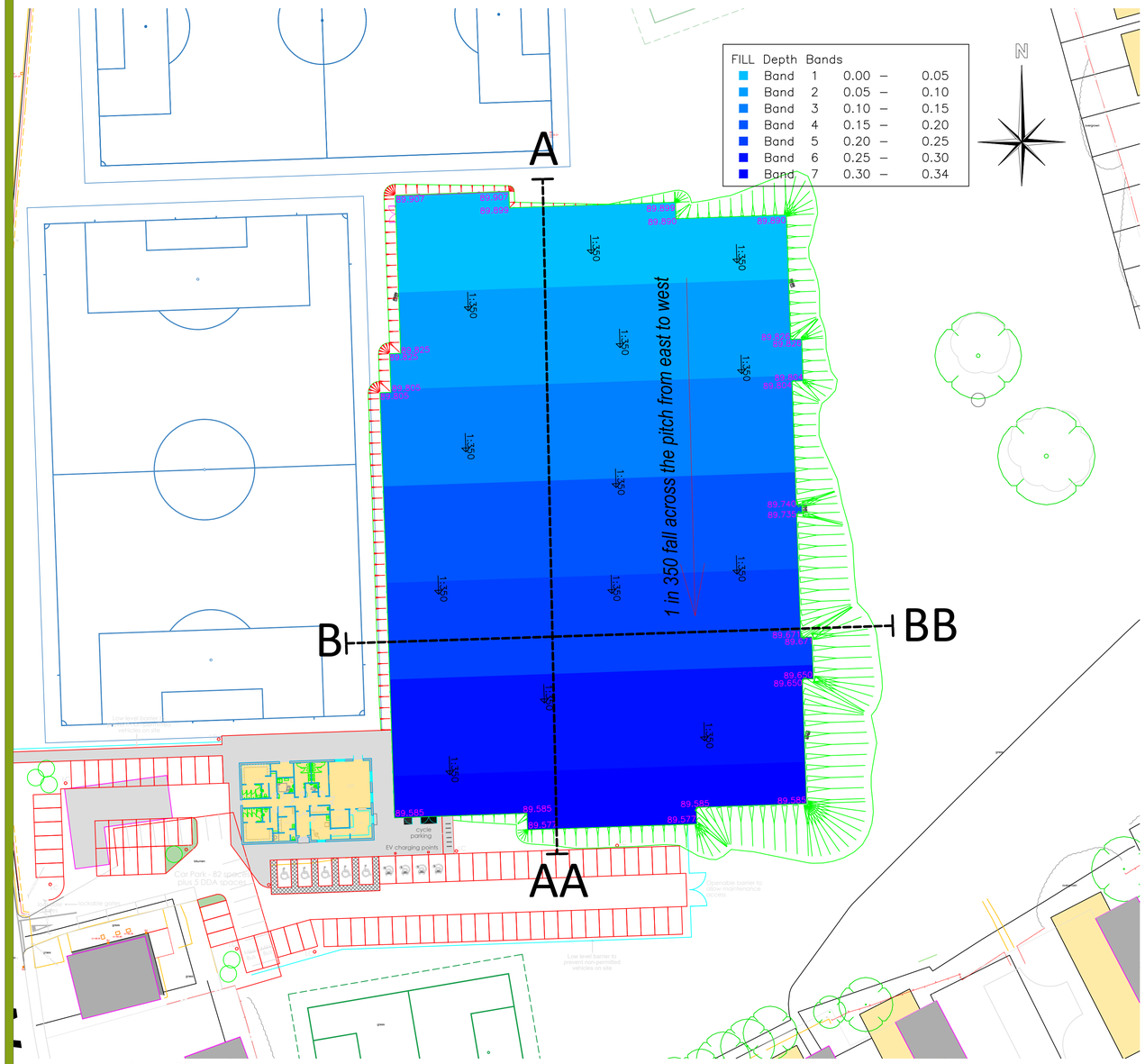
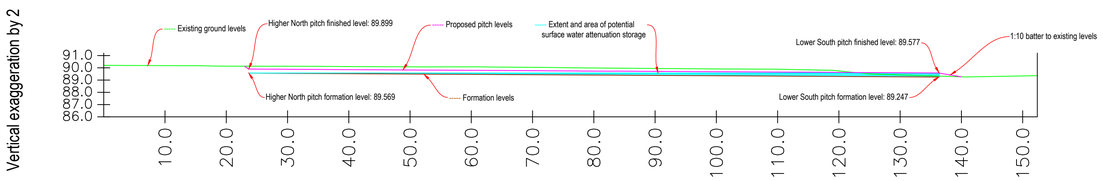
Redbank Playing Fields

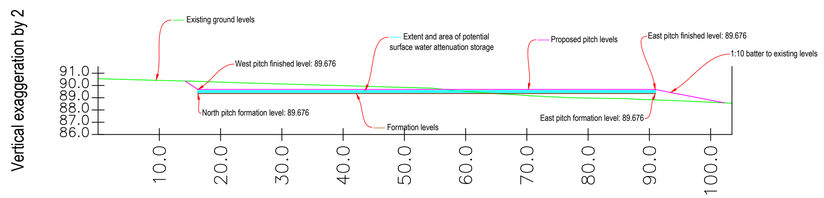
Artificial Grass Pitch



Attenuation Scheme



Section A-AA Showing Surface Water Attenuation Storage



Section B-BB Showing Surface Water Attenuation Storage

0 5M 50M
2M 10M 25M

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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 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.

