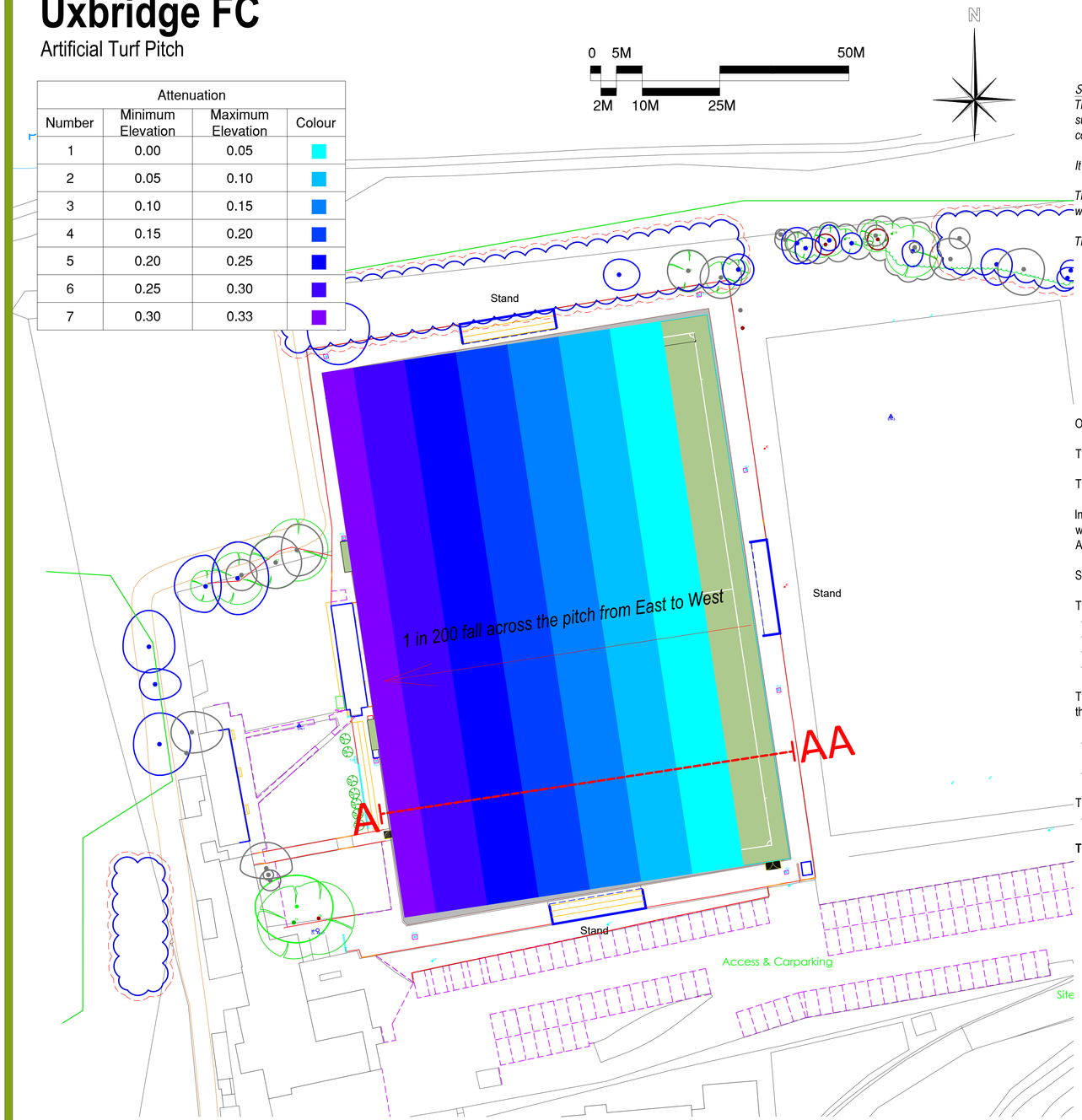
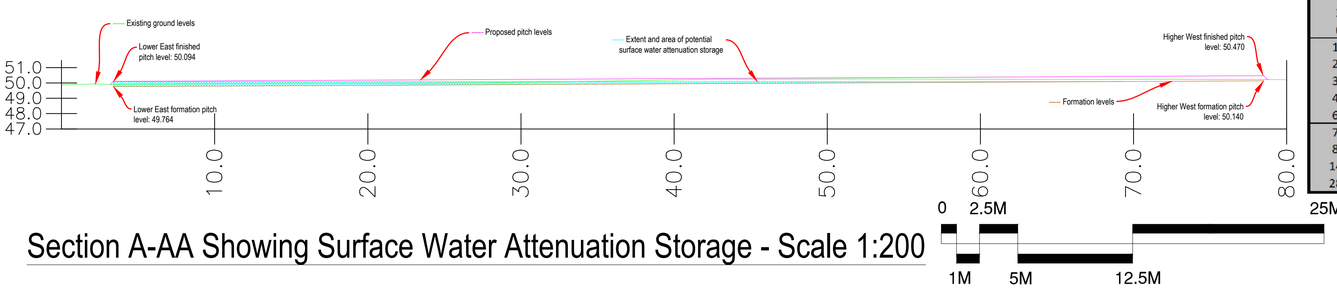
Uxbridge FC

