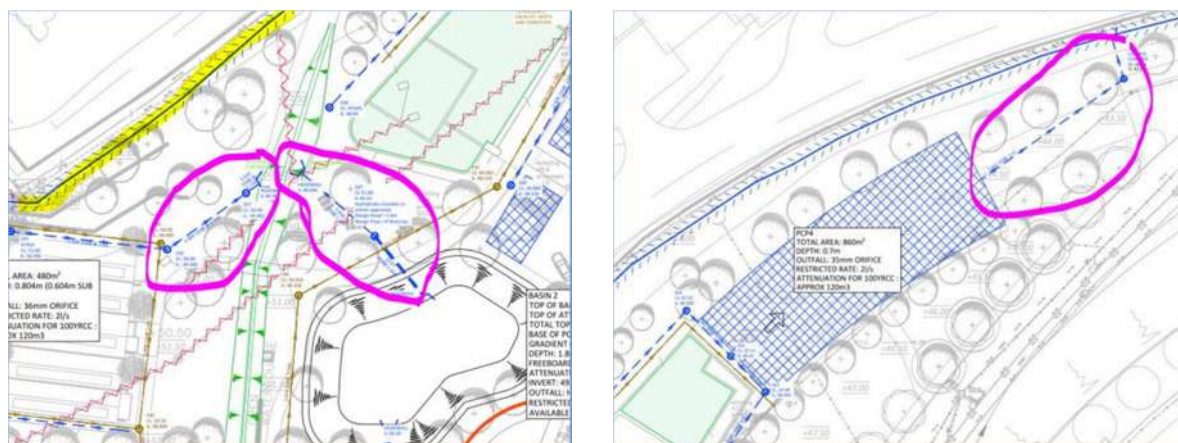


Figure 1 – Sections of Pipe Identified by the LLFA

Comment 5:

The LLFA make reference to a drainage pipe which they highlighted in yellow on **Figure 2**, and advise that this is a new surface water drain but that it does not pass through any form of filtration.

Drainage from the residential home discharges to a 600mm diameter pipe and then drains north-east towards the lakes, as described above. The lakes would therefore provide additional biodiversity benefit and natural filtration. We would also suggest that rain gardens could be incorporated into the building design, at detailed design stage, to provide additional biodiversity benefit and natural filtration.

The LLFA also advise that it was unclear where the surface water pipe marked with a pink X is from. The annotation on the drainage plan clarifies this (as shown on **Figure 2**). It is an existing land drain that is to be diverted, but with the lower section continuing to drain as it does at present (i.e. into the lakes).

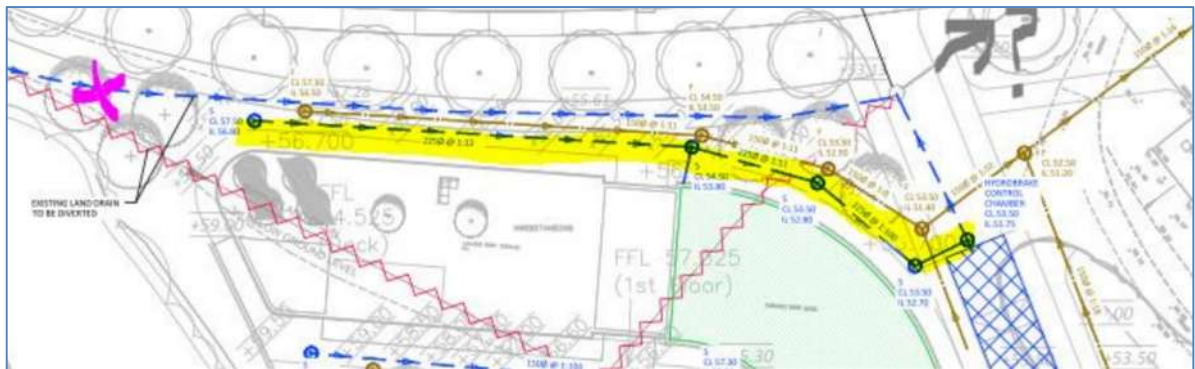


Figure 2 – Section of Pipe Identified by the LLFA

Comment 6:

The LLFA asked whether a site investigation of the car park has been carried out to establish the groundwater level to ensure there is a sufficient depth of unsaturated substrate. The LLFA also asked if the existing substrate meet the required design specifications for infiltration (soil with a good attenuation potential of at least 3000mm in depth) or whether replacement substrate proposed.

A ground investigation has not been completed for this application. However, the proposals are to leave the ground surface as close to existing as possible and to limit the development in this area. To replace the existing soil would work against this approach and would not be a viable or sustainable solution.

The July 2023 FRA (Para 6.32) advised that the surface of the overflow car park is to be reinforced using a geogrid, allowing water to continue to drain naturally. A reinforced gravel path would cross the car park. A gravel filled filter drain would also be located around the north-eastern and eastern periphery of the car park. Water would pass through this filter drain, and then out to the existing drainage channel.

The proposals are to limit development by using only a reinforced geogrid to an area which will largely be unused (i.e. an occasional overflow carpark). It is suggested that any surface water flows in excess of this will be picked up by the gravel filled drains that have been introduced.

In terms of the drainage design detail associated with these works, we feel that this could be addressed as part of an appropriately worded condition, similar to what the LLFA had previously suggested.

Comment 7:

The LLFA provided some comments on the detail of the surface water drainage strategy, such as requesting the addition of sediment traps.

The notation of types of chamber at this stage is considered to be detailed design, and ordinarily this would be provided as part of the detailed drainage design. However, as requested we have brought silt traps into the updated drainage strategy plans, included as **Appendix B**.

Comment 8:

The LPA advised that the: *“basins look like engineer led structures that do not fit within open spaces where their value for amenity and biodiversity is also important alongside managing water quantity and improving water quality.”*

Detention basins were included in the drainage strategy, as these are recognised as a sustainable and landscaped drainage solution for managing surface water runoff. There are design requirements that these detention basins must adhere to for them to provide the required benefit for surface water runoff, which is the primary reason for their inclusion in the layout.

As advised in the July 2023 FRA (Para 7.26), the drainage strategy would provide additional community and environmental benefits, in particular to landscape amenity, ecology, biodiversity and water quality.

The July 2023 FRA (Para 6.24) advised that detention basins would be included within the layout, and provided an extract from the SuDS Manual of a typical detention basin.

In terms of the drainage design, we do agree that there is an opportunity to provide additional benefit with the profile of the basins and therefore propose over-deepening a section at the base of the detention basins adjacent to the outfall. This would result in a part of the detention basins, in addition to the part that has been included for providing attenuation, which would be more frequently wetted.

These parts of the detention basins would therefore be more like a pond, and would be appropriately planted and managed as part of the SuDS operation and maintenance plan. We have brought these detention basins pond areas into the updated drainage strategy plans, included as **Appendix B**.

Summary:

This Flood and Drainage Addendum has been provided in response to the comments raised in November 2023 by the LPA and LLFA on the July 2023 FRA, included here as **Appendix I**.

The LPA and LLFA comments have been collated under a number of headings and with a response and where required additional information provided, with the aim to reach a position of agreement.

This includes a slight update to the drainage strategy plans, included as **Appendix A to F**, and some additional details on the proposed landscaping of the existing lakes, included as **Appendix G**.

After review of the previous material, the LLFA had accepted the approach to enhance the existing watercourse and lakes and previously provided a planning condition, included here as **Appendix H**. This advised that a detailed drainage scheme would need to be provided before development can begin.

In terms of the drainage design detail associated with these works, we feel that this could be addressed as part of an appropriately worded condition, similar to what the LLFA had previously suggested.

Appendix A

Drainage Network Calculations

Tumu Consulting		Page 1
20 East Sands	19320	
Burbage Marlborough	Ageas Bowl	
Wiltshire SN8 3AN	CA5.1	
Date 21/06/2023	Designed by Robbie Parnham	
File 13920 - AGAES BOWL - CHA...	Checked by	
Micro Drainage	Network 2018.1	

STORM SEWER DESIGN by the Modified Rational Method

Pipe Sizes STANDARD Manhole Sizes STANDARD

Designed with Level Soffits

« - Indicates pipe capacity < flow

Network Results Table

Tumu Consulting										Page 3	
20 East Sands Burbage Marlborough Wiltshire SN8 3AN						19320 Ageas Bowl CA5.1					
Date 21/06/2023						Designed by Robbie Parnham					
File 13920 - AGAES BOWL - CHA...						Checked by					
Micro Drainage						Network 2018.1					
Network Design Table for Storm											
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
4.003	5.197	2.067	2.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.013	18.651	0.200	93.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.014	37.486	0.108	347.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.015	26.858	0.850	31.6	0.094	0.00	0.0	0.600	o	150	Pipe/Conduit	
6.000	18.557	1.500	12.4	0.006	5.00	0.0	0.600	o	150	Pipe/Conduit	
6.001	17.752	0.250	71.0	0.022	0.00	0.0	0.600	o	150	Pipe/Conduit	
6.002	36.497	1.000	36.5	0.080	0.00	0.0	0.600	o	225	Pipe/Conduit	
6.003	10.318	0.800	12.9	0.043	0.00	0.0	0.600	o	225	Pipe/Conduit	
6.004	8.363	0.800	10.5	0.030	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.005	7.904	0.800	9.9	0.031	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.006	5.363	0.600	8.9	0.037	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.007	37.488	0.800	46.9	0.079	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.008	16.542	0.600	27.6	0.069	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.009	17.327	1.866	9.3	0.010	0.00	0.0	0.600	o	300	Pipe/Conduit	
7.000	19.526	0.150	130.2	0.031	5.00	0.0	0.600	o	150	Pipe/Conduit	
7.001	6.341	0.050	126.8	0.030	0.00	0.0	0.600	o	150	Pipe/Conduit	
7.002	38.985	3.000	13.0	0.058	0.00	0.0	0.600	o	225	Pipe/Conduit	
Network Results Table											
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	
4.003	42.28	7.46	53.250	0.192	0.0	0.0	0.0	6.40	113.2	22.0	
1.013	41.76	7.65	51.033	0.942	0.0	0.0	0.0	1.63	115.1	106.5	
1.014	40.11	8.29	50.758	0.942	0.0	0.0	0.0	0.97	106.8	106.5	
1.015	39.51	8.54	50.650	1.036	0.0	0.0	0.0	1.80	31.8«	110.9	
6.000	50.00	5.11	60.200	0.006	0.0	0.0	0.0	2.88	50.9	0.8	
6.001	49.21	5.36	58.700	0.028	0.0	0.0	0.0	1.19	21.1	3.7	
6.002	48.13	5.64	58.375	0.108	0.0	0.0	0.0	2.17	86.4	14.1	
6.003	47.96	5.68	57.375	0.151	0.0	0.0	0.0	3.66	145.7	19.6	
6.004	47.85	5.71	56.500	0.181	0.0	0.0	0.0	4.89	345.6	23.5	
6.005	47.76	5.74	55.700	0.212	0.0	0.0	0.0	5.03	355.6	27.4	
6.006	47.69	5.75	54.900	0.249	0.0	0.0	0.0	5.29	373.9	32.2	
6.007	46.72	6.02	54.300	0.328	0.0	0.0	0.0	2.30	162.8	41.5	
6.008	46.41	6.12	53.500	0.397	0.0	0.0	0.0	3.01	212.5	49.9	
6.009	46.22	6.17	52.900	0.407	0.0	0.0	0.0	5.19	366.8	50.9	
7.000	49.15	5.37	60.800	0.031	0.0	0.0	0.0	0.88	15.5	4.1	
7.001	48.69	5.49	60.650	0.061	0.0	0.0	0.0	0.89	15.7	8.0	
7.002	48.01	5.67	60.525	0.119	0.0	0.0	0.0	3.65	145.1	15.5	
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20 East Sands					19320						
Burbage Marlborough					Ageas Bowl						
Wiltshire SN8 3AN					CA5.1						
Date 21/06/2023					Designed by Robbie Parnham						
File 13920 - AGAES BOWL - CHA...					Checked by						
Micro Drainage					Network 2018.1						
Manhole Schedules for Storm											
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	
S1	61.250	1.250	Open Manhole	1200	1.000	60.000	150				
S2	60.500	1.100	Open Manhole	1200	1.001	59.400	150	1.000	59.400	150	
S3	59.600	1.275	Open Manhole	1200	1.002	58.325	225	1.001	58.400	150	
S4	59.700	1.575	Open Manhole	1200	1.003	58.125	225	1.002	58.125	225	
S5	59.350	1.405	Open Manhole	1200	1.004	57.945	225	1.003	57.945	225	
S6	58.400	1.355	Open Manhole	1200	1.005	57.045	225	1.004	57.045	225	
S7	58.000	1.655	Open Manhole	1200	1.006	56.345	225	1.005	56.345	225	
S8	58.000	2.430	Open Manhole	1200	1.007	55.570	300	1.006	55.645	225	
S9	58.000	2.480	Open Manhole	1200	1.008	55.520	300	1.007	55.520	300	
S10	57.050	2.530	Open Manhole	1200	1.009	54.520	300	1.008	54.520	300	
S11	55.400	1.380	Open Manhole	1200	1.010	54.020	300	1.009	54.020	300	
S12	55.500	2.480	Open Manhole	1200	1.011	53.020	300	1.010	53.020	300	
S13	57.500	1.000	Open Manhole	1200	2.000	56.500	150				
S14	57.400	1.250	Open Manhole	1200	2.001	56.150	150	2.000	56.150	150	
PCP 1	56.500	0.700	Open Manhole	1200	3.000	55.800	225				
S15	56.500	0.800	Open Manhole	1200	3.001	55.700	225	3.000	55.700	225	
S16	55.750	1.075	Open Manhole	1200	2.002	54.675	225	2.001	54.750	150	
								3.001	54.675	225	
S17	54.900	3.192	Open Manhole	1200	1.012	51.708	300	1.011	51.708	300	
								2.002	51.783	225	
S18	54.000	0.500	Open Manhole	1200	4.000	53.500	225				
S19	54.000	0.500	Open Manhole	1200	5.000	53.500	225				
S20	54.000	0.620	Open Manhole	1200	4.001	53.380	225	4.000	53.380	225	
								5.000	53.380	225	
PCP 2	54.000	0.750	Open Manhole	1200	4.002	53.250	225	4.001	53.280	225	
S21	54.500	1.250	Open Manhole	1200	4.003	53.250	150	4.002	53.250	225	
S22	55.000	3.967	Open Manhole	1200	1.013	51.033	300	1.012	51.033	300	
								4.003	51.183	150	
S23	53.000	2.242	Open Manhole	1350	1.014	50.758	375	1.013	50.833	300	
BASIN 1	52.500	1.850	Open Manhole	1350	1.015	50.650	150	1.014	50.650	375	
S24	61.000	0.800	Open Manhole	1200	6.000	60.200	150				
S25	59.750	1.050	Open Manhole	1200	6.001	58.700	150	6.000	58.700	150	
S26	59.300	0.925	Open Manhole	1200	6.002	58.375	225	6.001	58.450	150	
S27	58.500	1.125	Open Manhole	1200	6.003	57.375	225	6.002	57.375	225	
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Date 21/06/2023 File 13920 - AGAES BOWL - CHA...					Designed by Robbie Parnham Checked by						
Micro Drainage					Network 2018.1						
<u>Manhole Schedules for Storm</u>											
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S28	57.890	1.390	Open Manhole	1200	6.004	56.500	300	6.003	56.575	225	
S29	57.450	1.750	Open Manhole	1200	6.005	55.700	300	6.004	55.700	300	
S30	56.800	1.900	Open Manhole	1200	6.006	54.900	300	6.005	54.900	300	
S31	56.430	2.130	Open Manhole	1200	6.007	54.300	300	6.006	54.300	300	
S32	54.750	1.250	Open Manhole	1200	6.008	53.500	300	6.007	53.500	300	
S33	54.190	1.290	Open Manhole	1200	6.009	52.900	300	6.008	52.900	300	
S34	62.500	1.700	Open Manhole	1200	7.000	60.800	150				
S35	62.500	1.850	Open Manhole	1200	7.001	60.650	150	7.000	60.650	150	
S36	62.000	1.475	Open Manhole	1200	7.002	60.525	225	7.001	60.600	150	
S37	58.500	0.975	Open Manhole	1200	7.003	57.525	225	7.002	57.525	225	
PCP4	58.000	0.700	Open Manhole	1200	8.000	57.300	150				
S38	58.000	1.000	Open Manhole	1200	8.001	57.000	150	8.000	57.000	150	
PCP5	59.000	0.700	Open Manhole	1200	9.000	58.300	150				
S39	59.000	0.700	Open Manhole	1200	9.001	58.300	150	9.000	58.300	150	
S40	58.100	1.930	Open Manhole	1200	7.004	56.170	300	7.003	56.245	225	
								8.001	56.320	150	
								9.001	56.320	150	
S41	53.500	2.616	Open Manhole	1500	6.010	50.884	450	6.009	51.034	300	100
								7.004	51.134	300	
S42	51.950	2.066	Open Manhole	1350	6.011	49.884	450	6.010	49.884	450	
S43	51.950	2.450	Open Manhole	1350	1.016	49.500	450	1.015	49.800	150	
								6.011	49.550	450	50
BASIN 2	51.000	1.900	Open Manhole	1350	1.017	49.100	450	1.016	49.200	450	100
S44	51.000	2.000	Open Manhole	1350	1.018	49.000	150	1.017	49.000	450	
	51.000	2.120	Open Manhole	0		OUTFALL		1.018	48.880	150	
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Tumu Consulting

20 East Sands

Burbage Marlborough

Wiltshire SN8 3AN

Date 21/06/2023

File 13920 - AGAES BOWL - CHA...

Micro Drainage

19320

Ageas Bowl

CA5.1

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Network 2018.1

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	S1	61.250	60.000	1.100	Open Manhole	1200
1.001	o	150	S2	60.500	59.400	0.950	Open Manhole	1200
1.002	o	225	S3	59.600	58.325	1.050	Open Manhole	1200
1.003	o	225	S4	59.700	58.125	1.350	Open Manhole	1200
1.004	o	225	S5	59.350	57.945	1.180	Open Manhole	1200
1.005	o	225	S6	58.400	57.045	1.130	Open Manhole	1200
1.006	o	225	S7	58.000	56.345	1.430	Open Manhole	1200
1.007	o	300	S8	58.000	55.570	2.130	Open Manhole	1200
1.008	o	300	S9	58.000	55.520	2.180	Open Manhole	1200
1.009	o	300	S10	57.050	54.520	2.230	Open Manhole	1200
1.010	o	300	S11	55.400	54.020	1.080	Open Manhole	1200
1.011	o	300	S12	55.500	53.020	2.180	Open Manhole	1200
2.000	o	150	S13	57.500	56.500	0.850	Open Manhole	1200
2.001	o	150	S14	57.400	56.150	1.100	Open Manhole	1200
3.000	o	225	PCP 1	56.500	55.800	0.475	Open Manhole	1200
3.001	o	225	S15	56.500	55.700	0.575	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	9.049	15.1	S2	60.500	59.400	0.950	Open Manhole	1200
1.001	22.047	22.0	S3	59.600	58.400	1.050	Open Manhole	1200
1.002	8.468	42.3	S4	59.700	58.125	1.350	Open Manhole	1200
1.003	17.221	95.7	S5	59.350	57.945	1.180	Open Manhole	1200
1.004	18.207	20.2	S6	58.400	57.045	1.130	Open Manhole	1200
1.005	15.588	22.3	S7	58.000	56.345	1.430	Open Manhole	1200
1.006	12.731	18.2	S8	58.000	55.645	2.130	Open Manhole	1200
1.007	9.084	181.7	S9	58.000	55.520	2.180	Open Manhole	1200
1.008	17.335	17.3	S10	57.050	54.520	2.230	Open Manhole	1200
1.009	30.076	60.2	S11	55.400	54.020	1.080	Open Manhole	1200
1.010	9.105	9.1	S12	55.500	53.020	2.180	Open Manhole	1200
1.011	16.599	12.7	S17	54.900	51.708	2.892	Open Manhole	1200
2.000	2.913	8.3	S14	57.400	56.150	1.100	Open Manhole	1200
2.001	29.286	20.9	S16	55.750	54.750	0.850	Open Manhole	1200
3.000	5.000	50.0	S15	56.500	55.700	0.575	Open Manhole	1200
3.001	5.462	5.3	S16	55.750	54.675	0.850	Open Manhole	1200

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Micro Drainage		Network 2018.1

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 6 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.800	Storm Duration (mins)	30
Ratio R	0.350		

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Micro Drainage	Network 2018.1																			
Online Controls for Storm Orifice Manhole: S15, DS/PN: 3.001, Volume (m³): 1.1 Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 55.700 Orifice Manhole: S21, DS/PN: 4.003, Volume (m³): 1.9 Diameter (m) 0.056 Discharge Coefficient 0.600 Invert Level (m) 53.250 Orifice Manhole: BASIN 1, DS/PN: 1.015, Volume (m³): 6.6 Diameter (m) 0.036 Discharge Coefficient 0.600 Invert Level (m) 50.650 Orifice Manhole: S38, DS/PN: 8.001, Volume (m³): 1.2 Diameter (m) 0.032 Discharge Coefficient 0.600 Invert Level (m) 57.000 Orifice Manhole: S39, DS/PN: 9.001, Volume (m³): 0.9 Diameter (m) 0.036 Discharge Coefficient 0.600 Invert Level (m) 58.300 Hydro-Brake® Optimum Manhole: BASIN 2, DS/PN: 1.017, Volume (m³): 6.7 Unit Reference MD-SHE-0123-8000-1600-8000 Design Head (m) 1.600 Design Flow (l/s) 8.0 Flush-Flo™ Calculated Objective Minimise upstream storage Application Surface Sump Available Yes Diameter (mm) 123 Invert Level (m) 49.100 Minimum Outlet Pipe Diameter (mm) 150 Suggested Manhole Diameter (mm) 1200 <table><tr><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td></tr><tr><td>Design Point (Calculated)</td><td>1.600</td><td>8.0</td><td>Kick-Flo®</td><td>0.977</td><td>6.4</td></tr><tr><td>Flush-Flo™</td><td>0.471</td><td>8.0</td><td>Mean Flow over Head Range</td><td>-</td><td>7.0</td></tr></table> The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated			Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	1.600	8.0	Kick-Flo®	0.977	6.4	Flush-Flo™	0.471	8.0	Mean Flow over Head Range	-	7.0
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<u>Storage Structures for Storm</u> <u>Porous Car Park Manhole: PCP 1, DS/PN: 3.000</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>16.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>83.0</td></tr><tr><td>Max Percolation (l/s)</td><td>368.9</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Safety Factor</td><td>1.5</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>55.800</td><td>Membrane Depth (mm)</td><td>150</td></tr></table> <u>Porous Car Park Manhole: PCP 2, DS/PN: 4.002</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>16.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>42.0</td></tr><tr><td>Max Percolation (l/s)</td><td>186.7</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>53.250</td><td>Membrane Depth (mm)</td><td>150</td></tr></table> <u>Tank or Pond Manhole: BASIN 1, DS/PN: 1.015</u> Invert Level (m) 50.650 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr><tr><td>0.000</td><td>346.0</td><td>1.500</td><td>833.0</td><td>1.501</td><td>0.0</td></tr></table> <u>Porous Car Park Manhole: PCP4, DS/PN: 8.000</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>10.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>44.0</td></tr><tr><td>Max Percolation (l/s)</td><td>122.2</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>57.300</td><td>Membrane Depth (mm)</td><td>150</td></tr></table> <u>Porous Car Park Manhole: PCP5, DS/PN: 9.000</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>11.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>43.0</td></tr><tr><td>Max Percolation (l/s)</td><td>131.4</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>58.500</td><td>Membrane Depth (mm)</td><td>150</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	16.0	Membrane Percolation (mm/hr)	1000	Length (m)	83.0	Max Percolation (l/s)	368.9	Slope (1:X)	0.0	Safety Factor	1.5	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	55.800	Membrane Depth (mm)	150	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	16.0	Membrane Percolation (mm/hr)	1000	Length (m)	42.0	Max Percolation (l/s)	186.7	Slope (1:X)	0.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	53.250	Membrane Depth (mm)	150	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	0.000	346.0	1.500	833.0	1.501	0.0	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0	Membrane Percolation (mm/hr)	1000	Length (m)	44.0	Max Percolation (l/s)	122.2	Slope (1:X)	0.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	57.300	Membrane Depth (mm)	150	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	11.0	Membrane Percolation (mm/hr)	1000	Length (m)	43.0	Max Percolation (l/s)	131.4	Slope (1:X)	0.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	58.500	Membrane Depth (mm)	150
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Micro Drainage	Network 2018.1									
Tank or Pond Manhole: BASIN 2, DS/PN: 1.017 Invert Level (m) 49.100 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>334.0</td><td>1.900</td><td>880.0</td></tr></tbody></table>			Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	334.0	1.900	880.0
Depth (m)	Area (m²)	Depth (m)	Area (m²)							
0.000	334.0	1.900	880.0							
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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm									
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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0									
Number of Online Controls 6 Number of Storage Structures 6 Number of Real Time Controls 0									
Synthetic Rainfall Details									
Rainfall Model FSR Ratio R 0.350									
Region England and Wales Cv (Summer) 0.750									
M5-60 (mm) 19.800 Cv (Winter) 0.840									
Margin for Flood Risk Warning (mm) 300.0									
Analysis Timestep 2.5 Second Increment (Extended)									
DTS Status OFF									
DVD Status OFF									
Inertia Status OFF									
Profile(s) Summer and Winter									
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440									
Return Period(s) (years) 1, 30, 100									
Climate Change (%) 0, 40, 45									
Water									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
1.000	S1	15 Winter	1	+0%					60.034
1.001	S2	15 Winter	1	+0%					59.443
1.002	S3	15 Winter	1	+0%					58.385
1.003	S4	15 Winter	1	+0%	100/15 Summer				58.196
1.004	S5	15 Winter	1	+0%					58.000
1.005	S6	15 Winter	1	+0%	100/15 Summer				57.110
1.006	S7	15 Winter	1	+0%	100/15 Summer				56.410
1.007	S8	15 Winter	1	+0%	30/15 Summer				55.689
1.008	S9	15 Winter	1	+0%	100/15 Winter				55.585
1.009	S10	15 Winter	1	+0%	100/15 Summer				54.619
1.010	S11	15 Winter	1	+0%	100/15 Summer				54.097
1.011	S12	15 Winter	1	+0%	30/15 Summer				53.099
2.000	S13	15 Winter	1	+0%					56.535
2.001	S14	15 Winter	1	+0%					56.193
3.000	PCP 1	360 Winter	1	+0%	30/120 Winter				55.864
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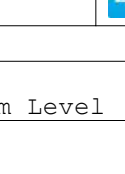
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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for
Storm

PN	US/MH Name	Surcharged		Flooded		Pipe		Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	
1.000	S1	-0.116	0.000	0.12		4.7	OK	
1.001	S2	-0.107	0.000	0.18		6.4	OK	
1.002	S3	-0.165	0.000	0.16		9.8	OK	
1.003	S4	-0.154	0.000	0.22		10.3	OK	
1.004	S5	-0.170	0.000	0.13		14.0	OK	
1.005	S6	-0.160	0.000	0.18		18.1	OK	
1.006	S7	-0.160	0.000	0.19		19.6	OK	
1.007	S8	-0.181	0.000	0.33		20.4	OK	
1.008	S9	-0.235	0.000	0.11		24.3	OK	
1.009	S10	-0.201	0.000	0.23		30.6	OK	
1.010	S11	-0.223	0.000	0.15		37.4	OK	
1.011	S12	-0.221	0.000	0.16		41.6	OK	
2.000	S13	-0.115	0.000	0.12		4.6	OK	
2.001	S14	-0.107	0.000	0.18		6.7	OK	
3.000	PCP 1	-0.161	0.000	0.04		1.9	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
3.001	S15	360 Winter	1	+0%	30/30 Summer				55.862
2.002	S16	15 Winter	1	+0%					54.706
1.012	S17	15 Winter	1	+0%	30/15 Summer				51.825
4.000	S18	15 Winter	1	+0%					53.535
5.000	S19	15 Winter	1	+0%					53.527
4.001	S20	15 Winter	1	+0%	100/60 Winter				53.446
4.002	PCP 2	360 Winter	1	+0%	30/30 Winter				53.350
4.003	S21	360 Winter	1	+0%	30/15 Winter				53.344
1.013	S22	15 Winter	1	+0%	30/15 Summer				51.192
1.014	S23	1440 Winter	1	+0%	30/15 Summer				51.118
1.015	BASIN 1	1440 Winter	1	+0%	1/60 Summer				51.117
6.000	S24	15 Winter	1	+0%					60.212
6.001	S25	15 Winter	1	+0%					58.741
6.002	S26	15 Winter	1	+0%					58.433
6.003	S27	15 Winter	1	+0%					57.431
6.004	S28	15 Winter	1	+0%					56.561
6.005	S29	15 Winter	1	+0%					55.765
6.006	S30	15 Winter	1	+0%	100/15 Summer				54.975
6.007	S31	15 Winter	1	+0%	30/15 Summer				54.400
6.008	S32	15 Winter	1	+0%	100/15 Summer				53.600
6.009	S33	15 Winter	1	+0%	100/15 Winter				52.975
7.000	S34	15 Winter	1	+0%	30/15 Summer				60.854
7.001	S35	15 Winter	1	+0%	30/15 Summer				60.731
7.002	S36	15 Winter	1	+0%					60.573
7.003	S37	15 Winter	1	+0%					57.583
8.000	PCP4	240 Winter	1	+0%	30/15 Winter				57.356
8.001	S38	30 Summer	1	+0%	1/15 Summer				57.464
9.000	PCP5	120 Winter	1	+0%	1/15 Summer				58.534
9.001	S39	120 Winter	1	+0%	1/15 Summer				58.532
7.004	S40	15 Winter	1	+0%					56.239
6.010	S41	15 Winter	1	+0%	30/15 Summer				51.026
6.011	S42	15 Winter	1	+0%	30/15 Summer				50.066
1.016	S43	15 Winter	1	+0%	30/15 Summer				49.680
1.017	BASIN 2	480 Winter	1	+0%	30/15 Summer				49.451
1.018	S44	480 Winter	1	+0%					49.082
Surcharged Flooded Pipe									
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded	
3.001	S15	-0.063	0.000	0.01		1.9	OK		
2.002	S16	-0.194	0.000	0.04		10.4	OK		
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

