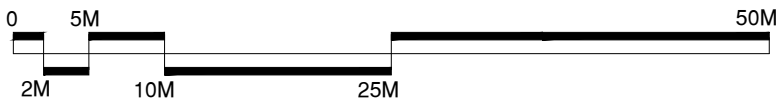


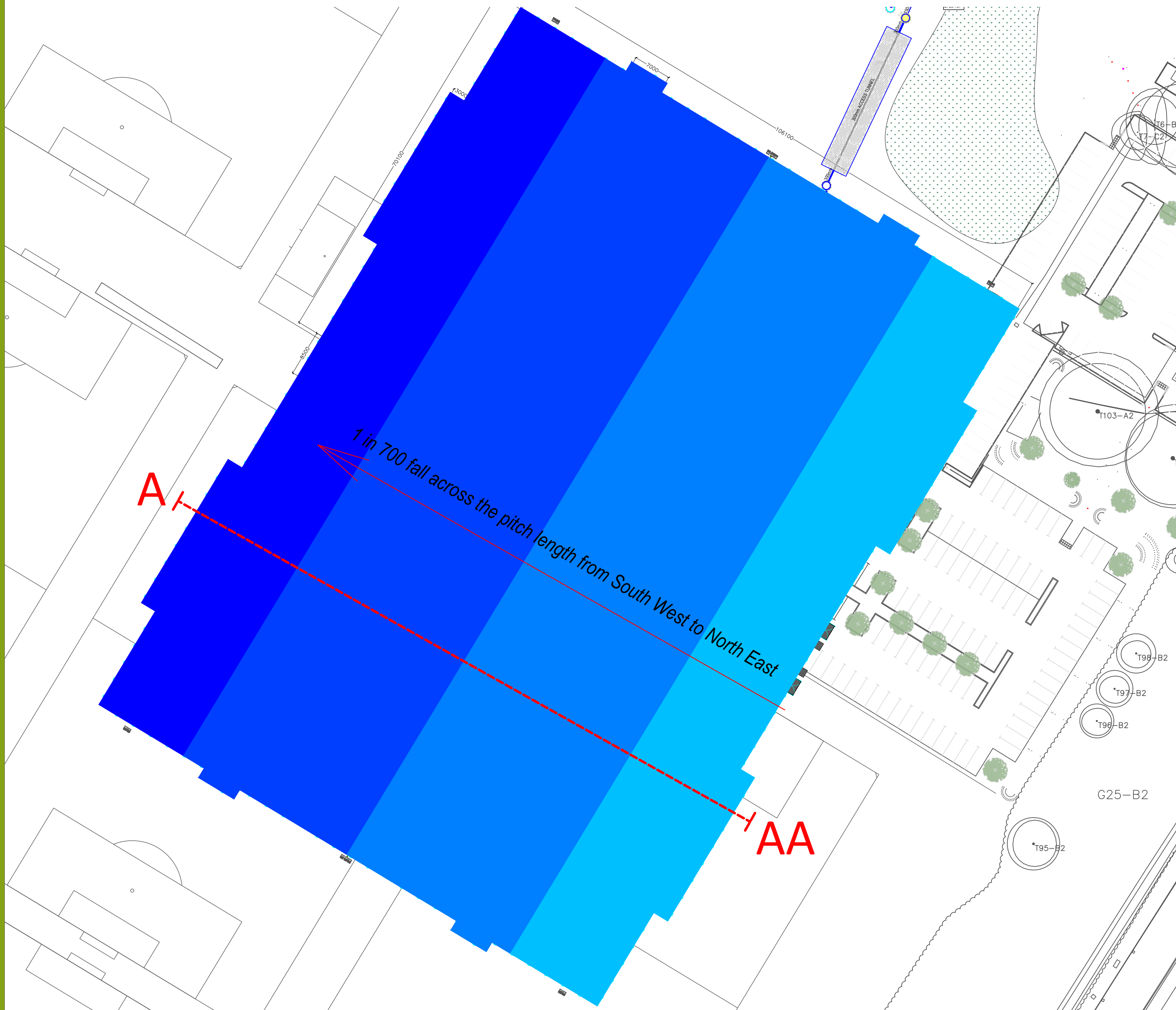
Hough End Leisure Centre

Artificial Turf Pitch



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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 impermeable drainage blanket being installed underneath the pitch base to connect to the drainage system leading to the outfall chamber at the north of the development site.

