

Russell Martin Foundation

Creation of an Artificial Grass Pitch



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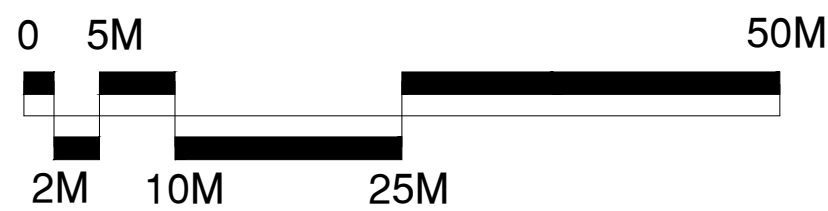
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Attenuation			
Number	Minimum Elevation	Maximum Elevation	Colour
1	0.10	0.15	
2	0.15	0.20	
3	0.20	0.25	
4	0.25	0.28	

Motorcycle Training

1 in 500 fall across the pitch from East to West

AGP Attenuation Scheme - Scale 1:500



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 southeast 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 near surface soils are not suitable for natural infiltration through the pitch sub-base due to its impermeability (clay). The deeper infiltration through the underlying chalk is assumed to be low density and therefore has a potential for chalk dissolution meaning any soakaway should be located more than 10m from any structures. Furthermore, the low infiltration rate of 6.4x10⁻⁶ would require a soakaway more than 42 x1 x 2m to sufficiently soakaway into the ground with the half drain down time at over 166 hours. Therefore, soakaways are not viable for the proposed artificial grass pitch.

The area is in a Category 1 flood zone and as such is at a low risk of flooding. The collector drainage pipe to the synthetic pitch will connect to the existing surface water chamber within the site with a restricted outfall rate.

We have used 2.0 l/s as the restricted outfall rate. Calculations have been based on a 1 in 100 year storm event with a 45% 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 includes:

- 200mm deep layer of type 3 stone
- 40mm macadam
- 10mm shockpad
- 25mm infill of sand and rubber on the carpet

The minimum 275mm 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 500 gradient offers a volume and capacity of 1815m³
 - Based on a voidage space of 37% this offers **671m³** of water attenuation.
- The drainage system, shown in drawing 'LANO-CLS042 01 - 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 + 45% allowance for climate change at run off restricted to 2.0 l/s - would require **577m³** of attenuation

The attenuation provided by the pitch design (741m³) will comfortably cater for a 1 in 100 storm event +40% (577m³) without flooding either the pitch surface or surrounding areas

Minimum Storage Required: **577 m³** Incl cc allowance

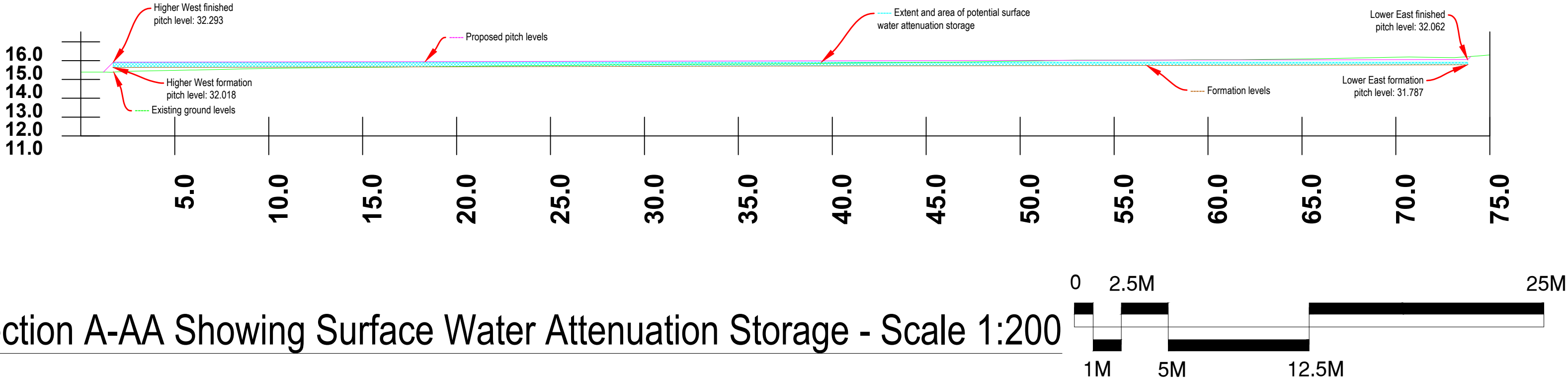
FACTOR	VALUE	SOURCE
Return Period (yrs):	100	Environment Agency, Water Authority, etc.
Limiting Discharge (l/s):	2	Environment Agency, Water Authority, etc.
Contributing Area (ha):	0.7502	Site plans
Impervious, PIMP (%):	100	Site plans
M5-60min (mm):	20	Volume 3 maps and site location
SAAR (mm/yr):	742	Volume 3 maps and site location
Ratio, r:	0.3	Volume 3 maps and site location
Soil Type:	1	Volume 3 maps and site location
SOIL:	0.15	Soil Type and Volume 1, Section 7.4
UCWI:	79	SAAR and Volume 1, Figure 9.7
Calculated PR	72.15	
Percentage Runoff =	72.15	