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 Coefficient 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 Offline Controls 0	Number of Time/Area Diagrams 0
Number of Online Controls 6	Number of Storage Structures 6	Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R 0.350
Region England and Wales Cv (Summer)	0.750	
M5-60 (mm)	19.800 Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep 2.5 Second Increment (Extended)	
DTS Status	OFF
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Winter	30	+40%					60.066
1.001	S2	15 Winter	30	+40%					59.489
1.002	S3	15 Winter	30	+40%					58.453
1.003	S4	15 Winter	30	+40%	100/15 Summer				58.286
1.004	S5	15 Winter	30	+40%					58.063
1.005	S6	15 Winter	30	+40%	100/15 Summer				57.192
1.006	S7	15 Winter	30	+40%	100/15 Summer				56.493
1.007	S8	15 Winter	30	+40%	30/15 Summer				55.920
1.008	S9	15 Winter	30	+40%	100/15 Winter				55.659
1.009	S10	15 Winter	30	+40%	100/15 Summer				54.758
1.010	S11	15 Winter	30	+40%	100/15 Summer				54.196
1.011	S12	15 Winter	30	+40%	30/15 Summer				53.866
2.000	S13	15 Winter	30	+40%					56.569
2.001	S14	15 Winter	30	+40%					56.240
3.000	PCP 1	360 Winter	30	+40%	30/120 Winter				56.067

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

PN	US/MH Name	Surcharged Flooded		Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)				
1.000	S1	-0.084	0.000	0.40	16.3	OK	
1.001	S2	-0.061	0.000	0.65	23.4	OK	
1.002	S3	-0.097	0.000	0.61	38.2	OK	
1.003	S4	-0.064	0.000	0.84	39.9	OK	
1.004	S5	-0.107	0.000	0.53	55.4	OK	
1.005	S6	-0.078	0.000	0.74	72.6	OK	
1.006	S7	-0.077	0.000	0.74	78.6	OK	
1.007	S8	0.050	0.000	1.34	82.3	SURCHARGED	
1.008	S9	-0.161	0.000	0.43	98.5	OK	
1.009	S10	-0.062	0.000	0.95	124.5	OK	
1.010	S11	-0.124	0.000	0.61	152.5	OK	
1.011	S12	0.546	0.000	0.61	162.0	SURCHARGED	
2.000	S13	-0.081	0.000	0.43	15.8	OK	
2.001	S14	-0.060	0.000	0.66	24.8	OK	
3.000	PCP 1	0.042	0.000	0.07	3.3	SURCHARGED	

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Micro Drainage				Network 2018.1					
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)									
for Storm									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
3.001	S15	480 Winter	30	+40%	30/30 Summer				56.076
2.002	S16	15 Winter	30	+40%					54.740
1.012	S17	15 Winter	30	+40%	30/15 Summer				53.388
4.000	S18	360 Winter	30	+40%					53.589
5.000	S19	360 Winter	30	+40%					53.588
4.001	S20	360 Winter	30	+40%	100/60 Winter				53.588
4.002	PCP 2	360 Winter	30	+40%	30/30 Winter				53.586
4.003	S21	360 Winter	30	+40%	30/15 Winter				53.628
1.013	S22	15 Winter	30	+40%	30/15 Summer				52.370
1.014	S23	1440 Winter	30	+40%	30/15 Summer				51.844
1.015	BASIN 1	1440 Winter	30	+40%	1/60 Summer				51.842
6.000	S24	15 Winter	30	+40%					60.223
6.001	S25	15 Winter	30	+40%					58.791
6.002	S26	15 Winter	30	+40%					58.506
6.003	S27	15 Winter	30	+40%					57.501
6.004	S28	15 Winter	30	+40%					56.630
6.005	S29	15 Winter	30	+40%					55.842
6.006	S30	15 Winter	30	+40%	100/15 Summer				55.071
6.007	S31	15 Winter	30	+40%	30/15 Summer				54.649
6.008	S32	15 Winter	30	+40%	100/15 Summer				53.795
6.009	S33	15 Winter	30	+40%	100/15 Winter				53.066
7.000	S34	15 Winter	30	+40%	30/15 Summer				61.074
7.001	S35	15 Winter	30	+40%	30/15 Summer				60.949
7.002	S36	15 Winter	30	+40%					60.623
7.003	S37	15 Winter	30	+40%					57.651
8.000	PCP4	240 Winter	30	+40%	30/15 Winter				57.618
8.001	S38	240 Winter	30	+40%	1/15 Summer				57.616
9.000	PCP5	240 Winter	30	+40%	1/15 Summer				58.716
9.001	S39	240 Winter	30	+40%	1/15 Summer				58.712
7.004	S40	15 Winter	30	+40%					56.316
6.010	S41	15 Winter	30	+40%	30/15 Summer				51.416
6.011	S42	15 Winter	30	+40%	30/15 Summer				50.704
1.016	S43	1440 Winter	30	+40%	30/15 Summer				50.337
1.017	BASIN 2	1440 Winter	30	+40%	30/15 Summer				50.334
1.018	S44	1440 Summer	30	+40%					49.083
Surcharged Flooded Pipe									
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded	
3.001	S15	0.151	0.000	0.02		3.1	SURCHARGED		
2.002	S16	-0.160	0.000	0.18		42.1	OK		
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Burbage Marlborough			Ageas Bowl																																																																																																																																																																															
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<table><tr><th></th><th>US/MH</th><th></th><th>Return</th><th>Climate</th><th>First (X)</th><th>First (Y)</th><th>First (Z)</th><th>Overflow</th><th>Water</th></tr><tr><th>PN</th><th>Name</th><th>Storm</th><th>Period</th><th>Change</th><th>Surcharge</th><th>Flood</th><th>Overflow</th><th>Act.</th><th>Level</th></tr><tr><td>1.000</td><td>S1</td><td>15 Winter</td><td>100</td><td>+45%</td><td></td><td></td><td></td><td></td><td>60.079</td></tr><tr><td>1.001</td><td>S2</td><td>15 Winter</td><td>100</td><td>+45%</td><td></td><td></td><td></td><td></td><td>59.510</td></tr><tr><td>1.002</td><td>S3</td><td>15 Winter</td><td>100</td><td>+45%</td><td></td><td></td><td></td><td></td><td>58.521</td></tr><tr><td>1.003</td><td>S4</td><td>15 Winter</td><td>100</td><td>+45%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>58.387</td></tr><tr><td>1.004</td><td>S5</td><td>15 Winter</td><td>100</td><td>+45%</td><td></td><td></td><td></td><td></td><td>58.086</td></tr><tr><td>1.005</td><td>S6</td><td>15 Winter</td><td>100</td><td>+45%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>57.288</td></tr><tr><td>1.006</td><td>S7</td><td>15 Winter</td><td>100</td><td>+45%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>56.645</td></tr><tr><td>1.007</td><td>S8</td><td>15 Winter</td><td>100</td><td>+45%</td><td>30/15 Summer</td><td></td><td></td><td></td><td>56.059</td></tr><tr><td>1.008</td><td>S9</td><td>15 Winter</td><td>100</td><td>+45%</td><td>100/15 Winter</td><td></td><td></td><td></td><td>55.914</td></tr><tr><td>1.009</td><td>S10</td><td>15 Winter</td><td>100</td><td>+45%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>55.670</td></tr><tr><td>1.010</td><td>S11</td><td>15 Winter</td><td>100</td><td>+45%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>55.122</td></tr><tr><td>1.011</td><td>S12</td><td>15 Winter</td><td>100</td><td>+45%</td><td>30/15 Summer</td><td></td><td></td><td></td><td>54.703</td></tr><tr><td>2.000</td><td>S13</td><td>15 Winter</td><td>100</td><td>+45%</td><td></td><td></td><td></td><td></td><td>56.582</td></tr><tr><td>2.001</td><td>S14</td><td>15 Winter</td><td>100</td><td>+45%</td><td></td><td></td><td></td><td></td><td>56.261</td></tr><tr><td>3.000</td><td>PCP 1</td><td>360 Winter</td><td>100</td><td>+45%</td><td>30/120 Winter</td><td></td><td></td><td></td><td>56.179</td></tr></table>										US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water	PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level	1.000	S1	15 Winter	100	+45%					60.079	1.001	S2	15 Winter	100	+45%					59.510	1.002	S3	15 Winter	100	+45%					58.521	1.003	S4	15 Winter	100	+45%	100/15 Summer				58.387	1.004	S5	15 Winter	100	+45%					58.086	1.005	S6	15 Winter	100	+45%	100/15 Summer				57.288	1.006	S7	15 Winter	100	+45%	100/15 Summer				56.645	1.007	S8	15 Winter	100	+45%	30/15 Summer				56.059	1.008	S9	15 Winter	100	+45%	100/15 Winter				55.914	1.009	S10	15 Winter	100	+45%	100/15 Summer				55.670	1.010	S11	15 Winter	100	+45%	100/15 Summer				55.122	1.011	S12	15 Winter	100	+45%	30/15 Summer				54.703	2.000	S13	15 Winter	100	+45%					56.582	2.001	S14	15 Winter	100	+45%					56.261	3.000	PCP 1	360 Winter	100	+45%	30/120 Winter				56.179
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water																																																																																																																																																																									
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged Flooded		Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)				
1.000	S1	-0.071	0.000	0.54	21.8	OK	
1.001	S2	-0.040	0.000	0.87	31.3	OK	
1.002	S3	-0.029	0.000	0.80	50.2	OK	
1.003	S4	0.037	0.000	1.11	52.8	SURCHARGED	
1.004	S5	-0.084	0.000	0.69	72.0	OK	
1.005	S6	0.018	0.000	0.96	93.8	SURCHARGED	
1.006	S7	0.075	0.000	0.96	101.4	SURCHARGED	
1.007	S8	0.189	0.000	1.71	104.7	SURCHARGED	
1.008	S9	0.094	0.000	0.55	125.7	SURCHARGED	
1.009	S10	0.850	0.000	1.12	145.5	SURCHARGED	
1.010	S11	0.802	0.000	0.66	165.4	FLOOD RISK	
1.011	S12	1.383	0.000	0.68	182.1	SURCHARGED	
2.000	S13	-0.068	0.000	0.57	21.2	OK	
2.001	S14	-0.039	0.000	0.89	33.3	OK	
3.000	PCP 1	0.154	0.000	0.09	3.9	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
3.001	S15	360 Winter	100	+45%	30/30 Summer				56.191
2.002	S16	15 Winter	100	+45%					54.751
1.012	S17	15 Winter	100	+45%	30/15 Summer				54.109
4.000	S18	360 Winter	100	+45%					53.719
5.000	S19	360 Winter	100	+45%					53.719
4.001	S20	360 Winter	100	+45%	100/60 Winter				53.719
4.002	PCP 2	360 Winter	100	+45%	30/30 Winter				53.717
4.003	S21	360 Winter	100	+45%	30/15 Winter				53.781
1.013	S22	15 Winter	100	+45%	30/15 Summer				52.778
1.014	S23	1440 Winter	100	+45%	30/15 Summer				52.108
1.015	BASIN 1	1440 Winter	100	+45%	1/60 Summer				52.106
6.000	S24	15 Winter	100	+45%					60.228
6.001	S25	15 Winter	100	+45%					58.812
6.002	S26	15 Winter	100	+45%					58.536
6.003	S27	15 Winter	100	+45%					57.528
6.004	S28	15 Winter	100	+45%					56.654
6.005	S29	15 Winter	100	+45%					55.985
6.006	S30	15 Winter	100	+45%	100/15 Summer				55.751
6.007	S31	15 Winter	100	+45%	30/15 Summer				55.419
6.008	S32	15 Winter	100	+45%	100/15 Summer				54.150
6.009	S33	15 Winter	100	+45%	100/15 Winter				53.268
7.000	S34	15 Winter	100	+45%	30/15 Summer				61.309
7.001	S35	15 Winter	100	+45%	30/15 Summer				61.099
7.002	S36	15 Winter	100	+45%					60.641
7.003	S37	15 Winter	100	+45%					57.679
8.000	PCP4	240 Winter	100	+45%	30/15 Winter				57.766
8.001	S38	240 Winter	100	+45%	1/15 Summer				57.764
9.000	PCP5	240 Winter	100	+45%	1/15 Summer				58.822
9.001	S39	240 Winter	100	+45%	1/15 Summer				58.818
7.004	S40	15 Winter	100	+45%					56.344
6.010	S41	15 Winter	100	+45%	30/15 Summer				52.350
6.011	S42	15 Winter	100	+45%	30/15 Summer				51.269
1.016	S43	1440 Winter	100	+45%	30/15 Summer				50.676
1.017	BASIN 2	1440 Winter	100	+45%	30/15 Summer				50.673
1.018	S44	1440 Winter	100	+45%					49.083

PN	US/MH Name	Surcharged		Flooded		Pipe		Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	
3.001	S15	0.266	0.000	0.02		3.5	SURCHARGED	
2.002	S16	-0.149	0.000	0.24		56.5	OK	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)	
S1.000	o	225	SS45	56.000	55.500	0.275	Open Manhole	1200
S1.001	o	225	SS46	56.000	55.000	0.775	Open Manhole	1200
S1.002	o	225	SS47	55.000	54.500	0.275	Open Manhole	1200
S1.003	o	225	SS48	53.000	51.000	1.775	Open Manhole	1200
S1.004	o	225	SS49	52.000	50.905	0.870	Open Manhole	1200
S1.005	o	225	SS50	51.500	50.810	0.465	Open Manhole	1200
S1.006	o	225	SS51	51.500	50.730	0.545	Open Manhole	1200
S1.007	o	150	SPCP3	51.500	50.500	0.850	Open Manhole	1200
S1.008	o	150	SS52	51.500	50.500	0.850	Open Manhole	1200
S1.009	o	150	SS53	50.000	49.500	0.350	Open Manhole	1200
S1.010	o	150	SS54	50.000	49.402	0.448	Open Manhole	1200

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)	
S1.000	12.515	25.0	SS46	56.000	55.000	0.775	Open Manhole	1200
S1.001	34.233	68.5	SS47	55.000	54.500	0.275	Open Manhole	1200
S1.002	30.937	8.8	SS48	53.000	51.000	1.775	Open Manhole	1200
S1.003	14.180	149.3	SS49	52.000	50.905	0.870	Open Manhole	1200
S1.004	13.911	146.4	SS50	51.500	50.810	0.465	Open Manhole	1200
S1.005	11.469	143.4	SS51	51.500	50.730	0.545	Open Manhole	1200
S1.006	9.144	39.8	SPCP3	51.500	50.500	0.775	Open Manhole	1200
S1.007	7.528	0.0	SS52	51.500	50.500	0.850	Open Manhole	1200
S1.008	23.132	23.1	SS53	50.000	49.500	0.350	Open Manhole	1200
S1.009	14.694	149.9	SS54	50.000	49.402	0.448	Open Manhole	1200
S1.010	2.534	149.1	S	50.000	49.385	0.465	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall	Outfall	C. Level	I. Level	Min	D,L	W
Pipe Number	Name	(m)	(m)	I. Level	(mm)	(mm)
				(m)		
S1.010	S	50.000	49.385	0.000	0	0

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<u>Online Controls for Storm</u> <u>Orifice Manhole: SPCP3, DS/PN: S1.007, Volume (m³): 1.4</u> Diameter (m) 0.032 Discharge Coefficient 0.600 Invert Level (m) 50.500		
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Storage Structures for Storm

Porous Car Park Manhole: SPCP3, DS/PN: S1.007

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	15.0
Membrane Percolation (mm/hr)	1000	Length (m)	36.0
Max Percolation (l/s)	150.0	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	50.500	Membrane Depth (mm)	150

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for
Storm

		Surcharged		Flooded	Pipe			
	US/MH	Depth	Volume	Flow /	Overflow	Flow		Level
PN	Name	(m)	(m³)	Cap.	(l/s)	(l/s)	Status	Exceeded
S1.000	SS45	-0.217	0.000	0.01		0.7		OK
S1.001	SS46	-0.202	0.000	0.02		1.3		OK
S1.002	SS47	-0.202	0.000	0.02		3.4		OK
S1.003	SS48	-0.173	0.000	0.12		4.5		OK
S1.004	SS49	-0.167	0.000	0.15		5.6		OK
S1.005	SS50	-0.163	0.000	0.17		6.1		OK
S1.006	SS51	-0.178	0.000	0.10		6.7		OK
S1.007	SPCP3	0.064	0.000	0.07		0.5	SURCHARGED	
S1.008	SS52	-0.141	0.000	0.01		0.5		OK
S1.009	SS53	-0.132	0.000	0.04		0.5		OK
S1.010	SS54	-0.130	0.000	0.04		0.5		OK

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Micro Drainage	Network 2018.1	

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

PN	US/MH Name	Surcharged		Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)			
S1.000	SS45	-0.201	0.000	0.03		2.3	OK	
S1.001	SS46	-0.180	0.000	0.09		5.1	OK	
S1.002	SS47	-0.180	0.000	0.09		14.2	OK	
S1.003	SS48	-0.110	0.000	0.51		19.0	OK	
S1.004	SS49	-0.067	0.000	0.04		1.7	OK	
S1.005	SS50	0.027	0.000	0.05		1.8	SURCHARGED	
S1.006	SS51	0.107	0.000	0.03		1.9	SURCHARGED	
S1.007	SPCP3	0.411	0.000	0.20		1.4	SURCHARGED	
S1.008	SS52	-0.131	0.000	0.04		1.4	OK	
S1.009	SS53	-0.118	0.000	0.10		1.4	OK	
S1.010	SS54	-0.114	0.000	0.13		1.4	OK	

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Date 22/06/2023 File 13920 - AGAES BOWL - CHA...		Designed by Robbie Parnham Checked by							
Micro Drainage		Network 2018.1							
<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>									
<u>Simulation Criteria</u>									
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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0									
<u>Synthetic Rainfall Details</u>									
Rainfall Model FSR Ratio R 0.350 Region England and Wales Cv (Summer) 0.750 M5-60 (mm) 19.800 Cv (Winter) 0.840									
Margin for Flood Risk Warning (mm) 300.0 Analysis Timestep 2.5 Second Increment (Extended) DTS Status OFF DVD Status OFF Inertia Status OFF									
Profile(s) Summer and Winter Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440 Return Period(s) (years) 1, 30, 100 Climate Change (%) 0, 40, 45									
									Water
PN	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level
	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)
S1.000	SS45	15 Winter	100	+45%					55.527
S1.001	SS46	15 Winter	100	+45%					55.051
S1.002	SS47	15 Winter	100	+45%					54.551
S1.003	SS48	960 Winter	100	+45%	100/480 Winter				51.251
S1.004	SS49	960 Winter	100	+45%	100/240 Winter				51.251
S1.005	SS50	960 Winter	100	+45%	30/480 Winter				51.250
S1.006	SS51	960 Winter	100	+45%	30/240 Winter				51.249
S1.007	SPCP3	960 Winter	100	+45%	1/240 Winter				51.248
S1.008	SS52	960 Winter	100	+45%					50.521
S1.009	SS53	960 Winter	100	+45%					49.535
S1.010	SS54	960 Winter	100	+45%					49.441
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged		Flooded		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)			
S1.000	SS45	-0.198	0.000	0.03		3.0		OK	
S1.001	SS46	-0.174	0.000	0.12		6.8		OK	
S1.002	SS47	-0.174	0.000	0.12		19.1		OK	
S1.003	SS48	0.026	0.000	0.05		1.8	SURCHARGED		
S1.004	SS49	0.121	0.000	0.06		2.1	SURCHARGED		
S1.005	SS50	0.215	0.000	0.06		2.2	FLOOD RISK		
S1.006	SS51	0.294	0.000	0.03		2.3	FLOOD RISK		
S1.007	SPCP3	0.598	0.000	0.24		1.7	FLOOD RISK		
S1.008	SS52	-0.129	0.000	0.05		1.7		OK	
S1.009	SS53	-0.115	0.000	0.13		1.7		OK	
S1.010	SS54	-0.111	0.000	0.15		1.7		OK	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	19.800	Add Flow / Climate Change (%)	0
Ratio R	0.350	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
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)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	57.948	2.432	23.8	0.083	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	10.600	0.098	108.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	30.264	0.329	92.0	0.050	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	15.813	1.691	9.4	0.081	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.002	8.318	0.084	99.0	0.053	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	79.114	3.570	22.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.47	48.940	0.083	0.0	0.0	0.0	2.07	36.6	11.2
1.001	50.00	5.58	46.508	0.083	0.0	0.0	0.0	1.51	106.8	11.2
2.000	50.00	5.48	48.539	0.050	0.0	0.0	0.0	1.05	18.5	6.8
2.001	50.00	5.56	48.210	0.131	0.0	0.0	0.0	3.31	58.6	17.7
2.002	50.00	5.65	46.494	0.184	0.0	0.0	0.0	1.58	111.7	24.9
1.002	50.00	6.26	46.410	0.267	0.0	0.0	0.0	2.15	38.0	36.2

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out PN Invert Level (m) Diameter (mm)	Pipes In PN Invert Level (m) Diameter (mm)	Backdrop (mm)
S55	49.645	0.705	Open Manhole	1200	1.000 48.940 150		
S56	47.500	0.992	Open Manhole	1200	1.001 46.508 300	1.000 46.508 150	
S57	49.889	1.350	Open Manhole	1200	2.000 48.539 150		
S58	49.998	1.788	Open Manhole	1200	2.001 48.210 150	2.000 48.210 150	
S59	47.400	0.906	Open Manhole	1200	2.002 46.494 300	2.001 46.519 150	
S60	47.150	0.740	Open Manhole	1200	1.002 46.410 150	1.001 46.410 300	
						2.002 46.410 300	
	43.140	0.300	Open Manhole	0	OUTFALL	1.002 42.840 150	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	S55	49.645	48.940	0.555	Open Manhole	1200
1.001	o	300	S56	47.500	46.508	0.692	Open Manhole	1200
2.000	o	150	S57	49.889	48.539	1.200	Open Manhole	1200
2.001	o	150	S58	49.998	48.210	1.638	Open Manhole	1200
2.002	o	300	S59	47.400	46.494	0.606	Open Manhole	1200
1.002	o	150	S60	47.150	46.410	0.590	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	57.948	23.8	S56	47.500	46.508	0.842	Open Manhole	1200
1.001	10.600	108.2	S60	47.150	46.410	0.440	Open Manhole	1200
2.000	30.264	92.0	S58	49.998	48.210	1.638	Open Manhole	1200
2.001	15.813	9.4	S59	47.400	46.519	0.731	Open Manhole	1200
2.002	8.318	99.0	S60	47.150	46.410	0.440	Open Manhole	1200
1.002	79.114	22.2		43.140	42.840	0.150	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
1.002		43.140	42.840	0.000	0	0

Simulation Criteria for Storm

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 Coefficient	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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Return Period (years)	100	Profile Type	Summer
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.800	Cv (Winter)	0.840

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Synthetic Rainfall Details

Storm Duration (mins) 30

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S60, DS/PN: 1.002, Volume (m³): 2.0

Unit Reference	MD-SHE-0071-2000-0740-2000
Design Head (m)	0.740
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	71
Invert Level (m)	46.410
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.740	2.0	Kick-Flo®	0.471	1.6
Flush-Flo™	0.220	2.0	Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.8	0.800	2.1	2.000	3.2	4.000	4.4	7.000	5.7
0.200	2.0	1.000	2.3	2.200	3.3	4.500	4.6	7.500	5.8
0.300	2.0	1.200	2.5	2.400	3.4	5.000	4.8	8.000	6.0
0.400	1.8	1.400	2.7	2.600	3.6	5.500	5.1	8.500	6.2
0.500	1.7	1.600	2.8	3.000	3.8	6.000	5.3	9.000	6.4
0.600	1.8	1.800	3.0	3.500	4.1	6.500	5.5	9.500	6.6

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Storage Structures for Storm

Porous Car Park Manhole: S60, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	18.0
Membrane Percolation (mm/hr)	1000	Length (m)	48.0
Max Percolation (l/s)	240.0	Slope (1:X)	0.0
Safety Factor	1.5	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	46.410	Membrane Depth (mm)	0

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 40, 45

PN	US/MH		Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m³)
1.000	S55	15 Winter	1	+0%	30/15 Winter				48.997	-0.093	0.000
1.001	S56	15 Winter	1	+0%	30/120 Winter				46.582	-0.226	0.000
2.000	S57	15 Winter	1	+0%	30/15 Summer				48.602	-0.087	0.000
2.001	S58	15 Winter	1	+0%	30/15 Summer				48.265	-0.095	0.000
2.002	S59	15 Winter	1	+0%	30/15 Summer				46.606	-0.188	0.000
1.002	S60	360 Winter	1	+0%	30/15 Summer				46.534	-0.026	0.000

PN	US/MH Name	Pipe Flow / Overflow		Flow (l/s)	Level Status	Exceeded
		Cap.	(l/s)			
1.000	S55	0.30		10.8	OK	
1.001	S56	0.14		10.8	OK	
2.000	S57	0.36		6.5	OK	
2.001	S58	0.29		15.5	OK	
2.002	S59	0.30		21.4	OK	
1.002	S60	0.05		1.9	OK	

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

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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 40, 45

PN	US/MH		Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m³)
1.000	S55	15 Winter	30	+40%	30/15 Winter				49.093	0.003	0.000
1.001	S56	480 Winter	30	+40%	30/120 Winter				46.904	0.096	0.000
2.000	S57	15 Winter	30	+40%	30/15 Summer				48.907	0.218	0.000
2.001	S58	15 Winter	30	+40%	30/15 Summer				48.470	0.110	0.000
2.002	S59	480 Winter	30	+40%	30/15 Summer				46.904	0.110	0.000
1.002	S60	480 Winter	30	+40%	30/15 Summer				46.903	0.343	0.000

		Pipe					
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level	
						Exceeded	
1.000	S55	1.00		35.8	SURCHARGED		
1.001	S56	0.06		4.6	SURCHARGED		
2.000	S57	1.17		20.8	SURCHARGED		
2.001	S58	0.99		53.9	SURCHARGED		
2.002	S59	0.14		10.2	SURCHARGED		
1.002	S60	0.05		2.0	FLOOD RISK		

Tumu Consulting		Page 9
20 East Sands	19320	
Burbage Marlborough	Ageas Bowl	
Wiltshire SN8 3AN	CA5.3	
Date 21/09/2023	Designed by Robbie Parnham	
File 13920 - AGAES BOWL - CHARACTER ...	Checked by	
Micro Drainage	Network 2018.1	

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

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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 40, 45

PN	US/MH		Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m³)
1.000	S55	15 Winter	100	+45%	30/15 Winter				49.609	0.519	0.000
1.001	S56	480 Winter	100	+45%	30/120 Winter				47.103	0.295	0.000
2.000	S57	15 Winter	100	+45%	30/15 Summer				49.693	1.004	0.000
2.001	S58	15 Winter	100	+45%	30/15 Summer				49.143	0.783	0.000
2.002	S59	480 Winter	100	+45%	30/15 Summer				47.104	0.310	0.000
1.002	S60	480 Winter	100	+45%	30/15 Summer				47.103	0.543	0.000

		Pipe				Level	
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Exceeded	
1.000	S55	1.10		39.3	FLOOD RISK		
1.001	S56	0.08		6.1	SURCHARGED		
2.000	S57	1.47		26.2	FLOOD RISK		
2.001	S58	1.16		62.8	SURCHARGED		
2.002	S59	0.19		13.6	FLOOD RISK		
1.002	S60	0.05		2.0	FLOOD RISK		