Artificial Turf Pitch

Attenuation			
Number	Minimum Elevation	Maximum Elevation	Colour
1	0.00	0.05	
2	0.05	0.10	
3	0.10	0.15	
4	0.15	0.20	
5	0.20	0.25	
6	0.25	0.30	
7	0.30	0.33	



Attenuation Scheme - Scale 1:500



Section A-AA Showing Surface Water Attenuation Storage - Scale 1:200

Surface Water Drainage Design

The proposed design of the AGP development is for a permeable surface construction. The surface of the synthetic turf area shall be permeable with the underlying stone sub-base acting as an attenuation/storage area for surface water. The stone base will act as an attenuation system to increase attenuation capabilities of the playing field area. This is combined with a perforated drainage system being installed underneath the pitch base to connect to the existing outfall chamber at the south east of the development site.

It is intended that a positive drainage scheme (land drainage); shall be installed beneath the development area comprising UPVC perforated carrier and lateral pipe drains.

The granular pitch substrate (typically consisting of Type 3 unbound (SHW 800 Series) to comply with BSEN 13285) is intended to provide onsite containment and attenuation within the granular sub-base, before surface water enters an outfall.

The designed surface water drainage solution should be based upon the following criteria, to maintain satisfactory system performance:

- Provide adequate functionality over a period of twenty years.
- Ensure that surface water is removed from the surface area at a rate necessary to prevent surface flooding experienced during acute rainstorms and to ensure the facility will not be lost through rain at the highest intensity which may be expected to occur either once every five years or through continuous rainfall of 50mm over a 24 hour period.
- Ensure that surface water is effectively removed from the facility construction to ensure that load bearing capacity of the substrate is not weakened by an increase in moisture content or becomes more susceptible to frost damage.
- Protect the installation from influences of groundwater or surface water from surrounding areas.
- Prevent the risk of uncontrolled flooding elsewhere (to land adjacent to the development).
- Comply with all applicable Sustainable Urban Drainage System (SUDS) requirements with attenuated flows (containment within the granular pitch sub-base) incorporated wherever necessary, without affecting the performance of the pitch.

Only natural surface water is being dealt with. The new development will not increase to the volume of water that the existing site area is currently subjected to.

The area is in a Category 1 flood zone and as such is at a low risk of flooding. Water discharging from the playing field area currently reaches the existing surface water drainage system, without any control or restrictions.

The collector drainage pipe to the synthetic pitch will connect to the existing surface water chamber within the site with a restricted outfall rate.

In terms of the proposed restricted outfall rate, we have proposed to use a variable restricted outfall as the limited discharge rate. Calculations have been based on a 1 in 1 year, 1 in 30 year and 1 in 100 year storm event with a 40% allowance for climate change. The largest attenuation volume is for the 1 in 100 year event + 40% for climate change which is the calculations shown below (for the other attenuation calculations please see Appendix B - Drainage Strategy).

Surface water discharge rate will be restricted and the installation of the new drainage system to this area of the site will provide a more careful, managed control of discharge than the current arrangement.