It is intended that an impermeable drainage blanket is laid to the formation of the pitch footprint and surrounding features with a positive drainage scheme (pipe drainage); installed to the perimeter of the pitch area comprising UPVC perforated carrier drains. With the below layers develop an overall attenuation space for the drainage requirements:

-
- 3G synthetic surfacing with 40mm sand stabilisation and performance infill
 - Asphalt Surfacing
 - Type 3 Stone Base
 - Impermeable Drainage Blanket
 - Underlying Subsoil

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 pitches will connect into an existing surface water chamber through a hydrobreak within the site with a restricted outfall rate.

In terms of the proposed restricted outfall rate, where one restricted discharge rate is proposed for all events, the Qbar (average annual) greenfield runoff rate should be used, or 5.0 litres per second (l/s), whichever is the lesser. The QBAR for this site is 3.95 l/s. We have, therefore, used 3.95l/s as the suggested limited discharge rate. Calculations have been based on a 1 in 100 year storm event with a 40% allowance for climate change.

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 construction incorporate:

- 150mm deep layer of type 3 stone
- 40mm macadam porous macadam layer
- 40mm sand and infill

The construction materials has a total void space of 37%

The 230mm 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 700 gradient offers a volume and capacity of 2453m³
- Based on a voidage space of 37% this offers **923m³** of water attenuation.
- The pozidrain blanket (shown in "CLS015 01 - Proposed AGP Drainage Layout REV01") provides an void volume of **115m³**

Therefore, combining the pitch and drainage void space, the drainage system can attenuate a total of **1038m³**

The surface water attenuation calculations as per the table below shows the following:

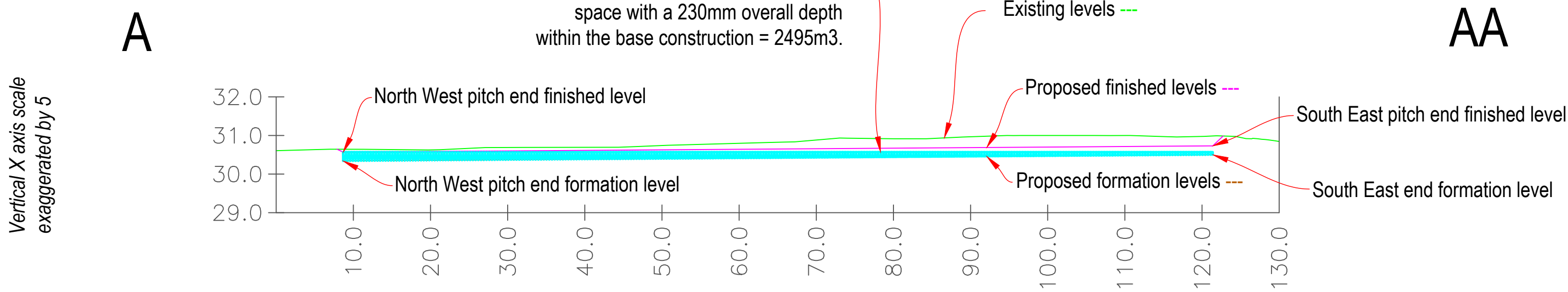
- 1 in 100 year storm event + 40% allowance for climate change at run off restricted to 3.95 l/s - would require **1038m³** of attenuation