Tumu Consulting							Page 2
20 East Sands			19320				
Burbage Marlborough			Ageas Bowl				
Wiltshire SN8 3AN			CA1-Hotel				
Date 21/09/2023			Designed by Robbie Parnham				
File CA1 GEOCELL PAVING.SRCX			Checked by				
Micro Drainage			Source Control 2018.1				
<u>Summary of Results for 100 year Return Period (+40%)</u>							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
10080 min Summer	39.438	0.138	0.0	0.6	0.6	30.7	O K
15 min Winter	39.442	0.142	0.0	0.6	0.6	31.6	O K
30 min Winter	39.492	0.192	0.0	0.7	0.7	42.6	O K
60 min Winter	39.544	0.244	0.0	0.8	0.8	54.2	O K
120 min Winter	39.595	0.295	0.0	0.8	0.8	65.5	O K
180 min Winter	39.621	0.321	0.0	0.8	0.8	71.4	O K
240 min Winter	39.636	0.336	0.0	0.8	0.8	74.7	O K
360 min Winter	39.655	0.355	0.0	0.9	0.9	79.0	O K
480 min Winter	39.664	0.364	0.0	0.9	0.9	81.0	O K
600 min Winter	39.668	0.368	0.0	0.9	0.9	81.8	O K
720 min Winter	39.668	0.368	0.0	0.9	0.9	81.9	O K
960 min Winter	39.663	0.363	0.0	0.9	0.9	80.7	O K
1440 min Winter	39.650	0.350	0.0	0.9	0.9	77.9	O K
2160 min Winter	39.624	0.324	0.0	0.8	0.8	71.9	O K
2880 min Winter	39.595	0.295	0.0	0.8	0.8	65.6	O K
4320 min Winter	39.548	0.248	0.0	0.8	0.8	55.1	O K
5760 min Winter	39.507	0.207	0.0	0.7	0.7	46.0	O K
7200 min Winter	39.472	0.172	0.0	0.7	0.7	38.3	O K
8640 min Winter	39.443	0.143	0.0	0.6	0.6	31.9	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
10080 min Summer	1.128	0.0	167.3	5752			
15 min Winter	130.405	0.0	32.1	22			
30 min Winter	87.611	0.0	43.6	37			
60 min Winter	56.129	0.0	56.2	66			
120 min Winter	34.675	0.0	69.7	124			
180 min Winter	25.749	0.0	77.8	182			
240 min Winter	20.687	0.0	83.4	240			
360 min Winter	15.234	0.0	92.2	356			
480 min Winter	12.237	0.0	98.8	468			
600 min Winter	10.316	0.0	104.1	580			
720 min Winter	8.967	0.0	108.6	686			
960 min Winter	7.182	0.0	111.6	878			
1440 min Winter	5.242	0.0	112.7	1098			
2160 min Winter	3.818	0.0	138.5	1560			
2880 min Winter	3.045	0.0	147.1	2016			
4320 min Winter	2.209	0.0	159.6	2860			
5760 min Winter	1.757	0.0	168.8	3688			
7200 min Winter	1.472	0.0	176.2	4472			
8640 min Winter	1.274	0.0	182.6	5272			
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Tumu Consulting		Page 4
20 East Sands	19320	
Burbage Marlborough	Ageas Bowl	
Wiltshire SN8 3AN	CA1-Hotel	
Date 21/09/2023	Designed by Robbie Parnham	
File CA1 GEOCELL PAVING.SRCX	Checked by	
Micro Drainage		Source Control 2018.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.800	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.122

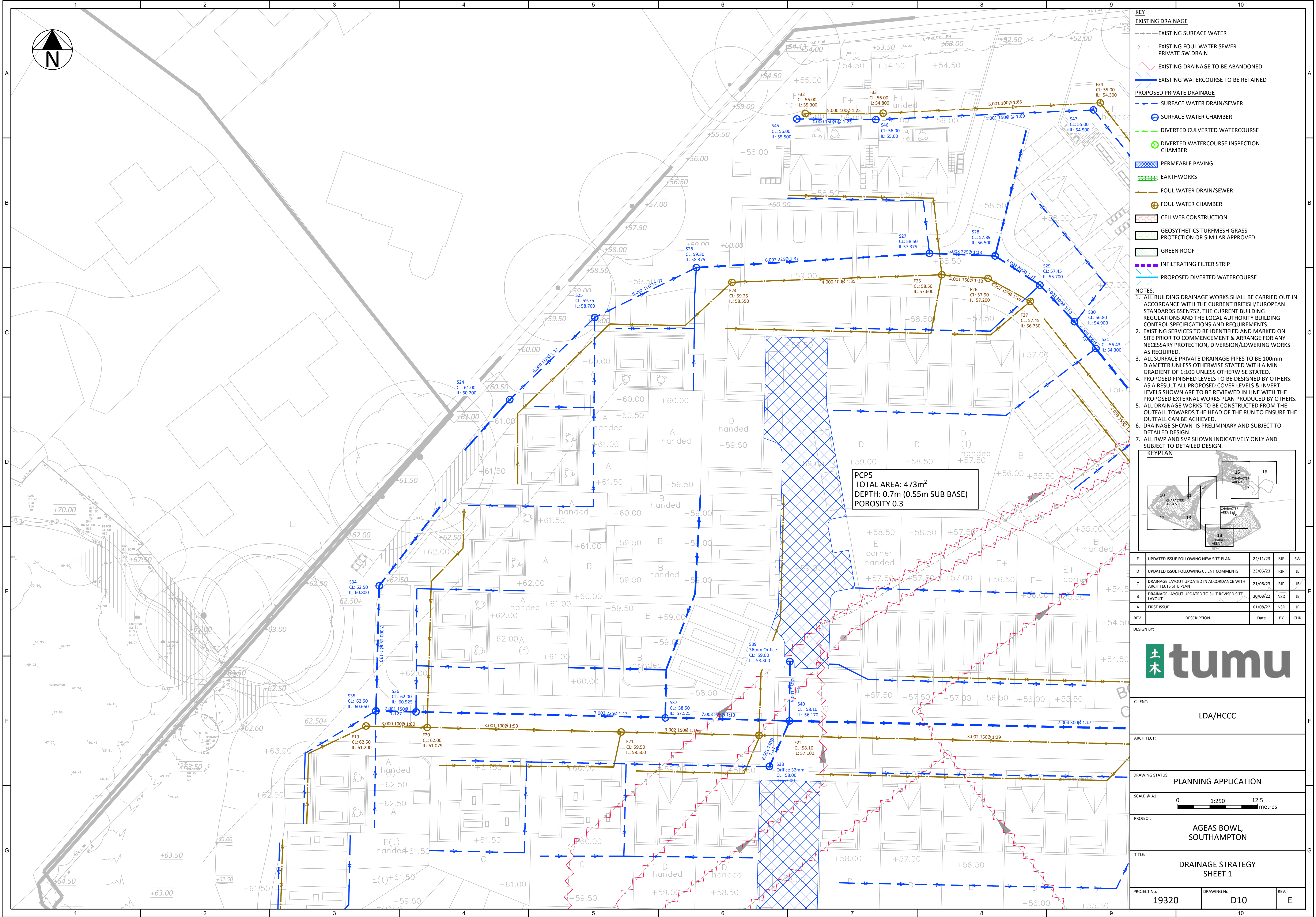
Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)
0	4 0.061	4	8 0.061

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Tumu Consulting		Page 5																								
20 East Sands	19320																									
Burbage Marlborough	Ageas Bowl																									
Wiltshire SN8 3AN	CA1-Hotel																									
Date 21/09/2023	Designed by Robbie Parnham																									
File CA1 GEOCELL PAVING.SRCX	Checked by																									
Micro Drainage		Source Control 2018.1																								
<u>Model Details</u> Storage is Online Cover Level (m) 40.000 <u>Porous Car Park Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.00000</td> <td>Width (m)</td> <td>6.5</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>1000</td> <td>Length (m)</td> <td>36.0</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>65.0</td> <td>Slope (1:X)</td> <td>0.0</td> </tr> <tr> <td>Safety Factor</td> <td>1.5</td> <td>Depression Storage (mm)</td> <td>5</td> </tr> <tr> <td>Porosity</td> <td>0.95</td> <td>Evaporation (mm/day)</td> <td>3</td> </tr> <tr> <td>Invert Level (m)</td> <td>39.300</td> <td>Membrane Depth (m)</td> <td>200</td> </tr> </table> <u>Orifice Outflow Control</u> Diameter (m) 0.025 Discharge Coefficient 0.600 Invert Level (m) 39.200			Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.5	Membrane Percolation (mm/hr)	1000	Length (m)	36.0	Max Percolation (l/s)	65.0	Slope (1:X)	0.0	Safety Factor	1.5	Depression Storage (mm)	5	Porosity	0.95	Evaporation (mm/day)	3	Invert Level (m)	39.300	Membrane Depth (m)	200
Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.5																							
Membrane Percolation (mm/hr)	1000	Length (m)	36.0																							
Max Percolation (l/s)	65.0	Slope (1:X)	0.0																							
Safety Factor	1.5	Depression Storage (mm)	5																							
Porosity	0.95	Evaporation (mm/day)	3																							
Invert Level (m)	39.300	Membrane Depth (m)	200																							
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Appendix B

Proposed Drainage Strategy



KEY

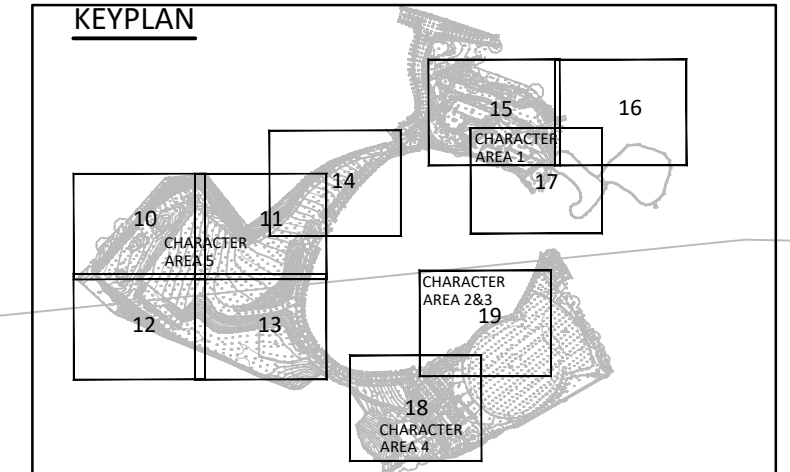
EXISTING DRAINAGE

- EXISTING SURFACE WATER
- EXISTING FOUL WATER SEWER PRIVATE SW DRAIN
- EXISTING DRAINAGE TO BE ABANDONED
- EXISTING WATERCOURSE TO BE RETAINED

PROPOSED PRIVATE DRAINAGE

- SURFACE WATER DRAIN/SEWER
- SURFACE WATER CHAMBER
- DIVERTED CULVERTED WATERCOURSE
- DIVERTED WATERCOURSE INSPECTION CHAMBER
- PERMEABLE PAVING
- EARTHWORKS
- FOUL WATER DRAIN/SEWER
- FOUL WATER CHAMBER
- CELLWEB CONSTRUCTION
- GEOSYNTHETICS TURFMESH GRASS PROTECTION OR SIMILAR APPROVED
- GREEN ROOF
- INFILTRATING FILTER STRIP
- PROPOSED DIVERTED WATERCOURSE

- NOTES:**
1. ALL BUILDING DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT BRITISH/EUROPEAN STANDARDS BSEN752, THE CURRENT BUILDING REGULATIONS AND THE LOCAL AUTHORITY BUILDING CONTROL SPECIFICATIONS AND REQUIREMENTS.
 2. EXISTING SERVICES TO BE IDENTIFIED AND MARKED ON SITE PRIOR TO COMMENCEMENT & ARRANGE FOR ANY NECESSARY PROTECTION, DIVERSION/LOWERING WORKS AS REQUIRED.
 3. ALL SURFACE PRIVATE DRAINAGE PIPES TO BE 100mm DIAMETER UNLESS OTHERWISE STATED WITH A MIN GRADIENT OF 1:100 UNLESS OTHERWISE STATED.
 4. PROPOSED FINISHED LEVELS TO BE DESIGNED BY OTHERS. AS A RESULT ALL PROPOSED COVER LEVELS & INVERT LEVELS SHOWN ARE TO BE REVIEWED IN LINE WITH THE PROPOSED EXTERNAL WORKS PLAN PRODUCED BY OTHERS.
 5. ALL DRAINAGE WORKS TO BE CONSTRUCTED FROM THE OUTFALL TOWARDS THE HEAD OF THE RUN TO ENSURE THE OUTFALL CAN BE ACHIEVED.
 6. DRAINAGE SHOWN IS PRELIMINARY AND SUBJECT TO DETAILED DESIGN.
 7. ALL RWP AND SVP SHOWN INDICATIVELY ONLY AND SUBJECT TO DETAILED DESIGN.



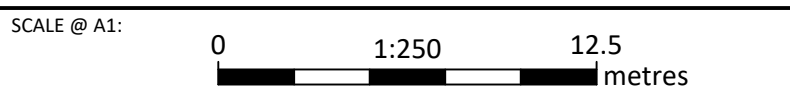
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D	UPDATED ISSUE FOLLOWING CLIENT COMMENTS	23/06/23	RIP	JE
C	DRAINAGE LAYOUT UPDATED IN ACCORDANCE WITH ARCHITECTS SITE PLAN	21/06/23	RIP	JE
B	DRAINAGE LAYOUT UPDATED TO SUIT REVISED SITE LAYOUT	30/08/22	NSD	JE
A	FIRST ISSUE	01/08/22	NSD	JE
REV.	DESCRIPTION	Date	BY	CHK



CLIENT: LDA/HCCC

ARCHITECT:

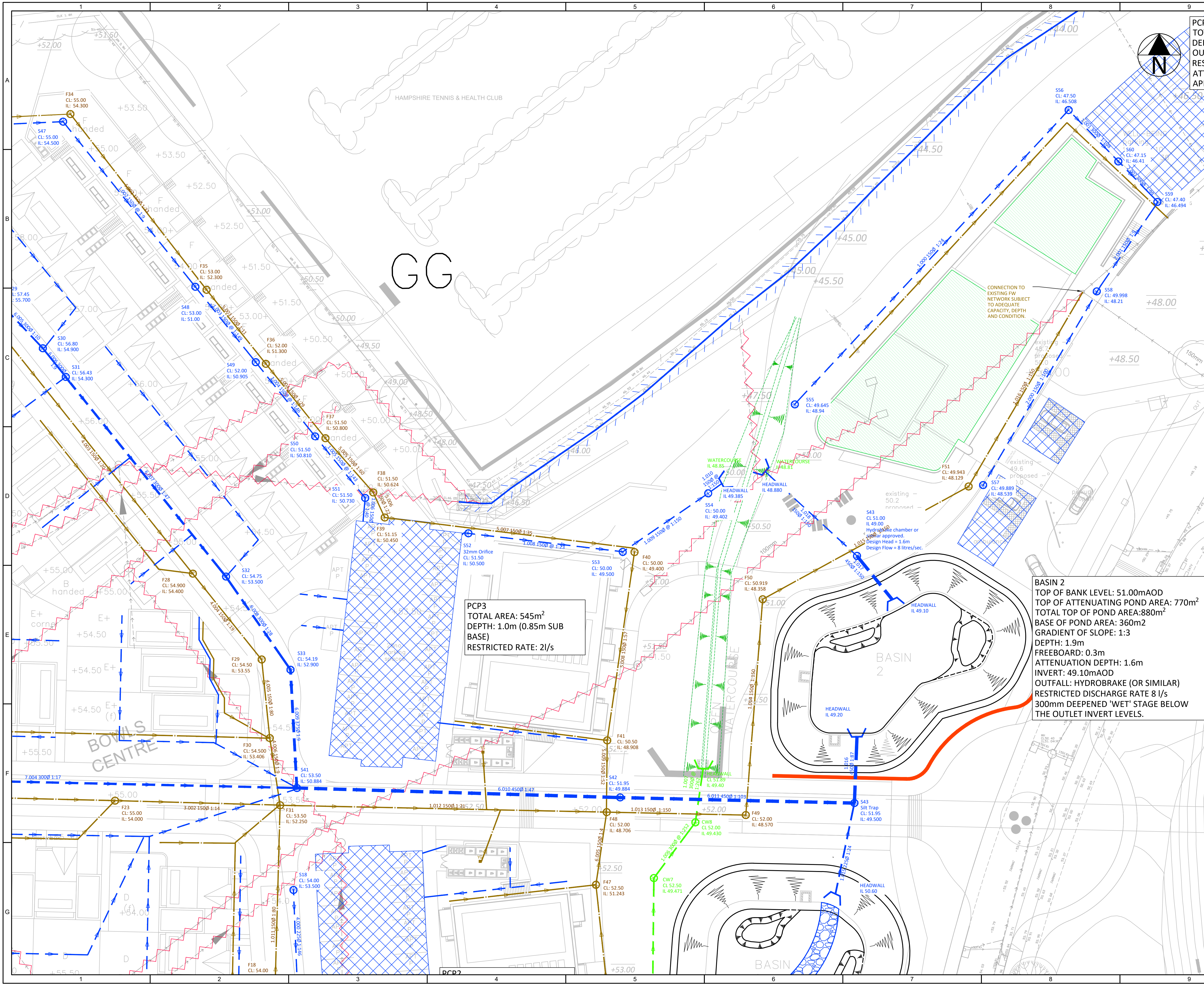
DRAWING STATUS: PLANNING APPLICATION



PROJECT: AGEAS BOWL, SOUTHAMPTON

TITLE: DRAINAGE STRATEGY SHEET 1

PROJECT No:	DRAWING No:	REV:
19320	D10	E



KEY

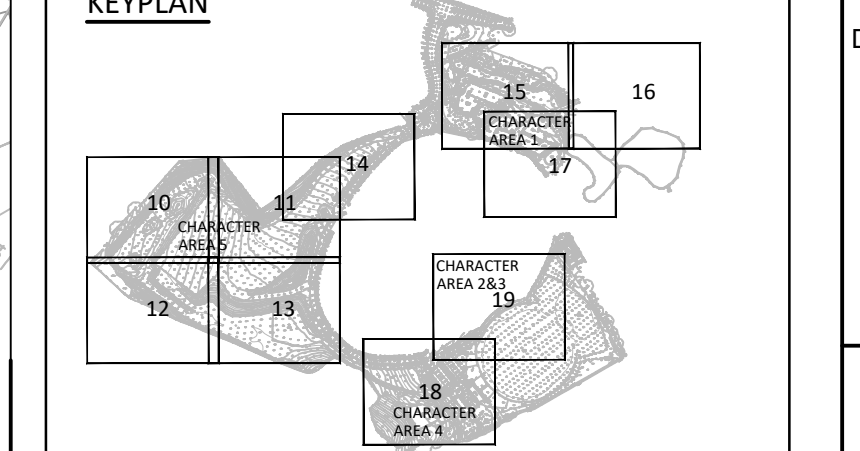
EXISTING DRAINAGE

- EXISTING SURFACE WATER
- EXISTING FOUL WATER SEWER
- EXISTING PRIVATE SW DRAIN
- EXISTING DRAINAGE TO BE ABANDONED
- EXISTING WATERCOURSE TO BE RETAINED

PROPOSED PRIVATE DRAINAGE

- SURFACE WATER DRAIN/SEWER
- SURFACE WATER CHAMBER
- DIVERTED/CULVERTED WATERCOURSE
- DIVERTED WATERCOURSE INSPECTION CHAMBER
- PERMEABLE PAVING
- EARTHWORKS
- FOUL WATER DRAIN/SEWER
- FOUL WATER CHAMBER
- CELLWEB CONSTRUCTION
- GEOSYTHETICS TURFMESH GRASS PROTECTION OR SIMILAR APPROVED
- GREEN ROOF
- INFILTRATING FILTER STRIP
- PROPOSED DIVERTED WATERCOURSE

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PCP3
TOTAL AREA: 545m²
DEPTH: 1.0m (0.85m SUB BASE)
RESTRICTED RATE: 2l/s

BASIN 2
TOP OF BANK LEVEL: 51.00mAOD
TOTAL TOP OF POND AREA: 880m²
BASE OF POND AREA: 360m²
GRADIENT OF SLOPE: 1:3
DEPTH: 1.9m
FREEBOARD: 0.3m
ATTENUATION DEPTH: 1.6m
INVERT: 49.10mAOD
OUTFALL: HYDROBRAKE (OR SIMILAR)
RESTRICTED DISCHARGE RATE 8 l/s
300mm DEEPENED 'WET' STAGE BELOW THE OUTLET INVERT LEVELS.

E	UPDATED ISSUE FOLLOWING NEW SITE PLAN	24/11/23	RIP	SW
D	UPDATED ISSUE FOLLOWING CLIENT COMMENTS	23/06/23	RIP	JE
C	DRAINAGE LAYOUT UPDATED IN ACCORDANCE WITH ARCHITECT'S SITE PLAN	21/06/23	RIP	JE
B	DRAINAGE LAYOUT UPDATED TO SUIT REVISED SITE LAYOUT	30/08/22	NSD	JE
A	FIRST ISSUE	01/08/22	NSD	JE
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

tumu

CLIENT:

LDA/HCCC

ARCHITECT:

DRAWING STATUS:

PLANNING APPLICATION

SCALE @ A1:

0 1:250 12.5 metres

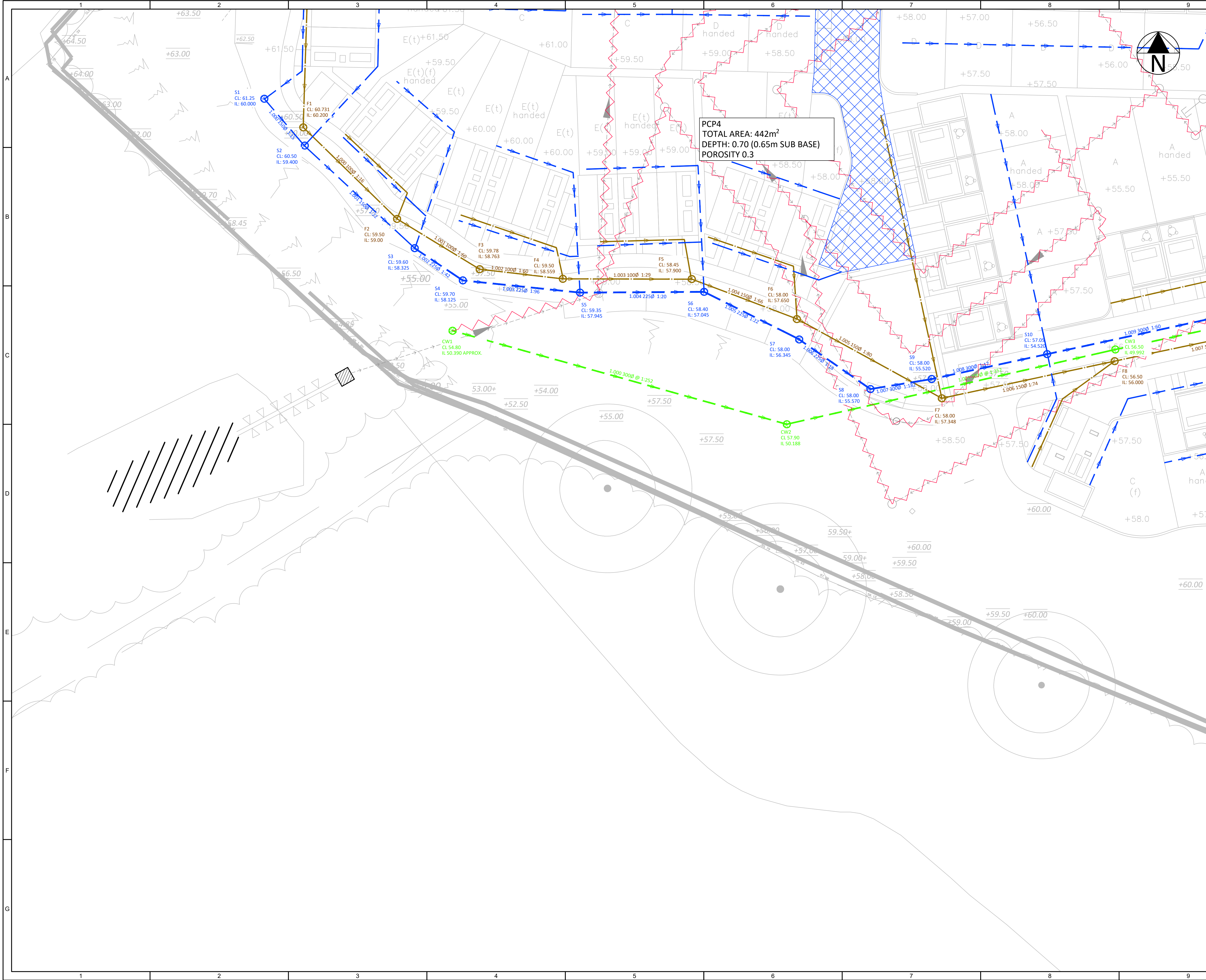
PROJECT:

AGEAS BOWL, SOUTHAMPTON

TITLE:

DRAINAGE STRATEGY SHEET 2

PROJECT No: 19320 DRAWING No: D11 REV: E



KEY

EXISTING DRAINAGE

- EXISTING SURFACE WATER
- EXISTING FOUL WATER SEWER
- PRIVATE SW DRAIN
- EXISTING DRAINAGE TO BE ABANDONED
- EXISTING WATERCOURSE TO BE RETAINED

PROPOSED PRIVATE DRAINAGE

- SURFACE WATER DRAIN/SEWER
- ⊕ SURFACE WATER CHAMBER
- DIVERTED CULVERTED WATERCOURSE
- ⊕ DIVERTED WATERCOURSE INSPECTION CHAMBER

PERMEABLE PAVING

EARTHWORKS

FOUL WATER DRAIN/SEWER

FOUL WATER CHAMBER

CELLWEB CONSTRUCTION

GEOSYTHETICS TURFMESH GRASS PROTECTION OR SIMILAR APPROVED

GREEN ROOF

INFILTRATING FILTER STRIP

PROPOSED DIVERTED WATERCOURSE

NOTES:

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KEYPLAN

E	UPDATED ISSUE FOLLOWING NEW SITE PLAN	24/11/23	RIP	SW
D	UPDATED ISSUE FOLLOWING CLIENT COMMENTS	23/06/23	RIP	JE
C	DRAINAGE LAYOUT UPDATED IN ACCORDANCE WITH ARCHITECTS SITE PLAN	21/06/23	RIP	JE
B	DRAINAGE LAYOUT UPDATED TO SUIT REVISED SITE LAYOUT	30/08/22	NSD	JE
A	FIRST ISSUE	01/08/22	NSD	JE
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

CLIENT:

LDA/HCCC

ARCHITECT:

DRAWING STATUS:

PLANNING APPLICATION

SCALE @ A1:

0 1:250 12.5 metres

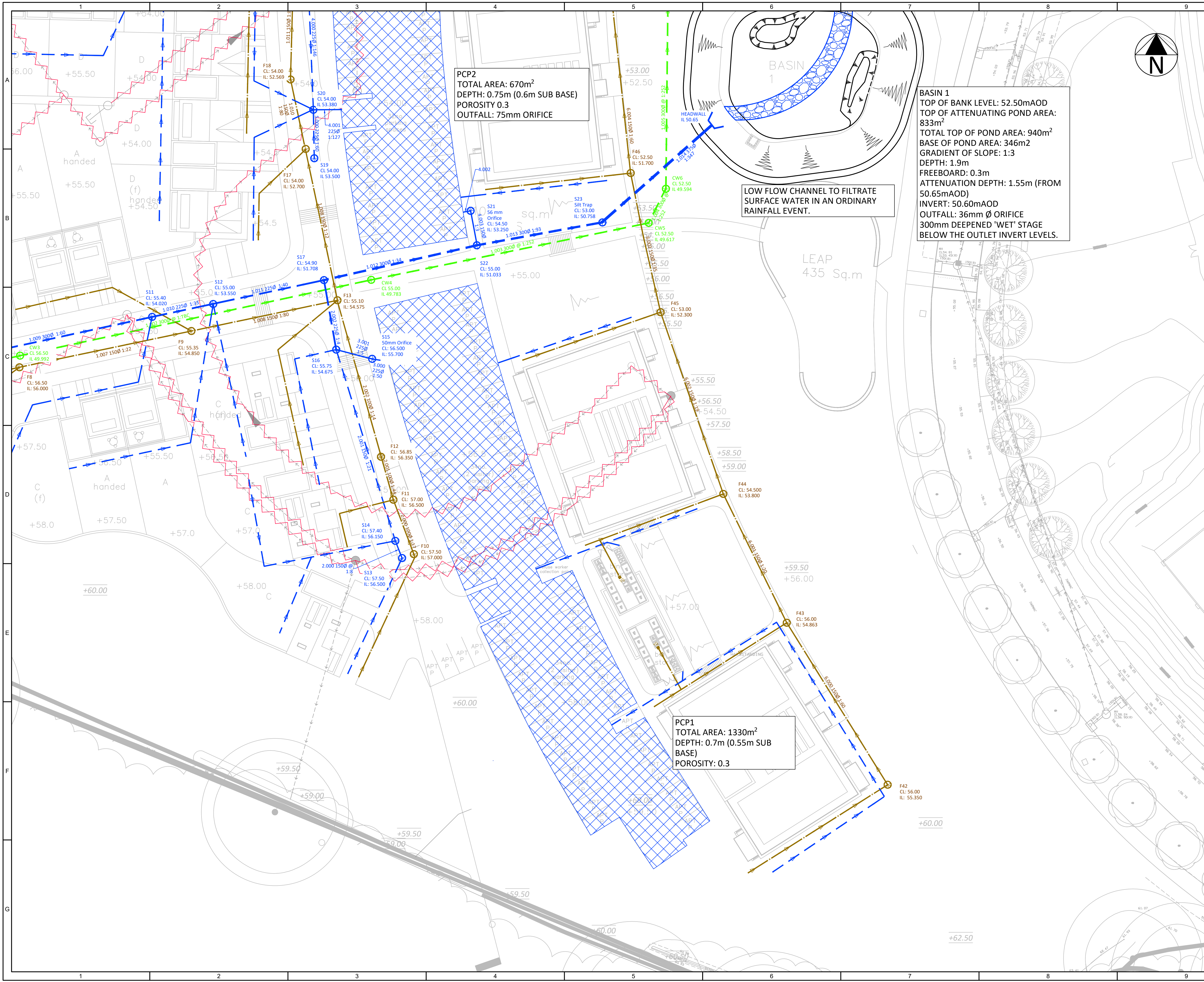
PROJECT:

AGEAS BOWL,
SOUTHAMPTON

TITLE:

DRAINAGE STRATEGY
SHEET 3

PROJECT No:	DRAWING No:	REV:
19320	D12	E



PCP2
TOTAL AREA: 670m²
DEPTH: 0.75m (0.6m SUB BASE)
POROSITY 0.3
OUTFALL: 75mm ORIFICE

BASIN 1
TOP OF BANK LEVEL: 52.50mAOD
TOP OF ATTENUATING POND AREA:
833m²
TOTAL TOP OF POND AREA: 940m²
BASE OF POND AREA: 346m²
GRADIENT OF SLOPE: 1:3
DEPTH: 1.9m
FREEBOARD: 0.3m
ATTENUATION DEPTH: 1.55m (FROM
50.65mAOD)
INVERT: 50.60mAOD
OUTFALL: 36mm Ø ORIFICE
300mm DEEPENED 'WET' STAGE
BELOW THE OUTLET INVERT LEVELS.