The proposed restricted outfall rate is 2 l/s and calculations have been based on a 1 in 100 year storm event with a 40% allowance for climate change. The surface water attenuation calculations as per the table below show the following:

- 1 in 100 year storm event + 40% allowance for climate change at run off restricted to 6.32 l/s - would require **435m3** of attenuation

The foundations of the new synthetic turf area (shown in drawing 'LANO-CLS-016-07 - Proposed AGP Drainage Layout') includes:

- 250mm deep layer of type 3 stone
- 40mm macadam
- 40mm infill of sand and rubber on the carpet

The minimum 330mm deep aggregate foundation offers a void space of 37% in which to attenuate surface water, prior to filling and flooding the pitch surface or surrounding grassed areas. The available volume of the attenuation is created through the following calculations:

- The pitch layer constructed at a 1 in 350 gradient offers a volume and capacity of 1378m3
  - Based on a voidage space of 37% this offers **509m3** of water attenuation.
- The drainage system, shown in drawing 'CLS-LANO-016-07 - Proposed AGP Drainage Layout', can also attenuate an additional **70m3**

Therefore, the attenuation provided by the pitch design will attenuate 579m3, catering for a 1 in 100 storm event +40% (435m3) without flooding either the pitch surface or surrounding areas

Minimum Storage Required: **435 m^3** **incl cc allowance**

FACTOR	VALUE	SOURCE
Return Period (yrs):	100	Environment Agency, Water Authority, etc.
Limiting Discharge (l/s):	6.32	Environment Agency, Water Authority, etc.
Contributing Area (ha):	0.8204	Site plans
Impervious, PIMP (%):	100	Site plans
M5-60min (mm):	17	Volume 3 maps and site location
SAAR (mm/yr):	1043	Volume 3 maps and site location
Ratio, r:	0.3	Volume 3 maps and site location
Soil Type:	4	Volume 3 maps and site location
SOIL:	0.45	Soil Type and Volume 1, Section 7.4
UCWI:	116	SAAR and Volume 1, Figure 9.7
Calculated PR	82.47	
Percentage Runoff =	82.47	

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=0.30	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	17	0.34	5.8	1.81	10.5	14.7	0.82	82	99.3	0.0	99.3	0.38	1.9	97.4
10	17	0.50	8.5	1.89	16.0	22.4	0.82	82	151.9	0.0	151.9	0.38	3.8	148.1
15	17	0.60	10.2	1.91	19.5	27.3	0.82	82	184.5	0.0	184.5	0.38	5.7	178.9
30	17	0.78	13.3	1.96	26.0	36.3	0.82	82	245.9	0.0	245.9	0.38	11.4	234.6
60	17	1.00	17.0	2.01	34.1	47.7	0.82	82	323.0	0.0	323.0	0.38	22.8	300.3
120	17	1.29	21.9	2.02	44.3	62.1	0.82	82	420.0	0.0	420.0	0.38	45.5	374.5
240	17	1.60	27.2	1.99	54.2	75.9	0.82	82	513.8	0.0	513.8	0.38	91.0	422.8
360	17	1.79	30.4	1.97	59.9	83.9	0.82	82	567.9	0.0	567.9	0.38	136.5	431.3
480	17	1.97	33.5	1.95	65.2	91.2	0.82	82	617.3	0.0	617.3	0.38	182.0	435.3
600	17	2.15	36.6	1.91	70.0	97.9	0.82	82	662.7	0.0	662.7	0.38	227.5	435.1
720	17	2.19	37.2	1.91	71.3	99.8	0.82	82	675.0	0.0	675.0	0.38	273.0	402.0
840	17	2.24	38.1	1.91	72.6	101.6	0.82	82	687.5	0.0	687.5	0.38	318.5	369.0
1440	17	2.81	47.8	1.83	87.2	122.1	0.82	82	826.3	0.0	826.3	0.38	546.0	280.2
2880	17	3.50	59.5	1.74	103.6	145.1	0.82	82	981.8	0.0	981.8	0.38	1092.1	-110.3

REV	DESCRIPTION	REV	CK	DATE
00	PLANNING ISSUE	ME	WB	21.06.22

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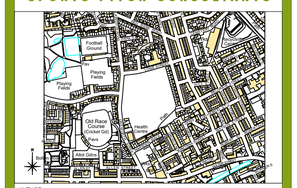

AUTHOR: ME

TITLE: Redbank Playing Fields
Artificial Grass Pitch
Proposed AGP Drainage Strategy

PROJECT	SCALE	SIZE
CLS017	1:500	A1

DRAWING No	REVISION
08	00