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

Minimum Storage Required:		1038 m ³	incl cc allowance											
FACTOR	VALUE	SOURCE	FACTOR	VALUE										
Return Period (yrs):	100	Environment Agency, Water Authority, etc.	Additional Inflow (l/s):	0										
Limiting Discharge (l/s):	3.95	Environment Agency, Water Authority, etc.	Calculate/Specify PR:	Calculate										
Contributing Area (ha):	1.7381	Site plans	Specify PR:	100										
Impervious, PIMP (%):	100	Site plans	Climate Change Allowance	40										
M5-60min (mm):	17	Volume 3 maps and site location												
SAAR (mm/yr):	846	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:	94	SAAR and Volume 1, Figure 9.7												
Calculated PR	77.06													
Percentage Runoff =	77.06													
Duration, D (min)	M5-60 (mm)	Z1 for r=0.40 (mm)	M5-D (mm)	Z2 for M100 (mm)	M100-D (mm)	Incl climate change (ha)	Area C (ha)	PR (%)	Runoff (m3)	Add. Runoff (m3)	Total Runoff (m3)	Limiting Discharge (m3/min)	Limiting Runoff (m3)	Storage Required (m3)
5	17	0.38	6.5	1.81	11.7	16.4	1.74	77	219.7	0.0	219.7	0.24	1.2	218.6
10	17	0.54	9.2	1.89	17.3	24.2	1.74	77	324.7	0.0	324.7	0.24	2.4	322.3
15	17	0.63	10.7	1.93	20.6	28.9	1.74	77	386.8	0.0	386.8	0.24	3.6	383.2
30	17	0.80	13.6	1.97	26.8	37.6	1.74	77	503.4	0.0	503.4	0.24	7.1	496.3
60	17	1.00	17.0	2.01	34.1	47.7	1.74	77	639.5	0.0	639.5	0.24	14.2	625.3
120	17	1.20	20.4	2.03	41.4	58.0	1.74	77	776.6	0.0	776.6	0.24	28.4	748.1
240	17	1.46	24.8	2.01	49.9	69.8	1.74	77	935.5	0.0	935.5	0.24	56.9	878.6
360	17	1.60	27.2	1.99	54.2	75.9	1.74	77	1017.0	0.0	1017.0	0.24	85.3	931.7
480	17	1.70	28.9	1.98	57.2	80.0	1.74	77	1071.9	0.0	1071.9	0.24	113.8	958.2
600	17	1.83	31.1	1.96	61.0	85.5	1.74	77	1144.6	0.0	1144.6	0.24	142.2	1002.4
720	17	1.85	31.5	1.96	61.7	86.4	1.74	77	1157.1	0.0	1157.1	0.24	170.6	986.4
840	17	1.90	32.3	1.95	63.1	88.4	1.74	77	1183.5	0.0	1183.5	0.24	199.1	984.4
1440	17	2.28	38.8	1.90	73.6	103.0	1.74	77	1379.5	0.0	1379.5	0.24	341.3	1038.2
2880	17	2.70	45.9	1.84	84.5	118.4	1.74	77	1585.4	0.0	1585.4	0.24	682.6	902.9

1 in 100 year storm event + 40% climate change Drainage Calcs

ATP Drainage Scheme Scale:1 in 500



Section A-AA Scale:1 in 500

1 in 700 fall across the pitch length from South West to North East

03	PLANNING ISSUE - Minor Amendments	ME	WB	07/09/22
02	PLANNING ISSUE	ME	WB	30/08/22
01	PLANNING ISSUE	ME	WB	22/07/22
00	PLANNING ISSUE	ME	WB	28/04/22
REV	DESCRIPTION	REV	CK	DATE

Surfacing Standards Limited
SPORTS PITCH CONSULTANTS

AUTHOR
ME

TITLE
Hough End Leisure Centre
Artificial Turf Pitch
Proposed AGP Drainage Strategy

PROJECT	SCALE	SIZE
LANO/CLS 015	1:500	A1
DRAWING No	REVISION	
02	03	