LOW FLOW CHANNEL TO FILTRATE
SURFACE WATER IN AN ORDINARY
RAINFALL EVENT.

PCP1
TOTAL AREA: 1330m²
DEPTH: 0.7m (0.55m SUB
BASE)
POROSITY: 0.3

KEY

EXISTING DRAINAGE

- EXISTING SURFACE WATER
- EXISTING FOUL WATER SEWER
- PRIVATE SW DRAIN
- EXISTING DRAINAGE TO BE ABANDONED
- EXISTING WATERCOURSE TO BE RETAINED

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- DIVERTED WATERCOURSE INSPECTION CHAMBER
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- FOUL WATER CHAMBER
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- GREEN ROOF
- INFILTRATING FILTER STRIP
- PROPOSED DIVERTED WATERCOURSE

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KEYPLAN

REV.	DESCRIPTION	Date	BY	CHK
E	UPDATED ISSUE FOLLOWING NEW SITE PLAN	24/11/23	RIP	SW
D	UPDATED ISSUE FOLLOWING CLIENT COMMENTS	23/06/23	RIP	JE
C	DRAINAGE LAYOUT UPDATED IN ACCORDANCE WITH ARCHITECTS SITE PLAN	21/06/23	RIP	JE
B	DRAINAGE LAYOUT UPDATED TO SUIT REVISED SITE LAYOUT	30/08/22	NSD	JE
A	FIRST ISSUE	01/08/22	NSD	JE

DESIGN BY:

CLIENT:

LDA/HCCC

ARCHITECT:

DRAWING STATUS:

PLANNING APPLICATION

SCALE @ A1:

0 1:250 12.5 metres

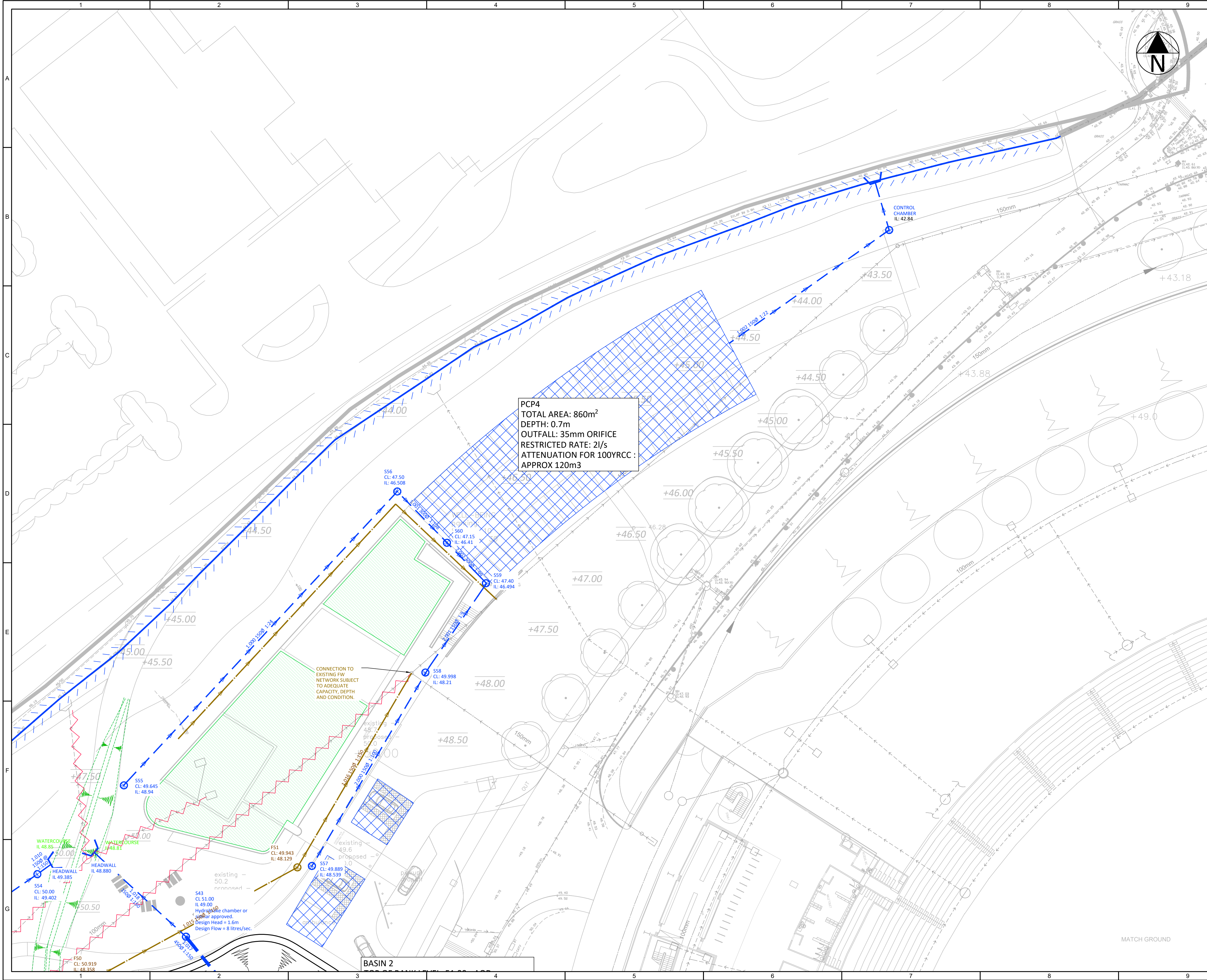
PROJECT:

AGEAS BOWL,
SOUTHAMPTON

TITLE:

DRAINAGE STRATEGY
SHEET 4

PROJECT No:	DRAWING No:	REV:
19320	D13	E



KEY

EXISTING DRAINAGE

→ EXISTING SURFACE WATER

→ EXISTING FOUL WATER SEWER

→ PRIVATE SW DRAIN

→ EXISTING DRAINAGE TO BE ABANDONED

→ EXISTING WATERCOURSE TO BE RETAINED

PROPOSED PRIVATE DRAINAGE

→ SURFACE WATER DRAIN/SEWER

⊕ SURFACE WATER CHAMBER

→ DIVERTED CULVERTED WATERCOURSE

⊕ DIVERTED WATERCOURSE INSPECTION CHAMBER

→ PERMEABLE PAVING

→ EARTHWORKS

→ FOUL WATER DRAIN/SEWER

⊕ FOUL WATER CHAMBER

→ CELLWEB CONSTRUCTION

→ GEOSYNTHETIC TURF/MESH GRASS PROTECTION OR SIMILAR APPROVED

→ GREEN ROOF

→ INFILTRATING FILTER STRIP

→ PROPOSED DIVERTED WATERCOURSE

NOTES:

1. ALL BUILDING DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT BRITISH/EUROPEAN STANDARDS BS EN 752, THE CURRENT BUILDING REGULATIONS AND THE LOCAL AUTHORITY BUILDING CONTROL SPECIFICATIONS AND REQUIREMENTS.

2. EXISTING SERVICES TO BE IDENTIFIED AND MARKED ON SITE PRIOR TO COMMENCEMENT & ARRANGE FOR ANY NECESSARY PROTECTION, DIVERSION/LOWERING WORKS AS REQUIRED.

3. ALL SURFACE PRIVATE DRAINAGE PIPES TO BE 100mm DIAMETER UNLESS OTHERWISE STATED WITH A MIN GRADIENT OF 1:100 UNLESS OTHERWISE STATED.

4. PROPOSED FINISHED LEVELS TO BE DESIGNED BY OTHERS. AS A RESULT ALL PROPOSED COVER LEVELS & INVERT LEVELS SHOWN ARE TO BE REVIEWED IN LINE WITH THE PROPOSED EXTERNAL WORKS PLAN PRODUCED BY OTHERS.

5. ALL DRAINAGE WORKS TO BE CONSTRUCTED FROM THE OUTFALL TOWARDS THE HEAD OF THE RUN TO ENSURE THE OUTFALL CAN BE ACHIEVED.

6. DRAINAGE SHOWN IS PRELIMINARY AND SUBJECT TO DETAILED DESIGN.

7. ALL RWP AND SVP SHOWN INDICATIVELY ONLY AND SUBJECT TO DETAILED DESIGN.

KEYPLAN

E	UPDATED ISSUE FOLLOWING NEW SITE PLAN	24/11/12	RIP	SW
D	UPDATED ISSUE FOLLOWING CLIENT COMMENTS	23/06/23	RIP	JE
C	DRAINAGE LAYOUT UPDATED IN ACCORDANCE WITH ARCHITECT'S SITE PLAN	21/06/23	RIP	JE
B	DRAINAGE LAYOUT UPDATED TO SUIT REVISED SITE LAYOUT	30/08/22	NSD	JE
A	FIRST ISSUE	01/08/22	NSD	JE
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

CLIENT:

LDA/HCCC

ARCHITECT:

DRAWING STATUS:

PLANNING APPLICATION

SCALE @ A1:

0 1:250 12.5 metres

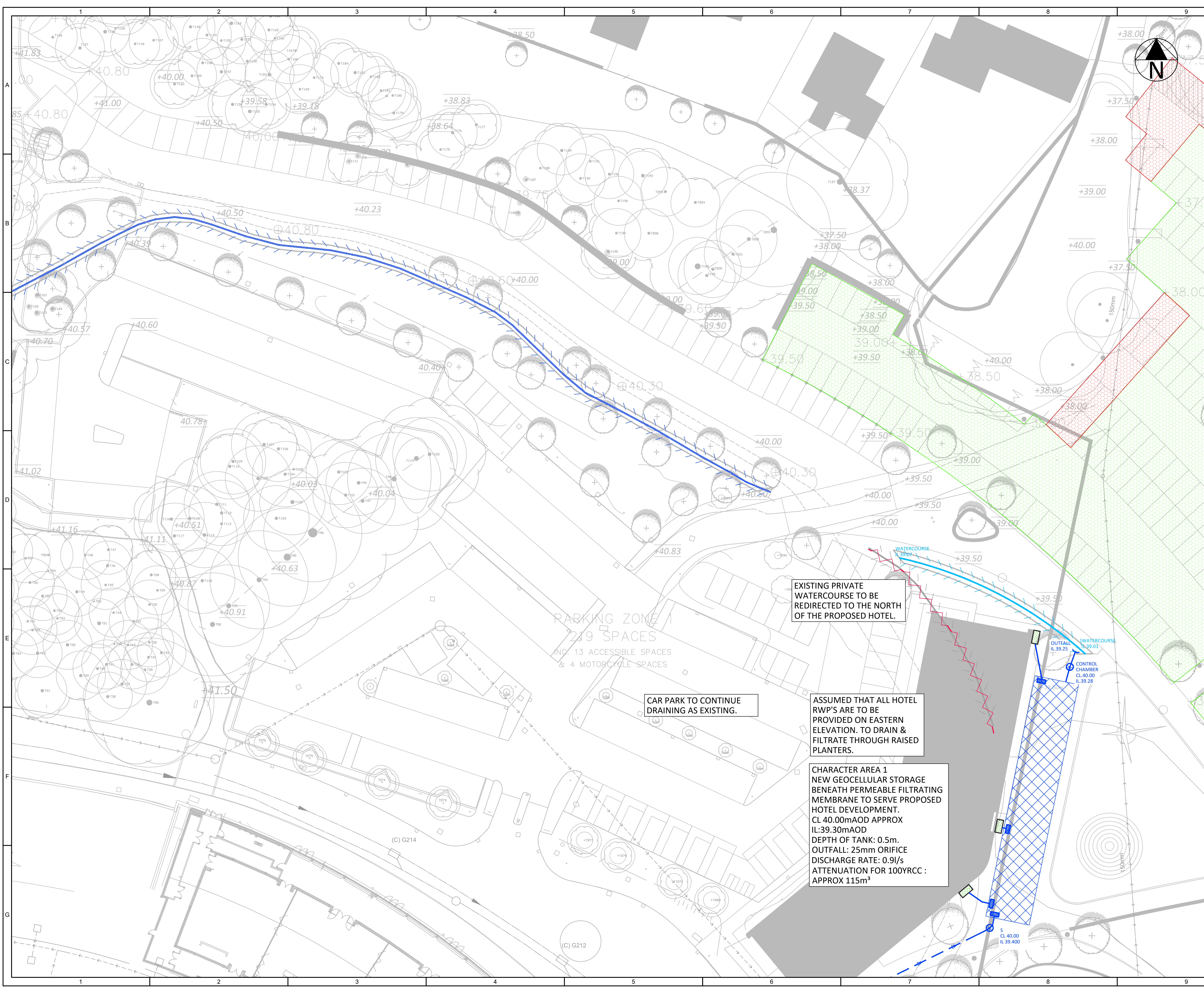
PROJECT:

AGEAS BOWL, SOUTHAMPTON

TITLE:

DRAINAGE STRATEGY SHEET 5

PROJECT No:	DRAWING No:	REV:
19320	D14	E



KEY

EXISTING DRAINAGE

 EXISTING SURFACE WATER

 EXISTING FOUL WATER SEWER

 PRIVATE SW DRAIN

 EXISTING DRAINAGE TO BE ABANDONED

 EXISTING WATERCOURSE TO BE RETAINED

PROPOSED PRIVATE DRAINAGE

 SURFACE WATER DRAIN/SEWER

 SURFACE WATER CHAMBER

 DIVERTED CULVERTED WATERCOURSE

 DIVERTED WATERCOURSE INSPECTION CHAMBER

 PERMEABLE PAVING

 EARTHWORKS

 FOUL WATER DRAIN/SEWER

 FOUL WATER CHAMBER

 CELLWEB CONSTRUCTION

 GEOSYTHETICS TURFMESH GRASS PROTECTION OR SIMILAR APPROVED

 GREEN ROOF

 INFILTRATING FILTER STRIP

 PROPOSED DIVERTED WATERCOURSE

NOTES:

1. ALL BUILDING DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT BRITISH/EUROPEAN STANDARDS BSEN752, THE CURRENT BUILDING REGULATIONS AND THE LOCAL AUTHORITY BUILDING CONTROL SPECIFICATIONS AND REQUIREMENTS.

2. EXISTING SERVICES TO BE IDENTIFIED AND MARKED ON SITE PRIOR TO COMMENCEMENT & ARRANGE FOR ANY NECESSARY PROTECTION, DIVERSION/LOWERING WORKS AS REQUIRED.

3. ALL SURFACE PRIVATE DRAINAGE PIPES TO BE 100mm DIAMETER UNLESS OTHERWISE STATED WITH A MIN GRADIENT OF 1:100 UNLESS OTHERWISE STATED.

4. PROPOSED FINISHED LEVELS TO BE DESIGNED BY OTHERS. AS A RESULT ALL PROPOSED COVER LEVELS & INVERT LEVELS SHOWN ARE TO BE REVIEWED IN LINE WITH THE PROPOSED EXTERNAL WORKS PLAN PRODUCED BY OTHERS.

5. ALL DRAINAGE WORKS TO BE CONSTRUCTED FROM THE OUTFALL TOWARDS THE HEAD OF THE RUN TO ENSURE THE OUTFALL CAN BE ACHIEVED.

6. DRAINAGE SHOWN IS PRELIMINARY AND SUBJECT TO DETAILED DESIGN.

7. ALL RWP AND SVP SHOWN INDICATIVELY ONLY AND SUBJECT TO DETAILED DESIGN.

KEYPLAN

D	RE-ISSUE FOLLOWING UPDATED SITE PLAN	24/11/23	RIP	PS
C	UPDATED TEXT ON ATTENUATION NOTE	06/09/23	RIP	PS
B	DRAINAGE LAYOUT UPDATED IN ACCORDANCE WITH ARCHITECTS SITE PLAN	23/06/23	RIP	JE
A	FIRST ISSUE	30/08/22	NSD	JE
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

CLIENT:

LDA/HCCC

ARCHITECT:

DRAWING STATUS:

PLANNING APPLICATION

SCALE @ A1:

0

1:250

12.5

metres

PROJECT:

AGEAS BOWL, SOUTHAMPTON

TITLE:

DRAINAGE STRATEGY SHEET 6

PROJECT No:	DRAWING No:	REV:
19320	D15	D

EXISTING PRIVATE WATERCOURSE TO BE REDIRECTED TO THE NORTH OF THE PROPOSED HOTEL.

CAR PARK TO CONTINUE DRAINING AS EXISTING.

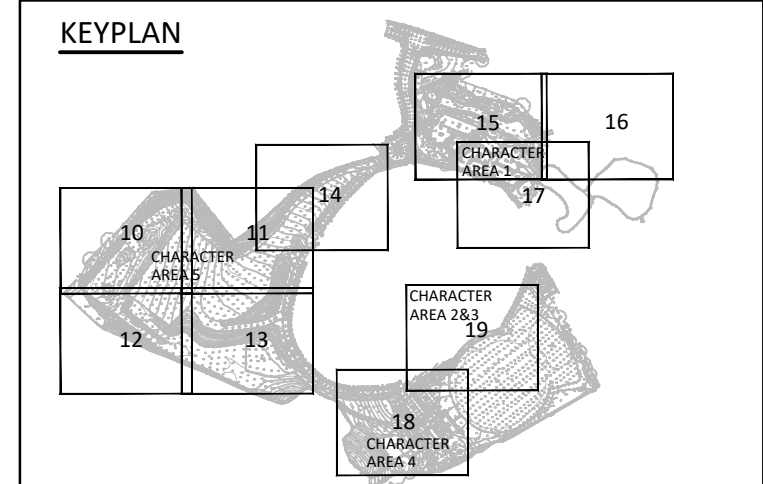
ASSUMED THAT ALL HOTEL RWP'S ARE TO BE PROVIDED ON EASTERN ELEVATION. TO DRAIN & FILTRATE THROUGH RAISED PLANTERS.

CHARACTER AREA 1
NEW GEOCELLULAR STORAGE BENEATH PERMEABLE FILTRATING MEMBRANE TO SERVE PROPOSED HOTEL DEVELOPMENT.
CL 40.00mAOD APPROX
IL:39.30mAOD
DEPTH OF TANK: 0.5m.
OUTFALL: 25mm ORIFICE
DISCHARGE RATE: 0.9l/s
ATTENUATION FOR 100YRCC :
APPROX 115m³



- KEY
- EXISTING DRAINAGE
- EXISTING SURFACE WATER
 - EXISTING FOUL WATER SEWER
 - PRIVATE SW DRAIN
 - EXISTING DRAINAGE TO BE ABANDONED
 - EXISTING WATERCOURSE TO BE RETAINED
- PROPOSED PRIVATE DRAINAGE
- SURFACE WATER DRAIN/SEWER
 - SURFACE WATER CHAMBER
 - DIVERTED CULVERTED WATERCOURSE
 - DIVERTED WATERCOURSE INSPECTION CHAMBER
 - PERMEABLE PAVING
 - EARTHWORKS
 - FOUL WATER DRAIN/SEWER
 - FOUL WATER CHAMBER
 - CELLWEB CONSTRUCTION
 - GEOSYTHETICS TURFMESH GRASS PROTECTION OR SIMILAR APPROVED
 - GREEN ROOF
 - INFILTRATING FILTER STRIP
 - PROPOSED DIVERTED WATERCOURSE

- NOTES:
- ALL BUILDING DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT BRITISH/EUROPEAN STANDARDS BSEN752, THE CURRENT BUILDING REGULATIONS AND THE LOCAL AUTHORITY BUILDING CONTROL SPECIFICATIONS AND REQUIREMENTS.
 - EXISTING SERVICES TO BE IDENTIFIED AND MARKED ON SITE PRIOR TO COMMENCEMENT & ARRANGE FOR ANY NECESSARY PROTECTION, DIVERSION/LOWERING WORKS AS REQUIRED.
 - ALL SURFACE PRIVATE DRAINAGE PIPES TO BE 100mm DIAMETER UNLESS OTHERWISE STATED WITH A MIN GRADIENT OF 1:100 UNLESS OTHERWISE STATED.
 - PROPOSED FINISHED LEVELS TO BE DESIGNED BY OTHERS. AS A RESULT ALL PROPOSED COVER LEVELS & INVERT LEVELS SHOWN ARE TO BE REVIEWED IN LINE WITH THE PROPOSED EXTERNAL WORKS PLAN PRODUCED BY OTHERS.
 - ALL DRAINAGE WORKS TO BE CONSTRUCTED FROM THE OUTFALL TOWARDS THE HEAD OF THE RUN TO ENSURE THE OUTFALL CAN BE ACHIEVED.
 - DRAINAGE SHOWN IS PRELIMINARY AND SUBJECT TO DETAILED DESIGN.
 - ALL RWP AND SVP SHOWN INDICATIVELY ONLY AND SUBJECT TO DETAILED DESIGN.



D	RE-ISSUE FOLLOWING UPDATED SITE PLAN	24/11/23	RIP	PS
C	UPDATED FILTER DRAIN LAYOUT	07/07/23	RIP	JE
B	DRAINAGE LAYOUT UPDATED IN ACCORDANCE WITH ARCHITECTS SITE PLAN	23/06/23	RIP	JE
A	FIRST ISSUE	30/08/22	NSD	JE
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

tumu

CLIENT: LDA/HCCC

ARCHITECT:

DRAWING STATUS: PLANNING APPLICATION

SCALE @ A1: 0 1:250 12.5 metres

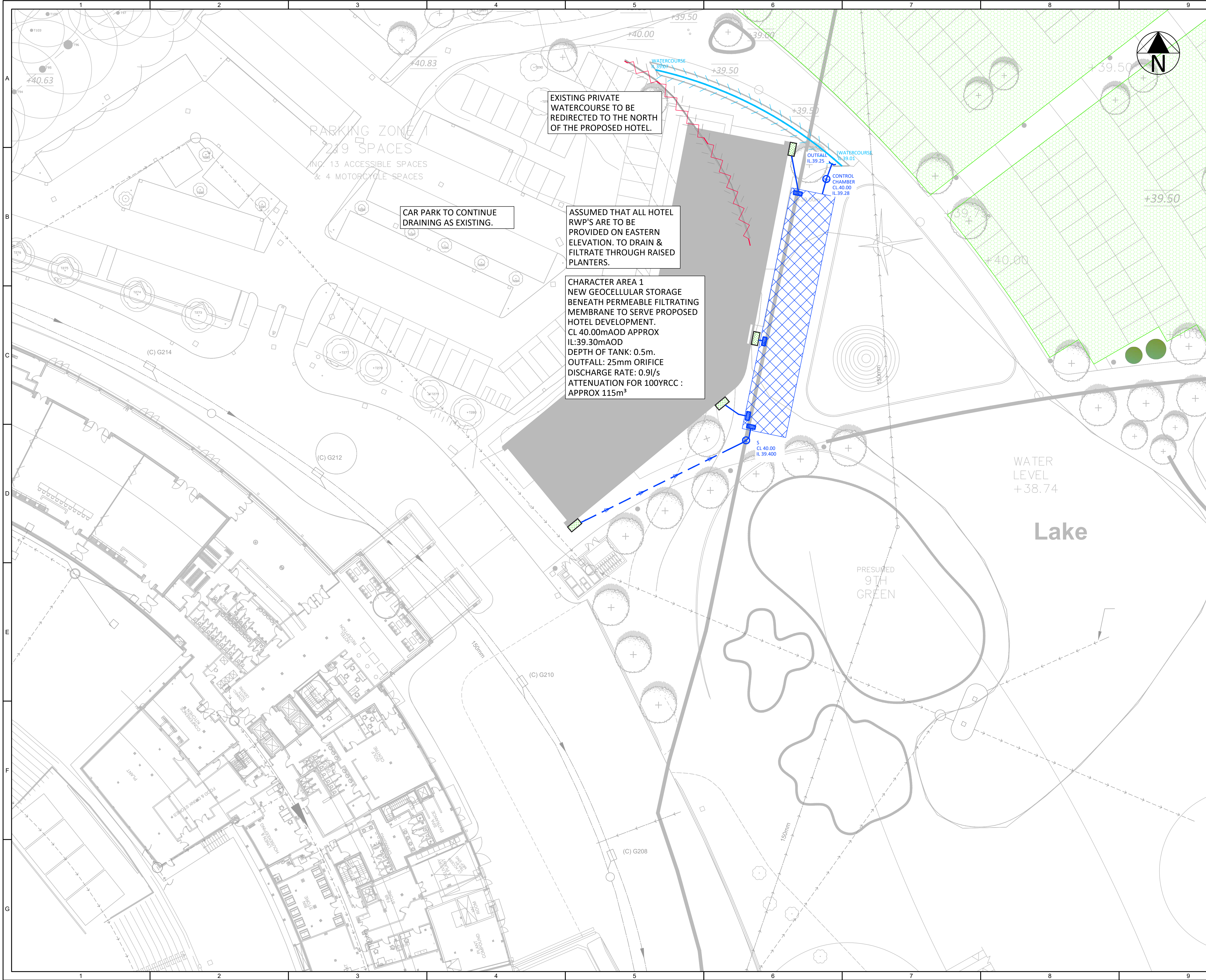
PROJECT: AGEAS BOWL, SOUTHAMPTON

TITLE: DRAINAGE STRATEGY SHEET 7

PROJECT No: 19320

DRAWING No: D16

REV: D



KEY

EXISTING DRAINAGE

- EXISTING SURFACE WATER
- EXISTING FOUL WATER SEWER PRIVATE SW DRAIN
- EXISTING DRAINAGE TO BE ABANDONED
- EXISTING WATERCOURSE TO BE RETAINED

PROPOSED PRIVATE DRAINAGE

- SURFACE WATER DRAIN/SEWER
- SURFACE WATER CHAMBER
- DIVERTED CULVERTED WATERCOURSE
- DIVERTED WATERCOURSE INSPECTION CHAMBER
- PERMEABLE PAVING
- EARTHWORKS
- FOUL WATER DRAIN/SEWER
- FOUL WATER CHAMBER
- CELLWEB CONSTRUCTION
- GEOSYTHETICS TURFMESH GRASS PROTECTION OR SIMILAR APPROVED
- GREEN ROOF
- INFILTRATING FILTER STRIP
- PROPOSED DIVERTED WATERCOURSE

NOTES:

- ALL BUILDING DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT BRITISH/EUROPEAN STANDARDS BS EN 752, THE CURRENT BUILDING REGULATIONS AND THE LOCAL AUTHORITY BUILDING CONTROL SPECIFICATIONS AND REQUIREMENTS.
- EXISTING SERVICES TO BE IDENTIFIED AND MARKED ON SITE PRIOR TO COMMENCEMENT & ARRANGE FOR ANY NECESSARY PROTECTION, DIVERSION/LOWERING WORKS AS REQUIRED.
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- PROPOSED FINISHED LEVELS TO BE DESIGNED BY OTHERS. AS A RESULT ALL PROPOSED COVER LEVELS & INVERT LEVELS SHOWN ARE TO BE REVIEWED IN LINE WITH THE PROPOSED EXTERNAL WORKS PLAN PRODUCED BY OTHERS.
- ALL DRAINAGE WORKS TO BE CONSTRUCTED FROM THE OUTFALL TOWARDS THE HEAD OF THE RUN TO ENSURE THE OUTFALL CAN BE ACHIEVED.
- DRAINAGE SHOWN IS PRELIMINARY AND SUBJECT TO DETAILED DESIGN.
- ALL RWP AND SVP SHOWN INDICATIVELY ONLY AND SUBJECT TO DETAILED DESIGN.