The foundations of the new synthetic turf area includes:
- 250mm deep layer of type 3 stone
- 40mm macadam
- 20mm shockpad
- 20mm infill of sand and rubber on the carpet

The minimum 330mm deep aggregate base construction offers a wedge for surface water attenuation prior to filling and flooding the pitch surface or surrounding grassed areas. The available volume of the wedge is created through the following calculations:

- The pitch layer constructed at a 1 in 200 gradient offers a volume and capacity of 1155.4m3
  - Based on a voidage space of 37% this offers **427m3** of water attenuation.
- The drainage system, shown in drawing 'SSL2475 - Proposed AGP Drainage Layout', can also attenuate an additional **70m3**

The surface water attenuation calculations as per the table below shows the following;
- 1 in 100 year storm event + 40% allowance for climate change at run off restricted to 3.88 l/s - would require **417m3** of attenuation

The attenuation provided by the pitch design will comfortably cater for a 1 in 100 storm event +40% without flooding either the pitch surface or surrounding areas

Minimum Storage Required: 417 m^3 **incl cc allowance**

FACTOR	VALUE	SOURCE
Return Period (yrs):	100	Environment Agency, Water Authority, etc.
Limiting Discharge (l/s):	3.88	Environment Agency, Water Authority, etc.
Contributing Area (ha):	0.7698	Site plans
Impervious, PIMP (%):	100	Site plans
M5-60min (mm):	20	Volume 3 maps and site location
SAAR (mm/yr):	620	Volume 3 maps and site location
Ratio, r:	0.4	Volume 3 maps and site location
Soil Type:	2	Volume 3 maps and site location
SOIL:	0.3	Soil Type and Volume 1, Section 7.4
UCWI:	52	SAAR and Volume 1, Figure 9.7
Calculated PR	73.79	
Percentage Runoff =	73.79	

FACTOR	VALUE
Additional Inflow (l/s):	0
Calculate/Specify PR:	Calculate
Specify PR:	100
Climate Change Allowance	40

Duration, D (min)	M5-60 (mm)	Z1 for r=0.40	M5-D (mm)	Z2 for M100	M100-D (mm)	incl climate change	Area C (ha)	PR (%)	Runoff (m3)	Add. Runoff (m3)	Total Runoff (m3)	Limiting Discharge (m3/min)	Limiting Runoff (m3)	Storage Required (m3)
5	20	0.38	7.6	1.86	14.2	19.8	0.77	74	112.5	0.0	112.5	0.23	1.2	111.4
10	20	0.54	10.8	1.93	20.8	29.1	0.77	74	165.4	0.0	165.4	0.23	2.3	163.1
15	20	0.63	12.6	1.96	24.7	34.5	0.77	74	196.2	0.0	196.2	0.23	3.5	192.7
30	20	0.80	16.0	2.00	32.0	44.8	0.77	74	254.2	0.0	254.2	0.23	7.0	247.2
60	20	1.00	20.0	2.03	40.6	56.8	0.77	74	322.9	0.0	322.9	0.23	14.0	308.9
120	20	1.20	24.0	2.01	48.3	67.7	0.77	74	384.4	0.0	384.4	0.23	27.9	356.4
240	20	1.46	29.2	1.98	57.8	80.9	0.77	74	459.3	0.0	459.3	0.23	55.9	403.4
360	20	1.60	32.0	1.95	62.5	87.5	0.77	74	497.2	0.0	497.2	0.23	83.8	413.4
480	20	1.70	34.0	1.94	65.9	92.2	0.77	74	524.0	0.0	524.0	0.23	111.7	412.2
600	20	1.83	36.6	1.91	70.1	98.1	0.77	74	557.1	0.0	557.1	0.23	139.7	417.4
720	20	1.85	37.0	1.91	70.8	99.1	0.77	74	563.1	0.0	563.1	0.23	167.6	395.5
840	20	1.90	38.0	1.91	72.4	101.4	0.77	74	575.9	0.0	575.9	0.23	195.6	380.4
1440	20	2.28	45.6	1.84	84.0	117.6	0.77	74	667.9	0.0	667.9	0.23	335.2	332.7
2880	20	2.70	54.0	1.78	96.3	134.8	0.77	74	765.5	0.0	765.5	0.23	670.5	95.1

Attenuation Calculations

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REV	DESCRIPTION			DATE
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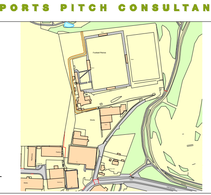

AUTHOR: ME

TITLE
Uxbridge FC
Artificial Turf Pitch
Proposed AGP Drainage Strategy

PROJECT	SCALE	SIZE
SSL2475	Varies	A1

DRAWING No	REVISION
09	00