FACTOR	VALUE
Additional Inflow (l/s):	0
Calculate/Specify PR:	Calculate
Specify PR:	100

Climate Change Allowance **45**

M-D values taken from FEH for storm durations of 15 minutes or greater

Duration, D (min)	M5-60 (mm)	Z1 for r=0.30	M5-D (mm)	Z2 for M100	M100-D (mm)	Incl climate change (mm)	Area C (ha)	PR (%)	Runoff (m ³)	Add. Runoff (m ³)	Total Runoff (m ³)	Limiting Discharge (m ³ /min)	Limiting Runoff (m ³)	Storage Required (m ³)
5	20	0.34	6.8	1.84	12.5	18.1	0.75	72	98.1	0.0	98.1	0.12	0.6	97.5
10	20	0.50	10.0	1.91	19.1	27.7	0.75	72	149.9	0.0	149.9	0.12	1.2	148.7
15					26.0	37.6	0.75	72	203.7	0.0	203.7	0.12	1.8	201.9
30					34.8	50.4	0.75	72	272.9	0.0	272.9	0.12	3.6	269.3
60					44.5	64.6	0.75	72	349.5	0.0	349.5	0.12	7.2	342.3
120					53.8	78.0	0.75	72	422.2	0.0	422.2	0.12	14.4	407.8
240					64.3	93.2	0.75	72	504.7	0.0	504.7	0.12	28.8	475.9
360					71.0	102.9	0.75	72	557.0	0.0	557.0	0.12	43.2	513.8
480					75.9	110.1	0.75	72	596.0	0.0	596.0	0.12	57.6	538.4
600					79.9	115.8	0.75	72	626.8	0.0	626.8	0.12	72.0	554.8
720					83.1	120.5	0.75	72	652.4	0.0	652.4	0.12	86.4	566.0
840					85.9	124.5	0.75	72	674.0	0.0	674.0	0.12	100.8	573.2
1440					95.6	138.6	0.75	72	750.1	0.0	750.1	0.12	172.8	577.3
2160					103.4	149.9	0.75	72	811.3	0.0	811.3	0.12	259.2	552.1
2880					109.4	158.7	0.75	72	858.7	0.0	858.7	0.12	345.6	513.1



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

Surface Water Attenuation Calculations

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PLANNING ISSUE

ME

WB

12.04.24

REV

DESCRIPTION

REV

CK

DATE

Surfacing Standards Limited
SPORTS PITCH CONSULTANTS

AUTHOR
ME

TITLE
Russell Martin Foundation
Creation of an Artificial Grass Pitch
Proposed AGP Drainage Strategy

PROJECT
LANO-CLS042

SCALE
Varies

SIZE
A1

DRAWING No
02

REVISION
00