KEYPLAN

C	RE-ISSUE FOLLOWING UPDATED SITE PLAN	24/11/23	RJP	PS
B	DRAINAGE LAYOUT UPDATED ISSUE IN ACCORDANCE WITH ARCHITECTS SITE PLAN	23/06/23	RJP	JE
A	FIRST ISSUE	30/08/23	NSD	JE
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

CLIENT:

LDA/HCCC

ARCHITECT:

DRAWING STATUS:

PLANNING APPLICATION

SCALE @ A1:

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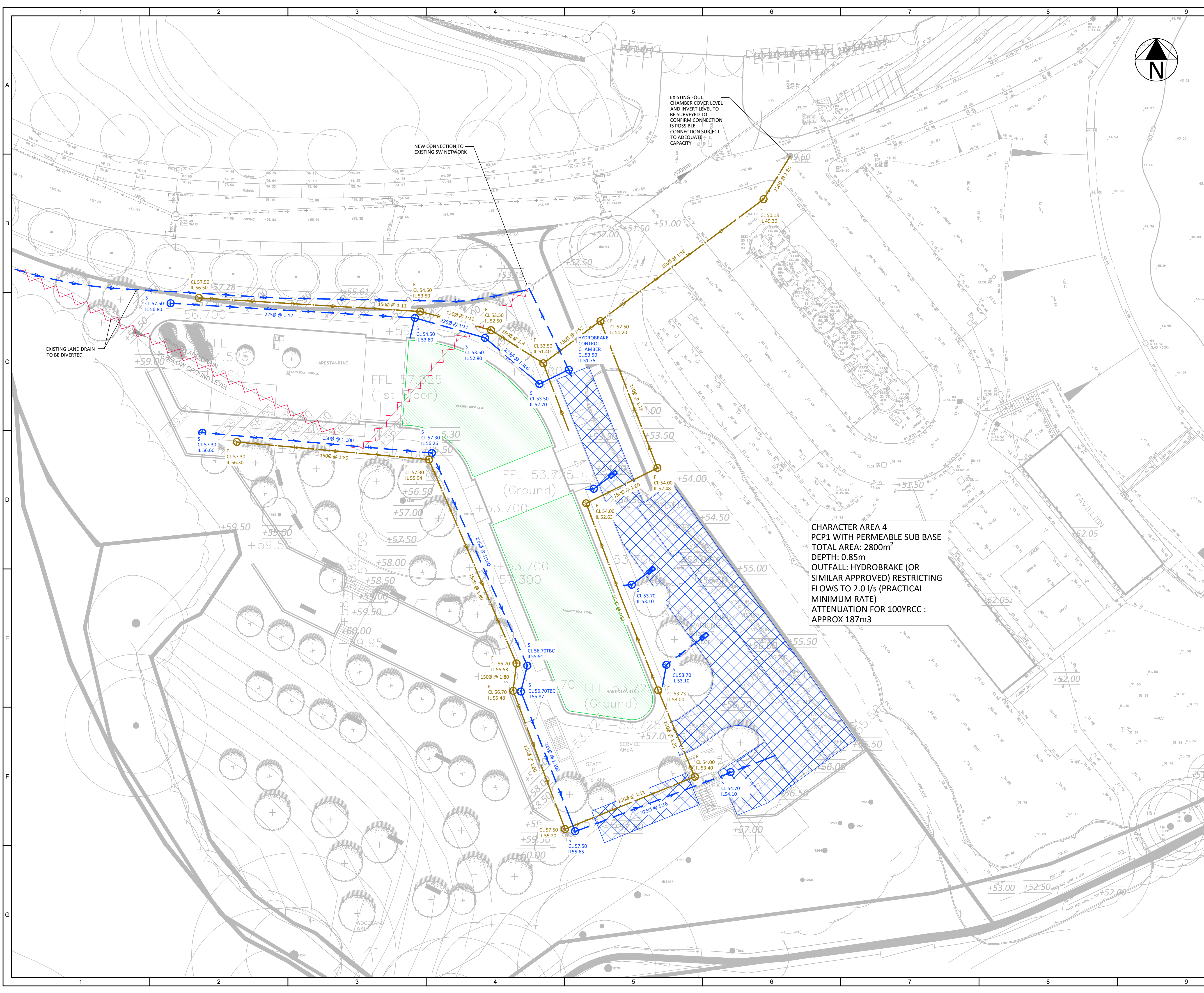
PROJECT:

AGEAS BOWL, SOUTHAMPTON

TITLE:

DRAINAGE STRATEGY SHEET 8

PROJECT No:	DRAWING No:	REV:
19320	D17	C



KEY
EXISTING DRAINAGE
→ EXISTING SURFACE WATER
→ EXISTING FOUL WATER SEWER
→ PRIVATE SW DRAIN
— EXISTING DRAINAGE TO BE ABANDONED
— EXISTING WATERCOURSE TO BE RETAINED
PROPOSED PRIVATE DRAINAGE
— SURFACE WATER DRAIN/SEWER
⊕ SURFACE WATER CHAMBER
— DIVERTED CULVERTED WATERCOURSE
⊕ DIVERTED WATERCOURSE INSPECTION CHAMBER
PERMEABLE PAVING
EARTHWORKS
FOUL WATER DRAIN/SEWER
⊕ FOUL WATER CHAMBER
CELLWEB CONSTRUCTION
GEOSYNTHETIC TURFMESH GRASS PROTECTION OR SIMILAR APPROVED
GREEN ROOF
INFILTRATING FILTER STRIP
PROPOSED DIVERTED WATERCOURSE

NOTES:
1. ALL BUILDING DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT BRITISH/EUROPEAN STANDARDS BSEN752, THE CURRENT BUILDING REGULATIONS AND THE LOCAL AUTHORITY BUILDING CONTROL SPECIFICATIONS AND REQUIREMENTS.
2. EXISTING SERVICES TO BE IDENTIFIED AND MARKED ON SITE PRIOR TO COMMENCEMENT & ARRANGE FOR ANY NECESSARY PROTECTION, DIVERSION/LOWERING WORKS AS REQUIRED.
3. ALL SURFACE PRIVATE DRAINAGE PIPES TO BE 100mm DIAMETER UNLESS OTHERWISE STATED WITH A MIN GRADIENT OF 1:100 UNLESS OTHERWISE STATED.
4. PROPOSED FINISHED LEVELS TO BE DESIGNED BY OTHERS. AS A RESULT ALL PROPOSED COVER LEVELS & INVERT LEVELS SHOWN ARE TO BE REVIEWED IN LINE WITH THE PROPOSED EXTERNAL WORKS PLAN PRODUCED BY OTHERS.
5. ALL DRAINAGE WORKS TO BE CONSTRUCTED FROM THE OUTFALL TOWARDS THE HEAD OF THE RUN TO ENSURE THE

KEYPLAN

C	RE-ISSUE FOLLOWING UPDATED SITE PLAN	24/11/23	RIP	PS
B	DRAINAGE LAYOUT UPDATED TO SUIT REVISED SITE LAYOUT	30/08/22	NSD	JE
A	FIRST ISSUE	01/08/22	NSD	JE
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

CLIENT:
LDA/HCCC

ARCHITECT:

DRAWING STATUS:
PLANNING APPLICATION

SCALE @ A1:
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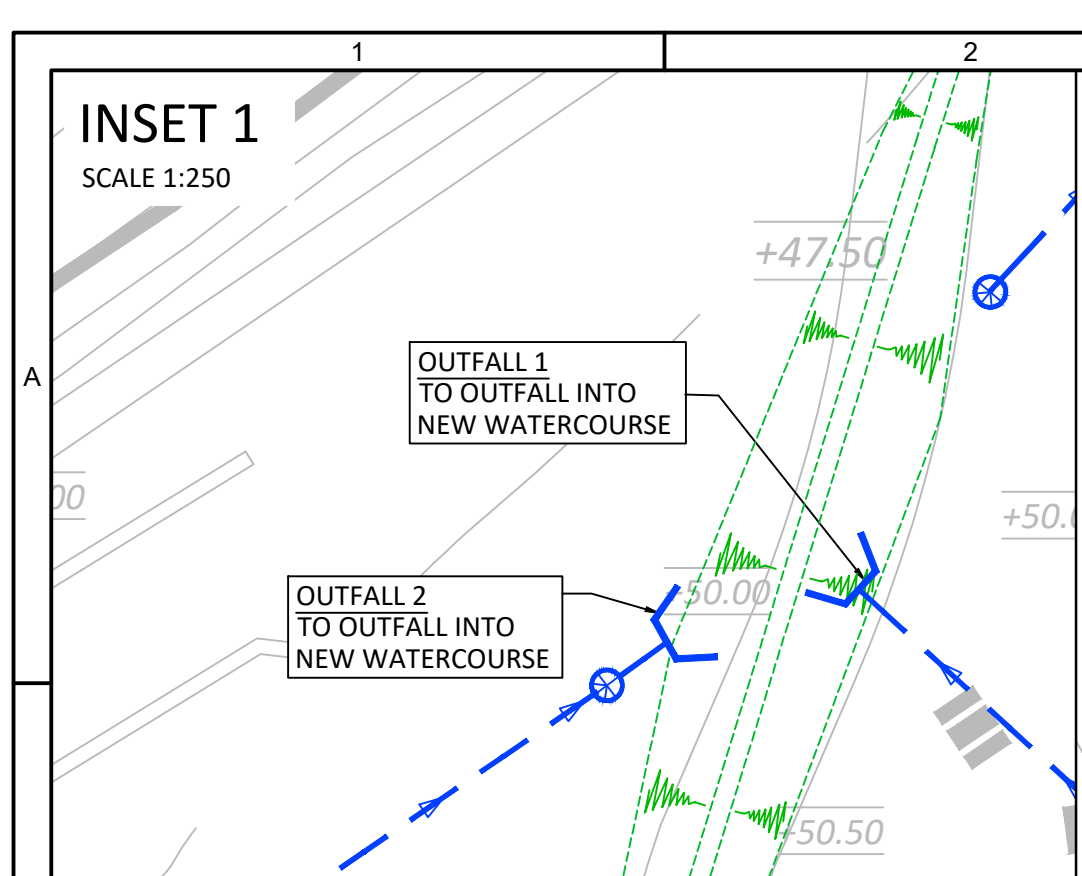
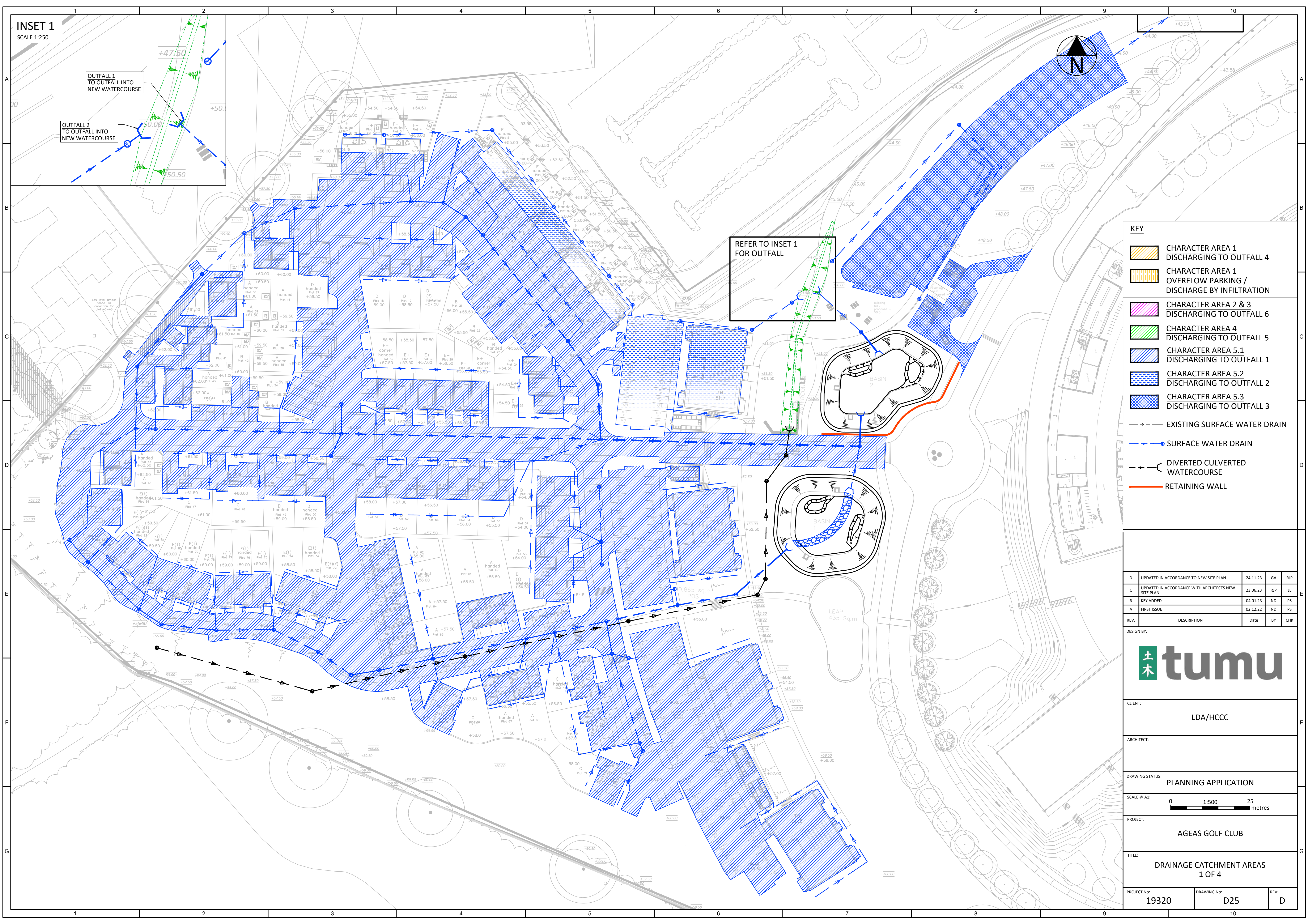
PROJECT:
AGEAS BOWL, SOUTHAMPTON

TITLE:
DRAINAGE STRATEGY SHEET 9

PROJECT No:	DRAWING No:	REV:
19320	D18	C

Appendix C

Drainage Catchment Areas



KEY

- CHARACTER AREA 1
DISCHARGING TO OUTFALL 4
- CHARACTER AREA 1
OVERFLOW PARKING /
DISCHARGE BY INFILTRATION
- CHARACTER AREA 2 & 3
DISCHARGING TO OUTFALL 6
- CHARACTER AREA 4
DISCHARGING TO OUTFALL 5
- CHARACTER AREA 5.1
DISCHARGING TO OUTFALL 1
- CHARACTER AREA 5.2
DISCHARGING TO OUTFALL 2
- CHARACTER AREA 5.3
DISCHARGING TO OUTFALL 3
- EXISTING SURFACE WATER DRAIN
- SURFACE WATER DRAIN
- DIVERTED CULVERTED
WATERCOURSE
- RETAINING WALL

D	UPDATED IN ACCORDANCE TO NEW SITE PLAN	24.11.23	GA	RIP
C	UPDATED IN ACCORDANCE WITH ARCHITECTS NEW SITE PLAN	23.06.23	RJP	JE
B	KEY ADDED	04.01.23	ND	PS
A	FIRST ISSUE	02.12.22	ND	PS
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

CLIENT:
LDA/HCCC

ARCHITECT:

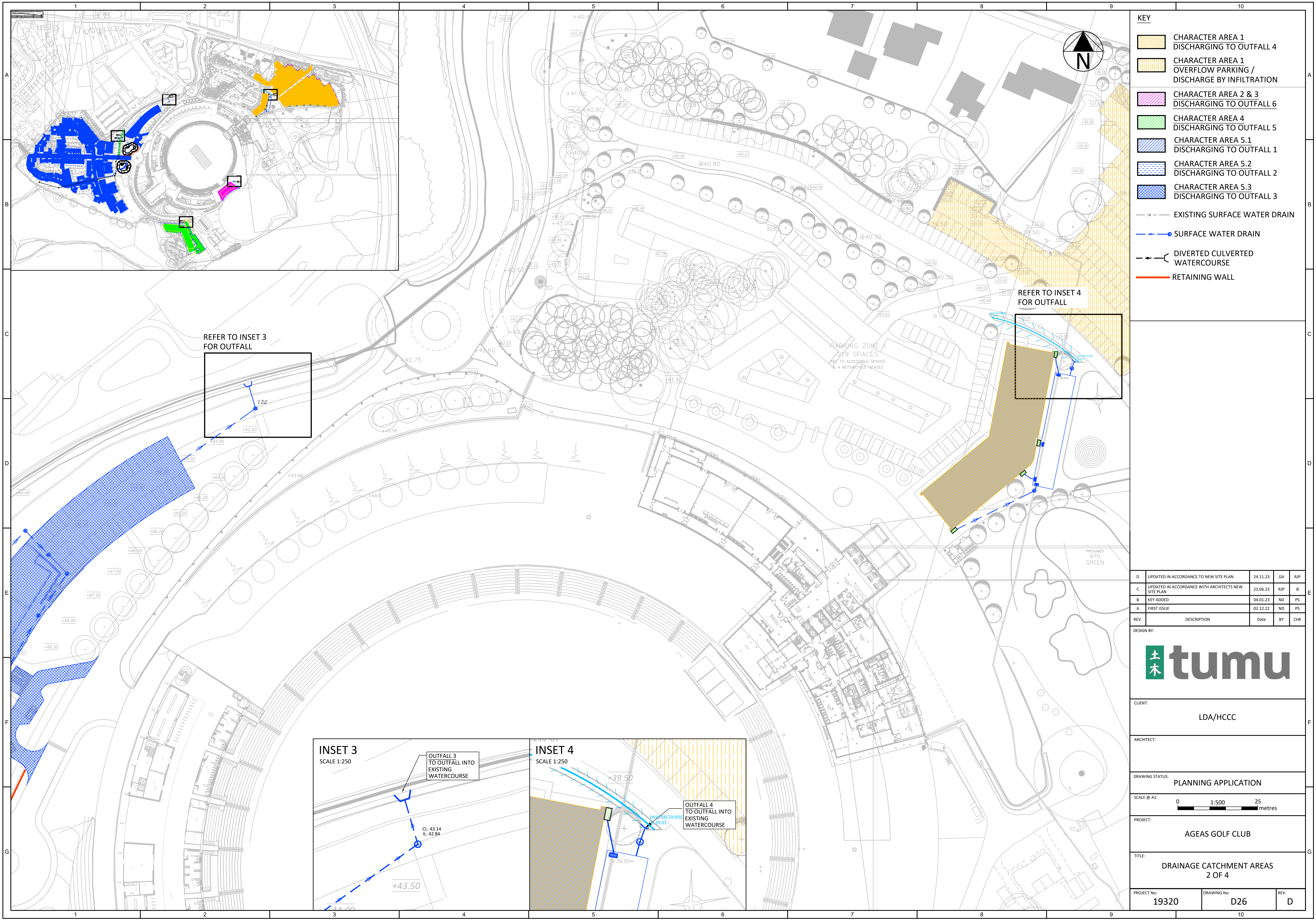
DRAWING STATUS:
PLANNING APPLICATION

SCALE @ A1:
0 1:500 25 metres

PROJECT:
AGEAS GOLF CLUB

TITLE:
DRAINAGE CATCHMENT AREAS
1 OF 4

PROJECT No: 19320	DRAWING No: D25	REV: D
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KEY

CHARACTER AREA 1
DISCHARGING TO OUTFALL 4

CHARACTER AREA 1
OVERFLOW PARKING /
DISCHARGE BY INFILTRATION

CHARACTER AREA 2 & 3
DISCHARGING TO OUTFALL 6

CHARACTER AREA 4
DISCHARGING TO OUTFALL 5

CHARACTER AREA 5.1
DISCHARGING TO OUTFALL 1

CHARACTER AREA 5.2
DISCHARGING TO OUTFALL 2

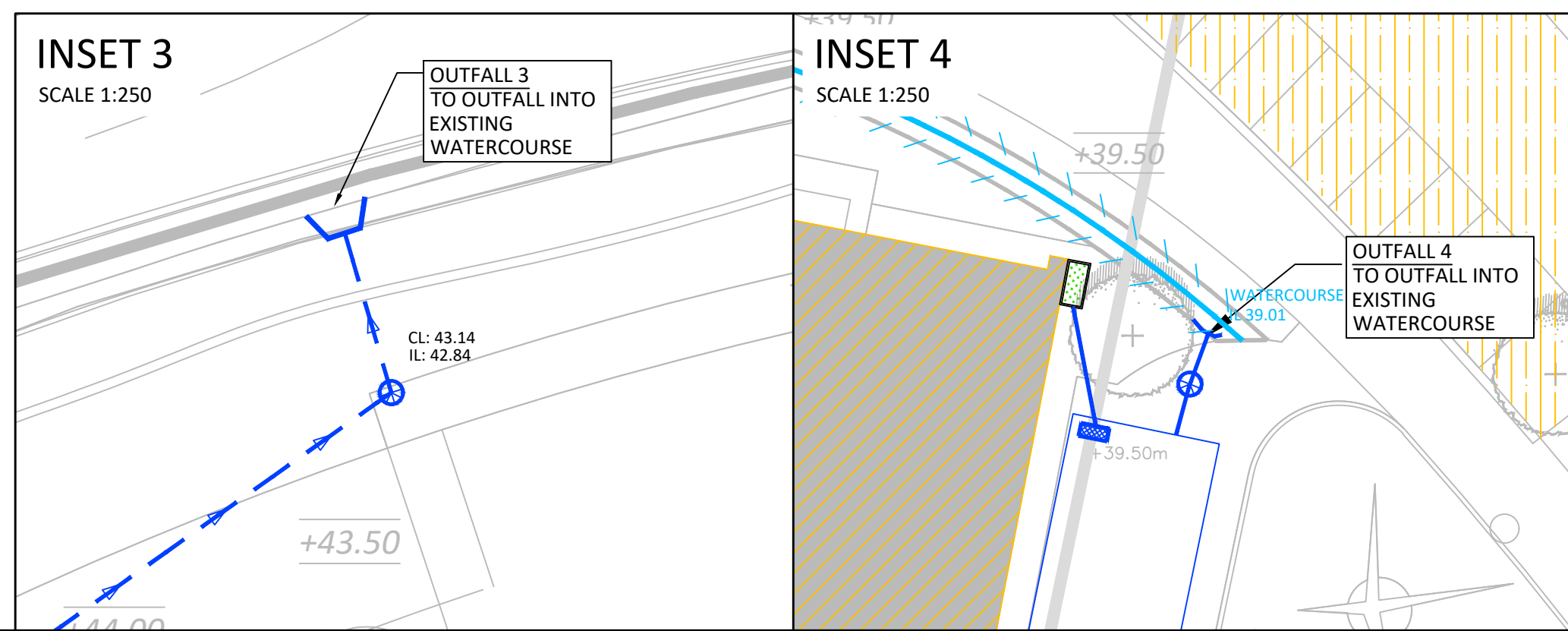
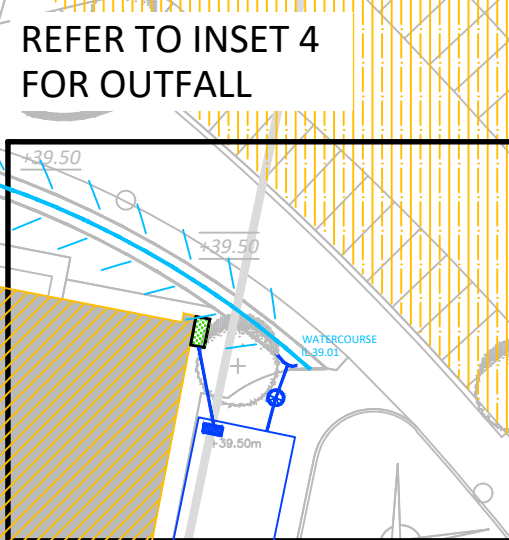
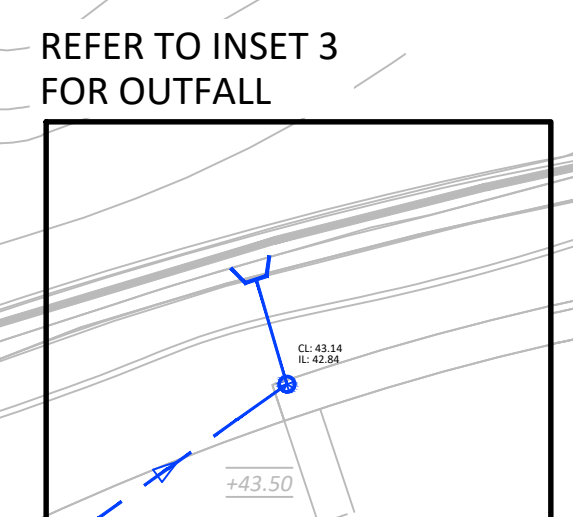
CHARACTER AREA 5.3
DISCHARGING TO OUTFALL 3

EXISTING SURFACE WATER DRAIN

SURFACE WATER DRAIN

DIVERTED CULVERTED
WATERCOURSE

RETAINING WALL



D	UPDATED IN ACCORDANCE TO NEW SITE PLAN	24.11.23	GA	RIP
C	UPDATED IN ACCORDANCE WITH ARCHITECTS NEW SITE PLAN	23.06.23	RJP	JE
B	KEY ADDED	04.01.23	ND	PS
A	FIRST ISSUE	02.12.22	ND	PS
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

土木

tumu

CLIENT:

LDA/HCCC

ARCHITECT:

DRAWING STATUS:

PLANNING APPLICATION

SCALE @ A1:

0

1:500

25

metres

PROJECT:

AGEAS GOLF CLUB

TITLE:

DRAINAGE CATCHMENT AREAS
2 OF 4

PROJECT No:

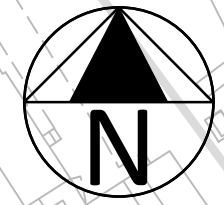
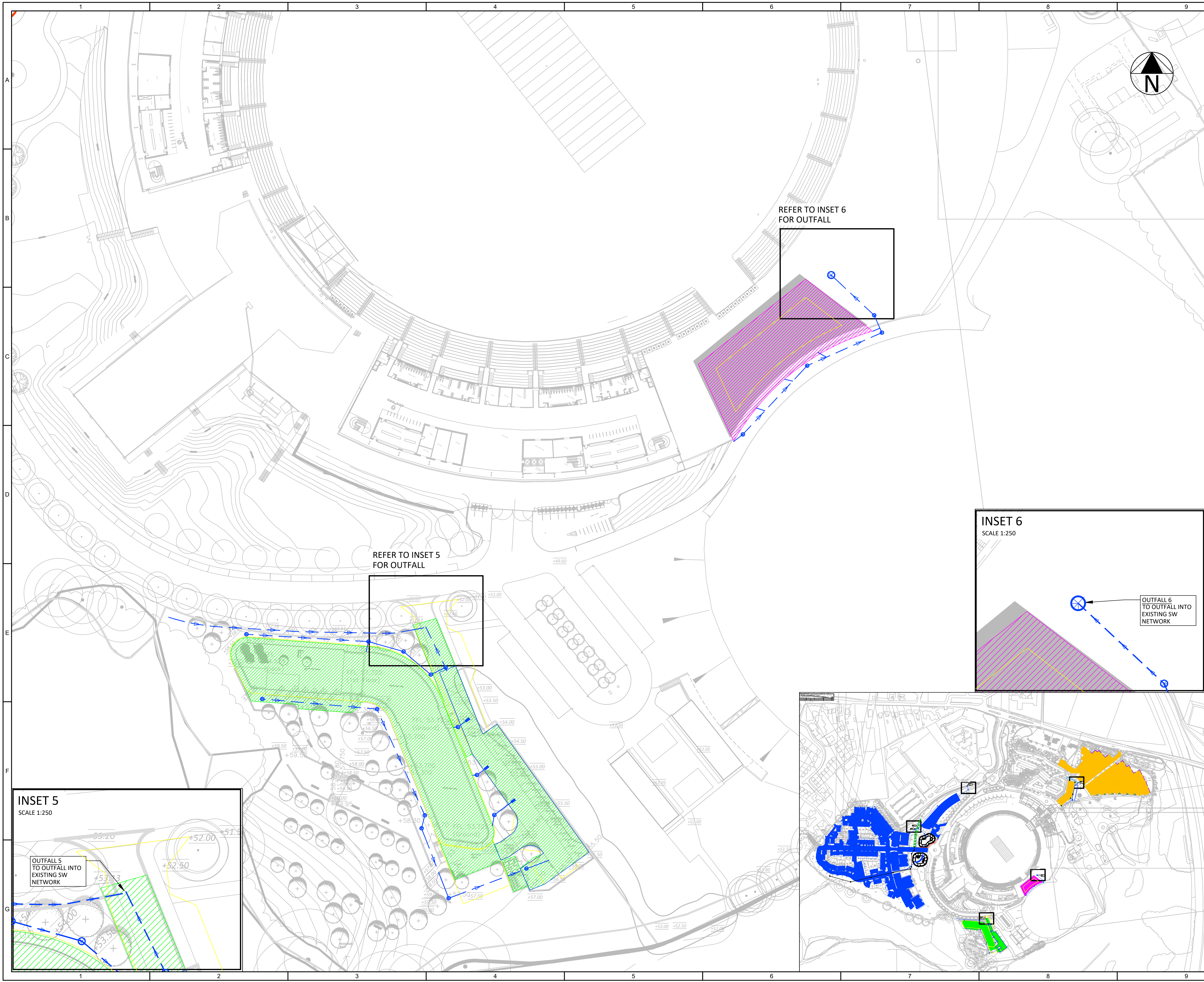
19320

DRAWING No:

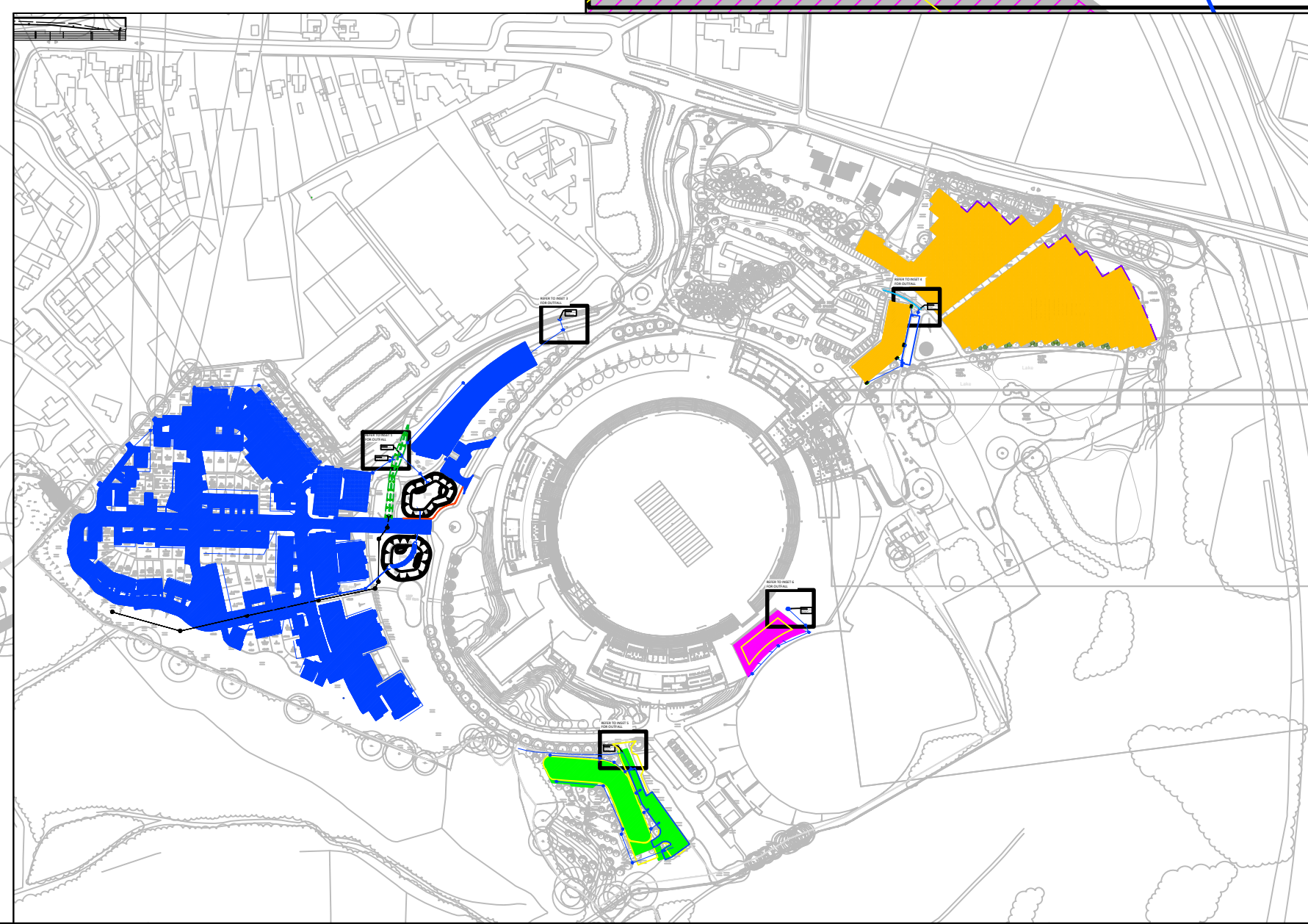
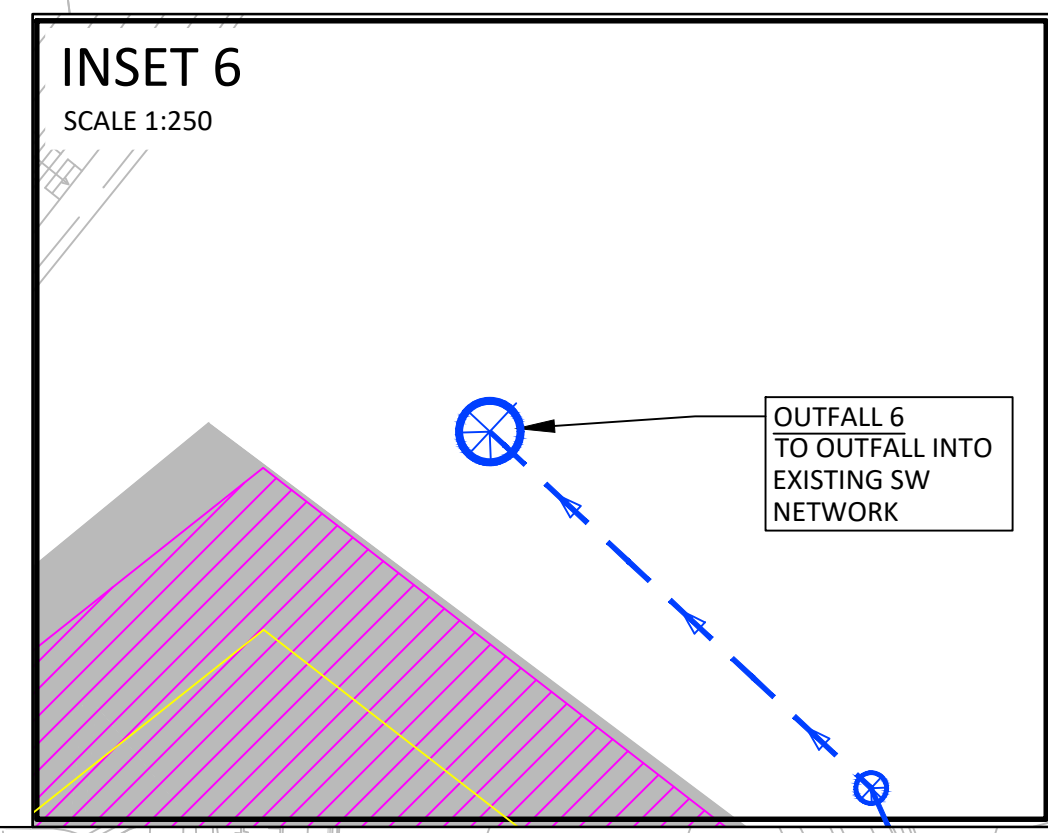
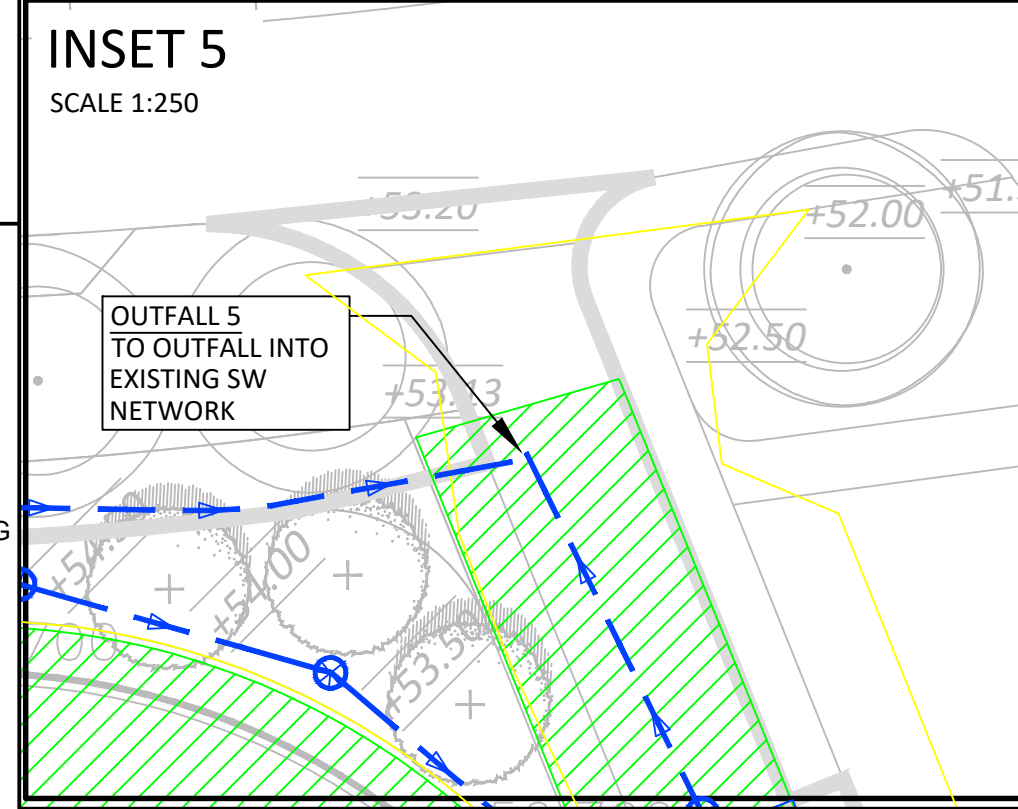
D26

REV:

D



- KEY**
- CHARACTER AREA 1
DISCHARGING TO OUTFALL 4
 - CHARACTER AREA 1
OVERFLOW PARKING /
DISCHARGE BY INFILTRATION
 - CHARACTER AREA 2 & 3
DISCHARGING TO OUTFALL 6
 - CHARACTER AREA 4
DISCHARGING TO OUTFALL 5
 - CHARACTER AREA 5.1
DISCHARGING TO OUTFALL 1
 - CHARACTER AREA 5.2
DISCHARGING TO OUTFALL 2
 - CHARACTER AREA 5.3
DISCHARGING TO OUTFALL 3
 - EXISTING SURFACE WATER DRAIN
 - SURFACE WATER DRAIN
 - DIVERTED CULVERTED
WATERCOURSE
 - RETAINING WALL



C	UPDATED IN ACCORDANCE TO NEW SITE PLAN	24.11.23	GA	RIP
B	KEY ADDED	04.01.23	ND	PS
A	FIRST ISSUE	02.12.22	ND	PS
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:



CLIENT:
LDA/HCCC

ARCHITECT:

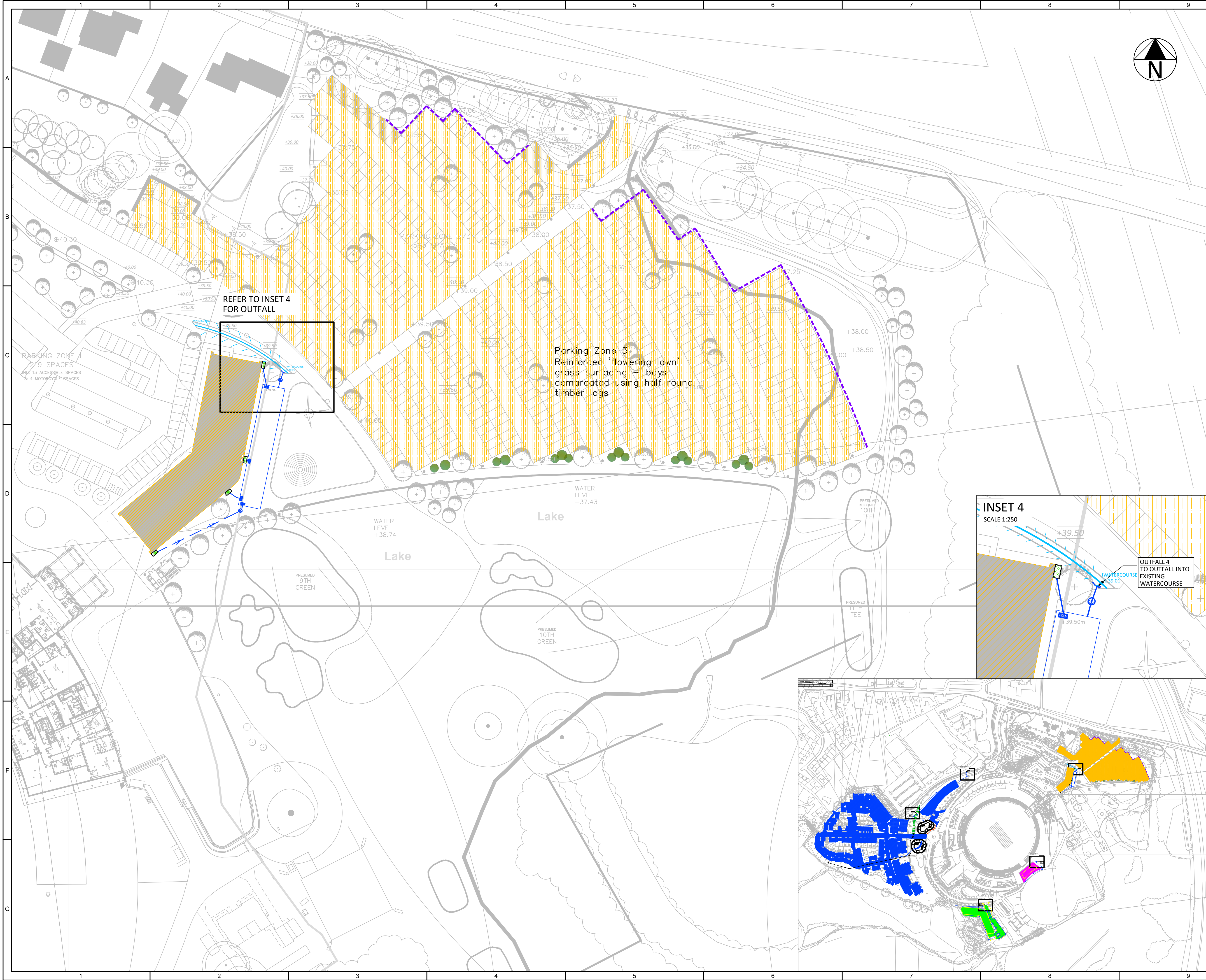
DRAWING STATUS:
PLANNING APPLICATION

SCALE @ A1:
0 1:500 25 metres

PROJECT:
AGEAS GOLF CLUB

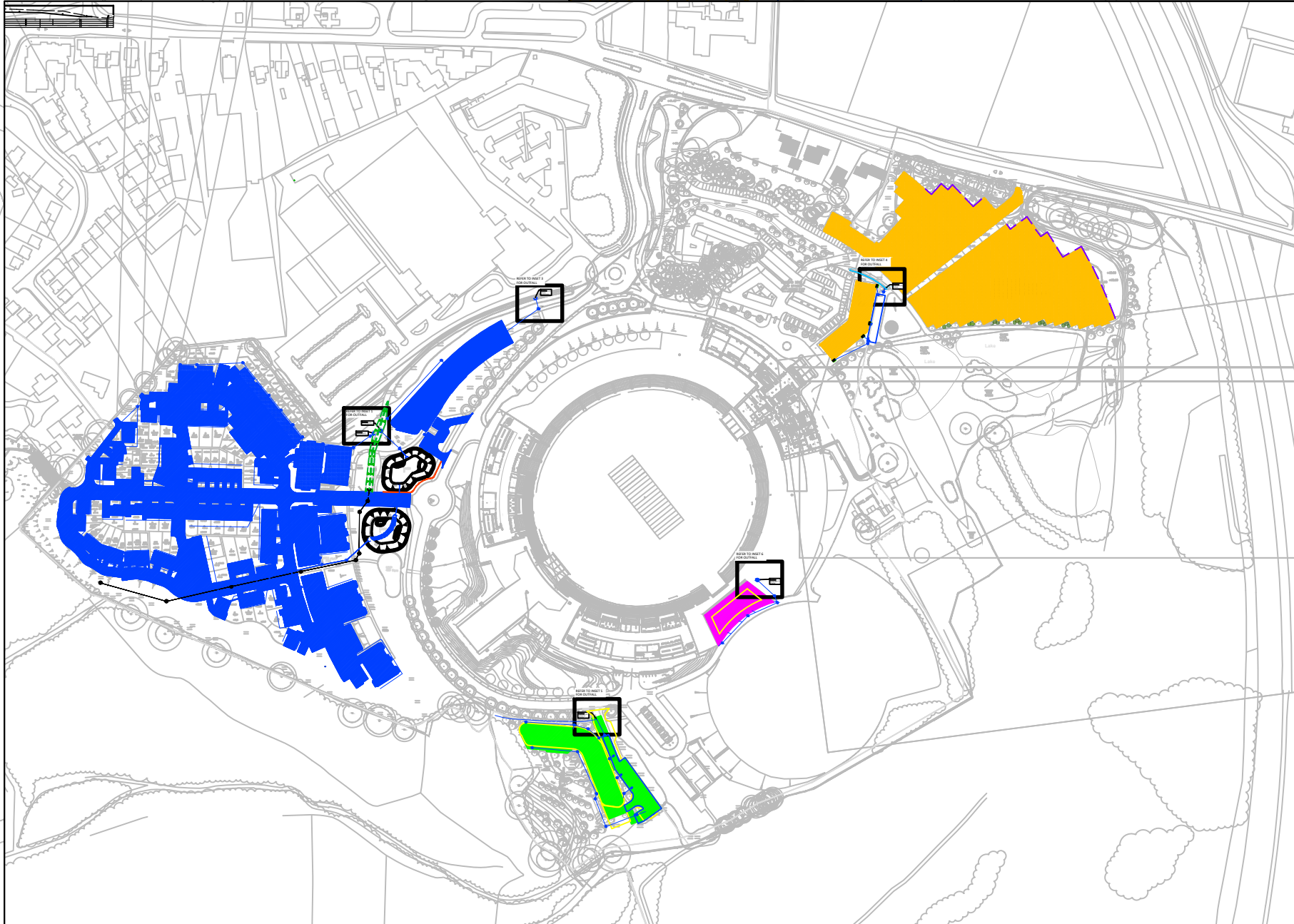
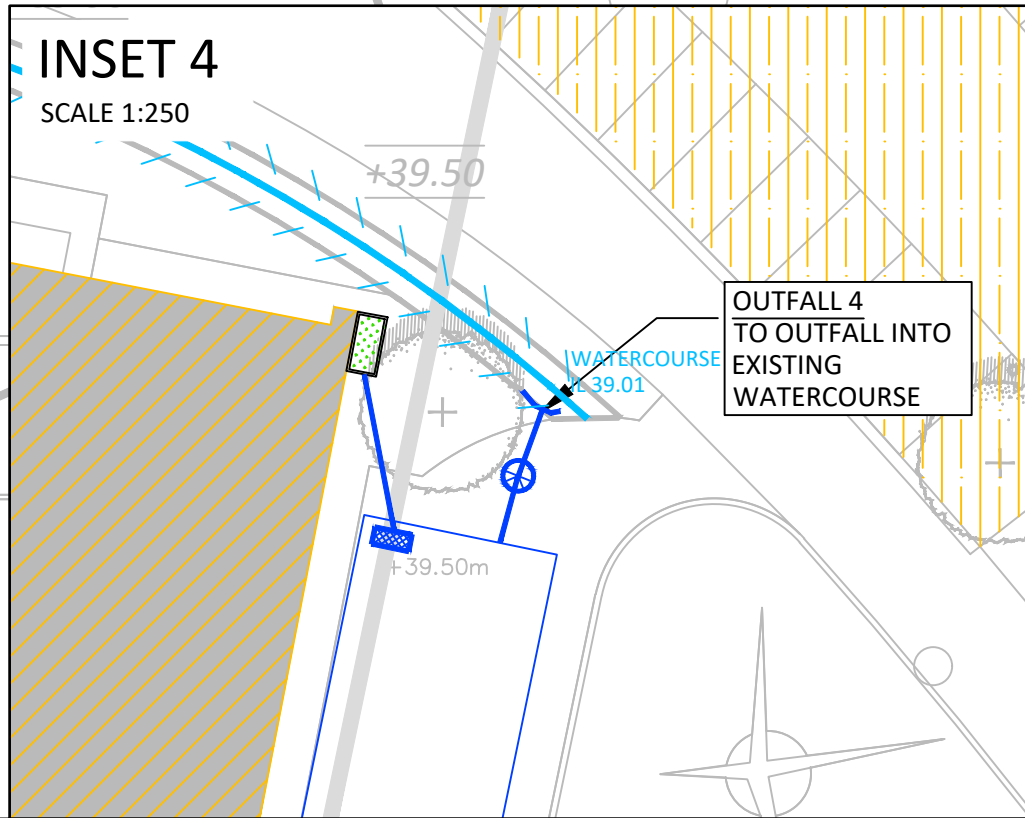
TITLE:
DRAINAGE CATCHMENT AREAS
3 OF 4

PROJECT No: 19320	DRAWING No: D27	REV: C
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REFER TO INSET 4
FOR OUTFALL

Parking Zone 3
Reinforced 'flowering lawn'
grass surfacing – bays
demarcated using half round
timber logs



- KEY
- CHARACTER AREA 1
DISCHARGING TO OUTFALL 4
 - CHARACTER AREA 1
OVERFLOW PARKING /
DISCHARGE BY INFILTRATION
 - CHARACTER AREA 2 & 3
DISCHARGING TO OUTFALL 6
 - CHARACTER AREA 4
DISCHARGING TO OUTFALL 5
 - CHARACTER AREA 5.1
DISCHARGING TO OUTFALL 1
 - CHARACTER AREA 5.2
DISCHARGING TO OUTFALL 2
 - CHARACTER AREA 5.3
DISCHARGING TO OUTFALL 3
 - EXISTING SURFACE WATER DRAIN
 - SURFACE WATER DRAIN
 - DIVERTED CULVERTED
WATERCOURSE
 - RETAINING WALL

D	UPDATED IN ACCORDANCE TO NEW SITE PLAN	24.11.23	GA	RIP
C	UPDATED IN ACCORDANCE WITH ARCHITECTS NEW SITE PLAN	23.06.23	RJP	JE
B	KEY ADDED	04.01.23	ND	PS
A	FIRST ISSUE	02.12.22	ND	PS
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

tumu

CLIENT: LDA/HCCC

ARCHITECT:

DRAWING STATUS: PLANNING APPLICATION

SCALE @ A1: 0 1:500 25 metres

PROJECT: AGEAS GOLF CLUB

TITLE: DRAINAGE CATCHMENT AREAS
4 OF 4

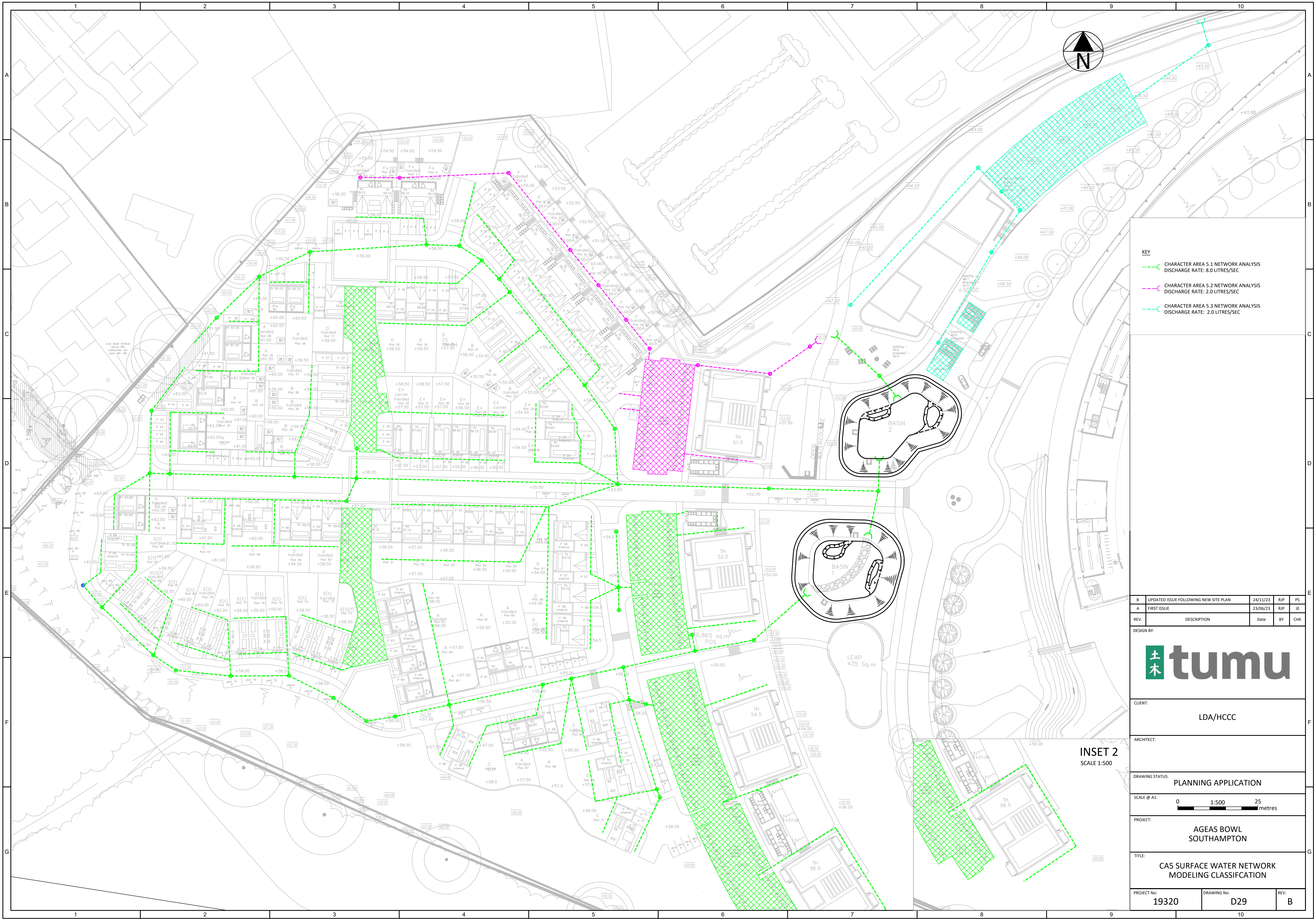
PROJECT No: 19320

DRAWING No: D28

REV: D

Appendix D

Surface Water Modelling Classification



KEY

- CHARACTER AREA 5.1 NETWORK ANALYSIS
DISCHARGE RATE: 8.0 LITRES/SEC
- CHARACTER AREA 5.2 NETWORK ANALYSIS
DISCHARGE RATE: 2.0 LITRES/SEC
- CHARACTER AREA 5.3 NETWORK ANALYSIS
DISCHARGE RATE: 2.0 LITRES/SEC

B	UPDATED ISSUE FOLLOWING NEW SITE PLAN	24/11/23	RIP	PS
A	FIRST ISSUE	23/06/23	RIP	JE
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

CLIENT:
LDA/HCCC

ARCHITECT:

DRAWING STATUS:
PLANNING APPLICATION

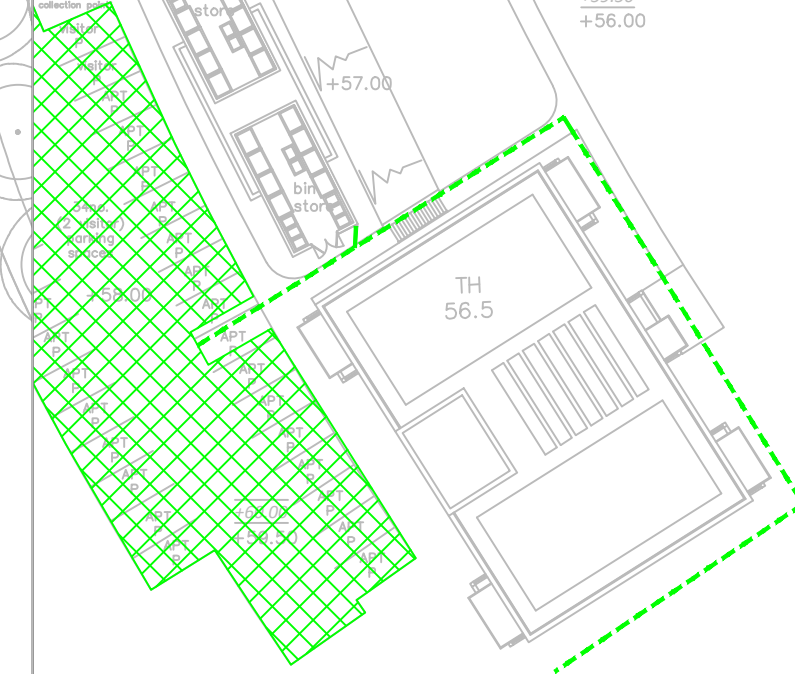
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PROJECT:
AGEAS BOWL
SOUTHAMPTON

TITLE:
CA5 SURFACE WATER NETWORK
MODELING CLASSIFICATION

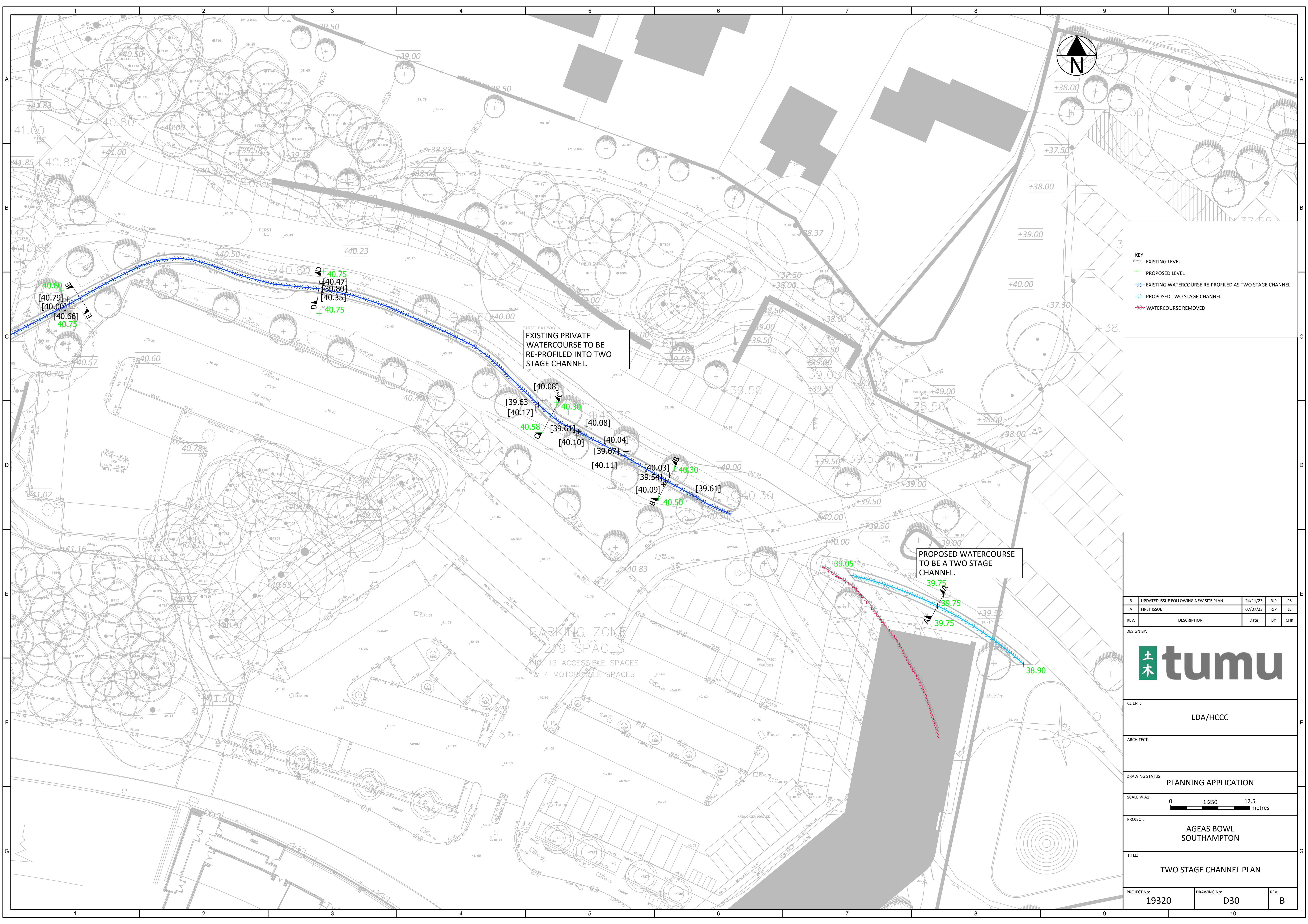
PROJECT No:	DRAWING No:	REV:
19320	D29	B

INSET 2
SCALE 1:500



Appendix E

Two-Stage Channel Layout and Sections



KEY

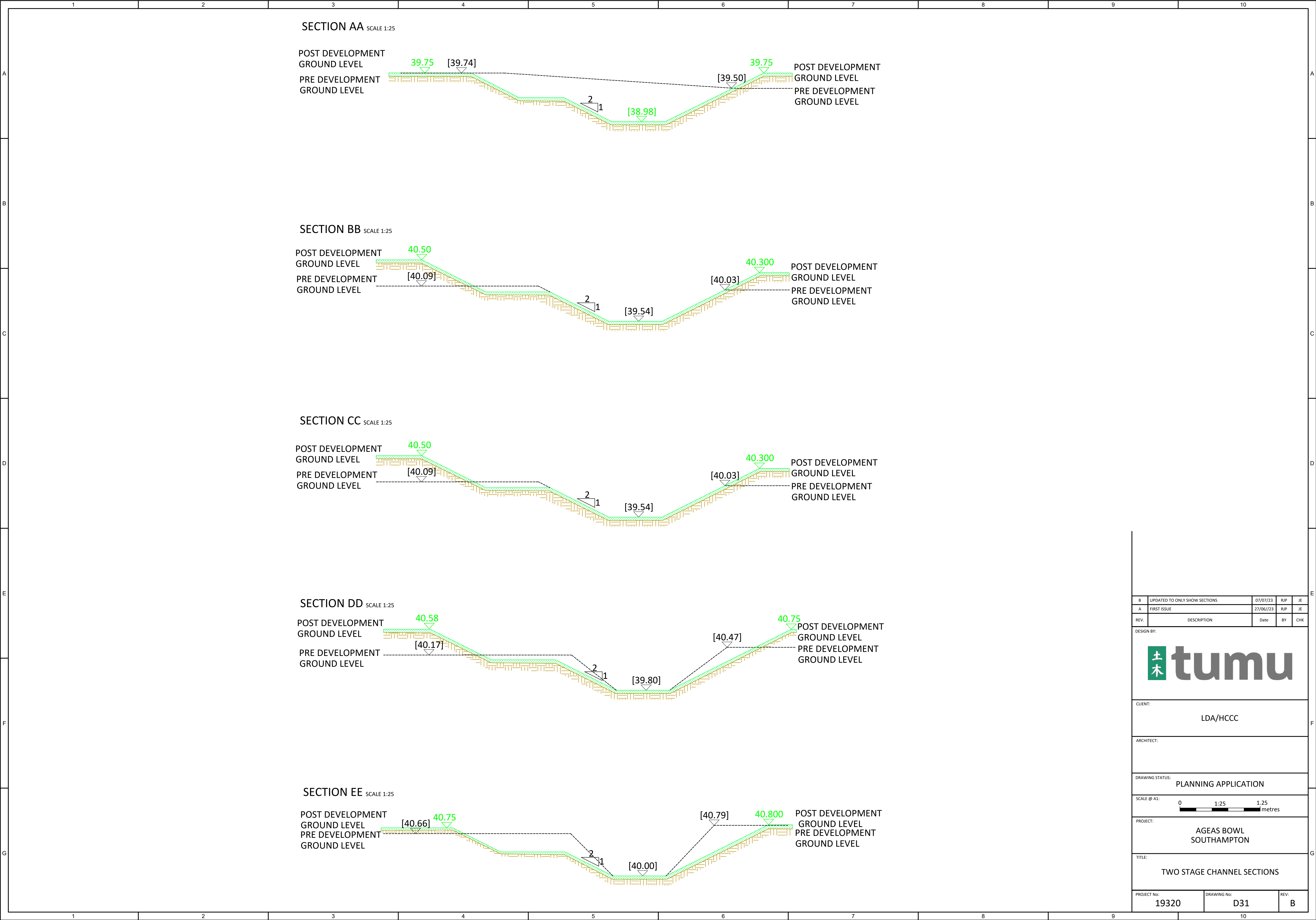
- EXISTING LEVEL
- PROPOSED LEVEL
- EXISTING WATERCOURSE RE-PROFIED AS TWO STAGE CHANNEL
- PROPOSED TWO STAGE CHANNEL
- WATERCOURSE REMOVED

EXISTING PRIVATE WATERCOURSE TO BE RE-PROFIED INTO TWO STAGE CHANNEL.

PROPOSED WATERCOURSE TO BE A TWO STAGE CHANNEL.

PARKING ZONE 1
29 SPACES
INC. 13 ACCESSIBLE SPACES
4 MOTORCYCLE SPACES

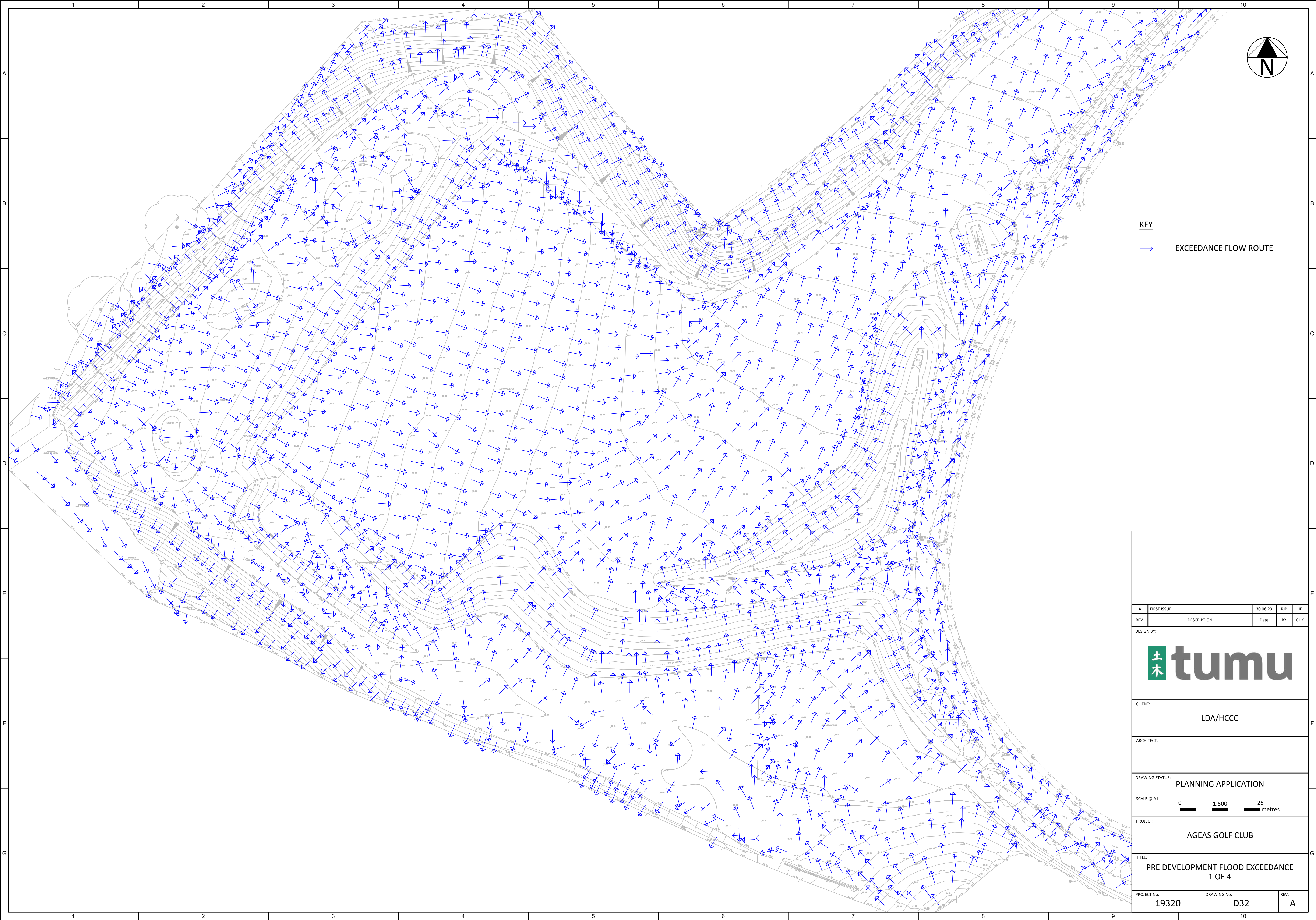
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A	FIRST ISSUE	07/07/23	RIP	JE
REV.	DESCRIPTION	Date	BY	CHK
DESIGN BY:				
CLIENT:				
LDA/HCCC				
ARCHITECT:				
DRAWING STATUS: PLANNING APPLICATION				
SCALE @ A1: 0 1:250 12.5 metres				
PROJECT: AGEAS BOWL SOUTHAMPTON				
TITLE: TWO STAGE CHANNEL PLAN				
PROJECT No: 19320		DRAWING No: D30		REV: B



B	UPDATED TO ONLY SHOW SECTIONS	07/07/23	RJP	JE
A	FIRST ISSUE	27/06/23	RJP	JE
REV.	DESCRIPTION	Date	BY	CHK
DESIGN BY:				
土 木 tumu				
CLIENT:				
LDA/HCCC				
ARCHITECT:				
DRAWING STATUS:				
PLANNING APPLICATION				
SCALE @ A1:		0 1:25 1.25metres		
PROJECT:				
AGEAS BOWL SOUTHAMPTON				
TITLE:				
TWO STAGE CHANNEL SECTIONS				
PROJECT No:		DRAWING No:		REV:
19320		D31		B

Appendix F

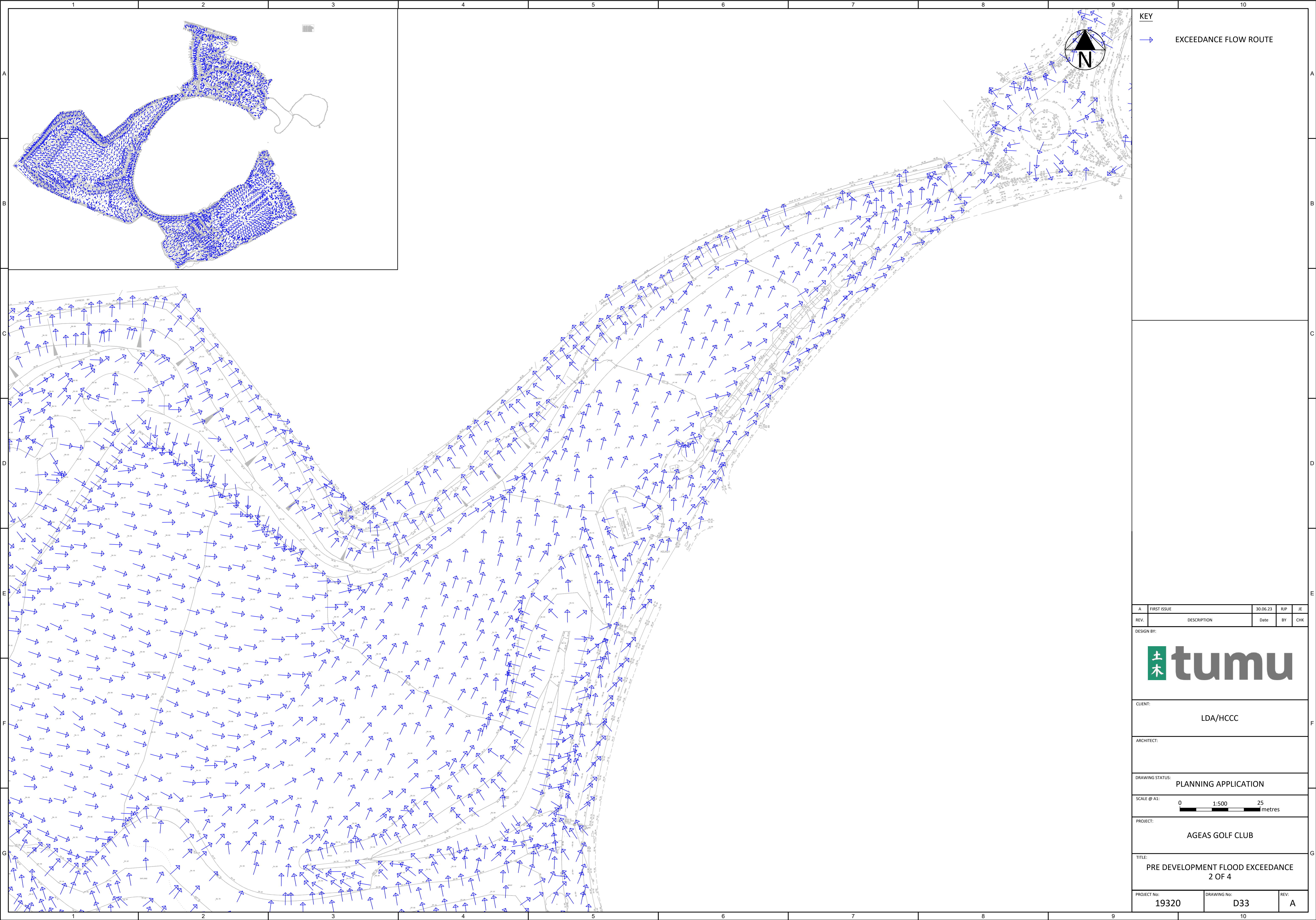
Pre- and Post-Development Exceedance Flows



KEY

EXCEEDANCE FLOW ROUTE

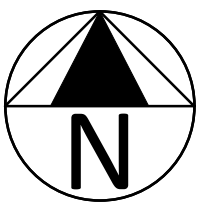
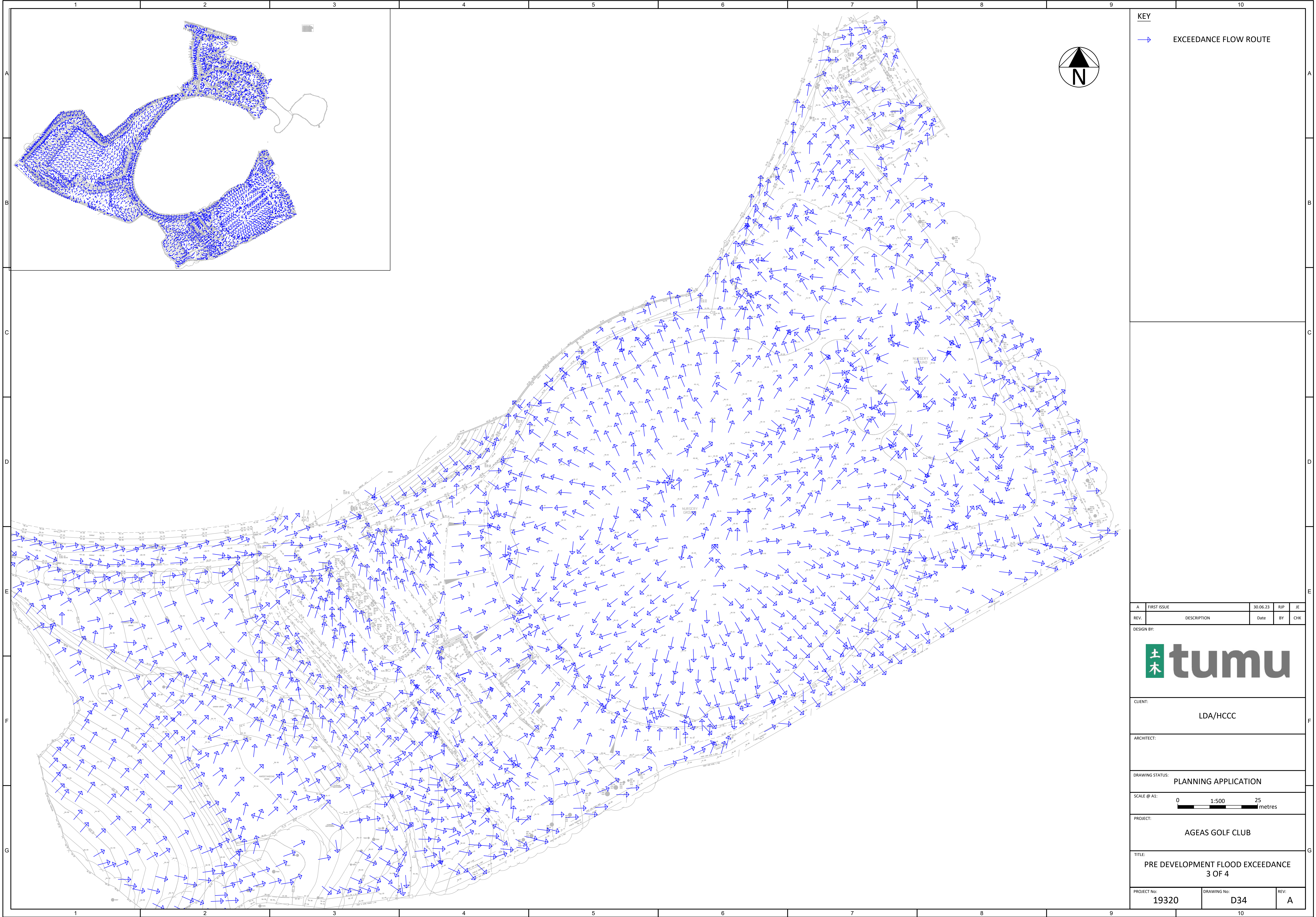
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REV.	DESCRIPTION	Date	BY	CHK
DESIGN BY:				
CLIENT: LDA/HCCC				
ARCHITECT:				
DRAWING STATUS: PLANNING APPLICATION				
SCALE @ A1: 0 1:500 25 metres				
PROJECT: AGEAS GOLF CLUB				
TITLE: PRE DEVELOPMENT FLOOD EXCEEDANCE 1 OF 4				
PROJECT No: 19320		DRAWING No: D32		REV: A



KEY

→ EXCEEDANCE FLOW ROUTE

A	FIRST ISSUE	30.06.23	RJP	JE
REV.	DESCRIPTION	Date	BY	CHK
DESIGN BY:				
				
CLIENT:				
LDA/HCCC				
ARCHITECT:				
DRAWING STATUS: PLANNING APPLICATION				
SCALE @ A1: 0 1:500 25 metres				
PROJECT:				
AGEAS GOLF CLUB				
TITLE:				
PRE DEVELOPMENT FLOOD EXCEEDANCE 2 OF 4				
PROJECT No:		DRAWING No:		REV:
19320		D33		A



KEY

→ EXCEEDANCE FLOW ROUTE

A	FIRST ISSUE	30.06.23	RJP	JE
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:



CLIENT:

LDA/HCCC

ARCHITECT:

DRAWING STATUS: PLANNING APPLICATION

SCALE @ A1: 0 1:500 25 metres

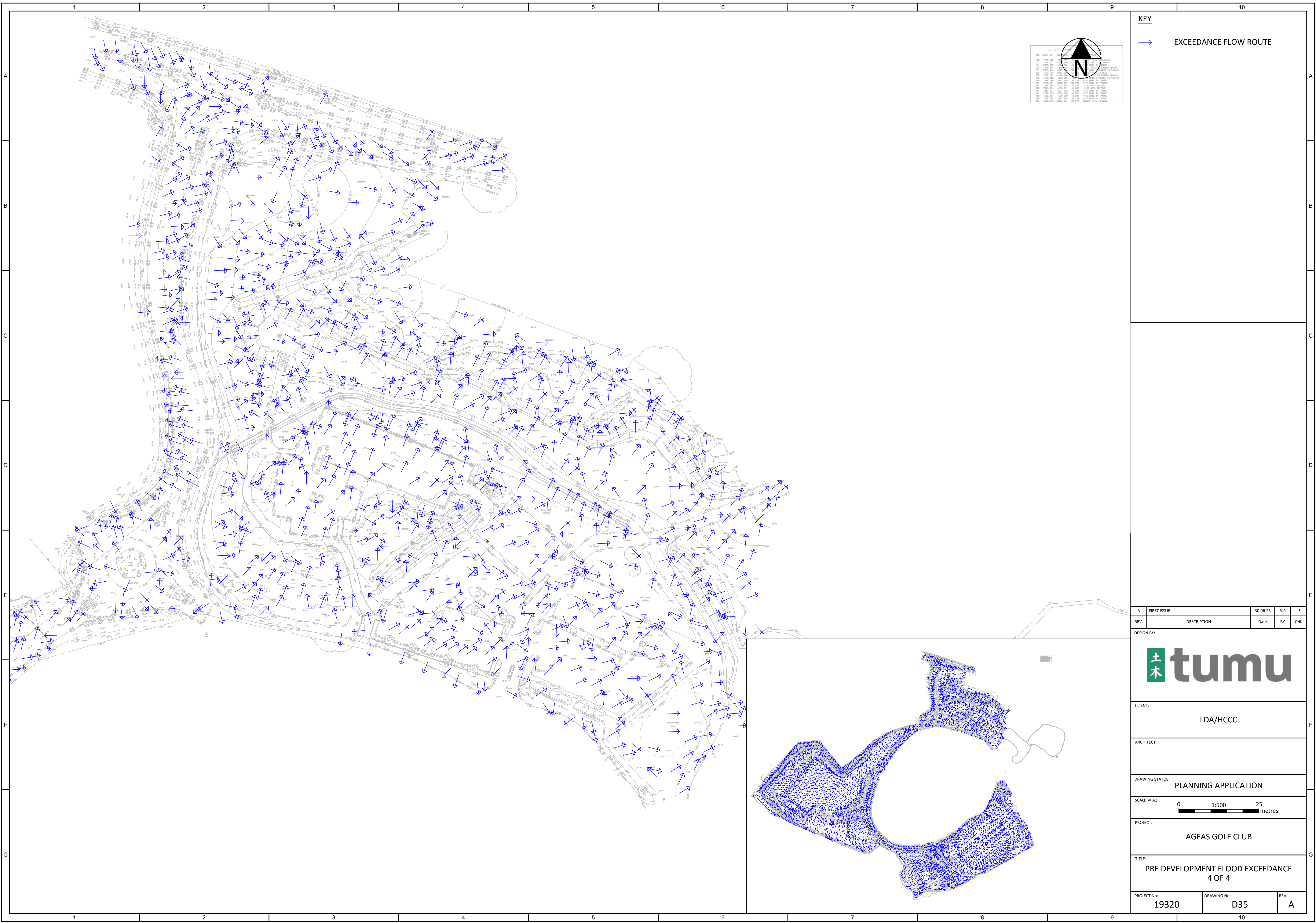
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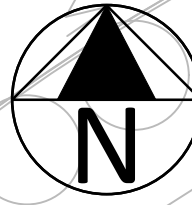
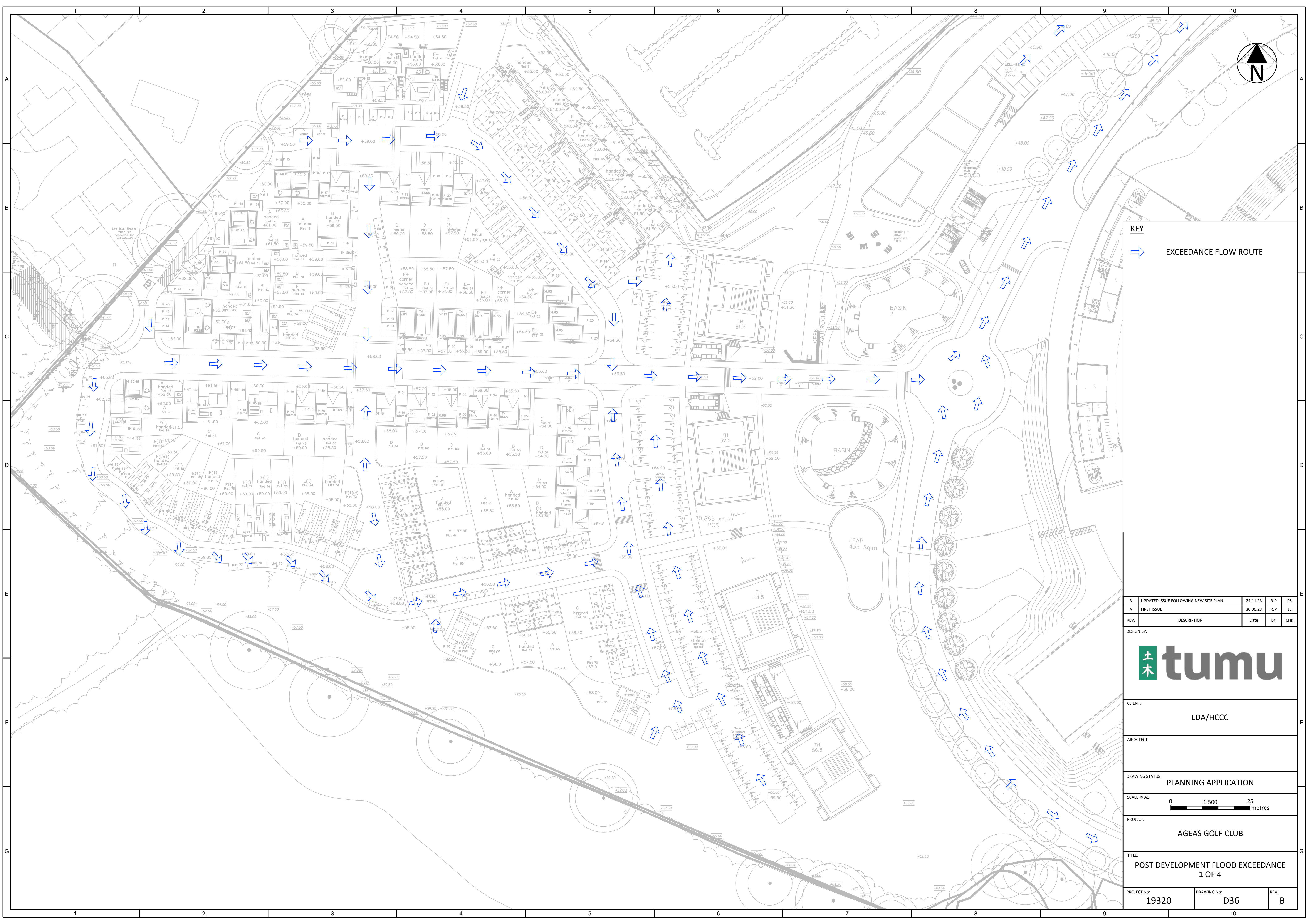
AGEAS GOLF CLUB

TITLE:

PRE DEVELOPMENT FLOOD EXCEEDANCE
3 OF 4

PROJECT No:	DRAWING No:	REV:
19320	D34	A





KEY

→ EXCEEDANCE FLOW ROUTE

B	UPDATED ISSUE FOLLOWING NEW SITE PLAN	24.11.23	RJP	PS
A	FIRST ISSUE	30.06.23	RJP	JE
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:



CLIENT:

LDA/HCCC

ARCHITECT:

DRAWING STATUS:

PLANNING APPLICATION

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metres

PROJECT:

AGEAS GOLF CLUB

TITLE:

POST DEVELOPMENT FLOOD EXCEEDANCE
1 OF 4

PROJECT No:

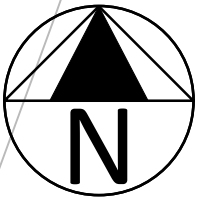
19320

DRAWING No:

D36

REV:

B



KEY



EXCEEDANCE FLOW ROUTE

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A	FIRST ISSUE		30.06.23	R/P	J/E
REV.	DESCRIPTION		Date	BY	CHK
DESIGN BY:					
					
CLIENT:					
LDA/HCCC					
ARCHITECT:					
DRAWING STATUS:					
PLANNING APPLICATION					
SCALE @ A1:		0 1:500 25 metres			
PROJECT:					
AGEAS GOLF CLUB					
TITLE:					
POST DEVELOPMENT FLOOD EXCEEDANCE 4 OF 4					
PROJECT No:		DRAWING No:		REV:	
19320		D39		B	

Appendix G

Proposed Landscape Detail for Existing Lakes



LANDSCAPE KEY:

- Existing trees and vegetation to be retained - refer to Arboricultural information for details
- Tree Root Protection Areas (RPA's)
- Existing vegetation to be removed to facilitate development
- Proposed specimen trees
- Native tree and shrub mix planting including feathered and light standard stock
- Managed wildflower grassland
- Species-rich grassland to swales and attenuation ponds with marginal and aquatic planting
- Amenity grassland and lawns to include areas to be managed as herb-rich grassland
- Formal hedges
- Shrub & groundcover planting areas
- Slab and / or block / sett paving (pedestrian)
- Block / sett paving (vehicular)
- Coloured asphalt surfacing (pigmented)
- Dedicated Fanzone route from Botley Rd to West Gate with seating and lighting - surface to comprise pigmented asphalt (both vehicular and pedestrian) to create legible route combining shared surface areas associated with existing access roads
- Tarmacadam surface
- Self binding gravel surface
- Permeable sett paving surface
- Reinforced grass surface to proposed overspill car park (occasional use) - area to be sown with a flowering lawn mix (as per Thornesdown) and following establishment areas to be reinforced with a suitable grass reinforcement mesh system eg Turfmesh by Geosynthetics Ltd or equivalent product eg SureGreen
- Permeable gravel surface to proposed overspill car park and access footpath eg Golpa by Geosynthetics Ltd or equivalent product
- Proposed 2.5 / 3m wide footpath / cycle route providing a strategic link through the site and connection to West End. Surface to be a pigmented asphalt surface (coloured) for legibility
- Private / communal access paths - finish depending on location
- Private drives / rear access paths - finish depending on location
- Granite sett thresholds / rumble strips
- Proposed 2m hoggan gravel footpath with timber edging to realigned PROW (refer to drg J00828-MP-002 for location)
- Seating
- Totem / waymarking features with integral low level lighting (details tbc)
- Low level waymarking lighting (indicative)
- Bollards to shared surface zones
- Steps with handrails (indicative)
- Gabion retaining wall system or similar (indicative)
- Landscape retaining wall (indicative)
- Metal railings to front gardens (residential area) eg 900mm high continuous bar estate style railings
- Proposed waymarking sign
- Levels - existing
- Levels - proposed (shown as indicative)
- Proposed 'no dig' construction zones within tree RPAs
- Indicative location for gravel filter drain to manage and treat surface water runoff prior to discharge into existing watercourse

For Tree Survey information please refer to Arboricultural Implications Assessment (Mulberry TMC, November 2023)



Notes

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The Contractor is to check all dimensions and conditions on site before commencing. Do not scale from this drawing.

Scale Bars

TO BE USED ONLY AS GUIDANCE

1:100 1:200 1:500 1:1250

0 10 20 30 40 50 60 70 80 90 100

14 Bin / cycle store for hotel added. Proposed native planting adjoining diverted PROW adjusted. Waymarking signs added. Repositioned and widened pedestrian crossing to Botley Rd added. Botley Rd access adjusted to WSP proposals

13 Adjustments to Calderpeel layout 21016 (PL) 100 I

12 Adjustments to layout to LPA consultee comments and latest Calderpeel layout 21016 (PL) 104 D

11 Adjustments to layout to LPA consultee comments and latest Calderpeel layout 21016 (PL) 104 D

10 Alignment of existing PROW route 241/050/1 amended

09 Footpath to Botley Rd amended to provide a 3m wide section to east of upgraded access off Botley Rd

08 Minor adjustments to layout to accommodate Tree RPA's in line with Mulberry Tree Consultants comments 2022-06-05

07 Tree planting strategy revised to client comments 2022-04-19

06 Tree planting strategy revised to client comments 2022-04-05

05 Overspill car park surfacing revised to client comments 2022-04-01

04 Updated to revised layout (Budget Hotel) and Mulberry Tree Survey information added

03 Draft Planning Issue for approval

02 Draft Planning Issue for approval

Issue	Description	By	Date
14	Bin / cycle store for hotel added. Proposed native planting adjoining diverted PROW adjusted. Waymarking signs added. Repositioned and widened pedestrian crossing to Botley Rd added. Botley Rd access adjusted to WSP proposals	JH	17.11.23
13	Adjustments to Calderpeel layout 21016 (PL) 100 I	JH	23.06.23
12	Adjustments to layout to LPA consultee comments and latest Calderpeel layout 21016 (PL) 104 D	JH	23.05.26
11	Adjustments to layout to LPA consultee comments and latest Calderpeel layout 21016 (PL) 104 D	JH	26.02.23
10	Alignment of existing PROW route 241/050/1 amended	JH	21.09.23
09	Footpath to Botley Rd amended to provide a 3m wide section to east of upgraded access off Botley Rd	JH	14.05.22
08	Minor adjustments to layout to accommodate Tree RPA's in line with Mulberry Tree Consultants comments 2022-06-05	JH	06.06.22
07	Tree planting strategy revised to client comments 2022-04-19	JH	28.04.22
06	Tree planting strategy revised to client comments 2022-04-05	JH	07.04.22
05	Overspill car park surfacing revised to client comments 2022-04-01	JH	01.04.22
04	Updated to revised layout (Budget Hotel) and Mulberry Tree Survey information added	JH	09.03.22
03	Draft Planning Issue for approval	CP	06.02.22
02	Draft Planning Issue for approval	CP	01.02.22

Issue Description By Date

Client

LAND AND DEVELOPMENT ADVISORY LIMITED

Project

AGEAS BOWL MASTERPLAN

Drawing Title

LANDSCAPE PLAN AREA 1 (EAST) SHEET 2 of 6

Date	By	Check	Drawn	Scale
01.2022	CP	CP	JH	
J00828	MP-002		14	
1:500@A1	PLANNING			

Johns Associates Limited
Bradford-on-Avon

Green Tree House,
11 St Margaret's Street,
Bradford-on-Avon
BA15 1DA

+44 (0)1225 723652

www.johnsassociates.co.uk

JOHNS ASSOCIATES

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Appendix H

Previous LLFA Comments to August 2022 FRA



Hampshire County Council

Universal Services
The Castle
Winchester, Hampshire SO23 8UD

Tel: 0300 555 1375
Fax 01962 847055
www.hants.gov.uk

Enquiries to	Sarah Reghif	My reference	SWM/2022/0506
Direct Line	0370 779 7497	Your reference	F/22/93194
Date	12 May 2023	Email	SWM.consultee@hants.gov.uk

Dear Sir/Madam,

Full planning application for the erection of 185 dwellings, a 71-bedroom care home (Use Class C2), a 142-bedroom hotel (Use Class C1), a well-being centre (Use Class E / F2), a new pavilion building and improvements to existing stadium, new vehicular access, car parking, pedestrian circulation and processional ramp, together with associated tree planting, landscaping, SuDS and biodiversity enhancements at THE AGEAS BOWL, MARSHALL DRIVE, WEST END, SOUTHAMPTON, SO30 3XH(Application No. F/22/93194

Hampshire County Council as Lead Local Flood Authority has provided comments in relation to the above application in our role as statutory consultee on surface water drainage for major developments.

This response does not reflect the position of Hampshire County Council as the Highway Authority. If there is a potential for the drainage features to be offered for adoption, this will need to be discussed separately with Highways development planning as they might not be considered acceptable by the Highway Authority.

In order to assist applicants in providing the correct information to their Local Planning Authority for planning permission, Hampshire County Council has set out the information it requires to provide a substantive response at <https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/planning>

The County Council has reviewed the following documents relating to the above application:

- Flood Risk Assessment Addendum 2 and Appendices

Director of Universal Services
Patrick Blogg

Additional information has been provided although primarily as a result of a meeting held with the applicants.

This has addressed a number of points however some additional information is still required at this stage while other elements could be conditioned.

Confirmation is required in relation to Character areas 2 and 3. These have been grouped together in the flood risk assessment with an overall storage requirement shown. However, these do not appear to be hydraulically connected on the drainage plans and no storage is shown for the pavilion. Evidence is needed to demonstrate that these proposals will not increase runoff at each individual location.

No pre / post development exceedance flow plans have been provided. Some narrative is included within the reports but plans are essential to show how water will flow in and around the development to ensure water is not directed to new locations. Although requested previously, no exceedance flow plans have been provided and on plan D12 there is a low point identified with exceedance routing to be considered by others. This information will need to be provided to give sufficient certainty that minor level adjustment is achievable and to understand the potential impacts.

The northern basin needs to be reviewed in terms of layout. The inlet and outlet are very close together and this is unlikely to be effective either hydraulically or from a water quality perspective. Refer to the SuDS Manual for additional guidance on basin design.

As has been highlighted previously, ordinary watercourse consent will be required for changes to ditches and watercourses affected by the works so extents of culverting / diversion and access chambers can be addressed through that process. There are no objections to the general principles currently proposed.

To assist with water quality, the applicant is proposing to enhance the existing watercourse and ponds and this can be accepted providing the details are confirmed by condition in conjunction with the relevant consultees. There is one section where a filter drain is proposed to provide additional treatment. Given the relatively minimal impact of this on overall design, this can also be conditioned.

Providing the initial 3 points are addressed, we would recommend the following condition:

1. No development shall begin until a detailed surface water drainage scheme for the site, based on the principles within the Flood Risk Assessment and addendums, has been submitted and approved in writing by the Local Planning Authority. The submitted details should include:

- a. A technical summary highlighting any changes to the design from that within the approved Flood Risk Assessment.
- b. Confirmation that sufficient water quality measures have been included to satisfy the methodology in the Ciria SuDS Manual C753.
- c. Details of the Biodiverse Channel and Lakes identifying works proposed to enhance from the current situation and provide sufficient water quality benefits.

As a statutory consultee, the County Council has a duty to respond to consultations within **21 days**. The 21 day period will not begin until we have received sufficient information to enable us to provide a meaningful response.

Please ensure all data is sent to us via the relevant Local Planning Authority.

This response has been provided using the best knowledge and information submitted by the applicant as part of the planning application at the time of responding and is reliant on the accuracy of that information.

Yours faithfully,



Flood and Water Management Team
 Economy, Transport & Environment Department,
 Hampshire County Council, 1st Floor, Ell Court West,
 The Castle, Winchester, Hampshire SO23 8UD
 Web:

<https://www.hants.gov.uk/landplanningandenvironment/environment/flooding>

General guidance for the application

It is important to ensure that the long-term maintenance and responsibility for Sustainable Drainage Systems is agreed between the Local Planning Authority and the applicant before planning permission is granted. This should involve discussions with those adopting and/or maintaining the proposed systems, which could include the Highway Authority, Planning Authority, Parish Councils, Water Companies and private management companies.

For SuDS systems to be adopted by Hampshire Highways it is recommended that you visit the website at:

<https://www.hants.gov.uk/transport/developers/constructionstandards> for guidance on which drainage features would be suitable for adoption.

Where the proposals are connecting to an existing drainage system it is likely that the authorities responsible for maintaining those systems will have their

own design requirements. These requirements will need to be reviewed and agreed as part of any surface water drainage scheme.

Works in relation to ordinary watercourses

*PLEASE NOTE: If the proposals include works to an ordinary watercourse, under the Land Drainage Act 1991, as amended by the Flood and Water Management Act 2010, prior consent from the Lead Local Flood Authority is required. **This consent is required as a separate permission to planning.***

Information on ordinary watercourse consenting can be found at the following link

<https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/c/hangewatercourse>

It is strongly recommended that this information is reviewed before Land Drainage consent application is made.

*For guidance on providing the correct information, we recommend you use our **Ordinary Watercourse Consents Pre-application service** and help avoid delays occurring at the formal application stage. A Pre-application service for Ordinary Watercourse Consents is available, allowing consents to go through in a smoother, often more timely manner. For full information please visit:*

<https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/c/hangewatercourse>

Appendix I

Recent LLFA Comments to July 2023 Comments

F/22/93194 Ageas development

Ecology Comments 16.11.23

We require further information primarily regarding the modification of the pond and lakes to provide sufficient filtration for treatment of surface water, the area of infiltration (temporary car park) and additional treatment of surface water at the residential home and canopy.

CHARACTER AREA 5

Interception/ source control is a fundamental part of good SuDS. In particular, Character Area 5 of the proposal does not demonstrate this. The proposed drainage scheme is a more traditional system with an extensive underground pipe network leading to a basin(s) just upstream of the discharge point. This is not ideal and the underground pipe network should be minimised with the water brought to the surface in vegetated features and pervious paving wherever possible. Unfortunately, the layout was planned prior to a SuDS being designed (rather than the layout being led by conceptual SuDS planning) and therefore there are now limited opportunities to integrate SuDS throughout the development.

Southern area of residential parcel (drainage strategy sheets 4, 3, 2)

Proposed drainage from this area passes through two attenuation basins (Basin 1 and Basin 2) before being discharged to the realigned Telegraph Brook.

Surface water from two car parks for two blocks of flats at the eastern side will pass through an additional form of filtration (pervious paving) for these areas.

This level of filtration satisfies the SuDS manual criteria regarding WQ. However, EBC's Policy DM7 requires a further form of treatment of the surface water prior to discharge from the site (three forms in total) which previously has been agreed to be provided through the modification of the existing downstream ponds/ lakes. These modifications must form part of the drainage proposals and must be shown to be capable of acting as an effective filtration component.

As source control is limited in the scheme, the design of Basin 1 is crucial. A sediment trap at the inlet end of the basin is required to enable easier maintenance to ensure the effective working of the basin to maintain the WQ of the discharge.

Northern area of residential parcel (drainage strategy sheets 2, 1)

The majority of run off from this area will pass through one attenuation basin (Basin 2) before being discharged into the realigned Telegraph Brook.

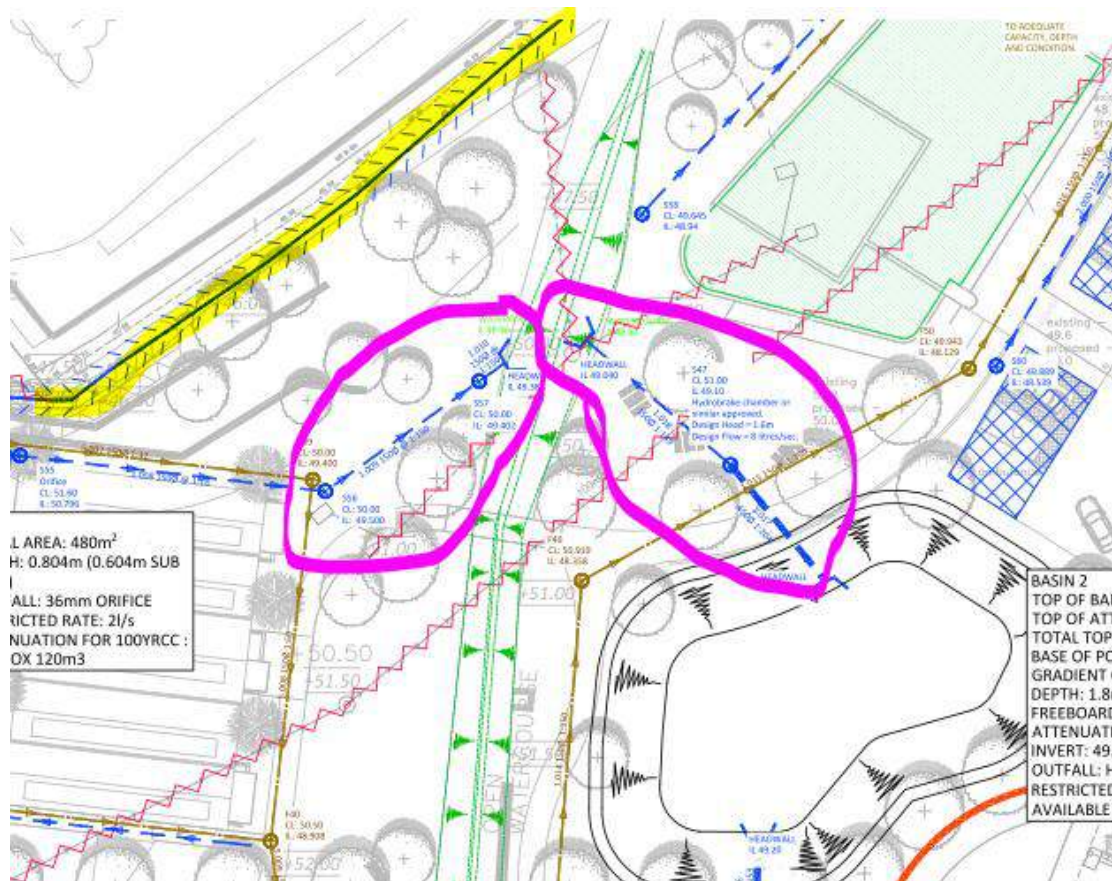
Run off from the remainder of the area will pass through the pervious paving of the car park of a block of flats prior to discharge to the realigned Telegraph Brook.

Provided both the attenuation basin and pervious paving are designed to function effectively to filter all of the receiving surface water runoff, then this satisfies the SuDS manual criteria regarding WQ. However, EBC's Policy DM7 requires a further two forms of treatment of the surface water prior to discharge from the site (three forms in total) which previously has been agreed to be provided through the modification of the existing downstream ponds/ lakes. These modifications must form part of the drainage proposals and must be shown to be capable of acting as effective filtration components.

As source control is limited in the scheme, the design of Basin 2 is crucial. A sediment trap at the inlet end of the basin is required to enable easier maintenance to ensure the effective working of the basin to maintain the WQ of the discharge.

The pervious paving will receive run off from impermeable areas several times its size. Therefore, the levels and flow paths within the pervious paving must be designed to ensure sufficient filtration is provided.

The underground pipe network should be minimised as much as possible. Could these two pipes circled pink below become open surface channels?



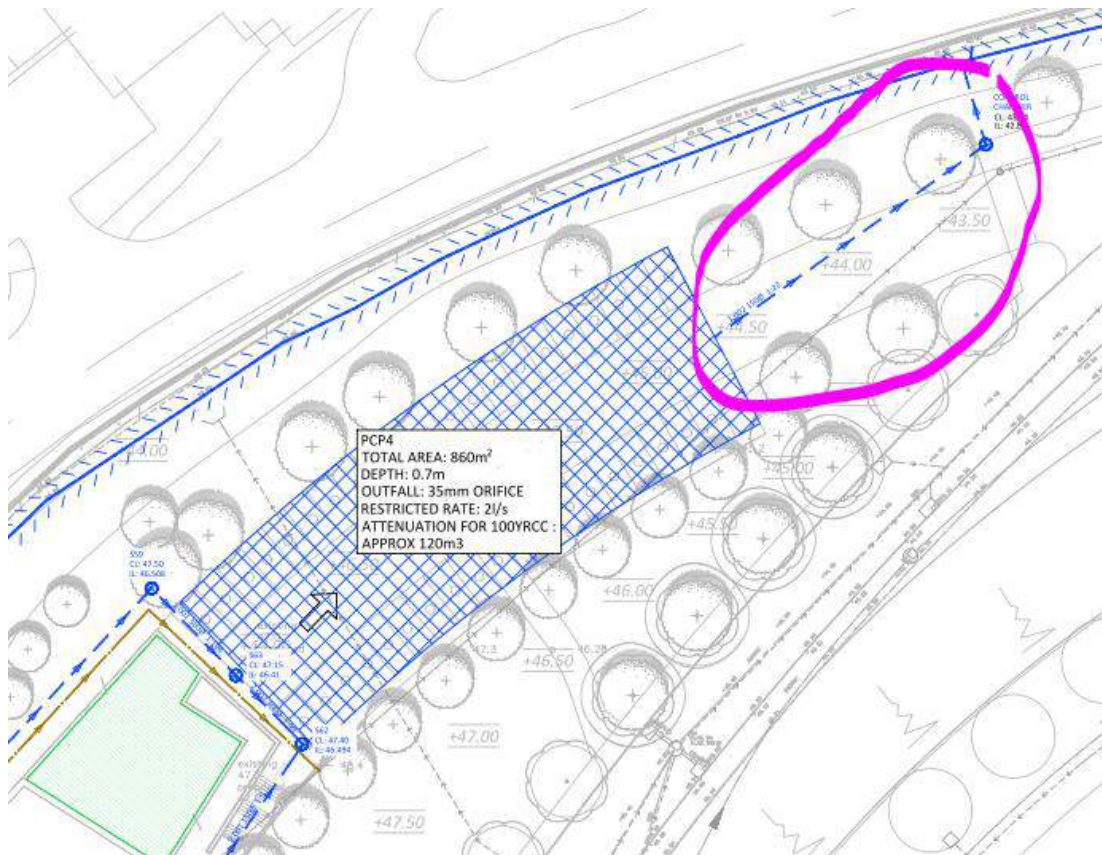
As the upstream culvert of the Telegraph Brook will be realigned, the highlighted stretch of watercourse above will no longer take upstream flows and will only take very localised runoff. It may also act as a backwater dependent on its bed levels and the water levels in the realigned and retained connected stretches of the Telegraph Brook.

Wellbeing centre (drainage strategy sheet 5)

The green roof will provide good interception and run off will enter the adjacent pervious paving of the car park prior to discharge into the Telegraph Brook providing one form of filtration for the car park.

This level of filtration satisfies the SuDS manual criteria regarding WQ. However, EBC's Policy DM7 requires two further forms of treatment of the surface water prior to discharge from the site (three forms in total) which previously has been agreed to be provided through the modification of the existing downstream ponds/ lakes. These modifications must form part of the drainage proposals and must be shown to be capable of acting as effective filtration components.

The underground pipe network should be minimised as much as possible. Is there scope to change the pipe circled pink below to an open surface channel?



CHARACTER AREA 1

New hotel (drainage strategy sheet 6 or 8)

Drainage from the roof of new hotel and pedestrianised areas will pass through pervious paving (with storage tank underneath) prior to discharge to the realigned Telegraph Brook.

This level of filtration satisfies the SuDS manual criteria regarding WQ. However, EBC's Policy DM7 requires two further forms of treatment of the surface water prior to discharge from the site (three forms in total) which previously has been agreed to be provided through the modification of the existing downstream ponds/ lakes. These modifications must form part of the drainage proposals and must be shown to be capable of acting as effective filtration components.

Overflow car park (drainage strategy sheet 7)

Discharge by infiltration is proposed. Turfmesh and cellweb is proposed and therefore much of the surface will be surfaced with natural vegetated material with an infiltrating filter strip at the north/north-east edge. Which hazard and mitigation indices have been attributed to the area? Has site investigation been carried out to establish the groundwater level to ensure there is a sufficient depth of unsaturated substrate (a minimum of 1m)? Does the existing substrate meet the required design specifications for infiltration (soil with a good attenuation potential of at least 3000mm in depth) or is replacement substrate proposed?

CHARACTER AREA 4

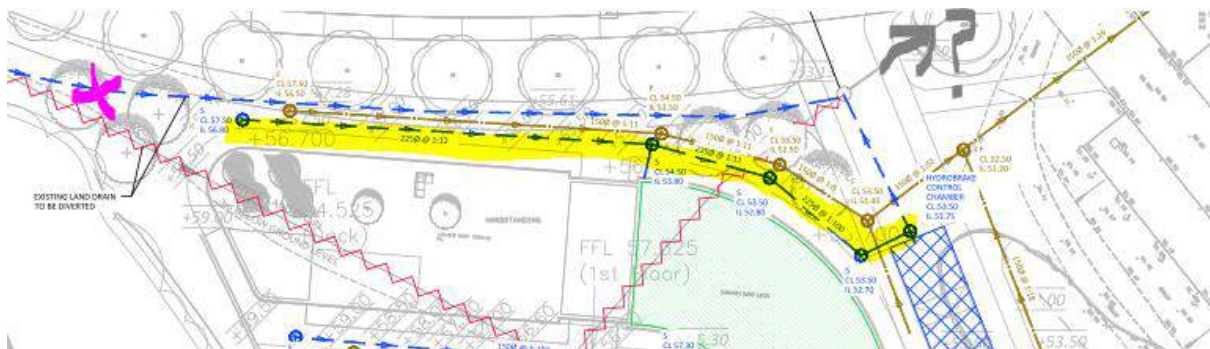
Residential home (drainage strategy sheet 9)

The green roof will provide good interception and the majority of the run-off from the roof and the surrounding area will enter the adjacent pervious paving of the car park prior to discharge into an existing surface water drain which continues in a north-east direction. This provides one form of filtration.

This level of filtration does not satisfy EBC's Policy DM7 which requires two further forms of treatment of the surface water prior to discharge from the site (three forms in total). It is not shown to where the existing surface water drain discharges to but presumably it does not enter the ponds/lakes (proposed to be modified to become effective filtration features) and the surface water entering this drain will be carried from the site with no further treatment. This needs to be corrected to ensure sufficient treatment of the surface water prior to discharge.

The surface water pipe highlighted below appears to be a new surface water drain but does not pass through any form of filtration prior to discharge. This needs to be corrected with sufficient filtration provided.

It is unclear where the surface water pipe marked with a pink x below is from. Is this taking runoff from the new development and what treatment has this runoff undergone prior to discharge?



CHARACTER AREA 3

Canopy (drainage strategy sheet 10)

The proposal appears to only comprise a canopy over existing impermeable hardstanding and run off is proposed to be discharged directly into an existing surface water drain with no surface water treatment. There is no information to where the receiving existing surface water drain discharges. Presumably it does not drain into any onsite features which will provide filtration and therefore there is no treatment of surface water prior to leaving the site.

Although the proposed drainage scenario is effectively the same as the existing, we seek a betterment. The inclusion of a rain garden for example, could provide WQ, biodiversity, amenity and attenuation benefits.

Sarah Boyd

Ecologist